Chapter three

Energy markets and the development of

renewable energy sources in the new Member States

As shown in previous chapters, the new Member States are going through significant transformations as a result of the accession process but also because they strive to achieve a more sustainable economic growth. Challenges are great and the importance of the way energy is being produced and consumed cannot be overlooked. Substantial adjustments will need to be made in national legislations, the structure of national energy systems and consumer behaviour if countries seek an adequate answer to these challenges.

It is somehow surprising that energy did not quite catch the eye of the international community back in 1992 when concerns about future sustainable development took a more concrete shape[1]. However, Agenda 21[2], the main non-binding intergovernmental outcome of the United Nations Conference on Environment and Development (UNCED), does mention the energy sector across various chapters. In Chapter 9 for instance, there are 4 programme areas, one of which is the promotion of sustainable development. Within this Program area (B), it is recognised that: "*Energy is essential to economic and social development and improved quality of life. Much of the world's energy, however, is currently produced and consumed in ways that could not be sustained if technology were to remain constant and if overall quantities were to increase substantially. The need to control atmospheric emissions of greenhouse and other gases and substances will increasingly need to be based on efficiency in energy production, transmission, distribution and consumption, and on growing reliance on environmentally sound energy systems, particularly new and renewable sources of energy. All energy sources will need to be used in ways that respect the atmosphere, human health and the environment as a whole."*[3]

---

[1] This is when the United Nations Conference on Environment and Development took place in Rio de Janeiro (Brazil). During this process, the energy sector has not been addressed as a distinct area.

[2] Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment.
Full text is available on http://www.un.org/esa/sustdev/documents/agenda21/

[3] Section B.1 Energy development, efficiency and consumption. See *Supra Note* 2.

Therefore, with the Agenda 21, the international community established the link between energy services, welfare, climate change and diversification of energy supply by increasing the utilisation of renewable energy sources. These issues have been taken forward ever since by numerous forums [4] including by the European Commission in its strategies on energy, environment, transport and agriculture to name a few. Consequently, various legislative measures have been or are about to be put in place in order to create a functional internal energy market and to address these issues in a coherent manner at the level of European Union, a Union which the new Member States are now part of.

This chapter describes some aspects related to the liberalisation process and its impact on the European energy markets. The discussion includes views on the drivers and some outcomes of the liberalisation process and a comparative overview of the main characteristics of energy systems in the new Member States and the EU-15 in the context of EU internal energy market. Further on, the chapter continues with a brief analysis of the reform in the electricity sector in the new Member Sates and discusses few issues which are likely to have an impact on the future development of renewable energy sources in these countries. Finally, some conclusions on the status of the liberalisation in the new Member States and its consequences on the future development of renewable energy sources are being provided.

3.1 Liberalisation of the European energy market

Doing business in today's energy markets is becoming an increasingly complex issue. At global level, energy systems tend to shift from vertically integrated business units to open, diverse market places and more often than not, to horizontally integrated businesses. New energy products - such as energy services or electricity with a green value attribute [5] - will be required if market players are to maintain their

[4] UNDP, UNDES, WEC, „*World energy Assessment: overview 2004 update*", pg. 17-23

[5] In the author's view, it is important to recognize that what differentiates the electricity produced from renewable energy from the one produced with conventional sources is exactly this green value that has intangible benefits to the society at large. These benefits include: cleaner environment, enhanced security of supply, health improvements to name a few. In addition, if well designed, renewable projects could also bring about an income-generation cycle for communities living in remote areas. Therefore, the author argues that this green value of the electricity produced from renewable sources

competitive edge as new actors penetrate the market. As the process advances, questions arise such as: What new requirements - equally for the market players and regulators - will need to emerge in the lead up to a liberalised European internal market? How can the incumbent companies maintain their competitive edge, and just as important, how can new companies gain it? How do market participants adapt and what does all this mean for the energy consumer?

There is no one definition of liberalisation but since 1996, when the whole process started across Europe, it became increasingly evident what we expect from it. In author's opinion, through liberalisation we aim to achieve fair and safe access to energy production facilities (including decentralized ones) and services, non-discriminatory, transparent, easily tradable and competitive conditions for cross-border network use, fair conditions for new entrants (including appropriate dispute-settlement mechanisms) and enhanced price transparency to enable us to move towards a sustainable energy production and consumption[6].

To attain these objectives requires, in author's opinion, adequate transmission and distribution capacity, transparent pricing and tax regimes, enforceable and unambiguous policies and planning coupled with a substantial change in consumer behaviour. To fully reap up the benefits of a flexible system, it is also imperative that consumers are free to choose their supplier (freedom to switch) and suppliers are able to offer their modern energy services to the grid and customers (freedom to trade). An effective liberalisation process will require among others transparency, changes in the regulatory behaviour and fair competition.

---

should be recognized and valued by the society and therefore considered as a commodity or service on its own right.

[6] For the purpose of this thesis, the author means by "sustainable energy production", a production that applies a long-term perspective to energy supply through the use of different energy sources with increased share of renewable energy and tailored to each country's specifics (e.g climatic, geographical and economic conditions, the stage of development, structure and age of its energy system and particular needs of remote communities). By "sustainable consumption", the author means a more responsible consumption that accounts for the specific needs of each end energy consumer (e.g security of supply, high quality energy) but also for the needs of the society at large and future generations such as the right to cleaner environment, access to modern energy services for larger number of people, access to energy resources of future generations, etc.

3.1.1 Two drivers for energy market liberalisation

Although it is hard to pin-point a particular reasoning behind liberalisation, it seems that back in mid 90s there was a certain political will to offset the effect of the de facto monopoly structure in the energy industry on market efficiency and to break open the issue of energy supply diversification. Further below, some attention is being given to these particular two challenges that continue to defy the European internal market to this date.

3.1.1.1 Market dominance by incumbent utilities

The liberalisation process is a relatively new phenomenon and its workings are still to be fully revealed. However, some interesting insights can be gained from past experiences as well as most recent events observed in the EU-15.

When liberalisation started in Europe back in 1996, the energy markets, although already in the process of transformation, were largely dominated by monopolies[7]. The "monopoly" structure of the energy industry emerged from the common perception that these network industries were strategic assets, able to supply vast territories and an increasingly large number of consumers with reliable energy at an affordable price by taking stock of economies of scale[8].

[7] W. Baumol and A.Blinder define the pure monopolist as follows: "*A pure monopoly is an industry in which there is only one supplier of a product for which there are no close substitutes and in which it is very hard or impossible for another firm to coexist*." (Economics: principles and policy, pg. 578).

[8] This is a basic economic principle according to which production costs decline as output increases. In the electricity industry, the London-born Samuel Insull (1859-1938) is credited to be one of the creators of the electric utilities as we grew to know them nowadays and who first spotted the advantage of economies of scale. While still working for Edison, Insull was the one recognising the advantages of using the alternative current instead of direct current and started to develop important economic concepts that governed modern utility planning and pricing ever since. Early leaders in the electricity industry back in that late 1800s recognized that scattered electric utilities (most of them using DC and therefore had to be built as close as possible to the consumer to diminish the transport losses) suffered from high fixed costs as a result of heavy investment necessary for the generation and distribution system. Insull understood that more customers on the system will bring more revenues and therefore the fixed costs could be widely spread among the system participants thus keeping the price for the electricity affordable for all consumers. Establishing the appropriate price for the electricity supplied was a challenge. Once metering became possible, Insull came up with a calculation of the electricity price to cover the fixed costs and variable costs (incurred during daily operation). Insull also is allegedly known as one of the early proponents for the industry regulation. Back in 1898, in an address before the US National Electric Light Association, Insull proposed that electric companies be

The key element in preserving the monopoly structure was to keep potential competitors out of the market, behaviour known as placing barriers to entry (that can be both in form of legal restrictions and cost advantages) which is what happened with the energy companies. Moreover, after the Second World War, energy companies in Europe were nationalised and were given the status of strategic companies (due to the service they provided and the fact that they use massive natural resources-hence a public good). Thus the high cost of investment needed to meet the rising demand[9] was covered, most times, at the expense of the tax payer. The principal regulatory characteristics in this period included[10]: exclusive rights to build and operate networks granted through concessions or licenses, closure to competition, detailed regulation of vertically-integrated operations, remunerations based on historical costs and a high degree of planning with tight, centralized control. The end-consumer had no say in the way the energy chain was organized and almost no knowledge of how or if something could have been done at the consumption level to improve the quality of life while reducing the energy bill in the same time. Those in charge with energy planning, management and operation of the energy system bore no risks for system failures and consequences for deficiencies in business decisions or maintenance were passed on to the end-consumer. The main concern related to the preservation of the de facto monopolistic structure of the former incumbent electric utilities was that systemic exercise of market power would significantly diminish the consumer benefits resulting from market restructuring for reasons which are briefly explained below.

According to the economic theory, the monopoly does not have to adjust his supply by observing the price on the market. In other words the monopoly is not a price taker. On the contrary, the monopoly is able to

---

regulated by the state agencies that should establish rates and set service standards. The argument was that if private-owned companies are oversaw by governmental agencies, the public might be more supportive and thus finance would be easier to obtain. Unfortunately, despite his visionary approach, Insull perished in the end due to its monopolistic greed which led to an unsustainable business structure (albeit the crash in 1929 contributed to accelerate the downturn). The scale of the disaster and the potential impact on the end-consumers determined president Roosvelt to take serious action against monopolists of this kind restricting their ownership rights and forced the incumbent companies to operate in a more transparent fashion. For further reading see C. Darrow, "*Enron meltdown: just a tip of the Iceberg?"(*www.ucan.org).

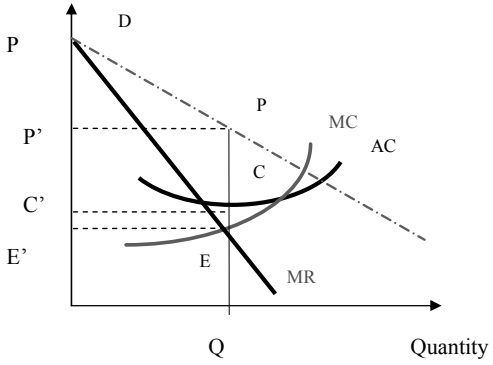
[9] It was the case with the formation of EdF (France) in 1946, ENEL (Italy) in 1962 and the UK with the establishment in the late 40s of the Central Generating Electricity Board.

[10] P.Cameron, Competition in energy markets; law and regulation in the European Union, Oxford, 2002, pg. 7.

be a market (price) maker thus having a combination of price-quantity of its own choosing. *Figure 3.1* explains the profit maximization for a monopoly.

Figure 3.1 Profit maximizing for a monopolist

MR=marginal revenue, MC=marginal cost, AC=average cost,
DD=demand curve



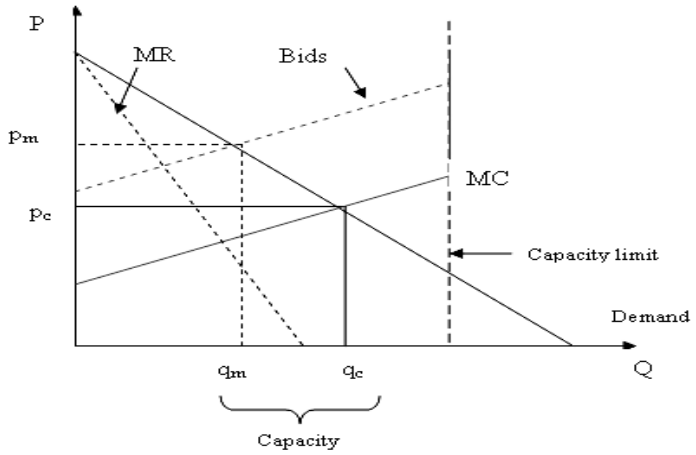
Source: Baumol and Blinder (1991)[11]

When a monopolist would like to increase sales by one unit, he has to cut prices for all consumers to attract new sales. When the price is cut, all consumers benefit. The additional revenue that the monopolist is making by increasing sales with one unit (the marginal revenue, MR), is therefore the difference between the revenues due to increased sales and the loss by cutting the price across all consumers. Going back to the *Figure.3.1* above, the monopolist will produce the quantity Q (when the marginal revenue equals marginal cost) but will charge the corresponding price P`. Since the average cost (AC curve) would lead to a price C´(<P`), the profit that the monopoly is making is consequently the rectangular area CPP`C`. In a competitive market on the other hand,

[11] See *Supra Note* 7, pg. 581 (*however the original Figure has been slightly modified by the author for the sake of clarity)*

a player would earn in long run just enough to cover its costs but higher profits can persist for the monopoly due to barriers to entry[12].
Secondly, because it is a price maker, the monopoly can restrict output to influence an upward move of the price in the market. In electricity markets, capacity can be withheld with the aim of setting higher market clearing price for wholesale electricity (see *Figure 3.2* below)[13].

Figure 3.2 Capacity withholding by a monopoly in electricity markets



The output q_m is kept below capacity. Bids exceed marginal cost (MC) to force higher market clearing price (p_m). This situation may have happened in Denmark where dominant producers are suspected to continuously drive up the area prices during transmission congestions with the neighbouring countries. On 2 September 2003, hourly prices skyrocketed inflicting a one-day loss of DKK 3million on the largest

[12] Probably one of the most relevant stories of this kind in oil business can be found in D. Yergin, The Prize; the epic quest for oil, money and power, 1992. In the electricity sector one recent such behaviour has been detected in the Slovenian market in August 2003. For details see R.Golob, "*Slovenian energy market opening-lessons learnt*", presentation delivered during the 10 year anniversary of the Slovenian Energy Forum, November 2003, http://www.ljudmila.org/sef/; For examples in the Nordic markets see D.Barbu, "*Market power in liberalised European energy markets*", November 2003, http://www.uni-oldenburg.de/speed/english/staff/barbu/presentations.htm
[13] W.Hogan, "*Market power and electricity competition*", paper presented at the 50th Annual Antitrust law spring meeting, American Bar Association, Washington DC, April 25 2002, http://ksghome.harvard.edu.

supplier in Jutland, Energi Danmark. In this case, Elsam, the electricity generation company, was suspected of market abuse[14].

Finally, monopolies tend to charge higher prices for smaller output than it would be the case in a competitive market given the same demand and cost conditions. In other words, monopolies tend to be inefficient. This may happen because a competitive industry would seek to use society's resources in 'just the right amount' to produce its commodity. In a free market, inputs are assigned to the most efficient firms. If a firm in a competitive environment is not able to produce a commodity in a most efficient way, sooner or later that firm will be priced out from the market. A monopoly however may not have this incentive to be efficient due to barriers to entry and the ability to take stock of economies of scale.

From the discussion above it is becoming evident that if unchallenged, a monopoly will end up eventually preventing new entrants from accessing the market (easy access of new entrants on the other hand being a necessary condition to ensure that competition is maintained over long-term) and sending the wrong signal to the end-consumer by not reflecting in its policy the core of our very existence: the scarcity of our resources.

Many different economic models have attempted to simulate the electricity market in Europe in order to uncover the implications its oligopolistic structure would have on resource allocations, end-consumer prices and the environment. But most of the models tend to use simplifying assumptions that do not always count for various aspects of real-life operation such as the treatment of capacity reserves, generation ramping constraints, uncertain outages, provision of various ancillary services, complex hydro power management, the existence of interruptible contracts as a means to mitigate peak demand, etc. Some experts estimate for instance that real-life constraints could increase by 5% the chance that an individual power plant is unavailable in any given hour[15]. Other issues specific to the electricity markets that, in the author's opinion, have not been yet fully investigated - but which have a certain impact on the strategic behaviour of dominant players - include the

[14] However, the Danish producer blamed the auctioning mechanism that governs the cross-border trade between Denmark and Germany instead. For details and a good discussion on these issues see Montel Powernews, Vol4 No3, May 2005.
[15] S.M.Harvey and W.Hogan, "*Market power and market simulations*", July 2002, http://ksghome.harvard.edu .

impact of high level of integration in financial markets compared with the much slower integration of physical markets for electricity[16] , the role of demand response policies to mitigate peak demand[17] and the role of vesting contracts[18] to name a few. For all the reasons mentioned, it is not always easy to distinguish between abuses of market power and effects of real-life operation constraints[19] and therefore policy decisions should also take into account events taking place in real markets to ensure that market failures are being addressed while avoiding in the same time costly and unnecessary regulatory intervention. When it comes to renewable energy, in the author's opinion, the entry of new, small and medium sized enterprises, into the market would provide a real opportunity for fast deployment of these technologies and would create a healthy competitive pressure on incumbent integrated companies in long-term. Therefore one of the priorities of the regulatory process should be a sustained effort to ensure easy entry into the market of these new players. *For more discussion on competition in European markets see section 3.1.2 below*.

3.1.1.2 Scarcity of natural resources

For many years the conventional wisdom in many network industries advocated for lower prices in the interest of the general public. The energy sector in particular was doomed to follow the trend as energy is

[16] For instance, some people tend to believe that in markets where trading forward contracts is a common place, this trading could actually enhance the market power of the dominant player. For a discussion see J. Bushnell, "*Oligopoly equilibria in electricity contract market*", Center for the Study of Energy Markets Working Paper CSEMWP 148, Berkley, University of California, 2005, www.repositories.cdlib.org .

[17] During the winter 2002-2003, residential users (most of which had variable pricing contracts) in Norway reduced significantly their demand in response to sharp price increases that occurred because of lack of hydro resources, thus successfully avoiding blackouts. Details in T.Jamasb and M.Pollitt, "*Electricity market reform in the European Union; review of progress toward liberalisation and integration*", MIT Center for Energy and Environmental Policy Research, WP 05-003, March 2005, http://eb.mit.edu/ceepr . Dominant players are more likely to abuse their market power in periods of power shortages. Reducing the risk for these periods to occur via a demand response could diminish the opportunity for the dominant players to exercise market power. However designing adequate demand response programs may not be that easy. See more discussion on the issue in the section on the impact of liberalisation on energy markets later in this chapter.

[18] One method to hedge against the risk of price volatility in electricity markets is through vesting contracts. Vesting contracts apply to the wholesale market and represent contracts concluded between generators and retailers. Essentially, the vested contract is a financial instrument where quantities and prices are specified (with provisions for price escalations/inflation) for all the periods across the duration of the contract. The retailer is locked into a price path for some or all of its purchases. This sort of contracts may have impacts on transitional arrangements in the retail market (therefore relevant for horizontal integration).

[19] For a good discussion on these issues see for instance *Supra Note* 15.

the basis of all economic activities in one form or another and access to energy was seen more of a public then a purely commercial service. As a consequence, in the past there were very few incentives for efficiency both in supply and consumption. The profits of the electric utilities were intrinsically linked with the number of kWh delivered and not necessarily with the quality of services offered.

Striking as it may be however, low prices may not always be in the public interest! Probably one of the most illustrative examples on how lack of appropriate signals (in particular price signals) but also lack of transparency and public awareness may lead to disastrous consequences for the public at large, is the Irish famine back in the 19th century (1846-1850). In 1834, 12 years before the event, a professor of economics named Mountifort Longfield lectured at the University of Dublin about the price system[20]: "*Suppose the crop of potatoes in Ireland was to fall short in some year one-sixth of the usual consumption. If there were no increase in price, the whole …supply of the year would be exhausted in ten months, for the remaining two months a scene of misery and famine beyond description would ensure …But when prices increase the sufferers often believe that it is not caused by scarcity …They suppose that there are provisions enough, but the distress is caused by the insatiable rapacity of the possessors …and they have generally succeeded in obtaining laws against the price increase …which alone prevent the provisions from being entirely consumed long before the new supply can be obtained".*

The predictions of the economics professor turned out to be tragically accurate as the article from *The Times* magazine dated March 20, 1846 and entitled "*The apprehended scarcity*"[21]:

With respect to the scarcity or failure of the potato crop, another Cork paper (the Constitution) contains the following cautious statement: "Amid all the talk which we hear about potatoes, we find nothing to guide us to a satisfactory estimate, or even conjecture, as to the actual supply in the country. On one hand we have nothing but fearful forebodings -- the stock is exhausted and famine stares us in the face; on the other, we are told of stores that will bring us safely through the season, and that the noise about scarcity is only a political device. Applied to different districts there may be truth in both. Throughout the controversy we have

[20] See *Supra Note 7*, pg.560.
[21] „*Interpreting the Irish famine, 1846-1850*", www.people.virginia.edu

endeavoured to steer clear of extremes. We have given no credence to the exaggerations of even officials information, but have endeavoured to set before our readers as they came in our way, such accounts as from the opportunities of the writers, appeared most worthy of attention. We believe the fact to be that in some places there is a sufficiency -- in others, the reverse; and we are not without hope that with the precautions taken by Government, we shall be able to struggle on until the new crop comes in. But on the part of the poor, the struggle will be severe. Even at present, the price is beyond their reach; but this is in a great measure owing to the habit of forestalling. The potatoes are purchased before they enter the market, and there retailed to the consumer at an enormous profit".

To this end, it is probably worth mentioning that due to the famine, five million people (out of total eight million) died or fled the country. The famine also triggered substantial changes in politics and agricultural practices in Ireland.

One may understandably ask oneself what the potato famine-which also happened in a totally different century-has anything to do with electricity markets nowadays? Because history has a bad habit to repeat itself.

The issue of oil and gas resources scarcity came up first during the energy crisis back in 1970s, recurred during the discussions on sustainable development at the beginning of the 1990s but it was only recently that it finally caught the attention of the general public. The idea that fossil fuel resources are not limitless determined a critical reassessment of the cosy relationship between governments and the energy companies especially in light of security of supply. Today questions such as "How much is really there?" are frequent especially given the vicious connection between macroeconomics and oil prices (which in turn are determined by the expectation that the market is able to deliver supplies to match the demand at any given moment)[22]. The difficulty to establish how much oil (and gas) will be available in the

[22] In one of the recent articles in Financial Times, P.Coggan argues that despite the fact that a rise in oil prices, other things being equal, does result in higher inflation and unemployment and despite recent findings of a study conducted jointly by IEA, OECD and IMF which found out that "a sustained $10 rise in the price of oil would result in the OECD [countries] loosing 0.4 per cent of the GDP in the first and the second years of the shift, while inflation would rise by half a percentage point.", the public and the markets may be overestimating the effect of higher oil prices (P.Coggan, Financial Times, August 7/August 8 2004, pg.7). However, events subsequent to the publishing of the article, with oil prices driving down the financial markets, may prove Mr. Coggan rather optimistic in the author's view.

future, stems from the difficulty in understanding how the industry deals with various types of reserves[23]. In the case of oil for instance, it suffice to mention some general terms such as resource base, reserves and estimated recoverable volumes, necessary to better understand the following paragraphs. According to the Society for Petroleum Engineers, the resource base includes all estimated quantities of petroleum in the sub-surface as well as quantities already produced[24]. Reserves in general are considered a sub-set of the resource base and are "*those quantities of petroleum which are anticipated to be commercially recovered from known accumulations from a given date forward"*[25]. Finally, the estimated recoverable volumes are further subsets of the resource base and include reserves, contingent resources and prospective resources[26].

The estimated recoverable volumes (sometimes also known as extractable ultimate resource - EUR[27]) are particularly important as they can be used to assess the peak production in oil exporting countries. Some studies estimate the world EUR to be somewhere in the range between 2 and 4 trillion barrels and suggest that when 50% to 60% of these quantities have been depleted, the oil production may have already peaked[28]. According to some specialists, many of the large oil fields seem to have already passed their maximum production[29] and a global peak may be occurring anywhere between now and the year 2030, depending on assumptions on production rates, oil demand growth rates, reserves estimations, etc.[30]. Another important factor in these estimates is the definition for conventional oil. It is generally accepted that conventional oil is the so-called "cheap" oil that can be recovered at relatively reasonable costs. If this definition is to be used, than other types of fuels such as tar sands should not be included in the reserve estimations because the cost of producing useful fuel at the moment is

[23] For definitions of various reserves and methodologies to estimate them see for instance Society for Petroleum Engineers (SPE), "*Guidelines for the evaluation of reserves and resources*", SPE, 2001 available at http://www.spe.org/spe/jsp/basic/0,,1104_1730,00.html.
[24] See *Supra Note 23*, pg. 12.
[25] See, *Supra Note 23*pg.14
[26] See *Supra Note 23*, pg.14
[27] SPE recommends that this terminology not to be used.
[28] J.Hallock Jr., P. J. Tharakan, C.A.S. Hall and M. Jefferson, "*Forecasting the limits to the availability and diversity of global conventional oil supply"*, Energy 29 (2004) 1673-1696, Elsevier
[29] E.Bedi and G.B.Olesen, „*Oil peak: a challenge for the renewables*", Power and Energy Magazine, Enlargement Europe pg. 116. The imprecision of the public data available is also an important factor to consider. See for instance Colin Campbell, "*The noose tightens*", New Energy; Magazine for Renewable Energy, No.4/August 2004, pg.20-21.
[30] Ibid 28

rather high due associated environmental problems and significant amounts of other resources required such as natural gas and water. In the gas sector, things do not appear to be much better. According to some experts[31], gas production seems to have peaked in North America, Indonesia, UK and most probably in Russia (at least the European part).

In the past, many of these estimations were brought into the public's attention by green movements in the context of climate change debates or in a broader context of sustainable development. Nowadays however, the industry itself is following suit[32] pushing the international community to move one step beyond denial. The way we succeed to balance the production rate with the rate of natural recovery[33] and discovery of new fields will determine "how much is there" for the next generations. This is one important reason why diversifying energy sources becomes more than just a buzz word if we are to pursue the new paradigm of sustainable development. More discussion on how oil dependency affects the macroeconomic situation and may influence the development of renewable sources is provided in *Chapter four: investment context for RES-E in the new Member States*.

3.1.2 The impact of liberalisation in European energy markets

Due to the creation of the European internal market and, more generally, to globalization, energy industries have to operate in an environment where energy systems are mutually dependent. The importance of energy costs, technological development and the need to share resources in an efficient way are few instrumental forces behind the liberalisation process and require a spectacular change in attitude for national governments, integrated companies and consumers alike.

---

[31] See *Supra Note* 29

[32] Lord Oxburgh, the Chairman of Shell (UK) said on 30 July 2004 in an interview on BBC World: „Fossil fuels are going to run out". Pierre Rene Bauquis, the President of the French Association of Petroleum professionals and special advisor to the Chairman of TotalFinaElf says: "As regards oil consumption, a slow down due to the depletion of reserves will be felt quite rapidly, say between 2010 and 2020. By that stage, it will be clear to most analysts that new discoveries are no longer able to cover the volumes lost to consumption and that the statistical increase in reserves and consumption is mainly due to two factors: increase in reserves within conventional deposits and the increasing conversion of non-conventional resources into conventional reserves", P.R. Bauquis, "*A reappraisal of energy supply and demand by 2050*", pg. 8-9

[33] For oil, the rate is rather low ranging between 30 to 40% while for gas is somewhere in between 70 to 80%.

The electricity industry has important characteristics that determine its optimal regulatory design among which, its vertical structure comprising of different stages with different optimal scales and a commodity (electricity) that can not be stored in large amounts at low costs. As a result, supply needs to match demand at any given time in any given point of consumption and that breaking up the vertical structure is bound to be challenging to say the least. In the context of internal energy market, this requires a high level of coordination among various national systems, some level of harmonisation in technical standards and sufficient cross-border transmission capacity. The peak demand is becoming increasingly a challenge. Due to different climatic and geographic conditions, different European countries have their peak demand at different times. Coordinating the peak load at European level to supply on one hand enough electricity to meet the demand avoiding blackouts and brownouts on one hand and price spikes on the other, requires a better congestion management and most likely new forms of generation such as distributed generation[34].

To respond to the need for more efficiency, innovation and increase in flexibility and quality of energy services, the European energy market landscape had to be altered. The European Commission issued few Directives whose implementation (or future implementation) have changed (or are about to change) dramatically the energy landscape across Europe. For the purpose of this thesis only two initiatives will be discussed in some detail as they are particularly relevant for the electricity market and potential development of renewables in the new Member States: the Electricity Directive[35] and the Directive on energy efficiency and energy services[36].

[34] To complement the Electricity Directive, a new process has been established known as The Florence process. The most important issues addressed currently by the Forum concern cross border trade of electricity, in particular the tariffs of cross border electricity exchanges and the allocation and management of scarce interconnection capacity,
http://europa.eu.int/comm/energy/electricity/florence/index_en.htm

[35] Directive 96/92/EC of the European Parliament and of the Council on 19 December 1996 concerning common rules for the internal energy market in electricity, 1997 OJL 27, 20. The legal basis for the Directive is Arts 47(2), 55 and 95 of the EC Treaty. It has been replaced by the new Electricity Directive 2003/54/EC. The new electricity directive is accompanied with a regulation on cross-border trade. It establishes common rules for the cross-border trade in electricity. A regulatory committee will decide on guidelines on compensation of transit flows, on harmonisation of national transmission tariffs and on allocation of cross-border interconnection capacity, www.europa.eu.int.

[36] Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing the Council Directive 93/76/EEC, OJL 114/64 from 27.4.2006.

3.1.2.1 The Electricity Directive

The general aim of the Electricity Directive was to establish common rules across European countries concerning generation, transport and distribution of electricity but also to provide some concrete recommendations concerning the organisation and access to the markets, procedures for new capacity, etc thus ensuring some level of harmonisation across national systems. Hence, the implementation of the Electricity Directive requires a significant change in the regulatory behaviour, competition environment and ownership.

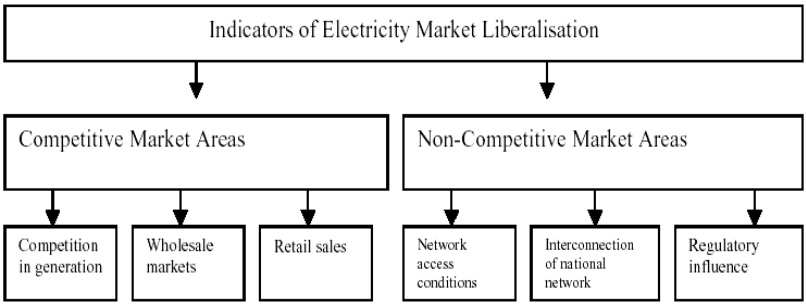
Within the scope of the Electricity Directive, several areas were identified as relevant to a competitive market opening: competition in generation, opening national markets, third party access to the networks, unbundling the vertically integrated monopolies, public service obligation[37], stranded costs[38] and reciprocity[39]. As a result of implementing the Electricity Directive, today some areas are completely open to competition while others are bound to remain the prerogative of natural monopolists (*see Figure3.3*).

[37] The Electricity Directive allows Member States to impose upon their electricity undertakings public service obligations related to: security (including security of supply), regularity, quality of supplies and environmental protection. Include reference from the Directive.

[38] By introducing competition the energy prices are likely to decrease. As a consequence some investments made before liberalisation may loose their economic viability. The challenge to correctly identify the loss of income due to liberalisation lies in the fact that often there is a fine line between stranded costs and bad management.

[39] The Directive gives Member States the right to refuse imports to its eligible customers if they are not considered to be eligible in the exporting Member State. The most significant case where these rights have been exercised by a Member State was the attempt of Edf to acquire the Italian company Montedison. Basically, the criticism brought to Edf was that it used revenue from monopolistic activities such as supplying customers which were not part of the liberalised market to acquire a company which was operating in a liberalised sector of the market in another Member State. Finally Montedison was bought by Italenergia, a subsidiary of the Fiat Group in which EdF has significant shareholding. The bid was approved for two reasons: EdF voting rights were limited to 2% and the Italian energy market was dominated by ENEL, a situation which could have not been altered by this particular acquision. For more details see *Supra Note 10*, pg.259.

Figure 3.3 European market liberalisation: the status quo



Source: Kemfert, Barbu, Kalashnikov (2003)[40]

Further bellow some of the outcomes of the implementation of the Electricity Directive are being discussed.

Competition in generation

In generation, the main objective was to introduce competition for new capacity. To increase competition at generation level, a large number of investors ready to invest are needed. In large markets this might very well be the case although even here fighting against incumbent companies remains a daunting task. In smaller markets - which is the case of most NMS -however, true competition in generation must await the development of new commercial and competitive technologies and/or external competition. Therefore, one major outcome that can be expected from increased competition in generation is likely to be the boost in developing new technologies able to provide clean and reliable energy and increased electricity trade.

New roles for the transmission operators

Transmission, by its very nature, remains an activity of natural monopolistic nature. The main task of a transmission system is to ensure physical delivery of electricity to distributors and end-consumers at any given moment, at specified quality standards. Consequently, the transmission system operator (TSO) is responsible for operating,

[40] C.Kemfert, A.D.Barbu and V.Kalashnikov, *"Economic effects of the liberalisation in the European energy markets-simulation results of a game theoretic modelling concept*", pg. 4, www.greenvalues.net

ensuring maintenance and if necessary develops the transmission network in a given area to guarantee security supply.

In addition, the interconnection with other systems falls as well under the authority of the TSO. During the liberalisation process, opportunities to trade electricity will continue to rise to take advantage of the difference in the price level between different markets. In Europe, the greatest volume traded has been recorded in Scandinavian countries, the UK and Germany. Not coincidentally, these countries already have fully liberalised markets. Increase trade in electricity[41] is likely to strain the existing interconnecting capacity[42] which may lead to refusals of network access and eventually higher prices for the customers. In addition, physical flows tend to follow the path of least impedance so transactions made between countries will affect the physical flows at all borders. The impact depends greatly on the network characteristics as well as the geographical location of the generation units. Therefore it seems crucial for the TSO to have a good overview of forecasted future generation in terms of location, loads and topology of the grid. This is particularly relevant for distributed generation [43] with renewable or modern conventional technologies as they seem to have a different behaviour than conventional sources[44]. The Directive however does not address specifically issues related to cross-border capacity allocation rules[45].

Furthermore, in some countries [46] the implementation of the RES-E Directive brought about new tasks for the TSO such as the issuing body for the Guarantee of Origin for electricity generated by renewable sources. Although the choice might be appropriate as the TSO is likely to have the best information on generating sources across the system, the

[41] Electricity exchanges within the UCTE area made up for 568.8 TWh in 2003, representing 23.9 % of total consumption. This figure does not include the Baltic States. For details see UCTE, "*Adequacy report; Retrospect 2003*", June 2004, pg.6, www.ucte.org.

[42] Italy, Poland, Czech Republic, Austria and Hungary face the most critical congestion problems but frequent congestions are also observed on international lines in France, Germany and Slovenia (See Ibid 34, pg.6).

[43] Although many definitions exist for distributed generation, for the purpose of this thesis, the author means by distributed generation that generation which is located close to the consumer.

[44] UCTE, "*Final report of the investigation committee on the 28 September blackout in Italy*", pg.84, www.ucte.org.

[45] See *Supra Note* 35

[46] Denmark, Finland, Greece, Italy, Portugal, Sweden, The Netherlands. See also the Communication of the EC to the Council and the European Parliament, COM (2004) 366, final,pg.17 at http://europa.eu.int/comm/energy/res/legislation/country_profiles/com_2004_366_en.pdf

task might prove quite challenging from the perspective of administrative costs and human resources needed[47].

Referring to the recent efforts to increase the share of renewable energy in the overall energy mix, TSOs expressed concerns related to apparent clashes between the Electricity Directive and the Renewables Directives over the issue of security of supply[48] and equal treatment of producers (the requirement to dispatch with priority the electricity generated from RES-E as provided in the RES-E Directive[49]).

In this context, it is not difficult to see that given its various crucial tasks, the TSO retains significant control over the system by overseeing the access to the grid. Although the Electricity Directive calls for an independent TSO and for transparent conditions concerning third party access to the grid, some challenges remain to be addressed including how to better motivate the TSO to carry out maintenance and extension works on the networks and to connect renewable generators[50].

Privatisation

To keep the regulator independent and to be able to define business units that operate fully on market principles, change of ownership of integrated companies could be an important step. There is no clear evidence that state owned companies cannot function efficiently (and Norway can be considered as an example in this case as competition has been introduced in a context with predominantly state and local

[47] Other countries such as Austria and Greece have chosen the Distribution System Operator to perform this task. In countries where the increase in RES share is foreseen in relation to distributed generation, this option might prove more adequate.

[48] This concern refers to the fact that by increasing the share of RES in the system, keeping production schedules is becoming more and more challenging and may lead to prohibitive balancing costs.

[49] See more on European Transmission System Operators, "*Report on renewable energy sources*", Brussels, 18/12/2003, www.etso-net.org.

[50] In addition, it is well known that often, to connect a renewable generator to the network reinforcements of the network are needed. In some countries it is not clear who bears these costs. Usually, the generator pays for the connection itself but not for reinforcements. In some countries, the costs associated with network reinforcements are split among network participants equally. For example in Spain there have been difficulties building new power lines to connect the wind farms, small developers having difficulties in concluding cost-sharing agreements with the grid operator. Belgian independent power producers face exaggerated costs for grid connection, unsubstantiated grid problems and calls for participation in the grid enforcement. In Czech Republic, Estonia, Poland and Slovenia, the RES developers have to meet the costs for strengthening the grid. For details see WWF, "*Giving renewables the green light*", www.panda.org.

ownership)[51] or that private entities are always profitable and well managed. However, privatisation may have benefits. By changing ownership, a business becomes fully taxable. A fully taxable business as opposed to a non-taxable one does wonders for a public budget. But what really makes the difference is that business decisions in a private business are not passed directly to the taxpayer who has nothing to say in the process, but instead involves the shareholders who have a more direct stake (especially if the rights of minority shareholders are safeguarded). In addition, privatisation does provide companies with the flexibility they need to raise capital in today's financial markets by diminishing the role for governmental interference in business decision making. Therefore, a well orchestrated privatisation strengthened by a sound institutional framework able to adequately oversee the process, may be a step in the right direction toward a successful liberalisation. However, changing ownership of these integrated companies which for a long time have been considered of strategic importance proved to be an extremely cumbersome process in some Member States[52].

Market concentration

While the implementation of the Electricity Directive might have indeed led to the break-up of old monopolies, it certainly whetted the appetite for consolidation and the rise of multinational companies. The past decade saw an increasing number of mergers among various utilities, and some even questioned if merging has not simply become the 'herd instinct at work'. A closer look reveals few explanations for such a wide spread and fast consolidation in the European energy markets.

At first, with competition coming up, former utilities began to merge to gain economies of scale and achieve lower costs of production. In some cases, a vertical integration, through vesting contracts, between

[51] See *Supra Note* 17.

[52] The case of EdF is rather notorious in this respect. Earlier in 2004, the French Government announced plans to privatise EdF. In response, unions rejected the idea and caused outages across the country. One issue concerned the 1 July 2004 deadline to open up the energy market to allow all industrial and commercial customers to choose suppliers, action which would require, according to the EdF's President Francois Roussely, changes in the EdF´s legal status. In addition, the French Government will have to end the financial guarantee by the end of 2004, guarantee which up to now allowed EdF to have access to cheap capital on the capital markets. It seems that a new debate is scheduled for 2005. See S.Roth, "*Competition delayed*" in Energy Markets Review, issue August 2004, Vol.9, No.8, pg. 11.

generation and retail proved to have strong commercial rationale. This is because the supply risk can be ensured against by integration with the retailing part of the business. The benefits of such integration surfaced in England and Wales where, during a recent collapse of wholesale electricity prices, a number of small generators went into bankruptcy while the integrated utilities were able to maintain their profits and survive[53]. More recently, horizontal mergers provided an even more appealing answer from the industry to liberalisation as it allows integrated companies to combine various services (e.g supply of gas and electricity[54] and/or telecommunications), thus being able to market the cheapest source of energy in their markets. This energy convergence was caused among others by technological progress which led to an increased efficiency in cross conversions in almost all major forms of energy (e.g CCGT, CHP, etc). This is, in the author's opinion, a particularly problematic development as it could significantly deter new entrants from accessing the electricity generation market (such as renewable generators for instance). Moreover, mergers spilled over abroad through acquisitions in form of foreign direct investment or intangible assets (e.g. long term power purchase agreements) thus transforming the traditional national utility into a global player. Utilities found themselves merging to increase the share value and to create operations large and efficient enough to withstand whatever deregulation might be in store for them in the years to come thus starting the quest for increasing rate of return. It is therefore reasonable to assume that more and more mergers nowadays seem to be triggered partly by real supply concerns but also by expectations of the capital markets on their capital investment - hence the desire of integrated companies to increase their return on investment (which since the beginning of the liberalisation seems to have diminished for some, see *Figure 3.4* below) - or because of national strategic interests[55].

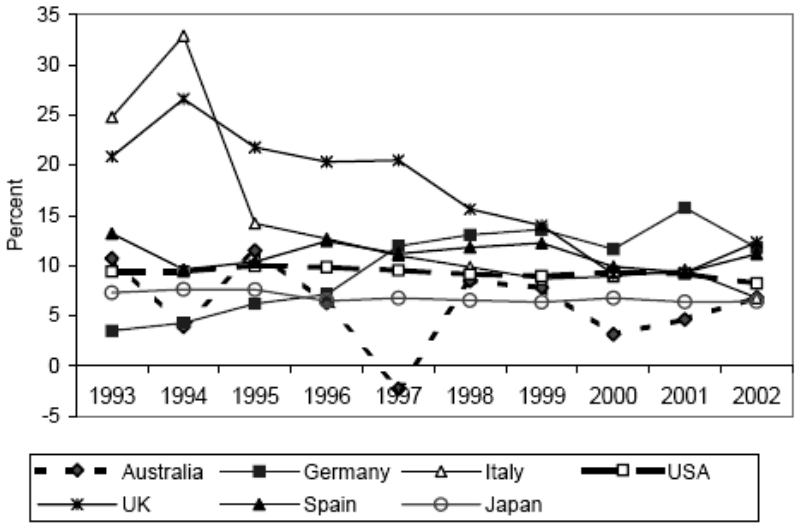
---

[53] See *Supra Note* 17.

[54] The most important event in this direction was the merger between the Germany`s largest electricity supplier E.ON and the dominant gas supplier Ruhrgas. In July 2002, E.ON obtained a Ministerial permit to purchase Ruhrgas for €bn10.4. Despite the recommendations from the Federal Cartel Office and the Monopolies Commission in Germany, the EC approved the merger. Due to this merger, German authorities fear market foreclosure for as much as 20% of the annual gas sales in Germany but also in the electricity market. Current market concentration in Germany leaves very little incentive for the new formed company to pass-on to the consumers the benefits from economies of scale resulting from this merger. For a good overview of the issues at stake see for instance: E.Lieb-Doczy, "*The E.ON-Ruhrgas merger: the German Government decides against competition*" in Energy Regulation Brief, NERA, August 2002.

[55] Early 2006, the German company EoN launched a bid for the Spanish utility Endesa but the Spanish Government favoured the acquisition of Endesa by Gas Natural, a Spanish gas company. At the time,

Figure 3.4 Return on total capital, OECD electricity companies



Source: Jamasb and Pollitt (2005)

In a nutshell, the implementation of the Electricity Directive although timely and well intentioned, provided rather mixed outcomes so far[56]. In

the Spanish Prime Minister Zapatero made no secret of his desire to facilitate the Endesa-Gas Natural combination in order to create a national champion able to compete in global markets. The European Commission strongly opposes this interference as the acquisition has cross-border implications and therefore has an European dimension and not a purely national one. One of the central questions in this case remains the control the German Government has over EoN and to what extent by reserving its veto rights (therefore pursuing national interests) the German government could pose any threats to Spanish national interests. For details see article "*Gas Natural reviews Endesa bid strategy*" by Renwick McLean, International Herald Tribune, March 1st, 2006, available at http://www.iht.com/articles/2006/02/28/business/utility.php. Similar comments have been made by EC Competition Commissioner, Mrs. Neelie Kroes. In her speech on "*Cross-border mergers and energy markets*", Mrs. Kroes made the following remark." *In the last days we have formally expressed our concern to the Spanish authorities concerning the conditions imposed by the Spanish Regulator CNE in relation to the EoN bid for Endesa. Our preliminary conclusion is that the compatibility of most of these conditions with EC law is doubtful*". The speech was delivered at the Villa d'Este Forum on "Intelligence 2006 on the world, Europe and Italy", Cernobbia, Itlay, 2nd September 2006 and is available at www.europa.eu.int.

[56] On 13th June 2005, the European Commission started an inquiry into electricity and gas markets pursuant Art.17 of the Regulation 1/2003 EC. The main objective of the inquiry was to identify obstacles in achieving a fully functional European energy market by 1st July 2007. The inquiry was conducted around five main issues: market concentration, vertical foreclosure, market integration, transparency and price formation. The preliminary findings for the electricity sector reveal that

its initial stage, the liberalisation process seemed to have delivered some of the expected outcomes such as increased competition, lower energy prices for the end-consumer, break-up of the vertically integrated monopolies, etc. In subsequent stages however, starting with late 90s, the market transformation took another turn, this time more complex and far more difficult to monitor leading to the creation of a new type of energy companies horizontally integrated and interrelated through various forms of cross-ownership resulting in possibly mixed consequences for the end-consumer. In addition, it is worth mentioning that liberalisation started at the beginning of 1990s when there was a renewed confidence in the Russian Federation as a strategic partner (in particular in the energy sector) as result of the fall of the iron curtain (which may have led to a certain level of enthusiasm for gas projects) and at a time where there was excess generating capacity. As we approach the end of this decade, the context may change profoundly. The complex, new landscape of the European energy market is likely to continue to be challenging from the regulatory standpoint. Further regulatory measures should target enhancing competitive pressure on incumbent integrated companies both by ensuring easy access for new entrants but also by increasing external competition through interconnections, cross-border transactions oversight and power exchanges. In addition, improving (and standardize practices) in balancing and capacity markets and the markets for ancillary services[57] would also be necessary.

With respect to the prospects of renewable development, given the current status quo, the author believes that the incumbent integrated companies will continue to focus - in short to medium term at least - on building power and gas portfolios with high return/risk ratio and financial hedging. They may also try to increase their flexibility by contracting or building gas storage capacity, more so given recent developments in

---

wholesale markets are still very concentrated creating scope for incumbents to raise prices, the efficiency of the unbundling requirement is questioned by many customers who believe that discrimination in favour of affiliates exists, market integration seems to be hampered by insufficient inter-connector capacity, lack of transparency prevents new entrants from competing effectively and price formation is not always based on effective competitive considerations. The full preliminary report is available http://ec.europa.eu/comm/competition/antitrust/others/sector_inquiries/energy/. The final report on this inquiry is expected early 2007 and may include recommendations for further regulations in this area.

[57] A good overview and definition of ancillary services is provided in "*Connection rules for generation and management of ancillary services*", Eurelectric, paper 2000-130-0003, www.eurelectric.org.

Russian Federation[58]. As risk became the word of the day since the start of liberalization, big players are likely to keep focusing on coal, extending the life of nuclear power plants (or build new ones), small hydro and to some extent on wind and some biomass, in other words on proven technologies with low technological and non-performance risks and lower costs. In the author's opinion, at least in short to medium term, renewable market will be considered by these companies more of a hedging strategy (e.g. portfolio diversification and PR activity) rather than a core business. For example, in EoN's investment plan for the period 2006-2008, the amount of €16.3bn was earmarked for fixed assets. From this, only around 4% is dedicated to renewable generation in wind power and some biomass. Most of the planned investments in generation will take place in coal fired power plants and CCGTs plus refurbishments of coal-fired plants and one nuclear power plant (life extension). Most of the investments seem to be planned in the Germany, UK, Nordic markets, Italy and the US (with wind planed for UK and Nordic)[59]. Therefore it is important, in the author's view, to support the development of SMEs in the renewable sector[60] but renewable generators should also seek to penetrate other complementary markets such as the market for ancillary services (e.g. voltage control, congestion management, etc). In the NMS, such an opportunity may already exist. Back in 2001, the Czech transmission operator (CEPS) started to develop an internet-based platform to organise the market for ancillary services (which previously was entirely provided by the incumbent CEZ) that included a rather novel feature, namely the possibility to contract ancillary services from abroad. In 2004, the platform was further developed to allow for trading in long-term contracts for ancillary services. The activation of the services is performed by the dispatching centre of CEPS[61].

[58] At the moment of writing this text, the tendency of Russian Federation to re-nationalize the energy sector became all too clear. On 18th of September 2006, Russia cancelled the environmental permit for one of the biggest energy project (USD 20bn) in the Sakhalin Island. While at the moment of writing it seems unlikely that the project will be stopped completely, the move certainly appears as an attempt by the Russian Government to gain more control over its development. More discussion on the implications of the strong energy link with Russian Federation is provided later in this chapter.

[59] This information was extracted from the Conference call with investors. The recording of this conference was available on EoN's web site early January 2006.

[60] In Denmark for instance, around 58% of the wind parks are owned by individuals or farmers, some 26% by cooperatives and only some 15% by utilities. In Germany, the ownership is even more striking with almost 90% of the wind power owned by private citizens, cooperatives and farmers.

[61] For details see the UCTE, Quaterly bulletin of information from UCTE Newsgrid, No.8 from June 2004, www.ucte.org.

3.1.2.2 Directive of the European Parliament and of the council on energy end-use efficiency and energy services

Probably one of the most valuable upshots of the liberalisation process, the author believes, is the fact that it forced governments, businesses and communities at large to think different. Many stakeholders now seem to acknowledge that it does matter not only which kind of energy we are using but also how we are using it.

On the demand side, end-use energy efficiency is yet another answer to various challenges we face today including climate change, scarcity of natural resources and security of supply (by reducing the need for imports). As mentioned earlier in this chapter, in the past, the profits of the electric utilities were solely based on the number of kWh sold and had very little to do with the quality of services provided or the number of customers supplied. In the context of liberalised markets however, the integrated companies have to reinvent themselves and together with national governments, end-consumers and other energy stakeholders have to find ways to make their profits not only from selling KWh but also from selling energy services. Due to current market fragmentation and a multi-speed Europe concerning the pace of liberalisation in energy markets, there seem to be a need for a coherent approach to demand side issues across Europe. Not only that it is cheaper today to save energy rather than to produce[62] but energy efficiency seems to be conducive to other positive effects in the economy. A SAVE study indicates for instance, that a net economic gain of € 10 bn is possible with yearly savings of 1% over a period of 10 years[63]. In addition, positive regional and cohesion benefits may result from energy efficiency measures due to their decentralised nature while the effect on employment is expected to be positive taking into account all direct and indirect macroeconomic factors[64]

[62] The estimated average cost to save energy in the European Member States (off-peak) is 2.6 €¢/kWh in the domestic sector compared to 3.9€¢/kWh, the average (off-peak) price for delivered electricity. Peak prices are somewhere in the range of 10€¢/kWh. By doing energy efficiency the peak load is shaved as well.

[63] Proposal for a Directive of the European Parliament and the Council on energy end-use efficiency and energy services, COM/2003/0739final

[64] According to ECN, the main reason behind the positive effect of investments in energy efficiency in residential sector for instance is believed to be the fact that the energy sector is relatively low labour intensive. Consequently, the shift of expenditures from the energy sector to other sectors which are more labour intensive seems to be the main cause for the increase in employment. However one of the findings of their study is that the amount of employment created relative to the amount of investment

In order to facilitate a coherent approach to energy efficiency and provision of energy services across Europe, the European Commission issued in 2003 a new proposal to address the end-use energy efficiency and the issue of energy services[65] and in April 2006, a new Directive was adopted[66]. Although it is beyond the scope of this paper to discuss in detail this Directive, the author believes it is important to mention some of its main features given the close link between renewable energy commitments and energy efficiency and especially the great potential for energy efficiency in the NMS.

The main goal of the Directive is to create a functional market for energy services thus making energy efficiency an integral part of the EU internal energy market concept. The new Directive covers the distribution and retail market and is meant to complement[67] previous EU initiatives such as the EU Directive for energy efficiency in buildings[68], the EU Emission Trading Scheme [69] and the Integrated Pollution Prevention Control Directive[70].

The Directive's main provisions include:

- a requirement for the NMS to set national indicative energy saving targets with the aim to achieve an overall national indicative target of 9% for the ninth year of the application of the Directive[71](for the period 2008-

in energy efficiency measures seems to be rather small so environmental benefits should be the main drive for energy efficiency programs with employment as additional outcome. For more details see H.Jeeninga, C.Weber, I.Mäenpää, F.Rivero Garcia, V.Wiltshire, J.Wade, "Employment impacts of energy conservation schemes in the residential sector; calculation of direct and indirect employment effects using a dedicated input/output simulation approach", ECN-C-99-082, 1999, www.ecn.nl.

[65] Energy services in the context of the Directive mean "*the physical benefit, utility or good derived from a combination of energy with energy efficient technology and/or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on a basis of a contract and in normal circumstances has proven to lead to verifiable and measurable or estimable energy efficiency improvement and/or primary energy saving* " .

[66] Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing the Council Directive 93/76/EEC, OJL 114/64 from 27.4.2006.

[67] Complementarity in this context means that all installations/buildings covered by the various other Directives above mentioned will not be covered by the new Directive on energy efficiency and energy services.

[68] EU Directive on energy performance of buildings, 2002/91/EC, OJL001 from 04.01.2003, www.europa.eu.int.

[69] Directive establishing a scheme for GHG emission allowance trading within the Community, 2003/87/EC from 13 October 2003, www.europa.eu.int.

[70] Directive 96/61/EC concerning integrated pollution prevention control, www.europa.eu.int.

[71] To calculate the target, Member States shall calculate the arithmetic average of total final domestic energy consumption for the most recent five years previous to the implementation of the Directive, for

2017) for the total energy distributed and sold to the end-users as well as an intermediate indicative target for the third year of application of this Directive;

- a requirement for the Member States to lay down certain obligations concerning the participation of energy distribution and retail supply companies in the energy service market, including offering of a minimum level of energy services or energy audits;

- a requirement for the Member States to provide financial instruments for energy savings;

- an obligation for the Member States to ensure that the tariff structure does not encourage increased energy consumption; and

- a requirement for the Member States to ensure accurate and informative metering and billing of energy consumption.

In addition, Member States are required to ensure that the public sector assumes a leading role in promoting energy efficiency and market development for energy services through the inclusion of a minimum two measures as recommended in Annex IV of the Directive. These measures include the use of energy performance contracting, emphasis on efficiency in public procurement of equipment and vehicles, the use of energy audits and implementation of cost-effective recommendations that may result from such audits and increase efficiency in public buildings.

The Directive is not only timely but it is likely to bring about a new impetus for changing the consumer behaviour and creating a new market for energy services, thus addressing simultaneously environmental concerns and security of supply. The expected interaction between energy efficiency measures and the EU Emission trading scheme is rather straight forward. On one hand, the EU ETS is expected to lead to

---

which official data is available. The target shall be calculated once and the resulting absolute amount of energy to be saved applied for the total duration of the Directive (9 years) and not adjusted for degree days, structural changes or for production changes. The target will be measured after the 9th year of application of this Directive. For more discussion on this topic see Chapter 5, in particular the case study on Romania.

increases in electricity prices thus creating new incentives for end-use energy efficiency programs. On the other hand, as demand for electricity goes down as a result of implemented energy efficiency measures, the carbon emissions decrease thus lowering the prices for the carbon credits sold on the ETS. The linkage between the commitments under the Renewable Directive of the NMS and energy efficiency measures is also a straightforward one. As the renewable target is directly derived from the internal electricity consumption, by reducing the consumption the target also decreases making it easier and cheaper for the NMS to achieve their renewable objectives by 2010. Despite its obvious benefits, the Directive has however some drawbacks. In the author's opinion the requirements of the Directive are rather soft. The methodology to calculate the targets is based on historical data and therefore is not correlated in any way with the future energy consumption. In particular in the NMS, historical data could be misleading as significant structural changes took place and the quality of statistical data at the beginning of the 1990s may sometimes be questionable. In addition, the Directive does provide for measures initiated before 1995 and even 1991 to be taken into account, albeit on a case by case basis. Guidelines on how to account for these measures are to be provided by the Commission but the deadline for the elaboration of these guidelines is yet to be determined. This period however is rather relevant for NMS.

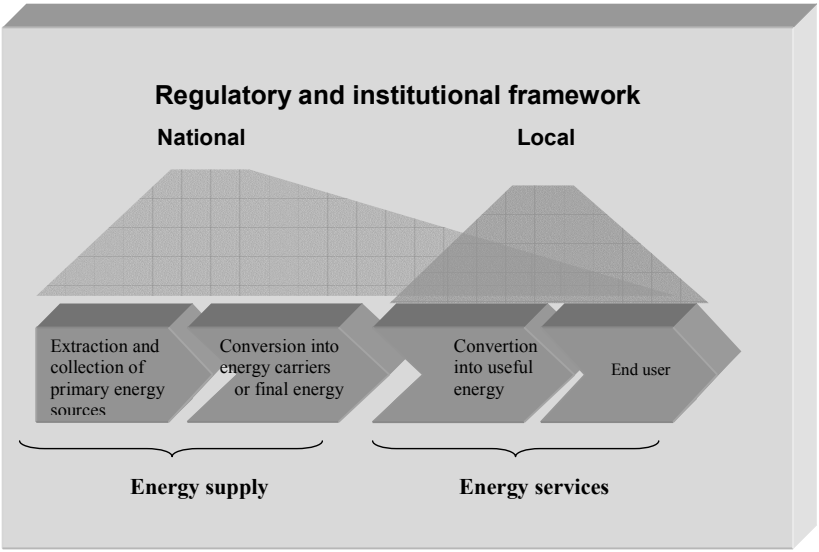
In conclusion, both Directives are likely to contribute to creating favourable market conditions for renewable energy sources. The Electricity Directive paved the way for increased transparency in the market thus leveraging to some extent the playing field for small and medium sized enterprises who will become most likely, significant proponents of renewable technologies in the near future. In the same time, the energy efficiency initiative will ensure a change in the long-term end-user consumer behaviour while contributing to freeing capacity that could be more efficiently used in combination with new renewable energy sources, thus reducing the need to build back-up reserves.

3.1.3 Energy systems in the new Member States

This section provides an overview of most notable market reforms in the energy sector that NMS undertook as a result of the accession process and a discussion on the implications the liberalisation process may have on the future development of RES-E in these countries.

Before going into the subject, the author would like to define from the outset the 'energy system' referred to in this section. Hence, for the purpose of this analysis, by 'energy system' one should understand the energy chain together with national arrangements (namely the regulatory and institutional framework) to deliver sustainable energy benefits. *Figure 3.5* below shows a qualitative representation of the energy system as discussed in this section.

Figure 3.5 The energy system



3.1.3.1 Energy market reforms in the NMS

Energy market reforms in the new Member States started together with the start of the negotiation process for accession to the European Union. The reform in the energy markets was mainly triggered by the need to comply with the energy Acquis which is the body of all energy related EU laws, regulations and policies. However, compliance with the energy Acquis required not only adequate legislation but also establishment of functional institutional frameworks (e.g. independent regulators for gas and electricity, nuclear safety authority, etc).

The NMS had come a long way from centrally controlled energy systems to energy systems capable to operate in a highly competitive European market. To comply with the energy Acquis, the NMS had to: decide on the energy policy and timetables for the sector restructuring, prepare for entering the internal energy market (e.g the implementation of electricity and gas directives, etc), improve their energy networks in order to connect to the Union for the Co-ordination of Transmission of Electricity (UCTE), organise a 90 days oil stocks, address social, economic and regional issues as a result of the restructuring, in particular in the mining sector[72], improve nuclear safety and prepare to increase the share of renewable energy sources in their energy mix. Although these requirements have been only a part of a multitude of requirements related to the other 30 Chapters of the Acquis, the NMS have succeeded to comply with most stringent requirements for the energy sector. Transitional arrangements concluded with all new Member states refer only to building oil stocks with the exception of Czech Republic who in addition has negotiated a transitional arrangement to comply with the gas directive by the end of 2004 and Estonia who in addition has a transitional arrangement to comply with the Electricity Directive by the end of 2008[73].

3.1.3.2 Energy market developments

Compliance with the Electricity Directive led to a complete market reorganisation that involved unbundling, establishment of an independent market regulator, increase competition in generation and market opening. *Table 3.1 in Annex 3.I* displays an overview of the current situation in the electricity markets in the new Member States.

[72] For example in Poland, the coal industry is one of the country's largest industries and employers, but inefficiencies have resulted in large annual losses, spurring the government to reform the sector. In 1998, the government introduced a five-year (1998-2002) Hard Coal Sector Reform Program which reduced employment from 248,000 to 140,000 at the end of 2002. In November 2003, the government introduced a second program to further consolidate and reform Poland's coal sector – Program of Restructuring of the Hard Coal Mining Sector for 2003-2006. The program plans to close inefficient mines and reduce employment on a voluntary basis. For those who voluntary leave, the government is providing other private sector employment for workers, such as retraining, social hardship allowances, and early retirement pensions. The program also plans to privatize the country's coal industry by 2006. In April 2004, the World Bank provided Poland with a loan of $160 million to support the country's restructuring program. For details, see www.eia.doe.gov.

[73] Basically due to the high percentage of indigenous fuel (oil shale) used in electricity production.

Unbundling and institutional development

Most of the NMS have indeed unbundled the generation, transmission and distribution activities with the exception of Malta which is still to proceed with finalising this process. Independent regulators have been appointed in almost all NMS with the exception of Cyprus. Their main roles are to oversee the market and provide a framework for dispute settlement mechanisms. With respect to tariffs, in almost NMS the regulator has to approve the electricity tariffs for the regulated market (captive consumers) or are established by the market for certain eligible customers. Contracts among market participants (including for ancillary services) are now being concluded based on strictly commercial purposes. For a detailed overview of the main steps undertaken to reorganise the electricity market in selected NMS, see *Table 3.2 in Annex 3.II.*

However, most of the suppliers in this region are still involved in long-term [74] power purchase agreements (PPAs). In the context of liberalisation however, these contracts are bound to come into question as they tend to hinder further market opening and de facto competition. In Poland for instance, government officials have pointed out that these contracts have been a disincentive for restructuring and modernization of country's power sector as producers have fixed revenues[75]. In Hungary on the other hand, the situation is rather different. Most of country's domestic electricity generation is locked up in long-term contracts that prevent further market opening as there is no spare capacity to offer to potential buyers. Hungary, already a net importer of electricity and is likely to face further supply problems as the country is expected to close down 1,070 MW of installed capacity by 2006[76]. From the financing perspective, revisiting the long-term power purchase agreements may affect companies involved. These agreements have been and continue to be perceived by the financial community as fundamental in financing new generation capacity as they provide the investor with some certainty

[74] 20-35 years

[75] New regulations have been put in place in Poland that require old PPAs to be cancelled out. For those who choose not to cancel these contracts, the matter will be deferred to the EU, the Directorate General for Competition. The new law is available on the web site of the Ministry for economic affairs and labour, www.mg.gov.pl . (Personal discussion with Mr. Rafal Kabacinski, Chief specialist with the Ministry for economic affairs and labour, during the International Congress on "*Restructuring energy markets in transition economies*", March, Leipzig, 2004).

[76] USA Energy Department, Country Profiles: Hungary, www.eia.doe.gov.

about the expected project cash-flow over the project life-time [77]. Concerning the renewable energy projects, due to a significant uncertainty surrounding the policy framework, the PPAs are being considered as indispensable for financing new generation capacity but given the fact that in the context of liberalised energy markets the role of these contracts is coming into question, new instruments may need to be found as a substitute[78].

Energy subsidies and prices

In the past, one characteristic of the energy systems in the NMS was a total decoupling between energy costs and energy prices due to significant subsidies and cross-subsidies applied in the energy sector[79]. These subsidies acted as a disincentive for increasing energy efficiency and if kept, would have distorted significantly the competition in the context of the European internal market. In order to create a well-functional market by increasing economic efficiency and improving energy services, the NMS took the necessary steps to eliminate these energy subsidies. To date, energy subsidies have been phased out to a large extent in the electricity sector with the exception of Malta. The past cross-subsidization between industrial and household consumers in

[77] The European Investment Bank (EIB) provides a EUR 80 million loan to finance the renovation and extension of electricity transmission and distribution facilities located throughout Estonia that will be undertaken by Eesti Energia AS over the next three years. As a first time for infrastructure operations in Estonia, the EIB loan is not signed on a sovereign basis (State borrowing or guarantee) but directly with Eesti Energia in recognition of Eesti Energia's own financial strength and credit-worthiness. (Press release, 2004-044-EN, Tallinn/Luxembourg, 7 May 2004; Estonia: EIB lends EUR 80 million to Esti Energia, http://www.centreurope.org/mag/current-events/eib-estonia-lending.htm); At this point is worth mentioning that Eesti energia is a de facto monopoly in Estonia.

[78] An interesting alternative has been used in a recent project Caterpillar Inc., a global power plant developer, undertook in Poland. The project is about building a 37 MW CHP gas fired power plant in the city of Starachowice. The total investment cost is US 42 million and the output of the plant is allowed, according to the Polish Energy Law, to be fed directly into the distribution company. The novelty in the project finance is this case is that the long-term power purchase agreement has not been concluded with the PSE (national electric utility) but with the local electricity distribution company ZEORK. The surplus of electricity produced by the new plant (which is supposed to supply heat and electricity to the Special Economic Zone of Starachowice), will be sold to ZEORK after meeting the needs of the economic Zone. For details see "*Caterpillar Invests in Poland's District Energy Sector*", article in Cogeneration & On-Site Power Production Magazine, issue November-December 2003.

[79] The OECD defines energy subsidies as "*any measure that keeps prices for consumers below the market levels, or for producers above the market levels or that reduces costs for consumers and producers*". IEA defines energy subsidies as "*any government action that concerns primarily the energy sector that lowers the cost of energy production, raises the price received by energy producers or lowers the price paid by energy consumers*." For a detailed discussion on the various forms of energy subsidies and their impact on sustainable development, see UNEP,OECD/ IEA, Reforming energy subsidies, 2002.

particular has been eliminated, households paying currently a higher price for the electricity than the industry like in all EU-15 (*see also the discussion in Chapter one, in particular Figure 1.3 and Figure 1.4*). Some intra-class subsidies[80] exist because of the introduction of social tariffs in some countries. The tariffs are being altered to permit the delivery of energy services at reasonable prices on one hand and to allow integrated companies to recover production costs and obtain an acceptable profit margin. In other words, efforts are being made to set the electricity tariffs as such to reflect the long-run marginal cost[81]. As it can be seen, while in the industry the electricity prices are becoming comparable, in the residential sector, electricity prices remain significantly lower than in the EU-15. Part of the explanation may be the remaining subsidies in the residential sector and the use of cheaper indigenous fuels for electricity production (e.g. Estonia oil shale[82], Czech Republic and Poland coal, Lithuania nuclear power, etc).

Privatisation

The task that proved the most cumbersome of all was the privatisation of the energy companies. To date, generation and transmission companies in the new Member States remain to a large extent state owned while distribution companies are being privatised to a much faster pace, with EoN, EdF and RWE having a visible presence in the region. Like Western Europe however, the region is split in between countries being more prone to privatise their incumbent monopolies-such as Hungary and Slovenia- to countries whose governments seem to prefer a hands-on attitude towards the energy sector such as the Baltic States, Cyprus and Malta, especially because of their specific circumstances (e.g high interdependency in the Baltic States and isolated systems in Cyprus and Malta).

There are few reasons why the privatisation of the incumbents is rather sluggish in the region. One reason is the fact that former incumbents

[80] Basically, there is a minimum level of consumption established for low income households for which the electricity tariff is much lower than the normal tariff. Any consumption above this minimum level is subject to a much higher tariff.

[81] The long term marginal cost is defined as the cost to produce an extra unit of output with existing capital stock.

[82] Since May 1997, the average price of oil shale has been fixed by the Estonian government at 106 kroons per tonne (i.e., $6.38 per short ton). Oil shale is mined in northeast Estonia, near Kohtla-Järve, by Eesti Polevkivi, which had been a state-owned company until the year 2000.

come along with sometimes huge debts, quite off-putting for an investor. Given the past sheltered relationship between the electricity utilities and governments, bad management was not sanctioned in many cases but rather backed up with even worse loan agreements and this is why today restructuring the debts of these companies to come up with an attractive package for a private investor can be rather challenging. In addition, due to the integration into the European internal market, increased environmental concerns and new standards for nuclear safety (and consequently uncertain liabilities), may prevent some generation plants belonging to the dominant supplier to be privatised as concerns may exist on both sides. For instance, in Czech Republic, in June 2003, the government's attempt to tender its 67% stake in ČEZ was temporarily suspended, mainly to liabilities surrounding the Temelín plant. Another example was in Estonia. The EU has been pressuring Estonia to reduce shale oil use. Suncor Energy of Canada had been negotiating with the Estonian government to build a $147 million shale oil plant in northern Estonia. However, negotiations were suspended in September 2000 because of environment-related problems with Suncor's pilot plant in Australia[83].

Other times, the investor may have difficulties in securing the required financing according to the schedule agreed upon at the time of the plant acquisition thus preventing the government to complete the privatisation process. One such a case seems to have happened in Estonia. The American company NRG has acquired in June 2000, 49% of the Narva power plant. In June 2001, NRG agreed to pay an additional $27.6 million for its share in Eesti Polevkivi to complete the deal, but in January 2002, Estonia cancelled the deal, claiming that NRG had missed an end-of-2001 deadline for obtaining financing plant. Whatever the reason may be, the situation led to a de facto situation of delayed privatisation process in the region.

Market concentration

Like in Western Europe, market concentration is becoming increasingly observable in the NMS' energy markets. The phenomenon is about to occur for instance in the Baltic States. One explanation could be their rather peculiar situation. The energy systems in these countries (Estonia, Latvia and Lithuania) have not really been designed to operate

[83] USA, Department for Energy, Country Profiles: Estonia, www.eia.doe.gov.

independently but rather as a part of the former USSR energy system. One consequence of this is that they are closely connected and operate in such a way to take stock of various forms of generation (e.g. hydro in Latvia, oil-shale in Estonia and nuclear power in Lithuania) but also to cover the demand in Kaliningrad (Russian Federation) and Belarus (task mainly for Lithuania). Because of its reliance on hydro (and therefore the electricity supply is very sensitive to weather conditions), Latvia is a net importer of electricity from both Lithuania and Estonia.

Table 3.3 Installed capacity, generation and consumption of electricity in the Baltic States in 2000

	Estonia	**Latvia**	**Lithuania**	**Total**
Installed capacity(MW)	3200	2133	6156	1149
Peak load (MW)	1462	1137	1779	4340
Peak generation (MW)	1718	897	1863	4478
Production (GWh)	8494	4143	11414	2401
Consumption (GWh)	7582	5928	10080	2350

Source: A. Bacauskas[84]

The physical power balance is regulated by a common dispatch centre DC Baltija which is jointly owned by the main utilities in these countries.

Table 3.4 The structure of the electricity generation in the Baltic States in 2000

Power plants	**Estonia**	**Latvia**	**Lithuania**	**Total Baltic countries**
Thermal	2735	0	1800	4535 (39.47%)
Cogeneration	466	604	843	1913 (16.65%)
Hydro	0	1528	114	1642 (14.3%)
Pumped storage	0	0	800	800 (7%)
Wind	0	1.2	0	1.2 (0.01%)
Nuclear	0	0	2600	2600 (22.6%)

Source: A. Bacauskas

[84] A. Bacauskas, "*Lithuanian way of reforms to electricity market*", pg.64, WEC Lithuanian Member Committee, Vilnius, Lithuania (*on file with the author*).

Due to the small size of their markets and their high dependency on Russian Federation for fuels[85], the three Baltic States seem to have taken a strategic approach. First step for the Baltic States was to increase the level of cooperation among them. In 2003 a Memorandum concerning further joint activities in the electricity sector[86] was signed. Moreover, on May 26, 2004, the joint Estonian-Latvian working group presented a proposal to the Ministries of Economy of both companies to establish a new competitive energy company (the Baltic Power Group) expected to operate within Latvia and Estonia as well as in other energy markets[87]. Second step will be to extend connections with other Western European countries, particularly Finland, Sweden and Germany[88]. Market concentrations have been observed in other countries as well. For instance in Czech Republic, CEZ Power Company estimated that the merger with regional distribution companies (completed in 2003), will reduce the prices of electricity supplied to households at least by 5 %[89]. Concentration activities in the distribution sector are taking place also in Poland.

[85] The countries of the Baltic region are entirely dependent on natural gas imports to meet their domestic consumption needs. The Baltic countries produced no natural gas in 2001 while consuming a total of 202 billion cubic feet (bcf). Natural gas imports come mostly from Russia and are handled by Russia's natural gas monopoly Gazprom and its subsidiaries. Gazprom holds long-term supply agreements with each of the Baltic states. Gazprom is also increasingly becoming an owner of natural gas utilities in the Baltic region. Gazprom holds a 25% stake in Latvia's Latvian Gaze and a 37% stake in Estonia's Eesti Gaas (along with other major foreign shareholders, Germany's Ruhrgas and Finland's Fortum). Most recently, in January 2004, Gazprom finalized its acquisition of a 34% stake in Lithuania's natural gas company, Lietuvos Dujos. With the three Baltic states scheduled to join the European Union in May 2004, Gazprom's growing influence in the Baltics could serve as a staging ground for greater exports to the countries of the European Union (www.eia.doe.gov).

[86] The Estonian Energy Inspectorate, the Latvian Public Utilities Commission and the Lithuanian National Control Commission for prices and energy have concluded in 2003 a Memorandum concerning the Common Baltic Electricity Market. The Memorandum provides a basis for the three countries to ensure smooth Third Party Access (especially for domestic producers), to regulate prices of network services, to encourage justified investments and to harmonize principles of electricity pricing among others. For the full text of the Memorandum see the web site of the Latvian Public Utilities Commission (PUC) at www.sprk.gov.lv.

[87] Eesti Energia press release, " *Eesti Energia and Latvenergo to merge operations and shares*", www.energia.ee.

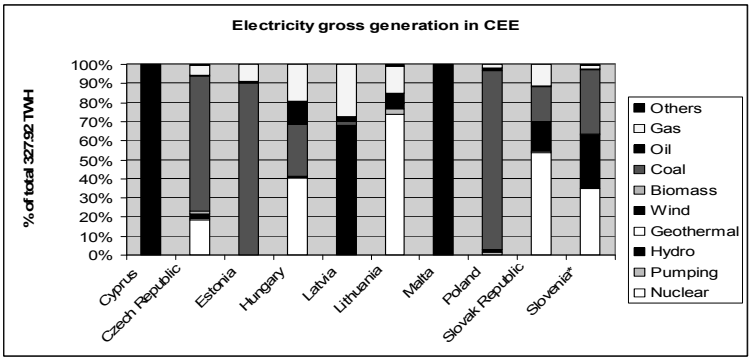
[88] It is anticipated that when the Baltic Ring is completed, the Baltic countries will be able to supply electricity to Sweden and Finland. One such project is the "Estlink" project that involved building a submarine cable under the Baltic Sea to connect Estonia and Finland. The electricity transmission was scheduled to start in 2004. The state-owned utility Eesti Energia will have a 20% share of the project, with other shareholders being Helsinki Energy, Pohjolan Voima Oy, Graningeverkens AB of Sweden, and the Swiss-Swedish company Asea Brown Boveri Ltd.
For details see http://www.energia.ee/en/whatsnew?energiaviewer_folderid=515&energiaviewer_itemid=1711.

[89] News of the week, 36th week 2002- "*The cost of CEZ-generated electricity supplied to households will decrease by at least 5 %*", www.cez.cz.

Energy source diversification

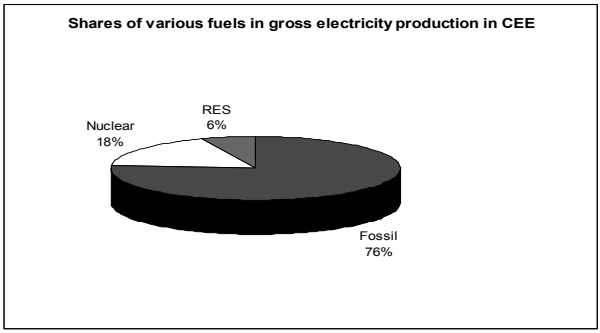
The long-period of central planning exclusively focused on the supply side resulted among others in inadequate metering services, high inefficiencies and a relatively narrow range for electricity generation options (*see Figure.3.6 and Figure 3.7).*

Figure 3.6 Overview of gross electricity production by sources in the new Member States



Data source: EC (2003)[90]

Figure 3.7 Share of main primary energy sources for electricity generation in the new Member States



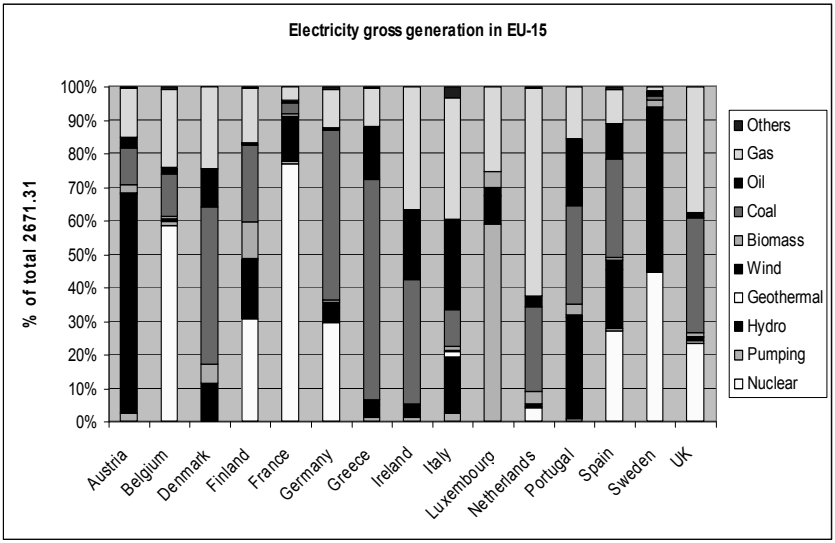
Data source: EC (2003)

[90] European Union, *Energy & Transport in Figures, 2003,* www.europa.eu.int

Figure 3.7 shows that in the new Member States, the dominant sources for electricity generation are fossil fuels (76%) followed by nuclear power (18%).

The RES-E account for about 6% of total electricity generation with large-hydro in Latvia and Slovenia having a significant share. From *Figure.3.6* it can be noticed that gas is picking up in Hungary and Latvia. In general, the region exhibits a relatively limited diversity in electricity generation sources as compared with the EU-15 group (*see Figure. 3.8 below*).

Figure 3.8 Gross electricity generation in EU-15



Data source: EC (2003)

Figure 3.8 above show that in the EU-15, the share of various primary energy sources for electricity generation is somehow different. The high share of nuclear power is due to electricity production in France and Belgium. With respect to renewables, although large hydro does play a significant role in EU-15 as well, other sources are also making a contribution such as wind in Denmark, Germany and Spain and biomass in Finland, Denmark and Luxembourg.

Energy planning and the new role of local governments

Finally, because the past development of the energy systems was mainly decided upon at central level based on energy consumption estimates (with incumbent utilities having vested interests in selling kWh and significant influence on the decision making process), energy planning was conducted in a similar fashion: central and based on highly aggregated data. This practice corroborated with lack of autonomy of local authorities finally crippled the ability of these countries to carry out adequate energy planning activities at local levels. As part of the economic reforms in the lead to accession, the Member States have indeed revisited the legal framework within which local governments can operate and a significant degree of autonomy has been granted. This change basically translates into higher freedom for local governments in determining tax levels and entering into private contract agreements to provide various services for the community (e.g. waste management). As a consequence, local governments are increasingly assuming new roles. From the energy perspective, the local governments are not only energy providers and energy consumers but, in the author's opinion, should also take leadership in promoting a sustainable local development[91]. To fulfil successfully these new tasks, will require unambiguous legislation (e.g. transposing national RES, energy efficiency and climate change targets into local objectives, resolving land ownership issues, improved waste management, sustainable agricultural policies, etc), adequate human and financial resources, institutional framework and an extensive knowledge base, including new technologies (local governments being in the position to influence the community's behaviour towards sustainable development through its public purchase policy), modern energy planning techniques, etc. While many of the above mentioned issues are being addressed to some extent in various forums, very little has been done so far to increase the ability of local governments to conduct diligently energy planning activities and successfully fulfil their new role. For instance, requirements for local authorities to elaborate adequate energy plans are still to be made compulsory in many of these countries. As renewable energy sources are land-specific (therefore their

[91] The task has been eased by the revision earlier this year of the EC regulations concerning the public procurement policy. The new regulations permit local governments to take into account environmental issues when purchasing new equipment and/or services. In the past, the public procurement was exclusively driven by low cost policy.

development is likely to influence to a great extent local communities[92]), local energy planning capabilities are a precondition for their successful deployment.

In the EU-15, local authorities benefited extensively from the establishment of energy management agencies through the EC SAVE programme[93] and the use of structural funds. The agencies have proven instrumental in EU-15 in developing a wide range activities starting with public awareness campaigns to providing support to local governments with energy planning and energy efficiency issues[94]. In the new Member States the use of EC structural funds for similar project types began only in recent years. *Box 3.1* contains an example describing a recent experience of a Danish project developer in Estonia[95].

[92] Although the development of RES is being carried out at local level thus affecting indeed local communities, their development will require a high degree of coordination at system level because of the necessity of back-up reserves (except stand-alone RES).

[93] The SAVE programme was the only EU community program that focused on the creation of local energy management agencies. First programme was adopted in 1991 and lasted until 1995. The SAVEII programme took over this activity and ended in the year 2000. Its main objective was that at least 1/5 of regions and cities with more than 100.000 inhabitants will benefit from services of an energy management agency. In February 2002 the SAVEII programme was integrated into the Energy Framework Programme. For the period 2003-2006, the new programme Intelligent Energy for Europe takes up this activity. To date, more than 140 energy management agencies have been established in the EU-15 under SAVE programmes.

[94] For instance, in Ireland, between 1994-1999, structural funds have been used to establish a local energy agency that had as a main purpose to disseminate information on renewable energy issues. Frank Conlan, "*European Network for Regional Development Agencies-example of Ireland*", presentation delivered during the European Conference on local energy actions, November 2003, Brussels, www.managenergy.org.

[95] Nils Dangaard, "*Energy sector funding within EU Cohesion Fund and Structural Funds – the case of Estonia*", presentation delivered during the European Conference on local energy actions, November 2003, Brussels, www.managenergy.org.

Box 3.1 Athme Biomass CHP Project

Background
In Estonia, 90% of the electricity is produced based on oil shale. Due to the accession process, Estonia needs to undertake significant changes in the energy sector. ERDF funds (Local, social and economic development) are available to develop local education and social infrastructure (e.g. schools), develop tourism, local transport and municipal infrastructure. Although the energy component is yet to be defined, it appears that investments related to renewable energy are likely to be made especially in the area of education and municipal infrastructure. A pipeline of projects concerning improvements in the district heating sector, CHP and wind has been developed. Total ERDF budget available for the period 2004-2006 is M€ 200/year, covering up to 90% of total project costs. Municipalities have the main responsibility to identify suitable projects.

The Athme Biomass CHP Project
The project is one of the projects on the pipeline. Its aim is to replace an oil-shale fired power plant commissioned in 1950s with a biomass CHP with an output of 50 MWth and 20 MWel. The project is estimated to deliver aprox. 270,000 tCO2 emissions savings per year. The total project cost is 48 bn Euro, out of which 35% are to be covered from ERDF funds.

Experience of the developer
According to the project developer, there seems to be a significant lack of awareness on energy issues and capability to prepare good projects at local level. The risk in this case (*as perceived by the developer)* is that in the end there will be too few projects of too low quality. Consequently, the developer has decided to offer assistance to the local authority in: advising on potential eligible projects, public awareness campaigns, developing technical guidelines for project preparation and tools for project monitoring.

Taking into consideration that Estonia is the first country to remove energy subsidies (since 2002) and has one of the most functional markets among all new Member States, some important lessons can be learnt from this case study. Despite of existing good business conditions at national level, project transaction costs may rise substantially because of lack of capacity at local level.

3.2 Challenges concerning the development of renewable energy sources in the new Member States

Apart from the local challenge as discussed earlier in the previous section, there are some other issues which are likely to impact the development of renewable energy sources in the new Member States. These matters include the relationship of most of the NMS with Russian Federation, the prospects for maintaining a certain level of nuclear

generation capacity, and the apparent clash between the aim to promote renewable energy sources and the significant scope for energy efficiency activities in the region.

3.2.1 The relationship between Central and Eastern Europe region and Russian Federation and its impact on the energy sector development

The relationship between most of the new Member States and Russia dates as far back as the First World War (WWI). The break-up of the Austro-Hungarian and the Ottoman Empires together with the Treaty of Versailles have changed the European and Middle East landscape forever. New countries have been created in the process: Austria, the Baltic Sates (Estonia, Latvia and Lithuania), Czechoslovakia[96], Finland, Hungary and Yugoslavia[97]. The Russian Empire suffered great territorial losses, including the Baltic States, Finland and Poland. By 1920s, the Eastern European states seemed quite successful in finding their place in the new order. Czechoslovakia evolved into a democracy, Yugoslavia was capable of managing a multi-ethnic territory while Poland took the path of self-determination. The Great Depression (1929)[98] marked the beginning of the end of a period of peace and strive towards economic development as it affected not only the US but also all European States and created a favourable climate for the Second World War (WWII). The Soviet Union emerged from the WWII victorious and regained control over the countries in Central and Eastern Europe. The economic development was regulated from 1949 onwards by the Council of Mutual Economic Assistance (COMECON). The only exception was Yugoslavia who developed a non-Stalinist form of communism. In 1955 the Warsaw Pact was signed creating a common defence strategy.

[96] The territory of Czech Republic and Slovakia today.
[97] The territory of Slovenia, Bosnia-Herzegovina, Croatia, Yugoslavia and Macedonia today.
[98] During the recession United States and Germany lost 50% of their industrial output. Germany in particular was hit as at the time the country was already struggling with enormous debts as a result of the WWI. In 1931, banks in the US started to withdraw funds from European banks leading to the collapse of many European Banks. Some Governments introduced exchange controls (e,g Germany) or devalued their currency (e.g UK) to stop the falling of national currencies. Finally the gold standard collapsed as well. It is interesting to notice that before the great depression governments and businesses alike believed that prosperity can come only through limited intervention of the government in the domestic economy an from open international economic relations. Very few stood by this idea by 1930s. This explains in part subsequent developments in the energy sector as described earlier in this chapter.

From the economic perspective, the post war period was characterised by a vision of scientific management of the economy. The economic scheme in the early 1960s envisaging supranational sectors across Eastern Europe with the North focused on industry and the South on agriculture and raw materials failed in part due to Romania's strong resistance and Albania's links with China[99].
Soviet economic growth declined from 5-6% annual increase in GDP in early 1960s to 2.7% in 1976-1980[100]. The Eastern Europe followed suit and from the mid 1970s onwards the region experienced a continuous economic decline as loans from Western banks became difficult to arrange. In the mid 1980s, the Soviet Union cut its subsidized oil exports in the region thus triggering a drop in Polish wages by 17% over the period 1980-1986 while wages in Yugoslavia dropped by 24% over the same period[101].

By the end of the 1980s, the economic development imposed by the Soviet Union in Eastern Europe led to a dramatic decline in living standards, huge inefficiencies and obsolete output in the industrial sector coupled with significant environmental and health problems. Gorbachev's [102] policies of glasnost (openness) and perestroika (restructuring) led eventually to the end of the Soviet control in Eastern Europe at the beginning of the 1990s.

From the energy sector perspective, 85 years of close link between the region and the former Soviet Union translated in the CEE countries in energy systems within which energy supply was decoupled from the energy demand and a high dependency on Russia for oil, gas and nuclear supplies (*see Table 3.5)*.

Table 3.5 Comparative overview of fuel imports dependency in the NMS, acceding countries and Turkey and the EU-15 in year 2000.

Countries	All fuels	Solid fuels	Oil	Natural gas
EU-15	49.3	51.2	75	45.2

[99] Atlas of World History: from the origins of humanity to the year 2000, pg. 237
[100] See *Supra Note* 99
[101] See *Supra Note* 99 pg.237.
[102] After succeeding Chernenko, Gorbachev embarked on a programme of significant reforms and played a crucial role in the nuclear disarmament and the demise of communist regimes in Eastern Europe, Philip`s Millenium Encyclopedia, pg. 290.

Countries	All fuels	Solid fuels	Oil	Natural gas
Cyprus	99.2	101.9	100.6	-
Czech Rep	23.2	-22	97.9	99.8
Estonia	31.7	9.5	101.9	100
Hungary	56.2	27.3	77.3	75.4
Latvia	62.6	37.9	95	101.9
Lithuania	59.5	88.4	94.8	100
Malta	100.5	-	100.5	-
Poland	11	-28.9	98.5	66.3
Slovakia	64.5	80.6	91.7	98.8
Slovenia	52.1	18.8	101.4	99.3
Total NMS	**29.9**	**-17.4**	**95**	**84.3**
Bulgaria	45.8	35.2	96.6	93.5
Romania	21.9	24.6	35.1	19.8
Turkey	64.7	39.7	93.3	95.4
Total acceding countries plus Turkey	**50.3**	**35.8**	**80.7**	**59.5**
EU-28	**47.3**	**31.4**	**76.7**	**49.8**

Source: EU (2003)

The table shows that with the enlargement process, the EU import dependency on oil and gas imports increases. The admission of acceding countries will add to the bill with Romania[103] adding the least due to its indigenous, albeit depleting, oil and gas resources. A significant part of the oil and gas imports in the new Member States comes from Russia. For instance, the Slovak Republic relies on oil imports from the Russian Federation to meet approximately 97% of its oil needs and about the same for the natural gas[104]. In Czech Republic, imports of crude and refined products in 2001 averaged about 192,000 b/d. Most oil imports come from the Russian Federation and from Germany. With respect to gas, in 2000, 78% of the gas imported by Transgas came from the Russian supplier Gazexport and the remainder from the Norwegian consortium GFU[105]. In general terms, 53% of Russia's oil exports (representing 19% of EU oil consumption) and 62%

[103] Romania is currently considered for accession in 2007.
[104] USA, Department of Energy, Office for fossil energy, http://www.fe.doe.gov/
[105] Ibid 104

of Russia's natural gas (representing over 40% of EU's gas imports) went to the EU in 2001[106].To this end, it is worth mentioning that in May 2006, the IEA's Executive Director, Mr. Claude Mandil, expressed publicly his concerns over Russia's ability to meet its current, let alone future, gas commitments, principally due to lack of adequate investment in infrastructure[107].

The situation of gas imports has a particular relevance for the future development of renewable energy in the new Member States as gas fired power plants are more often than not seen as a panacea for many of the supplies issues these countries face and may become the preferred solution even in circumstances where other options, including renewable projects, might make economic sense. In long term, this rush for gas may prove a rather costly undertaking. In its report back in April 2003[108], the International Association of oil and gas producers (OGP) stressed that "*the commercial environment and the policy and regulatory framework within which the gas producers operate is, however, crucial in terms of what resource is likely to be developed when and most importantly where*" and concludes that "*the updated remaining potential of EU recoverable natural gas resources-including the undiscovered potential-are about 135000 billion cubic meters (BCM). At current consumption levels this would be equivalent to supply the EU area with natural gas for the next 30-40 years*". For an overview of EU gas reserves and definitions of various reserves used in this report, see *Table 3.6, Annex 3.III*. Given that prospects concerning the ability of the EU area to sustain indigenous gas production to meet current levels of consumption seem rather gloomy and the fact that the NMS are on the upward trend for economic development (with a yearly GDP increase between 3 to 5 %), it seems reasonable to say that these countries may need to carefully balance out the consequences of increasing their gas uptake in the energy mix (thus further exposing their economies to price volatility and stronger correlation with the economy of the Russian Federation) and other opportunities for electricity generation (such as RES-E) coupled with energy efficiency.

---

[106] N.Fujiwara, "*The EU-Russia energy dialog: where it is leading to*?" in Oil, Gas & Energy Law Intelligence, Vol 1, Issue 5, December 2003, www.gasandoil.com/ogel.

[107] The statement appeared in an interview with BBC correspondents. The interview was published on the BBC web site http://news.bbc.co.uk/go/pr/fr/-/1/hi/business/5007696.stm searched on 23 May 2006.

[108] International Association for Oil and Gas Producers, "*Enlarged EU/EEA gas supply and the policy framework: an updated analysis of EU/EEA gas production potential and external gas resources and their relationship to the policy and regulatory framework",* Report 340, April 2003,www.ogp.org.uk.

3.2.2 The nuclear power question

The nuclear power sector in Europe experienced a significant turn at the end of 1980s when attention shifted from building new nuclear generation capacity to improvement of nuclear safety and nuclear waste management. The nuclear package included in the Energy Chapter of the Acquis Communautaire proved a cumbersome one. The difficulty to get agreements in this sector stem from the fact that while nuclear generation plays a strategic role in many of the European domestic electricity markets (as it can ensure affordable base load), nuclear safety and waste issues are cross-boundary and thus concern us all. Because of this dual impact on development, the issue of nuclear power is one of the most controversial to tackle and at times it seems difficult to reconcile national and EU interests in relation to it.

On 6 November 2002 the first draft for the nuclear package containing two Directives (one for nuclear waste and one for nuclear safety) was proposed but strong opposition from UK, Germany, Sweden and Finland as well as from the European Parliament[109] delayed the process of moving forward. Early September 2004, a new package has been proposed containing a softer language on some of the most contentious issues such as the subsidiary principle concerning the nuclear safety standards, decommissioning funds, setting up a national regulatory committee at the level of the EU, waste disposal programme and timetable for long-term radioactive waste disposal management[110].

Given the increasing concern over nuclear safety across Europe, it comes to no surprise that nuclear power was a highly controversial issue during the accession process for the NMS and remains so for acceding countries. Although there is no specific Acquis dealing with nuclear energy, the NMS and acceding countries have been requested to revisit their approach towards nuclear power especially because of concerns over the safety of their nuclear generators. *Table 3.7*, provides a brief overview of the nuclear generation in the region.

[109] "How new is the nuclear package", 10 September 2004, www.EurActiv.com
[110] Ibid 109

Table 3.7 An overview of the electricity production from nuclear sources in Central and Eastern Europe *(in 2001)*

Country	No.of generators	Total electricity generation (TWh)	Share of nuclear (%)
Bulgaria	6	18.2	45
Hungary	4	14.2	40.6
Lithuania	2	8.4	73.7
Czech Republic	5	13.6	20.1
Romania[111]	1	5.1	10.9
Slovakia	6	16.5	53.4
Slovenia	1	4.5	37.4

Source: Louis (2004)[112]

As it can be seen from the *Table 3.7* above, the nuclear power accounts for a significant share of over 37% of the electricity generation in some of the new Member States (with exception of Czech republic) as well as in some acceding countries. Their nuclear reactors however differ considerably in terms of technology employed and age of the technology. For instance, four of the reactors at the Kozloduy nuclear power plant in Bulgaria, two of the reactors in Bohunice (Slovakia) and both reactors at Ignalina (Lithuania) are over 20 years old and of Soviet type. In contrast, the nuclear power stations in Romania and Slovenia use Candu and Westinghouse western technology respectively and the management is handled by well established international companies such as Areva and Siemens with proven track records. Because of safety concerns, two separate Protocols have been concluded with Lithuania and Slovakia prior to accession concerning the closure of all (in the case of Lithuania) or a part (in case of Slovakia) of the nuclear capacity. The Protocols set clear time tables and constitute an integral part of the Accession Treaty.

According to the Protocol no.4 of the Accession Treaty[113], € 280 Mil. will be available for Lithuania from EU for the period 2004-2006 to compensate for the closure of the nuclear reactors, first before 2005 and the second reactor by 2009. Although in certain cases the EU funds may

[111] Works for the second generator should be completed by 2007 and a third is planned to start production by 2010.
[112] O. Louis, "*Nuclear energy in the CEECs*", article published on the European portal EurActiv on 16th June, 2004, www.euractiv.com.
[113] AA2003/ACT/P4/en4764, www.europa.eu.int

cover up to 100% of the total investment, for projects needed to counterbalance the closure of the nuclear reactor, Lithuania would need to find financial sources for co-financing in order to absorb the total amount available. At the time of writing this paper, it is was not yet decided what payments Lithuania will be receiving from the EU beyond 2006 but it seems that the amount will depend on two things: the interpretation of both parties on 'actual needs' for Lithuania and, again, on country's ability to co-finance. In any case the burden to compensate in full for the loss of the nuclear generation may lay for Lithuania on the hefty side[114]. The impact of closing the nuclear reactors is probably significant not only because Ignalina is currently covering more than 70% of the domestic electricity demand but also 100% of its exports.

According to Protocol no.9 to the Accession Treaty[115], Slovakia as well will have to close down reactor I in Bohunice before December 2006 and the reactor VI before December 2008. For this operation, Slovakia may receive €90 Million for the period 2004-2006 with possible additional financial aid after 2006. Although the Protocol stipulates that financial aid from the EU may continue beyond year 2006, it contains no specifications under which circumstances these payments may be made during the Next Financial period[116] nor does it provide for the application of the safeguard clause in case of significant disruptions in energy supplies.

In the case of the accession country Bulgaria[117], during the negotiations on the Energy Chapter, the Government agreed to close reactors I and II of the Kozloduy nuclear power. Further closure of the reactors III and IV of the same plant is envisaged but at the time of writing this paper it

[114] According to Art.3(4) of the Protocol, "*For the period of the next Financial Perspectives* […] pro*gramming of these resources will be based on actual payment needs and absorption capacity*". The costs for the Lithuanian economy for closing down the Ignalina power plant are estimated to $bn 2.5-3(€bn 2.05-2.47; 1$=0.823692€), meaning approximately 10 times more than the current financial aid (see *Supra Note* 84, pg. 65); The Protocol does provide however for the application of the general safeguard provision if energy supply will be disrupted in Lithuania as a direct result of this measure.

[115] AA2003/ACT/P9/en4800, www.europa.eu.int.

[116] Art.3 stipulates that "*The European Union acknowledges that the decommissioning of the Bohunice V1 Nuclear Power plant will have to continue beyond the current financial perspective and that this effort represents for Slovakia a significant financial burden. Decisions on the continuation of EU assistance in this field after 2006 will take the situation into account.*"

[117] Currently is considered for the full membership by 2007.

remained a highly debated issue in Bulgaria[118]. EU expressed therefore readiness to continue a financial assistance of €550 Mil over the period 2000-2009 to support Bulgaria's effort[119].

Plans to maintain and/or replace nuclear capacity for electricity generation exist in some of the new Member States as well as in acceding countries. For instance, the Czech energy policy adopted on January 12, 2000[120] indicated that in short term Dukovany and Temelín nuclear power plants are suitable to provide base-load power. Dukovany was expected to operate until 2025, possibly with increased output while Temelín is planned to run at least to 2040. Subject to public approval and economic viability, new nuclear power plants are envisioned for the period 2015 to 2030 to compensate for limited coal resources in the Czech Republic[121]. Slovakia indicated recently that the privatisation of the Mochovce power plant will come with a condition for the strategic investor to complete the two nuclear reactors[122].

To conclude, it seems that the NMS acknowledged the importance of applying high safety standards to their nuclear generation and efforts are being made on all sides to ensure a long-term cooperation in this respect both with the EC and through bilateral agreements between neighbouring countries[123]. However, the future of the nuclear generation in this region is likely to depend on a broader range of issues. Although the full cost of accession is yet to be revealed[124], it is to be expected that high costs lay ahead the NMS to complete the market reforms and comply with all the Acquis requirements[125]. On the other hand, all these

[118] According to Bulgaria`s nuclear watchdog agency, the two reactors may remain operational for another nine and ten years respectively. The Parliament has passed a resolution that bans any reactor closures before Bulgaria`s accession to the EU (EurActiv, 4 June 2004).
[119] EU Enlargement, Chapter 14: Energy, www.europa.eu.int.
[120] On February 18, 2004, a new policy has been submitted to the Government for approval. At the moment of writing this thesis, an English version of the draft was not available. The new energy policy might contain slightly different views that the ones mentioned here.
[121] European Atomic Forum, www.foratom.org.
[122] Ibid 121
[123] For instance the Melk agreement between Czech Republic and Austria.
[124] Some estimates are available for the acceding country Romania from the European project "Pre-Accession Impact Studies II". For instance for investments in infrastructure in the transport sector, €bn 18.3 will be required for the period 2004-2007 and an additional €bn 10.6 for the period 2008-2015. To comply with the environmental Acquis, €bn 29.5 will be required for the period 2004-2021 out of which 20% will come from the state budget (€bn 5.9), 30% from EU funds (€bn 8.85), about 35% is expected from the business sector (€bn10.3) and the rest of 15% from other sources. For details see Romanian European Institute, http://www.ier.ro/impactstudiesPAIS2.html
[125] In their article "*What will be the new Member States break even point*", Y. Lepape and M. Lantieri estimate that the volume of projects the new Member States will need in order to at least balance the

countries are on the upward trend of economic development so in short to medium term, financial resources will most likely remain scarce due to competitive development projects awaiting financial closure. As a result, income/electricity from the nuclear capacity will continue to play a strategic role in the region given the high percentage of electricity produced from this source in these countries.

Some new Member States and accession countries may wish to take stock of their generation options and the new opportunities offered by the European internal market and increase their ability as market players. Their nuclear capacity may facilitate to achieve this goal. According to UCTE, taking into account the existing capacities for electricity generation and investments planned in this sector by 2010, the CEE countries are potential exporters with Poland and Bulgaria having potentially significant export capacities in 2010 and Czech Republic a slight surplus. Member States like Hungary, France and Germany could find themselves as potential importers unless new investment projects are undertaken[126].

Finally, as mentioned earlier in this chapter, the region is highly dependent on Russian Federation for its fuels. Hence, maintaining a certain level of nuclear capacity may be considered by some new Member States as one possibility these countries have to diversify their electricity supply.

---

transfers of funds to and from the EU, would be somewhere in the range of €3bn worth of projects for the period 2004-2006 or, in other words, an utilisation rate of 14%. This rate is likely to vary from one country to another and will depend on the kind of funds used, in particular cash-flow facilities and temporary budgetary compensations negotiated in Copenhagen. The question of co-financing is therefore important because even if they do not affect directly the public budget will however weight on public spending (EurActiv, 25 June, 2004).

[126] The UCTE calculates the balance between "guaranteed production" and a "load level in reference period"; from this potential a necessary margin is subtracted to cover the peak load and to ensure reliability and security of supply (5%); if the balance is positive than the country is considered a potential exporter; Y.Lepape, "*Electricity prospects for 2010*", 12 March 2004, www.euractiv.com; These findings seem in line with what happens in some of the CEE countries. An interview dated 4th June 2004, revealed that the prime Minister Simeon Saxe-Coburg expects a decision to revive the controversial nuclear project at Belene (on the Danube) which stalled in 1990s, in order to maintain Bulgaria`s strategic position within the regional market. In 2003 for instance, Bulgaria sold 5 Million kWh of electricity to Greece, Turkey, Serbia and Macedonia ("*Bulgaria set to resume nuclear project",* www.euractiv.com). Electricity exports are becoming increasingly important for the Czech Republic, particularly with the commissioning of the Temelín nuclear power plant in 2001. The addition of the nuclear power plants has allowed Slovakia to become a net exporter of electricity, beginning in 1999.

3.2.3 The "low-hanging fruit" of energy efficiency

Although energy efficiency can be achieved on the supply side of the energy chain, the concept it is often referred to as measures taken on the demand side (or end-use) and this is also the meaning intended for this discussion.

In the electricity sector, we have seen that electricity is not quite a trouble-free commodity which makes its demand also rather particular. In short to medium term, the price elasticity of the electricity demand is very low. This basically means that in short to medium term the electricity demand is not so responsive to price signals and it tends to change very little, usually in response to weather variations or short-term production cycles in the commercial and industrial sector. In long run however, the electricity demand is increasingly becoming sensitive to price signals and it will adjust according to macroeconomic business cycles, available new technologies and more permanent changes in climate as substitution options become available.

During the 1980s, end-use energy efficiency measures (known as Demand Side Management) were undertaken by utilities to modify the customer's load profile. Normally the decision was made based on a cost-benefit analysis between costs to undertake the DSM measures versus building new generation capacity. In the liberalised markets utilities saw their profit margins squeezed and therefore slowed down if not abandoned completely this kind of projects. But liberalisation of energy markets influenced in more than one way the potential for energy efficiency.

The most evident effect was through the change in energy prices. As discussed earlier in this chapter, one of the expected effects of liberalisation was lower energy prices for the end consumer and most energy efficiency proponents saw their bred being taken from under their nose. In the EU-15 however, things did not happen exactly this way. While the industrial consumers did see some reductions in their electricity bill, the residential consumer saw an increase over the same period of time. This might have various explanations including phasing out subsidies, the desire to increase competitiveness of the industry but also the fact that residential consumers are still captive consumers and consequently some of the outcomes of liberalisation could have been

passed on to them. *Table 3.8* shows the evolution of electricity prices for the end-consumer in industry and household sectors, in the EU-15.

Table 3.8 Evolution of electricity prices in the EU-15

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Industry												
6.19	6.38	6.42	6.33	6.35	6.27	5.89	5.87	5.68	5.48	5.45	5.49	5.49
Households												
10.79	11.39	12.64	12.51	12.71	12.57	12.60	12.61	12.51	12.14	12.26	12.40	12.56

Source: EU (2003)
Note: averages in €¢/kWh, all taxes included, end-consumer

In the gas sector the price evolution may follow suit as liberalisation in this sector is somehow behind the electricity sector. *Table 3.9* displays the evolution of gas prices in EU-15.

Table 3.9 Evolution of gas prices in the EU-15

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Industry												
3.46	3.74	3.62	3.44	3.50	3.41	3.26	3.70	3.72	3.19	3.78	5.26	4.91
Households												
10.23	10.85	10.78	10.47	11.14	11.19	11.04	11.77	11.80	11.39	12.07	13.49	13.62

Source: EC(2003)
Note: excise taxes included, prices are calculated in €/GJ

With the new environmental regulations and the increased awareness that the availability of fossil fuels comes at an increasing risk premium (thus the author expects prices to remain higher than the last decade), electricity prices are on the rise which makes, in author's opinion, energy efficiency to actually gain momentum. But there is also a more perverse effect of liberalisation on energy prices which is increased price volatility. Price volatility may become a nuisance for energy efficiency project developers. In particular Third Party Financing schemes [127] may be

[127] An energy efficiency project undertaken within a Third Party Financing scheme is a project which is developed by a third party using energy savings to pay for the investment.

affected as the question of 'who is taking the price risk?' becomes central to successfully close the project financing.

Liberalisation also forced integrated companies to use their assets wisely. Unbundling the vertically integrated monopolies created business units where costs and profits are much more noticeable with the retail part of the energy chain on the lower end of the profit margin. This makes the retail business one of the best candidates for future energy efficiency projects as they can be integrated into a service package[128]. In addition, as discussed earlier in this chapter, electricity tariffs are changing and in the future they may allow cost recovery for DSM measures.

Finally, liberalisation did bring about a rather undesired effect of 'volatility' in policy making. Because this is a rather new phenomenon where all countries learn as they advance in the process, the regulatory framework is bound to change faster than it used to be the case in the past. This may trigger shorter business cycles as both governments and investors alike may tend to focus on short-term objectives leading to expectations for higher returns on investment in shorter payback periods. But neither energy efficiency nor renewable energy is a short-term commitment so they will both succeed only if investors are willing to share some risk and take a long-term approach and governments are willing to put in place a policy-making mechanism that would ensure clarity and transparency beyond the electoral cycle.

So the question is: what is the potential for energy savings in the new Member States? Some people may say 'a lot' and this has led to a wide-spread perception that energy efficiency makes more sense in this region than renewable energy. Although this may be the case in certain circumstances, a sound analysis is required to fully account for all relevant issues. The section below highlights only some elements such an analysis may need to contain.

Earlier in the chapter it has been explained how the energy systems in some NMS emerged and the fact that the supply side and the demand side were almost completely disconnected in the context of central planning with a focus almost exclusively on the supply side. This resulted

[128] And this is where the new EC Directive on energy efficiency and energy services can provide a framework to work with.

in all sorts of inefficiencies but also in a blatant lack of adequate metering equipment, especially in public buildings and residential sector. This is highly relevant for any energy efficiency measures as the level of energy savings depends on the chosen baseline. Recognising this deficiency, and because of the accession process, the NMS had to modernize their energy systems to comply with technical requirements to connect to the UCTE grid and with other regulatory requirements-such as past EU Directives targeting energy efficiency measures or the electricity directive. In addition, the NMS are signatories of the Energy Charter[129] and members of the Energy Charter Conference. The Charter's Protocol on Energy Efficiency and Related Environmental Aspects defines policy principles for the promotion of energy efficiency as a source of energy and consequently, for reducing adverse environmental impacts of energy systems. It also provides guidance on the development of energy efficiency programmes and indicates areas of co-operation while providing an adequate framework for such a cooperation to take place. An important benefit of belonging to this multilateral framework is that periodic monitoring of the energy performance is being conducted and guidance is being provided thus keeping the energy efficiency on the agenda.

Apart from the challenge concerning the availability of affordable metering devices and to continuously adjust policies and measures, it is equally important to understand which Figures one is looking at when assessing the energy efficiency potential in the region. One needs to keep in mind that although now full Members of the European Union, these countries are still some way to go along the transition path and structural changes in GDP do tend to affect the end result of the analysis as the discussion below shows.

Table 3.10 The evolution of energy efficiency in Hungary in two subsequent periods: 1991-1994 and 1994-1998

	1991-1994	1994-1998
Actual final energy intensity corrected for climatic conditions	-4	-2.9

[129] The Energy Charter is a political initiative that started in early 1990s with the main objective to boost cooperation and strengthen the rule of law in the energy sector among Eurasian countries. The Energy Charter and its Protocol on energy efficiency and related environmental aspects has been signed on 1994 and entered into force in 1998. Currently the Treaty has been signed or acceded to by 51 states and the European Communities.

Final energy intensity with the structure of GDP in 1991 corrected for climatic conditions	-4.4	-0.6
Structural impact	0.4	-1.8
The impact of structural change in % of the actual final energy intensity	10	75

Source: Energy Charter (2001)

Note: the energy intensity is calculated in TPES/GDP using PPP – toe000/90 USD

Using the decrease in final energy intensity as an indicator for the impact of energy efficiency measures, it seems that during the period 1994-1998 the impact of structural changes on the decrease in final energy intensity was about 75% which means that in real terms, more energy efficiency measures were taken during the first period rather than the second. This can be easily explained if we keep in mind the evolution of electricity prices in the region.

For example, in Poland, in 1990 energy prices initially increased 300-600 per cent[130]. Then price increases slowed down more than expected due to political and social pressures. In 1993, electricity prices only covered 50-60 per cent of production costs. In 1994, heat prices covered 73 per cent of costs. Between 1995 and 1997, however, all subsidies were removed. Using 1995 as the base 100, energy prices in the second quarter of 2000 were: oil products 273.7, electricity 193.8, natural gas 208.2, coal 177.4. Between 1995 and 1999, electricity prices in Hungary increased 207 per cent, while natural gas prices increased 121 per cent. Since 1997 the prices of electricity and natural gas are calculated according to pricing principles and price formulas defined by the energy regulator. Using 1995 as the base 100, energy prices in the second quarter of 2000 were: oil products 439.1, electricity 271.1, natural Gas 207.0, coal 179.5. Czech Republic underwent a similar process and using the 1995 as the base 100, prices in the second quarter of 2000 were: oil products 149.1, electricity 229.7, natural Gas 234.8 and coal 170.6. The changes in prices were particularly triggered by changes in the fuel mix and the change in taxation policy, trend which is likely to continue in short to medium term due to environmental and renewable policies.

[130] Progress report on implementing the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects, Energy Charter, pg.16, December 2001.

Because a series of past EU energy efficiency policies have already been implemented, in most of the NMS the institutional and legal framework has been adjusted accordingly. Hence, most of the NMS have a national energy efficiency strategy and an energy efficiency unit located in the responsible Ministry and/or an energy efficiency law, an energy centre and/or an energy conservation agency and in some cases energy efficiency funds established to ensure financing in forms of grants, soft loans or commercial loans for energy efficiency projects. More importantly, there is a wide variety of networks active in the region (e.g. OPET, the network for sustainable energy regulators, etc) and NGOs that are carrying out an impressive amount of projects aimed at increasing public awareness on energy efficiency benefits, conducting energy audits, provide input in the policy making process, etc. This is essential for a good implementation of any policy so in the case of energy efficiency it seems easier to implement policies for which the channels for communication and financing are already in place and better understood by local communities. This does not seem to be the case for renewable energy where most of the elements of the 'policy chain' are still missing. This situation may be one explanation for the reluctant attitude towards renewable energy. One way to leverage the playing field would be, the author believes, to find synergies and use as much of the existing channels for increasing awareness and financing energy efficiency also for renewable energy.

Like with renewable energy, the NMS have to set for themselves clear goals when it comes to energy efficiency. So far, these goals materialized in some countries in the form of energy efficiency targets. *Table 3.11* below provides an overview of European countries that have such targets already in place.

Table 3.11 Energy efficiency targets within the EU

Country	Target
New Member States	
Hungary	Increase energy efficiency by 3.5 % per year; achieve energy savings at end of 2010 of 75 PJ per year.
Poland	No specific target. Draft new environmental policy calls for lowering energy intensity in industry by 50% until 2008-2012 from 1990 base.

Slovenia	Target to improve overall energy efficiency by 2% p.a. over the next 10-15 years {20% over next ten years]
EU-15	
Denmark	20% improvement in energy intensity between 1994 and 2005.
Finland	The energy efficiency target in Finland is to bring down total energy consumption by 4 to 5%, which corresponds to a reduction of about 1.5 Mtoe in 2010 compared to a situation in which new energy efficiency activities would not be implemented. CO2 emissions would be reduced by around 4 million tonnes. The energy efficiency targets for the end-use sectors in 2010 are: industry 3%, transport 6%, heating of buildings 9%, electricity for residences 2% and electricity for services 3%.
Netherlands	Action Programme calls for increasing the energy conservation from 1.6% to 2.0% improvements per annum.
Portugal	There is a target for energy intensive industrial plant to reduce their specific energy consumption with 1% per year.
Spain	Reduce final energy demand by 7.6% in 2000 compared to 1991.

Source: Energy Charter (2001)

From the *Table 3.11* above, it appears that only 8 out of the 25 EU Member States have set energy efficiency targets for a variety of reasons such as diminishing the overall energy intensity or in a specific sector (normally the industry) or to reduce energy consumption. In a similar fashion, renewable energy targets may be considered by the NMS as viable means to achieve different objectives that could complement energy efficiency and/or climate change objectives.

With respect to energy efficiency there is yet another issue one needs to be considered. There is a significant difference between what is maximum possible, what is economically achievable and when (short-term, medium term or long term). Often various estimates for energy savings potentials are being mentioned but without a comprehensive explanation of what those figures really mean. *Table 3.12* shows the magnitude of the difference between various potentials for saving energy in two of the new Member States: Czech Republic and Slovakia.

Table 3.12 Estimates for various potentials for energy savings in Czech Republic and Slovakia

Potential as % of the indicator[11]	Technical potential		Economic (5% d.r.) potential		Market potential
Sector \ country	Czech Rep.	Slovakia	Czech Rep.	Slovakia	Slovakia
industry	17.4%	18.8%	9.8%	8.1%	4.7%
households	14.5%	11.1%	5.4%	3.9%	1.8%
services	5.7%	5.6%	3.0%	3.4%	1.7%
transport	4.3%	4.5%	2.5%	3.1%	1.4%
municipal energy systems/district heating	4.7%	3.9%	0.6%	1.2%	1.0%
agriculture	0.9%	N/A	0.5%	N/A	N/A
total	**47.5%**	**43.9%**	**21.7%**	**19.8%**	**10.7%**

d.r. – discount rate; N/A- no data available

Source: CEU (2003)[131]

If we start thinking not in terms of percentages but in terms of millions of Euro needed to fulfil these various potentials, the difference between what is technically possible and what is realistically achievable becomes obvious.

In the case of Czech Republic for instance, the total investment needed to fully realise the technical potential[132] for energy savings was estimated to €118 bn. The amount represents over 200% of the annual Czech GDP (in 2001) and 50% of the state budget (in 2001). To realize the economic potential [133], the total investment needs were estimated to be approximately 4 - 6 % of the investment needs calculated for the technical potential. Over a 10 year period, to attain the economic potential of energy savings would therefore require an annual investment of about 1 % of Czech GDP, i.e. 3.3 % of the Czech state budget. The market potential [134] is roughly considered to be around 80% of the economic potential for the Czech Republic and 50% for Slovakia. For

[131] Central European University (CEU),"*The impact of structural changes in the energy sector of CEE countries on the creation of a sustainable energy path*", Final report, December 2003, Project no iv/2002/07/03 for the European Parliament, pg. 19.

[132] Technical potential is defined as "*The maximum possible savings without considering any economic limitations"*; Ibid 131, pg. 96.

[133] Economic potential is defined as the share of the technical potential for which the cost of investments is lower than the resulting benefits and for whose calculation social and macro-economical conditions are considered; Ibid 131, pg. 96.

[134] Market potential is defined as the potential that takes into account the micro-economic situation or the willingness of the investors to invest in energy efficiency. Its estimation depends on the assumptions about expected risk and the pay-back time; Ibid 131, pg. 96.

Poland, the 'achievable potential[135]' is estimated to be around 12% of the final energy demand or estimated to be around 75% of the economic potential. Looking at the figures above, one can see for instance that although Czech Republic and Slovakia have a comparable technical and economic potential, the market potential is 30% lower in Slovakia than in Czech Republic although both countries started from the same initial condition.

Whatever the actual figures may be, there is one conclusion that can be drawn based on the examples presented above: the level of actual energy savings that can be achieved is significantly sensitive to macroeconomic conditions and most likely highly dependent on how well targeted the policies are (well defined policies tend to require less public spending). With respect to renewable energy potentials, the analysis goes much in the same way. However, the difference concerning the estimation of RES-E potentials stems from the fact that in this case, the role of local authorities is enhanced as the potential for future development of these sources relies heavily on local energy planning. Consequently, an accurate assessment of RES-E potentials may require different human and financial resources as well as local energy planning skills, knowledge not so wide-spread amongst local policy makers in the new Member States. This could also be yet another impediment in developing renewable energy sources[136].

The discussion above, without having the goal to provide a complete overview of the important efforts that are being made in all new Member States to tackle energy efficiency (which would be beyond the scope of this thesis), does provide few explanations why analysing the end-use energy efficiency and renewable potential in the region is a rather complex task and requires a careful consideration of all relevant circumstances and the existing economic and policy background. It is probably quite true that a lot could and needs to be done still with respect to energy efficiency, especially considering the new EU regulatory initiatives which will most likely require a change in the legal and market framework for implementation. In addition, the author believes that the focus should shift in time from the public and commercial sectors (which

[135] Achievable potential is considered to have the same meaning as the market potential. In this context the term accounts for the barriers to investment in energy efficiency; see *Supra Note* 131, pg.96.

[136] In this paper, the potentials for various RES-E technologies have been calculated using the ADMIRE-REBUS framework. Details on the scientific method employed and potentials in the NMS for various RES-E technologies are presented in Chapter 5 of this paper.

have been so far the focus of most energy efficiency related projects in the region) to the residential sector, in particular low income households whose energy consumption should be kept low if in long-term, intra-class and other targeted subsidies are to be phased out. But, in the author's opinion, there is scope for energy efficiency measures to tackle the issue of sustainable energy consumption as it is scope for renewable energy to tackle the challenge of sustainable energy supply, these two forms of measures being complementary rather than substitutes. The time dimension will also play a role. It does matter what could and needs to be done in short to medium term and what needs to be addressed in long-run since maintaining a sustainable energy production and consumption pattern requires continuous monitoring and progress evaluation and deployment of new technologies and methodologies as they become available. While energy efficiency seems to be indeed an immediate option, in particular in urban areas, RES-E deployment would require a much longer time-frame to reach its potential provided that adequate policy framework and resources are being allotted now.

3.3 The European energy sector: a fast changing environment and a challenge for renewable energy proponents

Going back to Samuel Insull´s story (see *Supra Note* 8 *above*) and the Irish famine, few lessons can be learnt. For one, a monopolistic structure while being in part inevitable in sectors that require large asset base and public service like the energy sector, left on its own and unchallenged may not provide the most adequate service in the most efficient way to the society at large. In addition, a market needs to operate in a transparent way and have appropriate checks-and-balances should be in place to ensure that resources are being used efficiently and consequences of taking (or not taking) certain actions understood by the public at large in order to attain the desired outcome. Any failure to convey equally to the market players and the society at large the underlying reasoning for any significant change in policy (and maybe in prices) is likely to trigger fierce opposition. Such opposition may delay if not completely block policy initiatives otherwise meant to deliver long-term benefits that most probably would outweigh the short-term distress (e.g. raising short-term unemployment, raising interest and inflation rates, etc).

Although understandable to some extent, the concerns of the TSOs with respect to the simultaneous accommodation of the Electricity Directive and the RES-E Directive may be addressed through various means such as: higher degree of harmonisation in technical standards[137], seek opportunities for RES-E distributed generation, better energy planning and increased transparency in communication between the TSOs, regional energy planners and the regulator to better shape RES-E policies (including considering market mechanisms that recognise the green value of the renewable energy that can be traded separately from physical flows), increased recognition of ancillary benefits, the local character of RES-E generators and technological progress.

One of the most important upshots of liberalisation is that it forced participants in the energy market to change perspective. Businesses are becoming increasingly aware that given new surges in oil prices[138], they are likely to face higher risks associated with oil and gas supplies, that due to scarcity of our natural resources, diversifying energy sources is an option that needs to be considered and that providing energy services could compensate for the loss of revenues from selling kWh due to liberalisation.

As the European internal market evolves and countries strive for economic growth, the energy sector competes with other sectors (e.g. agriculture, transport, waste management, education, etc). New market oriented policies are needed to compensate for the scarcity of public financial resources. New solutions need to be found but this will require governments to become increasingly aware of market rules and more forthcoming when it comes to setting priorities for future development.

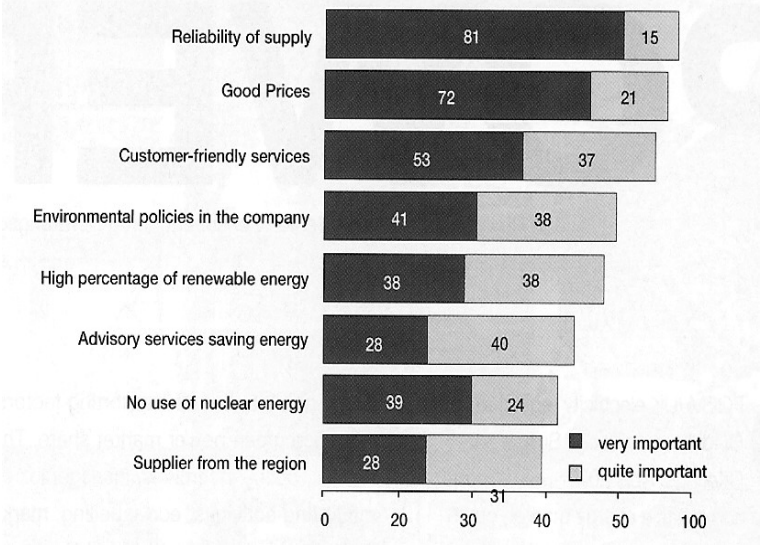
Although most of the new regulations will translate in one way or another to increased costs for the end-consumer, a wide range of options on how to optimize consumption are and will continue to be available and provided that adequate information is made accessible, the end-consumer will have to shift from a passive observer to an active participant in the market. This is particularly relevant to renewables as

[137] For instance, the UCTE has elaborated recently a new Operational Handbook that sets new technical, communication and policy standards for the TSOs in the UCTE area. Information on the status of the Operational Handbook can be found at: http://www.ucte.org/ohb/cur_status.asp

[138] Oil price spikes could significantly affect economic performance. A 10 $ per barrel of oil above the average price may slow down the global economy by 0.5% annually (UNDP, World energy assessment: overview 2004, pg.42). On 22 September 2004, oil prices reached the psychological ceiling of 50USD/bl. On 10th August 2005, oil prices reached an all time high 64 USD/bl.

the future development of the market for the green value is closely linked with the consumer attitude. Up to now, the perception of the liberalisation process in general and the green market in particular has been rather gloomy. A recent survey[139] shows that the consumer experience with liberalisation and marketing green power can be characterised by: fears and uncertainty, liberalisation so far being perceived as a loss of security rather than gain of freedom, perceived lack of reliability of new, aggressive suppliers and discount–sales style that conflicts with consumer's need for stability, inertia due to long-term relationship with current supplier, confusion and lack of information about products on offer. *Figure.3.9* below shows a ranking of major criteria used by end-consumers for choosing an electricity supplier

Figure 3.9 End-consumer criteria for choosing their electricity supplier



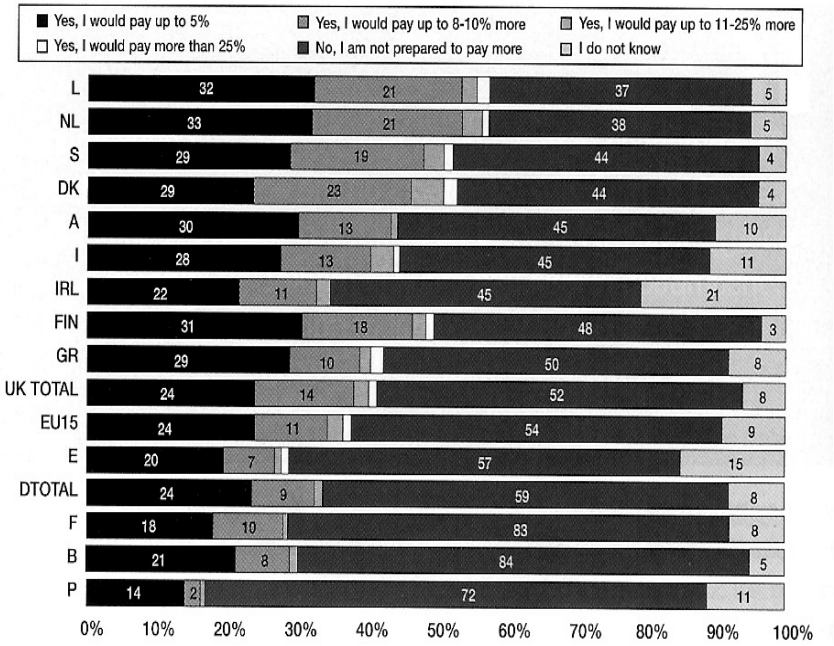
Source: J. Devries (2004)

With respect to the willingness to pay a premium for the green value of the electricity produced from renewable energy sources, the survey seems to suggest that only 24% of the European customers are willing to pay a premium of around 5% on top of current electricity prices, 11% are prepared to pay an additional 8% to 10% , 3% of the customers will be

[139] J. Devries, "*Marketing green power*" in Power and Energy: enlargement EU; Down of a new Europe, special issue, 2004, pg.63, www.gdsinternational.com.

willing to pay in between 11-25% on top of the current electricity price while the majority (62%) are still to be convinced that the green value of the electricity produced from RES-E is something worth paying for. It is also probably worth mentioning that the highest percentage of customers willing to pay a premium is in the Nordic countries where income levels are relatively high. *Figure 3.10* below shows the spread of consumer's willingness to pay for EU-15.

Figure 3.10 Consumer's willingness to pay a premium for the green value of the electricity produced from renewable energy sources



Source:J. Devries (2004)

In this new context, renewable generators will have to fight tooth and nail not only with the incumbent integrated companies well established by now in these markets but also with a very reluctant customer. Consequently, increasing the share of renewable energy sources in the total energy mix in Europe but even more so in the new Member States,

will only be possible if there is sufficient political will in each domestic market, if new planning techniques are being applied to take stock of new knowledge on technological progress and modelling tools for complex energy systems and if new alliances will be created for lobby purposes.

Renewable energy sources and energy efficiency measures are most likely to act as complements in the liberalised energy markets as they help in tackling some of the major challenges (e.g. climate change, security of supply, development, etc) from both ends of the energy supply chain. In the NMS, renewable energy will have to catch up with energy efficiency in terms of policy development, information channels and resources. In order words, estimating RES-E potentials will need to be given further consideration, public awareness needs to be addressed and institutional frameworks (e.g. local energy agencies) need to be put in place if the targets are to be met in 2010. As we have learned from the Estonian case study, unless the issues surrounding the investment itself are addressed (e.g. raising awareness of the targeted community, enable local actors to prepare good quality projects, a clear institutional and legal framework to work within, etc), it is unlikely that development projects, in particular renewable, will take off smoothly in short to medium term, in the new Member States. In addition, as one of the case studies developed in this paper shows[140], energy efficiency could be the cheapest option for NMS (and as a matter of fact for other EU-15 countries) to ensure that the RES-E target by 2010 is met.

[140] See the case study on Romania in Chapter 5 of this paper.

REFERENCES

Bacauskas, A. "*Lithuanian way of reforms to electricity market*", paper prepared for the World Energy Council, Lithuanian Member Committee, Vilnius, Lithuania (*on file with the author*).

Barbu, A.D., "*Market power in liberalised European energy markets*", November 2003, http://www.uni-oldenburg.de/speed/english/staff/barbu/presentations.htm

Barbu, A.D., Uyterlinde M. and de Vries H., "*Prospects for renewables in the new EU Member States*", on http://www.uni-oldenburg.de/speed/english/staff/barbu/working_papers.htm.

Bauquis, P.R. "*A reappraisal of energy supply and demand by 2050*", International Association of Oil and Gas Professionals, www.ogp.org.uk.

Baumol, W. and Blinder, A., "Economics: principles and policy", Fifth Edition, HBJ Publishers, USA, 1979.

Bedi, E. and Olesen, G.B. „*Oil peak: a challenge for the renewables*", Power and Energy Magazine, issue Enlargement Europe, 2003

Bushnell, J., "*Oligopoly equilibria in electricity contract market*", Center for the Study of Energy Markets Working Paper CSEMWP 148, Berkley, University of California, 2005, www.repositories.cdlib.org .

Cameron, P., Competition in energy markets; law and regulation in the European Union, pg. 7, Oxford, 2002

Campbell, C., "*The noose tightens*", New Energy; Magazine for Renewable Energy, Issue No.4, August 2004.

Central European University (CEU), "*The impact of structural changes in the energy sector of CEE countries on the creation of a sustainable energy path*", Final report, Hungary, December 2003, Project no iv/2002/07/03 for the European Parliament, www.ceu.hu.

CEZ (Czech integrated public company), News 36th week 2002- "*The cost of CEZ-generated electricity supplied to households will decrease by at least 5 %*", www.cez.cz.

Coggan, P., Financial Times, Issue August 7/August 8, 2004

Conlan, F., "*European Network for Regional Development Agencies-example of Ireland*", presentation delivered during the European Conference on local energy actions, November 2003, Brussels, www.managenergy.org.

Dangaard, N., "*Energy sector funding within EU Cohesion Fund and Structural Funds – the case of Estonia*", presentation delivered during the European Conference on local energy actions, November 2003, Brussels, www.managenergy.org.

Darrow, C.,"*Enron meltdown: just a tip of the Iceberg?*", www.ucan.org.

Devries,J., "*Marketing green power*", Power and Energy Magazine, Enlargement EU; Down of a new Europe, special issue, 2004.

Eesti Energia, "*Estonia: EIB lends EUR 80 million to Eesti Energia*", Press release, 2004-044-EN, Tallinn/Luxembourg, 7 May 2004, http://www.centreurope.org/mag/current-events/eib-estonia-lending.htm.

Energy Charter, *Progress report on implementing the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects*, Energy Charter, December 2001, www.encharter.org.

European Commission, Directive 96/92/EC of the European Parliament and of the Council on 19 December 1996 concerning common rules for the internal energy market in electricity, 1997 OJL 27, 20, www.europa.eu.int

European Commission, Directive 2003/54/EC of the European Parliament and of the Council on 26 June 2003 concerning common rules for the internal energy market in electricity and repealing Directive 96/92/EC, OJL 176/37 from 15.7.2003, www.europa.eu.int

European Commission, *Proposal for a Directive of the European Parliament and of the Council on energy end-use efficiency and energy services*, COM/2003/0739 final, www.europa.eu.int

European Commission, Communication to the Council and the European Parliament, COM (2004) 366, final, http://europa.eu.int/comm/energy/res/legislation/country_profiles/com_2004_366_en.pdf

European Commission, Directive 2002/91/EC on energy performance of buildings, OJL001 from 04.01.2003, www.europa.eu.int.

European Commission, Directive 2003/87/EC establishing a scheme for GHG emission allowance trading within the Community, from 13 October 2003, www.europa.eu.int.

European Commission, Directive 96/61/EC concerning integrated pollution prevention control, www.europa.eu.int.

European Commission, Directorate General for Energy and Transport, "*European Union: Energy & Transport Figureures 2003*", in cooperation with Eurostat, www.europa.eu.int.

European Commission, Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing the Council Directive 93/76/EEC, OJL 114/64 from 27.4.2006.

European Commission, Competition DG, preliminary report on "*Sector inquiry under Art 17 Regulation 1/2003 on the electricity and gas markets*", 16 February 2006, http://ec.europa.eu/comm/competition/antitrust/others/sector_inquiries/energy/

European Commission inquiry into electricity and gas markets pursuant Art.17 of the Regulation 1/2003 EC, preliminary report available at http://ec.europa.eu/comm/competition/antitrust/others/sector_inquiries/energy/

Eurelectric, "*Connection rules for generation and management of ancillary services*", paper 2000-130-0003, www.eurelectric.org.

European Transmission System Operators, "*Report on renewable energy sources*", Brussels, 18/12/2003, www.etso-net.org.

Fujiwara, N., "*The EU-Russia energy dialog: where it is leading to*?", Oil, Gas & Energy Law Intelligence, Vol 1, Issue 5, December 2003, www.gasandoil.com/ogel.

Golob, R., "*Slovenian energy market opening-lessons learnt*", presentation delivered during the 10 year anniversary of the Slovenian Energy Forum, November 2003, http://www.ljudmila.org/sef/

.Hallock Jr, J., Tharakan, P. J., Hall C.A.S. and Jefferson M., "*Forecasting the limits to the availability and diversity of global conventional oil supply"*, Energy 29 (2004) 1673-1696, Elsevier

Harvey, S.M.and Hogan, W., "*Market power and market simulations*", July 2002, http://ksghome.harvard.edu

Hogan, W., "*Market power and electricity competition*", paper presented at the 50th Annual Antitrust law spring meeting, American Bar Association, Washington DC, April 25 2002, http://ksghome.harvard.edu.

International Energy Agency (IEA), Energy prices and taxes; Quarterly statistics, 1st Quarter 2004, Statistics Department, IEA/OECD, 2004.

International Association for Oil and Gas Producers, "*Enlarged EU/EEA gas supply and the policy framework: an updated analysis of EU/EEA gas production potential and external gas resources and their relationship to the policy and regulatory framework",* Report 340, April 2003, www.ogp.org.uk .

Jamasb, T. and Pollitt, M., "*Electricity market reform in the European Union; review of progress toward liberalisation and integration*", MIT Center for Energy and Environmental Policy Research, WP 05-003, March 2005

Jeeninga, H. et al, "*Employment impacts of energy conservation schemes in the residential sector; calculation of direct and indirect employment effects using a dedicated input/output simulation approach*", ECN-C-99-082, 1999, www.ecn.nl.

Kemfert C., Barbu A.D. and Kalashnikov V.,*"Economic effects of the liberalisation in the European energy markets-simulation results of a game theoretic modelling concept*", http://greenvalues.net .

Kroes, N., "*Cross-border mergers and energy markets*", speech delivered at the Villa d'Este Forum on "Intelligence 2006 on the world, Europe and Italy", Cernobbia, Itlay, 2nd September 2006 and is available at www.europa.eu.int.

Lepape, Y., "*Electricity prospects for 2010*", article published on EurActiv 12 March 2004, www.euractiv.com.

Lepape, Y. and Lantieri, M., "*What will be the new Member States break even point*", article published on EurActiv, 25 June, 2004, www.euractiv.com.

Lieb-Doczy, E. "*The E.ON-Ruhrgas merger: the German Government decides against competition*", Energy Regulation Brief, NERA, August 2002.

Louis, O., "*Nuclear energy in the CEECs*", article published on EurActiv on 16th June, 2004, www.euractiv.com.

Louis, O., "How new is the nuclear package", article published on EurActiv on 10 September 2004, www.euractiv.com

Luck S. (Ed), Millennium Encyclopedia, George Philip Limited (Publisher), London,1999.

McLean, R., "*Gas Natural reviews Endesa bid strategy*", International Herald Tribune, March 1st, 2006, available at http://www.iht.com/articles/2006/02/28/business/utility.php
Montel Powernews, "*Are you an insider?*", Vol4 No3, May 2005.

O'Brian P. (Ed.), Atlas of World History: from the origins of humanity to the year 2000, Institute of historical research, University of London, George Philip Limited (Publisher), 1999.

Yergin, D., The Prize; the epic quest for oil, money and power, Simon & Schuster (Publisher), New York,1992.

Romanian European Institute, "*Pre-Accession Impact Studies II*", http://www.ier.ro/impactstudiesPAIS2.html

Roth, S. "*Competition delayed*", Energy Markets Review, issue August 2004, Vol.9, No.8.

Society for Petroleum Engineers (SPE), "*Guidelines for the evaluation of reserves and resources*", SPE, 2001, http://www.spe.org/spe/jsp/basic/0,,1104_1730,00.html.

UCTE, "*Adequacy report; Retrospect 2003*", June 2004, www.ucte.org

UCTE, "*Final report of the investigation committee on the 28 September blackout in Italy*", www.ucte.org

UCTE, Quaterly bulletin of information from UCTE Newsgrid, No.8 from June 2004, www.ucte.org

UNEP,OECD/IEA, Reforming energy subsidies, Works and Publications, Oxford (UK), 2002.

UNDP, UNDES, WEC, „*World energy assessment: overview; 2004 update*", http://www.un.org/esa/sustdev/documents/agenda21/.

Other resources

"*Caterpillar Invests in Poland's District Energy Sector*", article in Cogeneration & On-Site Power Production, issue November-December 2003.

EoN conference call with investors, recording was available on EoN's web site early January 2006, www.eon.com

European Atomic Forum, www.foratom.org.

Information on the Florence process, http://europa.eu.int/comm/energy/electricity/florence/index_en.htm.

„*Interpreting the Irish famine, 1846-1850*", www.people.virginia.edu.

Lord Oxburgh, Chairman of Shell (UK), Interview on BBC World: „*Fossil fuels are going to run out*“, 30 July 2004.

Latvian Public Utilities Commission, www.sprk.gov.lv.

USA Department for Energy, Country Profiles: Estonia, www.eia.doe.gov.

USA Department of Energy, Country Profiles: Hungary, www.eia.doe.gov.

USA Department of Energy, Country Profiles: Poland, www.eia.doe.gov.

USA, Department for Energy, Country Profiles: Slovakia, www.eia.doe.gov.

World Wide Fund, “*Giving renewables the green light*”, www.panda.org.

ANNEX 3.I

Table 3.1 CEE electricity markets at a glance

Country	Implementation of electricity directive*				Market structure*			Reserve cap[141] (%)	Balancing markets*	
	Market Op. %	Unbund. Trans.	Unbund. Distrib.	Access to the net.	Comp. with at least 5% share of installed capacity	Top 3 share % installed capacity	P.Ex.		Bal. Per. (min)	Charg eset by
Czech Republic	30	Legal[142]		Reg.	1	77	Y	28		market
Cyprus	33[143]	Manag[144].		Reg.	1	100	N	26	30	Market operator
Estonia	10	Manag.		Reg.	1	98	N	100	60	TSO
Hungary	30	Accounts[145]		Reg.	5	unknown	N	15		
Latvia	11	Legal		Reg.	1	95	N	60		na
Lithuania	21	Legal		Reg.	2	98	Y	100	60	Reg/market
Malta	0	Derogation		Single buyer	1	100		25		
Poland	51	Legal		Reg.	6	47	Y	28	60	Market (max)
Slovenia	64	Legal		Reg.	2	90	Y	25	60	Balancing costs socialised
Slovakia	41	Legal	3 regional PDC have been privatised[146]	Reg.	2	90	N	26	60	Market (from 2003)

Source: Barbu, Uyterlinde and De Vries (2003)

[141] These Figures refer to "remaining capacity" defined for this purpose as the value obtained by deducting the reference load from the guaranteed capacity and corresponds to the surplus of capacity available to the plant operators. The "security margin" required by UCTE standards recommends plant operators to maintain at minimum 5% capacity reserve. For details, see more in the UCTE report on "System adequacy forecast 2003-2005"

[142] Legal unbundling means separate legal entity;

[143] "How do they measure up?" in Power and Energy: enlargement EU; Down of a new Europe, special issue, 2004, pg.50, www.gdsinternational.com

[144] Management unbundling: separate management structure;

[145] Accounts: separate income streams but the same company with the same management;

[146] UCTE system adequacy retrospect 2002. See also the Energy Policy of Slovak Republic.

ANNEX 3. II

Table 3.2 Energy market organisation issues in selected new Member States

Countries	Energy market organisation issues
Cyprus	The Electricity Law, first enacted in 1941 (Cap. 170) and the Electricity Development Law, first enacted in 1952 (Cap. 171) govern the electricity sector. The Authority advises the Government through the Minister of Commerce, Industry and Tourism, on all matters connected with the generation, transmission, distribution and use of electric energy. Although under existing legislation it is possible for other enterprises to be granted licenses for the generation, transmission and distribution of electricity, EAC is the sole operator in the sector. At the moment, there are no plans to privatise EAC. According to article 12 of the Electricity Development Law the general functions of EAC include: • Generate electricity and maintain any Authority installation • Secure the supply of electricity at reasonable prices • Promote and encourage the use of electricity • Promote and encourage the development of the natural resources of Cyprus in connection with the generation of electricity • Make regulations in accordance with the provisions of the Electricity Development Law • Advise the Minister on all matters relating to the generation, transmission, distribution and use of electricity, and the future expansion of the electricity system of the Republic • Planning for the future development of the power system of the country. The plan must have the approval of the Minister of Commerce, Industry and Tourism On the other hand the Government, through the Minister of Commerce, Industry and Tourism, is empowered to give directives to the EAC on matters pertaining to the general interest of the Republic. Self-generation and generation of electricity from renewable energy, to cover part or all of the own consumption and subsequent sale of surplus to the EAC grids is possible for interested parties. The

	Minister will grand the orders, with the consent of EAC in this case. No permission is given to sell power to other parties. In case of Energy Services, foreign participation of up to 100% may be permitted. In the **November 2001 EU Report**, the Commission noted that Cyprus needed, for instance, to build up its oil stocks and storage capacity and rectify the monopoly position of the Electricity Authority. The **2003 EU Report** stressed that Cyprus was essentially meeting the commitments and satisfying most of the requirements arising from the accession negotiations on energy efficiency and renewables and nuclear energy and safety, and should be in a position to implement the *acquis* in these areas upon accession. It must complete alignment of its legislation, in particular with the most recent *acquis* in the field of energy efficiency. For the construction of new generating capacity the authorization procedure will be adopted in accordance with objective, transparent and non-discriminatory criteria. According to the EU, greater consideration should be given to administrative structures because, although Cyprus has proper institutional systems, no regulatory mechanism as required by the internal energy market *acquis* has as yet been established. In view of the small size and isolated nature of its electricity sector and having regard to considerations of efficiency and economic balance, Cyprus intends to designate a common system operator for both the transmission and distribution systems. The Transmission / Distribution System Operator will be independent, at least in management terms, from the activities of generation and supply. Market opening By 2004, a market opening of 33% was initially envisaged. The initial size threshold is likely to be annual consumption (on per site or per meter basis) of 500 MWh, which equals to around 440 customers currently. In the longer term changes (i.e. reductions) in the minimum size for eligibility may be considered.

	Tariffs setting According to article 44 of the Electricity Development Law, EAC may, with the approval of the Council of Ministers make regulations concerning electricity tariffs. Tariff rates have to be approved by the House of Representatives. There are appropriate tariffs for domestic, commercial, industrial, water pumping and street lighting consumers. At present tariffs are re-examined in order to introduce marginal costing principles and bring them in line with EU Directives.
Czech Republic	Directive 2003/54, Regulation 1228/2003 and Decision1229/2003 accepted by European Parliament and Council of Europe in July 2003 have major influence on legislative process in energy sector of the Czech Republic. An amendment of Energy Act No. 458/2000 Coll., issued under No.

	256/2003 Coll. brought change and acceleration of electricity market opening within Czech Republic. At the same time some changes have been made in implementing regulations to this Act, which deal with electricity market, contractual relations among market actors, making information public and price System services were provided in accordance with law to all consumers taking off electricity from synchronously interconnected system. The principles for payments in 2003 were yearly contracts closed with direct electricity consumers and ČEPS, a.s. ČEPS., a.s. buys, as the only subject, ancillary services in order to secure provision of system services. At present ČEPS, a.s. cooperates with nine domestic and two foreign provides of ancillary services. ČEPS, a.s. buys energy to cover losses in the Czech power system for securing of electricity transmission. In 2003 the only domestic supplier of this energy was ČEZ, a. s., foreign supplier was also Polish company PSE. ČEPS, a.s. further guarantees cross border transmission for export, import and transit of electricity. Market opening • The threshold 40GWh/a (approx. 30% of the market) (since January, 2001) was lowered to 9 GWh/a in 2003. • Accelerated, to start January 2004: consumers using more than 100 GWh/a. • From January 2006, all customers will be eligible. Tariff setting Responsible authority is the regulator.
Estonia	Estonia exports to Russia and Latvia (oil-shale generated electricity). Market opening In 2001, only the largest consumers – those who use annually more than 40 gigawatt-hours (GWh) – were eligible (about 20% of the market). Since 2002, all electricity users are covered by this liberalization. Large users require an import license for power purchases from abroad. Tariff setting

	Tariffs have to be approved by the Energy Market Inspectorate, the regulator.
Hungary	Market opening As from 1st January, 2003, the consumers using more than 6.5 GWh/year (eligible consumers) have the ability to purchase electricity in the free market. By this measure, two parallel markets have been created in Hungary: along with the newly opened competitive market also a public utility electricity market is running where the consumers can enjoy the safety of public service. The eligible consumers may create their own balance circle or are obliged to affiliate to a trader's balance circle. Tariff setting Each member of the public utility market shall purchase and transmit the electricity to its partner at a price published and fixed (regulated) by the Minister of Economics and Transport. Hungary has three-tier balancing markets. The balance circle is a group of producers, marketers and consumers in which the planned value of all purchases and sales correspond. These volumes, defined for every quarter of an hour (schedule), are given by the balance circles to the transmission system operator. If the balance circle differs from its schedule – the actual consumption is higher or smaller than planned – the difference is balanced by the transmission system operator and this balancing energy is settled later with the balance circle. The public utility supply also creates a balance circle consisted of power plants, the public utility wholesaler Magyar Villamos Művek Rt. and the distribution companies. Transmission system operation provides system services for every player: ensures the quality of electricity (frequency, voltage), covers the network losses, ensures the power reserves and balancing energy, guarantees the operation control of the system and prepares for troubleshooting the severe disturbances and decreasing the resulting consequences. The transmission system operator is entitled to receive a transmission system operation fee for these services.
Latvia	An attempt to privatize Latvenergo in 1999 was stopped because the public was opposed to a foreign takeover. The dominant role in electricity supply is played by the state company JSC “Latvenergo”, which provides more than 90% of all electricity generated in Latvia and ensures imports, transmission, distribution and supply to

	consumers. In addition there are more than 100 small power plants and 10 licensed distribution and sales companies. Market opening All energy users in Latvia should be able to freely choose their energy suppliers not later than July 1, 2007. Tariff setting Tariffs are uniform throughout the country. The Regulatory Authorities are responsible to set the tariffs for all energy utilities.
Lithuania	Market opening Since 2002 - to the customers consuming more than 20 million of kWh per year, since 2003 - to the customers consuming over 9 million kWh per year and since 2010 - to all customers. The prices charged between Suppliers and Eligible Customers are the contractual ones. Tariff setting The regulator is in charge with: • Prices charged by the market players having a pre-dominant position in the market • Price setting for non-eligible customers • Price setting for services provided by natural monopolies. The objective of the next stage of market liberalisation is to fully implement the hourly commercial metering of electricity quantities for Eligible Customers,thus providing rights to conclude direct contracts for the whole traded volume and by attracting to the Market power companies from foreign countries (first of all from the Baltic States).
Malta	In the **November 2001 EU Report**, the Commission stated that Malta had made considerable progress in the energy sector. The adoption of the Malta Resources Authority Act in January 2001 was a major step forward as the legislation provided a basis for alignment on the *acquis* in this sector. There had been progress on preparations for the internal energy market. However, further attention needed to be paid to this field, in particular to end the monopolies which still existed in some sub-sectors. Little progress had been made on security of supply, which is nonetheless an important area.

	The **October 2002 EU Report** noted that Malta had made considerable progress. However, Malta's efforts now need to focus on the full and timely transposition of the Electricity Directive and the remaining *acquis* related to energy efficiency, as well as on the gradual building up of its oil stocks. The **2003 EU Report** said that Malta must gradually increase its oil stocks in accordance with the programme agreed at the accession negotiations and prepare to implement the electricity Directive. In addition it must complete the harmonisation of its legislation by adopting the implementing provisions relating to the 2002 *acquis* on energy efficiency and renewable energy. n terms of competitiveness and the internal energy market, Malta has adopted an initial series of measures to bring itself into line with the *acquis*, an important one being the setting up of the Malta Resources Authority in February 2001. The Authority, which is independent, is responsible for regulating the energy sector and for energy policy. The island must make a particular effort to implement the Authority Act and to restructure the electricity market monopoly dominated by Enemalta. For electricity the Maltese Parliament has adopted framework legislation and implementing provisions aligned on the *acquis*. However, the price distortions which remain in the electricity sector must be eliminated.
Poland	Distributors can from now on buy up to a total value of 35% of their electricity needs directly from the producers. Market opening • customers with total annual purchase of electricity of more than 10 GWh acquired that right from 1 January 2002, • customers with total annual purchase of electricity of more than 1 GWh will acquire that right from 1 January 2004, • others will acquire that right from 1 January 2006. Tariff setting Generators and electricity traders have been released from to the obligation to approve their tariffs by the regulator (ERO) once they have proved that they are operating under competitive conditions. Transmission and distribution companies are obliged to submit their

	tariffs for ERO approval. The last amendments to the Polish Energy Act and the appropriate secondary legislation have resulted in detailed guidelines of tariff settlements and setting principles for connection to the grid and its financing. New regulation has drastically reduced the "connection fees". PSE SA is considering the concept of establishing a company, PSE-Energia SA, to consolidate energy generation and sales operations now conducted by GK PSE Group companies (PSE-ELEKTRA SA and Elektrownie Szczytowo-Pompowe SA). the establishment of PSE-Energia SA would facilitate optimisation of production and sales asset value in order to raise the funds for the development of transmission operations.

ANNEX 3.III

Table 3.6 European natural gas resources (in BCM)

Country	Reserves[147]	Discovered potential[148]	Undiscovered potential[149]	Total
Norway	2362	1472	2510	6344
Netherlands	1434	304	333	2071
Germany	343	296	100	739
UK	1161	567	878	2606
Ireland	28	1	100	129
Denmark	152	-	-	152
Austria	24	5	19	48
France	8	-	-	8
Italy	182	41	174	397
Total EU-15/EEA	**5694**	**2686**	**4114**	**12494**
Hungary	73	22	50	145
Poland	85	65	100	250
Romania	200	177	200	577
Total CEE	**358**	**264**	**350**	**972**
Total Europe	**6052**	**2950**	**4464**	**13466**

Source: OGP (2003)

[147] The meaning within the context of this report: remaining resources in all currently known gas accumulations which will be produced in the future under the current economic conditions and the current available technologies, i.e. this category may include nearly all gas volumes which in some countries are classified as proved and probable remaining reserves.

[148] The meaning within the context of this report: all other known remaining gas resources, including gas from undrilled structures which need new, advanced technologies or improved economic conditions or any other incentives to be developed and brought to the market.

[149] The meaning within the context of this report: remaining gas resources which are of exploratory nature or speculative i.e. leads indicated by seismic activity.