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The New EU energy policy: Economic rationality for the single market?

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The New EU energy policy: Economic rationality for the single market?

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Abstrakt:
The European Commission and the EU Member States, pushed by global realities, made an attempt in 2006 and 2007 to come up with a new, effective view of the energy sector in the context of the European Union and European integration. This attention was also supported by the increased interest of researchers as well as public opinion.[1] This is related both to the definition of key priorities and the strategy for addressing them. Even though we are talking about documents issued within a single year, we can see progress in their development. The implementing documents from the beginning of year 2007(The Energy Packet of the European Commission of January, and the Action Plan – the Energy Policy for Europe of March) are not as radical as was the strategy for European Policy presented in the Green Book published in March 2006. We should also ask whether the Energy Policy is really a "new", economically rational, implementable one corresponding to the main challenges of the 21st century.
The predetermination of the Energy Packet sounds rather alarming: The European Union should lead the world into a new industrial revolution. The strong words used at the beginning of the Lisbon strategy have not yet fallen into oblivion.

Keywords: EU, Energy policy

JEL Classification: F15, Q4

[1] See Annex No. 1

THE MAIN FEATURES OF THE GREEN BOOK, THE ENERGY PACKET, AND THE ENERGY POLICY FOR EUROPE

The Green Book represents a conceptual document which aims to conceive the position and prospects of the EU´s power supply as a whole. It sets forth primary recommendations; however, it does not define the obligations corresponding to the individual steps. Its analysis is presented in the following chapters.

The Energy Packet is a set of proposals whereby European energy policy aims toward the future. The European Union should lead the world into a new industrial revolution. It presents the EU as a leader in fighting against global warming and for the reduction of greenhouse gases on the international scene.[1] With only a few exceptions, it does not set limits on responsibilities and commitments.

The Action Plan is set for the years 2007-2009, and it is presented as a primary step for the creation of the European Energy Policy. Its aim is to finalize a single energy market for the EU and its effective functions: Effective separation of transport and other activities, alignment of competences, and strengthening of the independence of national energy regulators. To secure these deliveries, the Plan emphasizes the utilization of bilateral cooperation between the EU and all its suppliers and securing a reliable energy flow into the EU. The Plan expects there to be ” “dialogue” with producer and transit countries. It sets ambitious, quantifiable targets for reduction and renewable sources of energy (RES).[2] As for research and technology, there is an intention to create a European strategic plan for energy technologies, including ecological systems for carbon dioxide trapping and storing.

[1] See Annex No. 15

IDENTIFICATION OF THE PROBLEMS IN THE EU ENERGY SECTOR

The European Union shall react to the essentials in a key branch of power supply:

Outstanding requirements of investment into energy infrastructure: For the next 20 years, the requirements of energy investments into EU countries are estimated to approximate EUR 1,000 billion (an amount higher than the entire financial projection for 2007-2013). This requirement results from both an assumed increase in energy demand and from the urgent needto renovate existing but ageing capacities.

The constantly accruing deficit and the growing gap between those supplies dependent upon installed capacities and demand based on economic growth are not incidental. These are dictated by the liberalization of the European energy market, the framework of which is limited by directives. Short-term targets have been preferred in the past; there has been neither motivation nor security for long-term investment. Capital has mainly been used for acquisition of new markets and the restructuring and consolidation of originally closed, protected national markets. Nevertheless, the original energy strategy has not been seriously re-evaluated. Only the real will to apply a long-term, well-advised European energy policy will provide investors with the necessary rates of stability and an ability to predict the market.

The requirement to halt dependency on energy imports: The dependency of the EU on energy imports is approximately 50 % at present; if the projects meant to increase the rate of renewable resources used and various economic projects are not implemented, the rate of dependency on imported energy will increase up to 70% in the next 20-30 years.[3]

The European Union, with its primary sources, will always be hugely dependent on imports. The imperative of competitiveness (productivity, added value) is higher here, allowing the processing industry and services to create the mechanisms for energy imports. Support for renewable resources and an increase of their share in production is certainly the right way forward.[4] However, the European Union lacks an economically sustainable strategy of increasing the share of renewable resources. All researchers working with actual data and quantified models have come to the conclusion that an increased share of renewable resources in production will also raise i the average price of energy under the critical rate to the level of 20% of what is now on offer , depending on the methodology used. Beyond this level, the vision is not cost-effective given the known technology prospects.[5] So far, this

[2] See Annex No. 14
[3] See Annex No. 7
[4] See Annex No. 13
[5] See Annex No. 12

potential, which is not being fully tapped, represents the goal, and needs the influence of the party demanding energy savings.

On the supplier side, nuclear energy represents the only significantly utilizable potential resource .[6] The European Union, however, has not been able to agree that this fact should be acknowledgeddue to the traditionally intuitively reserved position of the public towards this resource and the right of individual Member States to not exploit nuclear energy. Time plays a key role in the economy of EU energy investments. There are at least two reasons for this: With the accumulation of investment demand into a short period developed by crises, the investment market becomes a supply market, with all the financial impacts that entails. Another underestimated factor is that the long-term suppression of the market in highly complex and sophisticated technology investment (such as nuclear power stations) means the loss of know-how, qualifications, and competitive producers. The timeframe of 15 years to build a nuclear power station is another underestimated factor.[7]

Am even stronger ratio of dependency on imports and concentration in a very low number of countries can be seen in the case of natural gas. - Half of its consumption within the EU is covered by supplies from only three countries (Russia, Norway and Algeria), and during the next 20-30 years this ratio will increase to 80%.[8]

With respect to geographic determinacy, the natural gas sub-branch will be primarily dependent on these three countries from now on, and demand will only increase. The prognosis of an 80% dependency is highly probable. The only alternative which might reduce but not remove the dominance of these countries' supplies to the EU would be a decision to significantly investin imports from far-away countries. Through this step, the fixed and variable costs would increase in the sub-branch in favor of a desirable diversification of resources. The less transparent aspects of property and contractual relations would increase economic and precautionary risks.

The demand for energy is constantly growing in the world. The increase is estimated to rise 60% by 2030, and the increase in world demand at that time is estimated to rise 1.6% annually.

Oil and natural gas prices are rising significantly;[9] these prices almost doubled in 2004-2005 and that was reflected in the price of electricity. Consumers have little hope this situation will change in their favour: The demand for fossil fuels is rising intensely; supply chains are often complicated; and dependency on key imports will also increase. However, price terms might be a strong impulse toward higher energy efficicency and innovation.[10]

[6] See Annex No. 6 and 8
[7] See Annex No. 10
[8] See Annex No. 11
[9] See Annex No. 16
[10] See Annex No. 3

So far, competitive single-energy markets have not fully developed in Europe. Provided that these markets will come into existence, they will offer citizens and businesses in the EU the advantage of secured supplies and lower prices. The cross-connection of energy systems and enforcible legal and regulatory frameworks are necessary to achieve these goals.

If we were to use an uncompromising word to describe the analytical view of the process and result of the liberalization of energy markets in Europe, the most pertinent expression would be "failure". The winners of this process are the original national monopolies, while the end-consumers and Member States are the losers.

Let us make use of the comparison with another network industry – telecommunications. The European liberalization of this industrial branch has gone ahead through slight advances and has been governed by the relevant regulations. The result is an open, competitive market with a high level of price and service competition, low entry barriers, and a high dynamic of innovation. The winners are both the end-consumers and the Member States. The original national monopolies, the incumbents, are still important players, but they are exposed to competition and consumer choice. New players on the market had the support of asymmetric regulation in their favour during the first years of liberalization. Nowadays, regulation is limited to selected segments; nevertheless, the market is working. Many incumbents underwent critical periods which meant their significant transformation into competitive companies operating with rational behavior and investment allocations with relatively radical clearance of the economy from sunk costs.

The explanation lies in a different approach to liberalization. In telecommunications, there was the clear will of the Member States to establish competition, open markets and create a single market with clear directives and defined commitments and terms. There were almost no exceptions, only a rather short transition period for some Member States. In power supply, this was different in each country, and there were strong tendencies to protect national markets and dominant companies in almost all the countries.[11]

The question is whether directives are not counterproductive when they enable the co-existence of such different market structures as exist in France compared to Great Britain, for example, and which effectively allow for protection against opening national markets on a long-term basis and therefore allow companies to behave unstrategically regarding investment into new resources and infrastructure,. We cannot talk at all about the restructuring of industry in the area of resources with respect to the sunk costs.[12] Investments into the network enabling the opening and interconnection of national markets

[11] The most important exception is Great Britain.

do not exist, there is no motivation or commitment to them. On the European scale, the directives come at the beginning, while the national regulations are differentiated.

The pricing policy is mainly brought from the upper EU level down to the end-consumer. The lack of cross-border networks and the auctioning of their capacity makes power more expensive instead of having a positive effect due to the partial opening up to foreign competitors. The hypothetical *sui juris* in supplier´s choice is merely a presumption without any significant impact. The restraint effect of the rightful customer can be seen in the big clients.

IDENTIFICATION OF THE EU'S COMPARATIVE ADVANTAGES

On the other hand, the European Commission is also identifying the EU's comparative energy sector advantages. A correct analytical approach requires the addition of the risks of these advantages.

The second-largest energy market in the world: With a growing deficit and a lack of its own natural resources, the size of the market could create a critical situation, with limited ability as an integrated unit to eliminate local crises by implementing an "island" regime.

Sufficient emphases on protecting and enforcing own interests: This provides the ability to co-ordinate the interests of the Member States, i.e., to implement a European energy policy, not the minority penetration of national energy policies. See, for example, Chapter V on the North European pipeline.

A range of policies which can be used for a new approach towards energy policy: Here the questions of the priority of the policies, how they will be implemented, the obligations and costshave not been not resolved.

The world´s #1 in demand control, in the support of new, renewable forms of energy, as well as in the development of low-carbon technologies: The European Union rightfully aspires to the role of leader of theprogressive approach towards sustainable, environmentally acceptable technologies. The risk lies in the fact that without a connection to one of the countries with the highest weight in terms of economy dynamics, global consumption and pollution, including global warming (i.e., China, India, or the USA), the role of the European Union is limited. In the medium-long and long-term prospects, the EU thus significantly weakens the competitive position of the Member States´ economies.

[12] Subdued nuclear reactors which fail safety regulations are the only rare exceptions. This process concerns newcomers, not the display of the effectivness of an energy policy. The negative example could be Great Britain. See Annex No. 9.

When looked at closely, it must be said that the above- named advantages are very debatable.

THE SUGGESTED RESPONSE THROUGH ENERGY POLICY

It is a sad fact that the previous energy doctrine of the EU was based on uneconomical, halfformed, liberalized directives, and it has led to remarkable strategic and investment passivity both at the level of the Member States and at EU level. Therefore, quick action must become a priority. An innovative cycle takes a very long time for the power supply industry.

This effort should: 1) enlarge the set of the EU´s common policies through a common energy policy, i.e., the principle that is apparent in other European policies where we are talking about the single market, and 2) decide whether sustainability, competitiveness and safety should be the basis of this newly created common policy.

If there is agreement among the Member States on these key steps, then it is necessary to continue with the following questions:

- ability to compete and the internal energy market;
- diversification of the energy resource structure;
- solidarity;
- sustainable development;
- innovation and technology;
- external policy.

The setting of energy policy on the EU scale as a common policy is, in the words of the European Commission, seen as a long-term task. I regard this as clashing with the urgency expressed in the identification of the problems facing the EU. It is necessary to establish a clear framework within which the common policy will be carried out. At the present phase, this framework is supported by six priority areas:

1. Energy for development and more job opportunities in Europe: Complete the internal market for energy and natural gas in Europe.

This issue is a direct reflection of the Lisbon strategy. It comes from the belief that sustainable, competitive and safe energy cannot be achieved without an open, competitive energy market which works on the basis of the economic competition of corporations on the market. Thecorporations gshould aspireto become European competitors, not to dominate national markets.

A truly competitive single European market for electricity and natural gas will lead to price reduction, to better security of deliveries, and to the strengthening of competitive advantage (see for example, Lessons from liberalized electricity markets, IEA, 2005). The effects would also influence the environment, since corporations respond to their competitors by closing energy inefficient plants.

Since July 2007, every consumer in the EU, without exception, should have the right to buy electricity and natural gas from any supplier in the EU. However, many national markets remain national markets ruled by a small number of companies. The approach of the Member States to the open markets differs; thisincludes the competences of their regulatory bodies, the independence of theirnetwork operators, their balancing regimes, their natural gas storage methods, etc.

The end of the 2006 was essential regarding the opening of market, since by that time the Member States had to accept a set of rules about electricity and natural gas, and the European Union had to verify whether a competitive environment existed. Within the framework of energy policy strategy, it is clear that attention will be aimed at the following:

- *The European distribution system*, demanding common rules and regulations for cross-border trade; a *Codex of the European distribution system* is also speculated to be issued; establishment of the European energy regulatory body is also being considered; company operators could be associated into the European Centre for Energy Networks;
- *a preferred plan for interconnection*;[13]
- *investment into power generation capacities*;
- *equal conditions for energy transfer and distribution*;
- *strengthening of the competitive advantage of European industry*.

The problems handled in this concept are mentioned in Chapter III. Their common denominator is the absence of a real action plan allocating resources, terms, competences and penalties. Instead, what has been named is renamed again, and there is some good advice which would have been really good to have had on hand five years ago. The terms “subject to consideration,” “assurance of common rules,” “they could be,” “codex of the system” are, unfortunately, typical.

2. Single energy market securing the safety of supplies: Solidarity among the Member States.

[13] See Annex No. 4 and 5

Better security of supplies to the single market; a liberalized, competitive market sends the proper signals to those branches participating and supports both transparency and ability to forecast. In these terms, a European observatory for energy deliveries is supposed to be established. To ensure the availability of physical infrastructure, the mechanisms for preparation and a rapid solidarity are considered for development, as well as assistance to countries which face problems with damage to their primary infrastructure, as well as the acceptance of common rules to protect such infrastructure;

Re-evaluation of the EU´s stance on the emergency reserves of crude oil and natural gas and on the prevention of their violation; release of the emergency reserves of crude oil and natural gas in cases of serious crisis would lead to a global reaction; the EU stance should connect to this global approach; the establishment of rules fordemonstrating the state of EU crude oil reserves more regularly and transparently could be useful.

This is all correctly proclaimed, but it is not overly different from the paradigm of inspiring, valid but insufficiently effective directives on liberalization. The principle of solidarity among the Member States will hardly be fulfilled by projects of the North European pipeline type.

3. Security and competitiveness of energy supplies: The way toward more sustainable, effective and diverse energy resource models.

Each EU Member State and each power company should have its own energy resource model. OneMember State's choices have a strong impact on indemnifying deliveries both in neighboring states and throughout the EU as a whole. Strategic review of the EU power supply would provide a clear frame work for domestic decision-making about energy resource patterns. This review should evaluate the advantages and disadvantages of different energy sources. It should also enable a transparent, matter-of-fact discussion about the future role of nuclear energy in the EU (see Chapter III. for details).

4. Integrated access to the struggle with climate change.

The European Union – in the spirit of meeting the goals of the Lisbon strategy – enforces the revocation of the commitment between economic growth and increasing energy consumption. The solution can be seen as reducing consumption in support of competitive, efficient renewable energy. The commitment to this solution is a long-term one. The long-term horizon bears the highest risk of access in relationship to the competitiveness of the EU economy, and has a limited ability to enforce the same paradigm and its fulfillment by global competitors.

The solution in specifics is, for example, the EU system for the emissions permis market. This creates a flexible, cost-effective frame for electricity generation which is more environmentally friendly. The system, however, has not met expectations and is currently collapsing (approximately 0.30 EUR per ton). No proposed solution is known.

Less means more: The leading position of the EU in energy effeciency. Effective policy in the field of energy efficiency does not mean it is necessary to give up the standard of living achieved. An effective process should actually mean the opposite: Cost-effective investment should reduce energy waste (which should increase living standards and secure money), while price signals leading to more responsible, cost-effective and reasonable utilization of energy should be implemented. For example, the framework of the Energy Tax Association could be effective.

Despite the fact that Europe is one of the most energy-efficient regions in the world, there is still room for improvement. The energy efficiency Green Book framed by the European Commission in 2005 mentions that up to 20% of the energy consumed in the EU could be saved, which represents an energy cost savings in the amount of 60 billion EUR, a considerable contribution toward providing energy supplies and forming up to one million new job openings within the area directly concerned.

The *Structural and Cohesion Policy* of the EU is a useful tool in this area. One of its targets (also currently in the process of preparation for the 2007 – 2013term) is support for energy efficiency, development of renewable and alternative sources of energy, and investment into networks in the event of market failures. It is up to each individual Member State to include such priorities in their *Operation Programmes* for the 2007 – 2013 term and thus make use of the possibilities offered by Structural and Cohesion Policy.

The comparative advantages of the EU are defined in Chapter IV. Although not included in the list, the option of using Structural and Cohesion Policy certainly falls within such advantages. Further analysis of the above-described
programmes would state more precisely the extent to which this tool could be used within the medium-term horizon.

In order to fulfill the potential described, the European Commission has prepared an energy efficiency action plan. Examples of the proposed measures within the scope of the plan are: A long-term, targeted, energy efficiency supporting campaign, including energy savings in buildings, especially public ones; an effort to increase energy effectiveness within transport sectors, especially the improvement of public transportation in large European cities; the use of financial tools as a catalyzer of commercial bank investments in energy efficiency projects and in companies providing energy services.

The described procedure should – in compliance with the International Energy Agency (IEA) and the World Bank – form the basis of similar approaches on a worldwide scale. See Section 4 for the risk related to this approach.

Increase in the use of renewable energy resources. Since the early 1990s the EU has been attempting to meet its ambitious idea of becoming the world's best in the field of renewable resources. As an example, let us mention the fact that the EU runs wind power plants of a capacity equal to that of 50 coal-powered power plants. The yearly turnover of the renewable energy market in the EU is 15 billion EUR (approximately half of the world market). It employs about 300 000 people and is a significant contributor to exports. Renewable energy is really becoming a competitor to fossil fuel..

However, quantified studies show that when such a statement is "depoliticized", competition is only possible with the support of direct, indirect and cross-cutting allocations. In 2001 the EU decided that electricity gained from renewable sources of energy should reach 21% of EU consumption by 2010. In 2003 it was agreed that biofuels should represent 5.75% of all types of petrol and diesel fuel by 2010.[14] Many countries are recording rapid growth in the use of renewable energy due to supportive measures carried out within their national policies. However, if the tendencies of this effort are projected to 2010, the targets mentioned are not going to be met. Renewable resources represent energy sources that already rank third in worldwide comparisons of electricity generation (following coal and gas) and has a large enough potential for further growth by exploiting the ecological and economic advantages.

It is impossible to take action wearing rose-tinted spectacles concerning renewable energy; should the energy meet its potential, strong political support will be necessary. Such support, however, must respect the rules of economic competition. Nevertheless, it is obvious that economic competition criteria are in the weaker position.

The full potential of renewable energy can be utilized through a long-term commitment to develop and install renewable energy resources. The European Commission is to present a *working plan for renewable energy* for this purpose. The plan is to focus on key questions regarding the effective policy of the EU in the area of renewable resources: An action programme involving particular measures to ensure the fulfillment of existing targets (see above); consideration of the need to meet the targets after 2010; acceptance of measures regarding heating and cooling; compilation of detailed short-term, medium-term and long-term plans for stabilizing and gradually decreasing EU dependency on imported oil;

[14] See Annex No. 17

initiatives in research and further efforts leading to bringing clean, renewable resources closer to the market.[15] See also Chapter III.

5. Innovation support: Strategic plan for European energy technologies

Research related to power engineering has greatly contributed to energy efficiency and, through renewable resources, also to diversification of resources. An example of a supportive tool is the Seventh Framework Programme for Research and Development, supporting, for instance, renewable energy technologies, the introduction of clean coal burning, development of economically survivable biofuels for transportation, etc.

The European Commission is compiling a strategic plan for energy technologies. Its target is to increase the research effort within the whole EU, limit the overlapping of national technology and research programmes, and focus attention on the agreed targets on the EU scale.

6. Cohesive External Energy Policy

The first step towards achieving the policy lies in an agreement on the EU scale regarding the targets of external energy policy and the activities leading to its provision.
Partial steps should include:

- *downright Policy on the provision and diversification of energy supplies*; relating, for example, to the priorities for the modernization and construction of new infrastructure (new natural gaslines, oil pipelines, terminals for liquefied natural gas, rules for transit countries and third-party access, etc.);
- *energy partnerships with producers, transit countries and other global participants*; these include, for example, dialogue with significant energy producers and suppliers as well as the formation of a pan-European energy association;
- *effective responses to external crisis situations*;
- *implementation of power engineering to other policies with an external dimension*;
- *energy efficiency for support of sustainable development*.

Is the EU able to meet these cohesive external energy policies? The current actions of individual member countries prove otherwise. The effort to meet the interests of national interests prevails.

[15] See Annex No. 2

CONCLUSION

The Green Book and related documents represent the current European Commission's view of the dynamically developing energy sector. These documents represent an interdisciplinary effort at grasping the issue, providing space to ecologists as well as farmers, foresters, and regionalists. The Green Book emphasizes integrated procedures within the fields described on an EU-wide scale. /Zahradník 2007/ It is very positive that the EU and its representatives, after years of lethargy and lack of reaction to current market and sectoral developmenta not only within the EU, but globally, have identified the seriousness of the situation in this key sector and declared its solution a priority.

From this point of view, the documents meet the criteria for the establishment of a common EU policy. Taking a critic's point of view and emphasizing implementability, specific impacts on the EU economy and on the economies of the individual Member States in the mid and long-term, it is obvious these are the weak points of this effort. Several questions arise:

First, the pursuit of a truly interdisciplinary approach inevitably leads to compromises. The negative experience of the Lisbon strategy, where a fundamental weak point is its inability to define and thoroughly meet crucial priorities, is insufficiently reflected herein. Instead of priorities, a list of objectives is presented. It is obvious that a clash of interests then arises within any particular document. Typical examples are the contradiction between environmental requirements and the economic interests of competitiveness, or between further liberalization of the energy market and the security of supplies (the concept of supply security itself will be discussed further below).

Second, the focus on supply security is a fairly new item in the EU's new energy strategy is. Other views have been explained in the energy strategy of the 1990s and related liberalizing directives.

Third, the soft framework of liberalization did not lead to an open, functional energy market. The positive results are of little significance to both the end-consumer (quality of services, prices) and the Member States (different market structures, constraints of entry). There has been no quality replacement of national energy policies by a European policy. The electro-energy industry of the EU, typified by an excess of supply with competition on variable costs, has become a deficit industry with a forecast of a further deepening of the deficit due to a low dynamic of investment into capacity installations. This is caused by the impact on the behavior of companies within the division, a preference for short-term rather than long-term targets, and the redirection of investments from new resources to consolidation on the European market.

Fourth, no conclusions have been drawn from the developments of the past 15 years, especially in the following:

- A single market requires a single policy in the key sector of energy. It has been declared, but not fulfilled. No mandatory procedures or terms have been set for the institutional and regulatory scope.
- A single market requires the elimination of business, administrative, and technical barriers between the individual Member States. Regarding the electricity industry, it is important to invest mainly in cross-border networks. However, there are no standards as to who and is obliged to invest into these networks or to what extent.
- The EU's electricity industry deficit the is the result of rash liberalizing directives regarding the behavior of companies and countries in the electricity industry and requires investments in the amount of 1 000 billion EUR. There are no effective directives or conditions set to quickly attract investors of such volume.
- Liberalizing tendencies in the electricity industry are limited by the newly-defined security paradigm. There are no boundaries set within which both priorities meet and support each other.
- Security criteria need to be approached in a strongly integrated and coordinated manner. The strategy offers no such guarantee. We are more likely to see very stand-alone schemes by the individual Member States that can be hardly considered compatible with the intentions of a strategy leading towards a single market (e.g., government protection of national companies against their takeover by investors from other Member States, the North European natural gas pipeline).
- The emissions permits market is a fundamental tool of the energy strategy. No alternative or effective resuscitation of the market has been offered after its failure . Instead, thesystem of massive allocations to investment and renewable resources is being counted on, following the vicious precedent of the Common Agriculture Policy. Other problems are: Malformations in resource allocations; an increase in average costs, mainly in the electricity industry; and the absence of an economically credible quantification of the extent of the substitution by renewable resources in proportion to the expenses activated.

The conclusion above is to be considered a criticism of the quality and realism of EU energy policy, not of the demand for it per se. It can be compared to the age-old, problematic Lisbon strategy which came to an infamous end. Since the EU is at the beginning of the 2007-2009 Action Plan, the near future will prove the feasibility of these ambitious targets and statements. The execution of the above- described measures is clearly visible.

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ANNEXES

Annex 1: EU citizens' attitude to energy engineering (Zahradník)

The majority of EU citizens (47%) would prefer to adopt decisions regarding the new energy challenges on a pan-European scale; such challenges are: Security of energy supplies, measures taken in response to rising energy consumption, and climate change. 37% of EU citizens prefer to resolve these matters on a national basis, and 8% prefer to resolve them on a local basis. The Eurobarometer results were processed and published by the Directorate-General TREN and presented by Commissioner Andris Piebalgs at the end of January 2006.

The citizens addressed would choose renewable energy and research and development as the tools to solve these problems. At the same time, they want to know more about how to use energy more efficiently. In relation to this, Commissioner Piebalgs has pointed out, "The public survey has given us a clear message – the electricity industry is the point of interest of all Europeans and the public expects transparent, concrete actions on all political levels. Europe needs a real energy policy focused on the security of supplies, competitiveness and tenability."

The survey shows that the public considers renewable resources, research, and technologies to be the main tools to help reduce the current energy reliance on the national scale. Almost half of the EU population (48%) believe that their national governments should focus on the development of solar energy use, followed by support for advanced research into new energy technologies (41%). 31% believe in using wind power. The respondents had less appreciation for regulating the reduction of dependence on oil (23%) or developing nuclear energy (12%) . It seems the public is well-informed as to the key role energy plays in the competitive strength of the economy.

"I want to save energy, but tell me how" - this is how we might interpret one of the survey's conclusions. European citizens are willing to learn more about energy efficiency, mainly because of the impact certain economizing measures might have on household spending. Many European citizens (43%) would like more information about the efficient use of energy. Also, encouragements such as tax relief related to energy efficiency support are considered a priority for public authorities. Such a view is supported by 40% of the citizens of the EU.

When buying an electric appliance, 8 out of 10 citizens consider its energy consumption. Regardless of the significant differences between individual Member States, it is possible to say that citizens of new Member States are more concerned with energy conservation than are citizens of EU-15 countries. As an example, we can mention the survey on power-saving lightbulbs; out of the six countries where results showed that citizens pay "great attention," exceeding 50% of respondents, five were new Member States. In Malta, Poland, the Czech Republic, Hungary and Italy, almost 6 out of 10 respondents answered that they pay "great attention" to power consumption, while in Spain, Greece and Ireland only 3 out of 10 respondents gave that same response.

A significant percentage of Europeans (40%), most likely those who are more sensitive to environmental issues, were ready to pay more for renewable energy. 27% would even accept an increase of 5% and 13% were ready to pay an even higher price. The comparison of countries, however, shows the differences remaining among them, especially between the EU-15 countries and the countries that joined in two years ago. New Member Statesin particular are not prepared to pay higher prices for "green energy".

"Don't touch my car" could be another phrase defining the survey. When examining motor vehicle use habits,of, it seems an increase in fuel prices has an impact only when a certain level is reached (the survey shows that in advanced countries it is when the price exceeds 2 EUR per liter). Two out of 10 Europeans said they would use their cars "much less often", while three out of 10 said they would use their cars "slightly less often". Such a situation would have a more significant impact on citizens of the Czech Republic, Slovakia,

Poland or Austria, where about one-third of respondents were prepared to restrict the use of motor vehicles. On the other hand the Irish, Cyprians, Maltese, Dutch and above all Slovenians (between 36% to 47%) would continue to use their vehicles as often as they do at present.

Annex 2: EU strategy for biofuel and Action Plan for biomass (Zahradník)

The EU strategy for biofuel

The EU is trying to support biofuel with the idea of decreasing greenhouse gas emissions, supporting the de-carbonization of transport fuel, expanding fuel supply resources and offering new possibilities for business and earnings in provincial regions. The very long-term target is to develop replacements for fossil fuels.

Climate change, oil and natural gas price rises, and expected developments in the energy market, together with concerns for the development of future reserves, have resulted in increased interest in the option of using biomass for energy purposes. In December 2005 the European Commission adopted its Action Plan for biomass. The Plan's objective is to increase the use of energy produced from forestry, agriculture and waste materials.

The comprehensive EU strategy for biofuels focuses on seven key priorities:

- activation of biofuel demand;
- gaining environmental benefits;
- development of biofuel production and distribution;
- expanding raw material reserves;
- strengthening business oportunities;
- support for developing countries;
- support for research and development.

The execution of the strategy should also reflect the appropriate adaptation of the Common Agriculture Policy of the EU after its reform in 2003. It portrays an interdisciplinary approach from the energy, environmental, agricultural, and regional points of view.

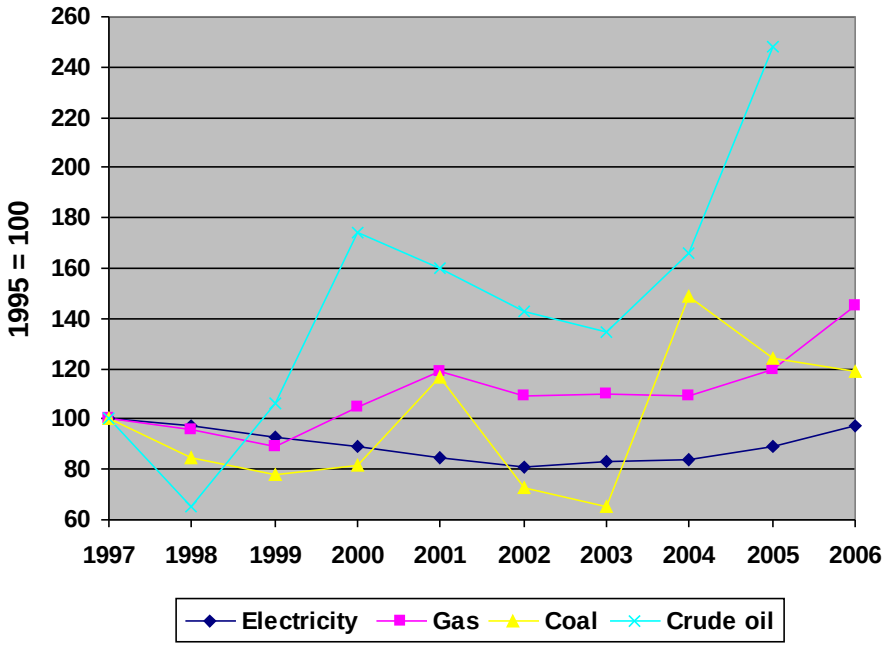
The EU Action Plan for biomass

The key points of this Action Plan are the decrease in energy demand, an increase of confidence in renewable energy resources, and the strenghtening of international cooperation both within and outside the EU.

The plan establishes the measures needed to expand the development of biomass energy gained from wood, waste and crops. This is done by creating market- oriented incentives focused on the use of biomass and by removing the obstraclesto market expansion.

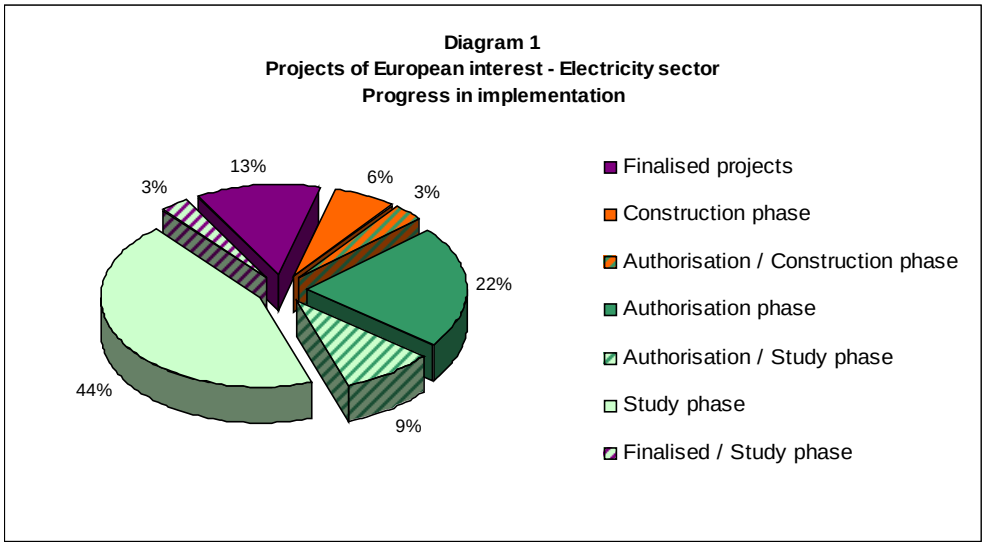
The plan represents the first step in this direction. It establishes measures to support the use of biomass for the production of heat, electrical energy, and transportation. Cross-sectoral measures concerning biomass supply, financing and research are also specified therein. The impacts and suggested individual measures are specified in the conclusion of the plan - .without any obligations!

Annex 3: Average[16] EU-15 electricity and gas retail prices since 1995 (at 1995 price levels)



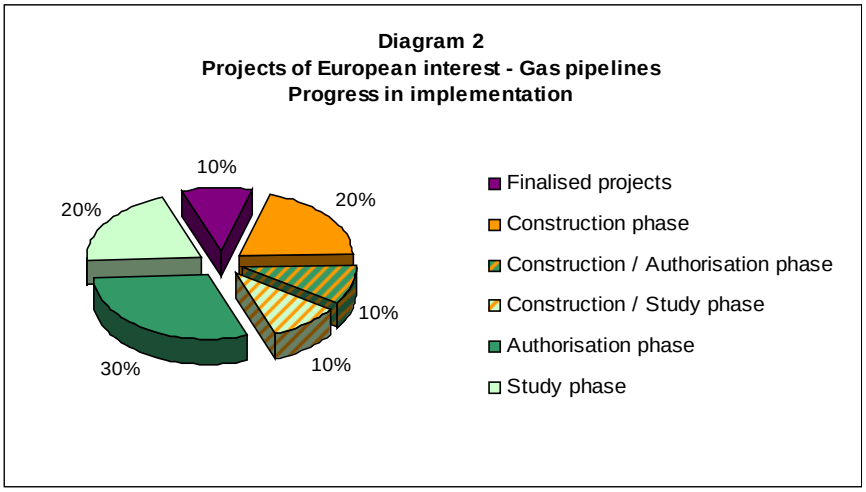
Source: *Prospect for the internal gas and electricity marke*t. European Commission, 2007.

Annex 4, Chart 1: Projects of European interest, electricity sector – Progress in implementation

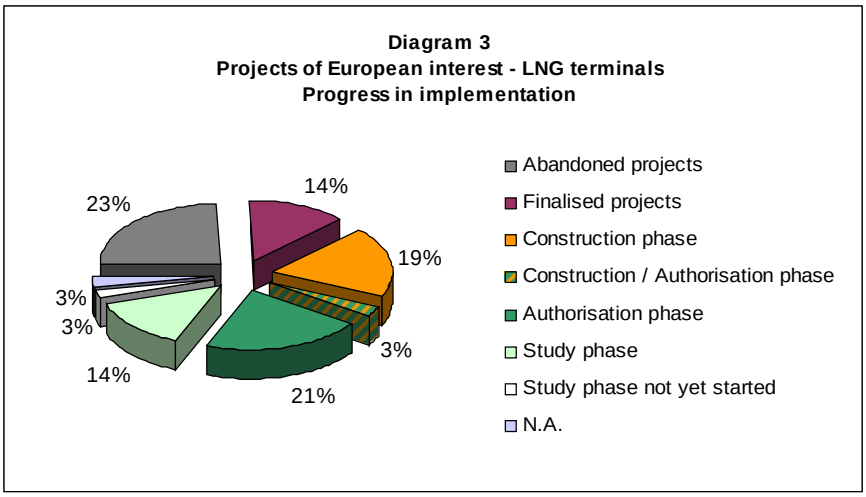


16 Weighted average of large industrial, industrial, commercial and household prices.

Annex 4, Chart 2: Projects of European interest, gas pipelines – Progress in implementation



Annex 4, Chart 3: Projects of European interest, LNG terminals – Progress in implementation



Source: *Priority Interconnection Plan.* European Commission, 2006.

Annex 5, Table 1: Projects of European interest in the electricity sector

	PROJECTS IN ELECTRICITY NETWORKS	COUNTRIES INVOLVED
1.	Aveline (FR) - Avelgem (BE) line	BE, FR
2.	Moulaine (FR) – Aubange (BE) line	BE, FR
3.	Lienz (AT) – Cordignano (IT) line	AT, IT
4.	New interconnection between Italy and Slovenia	IT, SI
5.	Udine Ovest (IT) – Okroglo (SI) line	IT, SI
6.	S. Fiorano (IT) – Nave (IT) – Gorlago (IT) line	IT
7.	S. Fiorano (IT) – Robbia (CH)	IT, CH
8.	Venezia Nord (IT) – Cordignano (IT) line	IT
9.	St-Peter (AT) – Tauern (AT) line	AT
10.	Südburgenland (AT) – Kainachtal (AT) line	AT
11.	Austria-Italy (Thaur-Brixen) interconnection through the Brenner rail tunnel	AT, IT
12.	Sentmenat (ES) – Becanó (ES) – Baixas (FR) line	ES, FR
13.	Valdigem (PT) – Douro Internacional (PT) – Aldeadávila (ES) line and Douro Internacional facilities	ES, PT
14.	Philippi (EL) – Hamidabad (TR) line	EL, TR
15.	Undersea cable link between England (UK) and the Netherlands	NL, UK
16.	Undersea cable link between Ireland and Wales (UK)	IE, UK
17.	Kassø (DK) – Hamburg/Dollern (DE) line	DE, DK
18.	Kassø (DK) – Revsing (DK) – Tjele (DK) line	DK
19.	V. Hassing (DK) - Trige (DK) line	DK
20.	Hamburg/Krümmel (DE) – Schwerin (DE) line	DE
21.	Skagerrak 4 (DK) – Norway undersea cable	DK, NO
22.	Connection of Poland and Lithuania, including the upgrading of the Polish electricity network and the PL-DE section as necessary to allow participation in the internal energy market	LT, PL, DE
23.	Estlink undersea cable link between Finland and Estonia	EE, FI
24.	Fennoscan undersea cable link between Finland and Sweden	FI, SE
25.	Halle/Saale (DE) – Schweinfurt (DE)	DE
26.	Neuenhagen (DE) – Vierraden (DE) – Krajnik (PL) line	DE, PL
27.	Dürnrohr (AT) – Slavětice (CZ) line	AT, CZ
28.	New interconnection between Germany and Poland	DE, PL
29.	Veľké Kapušany (SK) – Lemešany (SK) – Moldava (SK) – Sajoivanka (HU)	HU, SK
30.	Gabčíkovo (SK) – Veľký Ďur (SK)	SK
31.	Stupava (SK) – south-east Vienna (AT)	AT, SK
32.	Electricity connection between Tunisia and Italy	IT, TN

Annex 5, Table 2: Projects of European interest in the gas sector

PROJECTS IN GAS NETWORKS		COUNTRIES INVOLVED
33.	North European gas pipeline	DE, RU
34.	Yamal – Europe gas pipeline	DE, PL, BY
35.	Natural gas pipeline linking Denmark, Germany and Sweden	DE, DK, SE
36.	Increase in transmission capacity on the Germany – Belgium – United Kingdom axis	BE, DK, SE
37.	Algeria – Tunisia – Italy gas pipeline	IT, DZ, TN
38.	Algeria – Italy gas pipeline, via Sardinia and Corsica, with a branch to France	IT, FR, DZ
39.	Medgas gas pipeline (Algeria – Spain – France – Continental Europe)	ES, DZ
40.	Turkey – Greece – Italy gas pipeline	EL, IT, TR
41.	Turkey – Austria gas pipeline	AT, HU, RO, BG, TR
42.	Lybia – Italy gas pipeline	IT, LY

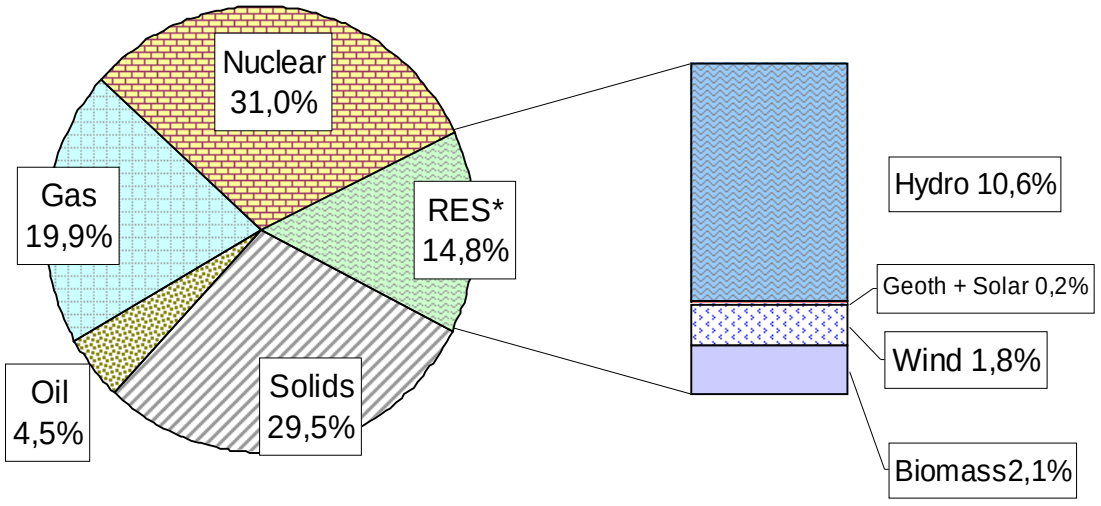
Annex 5, Table 3: Liquefied Natural Gas terminal projects

	LIQUEFIED NATURAL GAS PROJECTS	COUNTRIES INVOLVED
43.	LNG terminal in Santa Cruz de Tenerife, Canary Island (ES)	ES
44.	LNG terminal in Las Palmas de Gran Canaria (ES)	ES
45.	LNG terminal in Madeira (PT)	PT
46.	LNG in Cyprus, Vasilikos Energy Centre	CY
47.	LNG in Crete (EL)	EL
48.	LNG terminal at Le Verdon-sur-Mer (new terminal) and pipeline to Lussagnet storage	FR
49.	LNG terminal at Fos-sur-Mer (extension)	FR
50.	LNG terminal Huelva II, extending existing terminal	ES
51.	LNG terminal Cartagena II	ES
52.	LNG terminal Cartagena III, extending existing terminal	ES
53.	LNG terminal Galicia (new terminal)	ES
54.	LNG terminal Bilbao (new terminal)	ES
55.	LNG terminal Valencia region (new terminal)	ES
56.	LNG terminal in Barcelona (extension)	ES
57.	LNG in Sines (new terminal)	PT
58.	LNG terminal Revithoussa II	EL
59.	LNG terminal on the North Adriatic Coast (at Monfalcone)	IT
60.	LNG terminal at Muggia	IT
61.	LNG offshore in the North Adriatic Sea (Rovigo)	IT
62.	LNG terminal on the South Adriatic Coast	IT
63.	LNG terminal at Brindisi	IT
64.	LNG terminal at Taranto	IT
65.	LNG terminal at Gioia Tauro	IT
66.	New LNG terminal in Italy (Sicily)	IT
67.	LNG terminal at Livorno (offshore)	IT
68.	LNG terminal at Rosignano	IT
69.	LNG terminal Zeebrugge/Dudzele (extension)	BE
70.	Construction of a second LNG terminal in Greece	EL
71.	LNG terminal in Poland project	PL

Source: *Priority Interconnection Plan*. European Commission, 2006.

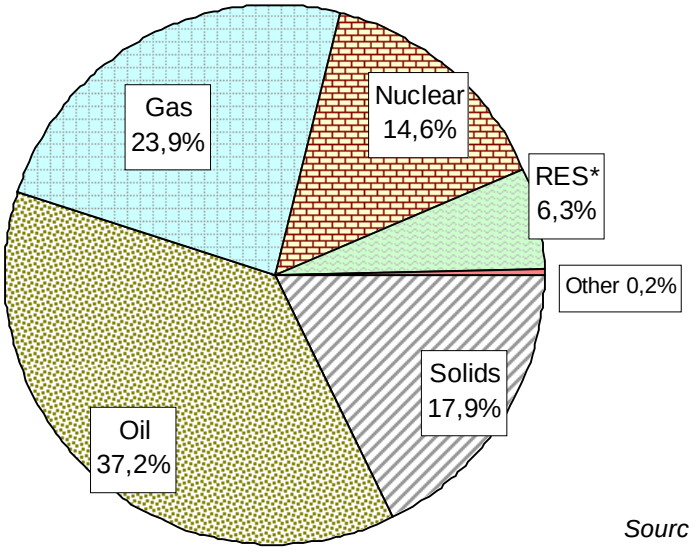
Annex 6, Figure 1, 2:

Figure 1: Nuclear Share in Electricity Generation in EU-25 (~3180 TWh in 2004)



Renewables Energy Sources *Source Eurostat*

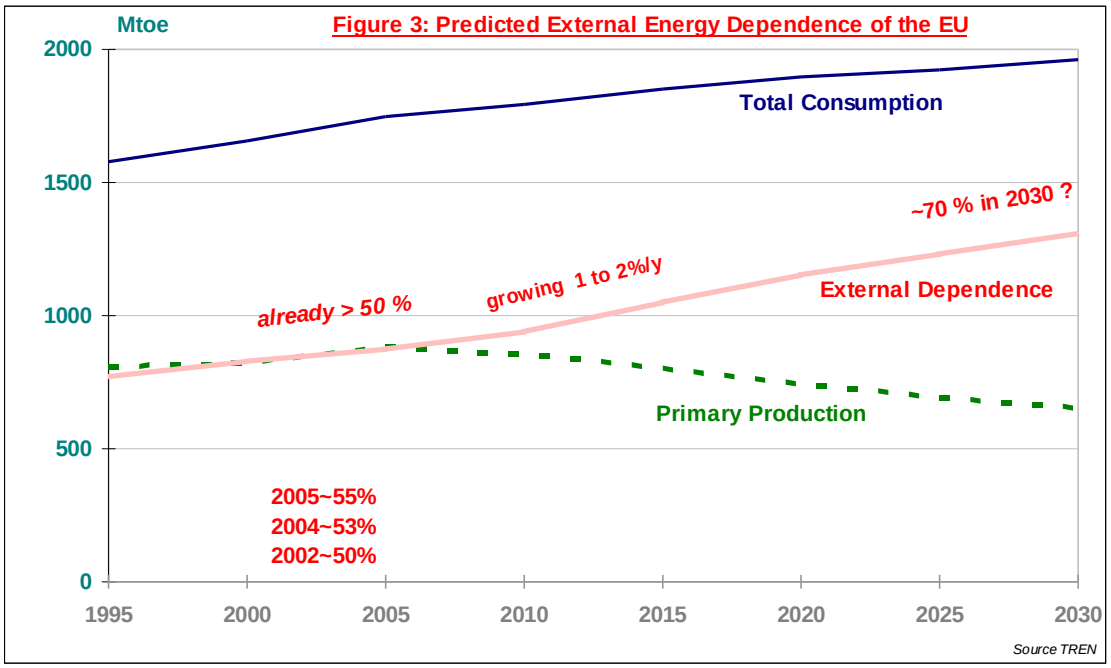
Figure 2 : Nuclear Share of Energy Consumption in EU25 (~1747 Mtoe in 2004)



Renewable Energy Sources *Source Eurostat*

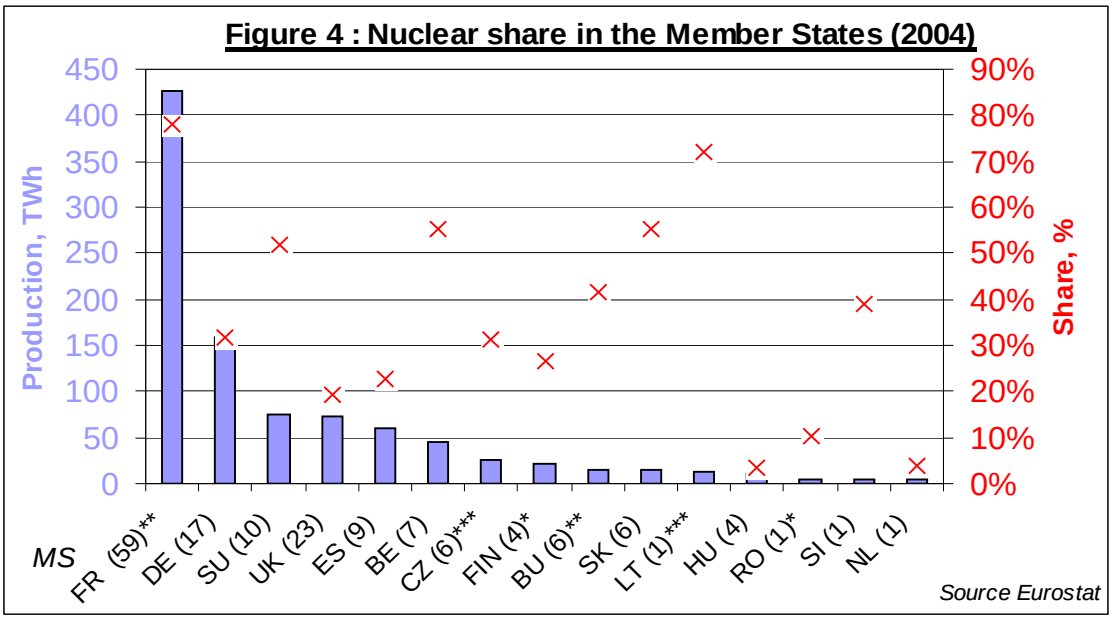
Source: *Draft Nuclear Illustrative Programme*. European Commission, 2006

Annex 7, Figure 3: Relative share of resources used to accommodate energy consumption



Source: *Draft Nuclear Illustrative Programme*. European Commission, 2006.

Annex 8, Figure 4: Comparison of trends in energy consumption and production



Number of NPPs in the EU nuclear Member States, along with their contribution to the nuclear share for electricity generation and production figures.

Annex 8, Table 1: List of Reactors, Electricity Generation and U Requirements in the EU-27 (15 August 2006)

Sources WNA-PRIS	Power Reactors					Electricity Produced in 2005		
Country	Operational in Aug 2006 Nr	Installed Capacity MWe	Shut Down Nr	Under Const. Nr / MWe	Planned + Proposed Nr / MWe	Total, TWh	Nuclear, TWh *(share)*	2006 Uranium Requirement Tonnes U
BE	7	5728	1	-	0	81.5	45.3 *(56%)*	1075
CZ	6	3472	-	-	2 / 1900	76.2	23.3 *(31%)*	540
FI	4	2676	-	1 / 1600	0	67.9	21.8 *(27%)*	473
FR	59	63473	11	-	2* / 3230	549.2	426.8 *(78%)*	10146
GE	17	20303	19	-	0	499.0	154.6 *(32%)*	3458
HU	4	1755	-	-	0	35.1	11.2 *(34%)*	251
LT	1	1185	1	-	1 / 1000	14.8	13.9 *(72%)*	134
IT	0	-	4	-	-	-	-	-
NL	1	452	1	-	0	96.4	3.6 *(3.8%)*	112
SK	6	2472	1	-	2 / 840	29.1	16.3 *(56%)*	356
SI	1	676	-	-	0	13.2	5.6 *(42%)*	144
SP	8*	7442	2*	-	0	279.6	54.7 *(20%)*	1505
SE	10	8975	3	-	0	154.7	69.5 *(45%)*	1435
UK	23	11852	22	-	0	378.4	75.2 *(20%)*	2158
EU-25	**147**	**130556**	**65**	**1 / 1600**	**7 / 5760**	**2275.1**	**924.8**	**21787**
BG	4	2722	2	-	2 / 1900	39.3	17.3 *(44%)*	253
RO	1	655	-	1 / 655	3 / 1995	59.6	5.1 *(8.6%)*	176
EU-27	**152**	**133943**	**67**	**2 / 2255**	**12 / 9565**	**2374.0**	**947.3**	**22216**
Changes* since 04/06	***-1***	***=***	***+1***	***=***	***+1 / +1600***	***-***	***-***	***=***
USA	103	98054	24	1 / 1065	23*/26716	4037.4	780.4 *(19%)*	19715
Japan	55	47700	4	1 / 899	12 / 14782	957.0	280.7 *(29%)*	8169
Russia	31	21743	5	5*/ 4550	10*/11225	869.8	137.3 *(16%)*	3439
Canada	18	12595	7	2*/ 1540	2* / 2000	593.6	86.8 *(15%)*	1635
Ukraine	15	13168	4		2 / 1900	171.8	83.3 *(49%)*	1988
China	10*	7587	-	5 / 4170	63* / 48800	2475	50.3 *(2%)*	1294
India	16*	3577	-	7 / 3088	24 / 13160	555	15.7 *(2.8%)*	1334
South Korea	20	16840	-	-	8	311.8	139.3 *(45%)*	3037
Switzerland	5	3220	-	-	0	68.9	22.1 *(32%)*	575
World	**442**	**368496**	**107**	**28**	**204**	**16400**	**2626 *(16%)***	**65478**
Changes* since 04/06	***+1***	***-***	***n/a***	***+1***	***+53/+45000***	***-***	***-***	***-***

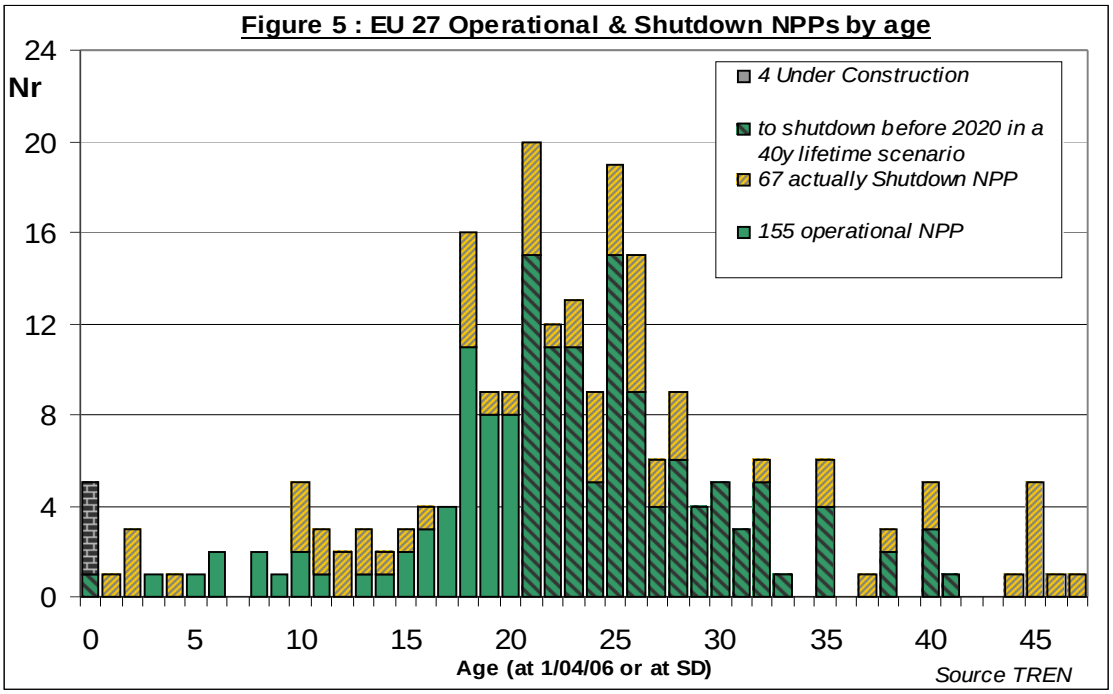
Source: WNA, PRIS

** Note changes between March and August 2006:*

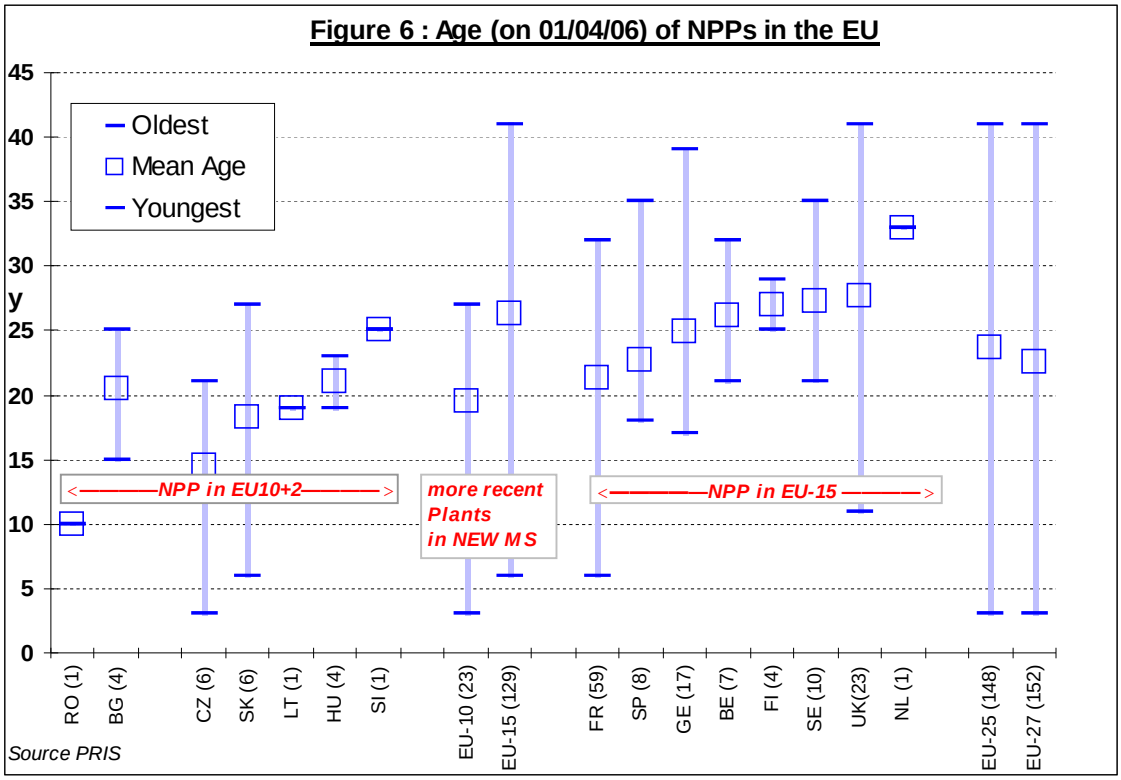
- *EU: 1 shutdown in Spain; 1 second EPR proposed in FR*
- *USA: 10 new proposed/planned*
- *Russia : 1 newly operational; 1 started construction*
- *Canada: 2 started constructions; 2 additional proposed/planned*
- *China: 1 newly operational; 1 started construction; 38 additional proposed/planned*
- *India: 1 newly operational;*

Source: EC: Draft Nuclear Illustrative Programme

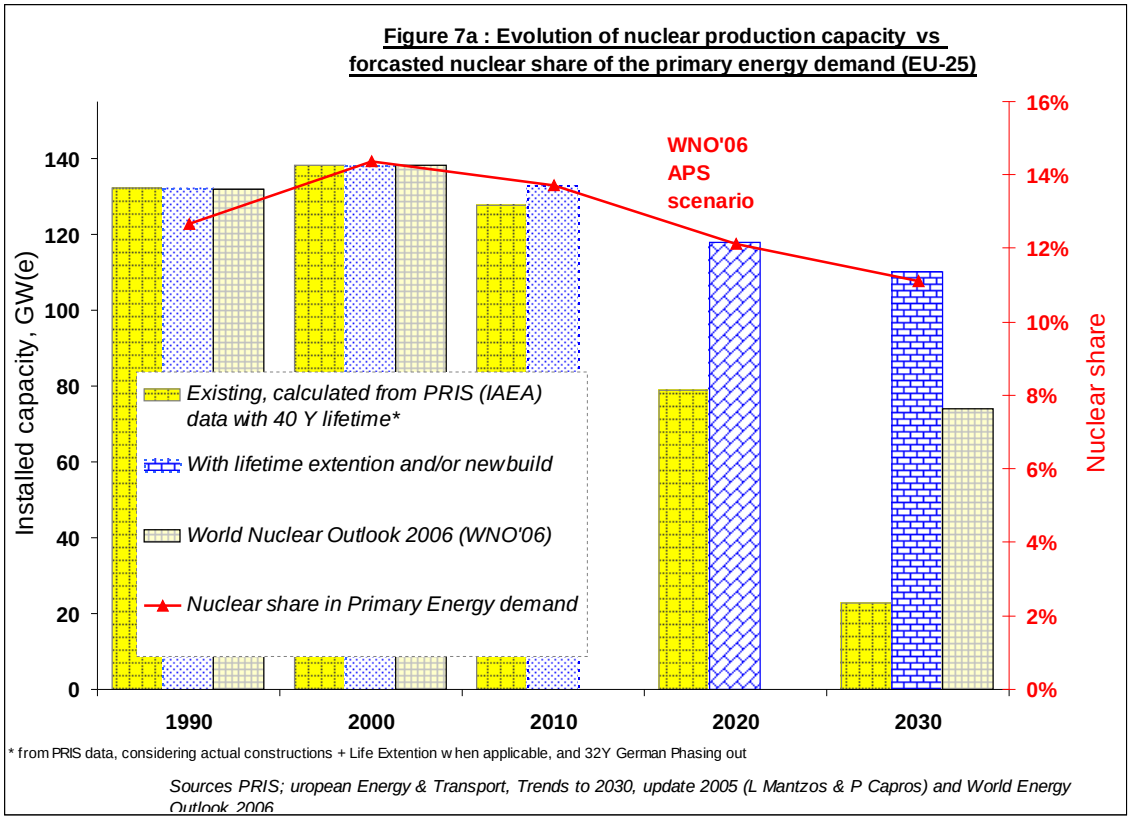
Annex 9, Figure 5: Distribution of operational and planned shutdown for NPPs in the enlarged EU as well as potential new building.



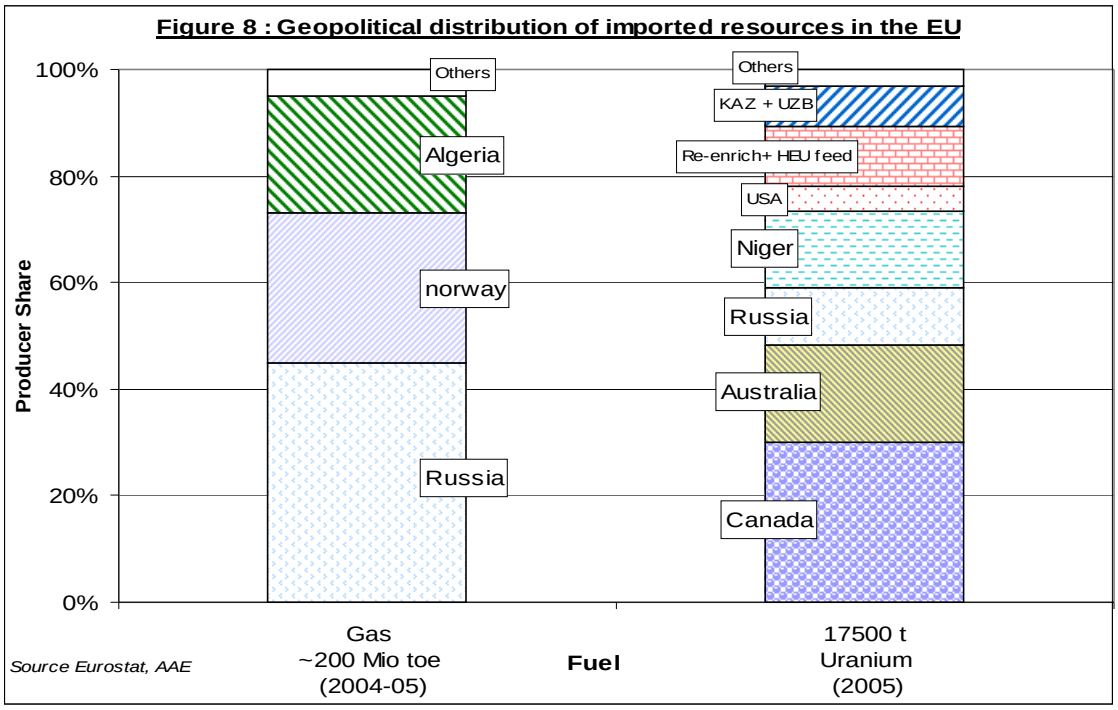
Annex 9, Figure 6: Distribution of age of NPPs in the EU



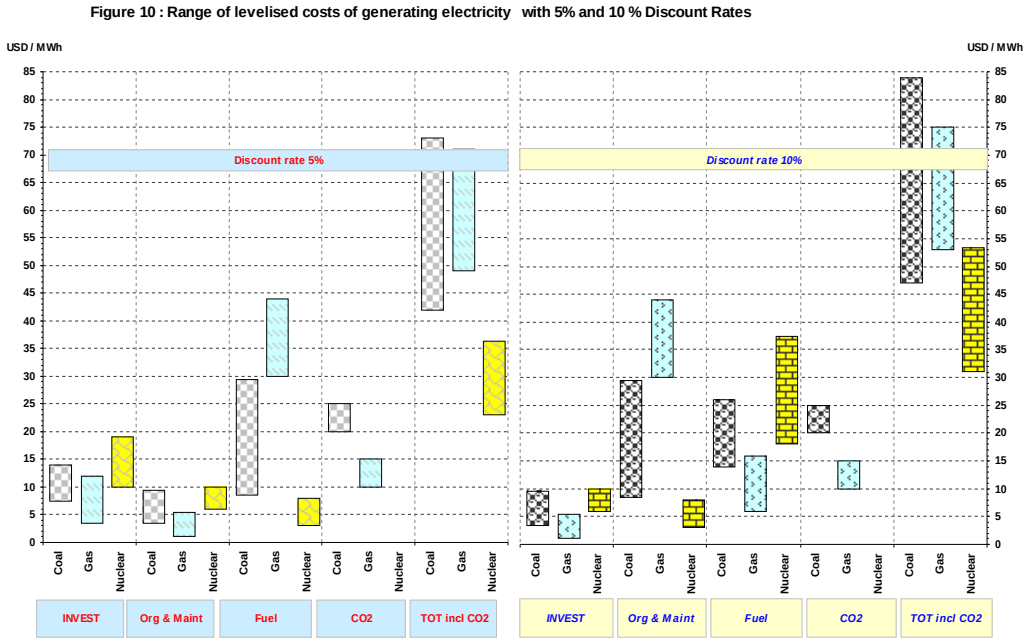
Annex 10, Figure 7a: Projection of the expected nuclear capacity to provide the nuclear share of electricity generation in the EU assuming planned closedown of reactors and potential lifetime extension or/and new building



Annex 11, Figure 8: Comparison of the Geopolitical distribution of imports of uranium and gas into the EU.



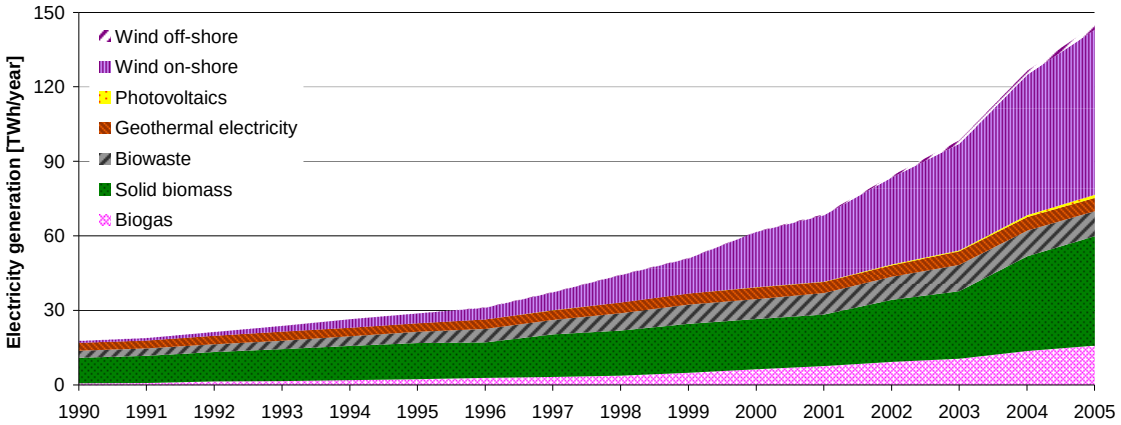
Annex 12: Range of levelised costs of electricity generation



* Carbon emission trading assumed at about 8.2 €/MWh for Combined Cycle Gas Turbine and 18.4 €/MWh for Coal-fired power plants, with a 20 € / t CO_2 carbon price.
Source: *Projected costs of generating electricity*. NEA, update 2005

Range of levelised costs of electricity generation based on a discount rate of 5% or 10 %. Total generation costs for power plants using coal, gas and nuclear are based on Investment, Organisation & Maintenance and Fuel, excluding the impact of carbon emission trading*

Annex 13: Historical development of electricity generation from "new" RES-E in the European Union (EU-25) from 1990 to 2005



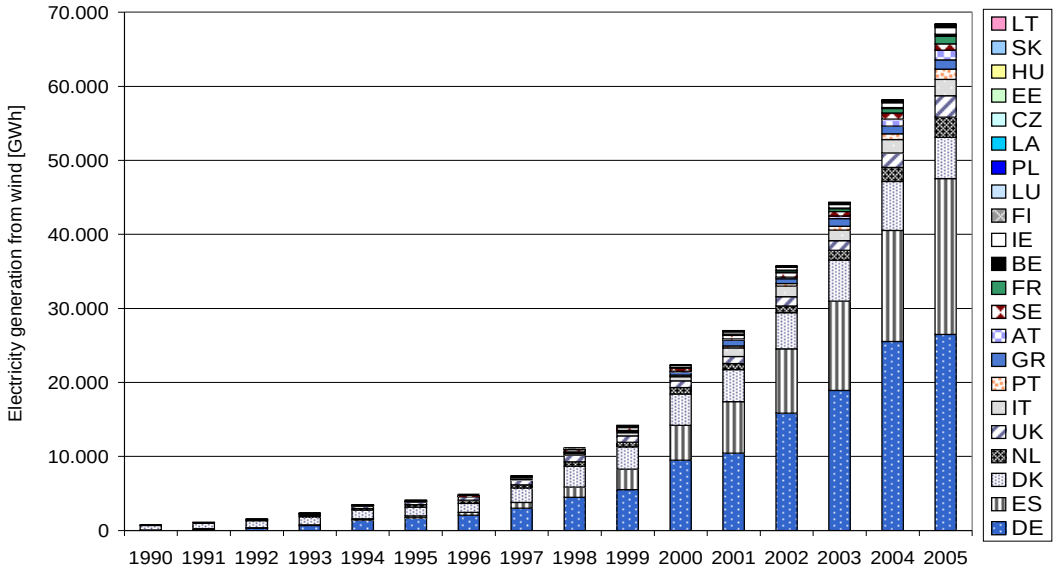
Source: *Report on progress in renewable electricit*y. European Commission, 2006.

Annex 14: Assessment of Member States' progress towards the 2010 target (%)

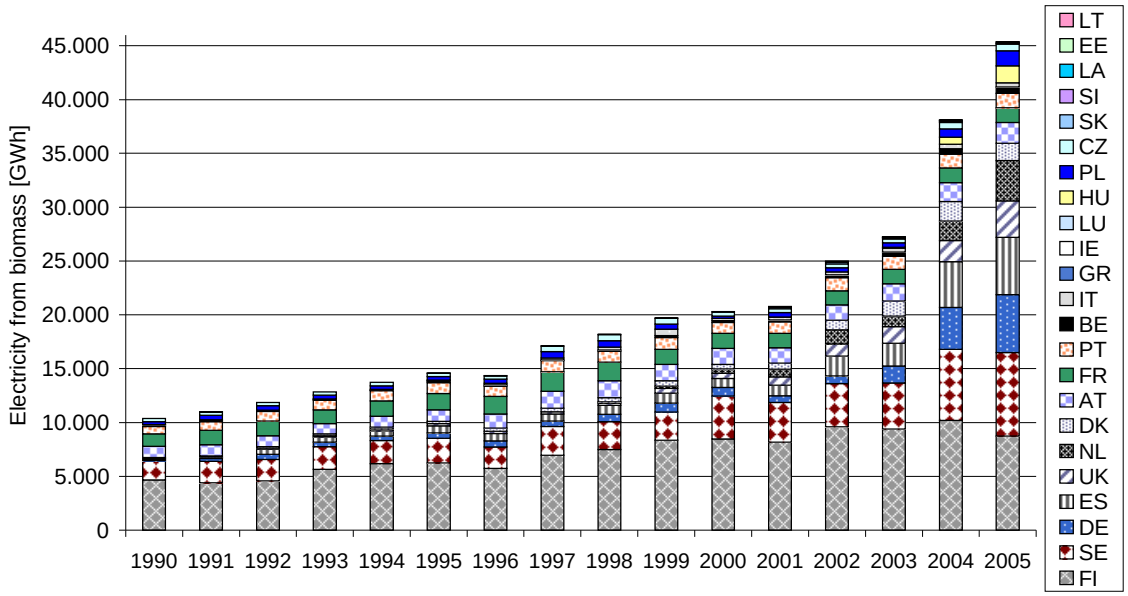
	Reference year (1997 or 2000)	Achieved penetration 2004/2005	Normalised penetration 2004/2005	Objective by 2010	Classification
Denmark	8.7	23.1 (2005)	27.3 (2005)	29.0	**J J**
Germany	4.5	10.4 (2005)	10.8 (2005)	12.5	**J J**
Hungary	0.7	4.4 (2005)	4.0(2005)	3.6	**J J**
Finland	24.7	25.0 (2005)	25.4(2005)	31.5	**J**
Ireland	3.6	6.1(2005)	8.0 (2005)	13.2	**J**
Luxembourg	2.1	3.6 (2005)	4.0 (2005)	5.7	**J**
Spain	19.9	17.2 (2005)	21.6 (2005)	29.4	**J**
The Netherlands	3.5	6.9 (2005)	6.5 (2005)	9.0	**J**
Czech Republic	3.8	4.8 (2005)	4.0 (2005)	8	**K**
Lithuania	3.3	3.7 (2004)	3.3 (2004)	7	**K**
Poland	1.6	2.8 (2005)	3.2 (2005)	7.5	**K**
Slovenia	29.9	29.1 (2004)	29.4 (2004)	33.6	**K**
Sweden	49.1	53.2 (2005)	52.0 (2005)	60.0	**K**
United Kingdom	1.7	4.1 (2005)	4.2 (2005)	10.0	**K**

Belgium	1.1	1.8 (2005)	1.9 (2005)	6.0	**L**
Greece	8.6	9.1 (2005)	7.7 (2005)	20.1	**L**
Portugal	38.5	14.8 (2005)	28.8 (2005)	39.0	**L**
Austria	70.0	54.9 (2005)	57.5 (2005)	78.1	**L L**
Cyprus	0.0	0.0 (2004)	0.0 (2004)	6	**L L**
Estonia	0.2	0.7 (2004)	0.7 (2004)	5.1	**L L**
France	15.0	11.0 (2005)	14.2 (2005)	21.0	**L L**
Italy	16.0	15.3 (2005)	16.0 (2005)	25.0	**L L**
Latvia	42.4	47.1 (2004)	43.9 (2004)	49.3	**L L**
Malta	0.0	0.0 (2004)	0.0 (2004)	5	**L L**
Slovak Republic	17.9	15.4 (2005)	14.9 (2005)	31	**L L**
EU-25	12.9	13.7 (2004)	14.5 (2004)	21.0	

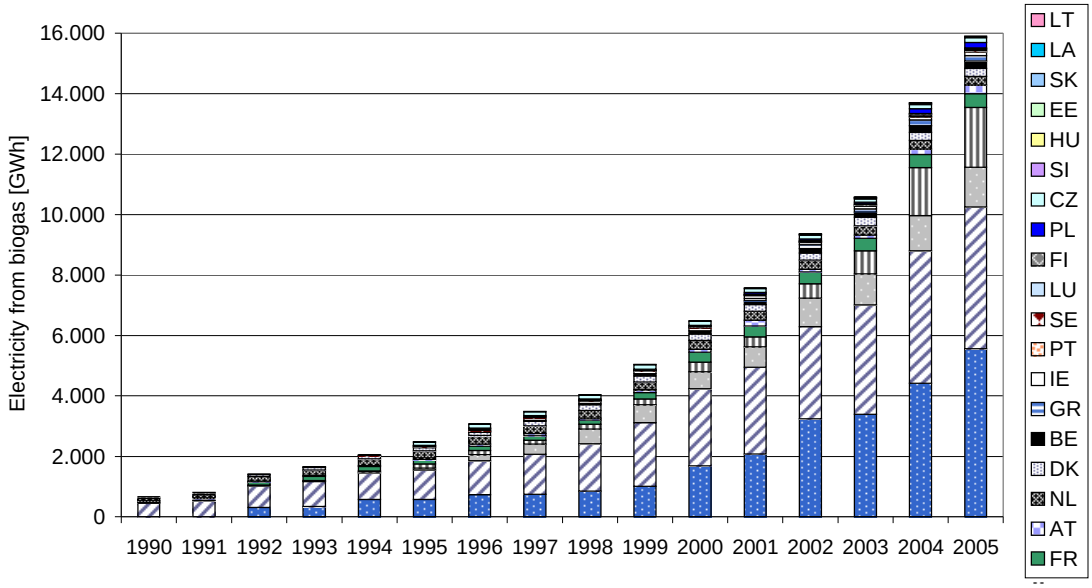
Historical development of electricity generation from wind in the EU-25 Member States from 1990 to 2005



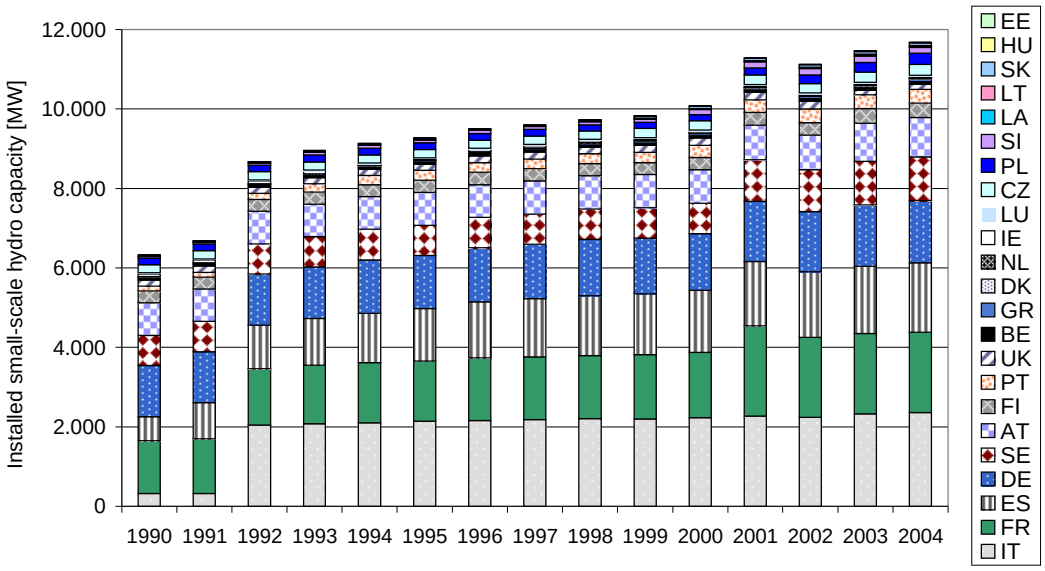
Historical development of electricity generation from solid biomass (excluding municipal solid waste) in the EU-25 Member States from 1990 to 2004



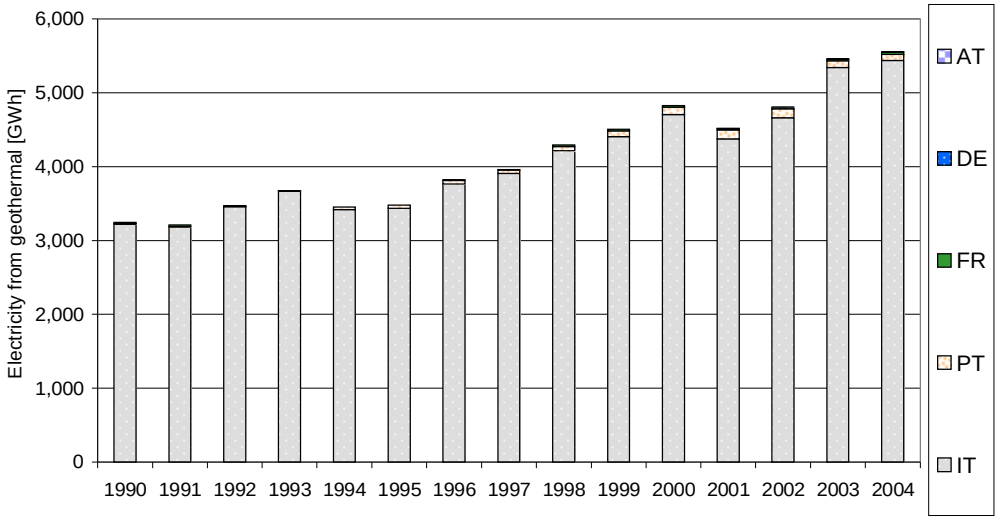
Historical development of electricity generation from biogas in the EU-25 Member States from 1990 to 2005



Historical development of installed small-scale hydro capacity in the EU-25 Member States from 1990 to 2004

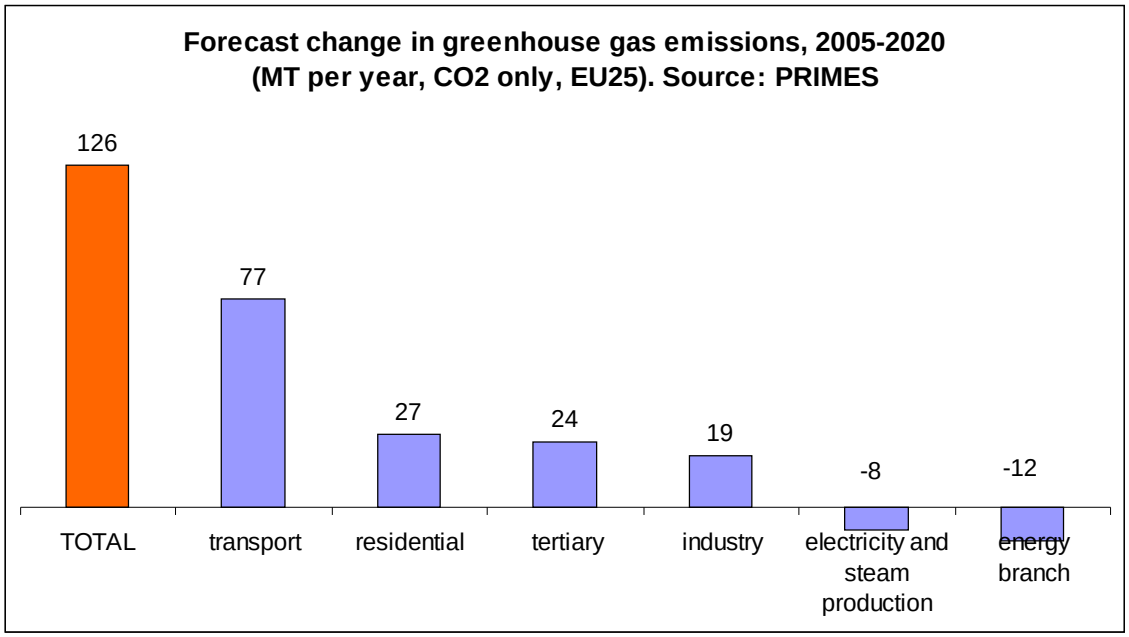


Historical development of electricity generation from geothermal sources in the EU-25 Member States from 1990 to 2004



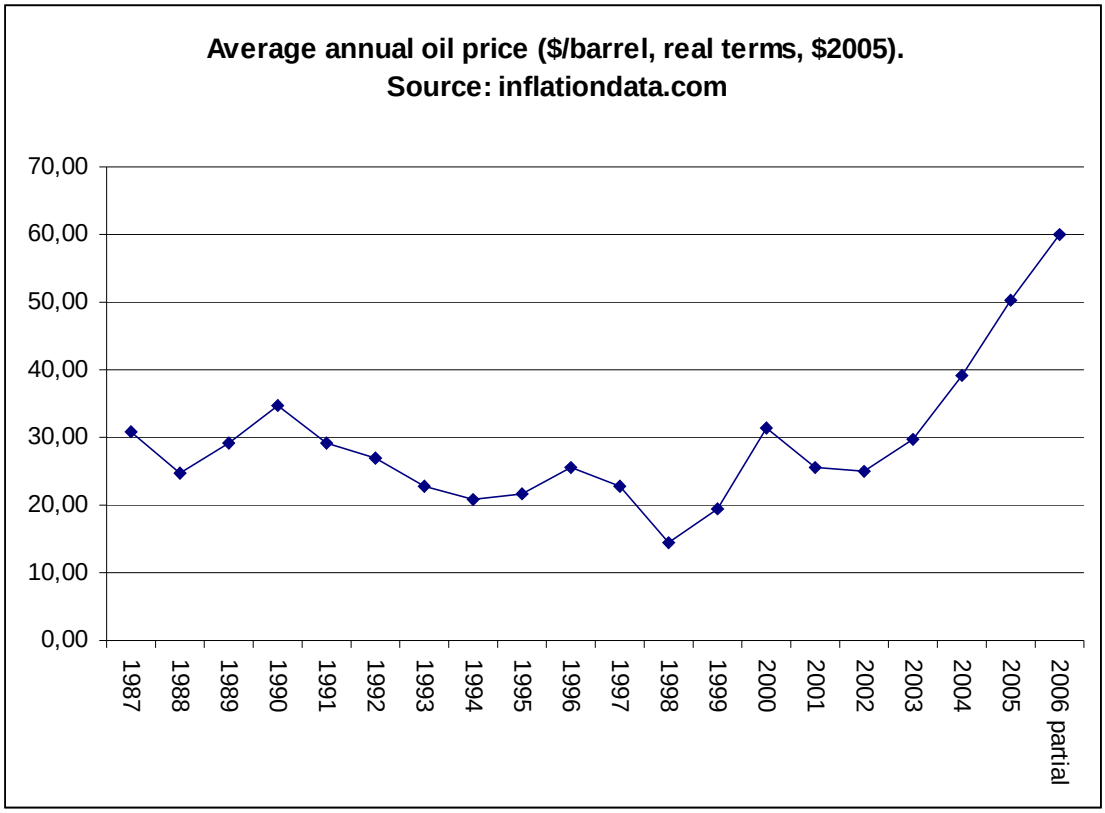
Source: *Report on progress in renewable elecricity*. European Commission, 2006.

Annex 15



Source: *Biofuels Progress Report*. European Commission, 2006.

Annex 16



Source: *Biofuels Progress Report*. European Commission, 2006.

Annex 17

Table 1: Scenarios for biofuel use[17]

Mtoe	**7% share of biofuels**	**14% share of biofuels**
domestic production		
biodiesel from rape	4.7	3.9
BTL from farmed wood	-	10.5
BTL from straw	2.5	0.5
ethanol from sugar beet	0.6	0.8
ethanol from wheat	5.6	11.2
ethanol from maize	1.3	1.5
Cellulosic ethanol from straw	2.1	5.0
Imports		
rape for biodiesel	2.4	2.6
palm for biodiesel	0.4	2.9
soy for biodiesel	2.6	3.2
ethanol from sugar cane	0.8	0.9
TOTAL	**23.1**	**43.1**
share of imports	*27%*	*22%*
share of diesel replacers	*55%*	*55%*
share of second-generation	*20%*	*37%*

Table 2: Estimated EU25 arable land use in 2020 with and without biofuels [18]

Million hectares	**"no biofuel" scenario**	**"7% biofuel" scenario**	**"14% biofuel" scenario**
rape for biodiesel	0	2.7	2.6
cereals for bioethanol	0	4.6	8.3
sugar beet for bioethanol	0	0.3	0.5
farmed wood for BTL[19]	0	0	6.9
TOTAL LAND FOR BIOFUEL PRODUCTION	0	7.6	18.3
non-biofuel arable production	87.6	84.8	80.8
idle arable land (set-aside)	10.8	7.7	3.4
TOTAL ARABLE LAND	98.4	100.1	102.5

Table 3: Estimated fuel costs (cost in 2020, €2005, oil at $48/barrel, cheapest biofuel production technique)

€/toe	**JEC values**	**adjusted values: "7%" scenario**	**adjusted values: "14%" scenario**
biodiesel from rape	703	686	725

[17] The most likely source of imports could be: Rape oil from Ukraine and Russia; soy oil from Latin America; palm oil from Indonesia and Malaysia; sugar cane ethanol from Brazil or other tropical countries.

[18] Source: 14% scenario from ESIM. 7% scenario from ESIM, adjusted to exclude use of farmed wood (since straw would be available, more cheaply, in sufficient quantities to supply the volume of second-generation biofuel production expected under this scenario). This adjustment was carried out on the assumption that land no longer required for biofuel production would be allocated between i) idle arable land, ii) arable land in active non-biofuel use and iii) non-arable land in the same proportions as are implied, in the ESIM results, for the shift between a 14% and a 7% share. Finally, the same assumption was used to estimate the "no biofuel" scenario.

[19] All the feedstock for cellulosic ethanol, and also for BTL in the 7% scenario, is assumed to come from straw that would otherwise be unused.

biodiesel from imported palm/soy oil	668	652	689
BTL from straw	n.a.[20]	951	885
BTL from farmed wood	1114	1028	963
ethanol from sugar beet	681	743	755
ethanol from wheat	607	730	777
ethanol from maize	n.a.	n.a.	n.a.
ethanol from imported sugar cane	577	694	717
Cellulosic ethanol from straw	1034	815	737
diesel and petrol	398 (both scenarios)		

Source: Commission service calculations from data in JEC (2006), amended for second-generation biofuels and for imports as described above.

Table 4: Important price effects of biofuel promotion relative to "no biofuel" scenario [21]

commodity	"7%" scenario	"14%" scenario
Beef	-7%	-7%
Sheep	-5%	-5%
Eggs	-7%	-7%
Pork	-5%	-5%
Poultry	-5%	-5%
common wheat	+7%	+15%
rape meal	-56%	-60%
rape oil	+102%	+122%
rape seed	+15%	+17%
soya bean	+6%	+8%
soya meal	-41%	-48%
soya oil	+110%	+126%
Wood	no expected price effect[22]	
Oil	-1.5%	-3%
Glycerine	n.a.	n.a.

Source: ESIM results except oil price effect calculated by Commission services on the basis of elasticities from Cooper (2003)

Table 5: Estimated greenhouse gas emissions from transport fuels, EU, 2020 (cheapest production techniques) – well-to-wheel analysis of individual fuels

fuel	greenhouse gas emissions ($tCO2_{eq}$/toe)	saving (%)
Diesel	*(3.65)*	
biodiesel from rape	1.79	51%
biodiesel from soy	2.60	29%
biodiesel from palm	1.73	53%
BTL from straw	n.a.	n.a.
BTL from farmed wood	0.27	93%
petrol	*(3.62)*	
ethanol from sugar beet	2.17	40%
ethanol from wheat	1.85	49%
ethanol from sugar cane	0.41	89%
Cellulosic ethanol from straw	0.33	91%

[20] Not included in JEC (2006). Costs under 7% and 14% scenarios estimated by Commission services.

[21] Relative to scenario with no biofuel consumption. Wholesale prices, 2020.

Table 6: Promotion of biofuels – summary of quantified impacts (annual, 2020)

	"7%" scenario	"14%" scenario
extra cost	€7.9 bn	€17.6 bn
short-term security of supply (maximum)	€2.7 bn	€5.1 bn
long-term security of supply – reduced imports of oil from Middle East and CIS	23 Mtoe	43 Mtoe
employment in EU	105 000 jobs	144 000 jobs
GDP	+0.12%	+0.23%
greenhouse gas emissions	-45 Mt	-99 Mt

Source: *Biofuels Progress Report*. European Commision, 2006.

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