

MINISTRY OF ENERGY OF THE RUSSIAN FEDERATION

# **ENERGY STRATEGY OF RUSSIA**

FOR THE PERIOD UP TO 2030

APPROVED  
by Decree N° 1715-r of the Government  
of the Russian Federation  
dated 13 November 2009

Moscow 2010

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Energy Strategy of Russia for the period up to 2030 (ES-2030) approved by decree N° 1715-р of the Government of the Russian Federation dated 13 November 2009.

The Strategy provides increase in the time horizon for strategic planning of the Russian energy sector until 2030 in accordance with new objectives and priorities of the country. The Strategy includes the following:

**the current results of the Energy Strategy of Russia for the period up to 2020 realization and goods and objectives of the Strategy;**

- the main trends and forecasts of the country socio-economic development, and of the interaction between the economy and energy sector;
- the prospects of demand for Russia's energy;
- the main provisions of the state energy policy and its most important elements;
- the development prospects of the Russian fuel and energy complex;
- the expected results and implementation system of the Strategy.

The Strategy focuses on the principles, strategic guidelines, the main components and mechanisms of the state energy policy implementation.

The quantitative parameters of the economy and energy development are subject to verification during the implementation of the measures specified by the Strategy.

The publication is intended for energy companies, research, consulting and educational organizations, state legislative and executive authorities, a wide range of experts in the field of energy and the economy of the Russian Federation.

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## EDITORS

Formation of long-term energy policy began with the first steps of the new Russia as an independent state. Energy Policy Concept of Russia in the New Economic Condition was approved by the resolution (N° 26 of September 10, 1992) of the Government of the Russian Federation. In May 1995 "Major directions of Energy Strategy of Russia for the period up to 2010" were approved by the edict (N° 472 of May 7, 1995) of the President of Russia and in the same year "Major provisions of the Energy Strategy of Russia for the period up to 2010" were adopted by the resolution (N° 1006 of October 13, 1995) of the Government of the Russian Federation.

Realizing the necessity of regular monitoring of the Strategy implementation and its periodic correction the Ministry of Fuel and Energy in 1998 decided to establish a new structure State Institute of Energy Strategy (IES) as a coordinator for complex analysis and long-term forecast of the fuel and energy complex development in connection with the trends of the socio-economic development of the country.

Yet in 2000, the Government of the RF (by the resolution N° 39 of November 23, 2000) approved new version of "Major provisions of Energy Strategy of Russia for the period up to 2020" that was prepared by the interdepartmental working group under IES and by the Council of Experts under the Ministry of Fuel and Energy. And in 2003 the Energy Strategy of Russia for the period up to 2020 was approved.

During the implementation of the Energy Strategy of Russia up to 2020 it was confirmed the following that its most important provisions are adequate to the real process of development in the energy sector of the country even in face of abrupt changes of external and internal factors that determine the basic parameters of operation of the fuel and energy complex of Russia. At the same time the necessary changes are supposed to be implemented in that strategy at least once in five years.

This work began in advance. In accordance with the Decree of the Ministry of Industry and Energy dated 21.12.2006, N° 413 "On a refinement of the Energy Strategy of Russia for the period up to 2020 and its prolongation up to 2030" 13 interdepartmental working groups were

founded. They were composed of leading Russian scientists and specialists.

The updated list of working groups includes:

- Evaluation of promising relationship in the system “economy – energy” and development of recommendations on priorities and target guidelines for the development of domestic energy markets (the head – G.O. Kuranov, Director of the Department of Macroeconomic Forecasting, the Ministry of Economic Development);
- Assessment of global processes in the energy sector, the prospects for external demand for Russian energy supplies and development of recommendations on regional and industry guidelines of long-term national energy policy (the head – L.M. Grigoriev, the President of the “Institute of Energy and Finance”);
- Formation and an forecasted evaluation of development scenarios for Russia’s energy sector, long-term energy balances and the formulation of recommendations on regional and industry guidelines of long-term national energy policy (the head – A.A. Makarov, Director of the Institute of Energy Research, RAS, Academician of RAS);
- Analysis of problems, objectives and mechanisms of state regulation in the energy sector and the formation of a “road map” of important measures of the long-term national energy policy (the head – V.V. Bushuev, general director of the Institute of Energy Strategy, professor);
- Development of a consolidated plan “road map” of innovative development of the fuel and energy sector and the transition to a clean energy future (the head – V.E. Fortov, director of the Institute of High Energy Densities of RAS, academician of RAS);
- Determination of long-term strategic priorities and major policy measures to develop raw material base of Russia's energy sector (the head – D.G. Khramov, director of the Department of Public Policy and regulation in the field of geology and mineral resources of the Ministry of Nature);
- Determination of long-term strategic priorities and major policy development activities of the oil complex (the head – A.E. Kontorovich, scientific director of the Institute of Petroleum Geology and Geophysics SB RAS, Academician of RAS);
- Determination of long-term strategic priorities and major policy measures to develop the gas industry (the head –

A.N. Dmitrievsky, director of the Institute of Oil and Gas Problems RAS, Academician of RAS);

- Determination of long-term strategic priorities and major policy measures to develop the coal industry (head – A.B. Kovalchuk, general director of the Institute of Coal Market Research, Professor);
- Definition of long-term strategic priorities and major policy measures to develop the electric energy industry (the head – E.P. Volkov, director of the Krjijanovsky's ERDI, Academician of RAS);
- Determination of long-term strategic priorities and major policy measures to develop heat supply (the head – V.A. Stennikov, deputy director of the Institute of Energy Systems SB RAS);
- Development of proposals for an economically viable management of the capacity of Russian industries for the development of the fuel and energy complex and potential for the development of industries (the head – V.V. Semenov, director of its basic Industries Department at the Ministry of Industry and Trade);
- Editorial Group (the head – Deputy Minister of Energy A.B. Yanovsky).

In 2007–2008 working groups in close collaboration with the Institute of Energy Strategy prepared concepts and proposals for individual sections of a project of the Energy Strategy of Russia for the period up to 2030.

The project of the Energy Strategy of Russia up to 2030 was prepared on the basis of these materials by specialists of the drafting group (U.L. Baron, V.V. Bushuev, A.I. Gromov), under the overall supervision of the Deputy Energy Minister A.B. Yanovsky in 2008.

Throughout 2008 the Ministry of Energy conducted hearings and public debate on the project of the document on the grounds of the State Duma and Federation Council, the Chamber of Commerce and the Russian Union of Industrialists and Entrepreneurs, the Institute of Energy Strategy and other developers of ES-2030 with the assistance of the wide range of professionals and public figures.

In 2009, under the leadership of Minister of Energy S.I. Shmatko the project of the Energy Strategy for the period up to 2030 was finalized with due account of the influence of the global economic crisis in late

2008. The procedure of approval of the project with interested federal executive authorities and organizations was reflected.

On August 27 the project of the Energy Strategy of Russia for the period up to 2030 was approved the Government of the Russian Federation (Minutes N° 27 of 27.08.2009), and on November 13, 2009, the Energy Strategy of Russia for the period up to 2030 was approved by Decree N° 1715-r of the Government of the Russian Federation.

The Government's determination to adopt a basic strategic document for the development of the key sector of Russian economy in crisis and the high uncertainty of the external economic environment shows that the country is changing not only the attitude but also the approach to strategic planning.

First, the emerging philosophy is that **strategy and outlook – are not the same**. In fact, the strategy sets a course of long-term development of the energy sector, independent from the wide-field predictions of long-term changes in external and internal conditions. The Strategy does not come from the adaptation of the Russian energy sector to external conditions, but from the target model of its future development, that is based on a stable (invariant) system of phased target indicators of development.

Secondly, the experience of the Energy Strategy of Russia for the period up to 2020 showed that during the period of its implementation and crucial changes in the external parameters of the Russian energy sector world oil price has rose from US \$27 to 94/barrel, that's more than 4 times higher then the forecasted indicators, the parameters of the energy sector changed only by 5–7%.

Moreover, the crisis of 2008–2009 put back most of the parameters of the energy sector to the estimations of Energy Strategy of Russia for the period up to 2020, that indicated high stability and persistence of production parameters on a sufficiently large time range of fuel and energy complex with respect to the volatility of external environment, as well as sufficient justification of forecasts of the energy sector development, carried out in the document.

Thus, **the Russian energy sector holds a sufficiently high potential for internal resistance and inertia, which enable to form a strategic**

**course of its development on the basis of target guidelines, rather than on constantly changing forecasts of external and internal conditions.**

In this regard, it should be emphasized that the formation of a new Energy Strategy — is a requirement of time and a necessary condition for strategic planning in energy, suggesting the prolongation of the Energy Strategy every five years to maximize the incorporation of the new trends in the economy and energy, new technologies and challenges of the development of the energy sector of the country.

Should also be said a few words about the status of the Strategy as a document. **Strategy is not a document of direct action, it is a document for documents.** It can't and should not replace the programs (master plans for development of individual industries and regions, investment programs of individual industries and energy companies). It sets the priorities and guidelines to be consistent with them.

The above mentioned concepts create an urgent necessity for the adoption of the Energy Strategy right now under the conditions of crisis, since the right time and correctly chosen way of strategic development of the country's energy sector will not only improve its state, but also enable to influence the external conditions of the energy sector development, construct a new energy future, based on the targets of energy development, rather than volatile forecasts.

**The publication below is an official document approved by the Government of the Russian Federation November 13, 2009 (Decree N° 1715-r).**



## GOVERNMENT of THE RUSSIAN FEDERATION

### DE C R E E

N° 1715-r 13 November 2009

MOSCOW

1. To approve the attached Energy Strategy of Russia for the period up to 2030 (hereinafter – the Strategy).

2. The Ministry of Energy, Ministry of Economic Development of Russia, Ministry of Natural Resources and the State Atomic Energy Corporation “Rosatom” to ensure implementation of activities specifies by the Strategy, and annually, within the I quarter, submit a report to the Government of the Russian Federation.

3. The Ministry of Economic Development and Ministry of Energy in preparing an action plan to implement the main activities of the Government of the Russian Federation for the corresponding period to include in this plan the activities specifies by the Strategy.

4. To recommend to the executive authorities of the constituent entities of the Russian Federation within their competence in the formation of regional development programs to incorporate measures for the implementation of activities specifies by the Strategy.

5. To declare null and void:

the decree N° 1234-r of the Government of the Russian Federation dated 28 August 2003 (Collected Legislation of the Russian Federation, 2003, N° 36, art. 3531), paragraph 2 of the decree N° 799-r of the Government of the Russian Federation dated 15 June 2009 (Collected Legislation of the Russian Federation, 2009, N° 25, art. 3111).

Prime Minister of the Russian Federation

Vladimir Putin



APPROVED  
by Decree N° 1715-r  
of the Government  
of the Russian Federation  
dated 13 November 2009

## **Energy strategy of Russia for the period up to 2030**

## I. INTRODUCTION

The objective of the energy policy of Russia is to maximize the effective use of natural energy resources and the potential of the energy sector to sustain economic growth, improve the quality of life of the population and promote strengthening of foreign economic positions of the country.

The Strategy determines objectives and goals of the Russian energy sector long-term development for the up-coming period, its priorities and guidelines, as well as mechanisms of the state energy policy at the implementation phases of the Strategy ensuring realization of the stated objectives.

While implementing the Energy Strategy of Russia for the period up to 2020, approved by Decree N° 1234-r of the Government of the Russian Federation dated 28 August 2003, the validity of most of its key provisions was confirmed by the actual development of the country's energy sector even under conditions of abrupt changes of foreign and domestic factors determining the main operating parameters of the Russian fuel and energy complex. In the Energy Strategy of Russia for the period up to 2020 was also specified that the document should be amended where necessary at least once in 5 years.

The Strategy extends the time period up to 2030 with new goals and priorities for the country development.

The Strategy sets new guidelines for the development of the energy sector in the transition of Russian economy to the innovative path of development specified in the Conception of Long-Term Socio-Economic Development of the Russian Federation up to 2020 approved by Decree N° 1662-r of the Government of the Russian Federation dated 17 November 2008 (hereinafter referred to as "the Conception").

The provisions of the Strategy shall be used when developing and adjusting programs for socio-economic development and energy strategies, as well as programs for the constituent territories of the Russian Federation, and integrated programs for energy developing regions in the Eastern Siberia, Far East, North-West Region of Russia, Yamal Peninsula, and continental shelf of the Russian Federation. They shall also be used when developing and adjusting master plans for development of individual industries of the fuel and energy complex, geological exploration of the regions, and when developing and adjusting investment programs and major projects of energy companies.

The Strategy is based on the experience derived from the implementation of the Energy Strategy of Russia for the period up to 2020 and

on an analysis of the current trends and the new system challenges to energy development. The Strategy takes into account possible fluctuations in foreign and domestic conditions of economic development in Russia. Nevertheless, the key objectives and long-term quality guidelines for the transition of the country's economy to the innovative path of development are specified as invariables despite the possible consequences of the global economic crisis that started in 2008. The very same requirements are imposed on the key objectives and long-term quality guidelines of the Strategy.

The Strategy includes:

- current results of the Energy Strategy of Russia for the period up to 2020 implementation and the purpose of the Strategy;
- main trends and forecasts of the socio-economic development of the country, and of the interaction between economy and energy;
- prospects of demand for Russia's energy;
- main provisions of the state energy policy and its most important elements;
- development prospects of the Russian fuel and energy complex;
- expected results and implementation system of the Strategy.

The quantitative parameters of the economy and energy development are subject to verification during the implementation of the measures specified by the Strategy.

## **II. CURRENT RESULTS OF THE ENERGY STRATEGY OF RUSSIA FOR THE PERIOD UP TO 2020 IMPLEMENTATION, OBJECTIVES AND GOALS OF THE STRATEGY**

The following main vectors of long-term development of the fuel and energy complex were specified in the Energy Strategy of Russia for the period up to 2020:

- transition to the path of innovative and energy-efficient development;
- change in the structure and scale of energy production;
- development of competitive market environment;
- integration into the world energy system.

Development of the energy market infrastructure (market mechanisms, institutions for open trade in energy carriers, energy transport infrastructure) is one of the main priorities. The program for increasing gas prices and the mechanisms to minimize the socio-economic impact of the overall growth of energy prices are of particular importance. Support and promotion of strategic initiatives in the energy sector form the basis for the implementation of major energy projects in the future.

Most of the guidelines stated in the Energy Strategy of Russia for the period up to 2020 have been implemented in practice with the use of all the mechanisms provided for by the state energy policy. In particular, the electric energy industry has been reformed. The electricity market is being liberalized and the nuclear energy industry is being reformed. A more favorable tax treatment has been set up for the oil and gas industries. The development of oil refineries and petrochemical plants is being promoted, while an energy exchange trade is being developed and excessive administrative barriers hindering energy companies are being removed. Infrastructure projects crucial to the development of the domestic energy sector are being implemented actively.

Nevertheless, the qualitative results projected for the first phase of the Energy Strategy of Russia for the period up to 2020 implementation have not been fully achieved, namely the setting up a base for stable and progressive development of the energy sector, including:

- establishing a coherent and approved legal and regulatory framework, creating highly competitive energy markets with fair trade principles;
- completing the conversion of the related sectors of the economy to a new level of energy efficiency;

- transition from the leading role of the fuel and energy complex in the economy of the country to the function of an effective and stable supplier of energy resources for the needs of the country's economy and population.

Given the principle of continuity, it is necessary to ensure that the qualitative results specified in the the Energy Strategy of Russia for the period up to 2020 should be achieved in the frames of the Strategy implementation.

During the period that has passed from the beginning of the Energy Strategy of Russia for the period up to 2020 implementation, the Russian energy sector was primarily developing within the main forecasting trends specified in the stated document despite significant deviations of the basic economic indicators of the country development and foreign economic conditions from their values projected in 2003.

Thus, when world oil prices grew from US \$27/barrel in 2000 to US \$94/barrel in 2008, that's almost a fourfold deviation from the forecast of the Energy Strategy of Russia for the period up to 2020, the actual export volume of energy resources for the same period grew 1.6 times, that's only a 9.6% deviation from the export forecast indicated in the Energy Strategy of Russia for the period up to 2020.

As the gross domestic product of the country grew by 65% compared to its 2000 level with a deviation of 11% from the forecast of the Energy Strategy of Russia for the period up to 2020, actual growth in production of energy resources amounted to 26% compared to its 2000 level with a deviation of 2.6% from its forecast in the Energy Strategy of Russia for the period up to 2020.

Meanwhile, domestic consumption of energy resources grew by 10% compared to its 2000 level with a deviation of 5% from the forecast of the Energy Strategy of Russia for the period up to 2020 mainly due to the decrease in demand in 2008 on account of the world economic crisis.

The key development indicators of the Russian economy and fuel and energy complex in 2008 and estimations of the Energy Strategy of Russia for the period up to 2020 are indicated in Appendix 1. On the whole, the indicated figures show stability and high inertance of the manufacturing parameters of the fuel and energy complex against changes in external conditions. They also point to the validity of the forecasts of the energy sector development specified in the Energy Strategy of Russia for the period up to 2020.

The objectives of the Strategy are identified by the main internal and external challenges for the forthcoming long-term period.

The main domestic challenge lies in the necessity for the energy sector to fulfill its vital role in the transition to an innovative path of economic development as provided for by the Conception. The domestic demand for energy resources should be guaranteed taking into account the following requirements:

- Russia's living standards must correspond with those of developed countries;
- Russia must achieve scientific and technological leadership in various key areas ensuring its competitive advantage and its national (including energy) security;
- the country economic structures must be changed in favor of less energy-intensive sectors;
- the country must switch from raw materials export to resource innovative-development with qualitative renewal of the energy sector (including development of fuel and non-fuel energy both) and related industries;
- the country should decrease the share of the fuel and energy complex in the total volume of investments in its economy and also increase the absolute levels of investments in the energy sector necessary for the development and rapid modernization of the sector and growth of its activities;
- Russia must improve its energy efficiency and reduce energy intensity of its economy to the level of countries with similar climatic conditions such as Canada and the Scandinavian countries;
- gradual limitation of the fuel and energy complex impact on the environment and climate by reducing pollutant emissions, wastewater discharge, greenhouse gases emissions as well as reducing energy production and consumption waste.

The energy sector must contribute to the reproduction of human capital (by developing energy infrastructure and providing energy goods and services at socially affordable prices, sustainably training highly-qualified personnel and increasing quality of life of the population, including those working in the energy and related sectors), as well as facilitate the transition to a new model of spatial development based on the balanced development of energy and transport infrastructure.

The main external challenge lies in the necessity to overcome the threats associated with the instability of world energy markets and volatility of world energy prices, as well as to ensure the contribution

of the energy sector into improvement of foreign economic activities and to reinforcement of Russia's positions in the world economic system. Thereby, the following must be provided:

- achievement of sustainable results of foreign economic activities in the fuel and energy complex under conditions of increased global competition for resources and sales markets;
- minimization of the negative impact of the global economic crisis and use of the crisis to radically update and diversify economic structures in favor of less energy-intensive industries, and to promote transition of the Russian energy sector to an accelerated innovative development path and new technological ways;
- increase in Russia's strategic presence on high technology markets and energy intellectual services, including by developing globally specialized production;
- geographic and product diversification of the Russian energy export under conditions of stable and increasing energy supplies to the world's largest consumers;
- reasonable reduction in the share of fuel and energy resources in the structure of Russian export, switching from selling abroad raw materials and energy resources to selling highly processed products, as well as promotion of sales of oil products produced at foreign refineries owned by Russian oil companies;
- development of international energy infrastructure hubs in Russia on the basis of new energy technologies.

Need for an adequate response to the major internal and external challenges of long-term development along with existing problems in the energy sector provide for the objectives and goals of the Strategy. The relevant risks are to be reflected in the system of strategic priorities and guidelines, as well as in the process of phased implementation of the Strategy.

The main objective of the Strategy is to set up innovative and efficient energy sector in Russia meeting the energy needs of a growing economy, as well as the foreign economic interests of the country and ensuring the necessary contribution to the country's social-oriented and innovative development.

Achievement of this objective requires successive solving of the following basic goals:

- improvement of the efficiency of reproduction, extraction and processing of energy resources to meet domestic and external demand for them;

- modernization and construction of a new energy infrastructure on the basis of large-scale technological updating of the country's energy sector;
- establishment of a stable institutional environment within the energy sector;
- improvement of the energy and environmental efficiency of the Russian economy and energy sector, including through structural changes and activation of technological energy saving;
- further integration of the Russian energy sector into the world energy system.



### III. MAJOR TRENDS AND PROJECTIONS OF SOCIO-ECONOMIC DEVELOPMENT IN RUSSIA FOR THE PERIOD UP TO 2030

Despite impact of the global economic crisis, achievement of the long-term guidelines for socio-economic development of Russia and adequate development of the energy sector are still based on the fundamental provisions of the scenario of innovative development of the economy, specified in the Conception.

The scenario of basic innovative development presupposes, in addition to using the competitive edge of the Russian economy in traditional sectors and new knowledge-intensive sectors, as well as in the economy of knowledge, a breakthrough in improving human capital effectiveness, developing high or medium technological industries and transition of innovative factors into the main source of economic growth.

Implementing this basic innovative scenario would ensure that living standards and the level of socio-economic development in Russia be on par with those of developed post-industrial countries due to improved competitiveness of the domestic economy, structural diversification and growth of its efficiency. At the same time, the gap between Russia and advanced countries in terms of living standards would be considerably decreased.

The economic development under this basic innovative scenario is characterized by full-scale realization of the following priorities:

- development and implementation of the Russian economy's comparative advantages in the energy sector, science and education, high technologies, and other fields;
- dynamic development of institutions determining entrepreneurial and investment activities, as well as companies' competitiveness;
- intensive innovative modernization of the manufacturing industry and enhancement of labor productivity;
- dynamic development of transport and energy infrastructure;
- intensive improvement in the quality of human capital and formation of a middle class;
- integration of the Euro-Asian economic area.

Additionally, provisions are made for changes in the specific path to innovation-based development and achieving long-term goals, particularly in view of the global economic crisis that started in 2008 and its likely duration.

When forecasting the basic predictions in the Strategy (hereinafter referred to as the basic forecasting field), the following consolidated forecast hypotheses for socio-economic development were used.

**Hypothesis I.** By the end of the first implementation phase of the Strategy and the beginning of the post-crisis period (approximately 2013–2015), the country will develop socially and economically at the rates specified in the Conception.

**Hypothesis II.** By the end of the second implementation phase of the Strategy (approximately 2020–2022) the level of the country's socio-economic development specified in the Conception will be reached thanks to accelerated development in the post-crisis period.

The interaction system between the economy and energy sector is characterized, firstly, by the conversion of the forecast hypotheses for socio-economic development into the basic forecasting field for the energy sector development, and secondly, by establishing hypotheses of guidelines for the prospective system of interaction between the economy and energy sector.

The basic forecasting field is used to determine the priorities and guidelines for long-term development of the energy sector in all the areas indicated in the Strategy. The specific development paths of the energy sector are assessed and elaborated in the process of advanced monitoring of the Strategy (depending on the implementation of its targets and external conditions). Possible deviations of the stated development paths beyond the basic forecasting field are factored in, in the first place, by adjusting the dates and the parameters for individual implementation phases of the Strategy (while maintaining their quality content). This mechanism protects against existing risks by allowing adjustment of the paths and deadlines for achieving the specified strategic guidelines based on the invariance of the main strategic objectives.

It follows that the Strategy does not define specific paths, but a model for phased long-term development of the energy sector taking into account the existing risks. What is of paramount importance is not so much predicting the changing risks as the willingness to overcome them.

The main hypotheses of the guidelines for the communication and interaction system between the economy and energy sector for the period up to 2030 are characterized in the following manner.

During the period of the Strategy implementation, the Russian economy will decrease its reliance on the energy sector thanks to the

priority development of innovative low-energy intensive sectors and implementation of the technological potential of energy-saving. This reliance will be further decreased for the period up to 2030 (compared with 2005 levels):

- the share of the fuel and energy complex in the gross domestic product and the share of fuel and energy resources in export should be decreased by no less than 1.7 times;
- the share of the energy export in the gross domestic product should be decreased by no less than 3 times;
- the share of investments in the fuel and energy complex as a percentage of the gross domestic product should be decreased by no less than 1.4 times, and their share in the total volume of investments – by more than twice;
- the energy intensity of the gross domestic product should be decreased by more than twice;
- the electricity intensity of the gross domestic product should be decreased by no less than 1.6 times.

During the period of validity of the Strategy the Russian energy sector will retain its determinant role in important strategic tasks solution regarding the country's development. In the first place, this touches upon the construction of new energy infrastructure allowing for an accelerated socio-economic development of the Eastern Siberia and Far East, as well as overcoming of the infrastructure disconnection of several Russian regions and formation of new spatial-industrial clusters based on the development of energy-supplying and manufacturing industries.

The decreased dependence of the economy on the energy sector will be accompanied by a qualitative change in the role of the fuel and energy complex in Russia. As the largest customer for many related industries (engineering, metallurgy, chemistry, etc.) and the economy (construction, transport), the Russian energy sector will make a significant contribution to the investment support for the innovative development of the domestic economy.

The Russian energy sector will continue influencing the country's social situation insofar as the level of energy comfort and access to energy resources largely determine the quality of life of the population.

## IV. PROSPECTS OF DEMAND FOR RUSSIAN ENERGY RESOURCES

### *1. Promotion of the demand for fuel and energy on the domestic market*

The domestic demand for energy resources is determined by the expected dynamics of economic development, changes in the structure of the country's economy and its level of specific energy intensity.

Decreasing energy intensity of the economy is the main objective of the Russian energy policy. Without solving this issue, the energy sector will inevitably impede the country's socio-economic development.

The solution of this problem requires, among other things, a rational restructuring of the Russian economy.

The Conception provides for large-scale structural reforms in the economy both in terms of the gross domestic product in general and in terms of the manufacturing sector. Low energy consuming industrial sectors specializing in high technology and science-intensive production are expected to develop by advanced rates in response to market demand. At the same time, the energy and raw material intensive industries will grow more slowly. This should result in a structural transformation of the Russian economy in favor of less energy-intensive sectors. The country will thus have a new source of economic growth more powerful than oil and gas sector based on the manufacturing sector and high technology services, which are substantially less energy-intensive.

By 2030 the share of low energy-intensive industries (engineering, light industry, food industry, etc.) in the industrial production structure is expected to be increased by 1.5–1.6 times and should amount to more than half of the total volume of industrial production in the country compared to the current 33%.

Along with the expected structural changes in the economy, the implementation of organizational and technological measures to save fuel and energy have also been provided for. In other words, an energy saving policy will be implemented. As a result of the structural changes in the economy and the energy saving policy, by 2030 the energy and electricity intensity of the Russian economy should be considerably decreased and should have an adequate impact on the dynamics of domestic demand for primary energy and electricity.

The estimated figures of domestic demand for fuel and energy resources are indicated in Appendix 1 to the Strategy.

## *2. Russia on world energy markets*

Russia is among the world leading countries in the system of world circulation of energy resources. Russia actively trades these resources and takes part in international cooperation in this field.

Russia's position is especially important on the world hydrocarbon market.

In the past years, Russia hold leading positions in terms of crude oil production and provided 12% of the world oil trade. Over four-fifths of Russian oil is exported to Europe and Russia's share on the European markets amounts to around 30%. Russian oil products are also mainly exported to the European countries.

Russia is the world leading country in terms of reserves (23% of the world reserves) and annual production of natural gas. The country provides 25% of the world trade in natural gas, dominating both on the European gas market and on the gas market of the Commonwealth of Independent States. Russian gas accounts for approximately 30% of the overall gas consumption in the European countries (including Turkey, but excluding the countries of the Commonwealth of Independent States). With a unique gas transportation system, Russia also plays an important role in supplying gas from Central Asia to Europe and to the countries of the Commonwealth of Independent States.

Russia holds the second place in terms of coal reserves in the world (19% of the world reserves), the fifth place in terms of annual production (5% of the world production) and also accounts for approximately 12% of the world thermal coal trade.

Russian nuclear electric energy industry represents 5% of the world nuclear energy market, 15% of the world nuclear reactors market, 45% of the world uranium enrichment market, and 15% of the world market of spent fuel conversion. Russia also provides 8% of the world production of natural uranium.

Peculiarities of the forthcoming period of the world energy markets development are associated with the processes of their restructuring, growth in the share of developing countries, and intensification of competition. Recently, the degree of uncertainty and risks has significantly increased on world markets, including in connection with abrupt and unpredictable dynamics of oil prices, negative impact of the world financial crisis, the threats of energy supply shortages in the post-crisis period, multiple-valued prospects for concluding international agreements on environmental policy and climate change. On the other hand, the efforts to improve long-term stability of the energy markets and

global energy security are increasingly understood and supported in the world, and this stability and security must be provided without prejudice to any national interests whatsoever. This trend was reflected, in particular, in the decisions and recommendations adopted at the St. Petersburg G8 Summit in 2006.

The stated factors with due regard to the Russian external energy policy will determine Russia's future position on the world energy markets.

Russia will undeniably remain the leading player on the world hydrocarbon market and will actively participate in the development of electricity and coal markets, while strengthening its position in world nuclear electric energy industry.

In this case, maintenance of Russia's stable relations with its traditional consumers of energy resources and development of equally stable relations on new energy markets will be one of the key principles.

Alongside with export of primary energy, a high emphasis will be put on export of highly processed energy products, as well as on developing the production thereof by Russian fuel and energy companies abroad. The highly competitive world markets of oil and gas chemistry will be of particular interest for Russia in the future.

Although at present Russia is practically not represented on the world renewable energy market, the country will develop this promising sector (taking into account the structure and features of the national energy sector development). The potential of renewable energy in the country, the scientific and technical achievements in this area along with development of international cooperation will be the basis of Russia's stage-by-stage increased contribution to the development of this market.

Within the period up to 2030, export of energy resources will remain the major development factor for the Russian economy, but its impact on the economy will decrease. Growth rates of the energy export will gradually slow down and its volume is expected to stabilize by the end of the period.

This trend is consistent with the state long-term economic policy, which focuses on diversifying the economic structure and decreasing the country's dependence on energy export.

The estimated figures for the Russian energy export are indicated in Appendix 1 to the Strategy.

The energy markets in Europe and the countries of the Commonwealth of Independent States will remain the main sales markets for the

products of the Russian fuel and energy complex for the entire implementation period of the Strategy. Measures will therefore be implemented to reduce transit risks, including further development and improvement of full-scale export infrastructure to ensure reliable supplies of Russian energy to these markets.

At the same time, the proportion of European energy markets in the total volume of Russian energy export will steadily decline due to export diversification to Eastern energy markets (China, Japan, Republic of Korea, other countries of the Asia-Pacific region). Moreover, by the end of the Strategy third implementation phase, the proportion of Eastern energy markets in the Russian energy export of liquid hydrocarbons (oil and oil products) should grow from the current 6 to 22–25%, while natural gas export should grow from 0 to 19–20%.

The Strategy also provides for a diversification of commodities structure of energy export on account of increased export of energy products with high added value (oil products, liquefied natural gas, engine fuel, production of gas chemistry and petrochemistry, electricity).

Russia will thus not only retain its position as the largest energy supplier in the world, but will also qualitatively change its presence on the world energy market by diversifying its commodities structure and destinations of energy export, actively developing new international energy business and increasing the presence of Russian companies abroad. This will make it possible to reduce the dependency of the Russian energy sector on export of energy resources to Europe, as well as increase profitability and efficiency of the international business of Russian energy companies without substantially increasing export of primary energy.

## V. STATE ENERGY POLICY

### *1. Principles of the state energy policy and its implementation phases*

The long-term state energy policy aims to protect the rights and legal interests of citizens and business entities, ensure state defense and security, effectively manage state property, and achieve a new qualitative state for the energy sector. The policy is implemented taking into account the following unalterable principles:

- consistency of the state measures in implementing key strategic guidelines for development of the energy sector;
- interest in setting up strong and stably developing energy companies representing Russia on foreign markets with dignity and contributing to the successful functioning of competitive domestic markets;
- relevance and predictability of state regulations aimed at private initiative stimulation in implementing state energy policy, including investments.

The main strategic guidelines of the long-term state energy policy are as follows:

- energy security;
- energy efficiency of the economy;
- budget efficiency of the energy sector;
- environmental safety of the energy sector.

The main components of the state energy policy are as follows:

- subsoil use and management of the state subsoil fund;
- development of domestic energy markets;
- promotion of a rational energy balance;
- regional energy policy;
- innovative and scientific-and-technical policy in the energy sector;
- social policy in the energy sector;
- foreign energy policy.

The main mechanisms of the state energy policy are as follows:

- creating a favorable economic environment for the operation of the fuel and energy complex (including coordinated tariff, tax, customs, antimonopoly regulations and institutional reforms in the fuel and energy complex);



- introducing a system of advanced technical regulations, national standards and norms improving and stimulating the implementation of key priorities and guidelines for energy development, including improving the energy efficiency of the economy;
- stimulating and supporting business entities strategic initiatives in investment, innovation, energy-saving, environmental and other priority areas;
- improving the management efficiency of state property in the fuel and energy complex.

The state energy policy will be implemented in 3 phases to ensure:

- consistent progress towards achieving the objectives and goals of the Strategy;
- coordination of the state energy policy with the socio-economic development of the country as a whole;
- taking into account the qualitative differences in external and internal development conditions and parameters of the energy sector, as well as of the nature and measures of the state energy policy at different phases of its implementation.

First phase consists in overcoming the crisis and establishing the foundations of a new economy. Accordingly, the main task is to quickly overcome the crisis in the economy and the energy sector in order to achieve sustainable economic and energy development rates specified in the Conception, and to use the opportunities that arose during the crisis for qualitative renewal and modernization of the Russian fuel and energy complex.

The main risks of the first phase lie in a possible heavier impact of the crisis than was expected, its larger duration, insufficient rate and efficiency of the improvements in the fuel and energy complex, which are expected to create the basis for sustainable post-crisis development by the end of this phase.

The first phase should therefore create the necessary conditions and remove the major barriers (both domestically and in collaboration with foreign partners) to ensure that all main components of the state energy policy are promoted speedily. At the same time, it is necessary to adjust and synchronize the development plans and programs for the energy sector with the measures specified in the Conception (taking into account the likely adjustment of deadlines and their implementation parameters as a result of the global economic crisis).

Basic production assets and infrastructure of the energy sector will be developed and updated during this period (including, completing the most important projects previously launched). The territories and regions, where it is necessary to ensure rapid development of energy infrastructure and change the negative trends in the development of energy resource base will be selected, while basic market institutions, a stable and effective regulatory framework and a state regulation system will also be put into place for the energy sector.

At this phase, the Russian fuel and energy complex will actively contribute to quick overcoming of the crisis and subsequent rapid innovative development of the related industries (manufacturing, pipe industry, etc.) by placing orders for the materials and equipment necessary for the energy sector.

The external conditions for the development of the Russian energy sector during this phase will first be the impact of the global economic crisis, and then the likely post-crisis growth of the world economy. As a result the first phase will be characterized by the instability and unpredictability of the world financial, stock exchange and energy markets. Under these conditions, the role of the state participation in the development of the country's energy sector will increase, including in the provision of the necessary resources for the construction and modernization of the energy infrastructure, granting of state guarantees to businesses for the implementation of long-term priority investment projects, and in supporting of the financial and economic stability of strategic energy companies.

The first phase should end approximately in 2013–2015 depending on the extent of the crisis and the speed of recovery in the economy and the energy sector.

Second phase consists in a transition to innovative development and construction of the infrastructure of a new economy. Accordingly, the second phase will be highlighted by the common increase in energy efficiency in the fuel and energy complex and in the economy as a whole as a result of modernization of production assets, related regulatory and institutional reforms, realization of innovative and new capital-intensive energy projects in the Eastern Siberia and Far East, on the continental shelf of the Arctic seas and Yamal peninsula, implemented during the first phase.

The main risks of the second phase lie in the possibility of Russia's energy sector lagging behind the rapid post-crisis development of advanced countries and not meeting by the end of the phase the necessary conditions leading to a transition to the innovative energy sector of the future.

At this phase, the fuel and energy complex should be entirely innovatively updated on account of domestic technologies, materials and equipment obtained as a result of the active interaction between the fuel and energy complex and related industries at the first phase, as well as through international cooperation.

The external conditions for the development of the Russian energy sector during this phase will be stabilization of the world energy market prior to switching to a new technological wave associated with a wide use of non-hydrocarbon energy in the economy, as well as an overall decreasing dependence of the Russian economy and budget on operation of the fuel and energy complex. Precisely during this phase, the fuel and energy complex is expected to concede its leading position in the Russian economy and budget revenues in favor of new innovative sources of growth based on manufacturing and high technology science-intensive services.

In these circumstances, direct state participation in the energy sector will gradually dwindle and be replaced by various forms of state-private partnership particularly in construction and modernization of energy infrastructure and development of innovations. At the same time, the state will strengthen its regulating influence in the sphere of improvement and optimization of the institutional environment in the Russian energy sector.

Third phase consists in developing an innovative economy. Accordingly, this phase is characterized by a gradual transition to the energy sector of the future with fundamentally different technological possibilities of further development based on a highly efficient use of traditional energy resources and new non-hydrocarbon energy resources and technologies.

Previous investments and innovations such as new technologies, equipment and operating principles in the Russian energy sector and related industries will ensure the innovative development of the country's energy sector.

The main risks of the third phase lie in the provision of the necessary level of quality and efficiency of innovations in the energy sector.

The external conditions for the development of the Russian energy sector during this period will be the significant decrease in the proportion of the energy sector in the Russian economy by substituting it with non-energy sources of innovative economic growth and actively developing non-hydrocarbon energy in the world.

In these circumstances, state participation in the energy sector development will mainly consist in supporting innovative development areas of the energy sector (non-fuel energy, etc.), as well as providing and regulating sustainable institutional environment for effective functioning of the energy sector.

The third phase should be completed by 2030.

## *2. Main strategic guidelines*

Energy security is one of the most important components of the national security.

Energy security is the country's security, that of its citizens, society, state and economy from the threats to reliable supply of fuel and energy. These threats are determined by external (geopolitical, macroeconomic, market) factors, as well as by the condition and operation of the country's energy sector.

Energy security is provided and determined by resource sufficiency, economic availability, ecological and technological acceptability. Resource sufficiency determines the physical possibility of deficit-free supply of energy resources to the national economy and the population. Economic availability determines the profitability of such supply at appropriate market prices. Ecological and technological acceptability determines the possibility of extraction, production and consumption of energy resources within the existing technological and ecological limitations determining operation safety for energy facilities at various phases.

Russia's energy security has been provided in full during the implementation of the Energy Strategy of Russia for the period up to 2020. Nevertheless, it has not always been possible to avoid local short-term violations of energy security committed in some regions thus reflecting the existing systemic problems in the Russian energy sector.

The main problems in the field of the energy security are as follows:

- high degree of fixed assets depreciation in the fuel and energy complex (in the electric energy and gas industries – almost 60%, in the oil refining industry – 80%);
- low level of investments in the development of the fuel and energy complex (in the last 5 years, investments in the fuel and energy complex amounted to approximately 60% of the volume specified in the Energy Strategy of Russia for the period up to 2020);

- sole dependence of the Russian economy and its energy sector on natural gas the share of which represents around 53% of the domestic energy consumption;
- failure of the industrial potential of the fuel and energy complex to match the world scientific and technical level, including in terms of environmental standards;
- slow development of the energy infrastructure in the Eastern Siberia and Far East.

The strategic objective of the state energy policy in the sphere of energy security is to continually improve the following main characteristics:

- the ability of the fuel and energy complex to reliably provide for economically sound domestic demand for quality and affordable energy;
- the ability of the consumer sector of the economy to use energy resources efficiently by preventing irrational expenditures of the society on energy supply;
- the stability of the energy sector against external and internal economic, technogenic and natural threats to the reliable energy supply, and its ability to minimize the damage caused by various destabilizing factors.

Energy security is achieved by implementing all major components of the state energy policy based on the following key principles:

- ensuring the guaranteed and reliable energy supply in the economy and to the population in full under normal conditions and in the minimum necessary amount under various exceptional circumstances by the creation of the system of strategic reserves of fuel and energy resources, regulations on minimum allowable reserves of generating and energy transporting capacities, levels of seasonal reserves of fuel, reserves of equipment necessary to eliminate the consequences of major accidents in the energy sector;
- separation of powers and responsibilities of the state bodies, executive bodies at federal and regional levels, of energy supplying companies and business entities-consumers in the area of providing for energy security to all sectors of the economy, population, socially important objects and business entities;
- ensuring reliable operations and predictable development of the energy infrastructure, including utilization of state-private partnership mechanisms, consistent lifting of restrictions in

transportation of energy resources between different regions of the country and between territorial production complexes (energy hubs) within regions;

- ensuring timely exploration, preparation and development of new deposits (deposits, areas, sections, provinces) of traditional fuels, including through state-private partnership and rational tax policy (referring to the growth of proven recoverable reserves, which outruns the production thereof), timely preparation to the use of substitute innovative energy resources and energy sources in proportion to the depletion of traditional fossil energy resources;
- avoiding depreciation of fixed production assets to a level threatening the energy security and stimulating investments to modernize these assets by introducing tax credit investment mechanisms, tax holidays for project investment payback period, accelerated depreciation, and investment risk insurance;
- maximizing the use of competitive domestic equipment in all technological processes and projects, stimulating the development of domestic energy production with high added value and improving the quality of oil products by tightening quality standards for engine fuel, modernizing oil and gas processing facilities in Russia, differentiating excise rates on engine fuel of different quality;
- improving national energy security as a result of international cooperation in the energy sector while guaranteeing execution of the obligations under international export contracts for energy supply.

The strategic objective of the state energy policy to improve energy efficiency in the economy is to maximize the rational use of energy resources by ensuring that it is in the interest of the consumers to save energy, improve their energy efficiency and investing in this field.

Over the past five years, energy intensity of the Russian economy decreased faster than was predicted in the Energy Strategy of Russia for the period up to 2020 mainly due to optimization of the workload of the existing spare productive capacity under conditions of substantial growth of the demand for energy, and a rapid development of low energy-intensive services.

Increased world prices for exported fuel and energy resources have considerably affected growth of the gross domestic product thus reducing its energy intensity.

The main problem in this sphere is the considerable untapped potential of organizational and technological energy saving amounting to 40% of the total volume of the domestic energy consumption. The proportion of various components of the aforementioned potential was estimated as follows:

- residential – 18–19%;
- power generation, industry, transport – from 13 to 15% each;
- heat supply, services, construction – from 9 to 10% each;
- production of fuel, gas flaring, and energy supply of state institutions – from 5 to 6% each;
- agriculture – 3–4%.

The following measures of the state energy policy, grouped by mechanisms of its implementation, will be applied to achieve energy efficiency of the economy.

Creating a favorable economic environment, including the following:

- elaboration of comprehensive federal and regional legislation on energy saving;
- setting up an integral system of control over the process of energy efficiency enhancement;
- setting up an energy services market;
- establishment of a rational system for domestic energy prices through their gradual and controlled liberalization to promote careful use of energy in the economy and by the population;
- promotion of entrepreneurial energy saving activities by setting up refund mechanisms of private investments in energy saving.

Developing a system of prospective regulations, standards and norms providing for the following:

- increased responsibility for irrational and inefficient use of energy by including requirements for energy efficiency (requirements for specific energy consumption of machinery and equipment, for heat loss in buildings, for water consumption in plants with water-intensive processes within the existing technical regulation system);
- introduction of special energy saving standards and penalties for their violation, as well as tax incentives when exceeding the standards for promoting replacement of depreciated equipment;
- state statistical monitoring of energy efficiency and energy saving, and the introduction of energy saving labeling;

- energy audits establishing energy passports for organizations with subsequent collection, analysis and systematic use of the gathered information.

Supporting strategic initiatives, including the following:

- developing state, regional, and municipal energy saving programs and monitoring of their implementation;
- state support for developing new energy saving technologies and implementing energy saving pilot projects;
- promoting the energy audits through special projects implemented as a part of the program supporting the development of small businesses (business-incubators, training programs, etc.), organizing compulsory energy audits of all types of organizations (enterprises) on a regular basis;
- elimination of unaccounted use of energy resources by installing meters accounting for energy consumption, especially for residential consumers, developing automated systems for commercial accounting of electricity and heat consumption on the retail market, establishing a system of metrological control of instruments measuring fuel and energy resources in real operating conditions;
- improving energy efficiency of the budget sector, including by providing to budget organizations the right to dispose the savings generated from implementing energy saving projects in accordance with the Russian budget laws;
- implementing special measures to improve energy efficiency in housing and communal complex, including by introducing a method of return on investments, new mandatory construction norms and regulations for effective use of energy not only for housing properties, but also for public, commercial and industrial buildings;
- promoting the development and use of new energy technologies providing quality products with qualitatively new consumer properties;
- implementing information and educational programs (events), promoting energy saving;
- developing and supporting international cooperation in energy saving and energy efficiency, and in research of new energy sources.



The budget efficiency of the energy sector is determined by the balance, stability and predictability of budget revenues from direct payments of business entities of the energy sector, on the one hand, and of investments from the stated entities necessary to further develop the energy sector to meet the demand for energy resources and ensure cost-effective operations, on the other hand.

During the implementation of the Energy Strategy of Russia for the period up to 2020, the energy sector was one of the most stable operating industrial complexes of the Russian economy providing the main contribution to the gross domestic product, export and budget revenues. Favorable foreign economic conditions also contributed to the increase in financial prosperity of energy companies as well as in their investment capacities.

The following problems are encountered in this sphere:

- insufficiently large-scale investment renewal of the energy sector under the current fiscal policy in respect of export revenues of energy companies with relatively low profitability of their activities on the domestic market;
- unbalanced ratio of the fuel and energy complex's share in the country's tax revenues and its share in the total volume of investments in fixed capital (in particular, over the last five years, this ratio changed from 1.7:1 to 2.6:1).

The strategic objective of the state energy policy aiming at budget efficiency of the energy sector is to ensure the effectiveness of relations between the state and energy business with regard to Russia's budget revenues, a good economic environment for private investments in the energy sector, direct state support in implementing strategic or socially important energy projects.

The following measures of the state energy policy will be implemented to ensure the budget efficiency of the energy sector.

Creating a favourable economic environment, including the following:

- rationalizing the tax burden on energy companies in the frames of a normative legal base elaboration aimed at effective economic regulation in the energy sector;
- improving the business environment by establishing clear and stable rules for companies' activities guaranteeing investors' rights by introducing predictable and balanced taxes and the normative legal base protecting investors' rights and promoting competition;

- improving the amortization policy by providing an accelerated amortization tax treatment for fixed assets to promote investments to replace and update them;
- improving state price (tariff) regulation for natural monopolies taking into account the objective cost increase of extraction, production and transportation of energy on the domestic market, the need for investments to develop infrastructure facilities, as well as planned increased control over cost effectiveness in this sphere (improving the purchase system of natural monopolies, switching to long-term tariffs and improving regulating organizations' transparency and information openness);
- completing the development of a system of electricity markets providing sufficient incentives for investments in developing the industry and improving energy efficiency of the consumers.

Developing a system of prospective regulations, standards and norms providing for the following:

- improving licensing policy, removing unjustified administrative barriers;
- amending the normative legal base for technical regulation of the energy sector, including simplifying approval procedures of project documentation for model energy projects with high technological and environmental indicators, simplifying certification procedures for generating equipment in respect of which compliance with the best international standards is confirmed, establishing priorities to use advanced international standards of design, manufacturing and operating power equipment;
- improving accounting and control of the reliability and quality of the goods and services provided by the energy companies.

Supporting strategic initiatives, including by the following:

- developing state-private partnership to implement energy projects;
- developing a risk insurance system for long-term investments in the energy sector;
- establishing joint leasing companies to provide organizations in the energy sector with advanced technologies and equipment;
- promoting economic incentives for small and medium businesses in the energy sector taking into account sectoral specificities and venture innovative manufacturing methods;

- promoting technological modernization, innovative development of enterprises and industries of the fuel and energy complex;
- organizing and promoting personnel training at all levels in the fuel and energy complex.

The energy sector is one of the major sources of environmental pollution in Russia with over 50% of pollutants emissions into the air, over 20% of dirty polluted discharges into the surface waters, and over 70% of total greenhouse gases emission.

The environmental safety of the country's energy sector is provided for by minimizing the negative impact of extraction, production, transportation and consumption of energy resources on the environment and climate.

During the implementation of the Energy Strategy of Russia for the period up to 2020, the environmental safety of the energy sector was considerably improved. Environmental requirements for subsoil use became stricter and a set of measures was developed to use associated petroleum gas effectively. a system of state ecological examination of investment projects in the energy sector was also developed.

At the same time, solving the problem of rational use of associated petroleum gas is being hindered (no regulatory base for access to pipelines for producers of dry stripped gas exists), and there are no economic incentives for companies to ensure effective utilization of waste from the energy sector and reclamation of disturbed soils.

The main objective of the state energy policy to ensure environmental safety of the energy sector is to consistently limit the impact of the fuel and energy complex on the environment and climate by reducing emissions (waste) of pollutants and greenhouse gases into the environment, as well as decrease waste from production and consumption.

The following measures of the state energy policy will be applied to implement the environmental safety of the Russian energy sector.

Creating a favorable economic environment, including the following:

- promoting and creating conditions for introducing environmentally clean energy efficient and resource saving technologies in the production, transportation, storage and use of fuel and energy resources;
- removing the main infrastructure, technological and other barriers preventing the rational use of associated petroleum gas and minimizing the volume of its flaring;
- creating conditions to expand electricity and heat production on the basis of renewable energy.

Developing a system of prospective regulations, standards and norms providing for the following:

- stricter control over compliance with the environmental requirements when implementing investment projects in the energy sector and operating energy facilities;
- harmonization of Russian and international environmental laws.

Supporting strategic initiatives, including the following:

- developing environmental audit of organizations of all forms of ownership operating in the fuel and energy complex ;
- promoting increase in the production of high-quality engine fuel with improved environmental characteristics corresponding to the international norms and standards.

The indicators of the energy security are listed in Appendix 2.

### *3. Subsoil use and management of the state subsoil fund*

The strategic objective of the state energy policy for subsoil use and management of the state subsoil fund is to ensure sustainable, efficient and environmentally save reproduction of the mineral resource base to meet the energy needs of the country's economy, as well as to ensure energy exports.

During the implementation of the Energy Strategy of Russia for the period up to 2020, the following was achieved:

- Long-term state program for subsoil exploration and reproduction of the mineral resource base in Russia on the basis of balance of consumption and reproduction of mineral raw materials developed by the Ministry of Natural Resources and Ecology of the Russian Federation as well as a number of regional programs for development and reproduction of the hydrocarbon resource base were approved;
- holding public auctions for the right to subsoil use widely practiced;
- the works of geological survey, prospection and exploration of hydrocarbon deposits have been redistributed between the state and subsoil users;
- state controls and sanctions have been actively used against unconscionable subsoil users.

The main trends are as follows:

- the proportion of complex and hard-to-recover fuel and energy resources (hard-to-recover and superviscous oil, 'fat' and low-pressure gas) in the structure of the Russian fuel and energy resources is increasing;

- the geography of hydrocarbon production in Russia is changing by exploiting resources in the Eastern Siberia, Far East, Yamal Peninsula and continental shelf of the Arctic seas and the Caspian Sea.

The main problems in this field are as follows:

- the reserves of fuel and energy resources uncovered by exploration works annually lag behind the production of fuel and energy resources (oil, gas, some coal grades);
- the pace of geological exploration to develop the deposits of fuel and energy resources in the Eastern Siberia, Far East, Yamal Peninsula, continental shelf of the Arctic seas is rather slow;
- the exploitation of existing deposits is insufficiently efficient in terms of the most full and comprehensive extraction of fuel and energy resources;
- the regulation mechanism of subsoil use from the search to the development and closing of deposits is not efficient.

To achieve the strategic objective set for subsoil use and management of the state subsoil fund, the following goals should be realized:

- increase in paces of geological exploration of new territories and waters;
- promotion of private investments in geological exploration and subsoil use;
- promotion of effective subsoil use based on full and comprehensive extraction of fuel and energy resources and improvement of oil extraction ratio;
- development of market of independent engineering services in the sphere of subsoil use.

These goals will be implemented using the following measures and mechanisms of the state energy policy:

- increase in the state participation in developing new territories and waters, including the continental shelf of the Arctic seas as well as in state financing of geological exploration;
- improvement in the licensing policy, elimination of excessive administrative barriers for exploration works, rapid transition to implementation tax incentives on a rental basis for subsoil users;
- elaboration of a special tax regime for the exploration of the Russia's continental shelf;
- provision of the conditions for achieving at least 95% of associated petroleum gas use;

- increase in reliability of fuel and energy reserves accounting and introduction of principles of cross-cutting management of fuel and energy deposits at all phases (from prospection to complete development and closing of deposits).

#### *4. Development of domestic energy markets*

The strategic objective in developing domestic energy markets is sustainable meeting of the domestic demand for high-quality energy resources at stable and affordable for Russian consumers prices by creating and developing highly competitive energy markets with fair trade principles.

This component of the state energy policy is crucial to the development of the energy sector and the economy as a whole.

During the implementation of the Energy Strategy of Russia for the period up to 2020, the following was achieved:

- basic institutions for a domestic energy market were set up (exchange trade in oil and oil products, experimental electronic platform to trade natural gas with prices not regulated by the state, trading system for electric energy based on a competitive procedure of price bids from the market participants in real time mode and in the one-day-ahead mode);
- the electric energy industry was restructured resulting in creating conditions for switching to a targeted model for the electricity market;
- the coal industry was successfully restructured and the domestic coal market were liberalized;
- special customs duties were introduced to promote export of highly processed energy products (refined oil products), while import customs duties on processing equipment for oil refineries were lifted;
- prices for associated petroleum gas were deregulated.

Modern trends in this field point to the development of energy exchange trade and to the strengthening of the state participation and control in the oil and gas sector.

The main problems in the stated field are as follows:

- shortcomings in market infrastructure (basic market institutions and mechanisms of exchange trade);
- presence of regional and technological monopoly, along with unfair competition on domestic energy markets;

- disparities of domestic energy prices for main energy resources;
- unsolved problems in reforming and restructuring of heat supply and the creation of local heat markets;
- access to energy infrastructure is not sufficiently transparent;
- maintenance of cross-subsidies in the energy sector.

To achieve the strategic objective set for developing domestic energy markets, the following goals must be realized:

- improvement of the state control over the level of economic concentration on energy markets and of the state regulation of natural monopolies in the energy sector;
- setting up and development of domestic systems of exchange trade for all types of fuel and energy resources;
- enhancement of the access system to energy infrastructure;
- setting up of an effective and stable pricing system on energy markets correlating with the measures to promote competition in all potentially competitive segments of energy markets and promoting energy efficiency and energy saving.

These goals will be implemented using the following measures and mechanisms of the state energy policy:

- legislative provision of transparent and non-discriminatory procedure for access of all market participants to energy infrastructure (trunk pipelines, electric and heat networks), toughening of antimonopoly laws aiming to prevent cartels and technological monopolism, creation of an integrated system of energy markets monitoring;
- promotion of the private companies participation in energy exchange trade, elaboration of regulatory frameworks for trade in energy derivatives (futures, options, etc.) in rubles, utilization of the exchange trade results as indicators for the pricing system of the Russian energy carriers;
- elimination of cross-subsidizing at all levels, reduction in the state price regulation of natural monopolies products for the population on the principle of limiting the maximum allowable share of spending on energy supply of socially significant categories of the population;
- gradual liberalization of domestic markets for basic energy (gas, electricity, heat), promotion of long-term energy supply agreements conclusion.

## *5. Promotion of a rational fuel and energy balance*

The state energy policy strategic objective set to form a rational fuel and energy balance is to optimize the production, domestic consumption and export of fuel and energy resources while considering the requirements for energy security, economic and energy efficiency and strengthening the country's foreign economic positions.

During the implementation of the Energy Strategy of Russia for the period up to 2020, the following was achieved:

- the ratio of domestic prices for gas and coal was changed from 0.6 to 1.1 (this change has not yet been reflected in the restructuring of the domestic energy consumption);
- crude oil export was gradually replaced by the export of oil products. Oil refining was considerably developed in the country following the changes of export duties on oil and oil products.

The current trends provide for:

- an increasingly important role of renewable energy in meeting the country's energy needs;
- the development of the coal industry on the basis of new clean coal technologies;
- the development of the production of energy products with high added value.

The main problems in this field are as follows:

- increase in the share of gas in the domestic energy consumption;
- insufficient development of production of energy products with high added value (light oil products, engine fuel, liquefied natural gas) and large-scale export of raw energy materials not or only slightly processed;
- slow rates of development of nuclear energy;
- insufficiently active development of renewable energy and use of local energy resources in regional energy balances;
- absence of mechanisms determining use of energy balances in forecasting and management of the fuel and energy complex at federal and regional levels.

To achieve the strategic objective set for promoting a rational fuel and energy balance, the following goals must be realized:

- decrease in the share of gas in the domestic energy consumption along with the corresponding increase in the share of coal and non-fuel energy;
- provision of the rational ratio of export and domestic consumption of different fuel and energy resources;



- promotion of production, export and domestic consumption of energy and non-energy production from the fuel and energy complex with high added value.

These goals will be implemented using the following measures and mechanisms of the state energy policy:

- provision of effective inter-fuel competition of substitute energy resources (gas, coal), direct state support for nuclear energy development and promotion of coal-based energy development ("clean coal" technologies);
- elaboration of long-term policy for developing renewable energy taking into account the structure and trends of the forecasted fuel and energy balance;
- provision of equal profitability of energy supply to the domestic market and for export;
- realization of the state policy aiming at improving the quality of engine fuel and oil refining depth, rational state support of projects in deep treatment and enrichment of coal, as well as the production of synthetic liquid fuel based on all types of energy resources (natural gas, coal, biomass, etc.);
- increase in use and importance of reporting and forecasting fuel and energy balances as a tool to analyze and correct imbalances, and to manage effectively the development of the fuel and energy complex and its industries (not making them prescriptive meanwhile) as well as transition to performing the balances in accordance with international standards.

## *6. Regional energy policy*

The strategic objective of regional energy policy is to set up a stable and self-regulating system ensuring regional energy security based on optimized territorial structure of energy production and consumption.

Implementing regional energy policy in a country like Russia (with different climatic and socio-economic conditions) should be based on incorporation of regional specificities and correlate with strategic national objectives for long-term development of the economy and the energy sector.

While implementing the Energy Strategy of Russia for the period up to 2020, the following was achieved:

- hydrocarbon production concentration level was decreased due to development of hydrocarbon production in other regions of the country, apart from the Western Siberia;

- energy connections between the regions were strengthened by developing energy infrastructure (oil and gas pipelines, power lines);
- the disparities both in the structure of energy consumption and energy self-sufficiency between different regions of the country were decreased (average gap in the level of energy self-sufficiency in the regions decreased from 20 to 15%);
- the priority development of the energy sector in regions with high cost energy resources was realized under the relevant federal target programs (the Far East, Trans-Baikal, Kaliningrad Region, North Caucasus, etc.).

The current trends in this field relate to the formation of a new geography of energy-redundant and energy-deficient regions, as well as to the shift of centers of energy production, processing and export to the north and east of the country.

The main problems in this field are as follows:

- high level of disparities in energy self-sufficiency and structure of energy consumption in the regions, need for rational distribution of revenues from energy production between mining regions and the federal center;
- lack of consistency between strategies, programs and plans for socio-economic development of the regions with federal strategic documents in the sphere of the fuel and energy complex (master plans, strategies of individual industries, federal target programs) and investment programs of energy companies;
- bottlenecks in energy supply systems at interregional and intraregional levels;
- insufficient development of small-scale energetics, negligible role of local energy resources of regional and local importance in fuel and energy balances of the regions;
- absence of regional energy programs and programs for energy saving as well as urban heating development programs in many regions.

To achieve the strategic objective of the regional energy policy, the following goals must be realized:

- improvement of interaction between the federal executive authorities, executive authorities of the constituent entities of the Russian Federation and local authorities by means of legislative division of powers and responsibilities in energy saving policy

realization, energy reliability and safety provision, regulation and promotion for development in energy sector;

- the state support for development of the interregional and intraregional energy infrastructure;
- implementation of major regional strategic initiatives of the state and energy business (energy developing of the Eastern Siberia, Far East, Yamal Peninsula and Arctic);
- promotion of the integrated development of regional energy sectors.

These goals will be implemented using the following measures and mechanisms of the state energy policy:

- provision for consistency of federal and regional strategic development programs for the energy sector and its industries, legislative division of powers and responsibilities of authorities at various levels, improvement in transparency of the distribution systems of revenues derived from energy production;
- elimination of cross-subsidizing in the electric energy industry;
- development of the necessary interregional and intraregional energy transportation lines, construction of different types of energy infrastructure for regional spatial-industrial clusters of energy-intensive (resource-based) and energy-efficient (innovative) types;
- elaboration and implementation of regional energy programs, regional programs of energy saving, maximization of the cost-effective use of local energy resources, development of cost-effective decentralized and individual heating systems.

### *7. Innovation and scientific-and-technical policy in the energy sector*

The strategic objective of this component of the state energy policy is to set up a sustainable national innovative system in the energy sector providing the Russian fuel and energy complex with highly efficient domestic technologies and equipment, as well as scientific-and-technical and innovative solutions necessary to maintain the country's energy security.

The scientific-and-technical and innovative policy for the energy sector should be based on recent achievements and forecast for priority lines of development of domestic and world fundamental and applied science in this sphere and provide for new highly efficient technologies to be developed and introduced in the Russian energy sector.

During the implementation of the Energy Strategy of Russia for the period up to 2020, large complex of researches was conducted in the priority area "Energy Sector and Energy Saving" in the frames of implementing the federal target scientific-technical program "Research and Development in Priority Areas of the Science and Technology" for the period 2002–2006, the federal target programs "Research and Development in Priority Areas of the Development of Russia's Scientific and Technological Complex for the period 2007–2012" and "National Technological Base" for the period 2007–2011.

Scientific bases were laid down, technologies and experimental designs of equipment and materials were developed during this period, including:

- new efficient methods of mineral exploration, including exploration on the continental shelf;
- scientific bases for the transit of energy resources in difficult climatic and geographical conditions;
- technologies and experimental-industrial production to process hydrocarbon resources, including associated petroleum gas;
- technologies to produce synthetic liquid fuels from natural gas, coal and biomass;
- industrial complexes to develop oil fields with low-permeability structures, high-viscosity oil, and oil bitumen;
- technologies for extraction and industrial use of coal-bed methane;
- technologies and complex of equipment to produce and use coal-water fuel;
- advanced technologies and new types of electric equipment for transmission, distribution and consumption of electricity;
- energy and transport units running on alternative fuels;
- model range of heat and power plants (mini heat and power plants) of modular type;
- energy-saving and environmentally friendly lighting appliances of a new generation, using LED and mercury-free gas-discharge lamps;
- technological bases for rapid diagnosis of electric equipment;
- technological bases for heat supply systems of new generation ensuring a significant reduction in energy loss;
- technological solutions for capture and burial of carbon dioxide using modern combustion technologies;

- experimental-industrial production of power plants on fuel elements (solid polymer and solid oxide) for autonomous, backup, emergency power generation and for vehicles;
- technologies and equipment using low-potential geothermal resources.

Positive changes occurred in scientific and technological cooperation of science and energy business, while human resource centers providing for the scientific and technological needs of the energy sector were reinstated.

Recent trends in this field relate to the growth of capital-intensive scientific and technical developments in the fuel and energy complex, as well as the development of integrated research and production systems (technology parks) in the energy sector.

The major problems in this field are as follows:

- high dependency of energy companies on imported energy technologies and equipment;
- inconsistency of the technical level of energy companies with the modern requirements;
- absence of integral and coherent system of interaction between science and business providing, on the one hand, the necessary demand of energy sector for scientific and technical achievements and establishing clear market pointers for their development and introduction, and, on the other hand, developing a highly competitive market of scientific and technical services;
- absence of the developed innovative infrastructure in the fuel and energy complex (technology transfer centers, innovation and technology centers, technology parks, business incubators, training centers for innovative activities, venture funds, etc).

To achieve the strategic objective set by the innovation and scientific-and-technical policy in the energy sector, the following goals must be realized:

- reconstruction and development of the scientific and technological potential, including fundamental science, applied research and development, modernization of the experimental facilities and scientific and technical information systems;
- provision of favorable conditions for development of innovative activity aimed at radical renewal of the industrial and technological base of the fuel and energy complex, resource-saving, increase in the efficiency, reliability, security and environmental performance of energy plants and systems,

rapid development of renewable energy and improvement of the consumer properties of fuel and energy products;

- setting up the system of state support and promotion of energy companies' activities in the field of development and implementation of investment project providing for innovative development of the Russian energy sector, as well as of similar projects, been realized abroad;
- improvement of all the phases of innovative process in the energy sector, promotion of demand for and efficient use of scientific, designing, and engineering innovations;
- protection of the rights to the results of scientific and technical activities;
- utilization of the potential of international cooperation aimed at implementation of the best world solutions and achievement by the domestic developments at a higher qualitative level;
- maintenance and development of human resources and scientific bases, integration of science, education and innovation.

An innovative approach to developing the fuel and energy complex also implies creating conditions for developing a continuous process of search and application of new scientific and technical, technological, organizational and economic solutions under state regulations and clear system of interaction between all participants in this innovation process.

Among the priorities of scientific and technological progress in the energy sector the following areas should be noted.

*"Development of the Resource Base in the Fuel and Energy Complex":*

- developing innovative technologies ensuring the reproduction of fuel and energy reserves (resources), improving reliability of forecasts for promising sites, radical decrease in timetable of search and exploration works on deposits in marine waters.

*"Oil Complex":*

- improving oil recovery rate of oil fields being developed and brought into development, including fields with non-conventional hydrocarbons such as heavy (high-viscosity) oil and natural bitumen;
- introducing advanced oil recovery methods;
- developing and wide-spread use of domestic software-hardware systems, equipment, and devices to simulate and manage geological and technical activities in the development of deposits;

- provision of scientific and technological support to improve the quality of light oil products (including in line with international standards);
- introducing technologies and equipment for small-tonnage production of synthetic liquid fuels in the field of associated petroleum gas production as well as in isolated natural gas fields.

*“Gas Industry”:*

- developing and introducing technological complexes for drilling and extracting hydrocarbons on the continental shelf of the Arctic seas;
- developing domestic equipment, technologies and materials to increase the reliability of wells, drilling-in, including in low-pressure natural gas deposits;
- economic utilization of unconventional natural gas reserves;
- developing domestic equipment, technologies and materials to construct and operate trunk pipeline systems with advanced characteristics as well as distribution networks of polymeric materials;
- designing and developing equipment for “raw” products treatment, extraction of high efficiency components (ethane, helium), engine fuel and hydrogen production, including for installation at the gas fields.

*“Coal Industry”:*

- improving the quality of exploration works including introduction of the latest methods of three-dimensional modeling;
- increasing the level of development of the material, technical and scientific research base in the area of work safety, accident prevention and liquidation (including automation of industrial processes in coal extraction, developing new technologies and equipment for effective coal-bed degasification, developing equipment and protection means from methane and coal dust explosion);
- developing and introducing the system of measures aimed at improving the quality of coal production (including wide-spread use of techniques and technologies providing for improvement in the quality of coal produced, developing and applying efficient coal preparation technologies, designing equipment to produce, transport and store standardized coal fuel);

- radical technical renewal of coal production (including equipping open-pit mines with highly-productive mining transport techniques of continuous and cyclical action, including for coal-bed selective mining; developing underground coal mining technologies with prior utilization of scouring mechanized complexes and excavating equipment of new technical level, as well as short bottom-hole technology with continuous miners and self-propelled means of transportation for coal);
- developing production of liquid and gas products from high coal processing, integrated use of related resources and coal conversion waste;
- improving efficiency of scientific research on the safety of coal mining, as well as scientific research on geo-mechanical phenomena in management of coal beds prone to sudden methane outbursts and mine bumps, developing measures to prevent them.

*“Electric Energy Industry”:*

- developing gas turbines with a capacity of 300–350 MW and on their basis highly efficient condensation combined cycle gas turbine units with a capacity of 500–1000 MW and a performance index exceeding 60%;
- designing standard modular combined cycle co-generation units with a capacity of 100 and 170 MW and a performance index amounting to 53–55% for heat and power plants;
- developing environmentally friendly coal condensation units on ultra supercritical steam conditions with a performance index of 43–46% and a capacity of 660–800 MW;
- developing environmentally friendly combined cycle units on solid fuel gasification with a performance index of 50–52% and a capacity of 200–600 MW, as well as a combine cycle unit on coal synthesis gas;
- designing, developing prototypes and introducing technological energy complexes working on gas and solid fuel for combined production of electricity and synthetic liquid fuel;
- developing highly integrated intellectual backbone transmission and distribution networks of new generation (Smart Grids) in the Russia's Unified energy system;
- developing ultra-high voltage alternating and direct current electric transit lines the Siberia – Urals – European part of Russia;



- designing electrical conductors on the basis of new composite materials providing for increase in the current-carrying capacity, reduction in the construction costs of transmission lines, as well as in distribution losses;
- producing high-temperature superconductor materials as well as devices made on their basis;
- utilization of low-temperature superconducting inductive electric accumulators in electrical networks and guaranteed supply of responsible consumers;
- active development of distributed generation;
- developing power electronics along with devices based on it, especially various types of network controlling devices (flexible alternating current transmission systems (FACTS));
- developing a highly integrated information and management complex of operational dispatch management working in real time mode with expert decision-making systems;
- developing highly reliable backbone communication lines between various levels of dispatch management as well as duplicate digital channels for information exchange between objects and control centers;
- developing and broad introducing of centralized systems of emergency control covering all levels of the Russia's Unified energy system;
- designing automated electricity demand controlling systems;
- developing a complex of highly-efficient and environmentally friendly hydroelectric equipment for tidal power plants as well as facilities for their construction with the use of floating blocks;
- establishing on the basis of computer diagnosis systems for hydraulic facilities a centralized safety system to monitor force-feed hydraulic facilities at hydroelectric power plants, as well as cascades of hydroelectric power plants;
- designing a hybrid combine cycle power unit;
- developing technologies for hydrogen production (including liquid hydrogen) from water with use of electricity from nuclear, thermal power plants and renewable energy;
- designing hydrogen systems for energy accumulation and load pattern irregularity compensation with an electricity recuperation rate of at least 50% for nuclear and coal-fired power plants, as well as power plants using renewable energy.

*“Nuclear Fuel Cycle and Nuclear Energy Industry”:*

- modernization and renewal of production capacities at nuclear power plants with thermal neutron reactors;
- designing experimental and commercial nuclear power plants with fast neutron reactors;
- designing a new generation of water-moderated power reactors with supercritical steam parameters and adjustable neutron spectrum;
- researching the issues of operation and closing of fuel cycle, developing technologies and setting up fuel cycle closing enterprises providing for fuel supply to nuclear power plants considering the integral and annual consumption of natural uranium, volume of separating works, fuel reproduction parameters, specific fuel tension rate in fast neutron reactors, as well as safety issues;
- developing innovative technologies in waste processing and nuclear cycle closing aiming to approximation to the radiation-equivalent radioactive waste burial;
- developing technologies of thermonuclear fusion on the basis of domestic innovations and fruitful international cooperation, including construction of an experimental thermonuclear reactor (ITER) and a demonstration power plant with a capacity of 1 GW.

*“Heat Supply”:*

- developing and wide utilization of modular technological equipment for new construction and transition of current heating sources to co-generation;
- developing technological equipment and automated heat consumption control and management systems;
- designing efficient combined-cycle technologies with steam injection and their prior utilization in heat supply;
- developing and introducing technologies of condensation heat utilization of water vapors in combustion gases;
- developing technologies of combined low-temperature heat supply with quantitative and quantitative-qualitative heat load control and decentralization of peak heat capacities;
- developing technological equipment and designing standard technical solutions for utilization of heat pumps in heating systems in large cities and urban formations;

- developing interconnected complex of technological subsystems in the unified system of centralised heat supply and centralised cold supply of major social and industrial consumers of heat and cold;
- developing telecommunication systems of centralized technological management of major heat supply systems using highly reliable executing mechanisms and technologies of geoinformation systems;
- improving technologies of industrial production of heat pipelines with pre-applied anticorrosion cover, heat and hydro insulation and remote diagnostics, regulating and locking devices with automatic gear, as well as of assembling heat supply networks with the abovementioned units;
- developing and introducing adaptive regulating circuits and intellectual regulating systems, structures and equipment for heating and hot water supply systems.

*“Renewable Energy and Local Energy Resources”:*

- developing technologies of renewable energy utilization, as well as multi-functional energy complexes for autonomous energy supply to consumers in regions not connected to centralized energy supply networks;
- introducing efficient technologies of network electricity and heat supply on the basis of renewable energy;
- developing technologies of combined use of renewable energy, as well as technologies for compensation of variations in power output of wind and tide generating units;
- developing and introducing technologies of modern materials application in manufacturing equipment and components for generating facilities on the basis of renewable energy in order to reduce their construction costs and raise operating efficiency;
- expanding production and use of new types of fuel derived from various types of biomass.

Achieving the goals set and promotion of the priority areas of scientific and technological progress in the energy sector will be realized with the use of the following measures and mechanisms of the state energy policy:

- detection and economic support of prospective trends of scientific, research and innovative activity, as well as crucial technologies in the fuel and energy complex, taking into consideration their anticipated efficiency and world tendencies; state support of applied research and development;

- provision of fundamental science funding in energy field, aimed at the search of fundamentally new ways of energy demand efficient meeting, in particular, at the expense of budget assets, as well as by returning a part of commercial profit into the research and development sphere;
- innovative cycle restoration: fundamental research – applied research – design project – prototype models – production by means of state participation in creation of prototype models, exemption of companies from taxation of profit invested into research and development activity, provision of tax benefits to energy companies for the initial period of implementation of new domestic machinery and technologies, as well as models of foreign machinery and technologies, which are new for Russia;
- developing incentive taxation for engineering and designing companies, as well as for any companies (including manufacturing ones) implementing advanced (innovative) technologies in the energy sector;
- developing a system of technological forecasting ("Foresight") in the energy sector;
- elaboration of target scientific and technical and innovative programs;
- enhancement and development of consolidated industrial financial sources for funding research and development works, concentration of budget and off-budget assets for the major innovative projects realization;
- promotion of venture business in the sphere of innovations in the energy sector;
- developing federal and regional centers of science and high-technologies in the fuel and energy complex;
- state support in importing crucial integrated technologies and purchase of foreign assets – technological "donors" in the field of the fuel and energy complex;
- developing an implementation system for the intellectual property objects and other results of research and development activity in the fuel and energy complex;
- developing proving grounds for testing samples of new machinery and technologies on the basis of state-private partnership;
- developing regularly updated databases on the most advanced domestic and foreign developments in the energy sector.

## *8. Social policy in the energy sector*

The strategic goal of the state policy in this field is the development of social partnership between the energy sector and the society, as well as reproduction of human capital in the energy sector.

Efficient interaction between the society and the energy business is the most important condition of successful realization of the objectives and goals of the Strategy.

The following goals were achieved in the course of implementation of the Energy Strategy of Russia for the period up to 2020:

- establishing an institution of guaranteeing suppliers in the electric energy industry;
- implementing social support measures in the context of restructuring the coal industry (provision of free allowance coal, additional pension provision, assistance in purchase (construction) of housing, creation of new jobs, assistance in resettlement of miners' families from unpromising mining towns and settlements);
- reduction in general injury rate in coal mining more than in half, reduction in the number of accidents – by 30%;
- commencement of implementing projects on social infrastructure improvement in the energy producing regions, especially in regions with extreme natural and climatic conditions;
- commencement of implementing a complex of measures aimed at professional training and advanced training of employees engaged in the fuel and energy complex.

Current trends in the stated field relate to sophistication of relationships and mutual dependence of the society and energy business, growth of the population's expenditures on energy goods and services, enhancement of the human potential role in the development of the fuel and energy complex.

The main problems in this field include:

- insufficient level of social infrastructure development in main coal mining and oil and gas producing regions of the country;
- the necessity for enhancement of the state control over retail prices for engine oil, gas, heat and electricity for the population;
- increase in the human factor role in major accidents at mines for the last years;
- insufficient participation of the society in support and development of the energy business in the country;

- general decrease in the human potential level in the fuel and energy complex;
- low level of energy service provision.

To achieve the strategic objective set by the social policy in the energy sector, the following goals should be realized:

- provision of reliable energy supply of the population at affordable prices;
- developing a practical cooperation of the society and energy business in solving problems of the energy sector functioning and development;
- developing and enhancing efficiency of the human potential use in the energy sector.

The designated goals will be achieved with the use of the following measures and mechanisms of the state energy policy:

- improving regulations, including antimonopoly regulations, of retail prices for energy (gas, heat, electricity, oil products) aiming to maintain acceptable share in expenditures of the population on required power supply;
- enhancing responsibility of energy business for power supply of the population;
- introducing mandatory norms for rates of reserve (autonomous) power supply provision for socially significant facilities in housing, municipal and budget spheres;
- creating safe labor conditions at enterprises of the fuel and energy complex, reducing accident and injury rates;
- developing and providing efficient functioning of the comprehensive system of illness and injury prevention at enterprises of the fuel and energy complex and employees' health rehabilitation;
- raising efficiency of the system of the target social support of the population;
- enhancing publicity of energy companies, including at the expense of their activity transparency;
- improving comprehensively the education system (including primary and secondary professional education) and further training of specialists of all levels, taking into consideration the development of the system of specialized regional centers, as well as the system of occupational retraining and personnel retraining in accordance with modern requirements;

- improving and implementing principles of project management of human resources in the fuel and energy complex;
- developing energy service system;
- developing social partnership of the energy business and the society, in particular, at the expense of more active participation of the population in the share capital of energy companies and public discussion of new energy projects in the regions.

### *9. Foreign energy policy*

The strategic objective of the foreign energy policy is the maximum efficient use of the Russian energy potential for full-scale integration into the world energy market, enhancement of positions thereon and gaining the highest possible profit for the national economy.

The global nature of energy problems, their rising politicization, as well as objective importance of the Russian fuel and energy complex in the world energy sector predetermine the important role of the foreign energy policy of the country. Currently Russia has already occupied one of the leading positions in the world system of energy resource turnover, it takes an active part in international cooperation in the sphere of fuel and energy resources production and their supply to energy markets. Russia is interested in provision of further increase in efficiency of production and export of all major energy resources and products of processing thereof, as well as of technologies with respect to which Russian energy and industrial companies have competitive advantages.

Stable relationships with traditional consumers of Russian energy resources and shaping equally stable relationships on new energy markets are the most important vectors of the country's energy policy in the sphere of global energy security provision in accordance with national interests of the country. The policy of Russia in the stated field is being realised in accordance with decisions and recommendations adopted at the St. Petersburg G8 summit in 2006. It is open and built on the principles of predictability, responsibility, mutual trust and taking into account interests of energy producers and consumers.

The progress of implementing the Energy Strategy of Russia for the period up to 2020 in the stated field is characterized with the following features.

Export of major Russian fuel and energy resources is growing, oil products export, substituting the export of crude oil, is also developing.

The following large-scale projects on export energy infrastructure construction aimed at enhancing the reliability of supply and transit of Russian energy resources to Europe were implemented:

- "Goluboy Potok" (Blue Stream) gas pipeline (16 billion m<sup>3</sup> of gas per year, 2005);
- the first phase of the Baltic pipeline system (65 million tons of oil per year, 2006);
- Yamal-Europe gas pipeline (33 billion m<sup>3</sup> of gas per year, 2007);
- the first phase of the "Sever" (North) oil-product pipeline (8.4 million tons of oil products per year, 2008).

Implementation of the following new infrastructure projects, aimed at diversification of export markets for Russian energy resources, was started:

- "Severnny Potok" (Nord Stream) gas pipeline (55 billion m<sup>3</sup> of gas per year);
- the Eastern Siberia – Pacific ocean oil pipeline (80 million tons of oil per year).

Agreements for construction "Yuzhny Potok" (South Stream) gas pipeline (30 billion m<sup>3</sup> of gas per year), the Pre-Caspian gas pipeline (20 billion m<sup>3</sup> of gas per year), and the Burgas – Alexandrupolis oil pipeline (35 million tons of oil per year) were signed.

Decisions were made on construction of the second phase of the Baltic pipeline system (50 million tons of oil per year), and expansion of the Caspian Pipeline Consortium.

The practice of energy assets exchange and mutual share participation of Russian and foreign companies in the entire economic chain – from exploration and production to distribution of energy resources to end users – is being developed. Transition to market relationships in the sphere of natural gas supply to the countries of the Commonwealth of Independent States is at the phase of accomplishment.

Energy dialogue with the largest countries – consumers and producers of energy resources, as well as with major regional unions (European Union, Eurasian Economic Community, etc.) and international organizations (Shanghai Cooperation Organization, Organization of Petroleum Exporting Countries, Gas Exporting Countries Forum, International Energy Agency, etc.) is being actively conducted.

Current trends in this field relate to high volatility of world prices for major fuel and energy resources and aggravation of competition on traditional sale markets for Russian energy resources.



Among the main problems in the stated field are the following:

- reduction in demand and cut in prices for energy resources due to the world economic crisis;
- insufficient diversification of sale markets for Russian energy resources and of export commodities structure;
- preservation of the Russian export dependence on transit countries;
- politicization in energy relationships between Russia and foreign countries;
- low level of Russian energy companies activity at foreign markets.

In order to achieve the strategic objective of the foreign energy policy the following goals must be realized:

- appreciation Russia's national interests in the developing system of world energy markets functioning aiming at their predictable and stable development;
- diversification of export energy markets and export commodities structure;
- provision of stable conditions on energy markets, including guaranteed demand and sound prices for major exported Russian energy resources;
- enhancement of leading Russian energy companies' positions abroad;
- provision of efficient international cooperation in implementation risky and sophisticated projects in Russia (including shelf Arctic projects).

Development and implementation of the foreign energy policy is based on the principle of consistency providing coordination of activities at the regional level and in relationships with international organizations, synchronized activity of the state and energy companies, mechanisms of control and monitoring, determination to achieve the shared result.

The abovementioned goals should be realized with the diplomatic support of Russian energy companies abroad, as well as by means of the following measures and mechanisms of the state energy policy:

- active participation in international negotiation processes on energy issues, provision of balance between interests of importers, exporters and transmitters of energy resources in international treaties and international organizations;

- development of energy cooperation with the countries of the Commonwealth of Independent States, Eurasian Economic Union, North-Eastern Asia, Shanghai Cooperation Organization, and European Union as well as with other international organizations and countries;
- coordination of activity on world oil and gas markets with the countries-members of the Organization of Petroleum Exporting Countries and the Gas Exporting Countries Forum;
- assistance in developing the united European-Russian-Asian energy area;
- assistance in provision favorable and non-discriminatory environment for domestic energy and service companies (as well as for foreign companies with Russian share holders) on world markets, including their access to productive and distributive segments of foreign markets;
- assistance in foreign investments attraction, primarily for technically sophisticated and risky projects, on mutually beneficial basis;
- provision of Russian energy companies with access to the resources of world financial markets and advanced energy technologies;
- stimulation of Russian energy technologies and services development and export;
- promotion of transport infrastructure construction in the east, south, north-west and north of the country aimed at diversification of sale markets and export destinations for Russian energy resources;
- stimulation of the growth in the share of highly processed energy resources in the overall structure of the Russian energy export;
- rational development of transit energy flows through the territory of Russia;
- development of new forms of international cooperation (including technological one) in the energy sector;
- provision of the Russian energy policy transparency and coordination of its energy strategy with prospective plans and energy strategies of other market players;
- active participation of Russia in international cooperation on development of the energy of the future (hydrogen, thermonuclear, tidal energy, etc.).

## VI. PROSPECTS AND STRATEGIC INITIATIVES OF THE FUEL AND ENERGY COMPLEX DEVELOPMENT

### *1. Fuel and energy balance of Russia for the period up to 2030*

The projected fuel and energy balance of Russia is based on the abovementioned forecast hypotheses for socio-economic development of the country and main components of energy policy. It provides harmonization of domestic demand and export of energy resources with volumes of their production and import, as well as mitigation of existing disproportions connected with domination of natural gas and small share of coal and non-fuel energy resources (nuclear and renewable energy) in the structure of domestic energy consumption.

The projected fuel and energy balance of Russia for the period up to 2030 provides for the following:

- reduction in the share of gas in the primary energy consumption from 52% in 2005 to 46–47% by 2030;
- increase in the share of non-fuel energy in the primary energy consumption from 11% up to 13–14% by 2030;
- large-scale reduction in the specific energy intensity of the economy and the energy sector (by 2.1–2.3 times) along with insignificant growth of domestic consumption (by 1.4–1.6 times), export (by 1.1–1.2 times) and production (1.3–1.4 times) of energy.

Indicators of strategic development of the resource base of the fuel and energy complex for the period up to 2030 are indicated in Appendix 3.

The projected fuel and energy balance of Russia for the period up to 2030 is shown in Appendix 4.

### *2. Strategic initiatives of the fuel and energy complex development*

The Strategy provides for realization of strategic initiatives in the sphere of the fuel and energy complex development, aimed to satisfy growing demand of the country's economy for energy resources, optimize the structure of energy production and consumption, improve energy efficiency of the economy and energy sector, promote in en-

hancing international, national and regional energy security. The most important strategic initiatives include the following:

- development of oil and gas complexes in the eastern regions of the country;
- development of hydrocarbon potential of the continental shelf of the Arctic seas and northern territories of Russia;
- development and spatial diversification of energy infrastructure;
- development of non-fuel energy;
- promotion of energy saving.

Development of oil and gas complexes in the eastern regions of the country (the continental shelf of Sakhalin, the Republic of Sakha (Yakutia), the Magadan and Irkutsk Regions and the Krasnoyarsk Territory) and construction of appropriate industrial, transport and social infrastructure will lead to energy self-sufficiency of the stated regions as well as diversification of the Russian hydrocarbons export destinations at the expense of the countries of the Asia-Pacific region. Involvement of multicomponent hydrocarbon resources of the region into industrial development will promote petrochemical and gas chemical production, assist in advanced social and economic development of the Eastern Siberia and Far East. As a result, annual growth rates of gross regional product in the region will exceed average growth rates in the country by at least 0.5–1.5%.

Development of hydrocarbon potential of the continental shelf of the Arctic seas and northern territories of Russia is intended to play the stabilizing role in oil and gas production dynamics, compensating possible decrease in production level in traditional oil and gas producing regions of the Western Siberia for the period of 2015–2030.

Creation of industrial centers of natural gas production on the Yamal Peninsula and continental shelf of the Barents, Pechora and Kara seas will satisfy the prospective demand of the economy for natural gas, provide energy security of the country and sustainable development of the fuel and energy complex on a long-term basis under conditions of growing demand of economy for energy resources.

Comprehensive development of the stated territories and construction of appropriate sea and pipe transport infrastructure will promote development of industries involved in elaboration of modern engineering facilities, technologies of search, exploration, production and transportation of oil and gas on the continental shelf of the Russian Federation, as well as development of the Northern Sea Route.

Development and spatial diversification of the energy infrastructure because of the strategic role of the energy sector in the Russian economy are the necessary condition for sustainable social and economic long-term development of the country.

The following are the most important strategic energy infrastructure projects, the implementation of which has already begun or is planned for the nearest future:

- construction of oil pipeline Eastern Siberia – Pacific Ocean;
- construction of oil-product pipeline systems “Sever” (North) and “Yug” (South);
- construction of gas pipelines “Severniiy Potok” (Nord Stream) and “Yuzhniy Potok” (South Stream);
- construction of multi-line gas-transport system from the Yamal Peninsula;
- development of sea port and transport infrastructure for liquid hydrocarbons transportation (oil, condensate, liquefied natural gas, wide fraction of light hydrocarbons).

Development of the non-fuel energy is determined by the necessity to restrict environmental impact of the fuel and energy complex facilities, as well as by future stabilization of hydrocarbon production under conditions of ongoing growth of demand for fuel and energy resources. The Strategy provides for development of nuclear and hydraulic energy industries in accordance with regional peculiarities of demand for electricity, as well as peculiarities of load pattern regulation and allocation of generating capacities of various kinds. Thus development of nuclear power plants is provided primarily for the European part of Russia, and the development of hydroelectric power plants – for the Eastern Siberia and Far East.

The Strategy also provides essential role for development of renewable energy. Involvement of renewable energy, including geothermal, solar, wind and bioenergy, etc., into the fuel and energy balance will enable to balance the demand for energy and reduce environmental load of energy sector facilities.

Energy saving is also one of the most important strategic initiatives of the Strategy, because without its large-scale implementation development of the Russian economy will be limited by energy and environmental factors. Realization of available technological and structural potential for energy saving will make it possible to provide for harmonization of energy demand and supply, as well as significantly limit greenhouse gases emission though maintaining high rates of economic

growth. Achievement of these objectives will require development of adequate incentives for energy saving among energy producers and consumers.

### *3. Development of the resource base in the fuel and energy complex*

Russia possesses one of the world's largest mineral resource potential which is the basis for guaranteed provision of the country's economic and energy security, satisfaction of current and prospective demand of the Russian economy for crude hydrocarbons, coal and uranium. The volume and structure of fossil fuel reserves, as well as their quality and exploration degree along with trends of economic development directly influence economic potential of the country and social development of its regions. Long-Term State Program of Subsoil Exploration and Reproduction of the Mineral Resource Base of Russia based on the balance between minerals consumption and reproduction is the basis for determination strategic goals of the energy resource base development.

Russia possesses significant oil resources. Meanwhile, initial oil reserves of the country have already been depleted by more than 50%. In the European part of Russia this figure amounts to 65%, in particular, in the Urals and Volga regions it exceeds 70%. The level of reserve depletion at large dynamically developed deposits approaches 60%.

Peculiarity of the remaining oil reserves structure, both at the country level and of major oil producing companies, is that 77% of current oil production comes from large deposits. provision with which is 8–10 years. The share of hard-to-recover reserves is constantly growing. Currently it reaches 30 to 65% for major oil producing companies. Besides, newly prepared reserves are often concentrated in middle- and small-scale deposits and are predominantly hard-to-recover.

Expected resources of natural gas are estimated at 164.2 trillion m<sup>3</sup>, including 63.8 trillion m<sup>3</sup> on the continental shelf of the Russian Federation. Proved balance reserves of natural gas of industrial grades A+B+C<sub>1</sub> amounted to 48 trillion m<sup>3</sup> as of 01 January 2008, including 6.9 trillion m<sup>3</sup> on the continental shelf of the Russian Federation.

The structure of gas resources in Russia is more favorable than that of oil. Nevertheless, the share of complex and hard-to-recover reserves tends to increase. The problems with gas resources development relate to reduction in commercially developed high-yielding reserves embedded at shallow depth, complicated natural and climatic conditions and remoteness of prospective major gas producing centers from existing

centers of gas industry development (the Eastern Siberia, Far East, Yamal Peninsula, continental shelf of the Arctic seas), the necessity to develop significant reserves of low-pressure gas, increase in the share of wet, condensate and helium-content gases in the structure of explored reserves, which require appropriate gas processing infrastructure for efficient development.

Gas reserves of major exploited deposits in the Western Siberia — the main gas producing region of the country (deposits Medvezhye, Urengoiszkoye, Yamburgskoye) have been depleted by 65–75%. Currently they are at the phase of actively declining production.

The Strategy, taking into account current situation in the sphere of oil and gas reserves, existing programs for the period up to 2030 and terms of licensing the subsoil use in the Russian Federation, as well as on the targeted levels of oil and gas production, provides for expanded reproduction of mineral resource base of hydrocarbons by means of exploration works. According to the estimates, cumulative increment of oil reserves in the amount of about 12 billion tons (it may reach 14 billion tons if measures aimed at increase in the rate of oil recovery would be successfully implemented) and gas reserves in the amount of at least 16 trillion m<sup>3</sup> may be provided at the expense of geological exploration works by 2030.

Besides, current inferred reserves and resources of distributed subsoil fund in main oil and gas producing regions may provide reproduction of mineral resource base not more than by 50% in the nearest 10–15 years. The rest of increment will come from new deposits, including in new oil and gas producing regions and waters of Russia. In particular, the increment of oil reserves required for achievement of optimal production levels in the Eastern Siberia and Far East is estimated at 1.8 billion tons by 2020 and over 3 billion tons by 2030. This will require substantial increment of reserves outside the zone of the oil pipeline Eastern Siberia — Pacific Ocean.

Within the whole period up to 2030 the Western-Siberian, Leno-Tungusskaya, and Timano-Pechorskaya oil and gas producing areas will be the main regions of oil and gas reserves increment. Prospecting, exploration and development of oil and gas deposits on the continental shelf of Arctic, Far Eastern and Southern seas will become the promising areas of the Russian oil and gas industries resource base development.

Total initial recoverable resources of hydrocarbons on the Russia's continental shelf amount to 90.3 billion tons of coal equivalent (which consist of 16.5 billion tons of oil with condensate and 73.8 trillion m<sup>3</sup>

of gas). They are distributed along 16 large sea oil and gas producing areas and basins. The major part of these resources (about 70%) falls within the continental shelf of the Barents, Pechora and Kara seas.

The exploration degree of initial recoverable resources of hydrocarbons on the Russia's continental shelf is low and does not exceed 10% in most regions. Meanwhile the exploration degree of gas and oil resources on the continental shelf of the Caspian Sea reaches 15.7 and 15.9% respectively, gas and oil resources on the continental shelf of the Sea of Okhotsk — 14.4 and 17.9% respectively, gas resources on the continental shelf of the Barents Sea — 15.5%.

The preparation of hydrocarbon reserves in the Russian sector of the Caspian Sea and on the continental shelf of the Barents, Kara seas and the Sea of Okhotsk is supposed to grow fast, taking into consideration the geographical distribution of expected oil and gas resources, as well as the attained level of geological and geophysical exploration.

The search of new oil and gas deposits will also continue in oil and gas producing areas with declining oil production: the Volga-Urals and North Caucasian areas, as well as within the Russian part of the Caspian oil and gas producing area. The volumes of deep-hole drilling for oil and gas within the period up to 2030 will exceed 70 million metres.

Russia possesses substantial coal resources — over 4000 billion tons. In particular, balance reserves as of 01 January 2008 amounted to 272.6 billion tons (193.3 billion tons of grades A+B+C<sub>1</sub>, and 79.3 billion tons of C<sub>2</sub> grade), while off-balance reserves accounted to 50.2 billion tons.

Thermal coal constitutes the prevailing share of the resources — 3641.9 billion tons (89%), and the share of coking coal is only 445.6 billion tons (11%).

The main part of coal resources is concentrated in the Siberia (64%), Far East (30%), European part of Russia and Urals (6%). The volume of explored coal reserves suitable for open-cut mining constitutes 117.6 billion tons (61%), with prevailing share of brown coal — 93.4 billion tons (79.4%) as of 01 January 2008. 99% of these reserves are concentrated in the Siberia and Far East. The reserves of coking coal suitable for open-cut mining amount to 3.2 billion tons or 2.7% (predominantly the Kuznetsk and South Yakutia basins).

Solving the problem of energy deficient regions as well as provision of by-product-coking industry with valuable sorts of coal will require improvement in solid fuel resource base exploration and reproduction taking into account the increasing role of coal in the fuel and energy balance.



The expected resources of uranium of the most proved categories  $P_1$  and  $P_2$  amount to 830 thousand tons, 60% of which are concentrated in the Siberian federal district.

Balance reserves of uranium in Russia, suitable for development under the current economic conditions amount to 547.8 thousand tons, including 216.2 thousand tons of grades  $A+B+C_1$ , and 331.6 thousand tons of  $C_2$  grade, as of 01 January 2008. Most of them (95%) are concentrated in the Siberian and Far Eastern federal districts. Meanwhile, the possibilities of natural uranium mining and production available in Russia do not meet aggregate demand therein from the part of nuclear power enterprises. The difference between annual production of natural uranium and its total consumption is planned to be covered at the expense of stock reserves and reuse with concurrent transition to nuclear-fuel conversion in fast-neutron reactors, as well as at the expense of purchase and production of uranium in the countries of the Commonwealth of Independent States.

The main ways to increase natural uranium production for the period up to 2030 are the following:

- development of existing enterprises and enterprises under construction: "Priargun Industrial Mining and Chemical Association" (the Zabaikalye Territory), "Dalur" (the Kurgan Region), "Khiagda" (the Republic of Buryatiya);
- construction of new uranium mining enterprises: Elkon Ore Mining and Smelting Plant (the Republic of Sakha (Yakutia)), Uranium Mining Company "Gornoye" and Olovsky Mining and Chemical Plant (the Zabaikalye Territory);
- performance of substantial amount of geological exploration works, assessment of reserves and newly found uranium deposits for putting them into operation at the second and third phases of the Strategy implementation.

At the first phase of the Strategy implementation geological exploration works in traditional energy producing regions will be promoted, besides, all necessary conditions (regulatory, taxation, institutional, etc.) will be created for the development of the resource base of the fuel and energy complex in remote and hard-to-reach areas of the country, including the Eastern Siberia, Far East, Yamal Peninsula and continental shelf of the Arctic seas. The Strategy contemplates creation of the centralized and vertically integrated system of mineral resources management aimed at maximum efficient and comprehensive subsoil use. By the end of the first phase the ratio of fuel and energy resources annual increment and the volume of their production will approach to 1.

At the second phase, the active development of oil and gas industries mineral resource base will start in the Eastern Siberia and Far East, shelf regions, including Russian sector of the Arctic, as well as on the Yamal Peninsula, in the Gulfs of Ob and Taz, in the European North and Caspian region. In the course of geological exploration works three dimensional seismic methods will be widely used, technologies of and equipment for geological radioscropy will be created. Volumes of geological exploration works will substantially increase, their efficiency will rise, which will make it possible to provide sustainable reproduction of mineral resource base in the main sectors of the fuel and energy complex.

At the third phase, the development of new energy producing regions will continue on the basis of modern exploration methods and technologies, state-private partnership and attraction of investments, including foreign ones. Maintenance of energy production will require substantial capital investments into the most advanced technologies in the sphere of geological exploration and mining of fuel and energy resources. Reduction in reserves of fuel and energy resources in the currently leading energy producing regions will take place.

#### *4. Oil complex*

The strategic goals of the oil complex development are as follows:

- stable, uninterrupted and economically efficient meeting of domestic demand for oil and oil products;
- active participation in meeting of the world demand for oil and oil products, without prejudice to domestic demand and needs of future citizens generations;
- provision of stable revenues for the Russia's consolidated budget corresponding to the energy sector significance in generation of the gross domestic product and export at the given phases of the state energy policy implementation;
- investment and innovative renewal of the oil complex aimed at enhancement of its energy, economic and environmental efficiency.

The progress of the Energy Strategy of Russia for the period up to 2020 implementation is characterized with the following features in the stated field.

Oil production at a number of large deposits has started, including Verkhnechonskoye and Talakanskoye deposits. Active development of Timano-Pechorskaya oil and gas area was commenced. Annual oil

output there exceeded 25 million tons. Oil mining at shelf deposits (projects "Sakhalin-1" and "Sakhalin-2") was launched.

New trunk oil pipeline systems were built, including the Baltic pipeline system with an annual carrying capacity of 65 million tons, port facilities for transshipment and sea transportation of liquid hydrocarbons were constructed in the town of Primorsk and settlement Varandei. Construction of the oil pipeline Eastern Siberia – Pacific Ocean with an annual carrying capacity of 80 million tons was launched to provide the oil complex development in the east of the country and diversification of oil export destinations.

The volume of oil refinery throughput increased from 173 million tons in 2000 up to 237 million tons in 2008, while the refining depth increased from 70.8 to 72.6%.

In the sphere of the oil complex state regulation, the system of customs duties calculation pertaining to oil and oil products was improved; it promotes export of oil products and promptly reacts at changes in the situation with world prices. As a result, the export of oil products grew from 57 million tons in 2000 up to 112 million tons in 2008.

Measures of antimonopoly regulation aimed at restraint and prevention of misuse by vertically integrated companies of their dominant position and anticompetitive collusions on Russian domestic markets of oil products, have been actively applied.

Tax burden on oil complex enterprises was reduced, the mineral extraction tax and deposit development tax were differentiated depending on natural climatic conditions and development stage, the system of excise duties was improved.

The following trends have to be taken into account at consideration of oil complex development prospects:

- depletion of major oil deposits in the Western Siberia and, hence, necessity to develop oil resources on the continental shelf of Arctic and Far Eastern seas, in the Eastern Siberia and Far East;
- increase in the share of hard-to-recover reserves (superviscous oil, natural bitumen, etc.) in the structure of mineral resource base of the oil complex;
- extensive involvement of combined oil and gas deposits with multi-component composition into operation and related necessity to utilize associated petroleum gas, methane, helium and gas condensate;
- increase in the cost of hydrocarbons mining and transportation.

The main problems of oil complex development include the following:

- inefficient subsoil use (low rate of oil recovery) and absence of complex technologies of mining and economically efficient disposal of hydrocarbons (burning of associated petroleum gas);
- low investment capacities of oil companies caused by high tax burden on the industry;
- infrastructure restrictions for diversification of oil export destinations;
- high degree of monopolization of oil product markets at All-Russian, regional and local levels;
- high degree of depreciation of oil refining industry fixed assets;
- low quality of oil products.

In order to achieve the strategic objectives of oil complex development the following principal goals must be realized:

- provision of expanded reproduction of oil resources at the expense of geological exploration works and timely preparation of deposits for operation both in traditional and new regions of oil production;
- development of new large oil centers contemplating oil production, disposal of associated petroleum gas and development of oil and gas chemistry on the basis of combined oil and gas deposits with multi-component composition, predominantly in the Eastern regions of Russia and on the continental shelf of Arctic and Far Eastern seas;
- improvement of oil mining technologies, including introduction of modern methods of reservoir recovery increase for the purpose of increase in oil-recovery rate;
- development of transport infrastructure, including pipelines, aimed at increase in efficiency and diversification of structure and destinations of oil and oil products transportation;
- oil refinery development aimed at increase in oil processing depth and improvement of oil products quality;
- promotion of development of independent structures in the field of production, storage, wholesale and retail of oil products;
- resource- and energy-saving, reduction in losses at all stages of technological process in the course of resource preparation, oil production, transportation and processing.

Subject to accomplishment of the stated goals, the oil complex will be able to completely satisfy external and internal requirements of Russia for oil and oil products of high quality within the entire period of the Strategy implementation.

Oil production in the European part of the country will increase mainly at the expense of development of oil reserves in the Timano-Pechora area, on the continental shelf of the Arctic seas and in the Russian sector of the Caspian Sea, with concurrent reduction in mining in the Volga region and in the Urals.

With respect to the Western Siberia, while stabilization and steady reduction of oil production will take place in the Khanty-Mansi Autonomous Area, in Yugra, the growth of oil production will occur in the Yamalo-Nenets Autonomous Area.

In the Eastern Siberia, commercial development of oilfields is supposed in Vankorsko-Suzunskiy region in the north-western part of the Kransnoyarsk Territory, along the route of the oil pipeline Eastern Siberia – Pacific Ocean in the Kransnoyarsk Territory, Irkutsk Region and Republic of Sakha (Yakutia) (Verkhnechonskoye, Talakanskoye, Srednebotuobinskoye, Yurubcheno-Tokhomskoye and other fields).

In the Far East production facilities at projects "Sakhalin-1", "Sakhalin-2" and others (the continental shelf of the Sakhalin Island) will be operated.

One of strategic goals in the oil sector is the maximum possible utilization and saving of associated petroleum gas resources. The Strategy contemplates that by the end of the first phase of its implementation 95% of recovered associated petroleum gas will be efficiently used, in particular, by means of processing thereof at gas processing plants with separation of gas into ethane, propane and butane, and, if technology requires so, into butane isomers. This problem is most important for new development regions in the Eastern Siberia, where resource base of hydrocarbons is complex: not only most oilfields contain oil and gas, but they also have a multi-component composition.

Taking into consideration strategic significance and complex nature of the stated goal, its solution will require a coordinated system of measures using the following principal mechanisms of the state energy policy.

Creating a favorable economic environment:

- formation of necessary legislative support regulating, in particular, issues of priority access to the wholesale market of electric energy (capacity) produced at the expense of associated petroleum gas, as well as priority right of access to available capacities of gas transportation networks for suppliers of the oil products: dry (residue) gas;

- assistance in application of financial flexibility mechanisms of the Kyoto Protocol in the course of implementation of associated petroleum gas utilization projects;
- release from customs duties on machinery and equipment having no Russian analogues for the purpose of associated petroleum gas utilization;
- provision of the opportunity of accelerated equipment depreciation for the purpose of associated petroleum gas utilization.

Developing a system of prospective regulations, standards and norms:

- introduction of additional indices for calculation of payment for emissions of harmful (polluting) substances produced at associated petroleum gas burning at flaring units;
- organization of control over rational utilization and accounting of volumes of burnt and dissipated associated petroleum gas;
- determination of requirements to the level of associated petroleum gas efficient utilization at granting rights for subsoil use at sites containing oil and oil condensate deposits.

Supporting strategic initiatives:

- monitoring of actual and expected results of implementation of oil companies' programs aimed at raising the degree of associated petroleum gas utilization and timely taking required synchronizing measures, including those using the principles of state-private partnership;
- reflection of issues related to raising the degree of associated petroleum gas utilization in program documents of federal and regional levels, in particular, in the developing state program of energy saving and energy efficiency raising;
- state support in developing new technologies for associated petroleum gas utilization and realization of appropriate pilot projects;
- assistance in developing small and medium businesses in the field of associated petroleum gas utilization;
- development and promotion of international cooperation in the sphere of implementation and improvement of best practices in associated petroleum gas utilization.

Oil chemical and gas chemical industries will be widely developing. Large oil complexes comprising enterprises on production and refinery of oil and associated petroleum gas, as well as oil chemical and gas chemical facilities will be established in new oil-producing regions.

Oil refining will be developing at advanced growth rates. The refining depth will be increased from 72 up to 83% by the end of the second phase and up to 89–90% by the end of the third phase of the Strategy implementation.

Oil refineries in Russia utilize practically all processes developed by the world industry. However the ratio of the processes deepening oil refinery and improving the quality of fuel and the processes of primary oil refining is substantially behind world indicators.

Thus, reconstruction and modernization of oil refineries will be aimed at priority development of technological complexes for deepening oil refining and reduction in specific intensity of oil consumption per unit of end products (catalytic cracking, hydro cracking, coking of residuals, viscosity breaking, bitumen production, etc.), as well as at introduction of modern technologies of catalytic reforming of gasoline fractions, hydrotreater of diesel and jet fuels, isomerization and alkylation.

Primary oil refining facilities are planned to be expanded (Tuapse Oil Refinery – up to 12 million tons per year, Kirishinefteorgsintez – by 12 million tons per year), besides, new oil chemical complexes are to be constructed (the Republic of Tatarstan – at least 7 million tons per year, the Far East — Primorskiy Oil Refinery – 20 million tons per year). Support of modernization, expansion of capacities and construction of oil refineries and oil chemical complexes, independent from vertically integrated oil companies, are contemplated.

Doubtless priority of deep oil refining development is satisfaction of the domestic market demand. However, the Strategy provides for optimization of oil refining volumes inside the country (with export delivery of a part of oil products) and volumes of crude oil export (with priority delivery of a part of it to oil refineries situated abroad and belonging to Russian companies).

Development of pipeline transportation of oil and oil products will be performed adequately with the growth of volumes and diversification of internal and external deliveries of liquid hydrocarbons. The following tasks are planned to be accomplished: increase in the share of pipeline transportation of liquid hydrocarbons in the entire volume of transportation of oil, and, particularly, oil products; provision of conditions for development of new oil-producing regions in the country; provision of balance between required volumes of oil transportation and transport system capacity; as well as reduction in dependence of Russia on transit of oil and oil products through the territories of adjacent countries.

The following projects are the most important in the sphere of development of pipeline transportation of oil and oil products:

- completion of construction of the oil pipeline Eastern Siberia – Pacific Ocean with an annual capacity of 80 million tons;
- construction of the oil pipeline Unecha – Ust-Luga (the second line of the Baltic pipeline system);
- development of oil and oil products export terminals in the ports of Primorsk, Ust-Luga, and Nakhodka;
- development of oil-products pipeline system (driving up to the rated capacity of the oil-product pipeline “Sever” (North), construction of the oil-product pipeline Andreevka – Ufa – Subkhankulovo – Almetyevsk – Kstovo, construction of the oil-product pipeline “Yug” (South).

Besides pipeline transportation of oil and oil products, sea transportation of liquid hydrocarbons will be developed, including transportation from coastal areas of the Russian part of the Arctic region.

In the sphere of oil and oil products export the state aims at diversification of commodities structure and destinations of export predominantly at the expense of the eastern vector of deliveries development. The Strategy contemplates increase in the share of the eastern destination in the structure of liquid hydrocarbons export from 8% up to 22–25% by the end of the third phase of the Strategy implementation.

Meanwhile, volumes of oil and oil products export will remain stable throughout the entire period of the Strategy implementation, with insignificant fluctuations. Annual levels of liquid hydrocarbons export will fluctuate within the range of 315–330 million tons.

Expansion of Russian companies presence in foreign technological chains from oil production to oil refining and distribution of liquid hydrocarbons, increase in transit of oil from adjacent countries through the Russian territory, development of new marker sort of Russian oil REBCO as well as promotion of international trade in it will become strategic areas of foreign economic activity in the oil complex.

Necessary conditions for sustaining oil complex efficiency will be provided on the domestic oil and oil products market at the expense of guaranteeing equal and transparent market environment for all business entities. High level of competitiveness will be provided at the expense of the following:

- promotion of open trade and development of oil and oil products exchange trade, including at the regional level;



- determination of procedure for non-discriminatory access to transport infrastructure;
- elimination of excessive administrative barriers for oil exploration, production, storage and transportation as well as for permits obtainment for petrol stations construction and allocation of land plots for such construction.

Under conditions of sharp decrease in world oil prices and (or) crisis situations on financial markets the state will provide for necessary support for oil business by means of state guarantees provision for investments into the oil complex development, re-financing of oil companies liabilities, taxation optimization, for maintenance of financial and economic sustainability of Russian oil companies, paying a special attention to promotion of small and medium oil business.

Energy saving in the oil complex will be implemented in the following principal fields:

- oil production: reduction in oil consumption for technological needs and losses, increase in oil recovery rate, optimization of oil wells working regime, as well as improvement of control and accounting of oil;
- oil transportation: reconstruction of pipeline facilities and system organization of technological regimes of their operation, reduction in oil losses, introduction of automated management systems and telemetry, improvement of oil-transfer facilities technical state, as well as extensive introduction of floating-roof storage tanks;
- oil refining: enhancement of the oil recovery depth, comprehensive utilization of oil refinery gases, as well as automation of optimal maintenance of process flow regimes.

At the first phase of the Strategy implementation the Russian oil complex will provide required volumes of oil production and export as well as increment of capacities of trunk pipelines and export terminals in accordance with the dynamics of domestic and external demand for oil affected by the country recovery from the economic crisis. a number of key urgent infrastructure projects of domestic and export importance will be accomplished, including the following:

- oil pipeline Burgas – Alexandrupolis;
- second line of the Baltic pipeline system;
- oil-product pipelines “Sever” (North) and “Yug” (South);
- oil terminals in the ports of Primorsk, Ust-Luga and Nakhodka.

Development of export infrastructure for oil transportation will enable Russia to diversify destinations of export deliveries and reduce transit risks in the western direction. Construction of Russian sea oil terminals and port infrastructure for oil export will provide the country with comprehensive export infrastructure (from a well to a port) and reduce dependence on other countries in this issue.

At the second phase of the Strategy implementation the Russian oil complex will satisfy demand of the country's economy under conditions of its qualitative restructuring in favor of innovative and less energy-intensive industries. Annual production of crude oil will approach the technological and economic maximum. Reduction in oil production in the Tyumen Region, the main oil producing area of the country, will be compensated by growth in the Eastern Siberia and Far East. Taking into account the multi-component structure of oil and gas deposits in the region, increase in oil production will assist in large-scale development of the complex of oil chemical facilities of national significance there.

In order to increase the output and sales of oil products with high added value the key focus of the complex development will be generally concentrated at promotion of oil refining and oil chemistry .

The trend towards stabilization of oil export volumes will take place, which will stimulate the expansion of Russian oil transport infrastructure (pipelines, sea terminals) use for provision of transit deliveries.

At the third phase of the Strategy implementation oil production will reach its technological and economic maximum. Meanwhile:

- export of oil and oil products will tend to decrease;
- development of highly technological oil chemical facilities and energy services will be substantially intensified;
- the Russian oil complex will actively use its capacities to provide oil transit, production and export of oil products with a high share of added value.

## *5. Gas industry*

The strategic objectives of the gas industry development are the following:

- stable, uninterrupted and economically efficient satisfaction of domestic and external demand for gas;
- development of the unified system of gas supply and its expansion to the east of Russia, enhancement of interregional integration on this basis;

- improvement of organizational structure of the gas industry aimed at increase in its economic efficiency, development of liberalized gas market;
- provision of stable revenues for the Russia's consolidated budget corresponding to the energy sector significance in generation the of gross domestic product and export at the given phases of the state energy policy implementation.

The progress of the Energy Strategy of Russia for the period up to 2020 implementation is characterized with the following features in the stated field.

Giant Zapolyarnoe deposit was put into operation in the Nadym-Pur-Taz district of the Tyumen Region. Natural gas production at shelf deposits of the "Sakhalin-1" and "Sakhalin-2" projects was commenced.

New gas pipeline systems are under construction. Yamal — Europe gas pipeline was completed, gas pipeline "Goluboy Potok" (Blue Stream) was constructed, liquefied natural gas plant was put into operation on Sakhalin Island. Construction of gas pipelines "Severniy Potok" (Nord Stream) and Northern Areas of the Tyumen Region — Torzhok was commenced. Decisions on the construction of Pre-Caspian gas pipeline and "Yuzhniy Potok" (South Stream) gas pipeline were taken.

Active works on gasification of the Russian regions and construction of the regional gas transportation and gas distribution infrastructure are being performed.

Gradual and controlled liberalization of domestic gas market has been launched. Experimental electronic platform working on the basis of stock-exchange technologies was established to trade natural gas. About 10 billion m<sup>3</sup> of gas has been sold there.

While considering prospects of gas industry development the following trends need to be taken into account:

- depletion of main gas deposits in the Nadym-Pur-Taz district of the Tyumen Region and, consequently, the necessity of developing new gas-producing centers on the Yamal Peninsula and continental shelf of the Arctic and Far Eastern seas, in the Eastern Siberia and Far East;
- increase in the share of hard-to-recover reserves (low-pressure gas) in the structure of the gas industry mineral resource base;
- increase in costs of natural gas production and transportation;
- development of technologies for production and transportation of liquefied natural gas.

The main problems in the stated field include the following:

- infrastructure restrictions of pipeline gas transportation;
- high transit risks of gas export to Europe;
- insufficient development of gas-processing and gas chemical industries;
- underestimated regulated gas prices and insufficient liberalization on the domestic market.

The following principal goals must be realized to achieve the strategic objectives of the gas industry development:

- compensation of decline in gas output volumes at old deposits in the Nadym-Pur-Taz district of the Tyumen Region (Yamburgskoye, Urengoiskoye, Medvezhye deposits) by means of putting into operation new deposits in remote regions with complicated natural, climatic and geological conditions; appropriate gas transport infrastructure construction aimed at provision of gas deliveries onto the domestic market and diversification of export destinations;
- promotion of geological exploration works aimed at provision of expanded reproduction of mineral resource base in major gas-producing regions and on the continental shelf of the Russian Federation, as well as at development of gas deposits of regional and local importance;
- in-time renovation of equipment and pipes of gas transportation system excluding reduction in its capacity; further development of regional trunk and distribution pipeline infrastructure;
- development of production and export of liquefied natural gas;
- development of gas-processing and gas-chemical industries aimed at rational utilization of valuable fractions of hydrocarbons and associated petroleum gas;
- gas market demonopolization, creation of competitive environment and establishment of non-discriminatory access to gas industry infrastructure for all business entities.

Meanwhile, further increase in gas production requires significant investments into production facilities and development of transport infrastructure. It entails the necessity of increase in domestic gas prices. Implementation of market principles for gas pricing at the domestic market will assist in elimination of existing disproportion between prices for compatible fuels (gas, coal, fuel oil), reduction in the share of gas in the structure of energy consumption and diversification of the fuel and energy balance towards increase in the share of coal and non-fuel

resources, as well as alignment of the fuel and energy balance structure with the structure of geological energy reserves in the Russian Federation, and, ultimately, in enhancement of the country's energy security.

Gas production will be developed both in traditional gas-producing regions, with the Western Siberia as the main one of them, in the European North of Russia, on the Yamal Peninsula, in new oil and gas producing regions of the Eastern Siberia and Far East, as well as in the Caspian region.

The Yamalo-Nenets Autonomous Area will retain its role of the major gas-producing region of the country for the period under consideration. Within the period up to 2010, the compensation of reduction in gas production will be provided predominantly at the expense of development of new deposits as well as of prepared for exploitation horizons and sites of developing deposits in the Nadym-Pur-Taz district of the Tyumen Region.

New technological solutions and significant investment will be required for achievement of high gas-recovery rates and maintenance of production level at deposits which are at the late stage of development.

Within the period upon 2010, the forecasted volumes of gas production are planned to be provided at the expense of development of deposits on the Yamal Peninsula, the continental shelf of the Arctic seas, including Stockman deposit, in waters of the Gulfs of Ob and Taz, as well as in the Eastern Siberia and Far East.

26 deposits with proven gas reserves of 10.4 trillion m<sup>3</sup> were discovered within the Yamal Peninsula. Within the nearest 25 years, cumulative capital investments in the amount of US \$166 to 198 billion will be required for the development of deposits on the Yamal Peninsula (Bovanenkovskoye, Kharasaveiskoye, etc.). The commencement of gas production is planned for the end of the first phase of the Strategy implementation; by 2030, the production will achieve 185–220 billion m<sup>3</sup>.

Gas deposits put into operation in the Western Siberia will contain wet gas and condensate. Thus, gas processing industry will be widely developed for the purpose of utilization and transportation of such gas.

Gas production in the Eastern Siberia and Far East will be developed on the basis of Kovyktinskoye gas-condensate deposit in the Irkutsk Region, Chayandinskoye oil-gas condensate deposit in the Republic of Sakha (Yakutia), hydrocarbon deposits in the Krasnoyarsk Territory, as well as shelf deposits on the Sakhalin Island and in the Western-Kamchatka sector of the Pacific Ocean. Development of rich

with helium (0.15 to 1%) gas deposits in the Eastern Siberia will require the promotion of helium industry, including construction of a number of large gas processing plants and underground storages of helium concentrate.

The following large gas-producing centers are planned to be developed there:

- the Sakhalin gas-producing center on base of the Sakhalin shelf zone deposits (projects "Sakhalin-1" and "Sakhalin-2") with further development of the center at the expense of realization of projects "Sakhalin-3", "Sakhalin-4", "Sakhalin-5", and "Sakhalin-6";
- the Yakutia gas-producing center on the base of Chayandinskoye deposit with the prospective development of adjacent deposits – Srednebotuobinskoye, Taas-Yuryakhskoye, Verkhnevilyuchanskoye and others;
- the Irkutsk gas-producing center on the base of Kovyktinskoye deposit with the prospective development of Yuzhno-Kovyktinskaya license area and deposits of the north of the Irkutsk Region;
- the Krasnoyarsk gas-producing center on the base of Sobinsko-Paiginskoye and Yurubcheno-Tokhomszkoye deposits with the prospective development of Omorinskoye, Kuyumbinskoye, Agaleevskoye and other deposits.

The prospective regional structure of gas production by 2030 will be as follows:

- gas production in the European part of Russia is planned to be increased up to 131–137 billion m<sup>3</sup> (against 46 billion m<sup>3</sup> in 2005) at the expense of development of the Timano-Pechorskaya oil and gas producing area and shelf deposits (first of all, Stockman deposit);
- gas production in the Western Siberia is expected at the level of 608–637 billion m<sup>3</sup> at the expense of development of the deposits on the Yamal Peninsula and waters of the Gulfs of Ob and Taz intended to compensate decreasing output of "old" deposits (Urengoiskoye, Medvezhye, Vyngapurovskoye and Yamburgskoye deposits);
- gas production in the Eastern Siberia and Far East will increase up to 132–152 billion m<sup>3</sup>.

In the sphere of gas transportation the unified system of gas supply will be further developed by means of inclusion therein new facilities

of any proprietary forms (including those on the base of participatory interests). The system will be gradually expanded to the east of the country in an economically reasonable manner.

The length of trunk gas pipelines will be increased by 20–22 thousand km by the end of the second phase and by 30–35 thousand km by the end of the third phase of the Strategy implementation, in particular, at the expense of new export destinations. The existing trunk gas pipelines with the total length of 20 thousand km will be reconstructed and modernized by the end of the second phase, and with the total length of 40 thousand km – by the end of the third phase of the Strategy implementation.

In the sphere of new export routes development the priority role is assigned to the implementation of the “Severniiy Potok” (Nord Stream) project. Russian gas will be delivered to the European market via this gas pipeline bypassing territories of other countries.

Construction of the “Yuzhniy Potok” (South Stream) gas pipeline, making the South-European gas transportation ring connection, will also be of great importance.

Gas pipeline from northern areas of the Murmansk Region with connection to the unified system of gas supply near the town of Volkhov is planned for transportation of gas from Stockman deposit to the north-western areas of Russia.

The construction of multiline gas transportation system with the length of 2400 km for transportation of gas from the Yamal Peninsula to the area of Ukhta compressor station and further to the town of Torzhok will become the most important project upon 2010.

Stage-by-stage construction of the gas pipeline system in the Eastern Siberia and Far East for the purpose of gas supply to the countries of the Asia-Pacific region, first of all, to the Republic of Korea and China, with the possibility of connection, should it be economically efficient, to the unified system of gas supply, will be performed in the context of implementing the program of the unified gas supply system formation in the Eastern Siberia and Far East.

Along with pipeline gas transportation, projects in the sphere of liquefied natural gas production and transportation, primarily aimed at enhancement of Russia's positions on the foreign market, will be dynamically developed in the country. Combination of liquefied natural gas deliveries with well-developed gas transport infrastructure will provide a powerful impetus for enhancement of gas export efficiency with concurrent diversification of sales markets. This will make it possible

to enter the markets, which are absolutely new for Russia, in particular, those of the USA and the countries of the Asia-Pacific region.

Import of gas from countries of the Central Asia, predominantly to the countries of the Commonwealth of Independent States, will be steadily developed. The volumes of import will be formed depending on economic situation on foreign gas markets and the state of the fuel and energy balance of Russia.

In the sphere of the Russian gas export, performed mainly on the basis of long-term contracts, the volume of gas supply to the European market will be retained at the necessary level, while the eastern direction of export (China, Japan, the Republic of Korea) will face a multiple increase. Russian gas producing companies will take an active part in development of gas deposits in other countries (Algeria, Iran, countries of the Central Asia, etc.) and construction of new interregional gas pipelines, in particular, in South Asia, as well as coordinate their export policy with these countries.

Development of the gas market in the Russian Federation will be based on provision of equal business conditions to all gas-producing companies. The sectors of gas production and distribution are supposed to function on the market basis while state regulation will be preserved in the sphere of gas transportation. The procedure of non-discriminatory access of market participants to gas transportation systems of various levels and equal specific tariffs for gas transportation will be provided.

Upon 2011, a stage-by-stage transition to application of market gas pricing principles will be performed by expanding a non-regulated market segment and forming market gas prices subject to payback of its production, transportation, consumer properties, demand and supply, as well as required investments for the gas industry development.

Gasification of urban and rural communities will be continued.

A wide network of underground gas storage facilities in the closest possible proximity to consumers will be created; the capacities of such storage facilities will correspond to seasonal and daily irregularity of gas consumption, in particular, they will supply gas to electric power plants in the regime of the real demand for electricity.

The use of gas as engine fuel will increase, with appropriate development of the market thereof.

The state will use non-price instruments of investment activity support in the gas industry (tax, credit, budget and other instruments), as



well as regulate the upper limit of gas prices for the population, for the purpose of reducing pressure on the domestic economy under the conditions of inevitable growth of domestic gas prices.

Under the conditions of sharp decrease in world prices for hydrocarbons and (or) crisis situations on the world financial market, the state will provide support for gas companies by providing state guarantees of investments into the complex development, refunding of liabilities and optimization of taxation.

Energy saving in the gas industry will be performed in the following main areas:

- gas production: reduction in gas consumption for technological needs, optimization of technological facilities working regime, improvement of control over and accounting of gas, as well as increase in recovery rate of gas formations;
- gas transportation: reconstruction of gas transportation facilities and system organization of technological working regimes of trunk gas pipelines, reduction in gas losses, introduction of automated management systems and telemetry, improvement of engineering condition of gas-transfer facilities, introduction of highly efficient gas-turbine drives for gas-transfer facilities with high performance index, as well as expansion of gas-transfer facilities with controlled electric drive use;
- gas processing: increase in the rate of workflow heat utilization, increase in the performance index of gas-fired heat generating units, as well as optimization and automation of process flows;
- underground gas storage: optimization of buffer gas volume, reduction in formation gas losses, use of non-commercial gases (nitrogen, fumes, etc.) as buffer gas volumes.

At the first phase of the Strategy implementation the Russian gas industry will satisfy domestic and export needs of Russian economy for natural gas mainly at the expense of existing deposits exploitation and putting new deposits into operation in the Nadym-Pur-Taz district of the Tyumen Region. Meanwhile, active works on preparation and involvement into operation of new gas deposits on the Yamal Peninsula, Eastern Siberia, Far East, and continental shelf of the Arctic seas will be performed.

A number of major urgent infrastructure projects of international and national importance will be accomplished, including the following:

- "Severniiy Potok" (Nord Stream) gas pipeline;
- Northern Areas of the Tyumen Region – Torzhok gas pipeline.

Implementation of the stated infrastructure projects will prepare the transport infrastructure for the commencement of large-scale development of the Yamal Peninsula. It will also reduce transit risks of Russian gas export to Europe and provide for the opportunity to expand the transit of the Central Asian gas to Europe via the Russian gas transportation system.

Along with the development of the pipeline infrastructure, the system of underground gas storage facilities will be developed. Operational gas reserves in main gas-consuming regions will be created in order to minimize risks of fuel supply in the periods of peak demand.

Export of Russian liquefied natural gas to the countries of the Asia-Pacific region will be commenced from the liquefied natural gas plant built on the Sakhalin Island.

New gas processing and gas chemical complexes are planned to be constructed in the Western and Eastern Siberia to provide complex processing of hydrocarbons and production of output with high added value.

On the domestic market the controlled liberalization based on the principle of equal profitability of gas supply to the domestic market and for export will be pursued dynamically. Stock-exchange trade in natural gas based on transparent and non-discriminated access of all business entities to gas transport infrastructure will be developed.

At the second phase of the Strategy implementation the Russian gas industry will completely satisfy the needs of the Russian economy under conditions of the post-crisis development. The geography of gas production and export will be substantially changed. The share of new gas-producing regions (the Yamal Peninsula, continental shelf of the Arctic seas, Eastern Siberia and Far East) in the total gas production in the country will exceed a one third. The strategic goal of diversification of the Russian gas export destinations and commodities structure will also be achieved at the expense of the eastern export destination development and construction of new terminals for liquefied natural gas production.

Putting into operation of Stockman deposit and deposits in the Gulfs of Ob and Taz, commencement of the Irkutsk, Krasnoyarsk and Yakutia gas centers development, as well as the active stage of the gas transportation system construction in the east of the country are planned at the second phase of the Strategy implementation.

Russia will augment efforts for main regional gas producing centers (countries of the Central Asia, Iran) consolidation on the

basis of its gas transport infrastructure. Russia will seek to establish the Eurasian integrated gas transportation system for provision of export and transit cross-flows between Europe and Asia (in particular, the "Yuzhniy Potok" (South Stream) gas pipeline will be completed).

At the third phase of the Strategy implementation, the Russian gas industry will be developed under the changed conditions of domestic and external gas demand caused by transition of the world economy and energy sector to the new technological level characterized with high energy efficiency of business and extended use of non-hydrocarbon energy resources.

Under this conditions development of the Russian gas industry will be aimed at expansion of the sphere of using gas in the economy not only as an energy carrier, but also as a valuable chemical product. Highly technological gas chemistry and production of synthetic liquid fuel on the basis of gas will become widely developed.

As for the territory of Russia, gasification of regions will be accomplished, works on expansion of the eastern gas transportation system will be continued with the possibility of connection, should it be economically efficient, to the unified system of gas supply. Independent producers will supply over one fourth of gas production in the country, while the share of the open joint stock company "Gazprom" will be reduced in proportion to the resource base of the company at the stated period. Development of deposits of the Arctic seas in the east of the country will be commenced. Technological conditions for production and industrial use of gas-hydrates will be created. Russian pipeline infrastructure will become an integral part of the "power bridge" between Europe and Asia, and Russia will become the key center of its management.

## *6. Coal industry*

The strategic objectives of the coal industry development are the following:

- reliable and efficient satisfaction of domestic and external demand for top grade solid fuel and products of its processing;
- provision of marketability of coal products under the conditions of domestic and foreign markets saturation with alternative energy resources;
- increase in the level of operational safety of coal mining and reduction in its harmful impact onto the environment.

The progress of the Energy Strategy of Russia for the period up to 2020 implementation is characterized with the following features in the stated field.

The restructuring of the coal industry providing its transformation from a planned unprofitable industry into an efficiently operating one has been generally completed.

The program of unprofitable and unpromising coal mines closure is approaching accomplishment. New highly efficient coal production facilities are under construction, which leads to reduction in coal production costs, growth of labor productivity and reduction in industrial injury rate.

State subsidizing of the coal industry has ceased. Development of the coal industry is performed mainly at the expense of internal funds of business entities and borrowed financial resources (about one third of the total volume of investments).

Commissioning of new coal mining facilities, mainly in the Kuznetsk basin, resumed after a lengthy pause.

The balance increment of coal mining facilities exceeded 80 million tons for the last 5 years, while the balance increment of coal beneficiation facilities exceeded 40 million tons.

The volume of coal processed at coal beneficiation facilities increased from 85 million tons (30%) to 127 million tons (40%). The volume of thermal hard coal beneficiation increased by a factor of 2.7.

Coal export increased from 60.7 up to 97.5 million tons (by a factor of 1.6).

The following trends are to be taken into account at consideration of the coal industry development prospects:

- depletion of the potential for development of existing coal basins in the European part of the country and in the Urals;
- slowing down of the rates of new coal deposits development;
- increase in coal mining and transportation costs.

The main problems in the stated sphere include the following:

- reduction in domestic demand for thermal coal;
- dependence of coal companies on the amount of export revenues;
- high share of transport costs in the price of coal products;
- insufficient rates of fixed assets renovation, high depreciation level of equipment and insufficient amount of investments for its modernization;
- low quality of coal products as compared with the world level;

- insufficient investment for large-scale infrastructure projects realization and development of resource and production potential of the coal industry;
- insufficient innovative potential of the coal industry, poor development of Russian coal machinery manufacturing and resulting growing dependence of the industry on the import of technologies and equipment;
- high level of social tension in coal mining regions caused by low employment of the population, deficit and low quality of social services, as well as high injury rate in the industry and general environmental problems;
- growing deficit of skilled workforce.

In order to achieve the strategic objectives of the coal industry development the following main goals must to be realized:

- the program of unprofitable and unpromising coal mines closure completion;
- provision of sustainable and rational reproduction of the mineral resource base of the coal industry;
- rationalization of the structure and regional allocation of production facilities for coal mining and beneficiation providing efficient use of the resource potential of the industry;
- transport and port infrastructure development aimed at transportation of coal cargo according to economically justified tariffs and diversification of destinations of their deliveries;
- increase in efficiency of state regulation processes and processes of corporate management in the coal industry providing sustainability of coal enterprises development and promoting growth of their competitiveness;
- enhancement of efficiency of coal mining, beneficiation and processing by improving technologies and equipment used, as well as introducing advanced organizational solutions;
- production of high-quality end products (synthetic liquid fuel, ethanol and other products of coal chemistry with high added value), complex use of coal and associated resources, including coal-bed methane;
- intensification of nature conservation measures in the industry;
- provision of coal companies with qualified specialists targeted at long-term labor relationships and development of professional career.

Coal mining development is contemplated in the main coal basins – Kuznetsk and Kansk-Achinsk basins. Coal mining will be developed on new deposits in the Eastern Siberia and Far East (Urgalskoye, Elegetskoye, Elginskoye, Apsatskoye deposits) alongside with the main coal basins in medium and long-term perspective. Furthermore, should the economic efficiency be proved, coal mining can be developed at Seidinskoye (the Republic of Komi) and Sosvinskoye (the Khanty-Mansi Autonomous Area – Yugra) deposits, as well as in the Bering coal basin (the Chukot Autonomous Area).

For the purpose of further development of the industry export potential the Strategy provides for construction of required port infrastructure (the ports of Vostochny, Vanino and Ust-Luga, the Murmansk deep-water port) and construction of new ports with high-capacity coal terminals, including ports on the Black Sea coast, and, should the economic efficiency be proved, on the North Pacific coast.

The increase in the share of coal in the fuel and energy balance, contemplated in the context of the policy of the rational fuel and energy balance promotion, will require, alongside with creation of conditions for efficient interfuel competition, the optimization of coal production costs with simultaneous improvement of taxation system in the industry and application of flexible tariff regulation in railroad coal transportation.

The improvement of the economic regulation system in the coal industry contemplates the following:

- transition to the taxation system based on the rent principles;
- tax burden rationalization in the industry;
- exemption from customs duties on machinery and equipment for the coal industry having no Russian analogues;
- application of state-private partnership mechanisms including subsidising a part of interest rates on credits raised in Russian financial institutions, aimed at promotion of fixed assets renovation in the industry, formation of new coal-producing centers, implementation of innovative projects (development of clean coal technologies, standardized coal fuel, coal chemical production facilities, coal-bed methane production) and development of railroad and port infrastructure;
- improvement of the railroad tariff regulation system for coal supply to domestic and foreign markets; including its correlation with market trends of coal prices and the costs of coal transportation by sea;

- development of direct and long-term contracts providing, among other issues, privileged tariffs for high-grade thermal coal transportation for the use at Russian thermal power plants;
- establishment of a mandatory procedure for a liquidation fund formation at coal producing organizations;
- rational imposition of custom duties on imported coal;
- development of exchange trade in coal products.

Improvement of the institutional structure of the industry and processes of corporate management involves the following:

- establishment of a leasing company dealing in provision of highly technological mining, transportation and beneficiation equipment;
- enhancement of the coal business transparency, including introduction of international accounting standards and harmonization of the structure of vertically integrated companies;
- development of service and ancillary enterprises (outsourcing) for provision of maintenance to the main business of coal–producing companies, including establishment of specialized companies performing a complex of research, design and commissioning works, in particular, in the sphere of mine degasifying, while in the future the share of outsourcing in expenditures for mining of one ton of coal shall be brought up to 30–35%.

Improvement of the technical regulation system in the industry involves the following:

- tightening of regulatory requirements to provision of safety and comfortable working environment at coal enterprises, including development of new regulatory documents in the sphere of safety of the equipment employed, as well as individual protection means for miners and protective systems applied in explosive environment;
- regular technical audit of fixed assets of coal producing companies;
- development and introduction of technical regulations tightening requirements to the quality of coal fuel, including establishment of quality standards pertaining to different types of coal consumed, organization of product certification, introduction of international quality standards at enterprises.

Regulatory requirements to coal industry entities pertaining to environment protection are supposed to be brought in line with the world standards.

Measures on enhancement of social protection of employees and the quality of labor relationships in the coal industry are planned to be performed, including development of social standards, setting-up of the personnel compulsory insurance system at coal mining enterprises, as well as further improvement of information and analytical support in the coal industry allowing performance of, among other issues, comprehensive monitoring of the situation in the industry.

At the first phase of the Strategy implementation the following measures are planned to be fulfilled in the coal industry:

- realization of a complex of program measures aimed at stabilization of the situation in the coal industry under the conditions of reduction in coal production;
- completion of the industry restructuring;
- technical re-equipment and intensification of coal production;
- augmentation of coal beneficiation;
- reduction in accident and injury rates at coal mining facilities;
- further development of export potential of the industry.

The second phase of the Strategy implementation pertaining to the coal industry development contemplates formation of new coal-producing centers at new coal deposits with favorable mining and geological conditions; equipment of the coal industry enterprises with highly productive machinery and technologies meeting world environmental standards; elimination of system restrictions at coal products transportation to domestic and foreign markets; development of the outsourcing system; achievement of thermal hard coal maximum processing taking into consideration domestic market requirements; implementation of pilot projects on the basis of Russian technologies of high-level coal processing and coal-bed methane production.

The third phase of the Strategy implementation pertaining to the coal industry development contemplates ultimate increase in labor productivity with meeting the world standards in the sphere of industrial safety, labor protection and environmental safety in the course of coal mining and beneficiation; commercial output of high-level processing coal products (synthetic liquid fuel, ethanol, etc.) and associated resources (methane, underground waters, construction materials).



## *7. Electric energy industry*

The strategic objectives of the electric energy industry development are the following:

- provision of energy security of the country and its regions;
- meeting of demands of the economy and the population for electricity (capacity) at affordable competitive prices providing return on investments in the electric energy industry;
- provision of reliability and safety of operation of the Russian electricity supply system under normal and emergency conditions;
- investment and innovative renovation of the industry aimed at provision of high energy, economic and environmental efficiency of electricity production, transport, distribution and consumption.

The progress of the Energy Strategy of Russia for the period up to 2020 implementation is characterized with the following features in the stated field.

Over the past period since the commencement of implementation of the Energy Strategy of Russia for the period up to 2020, the demand for electricity was growing at higher rates as compared with the forecasts, due to the higher rate of the Russian economy growth. Meanwhile, commissioning of new facilities in the electric energy industry was substantially behind the forecast contemplated by the stated document, and had not fully satisfied the needs of growing economy.

Within this period, the first phase of the industry reformation was completed: the unified generating company which possesses of and manages nuclear power plants – the Open Joint-Stock Company "Concern for the Production of Electrical and Thermal Energy at Nuclear Power Plants" was established; the Open Joint Stock Company "RAO "UES of Russia" was liquidated and a group of independent companies was established on its basis, including 6 wholesale generating companies, 14 territorial generating companies, the Open Joint-Stock Company "Federal Grid Company of Unified Energy System" (JSC FGC UES), the Open Joint-Stock Company "RusHydro", the Open Joint-Stock Company "System Operator of Unified Energy System", the Open Joint-Stock Company "Interregional Distribution Grid Companies Holding", the Open Joint-Stock Company "RAO Energy Systems of the East" (for management of the Far Eastern electric energy industry), the Open Joint-Stock Company "INTER RAO UES" (for export

and import of electricity), energy sales companies, as well as a number of research, design, service and repair organizations.

The commercial infrastructure of the wholesale market of electricity (capacity) was established. a commercial operator of the stated wholesale market – the Open Joint-Stock Company “Administrator of Trading System” – and a self-regulated organization integrating subjects of the electric energy industry and major consumers of electricity and heat were set up.

The process of competition promotion on the wholesale market of electricity (capacity) was launched; it involves gradual retreat from state regulation of prices for electricity and transition to market pricing for all consumers, with the exception of the population, within the price zones of the stated wholesale market (ultimate elimination of the state regulation of prices is supposed to have been accomplished by 2011).

The following trends have to be taken into account at consideration of the prospects of the electric energy industry development:

- change of geography of electricity consumption in the country involving shift of electricity consumption centers towards eastern regions of the country and the cities of the European part of Russia;
- growth of seasonal and daily peak loads in the Unified energy system of Russia.

The main problems in the stated sphere include the following:

- deficit of generating and grid capacities in a number of regions of the country;
- absence of electric grid the Siberia – Urals – Center with transfer capacity enabling the efficient use of the Siberian water and fuel energy resources, realization of effects of latitudinal extent of the Unified energy system of Russia and other system effects;
- non-optimal structure of generating capacities caused by insufficient amount of semi-peak and peak-load flexible generating plants;
- reduction in reliability of electricity supply caused by high level of depreciation of fixed assets and non-availability of required investments for their large-scale and timely renovation;
- considerable technological backwardness in creation and development of modern combined heat and power, environmentally friendly coal and power grid technologies;

- low energy and economic efficiency of the industry (low performance index of most thermal power plants, high level of losses in electric grids, non-optimal load of generating capacities in the Unified Energy System of Russia, in particular, occurrence of "blocked" capacities);
- extremely high dependence of the electric energy industry on natural gas;
- absence of full-scale competitive electricity (capacity) market;
- insufficiency of investment resources for development of electric grid infrastructure aimed at connection of capacity of new generating objects and technological connection of consumers to electric grids;
- cross-subsidization between groups of electricity consumers and between electric and thermal power on the domestic market.

The following principal goals must be realized to achieve the strategic objectives of the electric energy industry development:

- balanced development of generating and grid capacities providing the required level of electricity supply reliability both in the country and in its separate regions;
- further development of the Unified Energy System of Russia, in particular, at the expense of connecting and uniting isolated energy systems;
- expanded construction and modernization of fixed assets of the electric energy industry (electric power plants, electric grids) aimed at satisfaction of demands of the economy and the population for electricity;
- development of competitive environment on retail markets of electricity, provision of economic validity of prices and tariffs for respective goods and services;
- advanced development of nuclear, coal and renewable electric energy industry (including hydraulic electric energy industry) aimed at reduction in the industry dependence on natural gas, as well as at diversification of the fuel and energy balance of the county;
- expanded introduction of new environmentally-friendly and highly efficient technologies of coal burning, combined cycle generating units with high performance index, controlled electric grids of new generation and other new technologies for enhancement of the industry efficiency;

- provision of survivability, regime reliability, safety and controllability of power grids, as well as electricity of required quality;
- development of small-scale power generation in areas of decentralized electricity supply at the expense of enhancement of efficiency of local energy resources consumption, development of electric grid facilities, reduction in the volume of consumption of delivered light oil products;
- development and implementation of a price control mechanism at the expense of technological innovative development of the industry, reduction in expenditures on construction of generating and grid capacities, development of competition in the electric energy industry and adjacent industries, as well as at the expense of creating the state system of management of the electric energy industry development;
- reduction in adverse effect of the electric energy industry on the environment by applying the highest technologies.

Substantial growth (by a factor of 2–2.5) of electricity production on the basis of nuclear and renewable energy is forecasted in the context of implementation of the strategic initiative on non-fuel energy development. In general, the share of non-fuel energy in the structure of electricity production is planned to be increased by the end of the third phase of the Strategy implementation from about 32% (2008) to at least 38%. Detailed paths and relative rates of development of each of the specified non-fuel components at various phases of the Strategy implementation are subject to adjustment in appropriate program documents, first of all, in the Master Plan for Allocation of the Electric Energy Facilities.

Prospective levels of electricity production are determined by estimated dynamics of domestic demand for it, which will be substantially ahead of the growth of demand for primary energy. The rates of electricity consumption growth will be determined by regional strategies of social and economic development, due to which they will be substantially higher in the Eastern Siberia and Far East than average rates in Russia.

In accordance with the domestic demand estimations, requirements of the country's energy security provision and enhancement of electricity supply reliability, the regional structure of generating capacities will be formed in the following way.

In the European part of Russia:

- nuclear power plants with increase of their share in the base part of electric load pattern; synchronization of commissioning of new nuclear power units with hydroelectric pumped storage power plants;
- thermal power plants with replacement of gas-fuel-oil steam power generating units by steam-gas units and decommissioning of old equipment. The replacement of steam-power units by steam-gas units will be supported by economic measures, including imposition of payment for carbon dioxide emissions and direct prohibition of outdated equipment use, which fails to meet modern technological and environmental standards;
- steam-gas, gas-turbine and modernized steam-turbine combined heat-and-power plants of various capacities, including block stations running on gas and partially on coal (where coal is the designed fuel);
- peak-load hydroelectric pumped storage power plants and gas-turbine units.

Meanwhile, generation in the semi-peak part of load pattern will be provided by existing thermal power plants (subject to modernization), hydroelectric power plants (under construction) in the Northern Caucasus with partial removal of load from the least energy efficient thermal power plants. Upon completion of construction of high-voltage electric transit in the direction of Siberia – Urals – Center, the capacity of the Siberian power plants transmitted by backbone lines of super high voltage may take part (as far as it is justified by economic efficiency) in meeting requirements of peak loads.

In the Siberia and Far East:

- hydroelectric power plants, both existing and under construction, for meeting requirements of all zones of electric load pattern, with predominance of their capacities in semi-peak and peak parts of load pattern;
- thermal power plants running mainly on coal fuel of the Kuznetsk and Kansk-Achinsk Basins, as well as the Irkutsk Basin, Transbaikal and Far Eastern deposits (the use of thermal gas-fired power plants is only envisaged in these regions for combined heat-and-power plants in large gasified cities for reasons of environmental pressure reduction);
- development of thermal gas-fired power plants in regions with large deposits of natural gas (the Khanty-Mansi Autonomous

Area – Yugra and Yamalo-Nenets Autonomous Area), including with the use of low-pressure gas reserves left at exhausted deposits;

- use of energy of nuclear sources of high, medium and low capacity in the areas of their potential competitiveness (the Tomsk Region, High North, Far East, etc.);
- development of small-scale energy production on the base of renewable energy, including by replacing local diesel generation.

The Strategy provides for individual directions of prospective development for the thermal, nuclear and hydraulic electric energy industry, as well as for the Unified energy system of Russia and electric grid complex.

Thus, in the thermal electric energy industry the strategic area of thermal coal-fired power plants advanced development will be realized, especially in the Eastern Siberia and Far East.

As a result, the share of coal in fuel consumption by thermal power plants will be increased by the end of the third phase of the Strategy implementation from 26 to 34–36%, and the share of gas, on the contrary, will be reduced from 70 to 60–62%.

The prospects of nuclear electric energy industry are based on the current situation in construction of nuclear power plants, as well as on the following provisions:

- in the European part of Russia, under the conditions of rising prices for organic fuel, nuclear power plants with enhanced security make it possible to close the energy balance, saving organic fuel;
- the development of nuclear electric energy industry provides for elaboration of more advanced nuclear technologies enabling energy problems of mankind to be solved in the future;
- the development of nuclear electric energy industry requires development and implementation of measures aimed at leveling load pattern by means of economic incentives for motivating consumers for more equal use of electricity by hours of the day in the regions of nuclear power plants activity, taking into account their use in base regime, as well as their parallel operation with hydroelectric pumped storage power plants.

The main goal of hydraulic electric energy industry development for the entire period of the Strategy implementation is further development of rich hydraulic resources of Russia correlating with demand for electricity and regimes of its consumption.

The predictive assessment of electricity production at hydroelectric power plants is based on the following assumptions:

- increase in electricity production at hydroelectric power plants in the European part of Russia will be moderate, mainly because of commissioning hydroelectric power plants in the Northern Caucasus and implementation of the program of hydroelectric pumped storage power plants construction required for regime (daily) regulation of energy system capacities. Increase in capacity and electricity production at existing hydroelectric power plants is predicted, mainly at Cheboksary and Nizhnekamsk hydroelectric complexes, at the expense of the rise in reservoir levels up to projected reference marks;
- increase in electricity production in the Siberia and Far East will be determined by engineering and economic indicators and competitiveness of hydroelectric power plants compared to thermal coal-fired power plants, their environmental impact and possibilities to cover load pattern. Potential to achieve the multiplicative effects of commissioning new hydroelectric facilities connected with creation on their base of industrial clusters – consumers of electricity, produced at hydroelectric power plants, will also be of great importance in these regions.

Development of the following large backbone hydroelectric complexes may become the principal direction of the abovementioned multiplicative effects achievement under the appropriate economic and environmental justification:

- Nizhneangarsk hydroelectric complex;
- South-Yakutia hydroelectric complex comprising several hydroelectric power plants on the rivers of Uchur, Timplon, Aldan and Olekma;
- Vitimsk hydroelectric complex;
- Nizhneeniseisk hydroelectric complex on the base of the Evenki hydroelectric power plants with the capacity of 12 million kW.

Electricity, produced at these hydroelectric complexes will be used for development of substantial local natural resources, creation of the regional mining and processing industries, and will be transmitted to the Urals, European part of Russia and industrial regions of the Siberia and Far East via electric power transmission lines of direct and alternate super high voltage current constructed for this purpose.

Specific development of these or those generation sources will be determined by their relative engineering and economic indicators, con-

ditions of fuel supply, nature (scale and structure) of energy consumption, environmental and social factors. Small-scale energy production and decentralized electricity supply with active use of all kinds of local and secondary energy resources will be developing, especially in regions with low load density.

In general, as a result of the development of generation facilities:

- by 2030, gas-fired generation facilities will be represented mainly by steam-gas units with performance index of 53–55%, gas-turbine units or, if necessary, the combination of the latter with a waste-heat boiler;
- coal-fired generation facilities will be represented by units running on supercritical steam parameters with performance index from 46 to 55% (in the case of high-quality high-calorific coal use), units equipped with boilers with circulating fluidized bed, boilers with low-temperature rotation, and a certain number of units running on overcritical steam parameters. Units with coal gasification and energotechnological units will also be developed. The total average performance index of coal-fired generation facilities will be about 41%.

Nuclear power plants with water-cooled reactors, fast-neutron reactors with sodium coolant, demonstration reactors with lead and lead-bismuth coolants, as well as high-temperature nuclear gas-cooled reactors will operate in the nuclear electric energy industry.

Hydroelectric power plants of various capacities, playing a strategic role and participating in provision of load pattern satisfaction, are supposed to be widely used, with concentration thereof in the regions of the Siberia and Far East.

The energy sector based on renewable energy will be developed, in particular, in the form of small hydroelectric power plants, solar energy units, geothermal power plants and heat supply units, bio-energy and wind units, waste-burning and waste recycling energy complexes in large cities. The usage of tide power is possible.

Heat output will be concentrated at central heating stations with reduction of their role in heat supply at the expense of development of co-generation systems (a gas-turbine unit with a waste-heat boiler) and autonomous heat supply units. In 2030, the share of heat produced at central heating stations in the centralized heat supply systems will be reduced from 43 (2005) to 35%. This niche will be occupied by gas-turbine units at central heating stations and autonomous units.



Units of distributed electricity generation in the form of gas-turbine units and combination thereof with a waste-heat boiler, which will replace existing boiler-rooms, will be widely developed. The stated units with a capacity of 10 kW to 60–70 MW will exercise the function of both local power supply sources and sources of variable part of the load pattern satisfaction, thus increasing the installed capacity use factor of most powerful energy units. The share of distributed generation may achieve 15% of electricity production at thermal power plants.

Thus, in 2030, generation facilities will consist of power units using advanced world technologies and operating them efficiently.

The Unified energy system of Russia will be developed both by means of integration of now isolated energy systems and energy complexes, and by means of development of intersystem and intrasystem electric grids of all voltage classes, in particular for electricity export.

For the purpose of controllability enhancement and provision of guaranteed reliability of functioning of electric power systems, flexible electricity transmission systems will be widely introduced; besides, complexes of automated emergency protection and dispatching control will be improved. Intersystem direct and alternative current power transmission lines for electric power and capacity transportation in the amounts not exceeding reliability requirements of the Unified energy system of Russia operation from energy-redundant to energy-deficient regions will be constructed.

The following is supposed to be provided in the sphere of electric grid complex development:

- optimization of configuration and increase in transmission capacity of backbone and distribution electric grids enabling efficient functioning of the Unified energy system of Russia and systems of distributed electricity generation with high indicators of operation reliability;
- reduction in depreciation rate of electric grids to the average level of the developed countries, including at the expense of quality renewal of equipment stock of electric power substations;
- reduction in losses in electric grids and enhancement of electricity transportation efficiency, including at the expense of wide implementation of semi-conductors made from new composition materials increasing their current-carrying capacity and the time of working life, as well as at the expense of creating systems of automated accounting and regulation in electric grids.

Conditions will be provided for private investments attraction into the distribution electric grid complex in the amount sufficient for modernization and reconstruction of electric grids and provision of reliability of electricity supply to consumers for a long-term period, development of electric grid infrastructure, including with the purpose of provision of intersystem power exchange and assistance in economic growth of the relevant territories. Administrative methods of motivation of grid companies to raise their efficiency will be replaced by economic methods; besides, mechanisms of distribution grids management consolidation in the regions of the Russian Federation will be developed, including with the use of licensing the activity on electricity transmission and distribution.

Furthermore, formation of the wholesale and retail electricity (capacity) markets will be completed in the electric energy industry, the appropriate regulatory and institutional conditions for activity of sales and power service companies will be provided, including the following:

- change in the procedure of accounting and reimbursement of expenses on technological connection to electric grids;
- inclusion of investment component into the tariff for provision of services on electricity transmission and into the tariffs of state companies implementing system-wide projects;
- enhancement of control over the group of persons overlapping competitive and natural monopoly types of activity in the electric energy industry;
- creation of conditions for unhindered access of sales organizations to the wholesale electricity (capacity) market;
- creation of conditions for entering into bilateral agreements with market (deregulated) prices between new electricity generating and consuming entities in non-price zones and isolated territories;
- creation of conditions for functioning of a system making it possible for a consumer to choose an electricity supplier;
- adoption of legislative acts regulating the procedure of holding regular and special contests for attribution of the guaranteeing supplier status.

Measures will be taken for improvement of tariff regulation in the sphere of natural monopolies (on the base of tariffs providing return on investments, payment for transfer capacity reserve, hourly tariffication, etc.). Simultaneously, the economic responsibility of pow-

er generation facilities and the grid complex facilities for meeting of guaranteed standards of reliability and consumer service quality will be introduced.

The state long-term tariff policy in the electric energy industry will be based on the following principles:

- extended application of market pricing mechanisms in the stated sphere, as well as self-regulation mechanisms;
- prevention of failure in implementation of the state strategic plans aimed at rise of living standards of the population and growth of competitiveness of Russian enterprises due to unreasonably high specific costs of energy supply of the population and enterprises;
- maintenance and improvement of forms and mechanisms of the state participation in regulation of sources of investments into the electric energy industry with the purpose of provision of sufficient investment attractiveness of projects aimed at development of generation and grid facilities (based on the principles of return on investments made by the state, in particular, under the conditions of state-private partnership);
- application on the electricity (capacity) and heat markets of pricing mechanisms providing market players with potential return level not lower than in other sectors of economy with comparable risk level;
- predictability of long-term tariff policy and its coordination with other components of the state energy policy: the policy in the sphere of energy efficiency and energy saving, as well as in the sphere of rational fuel and energy balance promotion.

The share of electricity production cost in its mean retail price for end users at the initial phases of the Strategy implementation is contemplated to reach 60–65% – the range of values considered to be rational in accordance with the current international experience. Taking into account that electricity prices have grown sharply in Russia in the latest years, and that continuation of this trend will make the country's economy non-competitive, it is necessary to stop the abovementioned sharp growth of prices, elaborate and implement measures on provision of optimal development and operation of electric energy systems, reduction in losses and wide introduction of efficient technologies at the first phase of the Strategy implementation. It should provide limited growth of the average mean retail price for electricity for end users at further phases of the Strategy implementation up to the level

of 9–10 US cents per 1 kWh by the end of the third phase (as calculated in permanent prices of 2008).

Substantial enhancement of energy efficiency of the industry will be provided, including at the expense of reduction in specific fuel consumption for electricity and heat production at thermal power plants, as well as at the expense of reduction in losses (expenses for energy transportation) in electric grids.

Stage-by-stage adjustment of forecasted electricity consumption in correlation with the forecasted prices for electricity in the Russian Federation are provided for.

At the first phase of the Strategy implementation the demand for electricity will be determined by consequences of the crisis, which started in 2008, as well as by the capabilities of the economy to swiftly overcome them.

Meanwhile, such trend will not lead to decrease in the rates of fixed assets renewal in the electric energy industry, the replacement of which is vitally important for successful long-term functioning of the industry. Steam-gas units with high performance index will become the main type of generation facilities to be constructed. Works will be performed for development of coal-fired power units with super-critical parameters. Enhanced safety reactors will be installed at nuclear power plants.

Important area at the first phase of the Strategy implementation will be modernization of gas-fired thermal power plants operating by steam-power cycle and transmission them to steam-gas operation cycle. In this case the withdrawal of old capacities and low efficient out-of-date equipment from operation will be performed.

Legislative base will also be created for attraction of private investments into development of all kinds of generation. The state program for construction of nuclear and hydroelectric power plants will be implemented, including under the conditions of state-private partnership.

In the sphere of electric grid complex development the priority areas will be the following:

- audit of electric grid complex and creation of distribution electric grids monitoring system from the viewpoint of reliability and sufficient transfer capacity provision;
- reconstruction and engineering re-equipment of electric grids on the base of new electric grid technologies providing their reliable and efficient operation and advanced equipment corresponding to the level of the best foreign analogues;

- optimization of configuration and enhancement of reliability of backbone and distribution electric grids for the purpose of enhancement of operation efficiency of the Unified energy system of Russia.

The Unified energy system of Russia will be developed both by means of integration of isolated power systems or power systems with weak electric connections, and by means of development of intersystem and intrasystem electric grids of all voltage classes, including for electricity export.

The process of controlled liberalization and creation of competitive domestic electricity and capacity market will be completed. It will provide price signals for suppliers and consumers of electricity and capacity with the purpose of investment decision-making. Institution of guaranteed suppliers and the system of a targeted social support of the population in respect of electricity supply will be developed. Transparent and predictable conditions will be created for long-term fuel supply of power plants, in particular, natural gas supply, as well as for priority use of coal in the electric energy industry where it is justified from the viewpoint of economy and environment.

At the second phase of the Strategy implementation nuclear power plants will be commissioned, large-scale renewal of fixed assets and development of new energy infrastructure will take place in the Eastern Siberia and Far East.

Industrial implementation of new steam-gas units with high performance index and coal generation units on supercritical steam parameters will be continued. In the nuclear electric energy industry, the serial production and commissioning of water-cooled reactors, as well as fast-neutron reactors will be expanded, and production facilities for provision of closed fuel cycle realization will be established. Renewable energy will be developed. Indicators of energy, economic and environmental efficiency will be substantially improved at the expense of investment and innovative renewal of the industry.

At the third phase of the Strategy implementation the electric energy industry will be characterized by expanded introduction of technological innovations into traditional segments of the industry and dynamic development of non-fuel energy against the background of slowdown in the growth rates of demand for electricity at the expense of enhancement of the general energy efficiency of the Russian economy. Industrial development of coal-fired power generating units of new technological generation, coal gasification units and energy technological complexes

will start in the sphere of thermal generation. The performance index of thermal power plants will become at average 1.2 times as high as that of the year 2005.

At the stated phase the following activities will be developed: construction of large hydroelectric power plants in the east of the country; usage of small-scale nuclear power facilities, including floating nuclear power plants, in the regions of the High North and Far East, as well as module high-temperature gas-cooled reactors with the purpose of production of electricity, municipal heat and high-temperature heat for technological purposes, including for hydrogen production.

### *8. Nuclear fuel cycle and nuclear electric energy industry*

The strategic objective of the nuclear fuel cycle development is formation of the whole integrated complex of nuclear electric energy industry, its fuel and energy base, environmental safety of nuclear power plants and nuclear industry, as well as scientific management of this complex in accordance with economically reasonable requirements of the country.

The nuclear electric energy industry is capable of its fuel base reproduction. This key peculiarity of the industry determines the adequate priority of the nuclear electric energy industry in the future, which is characterized by tightening of environmental requirements to energy activity and stabilization of hydrocarbon capacities of the fuel and energy complex. Under these conditions, for the purpose of timely preparation and development of appropriate areas of the nuclear electric energy industry, serial nuclear power plants with fast-neutron reactors and related facilities of closed nuclear fuel cycle will be established alongside with traditional thermal neutron reactors.

Explored and potential reserves of natural uranium, accumulated reserves of regenerated uranium, existing and developing capacities of nuclear fuel cycle, subject to justified investment and export-import policy in this sphere, will provide the anticipated parameters of nuclear electric energy industry development in the stated period. The long-term technological policy contemplated in the Strategy with introduction and development of nuclear power technologies of new generation, including fast-neutron reactors and technologies of closed nuclear fuel cycle, will eliminate fuel restrictions for the nuclear electric energy industry in a long-term outlook.

Taking into account the targeted scales of the industry development, the following key goals are supposed to be solved:

- enhancement of efficiency and competitiveness of the nuclear electric energy industry, reduction in the level of specific capital investment, provision of the safety level compliance with modern standards;
- promotion of unified complex including fuel and raw material resources – energy production – waste disposal;
- development of an industrial investment policy and target programs which are to provide sustainability, renewal and increase in efficiency of the existing potential and development of the nuclear fuel base and facilities for recycling and disposing of radioactive wastes;
- implementation of highly technological and economically sound projects of energy complexes in line with the modern level of safety and reliability, including on the base of innovative technologies;
- development of Russian energy machinery production and construction and assembly complex.

An important component of the state strategy of the nuclear fuel cycle and nuclear electric energy industry development is the enhancement of the Russian nuclear technologies export potential: promotion of nuclear power plants, nuclear fuel and electricity export.

Areas and phases of the state energy policy implementation with respect to the nuclear electric energy industry development envisage, in particular, the following.

Increase in electricity production at nuclear power plants shall be performed on the basis of the following:

- implementation of projects on nuclear power plants construction (completion of power-generating units on existing sites at the first phase of the Strategy implementation, construction thereof at all phases, including at the second and third phases – in cooperation with third party investors);
- increase in output and extension of operating life of existing power-generating units; program of intensification and increase in operating ratio of installed capacity at all phases.

Formation and development of basic energy equipment engineering on the basis of the following:

- development of standard designs of serial power-generating units (stage-by-stage standard designs of AES-2006, fast-neutron reactor);
- development of new types of fuel for power-generating units of nuclear power plants and its promotion onto western markets (licensing, signing of contracts for delivery of fuel assembly to Europe and the USA, implementation of trial operation programs);
- elaboration and construction of power-generating units of the 4th generation (construction of power-generating unit BN-800 at Beloyarsk nuclear power plant and elaboration of technical projects for fast-neutron reactors with liquid-metal coolant).

Development of nuclear fuel cycle on the basis of the following:

- development of gas-centrifuges of new generation;
- modernization of separation-sublimation complexes (meeting the requirements of Russian nuclear power plants and preservation of Russia's leading positions on the world market of services on uranium enrichment);
- enhancement of fabrication economic efficiency (providing competitiveness of Russian nuclear fuel on world markets).

Development of the resource base of the nuclear electric energy industry on the basis of the following:

- development of uranium deposits;
- increase in mining at combined deposits;
- exploration and exploitation of new deposits in the most promising uranium-rich regions of the world (providing aggregate uranium mining at the level of at least 6 thousand tons per year by the end of the first phase, and 17 thousand tons per year by the end of the second phase of the Strategy implementation);
- establishment of facilities for the new types of fuel production;
- development and promotion of the closed fuel cycle conception implementation.

Development of the nuclear electric energy industry production base on the basis of the following:

- provision of required volumes of equipment deliveries for nuclear power plants, minimization of monopoly pressure (establishment of alternative suppliers of power equipment, including by forming alliances with foreign companies);



- enhancement of economic efficiency of power engineering enterprises operating under the jurisdiction of the State Atomic Energy Corporation "Rosatom" and their entrance to allied markets.

Creation of infrastructure for management of the nuclear power plants life cycle by establishing unified state systems of spent nuclear fuel management and radioactive waste management, as well as by developing technologies of nuclear power-generating units decommissioning.

### *9. Heat supply*

The strategic objectives of the heat supply development are the following:

- achievement of the high level of comfort in residential, public and industrial premises, including growth in volume and quality of the complex of services on heat supply (heating, cold supply, ventilation, air conditioning, hot water supply), high level, corresponding to the level of the leading European countries, of the country's population and economy provision with this complex of services at affordable prices;
- radical increase in engineering level of heat supply systems on the basis of innovative highly efficient technologies and equipment;
- reduction in nonproductive losses of heat and fuel;
- provision of controllability, safety and economic efficiency of heat supply;
- reduction in negative impact onto the environment.

The results of the Energy Strategy of Russia for the period up to 2020 implementation in the field of heat supply should be recognized unsatisfactory. Over the past period the situation in the stated field deteriorated despite a number of adopted resolutions which turned out to be not sufficiently supported by the required organizational measures, material and technical resources and financial assets.

Over the past period the indicators of depreciation of heat supply fixed assets grew up to 65–70%, the operation ratio of installed heating capacity of electric power plants dropped to the amount not exceeding 50%, the length of heat supply networks reduced by 7% (by more than 13.5 thousand km), losses in heat supply networks increased from 14 to 20%, and electricity consumption for heat-carrier transfer grew significantly as well (up to 40 kWh/Gcal).

The main problems in the stated field include the following:

- unsatisfactory state of heat supply systems characterized by high depreciation of fixed assets, especially of heat supply networks and boiler rooms, insufficient reliability of operation, large energy losses and negative impact onto the environment;
- demand for intensive investment to provide reliable heat supply and simultaneously limit the growth of prices for heat supply services;
- organizational dissociation of heat supply systems and consumers of their services: absence of the unified state policy in this sector, first of all research and development and investment policy;
- demand for institutional reconstruction of the whole heat supply system in order to help it overcome the crisis and successfully function in market environment.

The following key goals must be completed to achieve strategic objectives in the stated sphere:

- development of heat supply in Russia and its regions on the basis of central heating with the use of modern economically and environmentally efficient co-generation units with wide range of capacities;
- expansion of central heating on the basis of steam-turbine, gas-turbine, gas-powered and diesel units to the area of medium and low thermal loads;
- optimal combination of central and decentralized heating with separation of the corresponding zones;
- maximum use of geothermal energy potential to provide heat supply of isolated regions rich with geothermal resources (the Kamchatka Peninsula, Sakhalin Island, Kuril Islands);
- development of systems of thermal power centralized-distributed generation with various types of heat producers located in areas of heat consumption;
- modernization and development of decentralized heat supply systems with application of highly efficient condensation gas and coal boilers, co-generation, geothermal, heat-pump and other units, as well as automated individual heat generators of new generation for burning various types of fuel;
- improvement of combined heat and power plants operation regimes aimed at maximum reduction in electricity production by condensation cycle, shift of its production to suburban thermal power plants for the purpose of operational economy;

- change of the heat supply systems structure, including rational combination of system and element redundancy, equipment with automatic devices and measuring instruments in the frames of automated systems of dispatching control over normal and emergency regimes of operation thereof, transition to the independent pattern of heat loading connection (ventilation and air conditioning) and closed system of hot water supply;
- combined operation of heat sources for mutual heat supply networks with optimization of their operation regimes;
- reconstruction of combined heat-and-power plants, boiler rooms, heat supply networks and heat sources, thermal hydraulic regimes adjustment, enhancement of construction-and-assembly and repair works quality, timely performance of scheduled measures, equipment of consumers with stationary and mobile heat supply units as reserve and (or) emergency heat supply sources;
- development of legislative base providing efficient interaction between heat producers, organizations performing its transportation and distribution, as well as consumers under market conditions.

Prospected structure, as well as volumes of heat production and consumption for the stated period are aimed at maximal satisfaction of Russia's economy demands. They also take into account deurbanization processes, which has already started, including shift of industrial production beyond the boundaries of urban areas and active development of individual low-rise housing, the share of which is planned to amount to 52–55% of all residential properties to be commissioned. Low-rise housing, as a rule, will be provided with individual heat generators, while high-rise buildings – with centralized (partly with decentralized) heat sources. The main increment of heat output in the centralized heat supply systems will be provided by thermal power plants, the share of which in the total volume of heat production in the centralized heat supply systems will grow from 44 to 49–50% by the end of the third phase of the Strategy implementation. Besides, the use of waste-heat utilization units and renewable heat sources on the basis of geothermal and solar energy and biomass will be increased. As a result, the share of boiler rooms in heat output in the centralized heat supply systems will be reduced from 49 to 40% by the end of the third phase of the Strategy implementation.

Nuclear power plants with module high-temperature gas-coolant reactors will also be used in the heat supply industry for industrial heat production, production of hydrogen, synthetic liquid fuel, etc.

Energy saving in the heat supply industry will be executed in the following main areas:

- heat production: increase in performance index of boiler, heating and other units on the basis of modern technologies of fuel burning, co-generation of heat and electricity, increase in the operating ratio of thermal capacity, development of distributed heat generation systems with involvement of renewable energy resources, increase in engineering level, automation and mechanization of small heat sources, equipment thereof with systems of accounting and regulation of heat power consumption, as well as reasonable division of centralized and decentralized areas of heat supply;
- heat transportation systems: reduction in heat losses and heat carrier leaks as a result of heat supply networks reconstruction on the basis of factory-assembled heat pipelines use, efficient methods of laying thereof, modern locking and control devices, automated units and regime management systems, as well as organization of optimum operation regimes of heat supply networks, heat sources and consumers;
- heat consumption systems: accounting and quality control of consumed heat power, reconstruction and new construction of buildings with the use of heat resistant structures, thermal automation, energy efficient equipment and heat pipelines, as well as high technological efficiency of the whole process of heat consumption, affordability of its control and the possibility to manage it.

As a result, specific heat losses will be reduced at least by half (from 19 to 8–10% by the end of the third phase of the Strategy implementation), fuel economy in the amount of at least 40 million tons of coal equivalent will be provided by 2030.

The projected development of heat supply will require implementation of such measures as establishment and improvement of competitive market environment, promotion of advanced Russian equipment for heat supply systems development, enhancement of management of these systems and support in investment attraction into the heat supply sector provided by the state and regional authorities.

At the first phase of the Strategy implementation, tightening of heat supply services standards will be provided due to optimization of sys-

tems structure, combination of centralized and decentralized heat supply, enhancement of reliability, safety, energy and economic efficiency of heat production, transportation and consumption at the expense of modernization of production assets and heat supply networks, as well as provision of consumers with accounting and regulation systems.

Within the stated period development and commencement of stage-by-stage implementation of program measures aimed at radical improvement of the heat supply industry should be realized. The measures, among other things, provide for the following:

- development of favorable conditions for private investments attraction in the heat supply sector, including introduction of the method of economic return on investment;
- optimization of the tariff system (transition to mandatory application of a double-rate tariff, application of long-term tariffs under bilateral contracts) with due account for interests of heat producers and heat consumers both;
- development of mandatory requirements to the equipment produced and used in the stated sector, as well as to enhancement of energy efficiency of buildings;
- rational application of state support mechanisms, including in the context of state-private partnership.

At the second phase of the Strategy implementation large-scale reconstruction and technical re-equipment of fixed assets will be performed, including economically efficient replacement of heat supply networks and central heating network equipment in the regions where such replacement is economically justified. Systems of decentralized (individual) heat supply will be widely developed at a new technological level, including with the use of renewable heat sources.

Heat power market will be established and relationships between its players will be harmonized. Processes of enhancement of the heat supply energy efficiency and introduction of innovative highly efficient process flows in the industry's organization will be further developed.

At the third phase of the Strategy implementation heat supply will achieve high levels of energy, economic and environmental efficiency. The population will be provided with high level of heat comfort corresponding to that of the countries with similar natural and climatic conditions (Canada, Scandinavian countries). Further development of the industry will follow the course of expanded involvement of non-hydrocarbon energy sources into the heat production and use of highly efficient automated process flows of the heat supply organization.

## *10. Use of renewable energy and local energy resources*

The strategic objectives of the renewable energy and local energy resources use are the following:

- reduction in growth rates of anthropogenic load onto the environment and resistance to climatic changes under the condition of necessity to satisfy growing energy consumption;
- rational use and reduction in growth rates of existing fossil fuels consumption under the condition of inevitable exhaustion of its reserves;
- preservation of health and quality of life of the population by means of slowdown in growth rates of environmental pollution from fossil fuel use; reduction in the state expenditures on health protection;
- reduction in growth rates of expenses for distribution and transportation of electricity and fuels and in the resulting losses;
- involvement of additional fuel and energy resources into the fuel and energy balance;
- enhancement of energy security and reliability of energy supply at the expense of its increasing decentralization.

According to current assessments, the technical potential of renewable energy in Russia amounts to at least 4.5 billion tons of coal equivalent per year. It mainly includes potential of solar and wind energy and exceeds the current energy consumption in the country by more than 4 times. Economic potential of renewable energy depends on existing economic conditions, cost, availability and quality of fossil fuels reserves, as well as on regional peculiarities. It changes in the course of time and must be specially assessed in the process of preparation and implementation of specific programs for and projects on development of renewable energy (taking into account the comprehensive assessment of their specific contribution into achievement of the stated strategic objectives).

In the future it is planned to provide rational and economically justified growth of various types of renewable energy use for electricity and heat production, as well as to expand the use of alternative kinds of fuel in transportation and energy sector.

In accordance with the Guidelines of the State Policy in the Sphere of Enhancement of Energy Efficiency of the Electric Energy Industry on the Base of Renewable Energy Use for the Period up to 2020, the target of the stated period is the increase in the share of electricity, produced

on the base of renewable energy (apart from hydroelectric power plants with installed capacity over 25 MW), in the structure of electricity production and consumption from 0.5 to 4.5% roughly. In order to achieve the projected volumes of electricity production on the base of renewable energy, commissioning of generating facilities (small hydroelectric power plants, wind, tide, geothermal power plants, thermal power plants using biomass as one of the fuels, other kinds of electric units) with an aggregate installed capacity up to 25 GW should be realized within the stated period.

In order to realize this goal, it is required to develop a complex of measures of the state policy in the stated sphere providing for the system state support and harmonized with projected and actual growth rates of renewable energy development. The stated growth rates shall also be harmonized with construction of required infrastructure, enhancement of competitiveness of electricity production on the base of renewable energy, as well as with rational involvement of renewable energy into the fuel and energy balances of individual regions.

For these purposes it is planned to develop and regularly adjust master plans for allocation of power generation facilities working on the base of renewable energy in the Russian Federation, with due account for layout of productive forces, prospects of social and economic development of the regions, development of resource base, including the list of projects for new generation facilities construction and reconstruction of existing ones operating on the base of renewable energy.

At the third phase of the Strategy implementation, under the condition of growing electricity production, it is planned to provide at least the constant share of renewable energy in its structure, which corresponds to the annual production by 2030 of at least 80–100 billion kWh on the base of renewable energy.

In general, the state policy in the field of renewable energy use for the period up to 2030 will provide for the following:

- coordination of measures in the sphere of electric energy industry and renewable energy development;
- rational implementation of state support measures for development of renewable energy, in particular, by means of payment for electricity produced with the use of renewable energy and sold on the wholesale market, with due account for markups above the wholesale market equilibrium price, as well as by means of reimbursement of the payment for technological connection to the networks;

- development of the complex of measures for the state support of the manufacturing industry and research institutes aimed at provision of the renewable energy sector with Russian equipment, components and advanced technologies, including with the use of transfer of technologies and localization of manufacture of components for electric power plants running on renewable energy at Russian enterprises;
- creation of favorable conditions for attraction of off-budget investments for new generation facilities construction and reconstruction of existing ones operating on the basis of renewable energy; use of venture capital funds for investing into the facilities in the renewable energy sector;
- support of development of small enterprises operating on the energy service market in the renewable energy sector;
- provision of access to information on elaboration and implementation of measures on renewable energy sector development;
- execution of engineering and technological control and supervision over compliance with safety requirements in the process of renewable energy use.

The use of local energy resources in the regional energy balances is insufficient at present. In 2008, the share of peat in the fuel and energy balance of Russia was less than 1%, the share of other hard fuels, including various wastes, and wood fuel for heat supply were within the range from 3 to 4%.

Peat is one of the most important and promising local fuel. Main areas of the peat utilization will be satisfaction of municipal and household needs, as well as requirements of agriculture and related industries. Upon increase in the volumes of peat production and modernization of technological base of the peat industry, its efficient use at thermal power plants will become possible.

Along with traditional areas of its use as fuel and fertilizer, the peat, due to its multisided natural features, will also be used in medicine and oil industry, which will require to form an appropriate legislative base, as well as development and application of rational forms of state support of the peat industry, including the issues of appropriate target programs elaboration, subsidizing of interest rates payable on loans for production development incurred by the peat industry entities, etc. This will enable facilitation of introduction of modern highly efficient technologies and equipment for mining, agglomeration and burning of peat



products for the needs of small and medium energy enterprises, as well as increase the share of peat use in the fuel and energy balance of peat-producing regions from the current insignificant amounts (as a rule not exceeding 1–2%) to at least 8–10%.

The state policy in the sphere of local energy resources use for the period up to 2030 will provide for the following:

- restoration and support of development of local energy resources production, establishment of thermal power plants and boiler rooms running on these sources (peat, wastes of forestry and wood processing industries), including in hard-to-reach and remote areas;
- creation of favorable conditions for energy production on the basis of municipal wastes.

Implementation of the stated policy, along with the development of autonomous energy sector and use of local hydrocarbon and coal resources, will make it possible to reduce the share of delivered energy resources in regional fuel and energy balances by a factor of 1.3–1.5, while at present this share amounts to about 45%.

### *11. Forecast of investments into the fuel and energy complex development*

The development of various industries of the fuel and energy complex, renewable energy, centralized heat supply, autonomous energy sector and energy saving will require large investments in the amount of US \$2.4–2.8 trillion at constant prices of the year 2007.

The major sources of investments will include own funds, profits of joint-stock companies (Russian (in the main) and foreign) with attraction of loans and assets raised from additional share issue. In the course of existing nuclear and hydroelectric power plants modernization and construction of new ones, as well as in the cases when, due to regional peculiarities, energy companies are not self-sufficient and investment-attractive, state assets will also be raised in accordance with approved program documents.

The predictive assessment of required investments are indicated in Appendix 4 to the Strategy.

## VII. REGIONAL AND INTERINDUSTRIAL ASPECTS OF THE FUEL AND ENERGY COMPLEX DEVELOPMENT

### *1. Regional peculiarities of the fuel and energy complex development*

The development of the fuel and energy complex in the Russian regions is based on the key provisions of the Concept for the Enhancement of Regional Policy in the Russian Federation and master plans for development of individual industries of the fuel and energy complex and will be implemented with due account to the existing energy potential of the territories.

#### *Central federal district*

The volumes of primary energy consumption in the Central federal district will grow and by 2030 will have exceeded the level of 2008 by the factor of 1.4–1.6. Simultaneously, the own production of primary energy will grow and will have overcome the level of 2008 by the factor of 1.9. As a result, the self-sufficiency rate of the district will have been raised to 17–19%.

At the first phase of the Strategy implementation, the replacement of steam-power generating units with steam-gas ones, loading and modernization of existing coal-fired generating units, decommissioning of old equipment of combined heat-and-power plants, as well as construction of new combined heat-and-power plants with steam-gas units will be performed in the electric energy industry of the region. Nuclear electric energy industry will be further developed. Capacities of oil refineries will be modernized. Construction of the gas pipeline Northern Areas of the Tyumen Region – Torzhok will be completed. High emphasis will be put on realization of the structural potential of energy saving at the expense of accelerated growth of the service sector and low energy-intensive industries.

At the second and third phases of the Strategy implementation energy production will grow at the expense of construction of nuclear power plants and hydroelectric pumped storage power plants synchronized therewith in their operation, as well as thermal power plants with steam-gas generating units. The use of coal from the Siberian federal district, as well as local energy resources (coal, bio-

mass, peat) will be slightly increased. In the field of energy saving, low-cost measures of its technological potential implementation will prevail.

By the end of the third phase of the Strategy implementation the construction of backbone high-voltage power transmission lines for electricity transportation from the Eastern regions of the country to its European part, including to the Central federal district, will have been completed. Key positions in the sphere of energy saving will belong to high-cost measures of its technological potential implementation.

In 2030, the Central federal district will be an energy-deficient region with developed electric energy industry, oil refining and oil chemistry. The role of nuclear power generation, as well as the use of local energy resources, will be significantly increased. The energy saving potential will be practically entirely implemented. Electric power connections of the district with the Unified power system of the Siberia will become stronger.

#### *North-Western federal district*

By 2030, the volumes of primary energy consumption in the North-Western federal district will have exceeded the level of 2008 by the factor of 1.4–1.6. The primary energy production will grow at higher rates in the regions (by 2030, the level of 2008 will have been overcome by the factor of 2.5–2.7), as a result, the North-Western federal district will no more be an energy-deficient region by the end of the second phase of the Strategy implementation, and by 2030, the level of the region's provision with primary energy will have reached 114–128%.

At the first phase of the Strategy implementation, the volume of primary energy production will grow at the expense of increase in oil and gas production in the Timano-Pechorskaya area and thermal coal in the Republic of Komi. Active works on putting oil and gas deposits into operation on the continental shelf of the Arctic seas will be continued. The nuclear electric energy industry will be further developed. Construction of the second line of the Baltic pipeline system, gas pipelines "Severnii Potok" (Nord Stream) and Northern Areas of the Tyumen Region – Torzhok, sea crude oil loading terminals in the ports of Primorsk and Ust-Luga will be completed. Measures will be taken on energy independence provision of the Kaliningrad Region. The growth of primary energy consumption will be reduced primarily at the expense of structural energy saving potential realization.

At the second phase of the Strategy implementation, the development of Stockman gas condensate deposit will play the leading role in the growth of energy production in the region. A liquefied natural gas plant will be built on the coast of the Barents Sea. A part of gas produced on the continental shelf of the Arctic seas will be delivered to the unified system of gas supply. The nuclear and hydraulic electric energy industries will be further developed.

Construction of a new oil refinery will be completed in the Lenin-grad Region. The region will turn from energy-deficient to energy-redundant, and export of energy resources to other regions of the country and abroad will be developed. Measures aimed at technological potential realization will prevail in the sphere of energy saving, wastes of timber processing complex will be used to the fuller extent.

At the third phase of the Strategy implementation, active development of oil and gas deposits on the continental shelf of the Arctic seas and development of energy transportation infrastructure will be continued in the region. Modern innovative technologies will be widely applied in the energy saving sphere.

In 2030, the North-Western federal district will be a large energy-redundant region, performing deliveries, including transit deliveries, of oil, natural gas, including liquefied natural gas, and electricity to the energy-deficient regions of the country and abroad. Energy efficiency of the region's economy will be raised significantly thanks to realization of the structural and technological energy saving potential. The level of energy security provision will be increased due to diversification of the fuel and energy balance and non-fuel energy development.

### *Southern federal district*

Growth of the primary energy consumption (by a factor of 1.5–1.6 as compared with the level of 2008) and substantial increase in the primary energy production (by a factor of 2.1–2.2 as compared with the level of 2008) will take place in the Southern federal district, which will cause the achievement of self-reliance of the region on its own primary energy resources (at the level of 89–97%).

At the first phase of the Strategy implementation, additional loading and modernization of existing coal-fired generating units, replacement of steam-power generating units with steam-gas ones and decommissioning of old equipment of combined heat-and-power plants will take place in the electric energy industry. The use of local energy

resources (biomass, geothermal waters) will be further developed. Construction of the oil-product pipeline "Yug" (South) and modernization of the crude oil loading terminal in the port of Novorossiysk will be completed. Significant priority will be given to the implementation of the energy saving potential, primarily the structural one (at the expense of accelerated growth of the service sector and low energy-intensive industries).

At the second phase of the Strategy implementation, the nuclear and hydraulic energy industry will be further developed. Modernization of the oil refinery in Tuapse will be completed. Export of Russian energy resources to the countries of Europe via the territory of the Southern federal district will be increased: construction of the gas pipeline "Yuzhniy Potok" (South Stream) will be completed, the transfer capacity of the Caspian Pipeline Consortium will be increased, a new sea port on the Black Sea coast with highly productive coal terminal will be constructed.

At the third phase of the Strategy implementation, electricity production at nuclear and hydroelectric power plants, as well as on the base of local energy resources, will be increased. Thermal coal from the Siberian federal district and natural gas from the Urals federal district will be primarily used to cover energy deficit of the region. Energy transport infrastructure, as well as technological energy saving will be further developed.

By 2030, the energy efficiency of the Southern federal district economy will have grown significantly. The share of nuclear and hydraulic power generation, as well as local energy resources in the structure of the fuel and energy balance will have increased in the region. Not only will the energy security of the region be provided, by also its importance as a transit export center providing deliveries of Russian energy resources to the world market be enhanced on the base of the developed energy transport infrastructure.

### *Volga federal district*

The growth of primary energy consumption (by the factor of 1.2–1.4 in 2030 as compared with the level of 2008) will be accompanied by reduction in primary energy production (70–80% in 2030 as compared with the level of 2008) in the Volga federal district. As a result, the energy shortage in the region (self-sufficiency of the Volga federal district with primary energy will amount to 50–53% in 2030) and its dependence on energy deliveries from the outside will grow.

At the first phase of the Strategy implementation, the gradual reduction in oil and gas production will take place in traditional energy-producing regions. The electric energy industry will witness the replacement of steam-power generating units of thermal power plants with steam-gas ones, additional loading and modernization of existing coal-fired generating units, commissioning of new steam-gas combined heat-and-power plants. Electricity production at existing hydroelectric power plants will be increased at the expense of the water level rise in reservoirs at Cheboksary and Nizhnekamsk hydraulic systems up to the projected marks. By the end of this phase, the first stage of a new oil refinery in the Republic of Tatarstan will have been commissioned.

At the second phase of the Strategy implementation, oil and gas production will be increased in the Caspian Region against the background of the further reduction in oil production in the Volga-Urals area. Along with processing of own hydrocarbons, the processing of the hydrocarbons mined at oil and gas deposits in the Western Siberia will be increased. New electric energy industry technologies on the base of burning of solid fuel with wide fraction structure will be introduced. Construction of pipeline systems running from deposits to be put into operation to existing oil and gas processing and chemical facilities will be completed. Oil and gas from the Urals federal district, as well as coal from the Kuznetsk coal basin will be used to cover energy shortage. Measures on technological energy saving potential implementation will be developed significantly.

At the third phase of the Strategy implementation, the stabilization of oil and gas production volumes in the Caspian region and further reduction in oil production in the Volga-Urals area will take place. For the purpose of growing energy shortage coverage, by the end of the second phase the capacities of high voltage backbone transmission lines will be used to transport electricity from the eastern regions of the country. High-cost measures will be widely used in the technological energy saving sphere.

By 2030, the share of oil and gas in the fuel and energy balance structure will have been reduced, while the share of coal and the energy of hydroelectric power plants will have been increased. The energy security in the region will be based on the maximum possible realization of structural and technological energy saving potential and inter-regional energy links provided by means of extended and modernized energy transport infrastructure.

### *Urals federal district*

The stabilization of primary energy production, accompanied with the growth of consumption thereof, will be witnessed in the Urals federal district, especially at the third phase of the Strategy implementation (by a factor of 1.3–1.6 in 2030 as compared with the level of 2008). In spite of some decrease in the rate of self-sufficiency, the Urals federal district will still be the main energy-producing region in the country.

At the first phase of the Strategy implementation, the stabilization and gradual reduction in oil production is expected in the region. Measures on utilization of associated petroleum gas will be actively developed. Reduction in the gas production volumes will be compensated by development of new deposits in the Nadym-Purtaz district and on the Yamal Peninsula. Works on pipeline systems construction from existing and newly commissioned deposits to oil and gas refining facilities and oil chemistry plants will be accelerated. Construction of new gas processing and gas chemical complexes will be commenced. Energy development of the Circumpolar Urals will be realised, in particular, in the context of the project "The Industrial Urals – the Polar Urals". Works on reconstruction of trunk oil and gas pipelines will be performed. Construction of the gas pipeline Northern Areas of the Tyumen Region – Torzhok will be completed. Gasification of the Western Siberia will be continued.

At the second phase of the Strategy implementation, the stabilization of oil and natural gas production in the region will go on. Active development of gas deposits on the Yamal Peninsula and in the Gulfs of Ob and Taz will compensate the reduction in gas production in the traditional gas-producing areas. Extensive gas processing industry and oil chemistry will be created in the region to utilize and transport "wet" gas and gas condensate. Low-pressure gas of exhausted large deposits will be used for the needs of gas chemistry and electric energy industry in the region. Development of uranium ore deposits in the Kurgan Region will be commenced (the Closed Joint-Stock Company "Dalur").

At the third phase of the Strategy implementation, gas production on the Yamal Peninsula and in the Gulfs of Ob and Taz will grow significantly, while gas production volumes in the Nadym-Pur-Taz district of the Tyumen Region will experience further reduction. The use of gas as a valuable chemical product will be expanded, production of synthetic liquid fuel from gas will be commenced.

In 2030, the Urals federal district will hold its position of the main oil and gas producing region of Russia delivering energy carriers to energy-deficient regions of the country and abroad. Energy efficiency of the region will be enhanced, the energy saving potential will be realized, environmentally friendly and efficient methods of energy production will be used in complicated natural and climatic conditions.

### *Siberian federal district*

By 2030, the primary energy production in the Siberian federal district will have been increased by a factor of 3.2–3.9 as compared with the level of 2008, and its consumption volumes will have been increased by a factor of 1.4–1.6. As a result, energy self-sufficiency of the region will have been increased from 42% in 2008 to 99–100% by 2030. The deliveries of the primary energy to other regions of the country and abroad will also have grown.

At the first phase of the Strategy implementation, oil and natural gas production will be increased in the Siberian federal district. Development of oil deposits in the Krasnoyarsk Territory (Vankor-Suzunsk center) and the Irkutsk Region will be continued. Active measures on utilization and complex use of associated petroleum gas will be taken. Preparation for development of large gas fields will be deployed. Creation of new oil and gas chemical centers will be commenced. Coal production will grow in the Kansk-Achinsk coal basin, while its stabilization will take place in the Kuznetsk coal basin. The construction of the oil pipeline Eastern Siberia – Pacific Ocean will be continued. Works on gasification of industrial facilities and communal housing will be undertaken. Production of heat and electricity on the base of renewable energy will be developed in isolated industrial centers.

At the second phase of the Strategy implementation, volumes of oil production and especially of natural gas production will go on growing. Exploitation of the Krasnoyarsk (on the base of Sobinko-Paiginskoye and Yurubcheno-Tokhomszkoye deposits) and the Irkutsk (on the base of Kovyktinskoye deposit) gas centers will be commenced. Large oil and gas chemical complexes will be established. Special priority will be given to the most rational use of multi-component hydrocarbons, including utilization of helium. Hydraulic and thermal coal-fired power generation based on the use of modern innovative technologies of solid fuel burning will be further devel-



oped. Large hydroelectric power plants will become the base for formation of territorial energy and industrial complexes in the region. Resource base of the nuclear electric energy industry will be actively developed on the base of uranium deposits in the Zabaikalye Territory and the Republic of Buryatia. The coal industry will be further developed, including at the expense of development of new deposits in the Republic of Tyva and the Zabaikalye Territory. Deliveries of coal to the European regions of Russia will be increased, which will require the increase in transfer capacity of railroads westwards. The use of renewable energy in remote and isolated regions of the Siberian federal district will be expanded. Gasification of the region will be continued.

At the third phase of the Strategy implementation, the growth of oil and natural gas production will be continued. Gasification of the region will be completed. Construction of interregional backbone electric grids for electricity transportation to the European part of Russia will be realized.

In 2030, the region will firmly hold the top position in Russia in coking and thermal coal production, the second position in oil and gas production, one of the the leading positions in Russian oil chemistry, and will also play the leading role in deliveries of helium onto the Russian and world markets.

Thanks to the development of energy transport infrastructure and use of renewable energy, not only the energy security of all regions of the Siberian federal district will be provided, but also sustainable deliveries of energy resources to the energy-deficient regions of the country and abroad will be organized.

### *Far Eastern federal district*

Thanks to substantial growth of primary energy production, the Far Eastern federal district will turn from energy-deficient to energy-redundant and export-oriented region at the first phase of the Strategy implementation. By 2030, the volumes of primary energy production will have grown by a factor of 4.4 as compared with the level of 2008.

Extensive industrial base will be created in the region on the basis of own energy and resource base with the use of modern technologies, including energy saving technologies. The primary energy consumption will have been increased by a factor of 1.7–1.9 as compared with the level of 2008.

At the first phase of the Strategy implementation, the development of oil and gas deposits of the Sakhalin Region (on the continental shelf of the Sea of Okhotsk) and oil deposits in the Republic of Sakha (Yakutia) (Talakanskoye, Verkhnechonskoye deposits) will be continued. Special priority will be given to the comprehensive utilization of associated petroleum gas and other components of extracted hydrocarbons, in particular, helium. The implementation of projects "Sakhalin-1" and "Sakhalin-2", as well as export of Russian liquefied natural gas to the countries of the Asia-Pacific region will go on. Coal mining in the region will be increased (primarily at the expense of deposits in the South Yakutia). Construction of the first stage of the oil pipeline Eastern Siberia – Pacific Ocean will be completed. Crude oil loading terminals in the ports of Nakhodka and De-Kastri, as well as coal terminals in the ports of Vanino and Vostochniy will be modernized. Production of heat and electricity on the base of renewable energy will be developed in remote and isolated areas. Construction of a windfarm may take place in the south of the Primorskiy Territory (the Russkiy and Popov Islands). Gasification of the southern areas of the Far Eastern federal district will be continued on the base of natural gas, produced at Sakhalin. Export of electricity to China will be commenced.

At the second phase of the Strategy implementation, volumes of oil and gas production will be increased. Development of the continental shelf of the Sea of Okhotsk will be continued (projects "Sakhalin-3", "Sakhalin-4", "Sakhalin-5", and "Sakhalin-6"). New oil and gas chemical centers will be established, an oil refinery will be constructed in the Primorskiy Territory. Works on gasification of industrial facilities and communal housing, construction of export gas pipelines to the countries of the Asia-Pacific region will go on. Production and export of liquefied natural gas will be expanded. Construction of the oil pipeline Eastern Siberia – Pacific Ocean will be completed. Exploitation of Elginskoe coal deposit in the Republic of Sakha (Yakutia) will be commenced. The growth of coal production will demand increase in transfer capacity of railroads westward and eastward both (for export to the countries of the Asia-Pacific region). The electric energy industry will enjoy accelerated growth rates, predominantly at the expense of coal-fired thermal and hydroelectric (included into energy and industrial complexes) power plants, as well as combined gas-fired heat-and-power plants in cities. The Central power region of the Republic of Sakha (Yakutia) is contemplated to be connected with the Unified power system of the East of Russia.

At the third phase of the Strategy implementation, development of the Yakutia gas center (Chayandinskoye, Srednebotuobinskoye, Taas-Yuryakhskoye and other deposits), hydrocarbon deposits on the Magadan shelf area and on the Western-Kamchatka sector of the Pacific Ocean will be commenced. Coal production at existing deposits will be increased, new deposits in the Magadan Region will be commissioned. Works on connection of isolated power regions of the Republic of Sakha (Yakutia) and the Magadan Region to the unified power grid will be continued. Creation of the eastern gas transportation network will be completed, which will make it possible, if necessary, to connect it to the unified system of gas supply. Large-scale development of electric grids aimed, among other issues, at the solution of the strategic task of unifying energy systems of the Siberia and Far East, will be accomplished.

In 2030, the Far Eastern federal district will be a large energy-redundant region, fully providing its own demands for primary energy, including in remote areas at the expense of local energy resources and renewable energy use, and exporting them to the countries of the Asia-Pacific region. Energy security of the Far Eastern federal district will be totally provided, energy efficiency of its economy will be largely enhanced.

## *2. Interaction of development of the fuel and energy complex and sectors of the industry*

The role of the fuel and energy complex in the system of its interaction with the industry is determined by two types of economic relations: the fuel and energy complex as a supplier of fuel, energy, raw materials, and the fuel and energy complex as a consumer of the finished products of related sectors of the industry.

At present the industry consumes over 50% of fuel and energy resources produced in the country and about 60% of electricity.

The main volume of industrial goods consumption in the fuel and energy complex consists of products of metallurgy (first of all, pipes), manufacturing (power equipment, electrotechnics, equipment for oil, gas and coal industries) and chemical industry (reagents, catalytic agents).

Feedbacks in this system have special significance. Due to high energy intensity of certain sectors of the industry, limitation of deliveries or unreasonably high prices for fuel and energy resources may lead to limitation of product deliveries to the fuel and energy complex and influence the economy growth in the country as a whole.

The Russian fuel and energy complex reliably satisfies the demands of industry for energy and raw materials. Still there are risks of negative impact produced by sharp rise in prices for fuel and energy resources on the industry development. First of all, this concerns the sectors using fuel as raw materials (agricultural chemistry, iron and steel industry).

Russian industry satisfies the demands of the fuel and energy complex for equipment and materials at the level of 80–85%. The situation is especially complicated with deliveries of equipment and catalytic agents for oil refining. The share of Russian products constitutes only to 30–40% in this sphere. Difficult situation exists with deliveries of Russian machinery to the coal industry.

The key problems of power machinery engineering are the shortage of facilities for production of required nomenclature of steam-gas and gas-turbine generating units, as well as of highly efficient and environmentally friendly coal-fired generating units, and also substantial scientific gap of Russian turbine engineering. Provision of the electric energy industry with Russian steam-gas and gas-turbine generating units does not exceed 50%.

Although some kinds of Russian equipment don't yield to foreign equivalents in technical characteristics and reliability, the substantial part of the equipment produced by Russian companies compares poorly by quality and (or) price parameters. Meanwhile, repair of Russian equipment under complicated natural and climatic conditions of the country is much cheaper and presents less technical difficulties than the repair of imported analogues.

The development of power machinery will be based on appropriate industrial strategy, where the main emphasis will be made on the following:

- production of low-speed steam turbines with the capacity of 1200 MW for nuclear power plants with reactors VVER-1200, hydraulic turbines with the capacity of 1000 MW, steam turbines and steam boilers for coal-fired generating units running on ultra supercritical steam parameters, steam boilers using advanced coal burning technologies with circulating fluidized bed under pressure, gas turbines with the capacity of 65 MW, highly economical gas turbine units for gas transportation system, equipment for hydrocarbons production and transportation on developing the continental shelf of the Arctic seas and equipment for renewable energy use;

- organization of licensed production of products which cannot be developed by Russian scientists and engineers in the nearest 3–4 years (serial production of gas turbines with the capacity of 270–290 MW and a number of others) at Russian facilities.

The forecasted development of the fuel and energy complex opens a wide prospect for the development of modern equipment and materials production in Russia, creates opportunities for accelerated innovative development of such sectors of the Russian industry as manufacturing, defense complex, metallurgy, chemical industry and construction complex. This area is important for realization of the state economic policy aimed at priority development of deeply processed goods production.

The most important factor of the growth of demand for Russian equipment and materials for the fuel and energy complex is the enhancement of their competitiveness, which is to be provided at the expense of the following:

- improvement of design and manufacturing technologies of power, oil-and-gas and mining transportation equipment, methods and systems of their quality and reliability enhancement and costs reduction;
- production of equipment and materials with the use of nanotechnologies providing innovative resource-saving and energy-saving development of the fuel and energy complex;
- development of chemical technologies and processes, systems for integrating chemical and energy industries, as well as for equipping energy sector with modern reagents and catalytic agents;
- expansion of assortment and improvement of properties of construction materials and standard units, including pipes for over-pressure pipelines, steam pipelines and boiler rooms running on steam with the pressure over 300 atmospheres and temperature of 570 degrees Celsius;
- development and implementation of efficient automated systems supporting the entire cycle of creation of perfect hardware, systems, algorithms and software for management.

The system of equipment and material purchase by the companies of the fuel and energy complex will be based on competitive bidding and in most cases realized by means of open tenders.

Interaction of entities of the fuel and energy complex and the industry contemplates the use of various forms of cooperation, including the following:

- joint programs of scientific and technological cooperation and import substitution;
- performance of field tests of new equipment and materials;
- implementation of brand import technologies with gradual reduction in the share of imported components;
- introduction of industrial standards tightening requirements to working capacity and safety of the equipment.

Achievement of the stated objectives, use and development of the Russian industry's potential for the energy sector require both state support and improvement of economic mechanisms of long-term relationships between the fuel and energy complex and related sectors, providing selection of industrial developments, which are more promising for the fuel and energy complex.

Taking into account the expansion of foreign manufacturers on the Russian market of equipment for the fuel and energy complex, the policy of Russian manufacturers protection by means of customs and tariff regulation will be pursued, especially at the first phase of the Strategy implementation.

One of the most important areas of improvement in cooperation between the industry and the fuel and energy complex is the long-term provision of deliveries of machinery and metallurgical units with high degree of completeness and prefabrication. Implementation of this area is necessary to reduce volumes of construction and assembly works for the purpose of providing projected commissioning of new facilities and facilities under reconstruction and other production facilities, the amount of which is growing in all sectors of the fuel and energy complex. Organization of the system of high-quality service of the equipment provided by manufacturers within the whole period of its operation is also required.

It is necessary to create and develop modern information system of interaction between entities of the fuel and energy complex and the industry (specialized databases, information, analytical and reference systems, Internet-gateways, electronic trade grounds, etc.). It is reasonable to use modern information technologies as an instrument of organization and support of all participants involved in the process of development, production and use of equipment and materials for

the fuel and energy complex enabling enhancement of the efficiency of their operation at the expense of acceleration of the processes of product research and development, reduction in costs in the processes of equipment production and operation, as well as improvement of equipment maintenance.

One of important tasks is the solution of an import substitution problem (production of import substituting products and parts for imported machinery). In 2030, the needs of the fuel and energy complex sectors are to be satisfied primarily at the expense of Russian equipment. As of the end of the first phase of the Strategy implementation, the share of imported machinery in the volume of purchased equipment shall not exceed 12%, as of the end of the second phase – not more than 8%, and it will have been reduced to 3–5% by 2030. It is forecasted that Russian industry will have assimilated up to 95–98% of the product range for the fuel and energy complex.

The volumes of investments and construction and assembly works are to grow substantially in the fuel and energy complex and in all its sectors in order to satisfy the forecasted demand for fuel and energy. According to the estimates, annual volumes of construction and assembly works in the fuel and energy complex may be increased by a factor of 2–2.5 by 2030. This will require increase in capacities of construction industry. For the purpose of work acceleration and reduction in labor costs directly on construction sites, it is necessary to enhance pre-fabrication grade of construction materials, as well as the productivity of mechanical means.

## VIII. EXPECTED RESULTS AND THE STRATEGY IMPLEMENTATION SYSTEM

### *1. Expected results*

As a result of measures provided by the Strategy, the Russian energy sector will make the fundamental contribution into the transition to sustainable innovative development of the Russian economy and provide for the following:

- extended reproduction of Russia's cumulative energy potential;
- necessary development of energy infrastructure;
- stimulation of innovative development of related sectors.

Russia will become a regional leader in the sphere of Eurasian energy security provision on the base of the following:

- efficient influence on provision of stable and predictable price situation on regional energy markets;
- rationalization of energy flows in Eurasia by means of active use of Russian energy infrastructure and its full-scale economic and technological integration with the Eurasian system of energy communications;
- enhancement of long-term stability of energy demand and supply in Eurasia at the expense of the Russian energy export development and active dialogue with countries-producers and countries-consumers of energy resources in the region.

The Russian energy sector will undergo qualitative changes and become a modern, highly technological, efficient, sustainably developing complex, the most important component of which will be not just natural resources potential, but rather human and innovative potential.

The following aspects will be provided in accordance with the Strategy:

- guaranteed energy security of Russia and its regions;
- full-scale participation of Russia in global energy security system formation, including at the expense of diversification of the energy export destinations;
- reduction in the country's economic well-being dependency on the oil and gas sector with the reduction in the fuel and energy complex's share in the structure of the gross domestic product from 30 to 18%;
- decrease in energy intensity of the gross domestic product at least by a factor of 2.3;



- optimization of the structure of the Russia's fuel and energy balance with reduction in the share of gas in domestic energy consumption from 52 to 46–47% and increase in the share of non-fuel energy from 11 to 13–14%;
- energy development of new regions;
- development of social partnership between the energy business and the society;
- enhancement of financial and economic sustainability and budget efficiency of business entities of the fuel and energy complex, provision of their stable investment sufficiency;
- innovative renewal of production assets and energy infrastructure, creation and development of new kinds of energy and energy technologies;
- environmental safety and efficiency of development and functioning of the fuel and energy complex with limitation of the amount of greenhouse gases emissions by 2030 up to the level of 100–105% as compared to the level of 1990.

Generally, implementation of the Strategy and of the state energy policy stated in the Strategy will make it possible to satisfy demands to the energy sector resulting from the projected transition of the country's economy to the innovative path of development and enhance leading positions of Russia on the world energy markets.

## *2. The Strategy implementation system*

The system of the Strategy implementation is based on the following principles:

- interdependent implementation of 2 processes: main provisions of the state energy policy realization and specification of the most important measures on the energy sector development;
- determination of the most important guidelines and concentration of available resources for their achievement at each phase of the Strategy implementation;
- organization of systematic advanced monitoring of the Strategy implementation at the background of the progress and results of the social and economic development of the Russian Federation for comparison of actual and expected results of the state energy policy realization with indicators of the integrated plan ("roadmap") of measures on its implementation and forecasted indicators of the fuel and energy complex development.

Adherence to the mentioned principles will make it possible not only to compare actual results of the fuel and energy complex activity with the target indicators of the Strategy, but also to perform adjustment of current guidelines of the state energy policy, keeping its main objective preserved. This must be one of the most important mechanisms of reduction in risks of the Strategy implementation.

The system of the Strategy implementation also provides for the following:

- adoption of legislative acts providing for implementation of the main provisions of the Strategy;
- inclusion of required measures providing the Strategy implementation into the plan of actions of the Government of the Russian Federation aimed at realization of guidelines of the social and economic development of the Russian Federation for the corresponding period;
- consideration of the basic provisions of the Strategy at development of corporate and regional strategic documents and preparation of investment plans and programs in the energy sector;
- improvement of the system of performance indicators of the state energy policy;
- information and analytical support of the Strategy implementation monitoring system on the basis of state information resources, attraction of various socio-political entities and associations, representatives of legislative power, mass-media, scientific centers and institutes;
- timely detection and system analysis of occurring changes for the purpose of preventing and overcoming negative trends which influence the energy security of the country.

Measures of the state energy policy provided for by the Strategy are classified by the following areas:

- enhancement of geological exploration works on new territories and waters;
- stimulation of private investment attraction into geological exploration works and subsoil use;
- stimulation of efficient subsoil use on the basis of full and comprehensive extraction of hydrocarbons from subsoil;

- development of the market of independent services and engineering in the sphere of subsoil use;
- improvement of the state control over the level of economic concentration on energy markets;
- establishment and development of Russian systems of exchange trade in all kinds of fuel and energy resources;
- formation of efficient and stable tariff and pricing systems on energy markets;
- reduction in the share of gas in the structure of domestic energy consumption and increase in the share of non-fuel energy in the structure of the fuel and energy balance;
- rationalization of export and domestic consumption of fuel and energy resources;
- promotion of production, export and domestic consumption of energy carriers with high added value;
- improvement of interaction between federal and regional authorities in the energy sector;
- state support of regional and interregional energy infrastructure development;
- stimulation of comprehensive development of the regional energy sector;
- establishment of the sustainable national innovative system in the energy sector;
- provision of reliable energy supply to the country's population at socially affordable prices;
- expansion of real interaction between the energy business and the society in solution of the problems of the energy sector development;
- development and enhancement of efficiency of the human potential use in the energy sector;
- consideration of Russia's national interests in the context of the developing system of world energy markets operation;
- diversification of the export energy markets;
- diversification of export commodities structure, increase in the volume of export of products with high added value;

- provision of stable conditions on export markets, including guarantees of demand and justification of prices for main products of the Russian energy export;
- enhancement of positions of leading Russian energy companies abroad;
- provision of efficient international cooperation in risky and complicated projects implemented in Russia (including shelf projects under the Arctic conditions).

The integrated plan ("roadmap") of the state energy policy measures for the period up to 2030 providing for the Strategy implementation is given in Appendix 5.

The report on the progress of the implementation of measures provided in the Strategy is submitted to the Government of the Russian Federation annually. In the context of the stated report, analysis and preparation of the following offers are made:

- provision of the major strategic guidelines achievement: energy security, energy efficiency, budget efficiency and environmental safety of the energy sector;
- performance of the main groups of the state energy policy measures provided by the Strategy;
- provision of achievement of the strategic indicators of development of the fuel and energy complex's industries.

Improvement and specification of the Strategy to be performed at least once in 5 years with simultaneous prolongation of its timeframes.

## APPENDIX 1

*to the Energy Strategy of Russia for the period  
up to 2030*

### **Key development indicators of the economy and fuel and energy complex of Russia in 2008 and forecast of the Energy Strategy of Russia for the period up to 2030\***

Indicators	2008		The ratio of actual and forecasted indicators of the Energy Strategy of Russia for the period up to 2020 (%)
	forecast of the Energy Strategy of Russia for the period up to 2020	actual figures	
Gross domestic product growth (in % as compared to 2000)	148.4	165.1	111.2
Industrial production growth (in % as compared to 2000)	141	146.7	104
Average annual world market price of oil («Urals») (\$US/barrel)	24	94.6	394.1
Average annual contract price of gas (\$US/1,000 m <sup>3</sup> )	120	353.7	294.8
Growth of primary energy production (in % as compared to 2000)	123.2	126.4	102.6
Primary energy production (million tons of coal equivalent)	1,747	1,797.8	102.9
Oil production (million tons)	476	487.6	102.4
Gas production (billion m <sup>3</sup> )	638	663.6	104
Coal production (million tons)	300	326.1	108.7
Electricity production (billion kWh)	1,009	1,037.2	102.8
Primary energy consumption (million tons of coal equivalent)	1,043	990.9	94.9
Growth of primary energy consumption (in % as compared to 2000)	115.4	110.2	95.5

Indicators	2008		The ratio of actual and forecasted indicators of the Energy Strategy of Russia for the period up to 2020 (%)
	forecast of the Energy Strategy of Russia for the period up to 2020	actual figures	
Liquid fuel consumption (million tons of coal equivalent)	218	187.3	85.9
Gas consumption (million tons of coal equivalent)	516	525.7	101.9
Solid fuel consumption (million tons of coal equivalent)	195	175	89.7
Electricity consumption (billion kWh)	980	1,019.6	104
Growth of energy export (in % as compared to 2000)	146.9	150.2	102.2
Total energy export (million tons of coal equivalent)	805	882.7	109.6
<i>including:</i>			
oil and oil-products (million tons)	332	360	108.4
gas (billion cub. m)	250	247.5	99
coal (million tons)	32	97.5	304.7
Gross domestic product specific energy intensity (in % as compared to 2000)	78	66.7	85.5
Gross domestic product specific electricity intensity (in % as compared to 2000)	76.4	71.5	93.6

\*According to optimistic scenario of the Energy Strategy of Russia for the period up to 2020.

## Forecast of the domestic demand for main energy resources for the period up to 2030\*

Indicators	2005 actual	2008 actual	Phase 1	Phase 2	Phase 3
Domestic primary energy consumption (million tons of coal equivalent)	949	991	1,008–1,107	1,160–1,250	1,375–1,565
same (in % as compared to 2005)	100	104	106–117	122–132	145–165
Domestic oil consumption (refining) (million tons)	208	236	232–239	249–260	275–311
same (in % as compared to 2005)	100	113	112–115	120–125	132–150
Domestic gas consumption (billion m <sup>3</sup> )	443	457	478–519	539–564	605–641
same (in % as compared to 2005)	100	103	108–117	122–127	137–145
Domestic solid fuel consumption (million tons of coal equivalent)	167	174	168–197	198–238	248–302
same (in % as compared to 2005)	100	104	98–115	116–140	145–177
Domestic consumption of electricity (billion kWh)	941	1,020	1,041–1,218	1,315–1,518	1,740–2,164
same (in % as compared to 2005)	100	108	111–130	140–161	185–230

\* This and the following tables show the variation range of both the overall figures and their separate components without generating complex "low" and "high" scenarios.

## Forecast of the Russian energy export for the period up to 2030

Indicators	2005 actual	2008 actual	Phase 1	Phase 2	Phase 3
Total energy export (million tons of coal equivalent)	865	883	913–943	978– 1,013	974–985
same (in % as compared to 2005)	100	102	106–109	113–117	113–114
<i>including:</i>					
crude oil (million tons)	253	243	243–244	240–252	222–248
natural gas (billion m <sup>3</sup> )	256	241	270–294	332–341	349–368
coal (million tons of coal equivalent)	58	70	72–74	74–75	69–74
electricity (net export, billion kWh)	12	17	18–25	35	45–60



## APPENDIX 2

### *to the Energy Strategy of Russia for the period up to 2030*

#### Indicators of energy security

Phase 1	Phase 2	Phase 3
<i>Energy per capita consumption growth, (in % as compared to 2005)</i>		
at least 10%	at least 20%	at least 40%
<i>Electricity per capita consumption growth, (in % as compared to 2005)</i>		
at least 13%	at least 43%	at least 85%
<i>Engine fuel per capita consumption growth (in % as compared to 2005)</i>		
at least 23%	at least 41%	at least 70%
<i>Reduction in average depreciation rate of basic production assets (in % as compared to 2005)</i>		
by 10%	by 10%	by 5%
Liquidation of deficit and maintenance of stable reserves of electricity- and heat generation facilities, including maintenance of power plants' spare capacity at the level of 17% of the overall installed capacity of power plants in the UES of Russia		

#### Indicators of energy efficiency of the economy

Phase 1	Phase 2	Phase 3
<i>Gross domestic product specific energy intensity (in % as compared to 2005)</i>		
no more than 78%	no more than 57%	no more than 44%
<i>Creation of additional energy potential for economic development</i>		
at least 100 million tons of coal equivalent per year	at least 200 million tons of coal equivalent per year	at least 300 million tons of coal equivalent per year
<i>Creation of high-technology segment of energy services at the rate of</i>		
at least 200 bln. RUR per year	at least 300 bln. RUR per year	at least 400 bln. RUR per year
<i>Average annual decrease in specific losses and auxiliaries at energy enterprises (in % as compared to the preceding year)</i>		
at least 1%	at least 1%	at least 0.5%
<i>Decrease in specific fuel consumption for heat generation by boiler rooms (in % as compared to 2005)</i>		
at least 2%	at least 6%	at least 10%

### Indicators of economic and budget efficiency of the fuel and energy complex

Phase 1	Phase 2	Phase 3
Creation of dynamically stable and predictable institutional and legal environment for the energy sector functioning		
Harmonization of the fuel and energy complex contribution into the country's budgetary system tax revenues and into total amount of investments into fixed capital, providing financial and economic stability of energy companies when performing the budgetary obligations		

### Indicators of environmental security of the fuel and energy complex

Phase 1	Phase 2	Phase 3
Reduction in specific indicators of pollutants emission into the atmosphere, waste waters discharge and wastes generation by the energy sector enterprises (in % as compared to 2005)		
at least 25%	at least 40%	at least 50%
<i>Greenhouse gases emission level (in % as compared to 2005)</i>		
no more than 83%	no more than 90%	no more than 105%
<i>Associated petroleum gas utilization ratio</i>		
95%	95%	95%

## APPENDIX 3

### *to the Energy Strategy of Russia for the period up to 2030*

#### **Indicators of strategic development of mineral resource base of the fuel and energy complex for the period up to 2030**

Indicators/directions	Phase 1	Phase 2	Phase 3
<i>Oil reserves increment (million tons)</i>			
Russian Federation – total	1,854	5,597	5,122
including:			
Western Siberia	1,205	2,500	2,500
Eastern Siberia	165	1,200	1,200
European North	91	330	200
<i>Natural gas reserves increment (billion m<sup>3</sup>)</i>			
Russian Federation – total	4,100	5,400	6,500
including:			
Western Siberia	1,200	2,100	3,000
Eastern Siberia	480	1,400	1,200
the seas of Russia	350	1,700	2,000
<i>Deep drilling (thou. meters)</i>			
Russian Federation – total	7,350	24,100	39,850
including:			
Western Siberia	3,300	12,250	2,300
Timano-Pechorskaya area	700	1,600	1,800
Eastern Siberia	1,250	3,300	6,100
the seas of Russia	850	2,150	3,200
<i>Exploration seismology (thou. km)</i>			
Russian Federation – total	730	1,180	1,500
including:			
Western Siberia	240	350	500
Eastern Siberia	190	270	350
the seas of Russia	180	350	500
<i>Coal reserves increment (%)</i>			
Average annual growth of balance reserves	0.5–0.8	1–1.5	2–3
The share of coal balance reserves economically efficient for extraction according to the world standards	48–50	55–58	60–65
<i>Uranium reserves and resources increment</i>			
Ensuring of reserves increment by 2030 to the extent of (million tons): C1–150, C2–300; forecast resources – P1–1,200, P2–2,000, P3–1,700			

### Indicators of strategic development of the oil complex for the period up to 2030

Indicators/directions	2008 (actual)	Phase 1	Phase 2	Phase 3
<i>Efficiency of subsoil use</i>				
Oil recovery rate (%)	30	30–32	32–35	35–37
<i>Oil production</i>				
The share of the Eastern Siberia and Far East in oil production (%)	3	10–12	12–14	18–19
<i>Oil transportation</i>				
Capacity gain of the trunk pipelines for oil supply to the far-abroad countries (in % as compared to 2005)	2	36–52	61–67	65–70
<i>Oil refining</i>				
Refining depth (%)	72	79	82–83	89–90
Light oil products yield (%)	57	64	67–68	72–73
Nelson complexity index (units)	4,3	6	6,5	8,5
Oil products per capita consumption (ton/person)	0,5	1	1,1–1,3	1,3–1,6
<i>Oil and oil-products export</i>				
The share of the eastern direction in the total volume of oil and oil products export (%)	8	10–11	14–15	22–25

### Indicators of strategic development of the gas industry for the period up to 2030

Indicators/directions	2008 (actual)	Phase 1	Phase 2	Phase 3
<i>Gas production</i>				
The share of the new regions in total gas production (%)	2	13–14	21–23	38–39
including:				
Yamal	–	6	9	23–24
Eastern Siberia and Far East	2	7–8	12–14	15
The share of independent gas producers and vertically integrated oil companies in total gas production (%)	17	20	25–26	27

Indicators/directions	2008 (actual)	Phase 1	Phase 2	Phase 3
<i>Gas transportation</i>				
Trunk pipelines length increase (in % as compared to 2005)	3	8–10	13–15	20–23
The share of reconstructed working gas pipelines (%) in total length of the unified system of gas supply	4	10–11	12–13	25–26
<i>Gas export</i>				
The share of the Asia-Pacific region in the export structure (%)	-	11–12	16–17	19–20
The share of liquefied natural gas in export structure (%)	-	4–5	10–11	14–15

### **Indicators of strategic development of the coal industry for the period up to 2030**

Indicators/directions	2008 (actual)	Phase 1	Phase 2	Phase 3
<i>Coal production and transportation</i>				
The share of newly commissioned capacities in coal production (%)	4	5–6	15–20	25–30
The share of the eastern regions of the country (Kansko-Achinsk basin, Eastern Siberia, Far East) in coal production (%)	33	38–39	41–42	46–47
Sea port coal terminals capacity (in % as compared to 2005)	110	125	150	175
<i>Coal processing</i>				
Thermal bituminous coal enrichment coverage (%)	32	35–40	55–60	65–70
Calorific value of domestically consumed coal fuel	0,62	0,65	0,7	0,75
<i>Technical progress and innovations</i>				
The share of progressive extraction technologies in total coal production:				
underground mining method («mine-lava»)	25	35–40	55–60	65–70
open-cut mining (continuous and cyclical-and-continuous mining)	20	30–35	40–50	60
The share of coal used for deeply processed coal products recovery in total volume of coal production (%)	-	-	1,5	5–8

Indicators/directions	2008 (actual)	Phase 1	Phase 2	Phase 3
<i>Economic efficiency of the coal industry</i>				
Increase in coal production per one person employed in the industry (in % as compared to 2005)	110	150	250–260	375–420
The rate of breakage face load increase (in % as compared to 2005)	120	135–140	200–250	400–450
<i>Environmental efficiency of the coal industry</i>				
The level of soil reclamation relative to annual dislocation volume (%)	50	60	65–70	100
The rate of dirty discharge relative to overall discharge (%)	87	80–85	70–60	30–35
Water rotation ratio	0.7	0.73	0.8–0.85	0.9–0.95

### **Indicators of strategic development of the electric energy industry for the period up to 2030**

Indicators/directions	2008 (actual)	Phase 1	Phase 2	Phase 3
<i>Electricity production</i>				
The share of non-fuel energy in the electricity production structure (%)	32.5	at least 34	at least 35	at least 38
<i>Fuel supply of thermal power plants</i>				
The share of gas in the fuel supply structure (%)	70.3	70–71	65–66	60–62
The share of coal in the fuel supply structure (%)	26	25–26	29–30	34–36
<i>Energy security and electricity supply reliability</i>				
The probability of the Russian power systems deficit-free operation	0.9960	at least 0.9990	at least 0.9991	at least 0.9997
<i>Efficiency of electric energy industry</i>				
Coal-fired power plants performance index (%)	34	at least 35	at least 38	at least 41
Gas-fired power plants performance index (%)	38	at least 45	at least 50	at least 53
Nuclear power plants performance index (%)	32	at least 32	at least 34	at least 36
Specific fuel consumption for electricity production at thermal power plants, grams of coal equivalent/ kWh (in % as compared to 2005)	333 (99)	no more than 315 (94)	no more than 300 (90)	no more than 270 (81)
Losses in power grids (percentage of electric supply to the grid)	13	no more than 12	no more than 10	no more than 8

**Indicators of strategic development of the heat supply  
for the period up to 2030**

Indicators/directions	2008 (actual)	Phase 1	Phase 2	Phase 3
<i>Energy security and the heat supply reliability</i>				
Heat supply cut-off rate, 1/year	0.27	no more than 0.25	no more than 0.20	no more than 0,15
Heat supply cut-off rate due to the fault of sources, 1/(sources•year)	0.06	no more than 0.05	no more than 0.03	no more than 0.01
Renovation of heat supply network (percentage of total length)	2	at least 10	at least 40	at least 90
<i>Innovative development of the heat supply</i>				
The share of systems equipped with new highly effective operation technologies (%)	10	at least 40	at least 80	100
<i>Efficiency of the heat supply</i>				
Fuel heating power utilization at heat and power plants (in % as compared to 2005)	5	at least 15	at least 40	at least 50
Average specific fuel consumption at boiler rooms (in % as compared to 2005)	99	no more than 98	no more than 94	no more than 90
Increase in energy efficiency of buildings (in % as compared to 2005)	5	at least 10	at least 30	at least 50
Heat losses (percentage of total heat production)	19	no more than 16	no more than 13	no more than 8–10

## APPENDIX 4

*to the Energy Strategy of Russia for the period  
up to 2030*

### Forecasted fuel and energy balance of Russia for the period up to 2030

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Domestic energy consumption (million tons of coal equivalent)	949	991	1,008– 1,107	1,160– 1,250	1,375– 1,565
same (in % as compared to 2005)	100	104	106–116	122–131	144–164
<i>including (million tons of coal equivalent)</i>					
gas	495	526	528–573	592–619	656–696
liquid fuel (oil and condensate)	181	187	195–211	240–245	309–343
solid fuel (coal, etc.)	167	175	168–197	198–238	248–302
non-fuel	106	103	117–127	130–147	163–224
<i>same (%)</i>					
gas	52.2	53.1	51.8– 52.3	49.5–51.1	44.5–47.7
liquid fuel (oil and condensate)	19.1	18.9	19–19.4	19.6–20.7	21.9– 22.5
solid fuel (coal, etc.)	17.6	17.7	16.7–17.8	17.1–19.1	18–19.3
non-fuel	11.2	10.4	11.5–11.6	11.2–11.8	11.8–14.3
Energy export (million tons of coal equivalent)	865	883	913–943	978– 1,013	974–985
<i>including:</i>					
to the CIS countries	177	162	172–175	174–179	153–171
including gas	110	91	101–103	100–105	90–106
to far-abroad countries	688	720	741–768	804–834	803–832
including gas	184	190	210–235	281–287	311–317
Energy reserves increment (million tons of coal equivalent)	-1	10	2	2	3
Total energy consumption (million tons of coal equivalent)	1,813	1,884	1,923– 2,052	2,140– 2,266	2,363– 2,542
Resources (million tons of coal equivalent)	1,813	1,884	1,923– 2,052	2,140– 2,266	2,363– 2,542
<i>including:</i>					
import	80	83	96–100	92–93	86–87



	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
including gas	64	64	76–80	79–80	80–81
Total primary energy production (million tons of coal equivalent)	1,733	1,803	1,827– 1,952	2,047– 2,173	2,276– 2,456
same (in % as compared to 2005)	100	104	105–113	118–125	131–142
<i>including (million tons of coal equivalent):</i>					
gas	736.5	760.9	784–853	919–958	1,015– 1,078
liquid fuel (oil and condensate)	667.2	694.2	691–705	718–748	760–761
solid fuel (coal, etc.)	202.8	221.8	212–260	246–311	282–381
non-fuel	126.5	126.1	134–140	156–164	219–236
<i>same (in %):</i>					
gas	42.5	42.2	42.9– 43.7	44.1– 44.9	43.9– 44.6
liquid fuel (oil and condensate)	38.5	38.5	36.1–37.8	34.4– 35.1	31–33.4
solid fuel (coal, etc.)	11.7	12.3	11.6–13.3	12–14.3	12.4–15.5
non-fuel	7.3	7	6.9–7.7	7.2–8	9.5–9.6

### **The forecast of phase-by-phase oil production development for the period up to 2030**

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Total oil production (million tons)	470.2	487.6	486– 495	505– 525	530– 535
same (in % as compared to 2005)	100	103.7	103– 105	107– 112	113– 114
<i>including (million tons):</i>					
North, North-West	24.5	29.1	32–35	35–36	42–43
Volga Region	52.7	54.1	49–50	44–45	34–36
Urals	49.2	52.6	45–47	36–41	25–29
Caucasus, Caspian Sea Region	4.9	4.8	7–11	19–20	21–22
Tyumen Region	320.2	319	282– 297	275– 300	291– 292
Tomsk Region	14.1	13.7	12–13	11–12	10–11
Eastern Siberia	0.2	0.5	21–33	41–52	75–69
Far East	4.4	13.8	23–25	30–31	32–33

**The forecast of phase-by-phase oil refining and major oil products output for the period up to 2030**

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Total refining (million tons)	208	237	232– 239	249– 260	275– 311
same (in % as compared to 2005)	100	113,8	112– 115	120– 125	132– 150
<i>Production by oil product types (million tons):</i>					
engine fuel	100.2	114.1	133– 140	151– 155	179– 188
gasoline	32	35.8	41–43	46–47	55–57
diesel fuel	60	69	79–83	90–91	106– 111
fuel oil	56.7	63.9	48–50	40–42	25–29

**Forecast of the required capital investments into the oil complex development for the period up to 2030  
(\$US billion, at constant prices of the year 2007)**

Capital investments	Phase 1	Phase 2	Phase 3	Total 2009 - 2030
Total	162–165	134–139	313–321	609–625
<i>including:</i>				
exploration and production	110–111	109–112	272–278	491–501
refining	21–22	8–9	18–19	47–50
transportation	31–32	17–18	23–24	71–74

**The forecast of phase-by-phase gas production development for the period up to 2030 (billion m<sup>3</sup>)**

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Gas production – total	641	664	685–745	803–837	885–940
<i>including:</i>					
Tyumen Region	585	600	580–592	584–586	608–637
<i>including the following regions:</i>					
Nadym – Purtazovsky	582	592	531–559	462–468	317–323
Ob-Taz bay	-	-	0–7	20–21	67–68

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Bolshekhetskaya valley	3	8	9–10	24–25	30–32
Yamal	-	-	12–44	72–76	185–220
Tomsk Region	3	4	6–7	5–6	4–5
European regions	46	46	54–91	116–119	131–137
<i>including:</i>					
Caspian Sea Region	-	-	8–20	20–22	21–22
Stockman deposit	-	-	0–23	50–51	69–71
Eastern Siberia	4	4	9–13	26–55	45–65
Far East	3	9	34–40	65–67	85–87
<i>including:</i>					
Sakhalin Island	2	7	31–36	36–37	50–51

**Forecast of the required capital investments into the gas industry  
development for the period up to 2030  
(\$US billion, at constant prices of the year 2007)**

Capital investments	Phase 1	Phase 2	Phase 3	Total 2009– 2030
Total	150–155	131–136	284–299	565–590
<i>including:</i>				
production	45–46	43–45	98–103	186–194
transportation	73–75	63–65	141–149	277–289
underground gas storage facilities, gas conversion, etc.	32–34	25–26	45–47	103–107

**The forecast of phase-by-phase coal production development  
for the period up to 2030 (million tons)**

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Coal production	299	326	314–350	365–410	425–470
including coking	69	66	70–84	90–94	101–106
<i>including:</i>					
Donetsk basin	8	7	5–6	7–8	5–8
Urals basin	5	4	2–3	3–4	5–8
Pechora basin	13	13	12–13	12–13	12–13

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Kuznetsk basin	166	184	174–186	190–195	201–205
Kansko-Achinsk basin	37	46	45–55	55–87	90–115
Eastern Siberia	37	40	40–46	53–54	58–60
Far East	32	32	32–38	39–46	44–57

### The forecast of phase-by-phase electricity production development for the period up to 2030

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Electricity consumption, domestic demand, (billion kWh)	941	1,021	1,041– 1,218	1,315– 1,518	1,740– 2,164
Electricity export net balance, (billion kWh)	12	16	18–25	35	45–60
Total electricity production (billion kWh)	953	1,037	1,059– 1,245	1,350– 1,555	1,800– 2,210
<i>including:</i>					
nuclear power plants	149	163	194–220	247–282	356–437
generating facilities on renewable energy and hydroelectric pumped storage power plants	175	167.5	181–199	224–240	319–422
condensation power plants	277	322	299–423	432–592	620–873
heat and power plants	352	385	385–403	441–447	478–505
<i>Electricity production structure (%):</i>					
nuclear power plants	15.7	15.7	17.6–18.3	18.2–18.3	19.7–19.8
generating facilities on renewable energy and hydroelectric pumped storage power plants	18.3	16.1	16–17.1	15.4–16.6	17.7–19.1
condensation power plants	29.1	31.1	28.2–34	32–38.1	34.4– 39.5
heat and power plants	36.9	37.1	32.4– 36.4	28.3– 33.1	21.6–28.1

**The forecast of phase-by-phase change of Russian power plants  
installed capacity (by generation types)  
for the period up to 2030 (million kWh)**

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Total installed capacity	216.3	224.9	239–267	275–315	355–445
<i>including:</i>					
nuclear power plants	23.7	23.8	28–33	37–41	52–62
generating facilities on renewable energy and hydroelectric pumped storage power plants	46.2	47.2	55–59	66–73	91–129
condensation power plants	67.1	68.4	67–83	73–103	100–148
heat and power plants	79.3	85.5	89–92	98–99	106–112

**Forecasted thermal power plants fuel demand for the period  
up to 2030 (million tons of coal equivalent)**

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Total fuel demand	286	304	296–333	348–388	416–460
<i>including:</i>					
gas	194	214	210–222	233–237	265–266
solid fuel (coal, etc.)	77	79	74–101	97–137	131–185
fuel oil	8	5	5–6	6–7	6–7

**Forecast of the required capital investments into the electric  
energy industry development for the period up to 2030  
(\$US billion, at constant prices of the year 2007)**

	Phase 1	Phase 2	Phase 3	2009–2030 – total
Total	122–126	110–233	340–529	572–888
<i>including:</i>				
nuclear power plants	29–30	13–28	58–81	100–139
hydroelectric power plants with capacity over 25 MW and hydroelectric pumped storage power plants	17–18	8–15	30–92	55–125
thermal power plants (condensation power plants and heat and power plants)	32–33	46–112	122–145	200–290
electric grids	44–45	43–78	130–211	217–334

**The forecast of phase-by-phase consolidated heat balance change  
in Russia  
for the period up to 2030 (million Gcal)**

	2005 (actual)	2008 (actual)	Phase 1	Phase 2	Phase 3
Total production	1,977	1,938	1,899– 1,975	1,975– 2,030	2,130– 2,150
Centralized heat supply sources	1,431	1,380	1,369– 1,425	1,465– 1,500	1,610– 1,620
<i>including:</i>					
power plants	628	601	601–620	680– 690	785–830
central boiler houses	701	676	661–688	659–686	640–654
nuclear heat and power plants and nuclear heat supply plants	5	5	4–6	6–8	12–15
secondary energy resources	91	93	98–107	107–116	118–135
unconventional sources	7	5	4–5	4–10	6–35
Decentralized heat supply sources	541	537	530–550	510–530	510–540
<i>including:</i>					
boiler houses	192	187	180–190	150–160	140–150
autonomous sources	349	350	350–360	360–370	370–390
Total heat losses	355	334	310–320	230–270	180–190
Total consumption	1,622	1,604	1,589– 1,655	1,745– 1,760	1,950– 1,960

**Forecast of the required capital investments into the development  
of the fuel and energy complex and energy supply of Russia's  
economy for the period up to 2030  
(\$US billion, at constant prices of the year 2007)**

	Phase 1	Phase 2	Phase 3	2009– 2030 – total
Fuel and energy complex – total	449–456	391–523	979–1,196	1,819–2,177
<i>including:</i>				
oil industry	162–165	134–139	313–321	609–625
gas industry	150–155	131–136	284–299	565–590
coal industry	12–13	14–16	42–47	68–76
electric energy industry	122–126	110–233	340–529	572–888
Energy supply spheres – total	85–98	125–142	329–356	547–588

	Phase 1	Phase 2	Phase 3	2009–2030 – total
<i>including:</i>				
renewable energy *	7–9	24–28	82–97	113–134
centralized heat supply	41–43	38–39	68–72	149–152
autonomous energy	8–9	8	24–27	41–43
energy saving in the economy	29–37	55–67	155–160	244–259
Total for the Strategy implementation	534–554	516–665	1,308–1,552	2,366–2,765

\*Except the hydroelectric power plants with the capacity over 25 MW.

**Comparison of the Strategy's basic ranges of forecasts with predictive estimates of the alternative innovative scenario envisaging swifter growth of the economy's energy efficiency and focus on the environment**

Indicators	2030		The ratio between alternative scenario predictive estimates and the Strategy's basic range of forecasts (%)
	the Strategy's basic ranges of forecasts	predictive estimates of the alternative innovative scenario	
The share in the gross domestic product (%)			
energy-intensive sectors (metallurgy, chemistry, etc.)	10.4–10.6	7	66–67
fuel production	3.5–3.6	2,8	78–80
Gross domestic product energy intensity (in % as compared to 2005)	44–46	39	85–89
Gross domestic product electricity intensity (in % as compared to 2005)	59–60	52	87–88
Greenhouse gases emission (in % as compared to 1990)	94–105	80	76–85
Total domestic energy consumption (million tons of coal equivalent)	1,375–1,565	1,195	76–87
including gas	656–696	590	85–90
Electricity consumption, domestic demand (billion kWh)	1,740–2,164	1,580	73–91

Indicators	2030		The ratio between alternative scenario predictive estimates and the Strategy's basic range of forecasts (%)
	the Strategy's basic ranges of forecasts	predictive estimates of the alternative innovative scenario	
Total primary energy production (million tons of coal equivalent)	2,276–2,456	2,130	87–94
including gas	1,015–1,078	960	89–95
Electricity production (billion kWh)	1,800–2,210	1,620	73–90
including by thermal power plants	1,098–1,382	995	72–91
Total fuel consumption by power plants (million tons of coal equivalent)	414–460	357	78–86
including gas	265–266	240	90–91
Total energy export (million tons of coal equivalent)	974–985	1,010	103–104
including gas (billion m <sup>3</sup> )	349–368	346	94–99
Investment into the fuel and energy complex development (\$US billion, at constant prices of the year 2007)	1,819–2,177	1,610	74–89



## APPENDIX 5

### *to the Energy Strategy of Russia for the period up to 2030*

#### **Master plan ("roadmap") of the state energy policy measures for the period up to 2030, ensuring the Strategy implementation**

Phase 1	Phase 2	Phase 3
<b>Subsoil use and management of the state subsoil fund</b>		
<i>1. Enhancement of geological exploration works on new territories and waters</i>		
Increase in the influence of state institutions on formation and implementation of the programs for geological exploration of perspective territories and waters (continental shelf). Elaboration and introduction of special tax regulations for developing the reserves of the continental shelf of Russia	State support of geological exploration works on perspective territories on the basis of direct state participation; provision of state guarantees to subsoil users; provision of tax holiday for the investments projected payback period and the investment tax credit	Acceleration of the reserves increment on new territories and waters in the structure of mineral resource base reproduction. Increase in the share of the continental shelf in the reserves reproduction: for oil to the level of at least 10 – 15% for gas to the level of at least 20 – 25%
<i>2. Stimulation of private investment attraction into geological exploration works and subsoil use</i>		
Elimination of superfluous administrative barriers for geological exploration works realization through introduction of standard subsoil use projects and reduction in the number of state expertise	Introduction of rent taxation of the subsoil users performing geological exploration works	Development of the state-private partnership in subsoil use
Stabilization of tax policy in the sphere of subsoil use and creation of conditions for transition to rent taxation of the subsoil users. Ensuring of the rights of both subsoil owner, and subsoil user, including introduction of transparent system of sanctions for license agreements infringement	Ensuring the ratio of annual increment of discovered fuel and energy resources as a result of geological exploration works and the annual production volume of major fuel and energy resources (oil, gas, coal, uranium) > 1	Stable (at least twofold for the period) growth of private investment volumes in subsoil use and geological exploration works (the share of private investments in geological exploration works – at least 80%)

Phase 1	Phase 2	Phase 3
<p>3. <i>Stimulation of efficient subsoil use on the basis of full and comprehensive extraction of hydrocarbons from subsoil</i></p> <p>Creation of the national register of fuel and energy resources on the basis of harmonization of the Russian and international classification of fuel and energy resources. Improvement of the mechanisms of the state control over fulfillment of license agreements, ensuring of accounting of probabilistic nature of reserves estimation and possibility of its adjustment for the purpose of most rational field exploitation. Improvement of the tax legislation stimulating full and comprehensive extraction of hydrocarbons. Development and introduction of uniform principles for fuel and energy resource deposits management at all phases: from prospecting to beginning of conservation or liquidation of a deposit due to achievement of the maximum possible recovery rate of hydrocarbons at the existing technological level of development methods</p>	<p>State support for introduction of innovative hydrocarbon extraction technologies raising the oil recovery rate</p>	<p>Tax stimulation of the expanded production of superviscous oil, natural bitumen, low pressure gas in old deposits and complex use of the resources of coal deposits, including the projects for degassing methane utilization</p>
<p>State support for introduction of innovative hydrocarbon extraction technologies raising the oil recovery rate</p> <p>Tax stimulation of the production of superviscous oil, natural bitumen, low pressure gas in old deposits</p> <p>Maintenance of the oil recovery rate at the level of 30 – 32%</p> <p>Increase in the share of non-conventional gas in total gas production volume to 10%</p> <p>Maintenance of the associated petroleum gas utilization rate at the level of at least 95%</p>	<p>State support for introduction of innovative hydrocarbon extraction technologies raising the oil recovery rate</p> <p>Maintenance of the associated petroleum gas utilization rate at the level of at least 95%</p>	<p>Increase in the oil recovery rate to 35 – 37%</p> <p>Increase in the share of non-conventional gas in total gas production volume to 15%</p> <p>Maintenance of the associated petroleum gas utilization rate at the level of at least 95%</p>

Phase 1	Phase 2	Phase 3
<p>4. <i>Development of the market of independent services and engineering in the sphere of subsoil use</i></p> <p>Stimulation of Russian independent engineering companies creation. State support for the import of key complex technologies with obligations for their localization</p> <p>Increase in the share of an independent segment in the sphere of services and engineering to 20%</p>	<p>Development of services and engineering market in the sphere of subsoil use</p>	<p>Increase in the share of an independent segment in the sphere of services and engineering to 50%</p>
<b>Development of domestic energy markets</b>		
<i>5. Improvement of the state control over the level of economic concentration on energy markets</i>		
<p>Toughening of the antimonopoly law for the purpose of suppressing the cartel agreements on the fuel and energy resources market and technological monopolism (including the questions of connecting to transport networks and grids)</p>	<p>Establishment of the integrated system of the energy markets monitoring based on the state information resources of the fuel and energy complex</p>	<p>Enhancement of the efficiency of state control over the level of economic concentration</p>
<p>Ensuring of transparent and nondiscriminatory access to the energy infrastructure (among other issues obligating the enterprises which manage the infrastructure to provide the information on availability or absence of free capacity). Creation of the state information system of the fuel and energy complex</p>	<p>Transparent and nondiscriminatory access to the energy infrastructure for all participants of the market</p>	<p>Elimination of regional and technological monopolism</p>

Phase 1	Phase 2	Phase 3
<p><i>6. Establishment and development of Russian systems of exchange trade in all kinds of fuel and energy resources</i></p>		
<p>Stimulation of private companies participation in exchange trade in energy carriers through obligatory reservation of transport systems capacity for exchange trade provision, obligatory execution of a part of state purchases of energy carriers through exchange mechanisms.</p> <p>Development of the regulatory and legal framework allowing integration of stock exchange pricing mechanisms into the pricing of energy carriers on the whole.</p> <p>Development of trade in energy derivatives (futures, options and other) using the Russian Federation currency</p>	<p>Stimulation of the expansion of exchange trade in energy carriers on Russian trading floors which carry out accounts in roubles through the following:</p> <ul style="list-style-type: none"> <li>- involving foreign companies producing and consuming energy resources (including from the CIS countries) in operations on the Russian exchange trade grounds;</li> <li>- engaging wide range of investors, including the population, in investing in energy derivatives of the Russian exchange trade grounds</li> </ul>	<p>Increase in the share of exchange trade in energy carriers to 5 – 10% of the domestic market volume</p>
<p>Increase in the share of exchange trade in energy carriers to 15 – 20% of the domestic market volume</p>		

Phase 1	Phase 2	Phase 3
<p>Enhancement of the system of targeted social assistance to the population in the context of the measures for cross-subsidization liquidation</p> <p>Controlled liberalization of prices for energy carriers (including for gas and electricity) on the domestic market while retaining state regulation of the tariffs for gas and electricity transportation.</p> <p>Development of the regulatory and legal framework defining the principles for the state reservation of fuel and energy resources for organized commodity interventions in order to stabilize the energy markets under the conditions of crises. Cross-subsidization liquidation</p> <p>Completion of liberalization of domestic markets of the electricity and gas</p>	<p>Creation of the state reserves of oil, oil products and natural gas for organized commodity interventions in order to stabilize the energy markets under the conditions of crises</p>	<p>7. <i>Formation of efficient and stable tariff and pricing systems on energy markets</i></p> <p>Formulation of a stable pricing policy meeting the interests of producers and consumers of energy resources</p>
<p>Completion of liberalization of domestic markets of the electricity and gas</p>	<p>Completion of liberalization of the domestic market of heat supply</p>	

Phase 1	Phase 2	Phase 3
<b>Promotion of a rational energy balance</b>		
<i>8. Reduction in the share of gas in the structure of domestic energy consumption and increase in the share of non-fuel energy in the structure of the fuel and energy balance</i>		
<p>Development and introduction of the economic mechanism of effective interfuel competition for replaceable energy carriers (gas/coal). State support and direct funding of nuclear power generation development in the country. State support of thermal coal-fired power generation development (stimulating taxation, accelerated depreciation, preferential lending, insurance of risks, simplification of land allocation procedures, etc.). Implementation of the policy of renewable energy development based on the following: creation of the institutional basis for renewable energy use in the energy sector; stimulating taxation of power plants and heating sources operating on renewable energy; introduction of the system of guaranteed connection and access to electric grids for the power plants operating on renewable energy.</p>	<p>Maintenance of effective and stable interfuel competition based on the system of advanced monitoring of the prices for replaceable energy carriers (gas/coal). State support of nuclear and coal-fired power generation development</p>	<p>Active development of renewable and non-hydrocarbon energy as a whole based on introduction of advanced technologies and use of the state-private partnership mechanisms</p>
<p>Ensuring of the gas and coal domestic prices ratio of 1.8 – 2.2</p>		<p>Ensuring of the gas and coal domestic prices ratio of 2.5 – 2.8</p>
<p>Reduction in the share of gas in the fuel and energy balance to 51 – 52%</p>	<p>Reduction in the share of gas in the fuel and energy balance to 48 – 49%</p>	<p>Reduction in the share of gas in the fuel and energy balance to 46 – 47%</p>
<p>Increase in the share of non-fuel energy in the fuel and energy balance to 11 – 12%</p>		<p>Increase in the share of non-fuel energy in the fuel and energy balance to 13 – 14%</p>

Phase 1	Phase 2	Phase 3
<i>9. Rationalization of export and domestic consumption of fuel and energy resources</i>		
<p>Alignment of export customs duties on dark and light oil products for the purpose of raising the economic efficiency of domestic projects on deep oil processing.</p> <p>Ensuring of equal profitability of energy carriers delivery to domestic market and for export at the expense of:</p> <ul style="list-style-type: none"> <li>rational regulation of customs duties;</li> <li>economically feasible increase in the domestic prices for energy carriers</li> </ul>		<p>Establishment of effective and stable system for optimization of export and domestic consumption of fuel and energy resources based on acknowledgement of the world and domestic prices, current requirements of energy security and geopolitical interests of the country</p>
<i>10. Promotion of production, export and domestic consumption of energy carriers with high added value</i>		
<p>Stimulation of enhancement of the quality of engine fuel and oil refinery depth based on the following:</p> <ul style="list-style-type: none"> <li>toughening the quality standards of engine fuel;</li> <li>differentiating the excise rates, stimulating the production of quality fuel;</li> <li>encouraging the upgrade of oil- and gas-processing complexes in the Russian Federation</li> </ul>	<p>Advanced growth of domestic consumption of major fuel and energy resources (oil, gas, coal)</p>	<p>Decrease in rates of growth of the export of fuel and energy resources with low added value (oil, natural gas, crude coal, etc.)</p>
<p>Stimulation of the output and export of gas-chemistry and petrochemistry products</p>	<p>Stimulation of the output and export of gas-chemistry and petrochemistry products</p>	<p>State support for development of synthetic liquid fuel production from all types of energy resources (natural gas, coal, biomass, etc.)</p>
<p>Implementation of a complex of program measures for petrochemistry and gas-chemistry development in the Eastern Siberia and Far East.</p> <p>State support of pilot projects for processing and deep conversion of coal</p>		<p>Increase in export of fuel and energy resources with high added value (engine fuel, gas-chemistry, petrochemistry, coal-chemistry products, etc.)</p>
<p>Exclusion the fuel of grade lower than 4 from circulation.</p> <p>Increase in the oil refinery depth to at least 78 – 79%</p>	<p>Exclusion the fuel of grade lower than 5 from circulation.</p> <p>Increase in the oil refinery depth to at least 82 – 83%</p>	<p>Increase in the oil refinery depth to at least 89 – 90%</p>

Phase 1	Phase 2	Phase 3
<b>The regional energy policy</b>		
<i>11. Improvement of interaction between federal and regional authorities in the energy sector</i>		
<p>Legislative differentiation of powers and responsibilities in the sphere of energy saving, reliability and safety of energy supply, and also regulation measures in the energy sector between the federal, regional and local authorities</p> <p>Harmonization of the federal programs and strategies of development of individual industries of the fuel and energy complex with the programs and strategies of social and economic development of the regions.</p> <p>Optimization of the system of financial relations between the federal centre and resource-producing regions</p>	<p>Strengthening of the joint control over observance by business entities of the federal and regional legislation in the energy sector</p> <p>Coordination of the federal programs of the energy sector development and the programs for social and economic development of the regions</p>	<p>Establishment of sustainable interaction system between the federal and regional authorities in the sphere of energy policy</p> <p>Efficient system of powers and responsibilities division between federal, regional, and local authorities in the energy sector</p>
<i>12. State support of regional and interregional energy infrastructure development</i>		
<p>State support for construction and expansion of the regional and interregional energy infrastructure</p> <p>State support for modernization and optimization of the operational mode of the existing regional energy infrastructure.</p> <p>Establishment of the obligatory system of seasonal reservation of fuel for problem regions. Ensuring of required throughput capacities of the energy transport infrastructure (gas pipelines, power grids) during peak periods of energy consumption</p> <p>Elimination of «bottlenecks» in the energy supply of regions</p>	<p>State support for regional energy infrastructure development according to the type of regional energy development.</p> <p>Maintenance of sustainable functioning of the existing regional and inter-regional energy infrastructure and provision of state support for building the new one</p>	<p>Implementation of the regional strategic initiatives of the state and business on the terms of state-private partnership regarding the development of the Yamal Peninsula, Arctic regions, Eastern Siberia and Far East</p>
<p>Minimization of the distortions in energy supply between the energy-deficient and energy-redundant regions of the country</p>		



Phase 1	Phase 2	Phase 3
<i>13. Stimulation of comprehensive development of the regional energy sector</i>		
<p>Development and implementation of the regional energy programs (including energy saving programs).</p> <p>Stimulation of development of regional small and medium businesses in the sphere of energy services.</p> <p>Promotion of local fuel and energy resources use (renewable energy, local kinds of fuel, wastes, etc.) with their subsequent involvement into the regional fuel and energy balances.</p> <p>Optimization of regional heat supply systems on the basis of economically efficient combination of centralized and decentralized heating</p>	<p>Establishment of a sustainable energy supply system in hard-to-reach and remote territories on the basis of expanded and efficient utilization of local energy resources</p>	<p>Formation of the regional energy systems on the basis of economically efficient combination of local and delivered energy resources use, optimum functioning of the regional and interregional energy infrastructure, reduction in the harmful environmental impact</p>
<p>Increase in the share of local energy resources in the regional fuel and energy balances to 10%</p>	<p>Qualitative increase in the level of regional energy security</p>	<p>Increase in the share of local energy resources in regional fuel and energy balances to 20%.</p> <p>Optimization of the territorial structure of regional fuel and energy resources production and consumption</p>
<b>Innovative and scientific-and-technical policy in the energy sector</b>		
<i>14. Establishment of the sustainable national innovative system in the energy sector</i>		
<p>Formation of the national innovative system in the fuel and energy complex based on the following:</p> <p>establishment of the technological forecasting system in the energy sector;</p> <p>the state support for import of key complex technologies and purchase of innovative foreign assets («technological donors») in the fuel and energy complex;</p>	<p>Advanced development of domestic innovative technologies in the fuel and energy complex based on the following:</p> <p>establishment of technical and implementation zones and technological parks;</p> <p>assistance to the development of venture business in the sphere of innovations in the energy sector</p>	<p>Wide introduction of domestic energy innovations based on the principles of project management of innovative solutions development and implementation with participation of the state and private companies</p>

Phase 1	Phase 2	Phase 3
<p>establishment of united system of scientific and design and experimental centers, functioning on the principles of state-private partnership and providing the entire process from the development to commercial implementation of innovations in the fuel and energy complex;</p> <p>state support for renewable energy use and research works aimed at increase in economic efficiency of the projects for renewable energy use;</p> <p>development and implementation of a complex of program measures aimed at human resources retaining and development</p> <p>Increase in the shares of Russian equipment of world technological level in the total deliveries of equipment for the fuel and energy complex to 20%</p>	<p>Development of stimulating taxation for engineering, design, and other companies (including industrial ones), which introduce the advanced (innovative) technologies in the energy sector</p> <p>Increase in the share of Russian equipment of world technological level to 30%</p>	<p>Increase in the share of Russian equipment of world technological level to 50%</p>

Phase 1	Phase 2	Phase 3
<b>The social policy in the energy sector</b>		
<i>15. Provision of reliable energy supply to the country's population at socially affordable prices</i>		
<p>Increase in the reliability of energy supply to the population, communal housing and budgetary institutions based on the following:</p> <ul style="list-style-type: none"> <li>improvement of the regulatory and legal framework aimed at increase in the responsibility of energy supply to the population;</li> <li>elimination of departmental energy supply to the population at the expense of large industrial enterprises and organizations.</li> <li>Enhancement of the regulation of retail energy prices (gas, electricity, heating) for the population taking into account development of the system of targeted social assistance and increasing quality of the system rationing the consumption of fuel and energy resources used by the population for communal needs</li> </ul> <p>Minimization of the energy failures and cutoffs number in the communal housing</p> <p>Decreasing the share of household's expenditures on energy (gas, electricity, heating) to the level not exceeding 15%</p>	<p>Establishment of efficient and transparent system of mechanisms controlling and regulating growth of energy prices for the population</p>	
<p>Decreasing the share of household's expenditures on energy (gas, electricity, heating) to the level not exceeding 12–13%</p>	<p>Decreasing the share of household's expenditures on energy (gas, electricity, heating) to the level not exceeding 8–10%</p>	<p>Decreasing the share of household's expenditures on energy (gas, electricity, heating) to the level not exceeding 8–10%</p>

Phase 1	Phase 2	Phase 3
<p align="center"><i>16. Expansion of real interaction between the energy business and the society in solution of the problems of the energy sector development</i></p>		
<p>Promotion of public energy companies establishment through assistance in obtaining the state guarantees and credits, investment insurance.</p> <p>Involvement of the population in the public companies management through pension funds and other forms of collective investments.</p> <p>Involvement of the population in discussion of large energy projects in the regions, obligatory accounting of the local population interests during their implementation</p>	<p>Promotion in increasing the number of public energy companies and expansion of the range of activity of public energy companies; stimulation of the increase in the volume of financial investments of the population in the assets of energy companies.</p> <p>Increase in the number of public energy companies.</p> <p>Increase in the volume of financial investments of the population in the assets of energy companies</p>	<p>Establishment of the centers for social control of the public energy companies activity, ensuring overall accounting of the population interests during long-term planning of public energy companies development (environment, social sphere, etc.)</p>
<p align="center"><i>17. Development and enhancement of efficiency of the human potential use in the energy sector</i></p>		
<p>Restoration of the united Russian system of personnel training for the fuel and energy complex based on the development of state-private partnership in attraction and training of young specialists of the low and medium grades.</p> <p>Extended reproduction and attraction of human resources for development of new areas of the Eastern Siberia, Far East, Yamal Peninsula and continental shelf of the Arctic seas based on the following:</p> <p>establishment of the system of specialized regional centers for specialists training in the fuel and energy complex;</p> <p>provision of the entire social setting for the personnel in the difficult natural conditions of the new areas development, including rotational method through use of mobile systems of the social infrastructure</p>		<p>Establishment of sustainable self-regulative system of human resources reproduction for the fuel and energy complex through stimulation of personnel mobility and enhancement of the principles of human resources project management in the fuel and energy complex</p>

Phase 1	Phase 2	Phase 3
<p>Increase in the share of persons of the age under 40 in the employed personnel to 30%.            Increase in the share of persons with higher (professional) technical education in the employed personnel to 60%</p>		<p>Increase in the share of persons of the age under 40 in the employed personnel to 40 – 50%.            Increase in the share of persons with higher (professional) technical education in the employed personnel to 70 – 80%.            Increase in the personnel mobility</p>
<p><b>The foreign energy policy</b></p>		
<p><i>18. Consideration of Russia's national interests in the context of the developing system of world energy markets operation</i></p>		
<p>Development of the concept and program of the energy markets reorganization for reflecting fundamental factors of the demand and supply and decreasing the role of short-term factors and speculative behavior.            Elaboration of initiative proposals for updating the existing and formulating new international legal documents in the energy sector, including development of internationally-recognized rules of transit and establishment of the mechanism for transit risks insurance</p>	<p>Development and co-ordination of the documents on the rules of energy markets functioning (in the format of corresponding international organizations), the rules of energy companies access to the infrastructure and activity types on the world energy markets (both on bilateral and multilateral basis)</p>	<p>Unification and harmonization of the fundamental regulatory and legal principles of the national legislation and international law, regulating cooperation on the world energy markets</p>
<p>Settlement of the legal status problems in disputed regions, including the Arctic, Caspian and South China Seas, etc.            Complex monitoring of the international energy cooperation.            Overcoming of negative consequences of the world economic crisis and decreasing the risks on the energy markets</p>	<p>Elaboration of the framework system of legal regulations in the energy sector, aimed at increasing the stability of the world energy markets</p>	<p>Establishment of effective system of legal instruments ensuring the balance of interests of the countries which export, import and provide transit of fuel and energy resources</p>

Phase 1	Phase 2	Phase 3
<i>19. Diversification of the export energy markets</i>		
<p>Assessment of the prospective directions of the energy markets diversification</p>	<p>Rationalization of the geography of energy production in the Russian Federation taking into account the regional export markets and expansion of Russia's participation in the regional energy alliances</p>	<p>Participation of Russia in the formation of a global energy infrastructure, including expansion of the infrastructure for fuel and energy resources delivery to the new markets and increase in the share of the infrastructure not linked to specific delivery routes (the ports, supertankers, liquefied natural gas deliveries, etc.)</p>
<p>Increase in the share of the Asia-Pacific countries in the structure of the Russian energy export to 16 – 17%. Increase in the volumes of the Russian gas export to the countries of Europe</p>	<p>Increase in the share of the Asia-Pacific countries in the structure of the Russian energy export to 21 – 22%. Retaining of the volumes of the Russian energy export to Europe</p>	<p>Increase in the share of the Asia-Pacific countries in the structure of the Russian energy export to 26 – 27%. Retaining of the volumes of the Russian energy export to Europe</p>
<i>20. Diversification of export commodities structure, increase in the volume of export of products with high added value</i>		
<p>Monitoring of the world energy markets and regular estimation of prospective demand for the Russian highly-processed energy resources</p>	<p>Promotion of new technological possibilities for the export structure diversification, including enhancement of efficiency of the processes of gas conversion into the engine fuel, transportation of gas in the form of compressed gas, gas hydrates, etc.</p>	<p>State support for raising the share of energy resources with high processing rate (added value) in the Russian energy export structure (reasonable customs duties, state guaranteees, risks insurance, etc.)</p>
<p>Increase in the share of liquefied natural gas in the total gas export to 6 – 7%. Decrease in the share of primary energy in the energy export to no more than 85%</p>	<p>Increase in the share of liquefied natural gas in the total gas export to 10 – 11%. Decrease in the share of primary energy in the energy export to no more than 80%</p>	<p>Increase in the share of liquefied natural gas in the total gas export to 14 – 15%. Decrease in the share of primary energy in the energy export to no more than 70%</p>

Phase 1	Phase 2	Phase 3
<p><i>21. Provision of stable conditions on export markets, including guarantees of demand and justification of prices for main products of the Russian energy export</i></p>		
<p>Development of the system of long-term contracts for the Russian fuel and energy resources delivery and restriction of speculative activity on the energy markets. Increase in equity participation of the Russian companies in the existing infrastructure of the Russian energy resources transit and delivery and construction of an effective alternative infrastructure</p> <p>Establishment of Russian system for monitoring and assessment of the global processes in the energy sector and critical threats to stability on the Russian energy export markets.</p> <p>Signing of multilateral and bilateral intergovernmental agreements on fuel and energy resources transit; unification of energy systems technical operation, and technical regulation in the energy sector</p> <p>Increase in the number of energy exchange trade grounds; promotion of international exchange trade in oil and oil products with settlements in the Russian Federation currency.</p> <p>Establishment of the national price indicators of the Russian oil and oil product grades.</p> <p>Establishment of the state oil reserve of the Russian Federation</p>	<p>Diversification of the energy production structure, active participation of Russia in technological developments and exchange of information about progress in key technological developments</p>	<p>Establishment of effective international system of expert analysis and forecasting of major processes on the energy markets, ensuring higher stability and objectivity of the corresponding estimations</p>

Phase 1	Phase 2	Phase 3
<p>Lowering of the risks of the Russian energy carriers transit and transportation to the export markets. Sustainable long-term demand for the Russian energy resources on the export markets. Establishment of the system for monitoring the rates of development and diversification of fuel and energy resources production</p>		<p>Stable and favorable conditions for the Russian energy export</p>
<p><i>22. Enhancement of positions of leading Russian energy companies abroad</i></p>		
<p>Development of mutually beneficial exchange of energy assets and other forms of international cooperation with the countries – consumers of Russian energy resources. Signing of intergovernmental cooperation agreements with due account for promotion of Russian energy companies interests. Mastering of the advanced management of complex energy projects, innovative energy technologies, including joint development and introduction in Russia of environmentally friendly technologies and equipment</p>	<p>Development and implementation of the programs of actions coordinated with other external economic directions for strengthening the positions of Russia in the regional energy cooperation (the countries of the European Union, Asia-Pacific region, Middle East, Africa, Central and South East Asia, Latin America, China)</p>	<p>Formation of global production strings of energy supply with participation of Russian companies and companies of the countries – consumers of Russian energy resources. Enhancement of the division of labor and efficiency of production and export of fuel and energy resources and energy technologies</p>



Phase 1	Phase 2	Phase 3
<p>Information, political and economic support of Russian energy companies abroad</p>	<p>Pursuing of flexible policy with transnational corporations, active cooperation of Russian companies with new national corporations and other players on the international market (service companies, financial companies). Strengthening of the Russian nuclear electric energy industry positions on the global markets of nuclear power generation, reactor building, fabrications of fuel, production, conversion and enrichment of natural uranium</p> <p>Information, political and economic support of Russian energy companies abroad</p>	<p>Stable presence of one Russian energy company in the top three leading world energy companies and in the top five world companies and two Russian companies in the top ten according to both ratings</p> <p>Information, political and economic support of Russian energy companies abroad</p>
<p><i>23. Provision of efficient international cooperation in risky and complicated projects implemented in Russia (including shelf projects under the Arctic conditions)</i></p>		
<p>Formation of favorable, stable, transparent and mutually beneficial conditions for attraction of foreign investments and competent foreign partners in the frames of international cooperation</p>	<p>Enhancement of the competitiveness of Russian companies in the specified sphere of complex energy projects implementation</p>	
<p>Increase in the share of direct foreign investments into the overall structure of investments into the fuel and energy complex to at least 5%</p>	<p>Increase in the share of direct foreign investments into the overall structure of investments into the fuel and energy complex to at least 8%</p>	<p>Increase in the share of direct foreign investments into the overall structure of investments into the fuel and energy complex to at least 12%</p>
<p>Achievement of rational volumes of extraction and reproduction of oil and gas reserves on the continental shelf and in other extremely difficult conditions</p>		<p>Large-scale participation of Russian companies in foreign projects implementation</p>

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MINISTRY OF ENERGY OF THE RUSSIAN FEDERATION

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FOR THE PERIOD UP TO 2030**

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