China National Energy Strategy and Policy Study

Sub-project 9:

China's Energy Market Reform

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List

Executive Summary

I. Motivation of the energy market reform

From a worldwide perspective, energy market reform is a global trend. All countries seek: 1) reducing the restriction of government; 2) disintegrating the monopoly; 3) giving full play to competitive market system; and 4) allowing a competitive enterprise to make their really independent way into a market. This is a common road selected by the energy sectors of all the world countries for development, whether it is a country that pursues a market economy, or a country that experiences a change from any sort of economy system to a market economy one.

Market reform mainly includes two levels of reforms. The first level refers to a transitional process from a non-market system to a market system, mainly the energy reform conducted by a country of a centrally planned economy in the course of structural reshape, which includes a series of reforms: Ownership structure, industrial organization structure, price setup, investment and finance system, financial and tax system, shipping and sales system, foreign trade system, government administrative system, legal system, etc. The second level refers to the widening and deepening process of the market mechanism, mainly the reform in the field of energy carried on in the countries pursuing market economy. The contents of the reform covers direct and indirect fiscal subsidies, policy finance, environmental standards, integrating regional markets, trade protective measures (e.g. import quota control), etc. All there are carried out within a framework of the market economy system in order to ameliorate and optimize the established market economy framework.

As viewed from all over the world, the major motivations of the market-oriented reform of the energy industry are: 1) Needs of adjusting the strategy of the state energy security; 2) Disintegrating the industrial monopoly, opening markets and introducing competitive mechanism; 3) Increasing energy supply, raise energy efficiency and improving service quality of the energy sector, and reducing the structural contradiction between the energy demand and the energy supply; 4) Rapidly developed high technology provides a tremendous impetus to industrial upgrade and transformation of the energy sectors; 5) The global voice of environmental protection is getting stronger and stronger, which wages the energy sectors to carry on a market-oriented reform; 6) Getting rid of the pressure on all levels of governments

due to fiscal subsidies.

As far as China's energy sector is concerned, a few other important reasons for promoting market-oriented reform are as follows:

1. A backward investment and finance administration system cannot adapt to the situation of a long-term shortage of energy supply. Over a long period of time, what prevailed essentially in the field of energy investment and finance of our country is such a administrative pattern, i.e. all the following things are done by government, say, investment, examination and approval, finance, intervening prices. It is very difficult for social capital to smoothly flow into the field of energy production, while government investment cannot meet energy demands. Therefore, no way has been found in fundamentally improving the situation that the relationship between supply and demand has kept in short supply for a long time.

2. The asynchronous reforms among the different energy sectors and the institutional friction have become a chromic malady for the energy sectors to have a healthy development. These give prominent expression to the "coal-electricity contradiction" that has been more intensified recently.

3. Since energy sectors have long been under the trade and investment protection of government, most of energy businesses don't possess a strong global competitive edge and obviously, do not have enough capability to cope with the impacts from foreign transnational energy companies.

4. Administrative monopoly still exist, and the competitiveness of markets have been held back to some extent, which also further hinders the healthy development of energy sectors in our nation.

5. The pricing system reform for energy products has not been finalized.

6. In the course of developing energy sectors, the relationship between government, enterprise and market has not been straightened out, while administrative intervention prevails everywhere. Hence, the role of market mechanism for optimizing the allocation of resources has been squeezed to some extent.

Taking into consideration the energy sectors at home and abroad, due to very large difference in each country such as system environment, development stage of the economy, the structures of energy production and consumption, development status of energy sectors, government administrative system, thus, the energy sectors in different countries have a certain difference, e.g. price formation mechanism, government administrative system, state-owned energy sectors, market regulatory

system, restriction on administrative access, the market-oriented reforms of relevant upstream and downstream industries, etc. Though the specific reform measures relevant to energy sectors pursued by each country are not absolutely same, one point is same, i.e. the orientation of the reform is highly unanimous, it is this very market-oriented reform. The so-called market-oriented reform means that the essential and leading roles of market mechanism shall be given a maximum play for allocation of resources. In a standard and transparent system environment, the price shall be used as leverage to adjust the relationship between market supply and demand, thus using competitive mechanism and free obligation to settle the market trade relationship between enterprises, industries as well as buyers and sellers, but not the mandatory administrative mechanism.

II. The influence factors, benefits and risks of the market-oriented reform

(I) Influence factors

The major factors that influence the market-oriented reform of energy industry are as follows:

1. Completeness of legal system. Under the conditions of market economy, the system condition that can secure, restrain and standardize the behaviors of stakeholders is just the law. The more complete the legal system is, the more clear the boundary of powers-responsibilities-interests among stakeholders is, the better a series of measures of market-oriented reform can be carried out and implemented, and the more obvious the reform results are, and vice versa.

2. The "initial state" of the reform. Refer to the internal condition and the external environment faced by the energy sector of a country at the initial stage of reform, which usually guide, restrain, or even determine the choice of the reform route, and are possibly locked in the existed route of the reform.

3. The financial status of government. Finance is a "propeller" and "stabilizer" of the market-oriented reform.

4. The structure of energy production and consumption. A certain energy sector's status in the energy production and consumption aggregates of a country, as well as the relationship between this sector and other energy sectors are important factors to influence this sector's reform course, too.

5. Resistance from persons who have vested interest, social pressure and acceptable degree.

6. The continuity and uniformity of policies. Whether reform policies can maintain coherence, sustainability, and uniformity is usually an important factor to influence the reform results of energy sectors. One of the important reasons for our country to hard promote the smooth reform of energy sectors is born of the fundamental drawbacks existed in the continuity and uniformity of policies.

(II) Benefits of the market-oriented reform

The major aspects to epitomize the benefits of market-oriented reform of energy industry are:

1. Increase the sustainable supply capability of energy, improve the production efficiency of energy and raise its industrial competitive strength.

2. Provide enough, cheap and quality energy products and service for the relevant industries and consumers.

3. Alleviate the financial pressure of government.

4. Optimize energy supply and consumption structure. As to optimizing resources allocation and improving resources supply and consumption structure, there is no other mechanism than market one that has more efficiency.

5. Pushing forward the technical progress in energy field and "cleaning" energy. The market-oriented reform makes competitive mechanism play a role of encouraging technological innovation. In the competitive market structure, energy sectors promote technological innovation not only for acquiring initiative competitive advantages, but they possesses the capacity of initiative innovation due to market-oriented energy price and the increase in their accumulation.

6. Improving environment. The independence of the energy sectors and the reform of property rights system pushed by the market orientation will solve thoroughly the accumulated malpractice for years caused by "no clear lines between the government administrative functions and enterprise management functions", and "no clear lines between government and assets' owner". The government makes efforts to improve the environment through the methods of economy, law and administration. The efforts are mainly "absorbed" by the energy sectors themselves, that is, the environment cost will be "internalized" by the competitive energy sectors.

(III) Risks of the reform

1. Market risk. There are two major expressions: one is temporary short supply

of energy caused by short-term shortage between supply and demand. The other is the negative effect on downstream industry and residential life caused by a large range of fluctuation of energy price.

2. Corporate risk. The market-oriented reform will be no doubt a strong shock to some energy enterprises, which suffer from long-term serious "institutional illness", especially for some state-owned energy enterprises, which have monopolized the market for a long time, confused the functions of the government with the enterprise's, without a clear line between government and assets' owners and mixing up the major work with the auxiliary one.

3. Industrial risk. The market-oriented reform will take some measures, such as lowering or canceling import and export trade and foreign investment control, reducing or calling off fiscal subsidies, relaxing price control, etc. These measures probably cause industrial recession or industrial living crisis for those energy sectors that have a growing low international competitiveness, although this sector itself has possibly good productivity.

4. Regional risk. In terms of some regions depending on energy production too much (energy-based cities), the measures mentioned above during the course of market-oriented reform may aggravate the crisis of regional economy and society. Particularly, for the regions lacking in energy resources and having poor conditions in exploitation and with unitary economic structure, the following measures of market-oriented reform will result in economic and social risks to be deteriorated in these regions, such as lowering and canceling trade protection, and reducing fiscal subsidies.

5. Financial risk. The energy sector with inefficient productivity and poor competitive power will unavoidably face serious business situation under the shock of marker-oriented reform. Once they are trapped in difficult situation, they may "infect" financial sector directly or indirectly.

6. Risks of trade and balance of international payments. Once the market-oriented reform of energy sector involves reduction or cancellation of tariff and non-tariff barriers, the country whose energy industry lacks enough international competitive power may face the situation that abundant and cheap foreign energy products crowd into its market. This situation will remarkably increase the degree of the country's dependence on foreign energy.

7. Risk of safety production. The process of energy production has high-level of

requirements for safety. However, the production safety depends largely on energy management and security capacity. In addition, it is also up to the effectiveness of government's supervision for safety.

8. Social risk. It mainly comes from the above-mentioned corporate risk, industrial risk and regional risk. As to the country whose energy sector is in serious lack of international competitiveness, market-oriented reform usually will create grave social risk within a short period of time.

III. Experience and enlightenment drawn from the international practices of market-oriented reform

There are certain differences between the energy sectors of different countries in resource reserves, exploiting conditions, market scale, the energy supply and demand status, level of development in energy industries, market structure, competition pattern, degree of reliance on overseas energy, industrial structure, the flexibility of energy demand, the comprehensive energy strategy and policy, and the competitiveness of their energy enterprises in global market. Likewise, they also differ in the strategic goals, patterns, methods, and detailed measures of their market-oriented reforms. However, we can still come up with some common experience drawn from the course of market-oriented reforms of the energy sectors of different countries.

1. Their overall objective and principle of reform are almost the same, that is, to ensure the national energy security, optimise the energy structure, raise the energy efficiency, and constantly improve such important economic relations as energy vs. resources, energy vs. environment, energy supply vs. energy consumption, etc. while fully meeting the energy need for economic and social development, through a series of market-oriented reform measures such as relaxing restriction, disintegrating monopolies, introducing competition, opening the market and ensuring effective regulation etc.. The emphasis of energy reform varies from country to country due to their different national conditions.

2. The effective organization and promotion by government is vital to the market-oriented reform.

3. Explicit energy strategies and policies direction as well as a step-by-step reform plan, these are also of great significance.

4. The ever-improving legal and regulatory systems are the precondition for the

success of the reform.

5. The authoritative, comprehensive and unified management of energy is the organizational guarantee of its reform and development.

6. A complete and effective modern regulatory system is the institutional guarantee of the sound development of the energy sectors of all countries.

7. In the light of the increasing mergers, acquisitions and restructuring among multinational energy group corporations, these multinational energy groups have gradually gained control over the global energy market, on which characteristics of monopoly competition and regional oligopoly intermingle with each other.

IV. Experience, lessons, difficulties and particularities of China's market-oriented reform in the field of energy

In general, since the implementation of the reform and opening-up policy, China's market-oriented reform in the field of energy has achieved certain success. A series of reforms have been carried out, including the administrative system reform, pricing reform, industry contracting, modern corporate system reform, separating the functions of government from those of enterprises, introducing foreign capital and private capital, disintegrating monopolies to establish a brand-new industrial organizational structure, markets and regulatory agencies, etc.

(I) Basic experience

1. The top-down reform pattern

One major reason why China's market-oriented reform in energy industry can make progress without the disturbance happened in eastern European countries is that our reform is carried out top-down.

2. Choosing the right time for reform is of vital importance.

During the past two decades or so, China's market-oriented energy reform has been guided by such idea, i.e. easier problems first, then troublesome ones; readjustment first, then deregulating; increase supply first, then structural adjustment. In view of the importance and influence of the energy sector, decision-makers have to stick to such a principle while carrying forward the market-oriented energy reform, that is, to cautiously advance the reform only when the imbalance between energy demand and energy supply is alleviated or redressed.

3. The government functions as a stabilizer and buffer.

4. It is advisable to bring into full play the initiatives of local authorities and enterprises, increase energy supply so as to create an adequate market condition for reform.

(II) Lessons

1. The lagging of energy reform will be eventually translated into the energy bottleneck of economic growth

Compared with most of the processing and manufacturing industries as well as the raw and semi-finished materials industries in China, the energy industry is developing rather slowly, one of the key reasons is that the market-oriented energy reform is imperfect and incomplete, which has become the institutional barrier to the sound development of the sector. Evidence can be found in the following laggings: market access (e.g. the exploitation, import, wholesale and retailing of petroleum), the reform of enterprises (e.g. Most electric power and coal enterprises are still solely owned by government.), the price reform (e.g. Energy enterprises do not have the final say in the pricing rights of energy products.), the competitive structural reform (e.g. The monopoly problem still exists in the market.), the reform of governmental administrative system, the building-up of the market regulatory system and the opening-up to foreign and private capital.

2. Lacking an overall design for the national energy strategy and reform

The market-oriented energy reform is quite like a huge "ecosystem", in which, all sectors and links are closely interrelated. Without a comprehensive and foresight national energy strategy, the whole "market-oriented reform" of energy might get stalled, and linger in the original place due to the lack of overall design.

3. Production safety, resource and environmental protection

Energy production concerns the safety of people's lives. Therefore, whether the safety of energy production and consumption can be ensured is a major criterion for measuring the success of the market-oriented energy reform. In other words, if energy-related accidents happen frequently without providing fundamental solutions to this problem, then the reform is far from being successful.

4. Lagging R&D of new energy, renewable energy, and new energy technology

Compared with developed countries, we have made great progress in the reform and development of conventional energy, but we remain in obvious inferiority in the field of new energy, renewable energy (e.g. nuclear energy, biomass, solar energy, wind energy and tidal energy), and R&D in the new technology (e.g. clean coal tech) of conventional energy. The absence of encouraging mechanism for new energy end new energy technology in the market-oriented reform accounts for such a disadvantage largely.

(III) The difficulties of the reform

The common difficulties confronting the energy sector include:

• Without a comprehensive national energy strategy and energy reform planning which are uniform and definite can be used as the guiding principle and direction for deepening the reform and speeding up development in the field of energy.

• Laws and rules governing the energy reform and development are incomplete, still unable to check and regulate the administrative intervention at will by means of ready and sound legal systems.

• Without finding out the effective administrative system and regulatory pattern, the administrative functions are excessively dispersed, the administrative level is not advanced and the government is still used to make use of administrative means to interfere in the reform and development of energy industry.

• A scientifically modern regulatory system has not been established, the regulation has not been realized independently, legally and professionally, far from it.

• With the in-depth development of market-oriented reform, the deep-seated contradictions of reform will be completely exposed, especially the hindrance function arising from the groups with vested interests is not allowed to be overlooked, even in some links or some stages, they may make the market-oriented reform get into a state of standstill (e.g. the price reform of coal for electric power).

• The monopoly capability is still powerful, on the one hand, it forms the expression of natural monopoly, mainly involved in both the field of infrastructure of electric power system and the field of oil transmission pipe networks of petroleum sectors and, on the other hand, it forms the expression of the regional monopoly of

large-scale petroleum groups (China National Petroleum Corporation (CNPC) and China Petrol-Chemical Corporation (SINOPEC), taking the Great Wall as the boundary between them, have been occupying the northern and southern markets of China respectively).

• The course of reform among the energy sectors lacks coordination, which finds prominent expression in asynchronous reform between the coal sector and power sector and on the matters concerning the prices of electric power and coal, it is impossible to find out a perfect resolution within a short period of time.

• It is difficult to establish and improve a nationally uniform energy market in a short time, the current price formation mechanism can impossibly reflect the true relationship between supply and demand and their costs; now government is still maintaining a certain influence over energy price, e.g. prices of coal for electric power, price of electric power and the immediate price of oil products.

• The building of the corporate system is lagging behind. The energy enterprise has not actually become qualified player in the competitive market, still existing in varying degrees are the problems such as state share " assuming arbitrary power by one share", "assuming control by insiders", "assuming three without-clear-lines" and no standard structure for control and management, etc.

• Restricted by the current management system of state-owned assets, it is difficult for the energy group integrating upstream and down stream enterprises, and domestic and foreign trades that is characterized by trans-administrative areas, trans-sectors, trans-ownership, to smoothly accomplish their process of integration in the capital market.

•There are still considerably big difficulties existing in the resources-based cities with oil and coal for their carrying out the industrial transformation and the development of connected industries.

•Still no sound social security system and it is still difficult to establish in a short time the buffer and absorption mechanism for the "losers" who grow out of the reform.

• The opening-up degree is comparatively limited, the domain and extent allowing to introduce foreign private capital are still very limited, and no situation is formed for a coordinated development by making full use of "two kinds of resources" and "two markets".

(IV) Particularities of the reform

The important reason why there exist all kinds of crux and problems in the market-oriented reform of the energy sphere in our country is that the energy reform of our country is of its particularity, which does not exist in the reform of other spheres.

• Under the long period of influence of a planned system, it has brought about a heavy historical burden, there is no separation of governmental administrative functions from enterprise management functions, and it is very common for enterprises to undertake the social affairs.

•Under the long-term influence of monopoly position in the market, it lacks both the competitive awareness and competitive mechanism, and people are only inclined to use the existing monopoly status to push out competitive counterparts.

• Because of the long-term influence of the governmental "favoritism", the enterprises have strong dependence upon policy and are used to "enjoy special privilege", thus lacking the capabilities of independent survival and development.

• Under the long-term influence of state-owned economy "bringing the whole country under the state's domination", x non-low efficiency is obvious, state shares assume the arbitrary power by one share, and the property right is not clear.

• Over a long-term influence by the "barriers between different departments or regions" of state-owned assets administrative system, the upstream and downstream industrial chains are separated, the energy sectors lack industrial integration which is trans-regional, trans-sectoral and trans-ownership, e.g. the integrated shortcomings in the coal, road, port and shipping of coal industry.

• There is no distinct definition for governmental functions, in which there are the cases of overstepping functions, unusing functions, and giving up functions, the management of the function is deconcentrated and the management efficacy is not uniform.

• The choice of pattern and route and right opportunity are the technical difficult problems which must by solved by government in pushing forward the reform in the field of energy.

• The major background of adjusting and perfecting the overall strategy and the industrial policy of energy is required for government to carry out the energy reform.

• Issues concerning the design and implementation of governmental regulatory system, such as the comprehensive utilization of regulatory agencies, regulatory agencies, regulatory rules, regulatory contents, and regulatory methods; price regulation, regulation of market access, regulation of market behavior, the relationship between trade management and market regulation, the supervisory mechanism of regulators.

• The relationships of interest among intergovernmental departments and regions, among the regions, among the departments, among the high authorities and subordinate one and among locality and overall situation.

Just the reciprocal effects of above-mentioned complicated factors make the market-oriented reform in the field of energy of our country full of risks and uncertainties.

V. Objective, principle and the key points of the market-oriented reform in the field of energy of our country

(I) Objective of the market-oriented reform

1. General objective

The market-oriented reform in the field of energy of our country should attain the following general objective, i.e. by means of designing and implementing a kind of scientific and rational pattern of reform, and under the premise of guaranteeing the smooth implementation of the national overall strategy of energy, make market competitive mechanism to be brought into full play its elementary function of optimal allocation of resources, raise the international competitive power of the energy sectors of our country, constantly meet the day-by-day increasing energy demand of the whole society, deal with the various kinds of challenges in the field of energy in the future so as to provide the relevant industries and users with low-price, high-quality, stable, ample and clean energy products.

2. Near-term objective (within two to three years)

Within the nearest two to three years, the following key points should be focused in the course of market-oriented reform in the field of energy of our country:

• Provide low-price, top-quality and ample energy supply, improve the relationship between supply and demand of energy, and meet the demand of rapid

growth of national economy to the energy.

• Through implementing the effective market regulation, prevent the enhancement of monopoly forces in the energy market, and in the meanwhile, make sure that there will be no considerable fluctuations occurred on the energy price and in the energy market so as not to cause a succession of economic and social influences.

• The surplus labor force released in the course of the reform of state-owned enterprises in the field of energy can be smoothly reemployed. This is also an important social criterion for judgment of success or failure of the market-oriented reform in the field of energy.

• The financial pressure borne by governments at various levels is controlled within the acceptable range. This indicates that although the reform measures within a short time cannot be separated from governmental financial aid, they should absolutely not exceed the governmental financial capability.

• Do not make remarkable increase of the difficulty and reform cost for the reform in days to come. This means that we should seize the reform opportunity, and boldly carry out the reform, e.g. a right time must be chosen for the reform of energy price, otherwise, once the opportunity slips away, it will augment the reform cost in days to come, therefore, we need to act according to our ability and carry out the appropriate reform accordingly.

3. Medium-and long-term objectives (within the future 5 to 20 years)

In the light of the future five to twenty years period, it is still an arduous task for the market-oriented reform in the field of energy of our country, and the tasks are as follows:

• Guarantee the national energy security and satisfy the demand of energy in the course of economic growth and social development.

• The energy sectors should possess a certain attraction to investment, and the existing factories and companies should maintain the capabilities of reinvestment, redevelopment and reformation.

• Establish the independent and effective market regulatory system in order to guarantee the sufficiency and orderliness of the competition to prevent market monopoly behavior.

• The development of the energy sectors should be maintaining harmony with

resources and environmental protection.

• Scientific and effectiveness of governmental administrative system and energy policies.

• The internationally competitive power of energy sectors should be fundamentally improved.

4. Industrial objectives

• For the electric power industry. Deregulate the market access of power grid facilities and encourage social capital to be invested in the construction of power grid facilities; through legislation realize the interconnection of regional power grids, and improve regulatory system; on the basis of improving the regional electric power market, gradually establish the national uniform electric power market; the power generating links should be first to introduce the competition, realize the separation of power plant from grid, and bidding for grid access to establish a fair market competitive mechanism; the electric power sales links (retail market) will gradually introduce the competitive mechanism so that the end users can freely choose power suppliers; the power transmission and distribution links taken as the retained links characterized by networks in the electric power industry will be continuously taken as the domain of natural monopoly, however, in this regard, the separation of power transmission from distribution will be gradually realized, and at the same time, the governmental regulation must be strengthened. The power grid should provide the necessary basis for guaranteeing the competition between power generating and power sales.

• For petroleum natural gas industry. Accelerate the reform of pricing formation mechanism of petroleum natural gas, and reduce the direct governmental intervention to the prices of oil products and natural gas; disintegrate regional monopoly, encourage the three major petroleum natural gas groups enter into the regions of other parties to develop their business and also encourage the new competitors' access so as to form an all-round and diverse competitive structure; improve the regulatory system and regulatory agency of petroleum natural industries; accelerate the steps of opening to the outside world, lower the barriers of trade and investment, gradually relax the restrictions on the foreign capital and private funds entering the sphere of oil exploration, exploitation, pipeline network transfer, petrochemicals and oil product

circulation (including the wholesale and retail links); encourage the social funds entering the construction of pipeline network of natural gas, and at the same time, strengthen the price regulation of the pipeline network facilities with the characteristics of natural monopoly; establish the early-warning mechanism of petroleum security and the reserve system of strategic petroleum.

• Coal industry. Under the circumstances of carrying out the opening-up, competition, uniform and effective regulation, the point of departure and goal lie in raising the international competitive power of the coal industry of our country, and form fully competitive coal market, and through the rebuilding of market players; establishment, unification and improvement of market system, reform of market price mechanism, standardization and regulation of market order, the ruling and guidance of market behavior, bring into full play the leading functions of market mechanism in guiding the development of coal industry and coal enterprises. Push forward the optimization of the supply and consumption structure of coal and other energy sectors, and promote the extensive utilization of coal cleaning technology so as to epitomize the basic status of coal industry of our country in the overall national energy strategy.

(II) The basic principle of the reform

1. Principle that legal system should be established first.

2. Principle of correctly handling the relationship between reform, development and stability.

3. Principle of overall planning and progressing, step by step.

4. Principle of combining governmental energetic support with strengthening regulation.

5. Principle of market competition. The governmental intervention must be predicated on no going against the basic function of market competitive mechanism. All these measures taken in relaxing the market access, diversification of property rights, reduction of fiscal subsidies, lowering tariff and non-tariff barriers for trade, preventing market monopoly have the irreplaceable functions for bringing into a maximum play the market competitive mechanism in aspects of cutting down cost, raising efficiency, increasing effective supply and selection of the best and elimination of the worst among the competitors.

6. Principle of combining the reform of energy sectors with the reform of

governmental functional administration.

7. Principle of reform package. It includes: the reform of energy sectors is coordinated with the reform of other spheres; in the specific energy sectors, the reform of enterprise, reform of financial and tax system, reform of investment and fund-raising, and the reform of administrative system, all these should be jointly pushed on and mutually cooperated.

(III) Main points of the reform

1. Reform the establishment of governmental administrative organization in the field of energy, and according to the principle of separation of governmental administrative functions from its regulatory functions, establish the comprehensive energy administrative agency and professional energy regulatory agency respectively.

With regard to the establishment of governmental energy administrative agency of our country, there are two outstanding problems as follows:

First, it lacks the comprehensive energy administrative agency characterized by strong coordinating capability and relatively centralized administrative functions.

Second, the regulatory system still has greater shortcomings. It is still in the transitional period of changing from the mandatory plan and direct intervention in enterprises into establishment of modern regulatory system and, there is some sharp friction still between the new and old systems. For instance, the recently established electric power regulatory agency did not delegate the regulatory functions according to the international usual practice of modern regulatory system, and it is still in an embarrassing situation of "having the agency and lacking in the functions." The old system is still playing the leading role, which has brought a great challenge to the establishment of new system of energy regulation that is being looked into, and also made the market-oriented reform of electric power system bear greater risks.

In order to solve the increasingly outstanding shortcomings in the energy regulatory system, it is recommended that in compliance with the principle of "separation of governmental administrative functions from its regulatory functions", adopt the two tiers of structures, i.e. establishing the comprehensive energy administrative agency and professional regulatory agency, respectively. In restructuring and improving the energy regulatory agency, the main tasks are centralized in the following two aspects: first, solve as soon as possible the problem concerning the function of electric power regulatory agency not being finalized, for

which the Electric Regulatory Commission should be conferred the right of price control and right of access control. Second, implement regulation on the natural gas industry, especially implement the effective control over the natural gas pipelines characterized by natural monopoly and the principal items for regulation is related to the two aspects: the fair access to the main pipeline and the price.

The relationship between the comprehensive administrative agency and professional energy regulatory agency should be: the former is responsible for drawing up the national energy strategy, medium-and long-term energy development planning, annual development plan and energy policies, overall coordination of the transdepartment relations and the development of different categories of energies; the latter implements the national energy planning and policies, and mainly executes the professionally independent regulation on two specific industries i.e. electric power and natural gas.

2. Firmly switch the government function, and establish an administrative system suited to the energy sector reform

After several stages of reform, the energy industry has defined the roles and functions of government and enterprises. Yet, the government's direct intervention in the enterprises is still prevalent. The most severe problem is the government overstepping its role and disturbing the market mechanism by allocating resources. As a result, enterprises are still in a "compulsory bind" with market supply and demand signals blocked or cut off.

The implication of the reform of government management is by no means merely the matter of improving administrative efficiency but for a thorough switch of the governmental function, i.e. resolutely let go what should not be controlled and what should be controlled must be finalized according to specific requirements. More specifically, the access control system based upon the project examination and approval should be reformed, and the comparatively intensive reform of investment administrative system should be carried out, for which the objective of the reform is to "relax the economic control and strengthen the social control", so as to push forward the regulatory revolution and the functional transformation.

The transformation of governmental administrative function as recommended above should be combined with the work of structuring modern energy regulatory system, i.e. confer the improved regulatory function on the professional energy

regulatory agency, and in the meantime, rescind the regulatory function of the original agency.

3. Speed up restructuring the ownerships of various energy industries, optimize the industrial institutional framework, implement the common development of multiple economic components, and establish the uniform, opening up, competitive and orderly energy markets.

If we want to actually establish an effective market competition system, it is necessary to discard the pattern of "closed competition", replace the "closed competition" with "open competition", and change the situation of the simplistic ownership structure of energy industry so as to attain the goal of shaping eligible players of the market. With regard to establishing the open and competitive energy market, there are four main points: First, focus attention on encouraging the access of newly established enterprises (particularly the privately-run and foreign-invested enterprises), and the relaxed access policy for employing the up-to-date technology (suitable for all the energy industries except the electric transmission networks and petroleum natural gas upstream industries). Second, in the state-owned energy enterprises, implement the reforms with the property rights system as a core. Third, optimize the industrial institutional framework. Still there exist the issues of market monopoly in considerable degree in the electric power and petroleum industries, and it must not confine the breaking of monopoly onto the level of "dismantlement" of original enterprises, in this case, it will become the circumstances that the interests are divided up inside the original monopoly enterprises and "major monopoly" evolves into "minor monopoly", for which it is necessary to focus our attention on newly-established enterprises' access. Fourth, establish the domestic uniform energy market and gradually make it compatible with international market.

4. Reform the prices formation system and establish the price system in favor of the realization of energy restructuring and sustainable development

Under the condition of market economy, the key links for realizing energy restructuring and sustainable development are to reform the price formation system and price structure, and give priority to solving the following issues: first, for the energy products that form effectively competitive power, adopt the market-pricing formation system so as to actually and quickly reflect the relations between supply

and demand. Second, implement the effective price regulation on the links characterized by natural monopoly. Third, formulate energy price structure and price relations favorable to the energy restructuring and attainment of sustainable development goal. Fourth, differentiate the duality of energy price; establish the scientific price system that can protect the low-income population and guarantee people's basic living needs.

5. Conduct pilot project in the market orientation of resources, and gradually establish an open and competitive new mechanism for resources distribution.

It includes: 1) Establish the market-oriented distribution system in the form of resources bidding and auction. 2) Clarify the players for implementing the market orientation of resources and try best to centralize the right of auction, establish the main implementers system of two levels of state and province (municipality directly under the central government and autonomous regions) respectively so as to stop the improper behavior of the local governments. 3) Implement the special account management for the funds through auction, and the funds will be mainly used as the aid funds for straightening out the subsidence, farmland refarming caused by the mining, and the industrial transformation of the areas where the resources are exhausted, ensure earmarking a fund for its specific purpose only. **(ignore)**

It is recommended that for the above-mentioned tentative ideas about the market-oriented distribution of resources, pilot projects in coal industry should be conducted.

REPORT

I. Basic implications and driving forces of the market-oriented reform

(I) Basic implications of the market-oriented reform and the "reforms in two levels"

First of all, we should make it clear what are the basic implications of "market reform." Generally speaking, what we called the "market reform" in energy field refers to a process where under a formal, apparent and predictable institutional environment, and in such links as investment, pricing, transportation, sales and services in the whole operation of energy industries (such as power, coal, and petroleum), and the fields of the interrelation with upstream and downstream industries in operational environment, the balance between supply and demand, customer relationships, ownership structure and enterprise systems, governmental administrative system and market regulation, (1) basic pattern of resource allocation will be transformed from the non-market system to market system, from monopolistic to competitive market structure, from unfair to fair competition, allowing competition system and free obligation to solve the market transactions between enterprises, industries, buyers and sellers instead of mandatory administrative system; (2) Players for the allocation of resources change from the government to enterprises with modern corporate system, from traditionally unitary and separated upstream and downstream state-owned enterprises bearing social functions to equity-diversified, upstream and downstream integrated modern enterprises, with legal person status and scientific and formal governing structure; (3) The governmental administrative systems and patterns will be switched from strict control to relaxing control and effective regulation, from decentralized administration to centralized one, from closed system to open (domestic opening up and opening up to the outside world) system.

From the world's perspective, market-oriented reforms in energy industry have become a global trend in the world. Both market economy countries and those countries transforming to market economy system are relaxing their governmental control, disintegrating monopoly, allowing competitive market system to play a full role and competitive enterprises to enter markets independently, this is a common road chosen by global energy industries.

Generally speaking, the market-oriented reform mainly includes two levels and in different nature. The first level is, transforming toward market system from non-market system. This mainly refers to the energy reform conducted by a centrally

planned economy country during the transformation of its economic system, which includes a series of reforms in ownership structure, industrial organization structure, pricing system, financing and investment system, fiscal and taxation system, shipping and sales system, international trade system, governmental administrative system and legal system. The second level refers to the widening and deepening of market system. This mainly refers to the reforms in energy industries by market economy countries including direct and indirect fiscal subsidies, policy financing, environmental standards, regional market integration, protective trade measures, (such as import quota control). All these reforms are implemented under the framework of market economy, the purpose of which is to improve and optimize the established market system framework.

(II) Driving forces for reforms---why should we reform?

Since the mid 1980s, world economy has experienced delicate changes, bringing far-reaching influence on global energy industries and also driving the market-oriented reforms in the field of energy.

1. The need to adjust the nation's energy security strategy. In recent 20 years, wars have been taking place frequently in the Middle East—the world's largest oil export region. From the oil crisis in 1970s to the Iraq-Iran wars in 1980s, from the Gulf War in 1990s to the Afghanistan and Iraq wars at the beginning of 20th century, it has been the top priority of energy strategies for all the countries in the world, how to reduce, to the most extent, the negative effects on national economies of the supply, and price fluctuations of energy products such as oil and natural gas and, how to ensure the energy supply to satisfy energy needs of the nation's economic growth. Thus, countries have begun to adjust their national energy strategies, for example, establishing and improving energy reserve strategy, formulating a series of long-term encouraging policies to increase domestic energy supplies and efficiency, strongly developing domestic substitute energies, diversifying energy imports, and encouraging extensive application of energy saving products and technologies.

2. Breaking industry monopoly, opening the market, introducing competition system, increasing energy supply and energy efficiency, improving the service quality in energy sectors and reducing structural conflicts between energy demand and supply have rapidly pushed the reform from regional exploration to global reform waves. The calls for speeding up reforms of monopolistic industries have been increasing in

mature European and American market economy countries since the mid 1980s. Some countries have made exploration on the market-oriented reforms of monopolistic markets, one after another, trying to eradicate systematic shortcomings of slow industrial development, low openness, weak competitiveness, low efficiency and poor service quality caused by market monopoly and weak competition. In the practice of the reform, privatization of state-owned sectors, reduction of trade investment barriers, industry restructuring, breaking market monopoly, governmental deregulation, introducing competition system, reforming regulatory system have witnessed positive results, setting a good example for reforming such traditional energy sectors as power, coal, oil and gases also with problems of market monopoly, weak competition, low efficiency and poor service quality

3. Increasing economy globalization, strengthened liberalization of trade and investment and regional economic integration, gradual reduction of "institutional" trade barriers. Since 1990s, economic globalization has developed rapidly, and the calls for facilitating liberation of trade and investment have been increasing around the world. Therefore, many countries supplying energy at high costs have to adjust their existing protective policies for energy sectors, reducing or eliminating tariff and non-tariff protective measures, and forcing their domestic energy sectors to face external competition directly. Take coal industry as an example. Under the great competition pressure from low-cost coal producing countries, European and Japan's coal production has declined dramatically because of high cost. Germany's hard coal output decreased from 69.76 million tons in 1990 to 40.40 million tons in 2000, Britain from 92.80 million tons to 35.30 million tons. Under the framework of regional economic and political integration, European Union has decided to gradually abolish its members' governmental fiscal subsidies to coal industries and build a uniform, open and competitive coal market. In fact, however, reducing fiscal subsidies will still be a hard reform process for those countries in Europe, Russia and East Europe with high production cost of coal.

4. The rapid development of high and new technologies has provided strong impetus to upgrading and improving energy industries. 1990s has witnessed rapid development of "knowledge economy", to such a broad and deep degree. The high and new technology with information technology (IT) as an example has brought unprecedented opportunity for upgrading and improving the traditional industries, reviving so many mature and even declining traditional industries in developed

countries such as textiles, consumer electronics, automobile, steel, and machinery. Driven and improved by information technology, such traditional energy sectors as coal, power, oil and natural gases have gained completely new development opportunities. Especially in coal sector, for sake of technological improvement, production efficiency has been doubled, safety has been improved a lot and production cost has declined significantly. Take the United States as an example, coal production increased by 24.9% during the decade of 1980 and 1990, while the number of staff fell by 31.1%, the average productivity up 106.2%, casualty rate falling dramatically by 57.6%. U.S. coal industry has become one of the few industries with the most rapidly increasing productivity[1]. Today, U.S. coal production has broadly adopted multi-functional computer monitoring system in underground conditions, just in time monitoring of production safety of coalmines. U.S. casualty rate per thousand coal workers is now lower than that of 20 other industries such as metallurgy, manufacturing, construction and agriculture, becoming a comparatively safe industry[2].

5. The waves of global environmental protection have promoted the market-oriented reforms in energy sectors. The worldwide environmental protection waves have brought great and far-reaching influence on global energy sectors. The "Kyoto Protocol", approved in December 1992, expresses the common cries from various countries of the world for climate changes and environmental pollution. Thirty-six industrial countries have committed that they would reduce greenhouse gases emission by 4% by 2008-2012, compared to that of 1990. According to the calculation by the U.S. Department of Energy, to realize the objective of emission reduction of 7%, the U.S. will have to reduce coal consumption by 25% by 2010. Under the increasing pressure of environmental protection, governments of various countries have to make great adjustments to their energy strategies by stipulating strict environmental protection laws and regulations or emission standards and encouraging development and application of clean and new energy resources.

6. To get rid of the pressure of fiscal subsidies from governments of different levels, especially in the field of coal industry. Restricted by resources reserve and exploration cost, except for a few countries in North America, Australia, and South

[1] China Energy Research Institute "Report of Strategic Choice Research on Establishing Market Economy System in China's Coal Industry"; Dec. 1995.
[2] Wang Dingyi "Research on Reasons for and Solutions to Coal Well Safety Problems"; Sep. 2002

Africa, most countries, especially in Europe and Japan, have endured a long-term loss in coal industry and these governments have to provide assistance through financial measures. At present, among the four major coal-producing countries (Britain, Germany, Spain and France), Germany, Spain and France are relying on the governments' fiscal subsidies for survival. The European Union has allowed its members to extend governmental subsidies to their coal industries till 2010. Take Germany as an example. Due to high labor costs and strict restrictions on environmental protection, the cost of exploring coal has amounted to EURO 160 per ton in Germany, four times as much as the international market price of coal. In 2001, Germany's government granted DM8.1 billion fiscal subsidies to its coal industry, especially focusing on price subsidy, allowances for coal workers and retirement pension and subsidies for closing coalmines and for research and development. The average annual fiscal subsidies received by a worker amounts to 80 thousand Euros in Germany. If the German government closed all coalmines and supported all the coal workers, it would have to pay only one-third[3] of the present subsidy. In Britain, Russia and some countries in the East Europe, governments are pushing reforms in state-owned coal sectors and are forced to undertake the remaining debt beyond the solvency of these enterprises. For example, Russia began reforming its state-owned coal mines from 1993 and the governmental fiscal subsidies granted to coal mines took up 1.4% of the GDP of the year, two-thirds of which was used to close the losing coal mines and more than 70% [4]of the amount for social security subsidies for coal workers. The high fiscal subsidies have made those governments facing greater and greater budget pressure. When trade barriers lose their roles, how to alleviate fiscal pressure from coal sectors is facing the governments of all major coal-producing countries.

(III) Motives for the market-oriented reforms in China's energy industry

Except for the above-mentioned motives for global market-oriented reforms in energy field, China's energy sector has several other reasons for its market-oriented reforms.

First, the backward investment and financing administrative system cannot solve the problem of long-term energy shortage. Since its reform and opening up, China's

[3] Magnetic Suspension Cannot Compete with Coal Subsidy. Yunkuang Civilization Net, July 9, 2003.
[4] Wang Dingyi "Research Program on Reasons for and Solutions to Coal Well Safety Problems"; Sep. 2002

economy has maintained sustainable and rapid growth. Therefore, the nation's demand for energy has kept rising. However, for a long time, China's administration of energy financing and investment has followed a model of "government investment, government examination and approval, government financing and government interference with price" and the social capital can hardly enter the field of energy production. While government's investment cannot meet the needs for energy, the long-term shortage of energy demand and supply has not changed completely. The nationwide power shortage since the summer of 2003 lies, to a large extent, in the fact the backward power investment and financing administrative system cannot meet the rapidly increasing demand for energy.

Second, the non-simultaneity of reforms in different energy sectors and system conflicts has become an obstacle to the healthy development of energy sectors. This phenomenon is especially obvious in the rising conflicts between coal and power industry in recent years. Because the coal sector moved earlier than the power sector on the road of market-oriented reforms, there exist significant differences between coal and power sectors in conditions and patterns of market transactions, especially in the price forming system of coal used for generating power, resulting in serious restrictions on both sectors. Every year's coal ordering fair will be the tangible place for the two sectors to exhibit their great intangible conflicts.

Third, because energy sectors have long been under the governmental protection of trade and investment, Chinese energy enterprises lack the ability to compete internationally and the capabilities to counter the attacks from foreign multinational energy corporations. Restricted by administrative system, resource exploration cost, technology level and production efficiency, domestic energy enterprises are broadly experiencing "institutional illness", to different extents, especially in aspects of property rights structure, corporate governance structure, decision making system, encouraging and bounding systems. Although state-owned or state-holding enterprises take up the most domestic market shares, their international competitiveness is not high on the whole level. This affects the nation's determination, to some extent, to open its energy markets, on the one hand, and forces government to create favorable trade and investment environment for energy sectors, on the other hand.

Fourth, administrative monopoly still exists and restricts the market competition and further impedes the healthy development of Chinese energy industries. Take oil and natural gas industry as an example. At present, domestic oil and natural gas

market is mainly controlled by three groups of SINOPEC, CNPC and China Ocean Oil Corporation (CNOOC). In fact, the circulation of oil products is facing the duopoly by SINOPEC in the North and CNPC in the South. The monopolistic market structure is obviously unfavorable for the healthy development of competitive petroleum and chemical industry, and the formation of competition system. To overcome the negative effects of fluctuations of international oil products market, people of different circles are calling for constructing China's oil futures market. However, if the duopolistic market structure of domestic oil products trading could not be changed, it might be the case that the duopoly would further monopoly the oil futures market. The end victims will still be the vast consumers.

Fifth, the pricing system of energy products has not been finalized. Although the nation improved the pricing system for crude oil and finished oil products in 1998 and 2001, adapting it to the international market, the existing pricing system still exposes many a problem. For instance, the low sensitivity of price adjustments cannot reflect the changes of domestic and international markets; the "immediate price" set by government cannot reflect the great differences in domestic and foreign oil product structures; the price of crude oil is not compatible with the price of finished oil, affecting formal production and operation of finished oil; the low apparentness of prices leaves a large room for oligopoly enterprises with monopolistic position in the market to make "black box" operations; government's continuous regulation on the price of finished oil products is disadvantageous to the autonomous operation by oil enterprises, unity of national markets and the fairness of competition[5].

Sixth, in the process of developing energy industry, relationships among the government, enterprises and market have not been properly dealt with. Governmental intervention is everywhere and market system allocating resources has been restricted. Generally speaking, Chinese government has not formed a set of scientific and effective models and systems for governmental administration. There coexist the phenomenon of government administrative giving-up functions and overstepping functions. For example, we have not made a clear long-term comprehensive energy strategy and the national energy safety security system has not been really set up; administration functions in the field of energy are controlled by various sectors leading to low administrative efficiency; the governments still enforce great influence

[5] Lu Dongyue " toward the reform of domestic oil price forming mechanism" see website of the Ministry of Commerce.

on the price formation of energy products and the relationship between energy demand and supply (e.g. prices of coal used for generating power, intermediate prices of oil products, and terminal power prices); market regulatory system is not perfect yet, especially the regulation on administrative monopolistic energy enterprises has not been finalized; industrial policies are most favorably to state-owned energy enterprises and the unity and apparentness of policies are still not very high; reforms on investment and financing administrative systems are lagged behind, especially there exist many entry barriers for private capital to entering the fields of production and operation of energy; local protectionism is still very strong and it is hard for a nationwide unified energy market (tangible and intangible markets, spot market and futures market, merchandise market and capital market) to come into being; the administrative system of state-owned assets has not been sorted out and it is very hard to form a trans-sector, trans-ownership and trans-regional large energy group. From this sense, transformation of the governmental function administration is the prerequisite for market-oriented reforms in the field of energy.

(IV) The fundamental approach to further developing energy sectors---speeding up market-oriented reform

In view of domestic and foreign energy industries, we can conclude that because there exist great differences in institutional environment, economic development phases, energy production and consumption structures, current situation of energy sectors and governmental administration systems between different countries, energy sectors of various countries have shown some differences in price forming mechanism, governmental administration system, state-owned energy sectors, market regulation system, administrative entry barriers, and the market-oriented reforms of upstream or downstream industries. However, there are also some common features between energy sectors of different countries, e.g. insufficient energy supply, low energy production efficiency, long-term loss of particular energy sectors (especially coal sector), fiscal subsidies problem, market openness and trade policies problems, environmental protection and clean energy problems, as well as the problem of energy substitution. Most of these problems can be traced back to the "government failure".

Although the governments of different countries have taken different measures to reform their energy sectors, they have something in common, that is, choosing the same direction: this is the reform towards the market system. What we called the

market-oriented reforms means that the market system will, to the most extent, play the fundamental and decisive role in allocating resources; and under a formal and apparent institutional environment, the price will adjust the market supply and demand, the market competition and free obligation will solve the transaction relationships between enterprises, industries, buyers and sellers instead of the compulsory administrative system.

II. Factors affecting the market-oriented reforms, as well as benefits and risks of the reforms

(I) Factors affecting the market-oriented reforms

1. The completeness of legal systems. Because energy sectors are the basic industries of national economy, their production, trading, transportation, price, quality, and market competition will involve benefits of various sectors. The government, energy sectors, or even energy consumers may all be possible "profit maker" or "profit sufferer" of a particular reform measure or policy during the market-oriented reform. Therefore the involved parties will be forced to strengthen or change the distribution pattern of benefits. Under the conditions of market economy, it is the law that can guarantee, bind or stipulate behaviors of the parties of interest. The more complete of the legal system, the clearer the boundary between obligations, rights and benefits of the groups of interest, the better a series of reforming measures can be understood and implemented and the more obvious for the results of the reform, vice versa.

2. The "initial status" of the reform. The "initial status" here refers to the internal conditions and external environment facing energy sectors at the beginning of market-oriented reforms. Examples are the situation of energy industrial development, the relationships between energy sectors and related industries, economic systems, governmental administration system, trade system and policies, operation of macro-economy, relationship between energy supply and demand. The initial status of the reform can usually lead, restrict or even determine approaches to the reform and it may be locked-in the existing reforms. It is not difficult to understand that a sudden and bold reform opening energy prices may result in disasters especially when a country is facing great pressure of inflation. For the same reason, with a initial status of insufficient energy supply, a government's complete opening its energy prices and deregulation will possibly lead to dramatic increase of energy prices, thus raising

production costs of downstream industries and further reinforcing the inflation pressure of the operation of macro-economy.

3. The fiscal situation of government. The fiscal situation of a government can determine whether it "could afford" or "could not afford" the market-oriented reform of its energy sectors. Sound fiscal situation is the "pusher" and "stabilizer" of market-oriented reform. During the market-oriented reform of energy sectors, price subsidies, loss subsidies, employment arrangement subsidies, division subsidies of social functions, establishing social security subsidies and safeties production subsidies will make "hard requirements" on government's finance at any time. Take the reform of German coal industry as an example. Due to the high cost of coal production in Germany (DM260-280 per ton, however, the market sale price only around DM70), the government will have to grant a huge amount of fiscal subsidies to the coal sector. During 1996-1998, the federal government granted Luer Group subsidies of 10.4 billion, 9.7 billion and 8.5 billion Dutch Marks respectively (subsidies for each ton of coal about DM 200) [6]. One problem should be noted that the market-oriented reform aimed to reduce or eliminate fiscal subsidies might produce huge financial pressure at the beginning of the reform. Moreover, the further the reform goes, the greater the financial pressure may be in the short term, thus forming a "policy paradox". The main reason for this is that when factors of production are transformed from the old systems and mechanisms to market-oriented and high efficient new systems and mechanisms, it is needed to pay intensively in the short term the reform costs accumulated in decades by the old systems. In fact many developed countries like Germany, France, and Britain with powerful financial capability can even hardly support the long-term serious loss in their coal sector. Therefore, the market-oriented coal reform in these countries also lasted ten years, even longer.

4. Energy production and consumption structures. The position of a particular energy sector in the total production and consumption aggregate and its relationship with other energy sectors is another important factor affecting the progress of reform of this sector. In short-run, a country's energy production and consumption structure is comparatively stable and inelastic (e.g. construction cycle for power is longer). Therefore, if a particular energy sector is the main provider of energy in a country, the

[6] Guo Jun "Comparative Analysis on Yuan Kuang Group and the German Luer Group" China National Enterprises Net.

lift control over price may lead to rapid increase of this energy price in the country in short term. From the long-run perspective, energy production and consumption structure will adjust accordingly to price changes of a particular energy. The continuing increase in price of a particular energy may encourage new investment, increasing the capability of supplying the energy and encouraging the growth of the production and consumption of substitute energy, and vice versa.

5. Resistance from groups of vested interest, social pressure and reform's acceptability. The market-oriented reforms in energy sectors may bring social changes, which can be reflected in the following aspects. First, reforms of the energy sectors themselves, energy enterprise reforms as an example, may force some uncompetitive enterprises to fail market competition (for instance, power companies unsuccessful for bidding access to grid), some enterprises going bankrupt, and some enterprises "downsizing" through reducing staff number and costs, which will undoubtedly lead to unemployment. Second, reforms of governmental energy administration system will change the existing interests to some governmental departments and some public officials. They will take every measure to maintain their existing benefits, trying to avoid loss or reduction of their existing power. Third, energy price fluctuations may affect the actual average disposable income of all the people. Finally, the above-mentioned pressure on the governmental finance will increase, especially for the financial pressure of solving closed and bankrupt enterprises and relocating laid-off workers. As the promoter of market-oriented reforms in energy fields, government should choose a properly step-by-step reform model within the social acceptability in short term. Where social conflicts are serious, the reform could be postponed and people whose benefits are eroded should be compensated. "Shock therapy" reform model may cause exposure of social conflicts in short time and impeding the reform.

6. The continuity and unity of policies. Whether the reform policies could remain coherent, lasting and unified will also affect the results of reforms in energy sectors. Because of the complication of market-oriented reforms in the energy sectors, it is impossible to reach ideal objectives in the short term. In most cases, energy reform measures will be passed on to several administrations, various departments, and different administrative regions. However, whether different governments, sectors and regions could guarantee the unity of reform measures is a practical crux. One important reason for being difficult for China's energy sector reforms to be smoothly

carried out lies in the fundamental drawbacks existing in the continuity and accordance of policies.

(II) Benefits of the market-oriented reform

1. To improve the capability of continuous supply and increasing production efficiency of energy, strengthening industrial competitiveness. From the perspective of energy production, the roles of market-oriented reforms in improving energy supply and its efficiency can be summarized in following two aspects. First, reducing market entry barriers will facilitate social capital entering the field of energy production, and the increase in number of competitors will undoubtedly intensify competition and improve efficiency (for example, the separation of generating plant from grid in power reform, removing restrictions on the investment and production of power). Of course, we should prevent market monopoly force from coming into being. Second, at the beginning of market-oriented reforms, with lift control over energy prices and marketization of price forming mechanisms, the previously conceived low energy prices will return to formal levels (reflecting both the production cost and the relationship between supply and demand), thus improving the profitability of energy providers and their capabilities of reinvestment. Form the middle to long- term perspectives, when profitability of energy sectors is higher than social average profit margin; price signals will attract social capital to enter profitable and prosperous energy fields.

2. Related industries and consumers could receive sufficient, low-price and high-quality energy products and services. The supply (mainly the total quantity and price of energy) of upstream energy sectors as fundamental industry will directly affect the production and cost of downstream industries, especially the manufacturing industries (vice versa, of course). For high energy consuming industries such as steel and color metals, energy supply costs are critical factors affecting production costs. Getting sufficient, low-price and high-quality energy supply is basis for developing these industries. The direct beneficiaries of market-oriented reforms of energy sectors are those downstream energy-consuming industries. Besides, the vast citizens will benefit from the reform in energy sectors. Of course, how much they could benefit from the reform will depend on the degree of reduction in energy prices and the regulatory policies. For instance, many cities in our country have completed the swap of natural gas for man-made gas. However, due to the high price of natural

gases, many citizens would prefer to use small household electric appliances (e.g. electric cooker and boiler).

3. To alleviate government's financial pressure. From domestic and foreign experiences, low efficiency, weak competitiveness and rigid systems of energy sectors have become the huge financial burden for the governments of various levels and thus being one of the reasons for governments of different countries to push market-oriented reforms in their energy sectors ("cast-off-burden based" type reform). For instance, although Germany has kept high production efficiency of coal, affected by resource reserves, exploration conditions and high labor costs, coal industry of Germany has always been experiencing embarrassment of relying on fiscal subsidies from the government for many years. In 2001, the German government granted its coal industry fiscal subsidies amounting to DM 8.1 billion, most of which was used as price subsidies, coal workers allowance and pension subsidies, coal mine closed subsidies and R&D subsidies. According to statistics, the annual average fiscal subsidies for a coal worker are up to Euro 80,000 in Germany. It was just the heavy financial burden that made those major coal-producing countries in European Union including Germany, Britain and France seek market-oriented reforms. The privatization of energy sectors, closing those bankrupt enterprises and gradually reducing or even eliminating subsidies will greatly alleviate the government's financial pressure. However, there is one point we should not neglect, that is, at the beginning of the market-oriented reform, the financial burden may be on the increase side.

4. To optimize energy supply and consumption structure. From a country's angle, generally speaking, market-oriented reforms will undoubtedly help to form reasonable energy supply and consumption structures. The basic reason lies in the fact that no mechanisms can be more efficient than market system in rationalizing allocation of resources and improving resource supply and consumption structures. However, from the internal perspective of energy sectors, non-simultaneity of reforms determines the imbalance of market-oriented reforms among different sectors, which might distort energy supply and consumption structures in the short term. For instance, if the reform in power sector were obviously lagged behind market-oriented reforms in coal sector (e.g. power price still being the government's mandatory price, however coal price being completely market price), a predictable short-term outcome is the increase in coal production cost, and its long-term outcome is that the resource of generating

power might transfer from coal-based to hydroelectric and nuclear power-based structure, and vice versa. From the consumption point of view, the market-oriented reforms of a particular energy sector will usually increase consumption cost in the short run (for it is hard for energy supply structure to adjust in the short term), and will change the price ratio of different energy products. As a result, consumers will divert to those energy products with lower prices.

5. To promote the technological advances in energy field and the cleanness of energy. Before the market-oriented reforms were implemented, generally, governments dominated technological advances in the energy field, top-down. Lack of experience and motivation has made energy sectors incapable of making technological innovation. Market-oriented reforms allowed competition system to play its role in encouraging technological innovation. In competitive market structure, energy sectors actively promote technological innovation not only to gain competitive advantage but because they have obtained the ability to innovate due to the market-orientation of energy prices and the accumulation of experience. Of course, the government also promoted the technological innovation in energy field. In fact, for those public technologies with great positive externality and those advanced ones requiring large R&D investment and with huge risks (e.g. new energy technology), the government's financial assistance still plays a critical role.

6. Improvement of environment. Prior to the market-oriented reforms, the issue without a clear line between government administrative functions and enterprise management functions largely exist in energy sectors. The energy sectors relied heavily on the government in various aspects of ownership, supply chain control, governmental investment and pricing, personnel and finance. Under such a system, the government has always been "in a dilemma" between protecting environment and increasing energy supply. Economic, legal and administrative measures couldn't essentially solve the problem of "treatment lagging behind pollution" for a long time. For instance, the government has stipulated high emission standards in order to protect environment and levy much higher taxes and charges, but these economic measures will turn out to be financial burden for the government. That is to say, the environmental costs induced by energy sectors are externalized. The vast social citizens will be the actual payer for the environmental cost arising from energy production and consumption. This situation be fundamentally will improved with the market-oriented reforms of the energy sectors getting along. Thanks to the

independence of energy sectors and reform of property rights systems, the problems of "no clear lines between government administrative functions and enterprise management functions" and the "no clear lines between government and assets' owners" will be solved completely. The economic, legal and administrative efforts, which governments have made to improve the environment, will be absorbed by the energy sectors themselves. The environmental costs will be internalized within the competitive energy sectors.

(III) Risk of the reform

1. Market risk. Market risk is the first risk facing the market-oriented reforms of energy sectors, which can be summarized in two aspects. First, the short-term shortage of supply and demand will result in the short-term energy shortage. For example, the average cost of coal-power industry increased dramatically after the market-oriented reforms of coal sector, and some uncompetitive power generating enterprises might stop or reduce their production, short-term result of which would be the shortage of power supply over the whole country. This has been conceived as one of the major reasons for the nationwide power shortage since summer of 2003[7]. Second, huge fluctuations of energy prices will bring negative effects for downstream industries and citizens. For those large energy consumers, huge fluctuations of energy prices might significantly affect the their operation. For example, when the international oil price rose from USD10 to USD40 per barrel and the aviation oil prices increased by 86% for eight times in 1999, China's air transportation had to pay extra RMB 4.0 billion Yuan for such price fluctuations.

2. Corporate risk. No matter it is the entry of new competitors or the deregulation on pricing and investment, market-oriented reforms would be a strong impact for those energy enterprises with "institutional illness" for a long period of time, especially for those state-owned energy enterprises with long-term monopolistic position, combination of government and enterprise, no clear lines between government and assets' owners and no division of major and supplementary business. Domestic and foreign experience has shown that one definite result of market-oriented reform is that inefficient energy enterprises may face risk of exiting from the market. Two possible ways out would be either reshaping the enterprise or closing them after

[7] LiuJianlin "Is lack of coal the reason for lacking power—an investigation on the nationwide "power outage" China Youth Daily, Dec. 17, 2003.

bankruptcy or restructuring them through merger. Comparatively speaking, the corporate risk that the power sector and oil and natural gas sector would face is next to the coal sector.

3. Industry risk. Corporate risk is different from industry risk. From a country's point of view, market-oriented reforms include: reducing or eliminating regulation on import and export and foreign investment, reducing or eliminating fiscal subsidies, or deregulation on price, may cause on-going industrial decline or industrial existence crisis for those energy sectors with low international competitiveness in spite of their own high production efficiency. In general, coal sector is facing the most serious industrial risk; the second is the oil and natural gas, and finally the power sector. One important reason for this is that coal, oil and natural gas are tradable. However, power is less tradable than the former two. In order to prevent the industrial risks of the market-oriented reforms of energy sectors from transforming to industrial crisis or even more serious political crisis, governments of different countries are responsible for taking effective measures to alleviate external impact, for example, by gradually eliminating trade and investment barriers and remaining some degree of fiscal subsidies. Although German coal industry has been in leading position in the world as far as the production efficiency and technology level are concerned, because coal resource reserve and economic exploration costs cannot be controlled, the German government has always been providing strong and powerful financial assistance to its coal industry because of the increasing industrial risk arising from its beginning of market-oriented reforms of coal industry.

4. Regional risks. For regions that heavily rely on energy production (i.e. energy-based cities), the market-oriented reform might aggravate the economic and social crisis there. Especially in the regions with insufficient resource reserves, poor exploiting conditions and unitary economic structure, reform measures such as the reduction or cancel of trade protection, cuts in fiscal subsidies etc. may all add to the exacerbation of the economic and social crisis in these areas.

5. Financial risks. Under the impact of the market-oriented reform, the operation of those less efficient and less competitive energy sectors will inevitably face severe challenges. Once the operation of these sectors lands in a fix, by which the financial sectors are likely to be affected directly or indirectly. One reason for this is that before the market-oriented reform, the market risks of the energy sectors have not yet manifested itself; on the contrary, because of the trade and investment protection

policy of the government as well as their special monopoly status, these energy sectors became a highly profitable industry, (say, large PNG company in China) making the financial institutions' investment in them a seemingly "reasonable" choice. Another important reason is that because of the state-run mechanism or the undue intimacy between banks and enterprises, financial institutions may easily fall victims to the less efficient and heavily indebted energy sectors, hence the evils of ineffective budget control and excessive loaning. Energy sectors, on the other hand, are usually large, prominent and influential group corporations, who can easily get the commercial and policy-related loans they need during the dealings with financial institutions. Once their original privileged status fades out as a result of the market-oriented reform, the operational predicament of the energy sectors will quickly spread to financial institutions.

6. Risks in trade and balance of payments. If the energy sectors of a country are lagging far behind in international competitiveness, trade protection policy is usually their unanimous appeal. Once the market-oriented energy reform touches on the lowering or lifting of tariff or non-tariff barriers, probably abundant cheap foreign energy products will pour into the country, thus enhancing their reliance on foreign energy. Accordingly, the balance of payments under the current account is bound to feel great pressure. Of course, the mass inflow of energy products is not solely caused by the market-oriented reform. The continuing rapid economic growth, together with poor energy self-sufficiency, is also an important contributing factor to the situation.

7. Risks in safety production. Energy production requires a very high safety standard, and to a large extent, the safety standard depends on the energy enterprises' capability of managing and ensuring safety, on the one hand, and on the government's effective safety supervision on the other hand. In the process of market-oriented reform, if the safety ensuring capacities of energy enterprises are weakened by the strong outside impact, or if the supervision on production safety becomes ineffective due to adjustments in the governmental energy administrative system, accidents in energy production might happen. For example, after the reform of the separation of electricity generation from grid in power industry, if the companies operating the power transmission network fail to make both ends meet or get swamped with huge deficit, or the grid systems of different transmission companies have difficulty for interconnection, these companies will become crippled in maintaining and upgrading their old transmission networks, or worse, a power failure might set in. In fact, as

regards the power crisis of California, U.S. in 2002 and the following blackout in the U.S. eastern regions, one major cause was the lack of essential capacities of transforming old transmission networks on the part of the transmission companies.

8. Social risks. For those "loser" energy enterprises in the market-oriented reform, grave social risks might result from the enterprise risks, industrial risks and regional risks. As for those countries whose energy sectors are severely lagging behind on the global market, the market-oriented reform, in short term, usually leads to grave social risks, such as the unemployment issue following the loser sectors' withdrawal from the market, the transformation of resource-intensive cities, the impact on people's daily life caused by sharp rise in energy prices, etc.

III. Experience and enlightenment drawn from the international practices of the market-oriented reform

Although it is true that the energy sectors of different countries vary greatly from each other in resource reserves, exploitation conditions, market scale and status of supply and demand, mature degree of energy industry, market structure and competition pattern, reliance on overseas energy, industrial structure, flexibility in energy demand, comprehensive energy strategy and policy, the competitiveness of their energy enterprises on global market, as well as in the strategic goals, patterns, methods and detailed measures of their market-oriented reform, we can still come up with some common experience drawn from their market-oriented energy reform, which can serve as positive reference for our own market-oriented reform in the years to come.

1. The overall objective and principle of the reform are almost the same, but the emphasis, policies and policy measures of the reform differ a lot.

Since countries are different in resource reserves, the present status of their energy industry, financial capacities, social bearing capability, energy administrative and decision-making systems, etc., there is no one single first best reform pattern or policy choice in advancing the market-oriented energy reform. More often than not, the reform can only be judged according to the original intention and progress made towards its middle- and long-term goals. However, the overall reform objective and principle of the market-oriented energy reform of different countries are almost the same, i.e. to ensure national energy security, optimize energy structure, raise energy

efficiency, and constantly improve such important economic relations as energy vs. resources, energy vs. environment, energy supply vs. energy consumption etc., while fully satisfying the energy need for economic and social development, through a series of market-oriented reform measures such as relaxing restrictions, disintegrating monopolies, introducing competition, opening the market, ensuring effective regulation, etc. The emphasis of energy reform varies from country to country due to their different national conditions. For instance, in the States, the power sector has topped the energy reform agenda since the 2002 power crisis in California. The reform in the coal sector has always been a tough problem in Germany. Countries like Japan are more concerned about the development of new energy and the practice of energy saving. In China, reform is needed in more sectors and wider regions.

2. The effective organization and promotion by the government is vital to the market-oriented reform.

Viewing from the brief history of energy reform around the world in the past over 20 years, it is not hard for us to find out that even in such developed market economies as the U.S. and European nations, the market-oriented energy reform is, nevertheless, initiated, promoted and carried out by the government.

Its reasons are attributed to many aspects: first, before reform, though in countries with developed market economy, some critical energy sectors, such as coal and power industries, are mostly dominated by solely state-owned enterprises or state holding enterprises, where exist the state enterprise common drawbacks, i.e. without a clear line between government administrative functions and enterprises management functions; second, government controls over the critical recourses, especially, the financial recourses, which can be used as the "propeller", "lubricant" and "buffer" for the reform. Third, market-based reform is the overall reform and restructure on the legal system, government control frame and market trade relations, while regulation system can't be adjusted and improved without the participation and organization of the governmental function departments. Fourth, energy reform involves basic research on strong external function resources, environment, national security, new technology, new energy, etc, but typical "market failure" problem exists in these fields. To ensure the successful implementation of the energy policy, which relates to the national security and long-term interests, all national governments usually establish a relatively high level of administrative agencies to be responsible for this organizational and

promoting work. For example, American Vice President Richard Cheney directly takes the command of the Energy Policy-Making Team, with 14 members[8], including Secretary of State, Secretary of the Treasury, Secretary of the Interior, Secretary of Agriculture, Secretary of Commerce, Secretary of Transportation, Secretary of Energy, Director of Federal Emergency and Management Agency, Administrator of Environmental Protection Agency. During the concrete implementing process, all national governments comprehensively utilize law, administration, economy, politics and even military measures to ensure the existing policy to be carried out.

3. It is very important to have a clear energy strategy and a policy direction and a progressive reform plan.

Energy market reform is a national long-term reform and development strategy, its foresight, comprehensiveness, consistency and stability have great significance to the success of the reform. Thus, all national governments attach great attention to research and mapping out energy planning and energy policy. For instance, American President George W. Bush formed a National Energy Policy Making Team in the second week since he took office in White House. After three month's extensive research, a report titled "Providing dependable, affordable and environmental compatible energy for American future" was published as a new energy policy[9] for America in the new period. After the establishment of the reform objective, it is crucial to apply which type of reform pattern. Theoretically speaking, to abolish the old energy system is easy, while the establishment of a new energy system can't be completed overnight. It involves the establishing and perfecting process of the system frame, the process of transition of market entity from personification to impersonification, the process of the gradual reduction of the trade cost (contracts search, negotiation, signing agreement, implementation and supervision), the process of establishing and perfecting the regulatory system and the process of adjusting the interests pattern, especially the adapting process for profit victims. Those reforms can't be completed in one move. Russian electricity reform gives us an impound lesson. Identical to the radical economy system reform, in 1992 Russian power sector applied a radical reform mode, which was different from other counties. It included

[8] Fang Zhaozen, "Introduction to the US National Energy Policy", Published in Issue 9th, 2002, China Coal

[9] Fang Zhaozen, "Introduction to the US National Energy Policy", Published in Issue 9th, 2002, China Coal

the rapid and large-scale privatization, successively establishing the grade dispatching structure (three grades: Central Dispatch Bureau, United Electricity Grid Dispatch Institution and Local electricity Grid Dispatch Station), two electricity markets (wholesale market and retail market), two grade regulation agencies (the Federal Regulatory Committee and Local Regulatory Committee supervise the wholesale and retail electricity prices respectfully). However, beyond expectation, the former Soviet Union has caused a total economy and social concern after disintegrating, which made Russia's economy slump, residents' life quality drop seriously and the social system steps in transition period, various kinds of laws remain incomplete, all the society experiences a serious chaos. To put forward abruptly a package of radical reform plans in such circumstance lacks of effective justification and will surely be queried by the whole society[10]. In the coal reform the governments of Germany and Japan have taken measures to reduce by steps the allowance both in scope and amount until the reform target is reached.

4. A prerequisite for successful reform is the content improvement of the legal system and regulatory system

As the reform in energy is ongoing currently in various countries, we are still unable to come to a clear judgment on their success or failure. Anyhow, a sound system framework is an essential element for any reform to move smoothly and approach gradually to the reform target in energy sector. Especially in the countries of market economy, to put energy reform under sound system framework all the time may define and regularize the borders, to a maximum extent, among the responsibilities, rights and interests for all interested parties; depict a steady development space and market prospect for entry of new strategic investors; make the market competition behaviors more standard and easy to regulate; have the matters like externality and "government failure" more manifest while decreasing market failure; provide sufficient legal basis for the specific behaviors of the administrative departments; provide technical statutes and standards for such production and consumption activities as resources conservation, environmental protection, energy conservation, etc. For example, the prevailing energy laws in USA includes: Energy Policies and Resources Conservation Act (in 1975), Utilities Control Policies (in

[10] "Russian Reform of the Power System", Refer to Economic Law Net, December 2003

1978), National Energy Utilization and Resources Conservation Act (in 1987), Clean Air Amendment Act (in 1990), Energy Policy Act (in 1992), etc.

5. Authority, integrativeness and uniformity in energy administration, organizationally, guarantee the energy reform and development

First of all, energy is a significant matter, concerning not only the development of energy industry but also the strategic capability and safety of a country. Therefore, the governments of various countries generally take the energy strategy as an important part of the whole strategies. For those developed countries always adoring free market economy and non-interference, the governments have never let it go freely without due control over the matter of energy. On the contrary, the administrative heads of various countries often participate directly and play a leading role in formulation of their own energy strategies and policies, they even take all possible means to ensure fulfillment of their energy policies including diplomatic, military, etc. Second, energy reform has such characteristics as extensive coverage, complicated involvements and crucial interests. The energy itself is classified into multiple categories: coal, crude oil, natural gas, electric power, nuclear power, wind, biomass power, etc., which needs a uniform, powerful administrative agency performing the functions of policy making, trade administration and market regulatory, and for specific implementing market-oriented reform plans. This responsibility is usually taken by the Ministry of Energy in many countries like USA, and by Ministry of International Trade and Industry in Japan. These competent energy authorities often take hold of more resources and authority, in comparison to the other ones, in terms of fiscal fund allocation, investment in research and development projects, engineering personnel assignment, etc. Besides, some countries have also established a specific energy strategic reserve system of high level under direct control of the administrative heads in view of the matter of strategic energy reserve.

6. Sound and effective modern regulatory system is a guarantee for a sound development of the energy sectors of various countries

As the energy sectors of various countries differ more or less in systematic environment, industrial characteristics, market structure, reform pattern, policy system, etc., the energy regulatory systems show certain differences in various countries. Countries mostly take the patterns suiting them best in light of the concrete situations of their own in terms of regulatory agency's setup, focuses and contents of regulatory,

regulatory funds for regulatory use among different regulatory agencies, regulatory basis, check and balance of regulators, etc. (1) Consistency in regulatory principles. No matter what regulatory pattern is taken, the regulatory principles are basically consistent, i.e. fairness, openness, professionalization, effectiveness, public benefits and independence. (2) Regulatory agency establishment. The regulatory organs are established differently depending on the situations. For example, there are two different modes of foreign power regulatory organs, one is independent regulatory pattern with separated administration and regulation as represented by USA and UK, that is, a power regulatory organ is set up separately outside the competent energy authority to exercise the special function of power regulation and ensure the uniformity, effectiveness and authorization in regulating the power market. The independent regulatory pattern is also divided into "vertical regulatory pattern" and "graded regulatory pattern"; the other is non-independent regulatory pattern of "integrated administration and regulation" as represented by Japan and the countries (like France and Germany) adopting the European continental law system before 1998, which tend to change towards the independent mode (by Feng Fei in 2002)[11]. (3) Nature of regulation. Most of the countries of market economy wouldn't set any strict regulatory contents of economic nature concerning energy investment projects like keeping a strict administrative control over investment scale, investment source, investment costs and earnings, etc., instead, they keep more social controls over energy investment projects, such as energy production safety of the investment project, degree of environmental impact, degree of resources destruction, pollutant emissions, etc. (4) Generality and individuality of regulatory contents. For all energy sectors, the transparency and fairness of the behaviors in market competition, the safety in energy production, the environmental friendliness and public benefits in energy consumption, regularity and orderliness of energy market, market monopoly prevention, etc. are all the important contents under the governmental regulation in various countries, which are common under the energy regulatory systems thereof. Nevertheless, in view of different energy sectors, they are obviously distinct in the main points of regulation. In power sector, for example, the regulatory contents must include the regulation of grid infrastructures and take the interconnection and access of grid facilities, the tariff level of "grid access charge", grid maintenance and updating, etc. as the focal points,

[11] By Feng Fei "Reform Study on Government's Regulatory System of China's Power Industry", "China's Power Reform and Sustainable Development Studies", July 2002.

preventing natural monopoly behaviors while having attraction to lure investments in grid facilities, as determined by the industrial nature of the power sector. (5) Fund sources of regulatory agency. The funds of the regulatory organs in some countries come mainly from fiscal budget allocation, and in some countries they originate directly from the fees due by regulatees' payment. It varies depending on different countries, some regulatory organs are independent from the competent energy authority and some set up inside the competent energy authority, such as the independent regulation with separated administration and the regulation taken in such countries as USA, UK, etc., while the countries like Japan take non-independent regulation with integrated administration and regulation. (6) Fairness for regulatees. In marked contrast to the way taken in China, governments of the countries with developed market economy, on the whole, wouldn't treat the energy investors discriminately, whether they come at home or abroad.

7. A tide of merging and restructuring among international transnational energy groups is upsurging, with the global energy market gradually being control led by the international transnational energy groups, and the features of monopoly competition and regional oligopoly in the global energy market mingling with each other.

In recent years, merger and restructuring among international energy groups tend to speed up, especially in the fields of coal and crude oil. Industrial restructuring is more developing toward intra trade and inter-trade association between than strong enterprises. In the field of crude oil, besides the merger between Exxon and Mobil, BP and Amoco known to the world, Chevron-Texaco, the second largest crude oil giant in USA, had Texaco, the third largest crude oil giant, merged with it with USD 45 billion to become the world fourth largest crude oil giant Chevron-Texaco, with total assets as much as USD 77 billion and being the third biggest crude oil and gas producer[12] succeeding ExxonMobil and BP. Now a pattern has taken shape in the world crude oil industry that competitions are going on mainly among the above four super-scaled groups. While extending their businesses into other countries, these transnational energy groups have their feelers go deep into other energy sectors, say, coal and power sectors, attempting to march toward comprehensive energy groups. For example, the American ExxonMobile Oil Group already holds 50% shares of

[12] "Oil strategy induces a wave of restructuring. Are you ready, China's enterprises?" Refer to the newspaper China Chemical Industry, Feb. 4, 2004.

Cerrejion Norte, a coalmine in Columbia. Different from the tradable commodities like crude oil and coal, the trend of globalization in the power sector is not so obvious as other energy products confined by the industrial tradability feature. In a region or a country, the power market is often put under control of a few domestic power groups, forming an oligopoly market structure. The governments of various countries are quite cautious about opening up the power market because the power system is of exceptionally important nature that concerns national safety and strategies.

IV. History, appraisal, main experience and difficulties concerning the market-oriented reform in China's energy field

(I) A brief history of the reform in the field of energy since reform and opening-up

1. The market-oriented reform in power sector

Before 1985, the power sector in China basically took the pattern characterized by vertical monopoly and administration by the central government, integrated administration and enterprise and run by the State. The competent power authority of the government had multifold roles as both a power industrial policy maker and an executer; both a power industrial administrative agency and homologue subject to administration; both an investor in the power industry and a representative of the State-owned assets and also a producer and operator for the State-owned power assets. After 1985, reform began to lift its curtain in the power sector. Nearly 20 years afterwards, the reform in the power sector has experienced three major phases (refer to the sub-report for this study project written by Lai Youwei):

The phase of "integrating government's administration and enterprise's management, lifting control over power generation"(1985~1997). The reform consists of two priorities: one was to relax the restrictions to market access in the power sector, reform the on-grid pricing system and attract social capitals to invest in power running by adopting investment encouraged policies; second was to mobilize the local initiatives and take province as an operational entity in terms of administration system. Two aggressive results came from adjustment and implementation of these policies: one was that it greatly encouraged the local governments and foreign capital to invest in running power and promoted the rapid growth of the power industry. Up to 1997, the situation that nationwide power shortage had been basically alleviated. Second, disintegrating the pattern of market monopoly by the State for many years and most of

investors were diversified gradually in the power production market. In spite of this, the long-lasting vertical monopoly system of integrated administration and enterprise had experienced no substantial change.

The phase of "separating the government administrative functions from the enterprise management functions, conducting market-oriented reform pilot projects in some provinces and cities"(1998~2001). To solve the systematic disadvantage of integrated administration and enterprise, the State Council decided to establish a national power company in 1997, in charge of national power production, operation and dispatch. Meanwhile, as the state sole-invested company, it also undertook the function to maintain and add value to the state-owned assets. Besides, the state performed such market-oriented reform tests as "separation plant from grid, bidding for grid access" in the five provinces and one city as Zhejiang, Shanghai, Shandong, Jilin, Liaoning and Heilongjiang to explore feasible ways to break vertical integrated monopoly. At the same time, the competent price control authorities of the state also conducted grid pricing system reform by changing power pricing on the basis of "principal and interest repayment" to "pricing during operational period" to push regularized administration of power pricing. Through the above mentioned reforms, the inherent disadvantage of integrated administration and enterprise in the power trade was resolved to some degree, though the problem of vertical integrated trade monopoly still remained unresolved, and a competition market structure and effective market regulatory system were still left without being really established.

The phase of "separating plant from grid, extensive promotion of the market-oriented reform" (since 2002). In Mar. 2002, the State Council approved the Plan for Power System Reform. Under the premise of fixing the reform plan of "separation of plant from grid, bidding for grid access", the power assets under administration of the State Power Company was re-divided, based on the two major business divisions of power production and grid, in which the power production division was restructured into 5 nationwide independent power production companies with fairly the same scale, i.e. China Huaneng Group, Ltd., China Datang Group, Ltd., China Huadian Group, Ltd., China Guodian Group, Ltd., China Power Investment Group, Ltd., gradually effecting the "bidding for grid access"; for the grid division, National Grid Company., and Southern Grid Company. were established separately, the former including five regional grid companies in North China, Northeast China, East China, Middle China and Northwest China respectively. Besides, the State also

approved to establish State Power Regulatory Commission to carry out independent and specialized regulation.

Through the above three-phases reform, power enterprises, a competition market structure, a contemporary regulatory system and a trade administration system complying with international practice had been set up initially in the power trade. However, as the market-oriented reform is still in the initial stage, we haven't reached the reform target as expected, and the tasks of reform and development are still arduous.

2. System reform in the petroleum and natural gas sector

Before reform and opening up, the petroleum and natural gas sector in China adopted a highly centralized production and administration system with integrated administration and enterprise. The Ministry of Petroleum Industry was both a competent authorities for the trade and a national monopoly enterprise integrating the upstream and downstream enterprises, having direct control over prospecting, mining and sales of the petroleum, natural gas in the whole country. After coming into 1980s century, the reform in the administration system in the petroleum and natural gas sector began to proceed slowly. In 1983 China Petrol Chemical Corp. (SINOPEC) was set up. In 1988, the Ministry of Petroleum Industry was revoked to establish the Ministry of Energy and China Natural Gas & Petroleum Corp. (CNPC), China Ocean Oil Corp. (CNOOC, established in 1982, affiliated to previous Ministry of Geology to engage in prospecting and mining of ocean petroleum and natural gas) under direct leadership of the State Council, realizing the separation of administration from enterprise management. In 1993, the Ministry of Energy was canceled to leave the trade administration function to CNPC.

The Year of 1998 saw the greatest reform in the administration system in China's petroleum and natural gas sector. In the organizational reform within the State Council during this year, the State decided to merge the governmental functions existing in the Ministry of Chemistry, CNPC, SINOPEC into State Petroleum & Chemical Industrial Bureau under control of the State Economic & Trade Commission. The petroleum and chemical enterprises like oil and gas fields, refineries, petrol chemical, fertilizer, fiber, etc. and petroleum companies and filling stations affiliated to the Ministry of Chemical Industry and two major corporations were reorganized into two giant petroleum and petrol chemical enterprise groups and a number of large scale

companies of fertilizer, chemical products on the principle of combining upstream and downstream products. Under such background, CNPC and SINOPEC exchanged part of the enterprises under them. The CNPC mainly in upstream and development transferred seven of its oil and gas fields to SINOPEC, while SINOPEC mainly in oil refinery and chemical industry assigned 19 of its oil refineries and sales enterprises to CNPC.

Through the administration system reform and trade restructuring in 1998, separation of administration from enterprise had been initially achieved in the petroleum and natural gas trade of China. CNPC, SINOPEC and CNOOC have become three big oligarch enterprises in the whole trade. Especially, SINOPEC and CNPC have realized extension of chain industries to the upstream and downstream extensions that they expected long ago through this restructuring, with certain competitive industrial pattern coming into shape initially (refer to the sub-report for details of the project, written by Liang Yangchun).

3. The market-oriented reform in coal sector

In comparison with the power and petroleum and natural gas sectors, the market-oriented reform in the coal sector involves larger scope and intensity, with some system problems left unsettled being a matter of course. Generally speaking, the market-oriented reform in the coal sector since reform and opening up started from price reform, and then transited gradually to the reforms in the investment and financing system, government administration system and enterprise system. (1) The reform in the price formation mechanism successively experienced the phase of uniform price adjustment from 1978 to 1993, the phase of selectively giving free rein to pricing from 1993 to 2001 and the phase of completely giving completely free rein to pricing since 2002. (2) The reform in the investment and financing system have undergone successively the "transformation from allocation to loan" for basic construction projects, the legal representative responsibility system for investment projects, diversified major investors, diversified fund-raising channels, etc. (3) The reform in the coal enterprises will be carried out on the three levels of State-owned key coal mines, local State-owned coal mines and township-owned coal mines, in which the State-owned coal mines have been transferred down to local administration one after another since 1998. At the same time, such reforms as "debt-equity swap", bankruptcy and closing, etc. will be continued; some local State-owned coal mines

will be restructured under direct leadership of the local governments to organize into large-scale coal mine groups; the township-owned coal mines have showed the problems in safety production though growing rapidly and became a focus of rectification after 1998. (4) Although the reform in the transaction relation and form in the coal market has made certain progress in terms of systematization, regularization and obligation, such form as the annual coal trade fair is difficult to give full play to itself because of the fierce contradiction between coal and power. (5) The reform in fiscal taxation is mainly in such aspects as value added tax, mineral resources tax and resources compensation charge, fiscal allowance and subsidies, etc.

Through a series of market-oriented reforms, a diversified investment pattern has basically taken shape in the coal sector in China; the market influence on the coal pricing mechanism has become intensified clearly; the process to integrate the coal resources and essential factors has been accelerated gradually; the State-owned coal enterprises themselves are being remodeled as major competitors to be fit to the requirements of the market economic system through changing economic system, reorganization so as to strengthen vitality and competitive capability in the enterprises; the governmental administration pattern has turned from the traditional "direct administration pattern" on basis of mandatory plans to the "indirect monitor pattern" on basis of the market.

(II) General appraisal

General speaking, the market-oriented reforms in energy sector in China have had certain achievements since reform and opening up. The energy sector remains all the time on the passage of fast growth and has played a crucial role in support of the rapid growth of national economy for the past over 20 years. During the period, a series of reforms have taken place successively in the energy sector, including the administration system reform, pricing reform, trade contracting, contemporary enterprise system reform, separation of administration from enterprise management, foreign and private capital introduction, breaking monopoly to construct a completely new industrial organizational structure, market establishment, regulatory agency's setup, etc.

Coal sector. The coal sector launched the earliest the market-oriented reform in the energy sector in China. The coal reform involves the most extensive scope and the most profound degree. In pricing reform, the price formation mechanism for other

coal products has basically become market-oriented except for the coal for power production; after the State-owned coal mines transferred to the local, their reform and restructuring are taking place faster and the coal enterprises are seeking survival and development orienting to the market with a number of regional coal groups formed in some areas; the trade relation in the coal market is tending to be regularized and such trade form as annual coal trade fair has begun to fade out from the stage; the problem without a clear line between administrative functions and enterprise management functions has been basically settled and the administration system in the coal sector has also been basically streamlined; the State allowance for loss to the state-owned coal mines is just a transitional arrangement at this stage without long term institutional feature.

Although the petroleum and natural gas sector lags behind the coal sector in reform launching time, it has gone beyond the power sector. We can see from the achievements that the competitive market structure has been formed initially, in which the three giants SINOPEC, CNPC and CNOOC and the three with Xinxing Group have come into competition in the natural gas sector; the pricing reform is faster than the other ones with the crude oil and finish oil prices basically complying with the international practice, realizing synchronous actions with Asia, Europe and North America; SINOPEC and CNPC has realized extension of their industrial chains after restructuring and assets substitution and become nationwide enterprises integrating upstream and downstream, domestic and foreign trade, prospecting and mining, who have begun their attacks in each other's "traditional territories"; the petroleum enterprises have basically finished the reform in contemporary enterprise system, who have successfully been financed in the capital market and also extended the businesses to overseas market; the separation of administration from enterprise has been accomplished with the governmental administration entering into the stage of legality, regularity and transparency; the petroleum strategic reserve plan has been initially established; SINOPEC and CNPC have become market-oriented, with their pricing following the three major international markets closely.

Power sector, generally speaking, the time of launching power reform for it lags far behind coal sector and a little behind petroleum and natural gas sector. However, the reform orientation to "separation of plant from grid, bidding for grid access, independent regulation" in the reform is correct, and in compliance with the international trend; such administrative system and market structure as non-separated

government administration from enterprise management and sole vertical monopoly have been out of existence; a pattern of competitions among the five major nationwide power generation groups in power generation link has basically taken shape and these power groups have basically established contemporary corporate system; the establishment of four secondary trade groups marks the launching of "separation of the primary trade from the secondary trade".

In spite of these, we couldn't appraise very highly on the reforms in the past. This is because, in general, the reforms are still in its initial stage, and a lot of in-depth contradictions faced in pushing the market-oriented reform have not been settled, such as the problems of legal system, trade monopoly, market uniformity, price formation mechanism, regulatory system, trade administration, market deregulation, environmental protection, resources utilization, renewable and clean energy, transformation of resources-type cities, reemployment for the lay-offs, fiscal subsidies, delayed and unreturned loans, energy structure adjustment, energy strategic reserve, trade equilibrium and energy security resulting from energy import in large quantities, etc. Of course, the reforms among different sectors have certain difference.

(III) Basic experience

1. Top-down reform pattern

Although different energy sectors may have different reform targets, routes and emphasis, one point remains the same, i.e. those reforms are market oriented. In other words, they all change the resources allocation mechanism formed during a planned economy when administrative power dominated, and gradually expand the space where the market mechanism functions. More importantly, one crucial reason that these reforms could obtain progress to different extent and no shock like that in East Europe occurs is attributed to top-down reform. If without a powerful leadership setup and administrative power, rigidity of vested interests and institutional obstacles are enough to ground the market-oriented reform. Especially when monopoly is shattered and a new competitive industrial pattern is built, energy sector is very difficult to rely on its own to move further since themselves are the very objects of the reform.

2. Selection of reform opportunity is crucial

In the light of past reform experiences, it is not difficult for us to find that the time sequence arrangement of reform is quite necessary for smooth progress of

market-oriented reform. When the reform is started, what is reformed first and what is the next are decided not only by the context of energy sectors themselves, but also by their external environment. As a whole, China's market-oriented reform has been following such an idea in the past over twenty years: easy first and difficult next, adjust first and deregulate next, supply increase first and structure adjustment next.

In view of importance and influence of energy sectors, decision makers in boosting market-oriented energy reform adhere basically to the principle i.e. reform is only furthered carefully when inconsistency between supply and demand is slackened or the relationship between supply and demand is not tight. In order to alleviate imbalance between supply and demand, the best measure is that the reform could lead to rapid increase of energy supply. Say, coal sector's reform. Coal sector deregulated its control over township coal mines at early period of the reform, which led to great development of coal industry across the country, greatly improved coal supply and also paved the foundation for future price reform, and the reform of state-owned coal mines. Petroleum sector drew deep lessons in the same scenario. Although the state has called on for price reform of petroleum and oil products as well as reform of fuel tax at appropriate time in early period, however, the favorable opportunity for price combination was to be fixed in light of difference between domestic and international oil prices. Actually when international oil price rose abruptly, we missed many reform opportunities and have to face a dilemma of aggravated reform cost. Fuel tax reform hasn't been carried out in scale until now.

3. Government's role as a "stabilizer" and "buffer"

During China's energy reform process, the government provided the affected sectors and individuals timely and suitable funding, which are important measures for smooth implementation of reform measures. In this sense, the government's support serves as a "stabilizer" and "buffer" to reform. Especially to those low-efficiency energy sectors (mainly state-owned energy enterprises), the government has provided fiscal subsidies to certain extent to prevent them from tremendous and abrupt external impacts to cause dwindled production or widespread unemployment so as to obstruct reform process. Moreover, fiscal subsidies to certain extent were also earmarked for downstream users who reduced their actual income and living standard because of adjusted energy price to help them establish gradually price adaptability.

4. Bring local and enterprises' enthusiasm into full play, increase energy supply and create relaxed market conditions for the reform

One important motivation for China's energy sector reform is to slacken increasingly sharp imbalance between energy supply and demand. Before the reform, the state's energy sectors were mainly invested, built, operated, managed, priced and deployed by the state, and the local and enterprises' initiatives were only an acting unit of the central government's energy plan. In order to solve shortage of energy supply, and insufficient investment of central government, the central government has paid great attention to bring local government and enterprises' enthusiasm into play when boosting its market-oriented energy reform, the expression was fully given in power and coal sectors. Take power sector as an example, in order to bring into play enthusiasm of local enterprises, foreign investors and other economic entities in investing in power facilities to slacken the pressure of short power supply, the State Council released "Provisionary Regulations in Encouraging Power Engagement by Fundraising and Implementation of Multiple Power Prices" in 1985, brought forward the guideline of "separating government functions from enterprise management, regarding a province as an entity, grid combination, uniform dispatch and power engagement by fundraising" and "adjusting measures to local and grid conditions" and initiated the policy of "new power and new price". These reform measures changed the pattern of power facilities invested and power-administered solely by the central government in history, and formed a stimulating investor's entry and administration mechanism. As a result, a wave of investing in power facilities spread across the country and greatly alleviated the increasingly sharp imbalance between supply and demand. In 1997, nationwide thirst for power was basically quenched. Meanwhile, power administration mechanism in which a province was regarded as an operating entity also gained local government's enthusiasm as an administrator, and boosted administration efficiency (Please refer to the sub-report with Lai Youwei as chief writer).

Similar scenario was also found in township coalmines. To steer away from long-term inconsistency between coal supply and demand, and mobilize enthusiasm of local, especially towns in vast rural area in engaging in coalmines with collective capitals, the State Council approved and issued "Report on Eight Measures in Developing Small Coal Mines" in Apr. 1983. Since then, township coalmines embarked on a high-speed development stage. In 1994, township coalmines produced

5 billion tons of coal in aggregate, taking 72% of total incremental output in the nation. Proportion of output by township coalmines in total output rose apparently from 27.3% in 1985 to 37.9% in 1990, and to 46.2% in 1995. Although township coal mines suffered from unsafety production that should not be negligible. Anyhow, one should observe that China's short coal supply trend could not be fundamentally held back without abrupt rise of township coalmines, and then China's generating capacity and electricity price reform would be affected seriously (Please refer to report with Shi Yaodong as chief writer).

5. It is imperative for reform to be of nonequilibrium

As a result of disparity of different energy sectors in industrial characteristics, development stages, reforms starting-point, external environment and influence degree, it is imperative for each sector to show certain asynchronism in the progress of the market-oriented reform. "Marching-forward side-by-side" for the reform is unrealistic.

As a whole, among three most crucial energy sectors in China, coal sector started the reform the earliest, the most extensively and with most remarkable effects. In comparison, power and petroleum and natural gas (PNG) sector set about relatively late. One important reason is that at very start of the coal sector's reform, the pattern existed that the state-owed uniformly allocated coalmines, local state-owned coalmines and township coalmines kept abreast. In light of coal output statistics, state-owned uniformly allocated coalmines produced 55.5% coal of total, local state-owned mines 26.1% and township coal mines 18.4%. Thanks to flexible adjustment by local and township coal mines, social pressure caused by coal price reform, financing and investment reform, reform of state-owned uniformly-allocated coal mines and fiscal reform was extensively resolved, so that the central government delegated the administrative power on key state-owned coalmines to local governments in 1999.

Even inside an energy sector, non-equilibrium exists during its reform process. The coal sector came across with belated coal for generating electricity price reform in its price reform. The PNG sector had price reform on product oil later than on crude oil. Many reasons contributed to reform non-equilibrium. One of the most crucial reasons is caused by reform's incrementality. Energy reform usually starts from the easiest part and moves toward the most difficult one where delicate issues are

concentrated.

(IV) Lessons

1. Belated energy reform will be finally translated into "energy bottleneck" for economic growth.

Compared with most processing, manufacturing and raw material industries in China, our energy sector develops slower, and one of the most crucial reasons is incomplete and imperfect market-oriented reform, which has become a systematic obstacle to energy sector's healthy growth. The belated reform is mainly manifested by: belated market admittance (such as petroleum exploitation, import, wholesale and retail), belated corporate reform (for example, most power and coal enterprises are still state-owned sole-investor enterprise), belated price reform (for example, energy enterprises could not have complete final say on price of energy products), belated reform in competitive structural reform (for example, the issue of market monopoly is still not solved), belated reform in government administrative system, belated construction of market regulatory system, and belated opening to foreign investment and private capitals.

Nationwide power outage, which affected some twenty provinces, regions and cities across our country since summer of 2003, has validated the truth from one side that "energy bottleneck" brought by belated market-oriented energy reform has become a significant restrictive factor on national economy and social development. At least two factors led to aggravated nationwide power shortage: one is belated coal and power reform, especially belated coal for generating electricity price reform and belated reform in the links of power generation, transmission and distribution; and the other is the belated reform in government administrative system, especially that reform in administrative approval system does not suit to the needs of new situation apparently.

2. Lacking in state energy strategy and overall reform design

An advantage of decomposing reform in energy sector into power, PNG and coal sectors is to "overcome difficulties one by one" and "fight a battle of annihilation". The fact is also that each energy sector has its own reform blueprint and targets. These targets are not closely correlated and sometimes disputes to certain extent do exist. Anyhow, compared with power system, its reform drive and ability in absorbing

reform cost depend largely on power enterprises' profitability, which has the precondition that power generation cost does not increase too rapidly and in addition, coal for generating electricity and end user power price is not too strictly regulated. Hence, until when coal and power sectors collided into each other fiercely on electricity-generating price, we come to find that market-oriented energy reform is actually a grand "ecological system" in which all sectors and stages are closely correlated. If without an integrated, forward-looking and strategic state energy strategy, the market-oriented reform of entire energy sector may be grounded or lingered in place due to lacking in an overall design.

We then examine our energy sector reform from the angle of state energy strategy. Take coal sector as an example, rapid rise of township has greatly boosted coal supply and made great contributions to improved generating capacity. Yet, we should not neglect concerns that our valuable mineral resource and ecological environment were seriously damaged behind blind mining activities by township mines, which originated largely from lack of a state coal resource exploration and protection plan at very start of the reform. We didn't have a clear idea what coal resources are suitable for short-term development, what for long-term development, what are not suitable for exploration and what should be closed for protection, what measures for repair of ecological environment should be adopted for coal mines that have been explored. "Energy Law" and "Mineral Resource Protection Law" could not settle only for having those principles, and should be materialized into specific energy strategy and resource protection strategy.

3. Safety production, resource and environmental protection issues

Energy production relates to human life safety. Whether safety in energy production and consumption is ensured is also a crucial criterion in judging a successful market-oriented energy reform. In other words, if energy safety accidents occur frequently and a permanent cure has not been found yet, such a reform could not be claimed as successful. We drew lessons in this aspect, say, safety management in coal production.

Through multiple reforms in coal sector's regulatory system, safety management in coal production has been weakened as affected by systematic reform. After Ministry of Coal Industry was cancelled, the state set up a Coal Industry Bureau inside the State Economic and Trade Committee that regulate safe coal production at

the same time. After Coal Industry Bureau was also cancelled, newly established Coal Production Safety Supervision Bureau exercises the regulatory function in safe coal production. Changes in regulatory system haven't solved the issue that grave safety accidents occur frequently in coalmines across the country. The root cause is absence of overall consideration on production safety in the course of reform. Current regulatory system and methods are still to be improved. Whether safety management in energy production is an administrative regulatory function or market regulatory function? If the latter, the regulatory function could be completely exercised by a 3rd party regulatory agency. Of course, such regulatory function could be exercised by an integrated energy regulatory agency.

Besides safety concerns, we have to deal with resource and environment protection issues seriously. As above-mentioned, if grand development of township coal mines are obtained at the cost of excessive exploration of coal mines and serious disruption of mine area environment, we have to ponder over our past reform strategy. Energy shortage could be covered by imports (such as coal and petroleum). How could disrupted resource and environment be covered?

4. Development in new energy, renewable energy and new energy technology lags behind

Compared with developed countries, we have made not small progress in reform and development of conventional energy. However, China is still apparently weak in development of new energy, renewable energy (such as nuclear, biological, solar, wind and tidal energy) and new technologies in conventional energy (such as clean coal technology). One important reason is absence of stimulants to development of new energy and new energy technology in market-oriented reform. When other energy sectors have kicked off their market-oriented reforms, the state still linger in "wait for development" or "preliminary development stage" for its new and renewable energy. Except for specific fields such as solar energy products, other new and renewable energy has not embarked on the track of scale and industrialization. Hence, it still not the right time for market-oriented reform to be carried out.

In study of this project, we discovered that China's new and renewable energy industry has been growing rapidly since reform and opening up. yet, as a whole, the industry's overall strength is not strong, its competitiveness in the market is weak, some key concerns that obstruct the sector from further development remain not

solved fundamentally, and market-oriented reform face obstacles in many aspects, such as immature market growth, absence of effective and systematic stimulation policy, obstructed financing and investment channels and too high production cost. One issue calls for special attention that developed countries have made great achievements in new and renewable energy and new energy technology. For example, developed countries in Europe and America have rather mature application of nuclear energy technology, compared with them; our biggest gap is insufficient government input. Take the expense for tackling key technical problems in renewable energy spent by State Science and Technology Committee (Ministry of Science and Technology) as an example, the figure was respectively RMB 18.6mllion, RMB 30 million, RMB 30 million and RMB 60 million from 6th Five-year to 9th Five-year plans. Nominal R&D expense was even not increased from 7th to 8th Five-year plans. If inflation factor is considered, the actual expense was actually decreased and that is beyond our understanding. (Please refer to the sub-report written by Lai Youwei).

(V) Difficulties of the reform

Regarding the reform at next stage, we are of the opinion that energy sectors will face both common difficulties and also some specific ones.

Common difficulties for energy sectors:

No matter coal, PNG or power sectors, we think that they all have an arduous reform task in the next period since we still could not identify plausible answers to challenges listed as follows:

• Lacking in a uniform and clear state comprehensive energy strategy and energy reform plan as guideline and direction for a deepened reform and quickened development in energy sector.

• Incomplete law and statute system involved in energy reform and development, discretionary administrative interference could not be restricted or standardized by ready existing and perfect legal system.

• Effective regulatory system and regulatory mode have not been identified yet. Administrative regulatory function is too much decentralized and regulation efficiency is not high. The government is still accustomed to interference of energy sector's reform and development by administrative means.

• A scientific and modern regulatory system is not yet established. Regulatory independence, legalization and professionalization are far from being realized.

• Along with market-oriented reform's moving deeper, underlying contradictions under the reform are exposed completely, especially, obstacles from groups of vested interest should not be overlooked since it may even cause market-oriented reform to stop (say, coal for generating electricity price reform) in certain steps of certain stage.

•Monopoly power remains strong, manifested at one aspect as natural monopoly, mainly in fields of power system infrastructure and oil-conveying pipeline network in petroleum sector at the other aspect as regional monopoly by large petroleum groups (CNPC and SINOPEC with their border separated by the Great Wall occupy respectively North and South China markets).

• Lacking in consistency among reform processes of energy sectors, highlighted as asynchronous reform between coal and power sectors and a perfect solution on coal for generating electricity price issue could not be identified within a short period.

• A nationwide uniform energy market could not be established and improved within a short period. Current price formation mechanism still could not reflect real relationship between supply and demand as well as the cost. The government still exercises certain influence on energy price, such as coal for generating electricity price, electricity price and oil products' intermediate standard price.

• Belated construction of corporate system. Energy enterprises are far from being qualified competitors in the market. Concerns such as "dominant state shares", "insiders' control", "three-without-clear-lines" and "nonstandard regulatory structure" still exist to certain degrees.

• As restricted by current state assets administrative mechanism, energy conglomerates with integrated upstream, downstream, domestic and international sales and spanning across different administrative regions, sectors and ownerships are difficult to fulfill the integration process smoothly in the capital market.

• Great difficulties remain for resource-type cities, such as coal and petroleum, to carry out industrial transformation and develop connected industries.

• Incomplete social guarantee system. It still hard to establish a buffer and absorption mechanism for reform "loser" within a short period.

• Limited opening-up degree. Fields and extent in which foreign investment and private capital can enter are still quite limited and concerted development by making good use of "two resources" and "two markets" is not formed yet.

(VI) Particularities of the reform

One important reason that China's energy sector comes across with all those challenges and problems in its market-oriented reform is that, our energy reform has the particularities that the reforms in other fields don't have. This particularities could be analyzed from three aspects:

1. Energy sector

• Agelong influence by a planned economy system, heavy historical burden, intermingled government administrative functions with enterprise management operation, it's a general phenomena that an enterprise assume social functions.

• Agelong influence by its monopoly position in the market, lack of competition awareness and mechanism, prefer to push out competitors by resorting to its current monopoly position.

•Agelong influence by the government's "paternity love", rely heavily on policy, accustomed to "preferential treatment" and lack of capabilities in independent survival and development.

• Agelong influence by dominant "state-owned economy", x non-low-efficiency is obvious, dominant state share, unclear property right.

• Agelong influence by "barriers existed between different departments and between different regions" under state-assets administrative system, upstream and downstream industrial chains are separated, the energy sector is in lack of industrial integration spanning across different regions, sectors and ownership, say, defects in integration of coal, road, port and shipping for coal sector.

2. Relevant industrial sectors

• Accustomed to cheap energy price and not fit for rising price of energy and raw materials (say, coal for generating electricity price).

• Belated relevant industrial reform, which influences the reform of energy sectors, such as impact of belated reform in railway transportation mechanism on reform in coal sector.

• Big energy consumers (such as steel and iron, metallurgical, construction material and automobile) grow rapidly to make the energy supply in a great demand, cause price rise and influence energy sector's reform progress.

3. Employees in energy sectors and resident consumers

• Employees in energy sectors are transformed from "corporate persons" to "social persons" whom, ID changed, ideology impacted, carrier of social security is shifted from enterprises to the society.

• Fluctuation in energy price influences residents' life and most residents are sensitive to rise of energy price and could not stand excessive rise.

4. Government

• The government function is not clearly defined, and the problems exist such as overstepping functions, unusing functions and giving-up functions, decentralized functional regulation and regulatory efficiency is not uniform.

• Reform mode, route and timing are technical challenges that the government must solve in boosting energy sector reform.

• The government's energy reform should be carried out in the grand background of adjusted and improved overall energy strategy and energy industry policies.

•Issues related with design and implementation of government regulatory system, integrated employment of regulatory agency, regulatory rules, regulated items and regulatory means, relationship between price regulation, market access regulation, market behavior regulation, trade management and market regulation and regulator's supervision mechanism.

• Relationships between vertical and horizontal lines of management inside the government, different regions, departments, upper and lower levels and locality and overall situation.

Due to interactions of these complicated factors, China's market-oriented reform in energy sector is full of risks and uncertainties. Of course, existence of risks and uncertainties does not mean that reform could not be carried out smoothly. On the contrary, we are absolutely likely to realize predefined reform targets if we steer towards correct reform targets and principles, make overall plan, move forward step by step and do what our strength allows and in due time.

V. Objective, principle and focus of China's market-oriented reform in energy sector

(I) Objective of the market-oriented reform

1. Overall objective

We believe that China's market-oriented reform in energy sector should reach the overall objective as follows within quite a long period in future, i.e. the market competition mechanism is given full play of its fundamental role in optimizing resource allocation to boost Chinese energy sector's international competitiveness, continuously satiate increasingly greater demand on energy by the entire society, respond to future challenges in energy sectors and provide related industries and users low-price, quality, stable, sufficient and clean energy products by design and implementation of a scientific and reasonable reform pattern and on the precondition that state overall energy strategy is carried out smoothly. It is not difficult to find that it covers the following important aspects:

First, the market mechanism is given full play of its fundamental role in optimizing resource allocation; the government plays the role of guidance and service to make up for market defects.

Second, boosting Chinese energy sector's international competitiveness should be regarded as an important criterion in judging a successful market-oriented reform. Especially, nowadays, when economic globalization becomes the trend, and energy sectors move faster for opening up, boosting quickly energy sector's competitiveness has particular significance.

Third, it will continuously satiate energy demand as a result of economic growth and social development to provide the society with sufficient, quality, reliable and low-cost energy products, which is also the starting point and the ultimate aim of market-oriented reform.

Fourth, the market-oriented reform should be regarded as both a crucial component and realization method of China's overall energy strategy and energy development planning. It should not be separated from state energy strategy, confining the discussion to the reform at issue.

2. Near term objective (two to three years)

China's market-oriented reform in energy sector should highlight the following

key issues within incoming two or three years:

•Provide low cost, quality and sufficient energy supply to improve energy supply and demand relationships, satiate energy demand as a result of rapidly growing national economy, especially to increase the state's power supply capability as soon as possible to solve nationwide "power outage" problem that has been perplexing the state's economy and social life in recent years.

• Prevent monopoly power in energy market from being stronger by means of effective market regulation, and meanwhile, ensure that energy price and energy market will not have great fluctuations so to cause a chain of economic and social impacts.

• Smooth outward-reemployment of excessive laborers released from state-owned enterprises (SOE) reform in energy sector, which is also a crucial social criterion for a successful market-oriented reform in energy sector.

•Fiscal pressure on government at different levels is controlled within acceptable scope, which implies that although reform measures within a short term could not be separated from government's fiscal assistance, it is absolutely not beyond the government's fiscal strength.

• It shall not remarkably increase difficulties and reform cost of future reforms. On one hand, we shall grasp reform opportunities and reform bravely. For example, we must choose the right time for energy price reform. Otherwise, if we miss the opportunity, it will increase cost of future reforms. We shall move forward and do what our strength allows, and carry out reforms to appropriate extent.

3. Medium and long-term objective (5-20 years)

China's market-oriented reform in energy sectors still face arduous tasks in the future 5 to 20 years, including:

• To ensure the state's energy security and satiate energy demand as a result of economic growth and social development. A well-off society will be realized with powerful energy support. Anyhow, energy consumption must be established on the basis of state energy security. If we rely excessively on imported energy, it will have an adverse effect on the state's permanent interest and national security.

• Energy sectors are attractive to investors. Existing manufacturers should maintain their ability of re-investment and innovative reform (say, grid investment

and reform capability). Actually, it was also a lesson drawn from California's power crisis (U.S.A). Energy sector's reform depends on its own development and the latter needs sufficient input, which needs a powerful simulative mechanism formed over a long period, such as grid infrastructure, new energy production and petroleum and natural gas pipeline network. The government's regulatory policy shall guarantee these segments with monopoly features could form certain capability in expanded reproduction. It needs reform and policy adjustment, and the energy sector should be allowed certain profitability and be attractive to investors. For example, after the reform of "separation of plant from grid", regulatory level of "grid-through fee" should render grid operators certain space for making profits so as to attract social capitals to invest in grid facilities.

• By means of independent and effective market regulatory system in place to guarantee sufficient and orderly competition and prevent market monopoly behavior. It is not realistic to establish a scientific and effective market regulatory system within a short term. It is the target that must be realized in the long run. It calls on the government to implement centralized, professional, standard and independent administration on basis of the government's functional transformation. Energy sectors and sections (such as grid facilities and petroleum and natural gas pipeline and network facilities) with the feature of natural monopoly should be regulated as key links for regulators.

• Development of energy sector maintains concerted with resources and environment. It implicates that energy sector's development should not sacrifice resource use and environment protection, which should be regarded as a crucial criterion of a successful energy sector reform.

• Scientific and effective government administrative mechanism and energy policy. It needs the government to establish scientific energy administrative mechanism and energy policy system on the basis of functional transformation to boost the government's role of guidance and service.

• Energy sector's international competitiveness is boosted fundamentally, which is the basic requirement of energy sector reform. It includes competitiveness in energy price, in the brand of energy products, in energy technology, in energy enterprises' management, in energy enterprises' culture and new energy technology, etc.

4. Industrial objective

• Power industry---allow market access to grid facilities, encourage social capitals to invest in construction of grid facilities, realize interconnection and interlinking of regional grids by law, improve regulatory system, gradually establish a unified nationwide power market on the basis of sound regional power markets; introduce competition into power-generation sector first, separate grid from plant, bidding for grid access and, establish a fair market competition mechanism; introduce market mechanism gradually into power sales sector (retail market) , allow end users to freely choose suppliers, power transmission and distribution segments are still regarded as fields of natural monopoly as reserved part with network features. Anyhow, power transmission and distribution should be separated gradually, and meanwhile, government regulation must be strengthened. The grid should provide necessary basis for competition in power generation and sales.

• PNG industry---speed up reform in PNG price formation mechanism, reduce government's direct interference into PNG price, disintegrate regional monopoly, encourage three grand PNG groups to explore business in each other's region, encourage entry of new competitors to form all-dimensional and diversified pattern for competition, improve PNG industry's regulatory system and regulators, move faster in opening up, reduce trade and investment barriers, relax gradually restrictions on entry of foreign investment and private capitals into petroleum exploration, extraction, pipeline transportation, petrochemical and oil products circulation (including wholesale and retail segments), encourage entry of social capitals into construction of natural gas pipeline, meanwhile strengthen regulation on price of pipeline facilities with features of natural monopoly, and establish petroleum safety pre-warning mechanism and strategic petroleum reserve system.

• Coal industry----Under the open, competitive, unified and effective regulatory system, the market mechanism is given full play of its leading role in guiding coal industry and coal enterprises' development. Since both our starting point and goal are to boost international competitiveness of China's coal industry and forming a sufficiently competitive coal market, by means of re-building market subjects, establishing, unifying and completing market system, reforming market-price mechanism, standardizing and regulating market order, regulating and guiding market behaviors, fundamental position of coal industry in the state's overall energy strategy

will be epitomized, along with supply of coal and other energy sectors and optimization of consumption structure, and promoting widespread application of clean coal technology.

(II) Basic principles of the reform

1. The principle that legal system should be established first. "Establishing statutes and systems" is the precondition and fundamental guarantee for market-oriented reform in energy sectors. On one hand, it needs to perfect current "Power Law", "Mineral Resource Law", "Coal Law" and etc., and on the other hand, it needs to work out "Petroleum Law", "Natural Gas Law" and "New Energy Law" and supplementary statutes to above laws so as to improve operability of laws and statutes.

2. The principle of handling properly relationships between reform, development and stability. The target of market-oriented reform is for development of energy sector. Any development should not be separated from stable external environment. Hence, no matter what reform pattern, policy measures are adopted; it still could not result in boosting energy sector's permanent development if without a stable situation. Then, the reform could not be claimed as a success.

3. The principle of overall planning and gradual progress. Market-oriented reform in energy sector is a complicated process of systematic change and involves in benefits of all aspects, hence, it is impossible to succeed by one trial. The interests of vested interests (groups) could be touched whatever measure is adopted: relaxed market access, lifted control over wholesale and retail price of energy products, adjusted government subsidies pattern or standard, changed distribution of interests between the energy sector with its related upstream or downstream segments, microscopic reform related with diversified property rights, industrial restructuring and enterprise restructuring within the energy sector. Market-oriented reform is actually a process of demolishing old interest format and forming a new and stable one. It decides that we are expected to adopt a "progressive" reform pattern in boosting market-oriented reform in energy sector, carry out overall planning at the height of state energy strategy facing 21st century, select the right time and boost market-oriented reform, step by step, in different stages and optionally. "Shock" reform could only aggravate reform cost within a short term, and cause the market-oriented reform to abort.

4. The principle of combining the government's great support and strengthening regulation. As shown by worldwide experience, government support is reliable guarantee for smooth progress of market-oriented reform in energy sector. Especially to market-oriented reform in coal sector, the government is not only a reform propeller, but also its protector and stabilizer. Even like U.S.A, the big and strong coal country, government refused to stand aside from its coal sector. For example, Clinton Administration adjusted tax rates and increased fiscal subsidies to clean coal technology in order to reduce pollution from coal consumption. When closing mines and mine areas with higher mining cost and low competitiveness, Germany, France and Japan also allowed affected persons considerable fiscal subsidy to alleviate possible social turbulence caused in structural adjustment of coal sector and transitional process of aging mine areas.

Of course, government provides market-oriented reform with various sort of supportive policies, which does not mean that government gives up its important regulatory functions. Actually, reform can only succeed by combining reform measures, say, relax regulation, introduce competition and unify market with effective regulatory system. Otherwise, it will possibly lead to disorderly reform state. Still take reform in coal sector as an example, while deregulating and introducing in competition mechanism, governments also attach great importance to regulation of market access and competitive behaviors in coal sector, such as issuance of coal exploration license, coal mine business license, coal resource bid assessment, collection of landfill security, energy supply and price regulation, stipulation of strict environment protection standards, coal price regulation, selling domestic coal to power company, anti-monopoly review on power company's merger with the coal sector.

5. Principle of market competition. Government must interfere also on the precondition of not disrupting basic functions of market competition mechanism. Measures such as slackened market access, diversified property rights, less fiscal subsidy, reduced customs and non-customs trade barriers and prevention of market monopoly are to play market competition mechanism's irreplaceable role in reducing cost, boosting efficiency, increasing effective supply and choosing the winner and getting rid of the loser to the utmost extent. The principle of market competition, as a whole, coal sector is a competitive industry and it also implicates dependence of coal industry's development on fundamental role of the competition mechanism.

Government must interfere also on the precondition of not disrupting basic functions of market competition mechanism. Actually, although the world adopted different routes and policy systems in market-oriented reform of coal industry in recent some ten or twenty years, the reform had the same final target, i.e. the market mechanism was given full play of its fundamental role, such as relaxed market access, boosted privatization of state-owned coal enterprises, gradual reduction of government's fiscal subsidy, reduced customs and non-customs trade barrier, prevention of energy companies (such as power companies) monopoly over coal production, introduction of competition mechanism into coal resource occupation, coal mine construction and production, coal transportation and consumption, etc. These measures are to play market competition mechanism's irreplaceable role in reducing cost, boosting efficiency, increasing effective supply and choosing the winner and getting rid of the loser to the utmost extent.

6. The principle of combining reform of energy sector and that of government's administrative functions. During market-oriented reform, besides market-oriented reform in the energy sector itself, the government's administrative functions system and pattern should also be reformed correspondingly, such as adjusting institutional setup and functional configuration for the government's functional administration, reforming borders of responsibilities and rights between government departments, reforming regulatory system and mechanism, reforming decision-making mechanism and improving democratic and scientific decision-making.

7. Principle of package Reform. It is analyzed from three levels: first, reform in energy sector should be complementary to reform in other fields, such as energy reform is supplementary to reform of China's state asset administrative system to form large energy groups spanning across different regions, sectors and ownerships to improve industrial concentration and competitiveness. Of curse, this restructuring process is founded on market mechanism. Second, concerted reform between energy sectors is also very important, especially; the coal sector should maintain its reform synchronous with power sector. Third, reforms in enterprises, fiscal and tax system, investment and financing system and administrative system should be boosted together and cooperated each other within a specific energy sector.

(III) Focuses of the reform

1. Reform institutional framework of government administration in energy sector

and establish comprehensive energy administrative authority and professional energy regulator in light of the principle of separated government administrative functions from regulatory functions.

As to energy supply and use, there are many aspects where market mechanism is invalid, mainly due to apparent existence of externalities in this field. These externalities are mainly manifested at a number of aspects, such as energy supply structure that shows the state's overall and permanent interests, permanent improvements in energy efficiency and energy-saving, state energy security and environment protection. These are difficult to solve or realize simply by market mechanism. For example, study by the World Bank indicates that market force only contributes 20% in tapping energy-saving potentials and government plays a more leading role in environmental protection. Hence, influence of government's "visible hand" is far greater than general competitive industries. Just because of these important externalities, market-oriented reform and deregulation in energy sector was initiated only some ten years ago even in countries of market economy. However, the government's macro comprehensive administration and regulatory system in this field are not weakened accordingly, but with functions transformed and perfected. Among countries that uphold free competition to utmost, including U.S.A, most countries of market economy have set up a comprehensive energy administrative agency and professional energy regulator.

Two prominent issues exist as to the setup of China's government agency for energy administration:

First, lack of a comprehensive energy administrator with strong ability in coordination and relatively centralized administration. Current setup of taking Energy Bureau under Development and Reform Commission as the major administrator has apparent defects in three aspects: firstly, poor ability in decision-making for multiple targets and comprehensive ability in coordinating between different departments. Energy's development and use involve a number of aspects, such as energy resource management, energy production management, energy saving, energy efficiency standard and environment protection. In the light of the principle of "division of labor and cooperation of work and obligations fulfilled respectively", it is reasonable that administrative work is implemented by relevant government agencies. Anyhow, an agency of strong coordination ability is called for to coordinate interests of different parties comprehensively, finally epitomize state interests so as to realize integrated

decision-making of multiple-targets for concerted development of economy, energy, resources and environment. Current comprehensive energy administrator (Energy Bureau under Development and Reform Commission) is difficult to shoulder the task of coordinating between different departments due to its innate defects. If it remains unsolved, the state's permanent interests will be exposed to hefty risk of being influenced by sector interests. Secondly, asymmetry of "strong enterprises and weak government[13]" exists due to weak industrial strength inside the field of macro energy management. The energy sector is largely comprised of SOEs. Particularly, the format of state-owned special grand enterprises assumes the position of oligopoly in some industries. Some enterprises are just reformed from original government administrator of the trade (most remarkable in petroleum, petrochemical and power industry). In light of their position in the industry and government, they have not only strong market power and also strong influence on decision-making. Conversely, the government's energy administrator has inferior level. Moreover, with several rounds of reform, although relationships between energy sectors are no longer those between relevant competent government agencies, the trace of original systematic framework still exist and market-based cooperation mechanism between energy sectors is not formed yet. At present, monopoly power is still strong and cooperation is absent between energy sectors, which is related with asymmetry of "strong enterprises and weak government" to certain extent. Thirdly, the energy administrator is insufficiently staffed and not a match to energy's strategic position, increasingly tight energy supply and fields covered by its administration.

Second, the regulatory system still has great defects. Facing energy industry of increasingly deepened market involvement, the regulatory system with aims of creating and maintaining market environment for fair competition and overcoming innate defects in natural monopoly segments is still in preliminary stage. Although an independent Power Regulation Committee was established recently to perform the regulatory function on power industry, China's energy administrative system is still in the transitional period from mandate planning and direct interference to enterprises to establishing a modern regulatory system. New system clashes fiercely into the old one. There are two major issues at present: first, current power regulatory mechanism could only cover power industry and vast regulatory vacuum still exists, especially

[13] The weak government mentioned here does not mean the implications of advocating limited government under the conditions of market economy.

effective regulation is not implemented on natural gas industry yet. Along with progress of conveyance of gas from west to east, and implementation of urban gas supply system's market-oriented reform, calls for effective control on natural gas pipelines with characteristics of natural monopoly are loud. Second, the newly established power regulator fails to configure its regulatory function according to international practice for a modern regulatory system and falls into the dilemma of "there is an agency but no function". The old system still plays its leading role, which implicates big challenges to building a new energy administrative system under exploration, and expose market-oriented reform in power system to greater risks.

It is observed that current setup of government administrative agency could not adapt to the need of energy development and reform in a new situation, not to demand of the situation of tight energy supply and energy security that have already been shown, and especially not to stipulation and implementation of sustainable energy development strategy in the long run. Even with a good strategy in place, it is still difficult to implement if without a powerful organizational backup.

To solve increasingly prominent defects in energy administrative system, a two-level structure is suggested to build a comprehensive energy administrator and a professional energy regulator in light of the principle of "separating administration from regulation".

There are two optional plans for building a comprehensive energy administrator: the first is to build Ministry of Energy, which is incorporated of Energy Bureau under Development and Reform Commission and related comprehensive divisions and bureaus governing resource and energy saving, and equip it with necessary functions and sufficient staff; the second is to establish State Council Energy Joint Office System, and set up a standing organ of certain scale to coordinate government's related agencies. The 2nd plan is convenient for operation. Anyhow, it will not produce ideal effects in light of implementation results of China's joint office system in other fields. The best method is to establish Ministry of Energy.

Major work in restructuring and improving an energy regulator is concentrated in two aspects: one is to solve improper functioning of the power regulator as soon as possible and the Power Regulation Committee should be authorized the right of price and access regulation. This issue is not a simple swap of "regulatory rights" between different departments but relates to successful replacement of the old system by a new one in energy sector where the color of a planned economy is thickest, which will

serve as a model for reform of administrative system in other monopoly industries (such as telecommunication, railway, etc). Moreover, the regulator should also be allowed the right of discriminating market monopoly behaviors and recommending industrial restructuring. Such authorization is especially important nowadays when China still doesn't have an independent anti-monopoly agency. The second is to control over natural gas industry, especially an effective control should be exercised over natural gas pipelines with characteristics of natural monopoly. The control mainly covers two aspects i.e. fair access to main lines and price. Restructuring could be done on basis of the power regulator, which is added with administrative function on natural gas and equipped with relevant regulatory staff and the current Power Regulation Committee is renamed as Energy Regulation Committee.

Relationship between a comprehensive energy administrator and professional energy regulator is described as follows: the former mainly stipulates state energy strategy, medium and long term energy development plan, annual development plan and energy policy; coordinate relationships between departments as a whole and development of different types of energy; the latter implements state energy plan and policy, mainly for implementation of professional and independent control over two specific sectors of power and natural gas.

In view of sustainable development of energy, resource and environment, there exist that attention to them by central government is high and that by some local governments is low. To solve this problem, besides defining Political Performance Assessment Indicators that epitomize the concept of scientific development and cadre management system and other comprehensive countermeasures, it still requires organizational guarantee by local energy administrators. Specifically, a professional energy regulator should be set up vertically from the central and local levels. A comprehensive energy administrator should also be set up locally to stipulate and implement local energy policy led by state energy policy to demonstrate the principle of "suiting measures to local conditions" and guarantee implementation of state energy strategy and policy.

2. Switch government functions, down to earth, and establish a government administrative system that adapts to market-oriented reform in energy sector.

After several rounds of reform in energy sector, the problem of intermingled government administrative function with enterprise management operation was

basically solved pro forma. Anyhow, direct interference by the government on enterprises is still prevalent, and issue of "unusing functions" and "overstepping functions" for government's functions is still serious. Especially, "overstepping" problem has seriously interfered the market mechanism from displaying its fundamental role in resource allocation. Enterprises are still bounded by mandates. Market supply and demand signals are obstructed by malpractice in government's administrative pattern.

The recent new round of power shortage is a concentrated manifestation of malpractice in traditional planned administrative pattern and doesn't have cause-effect relationship with market-oriented reform kicked off one year ago. Enterprises and government have rather different insights and response speeds to market signals. Generally speaking, with information symmetry, non-SOEs have keenest sensibility to market, and government far away from the market is most indifferent. While under current project examination system inherited from the tradition, overall supply volume depends totally on the government that is most insensitive to market signals. Market signals then will have apparent "time lag", naturally. Hence, it is inevitable to have big problems and mistakes. Now there is power shortage. It is quite likely to have serious excessive supply in near future. An enterprise would irrationalize its behaviors for pursuit of eligible access.

At present, the biggest obstacle comes across by power system reform being implemented is not likely power price rise due to repeated occurrence of power shortage, but belated government reform and improper modern power regulatory system. Current semi-planned and semi-market-oriented situation is the most adverse state. In light of international experience, reform in power system mainly relates to three aspects: liberation (i.e. to shatter monopoly and build a competitive power market); corporatization (corporatization reform with privatization as the focus); deregulation (carry out regulatory reform to adapt to requirements of a competitive power market). While, China has only made partial progress in shattering monopoly of vertical integration and lags behind seriously in privatization reform and change of government functions. Although reforms may be carried out subsequently, it must have overall design and concerted progress. Current systematic environment implicates great risk to investors, who will shoulder not only market risks but also tremendous unpredictable risks from the systematic environment. Although with drive of robust market demand, domestic investors are enthusiastic and such investment

behaviors could be sustained only with sufficient market signals. At present, foreign investors still look on, which shows their worries on our systematic environment and high systematic cost. In early 20 years of the new century, China has to increase its power generation capacity by twice of its current scale. If systematic environment issues remain unsolved, it is still hard to realize the development target and avoid big ups and downs. Similar issues are also found in other energy sectors.

Dispute in coal for generating electricity that has been in place for years, and become sharp in recent two years, reflects actually clash of two price formation mechanisms for upstream and downstream power sectors. Upstream coal sector is founded on price formation mechanism as a result of market supply and demand relationship. The downstream power sector still follows the regulated price. Since it is difficult to address them by market contracts, relevant government authorities fall into a dilemma of endless passive coordination.

The above cases show that it is imperative to change the government's administrative mode. Otherwise, domestic energy supply couldn't guarantee energy demand in 2020. Looking back the state's past experience in alleviating short energy supply of coal, power, etc., we find in it actually a reform of access and price regulatory system to certain degree. Deregulation led to strong stimulant for investors and mobilized enthusiasm of investors in different categories. However, it seems that deregulation could not solve issues related future energy development in China. If energy supply could meet doubled demand on bigger basis, we need a grand systematic innovation, which implicates the emphasis in systematic innovation moving from deregulation to fully displaying the market mechanism's fundamental role in resource allocation. The bottleneck that restricts market mechanism from playing its function effectively falls on the government's backward administrative pattern.

Reform implication of the government's administrative mode does not only implicate boosting of administrative efficiency but also complete change of government functions. The government is expected to give up those should not be administered and exercise proper administration on those should be administered. Specifically, access regulatory system on basis of project examination is reformed and great effort is exercised on reform of investment administrative system (price systematic reform will be discussed later in the report). The reform is targeted to "relax economic regulation and strengthen social regulation" to boost regulatory

revolution and functional transformation. "Slackening economic regulation" is the core and main direction for reform of current investment administrative system and its inner core is relaxing access regulation, allowing enterprises the right of making investment and operation decisions by themselves, establishing an investment administrative mechanism that the investor receives benefits and shoulders risks, stopping use of the project's financial assessment as main basis for the government to approve and make decisions, canceling most items in current project examination system and confining economic regulation to judgment that whether a project's implementation will produce market monopoly. So-called "strengthening social regulation" implies regulating social targets such as sustained use of resources, environment protection and energy security based on the state's medium and long term energy strategy and targets, establishing an assessment system that reflects systematically above social targets and is easily operated, setting up the lowest access threshold on such basis and establishing a project approval system with social regulation as the core. By functional transformation of above regulatory system, we shall establish a stimulant mechanism of mobilizing sufficiently enthusiasm of state-owned, private and foreign investors by relaxing economic regulation and realize social targets of orderly and efficient use of resources and effective control over environment pollution by strengthening social regulation.

Essence of above reform in government's administrative mode is described from four aspects. The first is to transform the project examination system on basis of the concept of economic regulation to the project approval system with targets of strengthening social regulation to realize transformation of regulatory functions; the second is project approval system with social regulation as the core. Its effective and smooth operation is based on systematic and social access criteria, open, transparent and predictable decision-making process. Otherwise, it is hard to solve the issue of discretionary decision-making; The third is to establish and perfect relevant laws and statutes and to address increasingly prominent issue of belated legislation in energy field and restrict competition and trade behaviors of different enterprises, the rights and decision-making processes of government and regulators, by laws and statutes, to make sure that enterprises operate and government administers under the law; the fourth is to establish a systematic arrangement that could boost effectively administrative efficiency and restrict relevant agencies, recommend to stipulate laws and statutes to restrict relevant agencies' decision-making period. It's regarded as

obtaining governments approval if stipulated period expires. Appeal and administrative reconsideration systems are also established based on "Administrative Approval Law" and "Administrative Reconsideration Law". An open, competitive, orderly and concerted energy market is formed by systematic institutional arrangement.

The change of above recommended government's administrative function should be combined with building modern energy regulatory system, i.e. new regulatory functions are assigned to a professional energy regulator and original institution's regulatory function is abolished.

Moreover, we shall improve market-oriented reform on urban utilities (including water, gas and heat supply), introduce in a franchised operation system oriented to different investors and with legal backup to increase supply, boost efficiency and improve services.

3. Speed up adjusting of ownership structure in all sectors, optimize structure of industrial organizations, carry out joint development of economic components and establish a unified, open, competitive and orderly energy market.

At present, the phenomena of "closed competition" are quite prevalent in energy sectors. Some issues with trade monopoly are not fundamentally solved. So-called "closed competition" refers to competition closed inside the national economy. Due to unsurpassable policy and systematic obstacles, entry of private and foreign capitals is difficult. Hence, state-owned economy dominates, and the competition is limited within state-owned economy and between SOEs. Because of SOEs' innate defects in corporate management structure (especially in property rights system) and also in view of the fact some SOEs that have been relying on policy resource for survival (especially original trade competent authorities in the government were reformed into super-grand SOEs under the system of intermingled government administrative functions with enterprise management operations) haven't learnt how to compete in the market, "closed competition" will lead to seriously weakened effects of market mechanism. Recent issue of "enclosing common field by running the horse" in some sectors is just related with the softened control of SOEs' budget. "Closed competition" is away from original connotation of a market mechanism. To truly establish an effective market competition mechanism, we must abolish the format of "closed competition" and replace "closed competition" with "open competition" to change single ownership structure in energy sector and reach the target of creating qualified

market players.

Four attentions are highlighted in building an open and competitive energy market:

The first attention is, encouraging entry of new enterprises (particularly private and foreign investment) and relaxed access policy for new technology use (suitable to all energy sectors except power transmission grid, upstream PNG sectors). On one hand, by access deregulation, policy obstacles to entry of non-SOEs are lifted up and a systematic environment is created where multiple ownership components could enter and exit without hindrance so as to solve the issue of single ownership structure. On the other hand, establishment of a new access system should also be combined with strategic targets of developing sustainable energy, boosting energy-saving and improving energy efficiency. As for renewable energy and energy saving projects, it may resort to establishment of policy and system design such as mandatory portfolio requirements to create a policy environment more favorable to entry of new enterprises. It is proven by international successful cases, such as "Power Utilities Regulatory Policy Act" (PURPA) passed by U.S.A congress in 1978 required that power utilities bought specified amount of power from power utilities that adopted renewable energy and new technology and passed qualification certifications. This policy created actually a brand new competitive and simulative mechanism to render considerable competition in power generation market. This practice has twofold significances in abolishing the format of "closed competition" and encouraging development of new energy and new technologies.

The second attention is, reform on energy SOEs with focus in property right system. Now energy sector has not a few SOEs of sole proprietorship, many companies with the dominant state shares as well as a number of traditional state-owned plant-system enterprises (such as Mining Bureau). SOEs reform apparently lags behind that in other competitive industries. We shall stick to the core of property right reform in boosting reform of energy SOEs.

One hand, big SOEs are introduced in private and foreign strategic investors to form a property right structure of blended ownership to boost overall listing of grand energy SOEs (not local listing by separating quality assets since practices have proved that local listing was suffered from the problem of correlated transactions and heavy burden on continued companies), dominant state shares are retained only in a few SOEs in crucial links (such as grid operators) and "State Capital Share System" (i.e.

veto by one vote) is tried only in a few key links. On the other hand, we could learn experience in reform of property right system in other competitive medium or small SOEs, and resort to a number of modes (such as auction, transfer, leasing, bankruptcy and etc) to withdraw state assets as a whole. Capital obtained from withdrawal is used to supplement capitals of grand SOEs after outstanding issues of the former enterprise are solved. Thus, state economy could both enter and withdraw, with its layout to be optimized.

The third attention is, to optimize the structure of industrial organizations. Power, petroleum and other industries are still perplexed with sizeable market monopoly, and demolishing monopoly should not be confined at the stage of "breaking up" original enterprises. Otherwise, it will only carve up interests inside original monopoly enterprise and convert "big monopoly" into "small monopoly". We should focus on entry of new enterprises. Market access should be allowed conditionally in downstream industries of power generation market, petroleum wholesale and retail or even refineries in middle of the stream. Five grand SOE generators should comply strictly with limits on market shares (i.e. the share in regional power generation market will not exceed 20%). On one hand, we need to change entirely current situation of "restricting activities to a designated area" and over-decentralization, find local integration as the point of breakthrough and form gradually several nationwide grand coal agglomerations spanning across different regions, ownership and trades (coal for generating electricity and coal chemical). On the other hand, we should focus on entry of new enterprises (especially private and foreign investment), mobilize enthusiasms of different parties to alleviate pressure on coal supply that has appeared and sustained for a long period.

The fourth attention is, to establish a unified domestic energy market and connect it gradually with international markets. Local division of energy market is not yet addressed fundamentally. Especially, inter-province barriers in the power market are still sharp. We shall carry out trials of regional power market in regions with mature conditions. Moreover, proper addressing of open trade and realizing gradually connection of domestic and foreign markets have twofold significance on China's energy supply and standardization of domestic market. On one hand, China opens its investment and trades both ways after China's accession into WTO and provides favorable external environment for domestic energy enterprises such as petroleum sector to "go out" and make good use of two markets and two resources at home and

abroad. On the other hand, China is also expected to carry out trade opening actively. Trade opening is not only to make up for domestic insufficient supply but also to address the issue of "closed competition" in China. As for petroleum sector, it's necessary to maintain the monopoly by three oligarchies for sake of petroleum security and international competition. Anyhow, we should open gradually circulation market of petroleum products (for example, wholesale and retail markets, such as gas stations). It has such benefits: the first is to address the issue of monopoly, i.e. three oligarchies, though, exercises oligopoly on domestic production and resources but not on market, by opening of product markets; the second is to lift the competition between three grand SOEs up to international level, which will help rapid growth of SOE petroleum companies. As for significance of connected coal sector with the international market, it will not only solve partially coal supply in Southeast coast and also stabilize price by imported coal (this is a better method under market economy). Equilibrium price established on basis of overall supply and demand relationship in markets at home and abroad plays a crucial role in regulating enterprises' competition when tight coal supply (not cost) drives continuous price rise.

4. Reform price formation mechanism and establish a price system that helps to realize energy structure adjustment and sustainable development.

Energy products have both attributes of common commodities and also social attributes that relate to national welfare and people's livelihood, which decides that price of energy products has both the general function of reflecting and regulating relationship between supply and demand as well as special function of realizing social targets, hence, dual nature.

China has such concerns in its formation mechanism and structure of energy product price: the first is that many energy products have regulated price (especially power products price), price is inelastic and is far away from relationship of supply and demand in the market; the second is constant swings between dual nature of energy price and absence of an effective permanent solution to energy price. In order to attract investor and protect producer's interests, a price formation mechanism of "cost plus returns" was established in sectors of power generation and natural gas pipeline. Since cost is difficult to monitor, a "price backward compelling" mechanism was formed to cause increasingly higher price. Price control must still be exercised on power's end user price to meet social targets. Thus, the government guides price of

coal for generating electricity, open first, but withdraw later, and also refers to regulated price in international petroleum market; the third is that the price structure does not help adjustment of energy structure and sustainable development. Since environment cost is not calculated, price of coal for generating electricity is too low, which restricts development of other energy types. Price of natural gas is too high due to defects in price formation mechanism and the market finds it unacceptable, which is against the energy development target of speeding up the development of natural gas. Price of fuel oil is too low since fuel tax is not imposed, and thus cars of low combustion efficiency move around without hindrance.

Under market economy, the crucial step in adjusting energy structure and implementing sustainable development strategy is to reform price formation mechanism and price structure and solves emphatically issues as follows:

First, to adopt a price formation mechanism with price determined by the market for energy products that effective competition has been established to reflect truly and sensitively relationships between supply and demand in energy market. We shall further power system reform unswervingly to implement "bidding for grid access", establish a price formation mechanism with price determined by the market for power price, and set a price cap on power price over the grid nowadays when power supply is insufficient. We shall demolish planned price for coal for generating electricity and establish a coal-power price linkage so that coal and power prices are linked but with the precondition that serious inflation is not ignited. Although this measure may lead to rise of end user's electricity price, it also brings three benefits: (1) Correct transmission of supply and demand relationship in the market to end user, who will save energy voluntarily; (2) It helps energy-saving and widespread use of efficiency-boosting technologies; (3) It creates favorable conditions for development and use of other new energies. Reform on petroleum price formation mechanism is oriented to, firstly, price should reflect relationship of supply and demand in China's petroleum market and not direct transfer of international petroleum price (not a true show of supply and demand relationship) and the second is belated transfer towards real time petroleum price. Petroleum price formation mechanism should be reformed progressively since factors of opened circulation channels, establishment of risk lookout system and effective regulatory system decide reform progress.

Second, the effective price regulation on stages with attributes of natural monopoly. Both transmission and distribution grid and natural gas pipelines have

attributes of natural monopoly. Its through-grid fee must be regulated. Theoretically, price regulation falls into two categories, the first is cost plus based on cost, i.e. all sales income of a relevant enterprise within a specified period shall not exceed the amount calculated from cost plus. Its key points are: (1) the regulator strictly reviews cost; (2) profit is verified based on regular rate of return in the society. The second is price cap (or revenue cap) based on price (or revenue). The price regulator does not verify cost and profits, anymore, but specifies an extent of fluctuation based on previous year's price (or revenue). This extent is mainly comprised of anticipated inflation rate and corporate efficiency improvement rate as specified by the government. As a new regulatory tool, price cap is applied widely to ongoing regulation reforms and privatization programs in foreign countries. Compared with cost plus, price cap has the same target, i.e. reduced monopoly interests. The former creates a strong stimulation mechanism to investors but has defects that a stimulation mechanism that encourages relevant enterprises to reduce their cost is absent since rate of return is fixed as statutory and their profits are guaranteed and fixed. Moreover, a regulator is difficult to know an enterprise's true cost. The latter is not a strong stimulation mechanism to investors but overcomes defects of the former. Transmission and distribution grid could be applied with "cost plus" to address the issue of seriously belated grid development, which is then transferred to "price cap". Since natural gas pipelines face the competition of other replaceable energy types, it uses acceptable price on the market side, as a whole, to determine the option of price control.

Third, to form energy price structure and parity relationship that helps to adjust energy structure and realize the target of sustainable growth.

The first is, the reduced value due to environmental protection will be added into the price of coal for generating electricity, so that environmental damage caused by coal burning will be internalized into price of coal for generating electricity to change current situation of too low coal for generating electricity price; the second is, as to the reform of natural gas' price formation mechanism, the main concern "cost plus" only takes account of producer's interests and not consumers' willingness to pay so there exist such problem as expensive natural gas, and its application meeting obstacles in the market. The reform direction should be "taking thorough consideration of replaceable value of natural gas compared with other fuels and deciding the price of natural gas by consumers' will to accept at the market side (not

the producer side)". The third is, to establish Energy Sustainable Development Fund and allow appropriate subsidy for renewable energy and new technologies.

Fourth, to differentiate dual nature of energy price and establish a scientific price mechanism that protects low-income population, and guarantees people's basic living needs. On one hand, we should consider trial of gradient water price in some cities and apply lower power price on residents' basic living needs due to existence of demand rigidity, and progressively higher price on the amount above the limit. On the other hand, extra income obtained from gradient price is earmarked as appropriate subsidy for low-income population, farmers and power use for agricultural production.

5. Conduct the pilot projects of market-oriented resource distribution and gradually establish an open and competitive new resource distribution mechanism.

At present, China still does not distribute its resources via markets and price of resource distribution is much lower than market price. Moreover, non-open resource distribution has caused unfair distribution and rent seeking of rights. No-price or low-price resource has caused tremendous waste, which is remarkable in coal sector: since resource price is seriously far away from market price, it is difficult to calculate a company's actual value during restructuring and listing of some energy enterprises. The market-based resource distribution is a better way out. We should address three issues as follows:

First, to establish a market-oriented distribution system for resource tendering and auction, which has four key points: (1) price is determined on resource volume but not on production output, i.e. if energy enterprises hold non-renewable resource, price is determined based on resource volume it holds whatever the output is, and enterprises should pay for all resources it holds so to urge them to treasure resource, reduce cost and boost efficiency; (2) we should implement the resource tendering and auction system based on resource scale, resource quality and mining conditions, determine the price in accordance with the market and correct the situation that resource price is far away from market value; (3) the auction process is expected to be open, transparent, avoid unfair distribution and right's rent-seeking; (4) as for resources explored independently by enterprises themselves, cost of preliminary exploration is deducted and preference allowed to encourage enterprises to explore and identify mines. Second, to clarify subjects in implementing market-oriented

resource distribution, withdraw the right of auction as possible and establish a two-level system where the state and provinces (cities directly under the central government and autonomous regions) act as the sponsor and prevent local governments' improper behaviors. Third, manage the capital from auctions under dedicated accounts. Capitals thus collected are mainly earmarked as aid fund for industrial transformation in regions suffered from sinking, re-farming and areas with resources exhausted.

It is recommended that pilot projects be carried out first in coal sector for the above-mentioned tentative idea of market-oriented resources distribution.

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