Opinion of the European Economic and Social Committee on 'Renewable energy sources'

(2006/C 65/20)

On 10 February 2005, the European Economic and Social Committee, acting under Rule 29(2) of its Rules of Procedure, decided to draw up an own-initiative opinion on *Renewable energy sources*.

The Section for Transport, Energy, Infrastructure and the Information Society, which was responsible for preparing the Committee's work on the subject, adopted its opinion on 24 November 2005. The rapporteur was Ms Sirkeinen and the co-rapporteur was Mr Wolf.

At its 422nd plenary session of 14 and 15 December 2005 (meeting of 15 December 2005), the European Economic and Social Committee adopted the following opinion by 142 votes to 1 with 2 abstentions.

The EESC has recently been adopting important opinions [1] *on key energy issues. The emphasis so far has been on individual forms of energy and their sources. The strategic aim of this series of opinions, which is concluded by this opinion and the opinion (TEN/212) on traditional fossil fuels — coal, oil and natural gas — is to provide a solid basis for establishing workable and realistic options for a future energy mix. A subsequent opinion* 'The energy supply of the EU: strategy for an optimal energy mix' *will then draw all these opinions together.*

1. **Introduction**

1.1 Usable energy [2] is the mainstay of our contemporary way of life and culture. Its ready availability opened the door to our present-day standard of living. The need for a secure, inexpensive, environmentally sound and sustainable supply of usable energy is at the heart of the Lisbon, Gothenburg and Barcelona European Council decisions.

1.2 We witness a fast growth in global demand, mainly in newly industrialised and some developing countries, of limited fossil energy resources. A large part of the supply comes from areas where normal market or political rules do not apply, and energy is increasingly getting into political focus. Prices are unstable and the trend is rising. As to the environmental aspects of energy, some competitors are less concerned than others, in particular regarding the potential effects on the global climate. Fossil energy is the subject of a separate opinion by the EESC, prepared in parallel with this one.

1.3 Energy policy in the EU needs to address three main challenges: ensuring security of energy supply, satisfying economic needs and reducing effects on the environment. Security of supply in the EU faces the challenge of a high and growing dependence of external energy resources. In order to secure the basic needs of citizens at affordable prices and the competitiveness of industries, energy prices should not be artificially driven up by political decisions, but should however provide incentive to adequate investments in the energy sector. Environmental concerns need to be addressed cost-effectively, by including external costs into energy prices and with the need for global competitiveness in mind.

1.4 In several opinions, the Committee has noted that supplying and using energy puts a strain on the environment, presents risks, depletes resources and involves the problem of external dependence and imponderables. In technical terms, none of the potential future energy supply options and technologies is perfect. None is wholly free of damaging environmental impacts. None is sufficient to cover all needs, and it is difficult to adequately gauge their long-term potential.

1.5 In order to ensure a sustainable energy future, Europe must, firstly, utilise the existing potential for better energy efficiency. The EESC is preparing an exploratory opinion (demand by the EU-Commission) on this issue. Secondly, renewable energy sources have a role of preference to play as they are by definition sustainable. They can be locally produced and as such they do not emit greenhouse gases, thereby contributing both to security of supply and combating climate change. However, in the foreseeable future they cannot alone cover all needs. The EESC will start working on an opinion on the future energy mix of Europe, based on findings from its opinions on different sources of energy.

1.6 The subject of this opinion is the current situation and potential for development of the following renewable energy sources: small-scale hydro-electricity, wind energy, biomass, solar energy and geothermal energy. This is in accordance with

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[1] See: *Promoting renewable energy: Means of action and financing instruments* (OJ C 108, 30.4.2004), *Nuclear Fusion* (OJ C 302, 7.12.2004), *The use of geothermal energy* (OJ C 108, 30.4.2004).

[2] Energy is not actually consumed, but merely converted and, in the process, used. This happens through conversion processes such as coal combustion, the conversion of wind energy into electricity, and nuclear fission (conservation of energy; $E = mc^2$). However, the terms 'energy supply', 'energy production' and 'energy consumption' are also used.

the definition of renewable energy sources in the directive on electricity from renewable energy sources, leaving out large hydropower, which in technical terms is clearly renewable and also normally included in energy statistics under renewable energy.

1.7 The opinion will examine the main features of these technologies from the point of view of energy policy (security of energy supply, diversification, supply-demand balance), economic policy (cost effectiveness, competition between different energy sources, support arrangements) and environmental policy (emissions, Kyoto Protocol), and will assess the contribution they could realistically make to a future energy mix.

1.8 The use of hydrogen is a new energy technology which attracts much attention and expectation. As an energy carrier it could provide a solution to the problem of electricity storage (from unsteady electricity sources). Hydrogen can be produced from natural gas, a fossil primary energy carrier which is in high demand for other purposes, or from water with a high input of electricity. Much R&D is still required to possibly conceive a safe and cost efficient hydrogen economy. Fuel cell technology is often linked to the efficient use of hydrogen, but in principle it can function on other fuels, including processed renewables. These possibilities are not specifically explored in this opinion, but they need further attention.

2. Development of Renewable Energy Sources (RES)

2.1 According to EU Commission statistics from 2002, roughly 1100 TWh of renewable energy is used in EU-25, out of the total primary energy consumption of nearly 20 000 TWh. This represents a 5.7 % share for renewables. Out of the total electricity generation of 3 018 TWh, renewable sources represent 387 TWh, which translates to a share for renewables close to 13 %.

2.2 The EU has taken an active leadership role in developing renewable energy sources, with indicative targets set to increase the share of RES in the total energy mix from 6 % to 12 % and in electricity from 13 % to 21 % for EU-25. According to EU Commission's interim estimates, these targets will probably not be fully met, but nevertheless the progress achieved has been impressive. There is general consensus on the need for a steady increase of RES in the energy mix and on the continuing need for economic support.

2.3 The use of wind energy has seen enormous growth rates in the past few years, despite coming under increasing criticism recently on both environmental and economic grounds. Meanwhile, the growth in the use of biomass has remained below expectations while its use is already significant today.

2.4 Whilst there is a long-established cultural tradition of harnessing the energy of flowing or dammed inland bodies of water, use of marine currents, waves and tidal flows is still in the development phase. An opinion could be devoted to these aspects at a later stage.

2.5 The level of utilisation of renewable energy sources varies widely between Member States, depending on natural circumstances and on national energy policy choices. Also the development of their use in response to EU policies varies greatly, as do the measures by which the Member States enhance their increased production and use. The Directive 2001/77/EC on Electricity production based on Renewable Energy Sources (RES-E) leaves the organisation of support to renewables to Member States, without any attempts to harmonise the support mechanisms. This is not conducive for an efficient internal market *(see 5.6)*.

2.6 Support to renewable energy sources is justified for strategic reasons of security of supply and climate policy. It can also be seen in the light of internalising external costs, as a compensation for lack of internalisation or support directed now or earlier to some traditional energy sources ([3]). Support is not supposed to distort markets when directed to activities far from the competitive stage.

2.7 Vested interests may slow down changes and hinder fair competition in the energy markets. This includes governments' need of a stable tax or other revenue. Some energy sources, in particular oil products, are heavily taxed in the EU.

3. Principal characteristics and potential of various renewable energies

3.1 *Small Hydro*

3.1.1 **Recent growth and development.** Hydro generation can be divided in large and small hydro production. Small-scale hydro production (SHPP; smaller than 10MWe) resources are plentiful in the European Union and a considerable potential is still available (nearly 6 000 MW in EU-15 alone). Total small hydro capacity in service at the end of 2003 EU-15 was estimated at about 10,700 MW.

3.1.2 **Role in electric systems and implications for networks.** Ideal for electrification of isolated sites, SHPP also contribute to national electric power production when they are connected to the electricity grid. Access to the grid is the first and most important step in allowing independent producers to operate effectively in the market.

([3]) In some Member States (Germany) all energy use – with very few exceptions – is subject to taxation (Öko-Steuer).

3.1.3 **Economics, including support systems.** SHPP have been technically feasible for centuries, and given a favourable site, it can be economically attractive. The investment costs in EU (2001) varies between EUR 1 000/kW in Greece and Spain to EUR 6 000/kW in Germany, and average production costs varies between EUR 1,8 cents/kWh in Belgium to EUR 14 cents/kWh in Austria.

3.1.4 **Availability and role in security of supply.** SHPPs are a secure source and can contribute to security of electricity supply. SHPPs have the ability to generate electricity instantly, to supply both base-load and peak-load electricity, have a long lifetime, are relatively easy to maintain and have a very reliable and mature technology.

3.1.5 **Environmental performance.** Small hydropower is a clean resource, and does not involve combustion, therefore avoiding polluting emissions. Nevertheless, it has a local environmental impact, notably due to the construction work and changes in the aquatic environment, for example due to weirs which obstruct the migration of fish, but measures for reducing or eliminating these impacts are available and applicable.

3.1.6 **Prospects for future growth and role.** The first objective that was set for 2003 was not reached (12 500 MW). Concerning 2010 objectives, European SHPP capacity should be found in the neighbourhood of 12 000 MW if the average annual growth rate of the last four years is applied. This figure is also going to be below the targets stated by the European Commission's White Paper.

3.2 *Wind power*

3.2.1 **Recent growth and development**. Wind power is today the fastest growing electricity generation technology. In specific locations with favourable conditions it may even become cost-effective without enforced support. Annual growth rates of more than 35 % between 1996 and 2004 have made Europe the leader in wind energy. At the end of 2004 the installed capacity of wind power nearly reached 35 GW in the EU 25 and more than 47 GW worldwide.

3.2.2 **Role in electric systems and implications for networks.** The intensive use of wind power is associated with significant operational challenges. The availability of wind power cannot be guaranteed in most regions at all times. However, this disadvantage can be largely offset by managing demand for power in combination with other renewable energy sources such as biomass, biogas, hydroelectricity and solar power, and also by developing new storage media.

The guarantied capacity of wind energy (capacity credit) clearly changes with the season. For instance, in Germany, from the total installed wind power capacity of 36 000 MW foreseen for 2015, the capacity of approx. 1 820 MW to 2 300 MW can be considered as guarantied for the coverage of maximum seasonal load (at a level of reliability of energy supply of 99 %). This corresponds to a share of approx. 6 % of installed wind power capacity. The needed amount of wind-related regulation and reserve power depends on the quality of short term wind power prediction and the resulting deviation between predicted and actual values of wind power feed-in.

3.2.3 **Economics, including support systems.** As electricity production is highly dependent on wind conditions, selecting the right site is critical to approaching economic viability (see however 3.2.2). Power production costs of wind-generated electricity have fallen steadily as the technology has developed. A cost reduction of over 50 % in the last 15 years has occurred for electricity from wind power. Presently wind power is approaching price competitiveness with other fuels. For example, in the UK onshore generation presently costs 3,2p/kWh (the wholesale price of electricity is 3p/kWh). The additional cost of making up for intermittency (eg back-up power) is 0,17p/kWh, as long as there is only 20 % wind power or less on the grid.

3.2.4 **Availability and role in security of supply**. The increased use of wind power in Europe has resulted in fluctuations now also occurring on the generation side due to the fluctuating character of wind power in-feed, thereby increasing the demands placed on control and bringing about rising grid costs. To guarantee stable grid operation despite the high volatility of wind power in-feed, transmission system operators depend on the most accurate possible forecasts of expected wind power generation.

The foreseeable further expansion of wind energy in Europe means that in future, it will be necessary to pay more attention than before to supply reliability when designing new wind energy plants. Due to the massive and ongoing new expansion of wind power, it has become increasingly difficult to guarantee the stability of the electricity supply — particularly in the event of a power failure. Future offshore developments may provide much higher equivalent hours, compared to onshore wind.

3.2.5 **Environmental performance.** Wind turbines cause virtually no pollution or emissions during their operation and very little during their manufacture, installation, maintenance and removal. Whilst wind energy is a clean technology, it is not free of impacts on the environment. The main issues are visual impacts.

3.2.6 **Prospects for future growth and role.** According to the latest projections from the European Commission, it is expected that wind power in Europe could reach a total of about 70 GW by 2010. Looking further ahead, EWEA (European Wind Energy Association) has adopted a target for a total of 180 GW to be reached by 2020, of which 70 GW would be located offshore. By 2010 this is expected to account for 50 % of the net increase, and up to 2020 for just over 70 %.

3.3 *Biomass*

3.3.1 **Recent growth and development.** In 2001, total biomass use for energy purposes was 650 TWh. To achieve the RES 12 % target 860 TWh more are needed by 2010. Each sector has to contribute: electricity 370 TWh, heat 280 TWh, and biofuels 210 TWh. This would lead to a total biomass accumulated energy production of about 1500 TWh in 2010. This additional biomass production can only be achieved in the short term with strong and targeted measures and actions in all three sectors. The share of liquid biofuels for transport in European consumption is estimated at 1 % today. However, this figure looks likely to rapidly grow because the EU has set respective objectives of 2 % and nearly 6 % for the years 2005 and 2010 through a specific directive. Biofuels should be mainly used in agriculture and forestry, and also, in view of their biodegradability, in water transport, and in other areas where they can bring particular environmental benefits, e.g. densely-populated areas where much of the bus public transport network already runs on bioenergy.

3.3.2 **Role in electric systems and implications for networks.** Biomass electricity can be produced by energy crops, agricultural and industrial biomass waste or through fermentation of biomass to biogas in combined heat and power plants. Biomass power plants have the ability to provide base-load capacity.

3.3.3 **Economics, incl. support systems.** The cost of generating biomass varies depending on the type of technology used, on the size of the power plant and on the cost of the biomass fuel supply. There are different systems and various levels of support for biomass in European countries (in 2003). Fixed price systems range from 3 to over EUR 10 cents/kWh and compensations from levies or certificate prices vary from EUR 0,6 cents/kWh to over EUR 8 cents/kWh.

3.3.4 **Availability and role in security of supply.** The biomass potential in Europe is regarded to be big and not yet used sufficiently. This is clearly the case in some Member States. Biomass can originate from a number of locations or resources — forest, agriculture or waste streams. Wood from forestry and wood-based industries represents the largest resource, and procurement logistics from forest to bio-energy plants are subject to major improvements. Decentralised use, especially of timber from the thinning out of plantations and wood waste from wood chip manufacturers, for heat and electricity production and for the manufacture of wooden pellets represents an excellent opportunity to boost regional economic activity, create jobs in rural areas and reduce imports of crude oil into the EU. There are, however, concerns about over-stimulating energy use of biomass to the detriment of other, non-supported uses.

3.3.5 **Environmental performance.** Wood is the renewable energy that can be best substituted for fossil fuels, and, moreover, is the leading renewable sector for primary energy production in Europe. Its use in the form of energy contributes to combating global warming since, unlike for fossil energies, the combustion-emitted carbon dioxide is reabsorbed by the growing forests. Incineration of wood-based biomass emits, however, some additional pollutants if not properly filtered. There could be a risk that intensive cultivation of particularly fast-growing and/or high-yielding biomass varieties will have a considerable influence on the sensitive regional — or if the felling of primary forest for the cultivation of biomass is considered — even global environmental and nature-protection balance.

3.3.6 **Prospects for future growth and role.** Substantial industrial participation is essential in all but basic research activities if biomass energy is to contribute effectively to the EU's policy objectives.

3.3.7 **Biofuels.** It is under dispute [4], whether in all cases a net energy gain or even a net environmental benefit can be obtained from liquid biofuels, when balancing the invested energy from e.g. fertilizers, agro-machinery, processing etc. with the potential energy gain from the produced biofuels. On the other hand, studies commissioned by the Commission show an overall positive balance, but obviously the net result differs from one crop to another. The Committee recommends, therefore, to clarify this point, e.g. by conducting further studies on this question, as the issue of dealing with the high global oil dependence is so high on the political agenda. Another pertinent question in need of penetration is the EU security of supply and related economic and trade aspects of increased use of liqiud biofuels.

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[4] David Pimentel and Ted. W. Patzek, Natural Resources Research Vol. 14, No 1, 2005.

3.4 *Photovoltaics*

3.4.1 **Recent growth and development.** In 2003, an additional 180 MWp of photovoltaic installations was put into service in the EU, bringing total European capacity up to about 570 MWp. Furthermore, an ever greater share of this installed capacity is now connected to the power grid: Grid-connected installations now represent 86 % of the total cumulated European capacity.

3.4.2 **Role in electric systems and implications for networks.** The most popular type of solar PV system for homes and businesses in the developed world is grid connected. Connection to the local electricity network allows any power so produced to be sold to the utility.

Otherwise, if completely independent of the grid, the system needs a battery to which it is connected enabling the use of normal appliances without mains power. Typical off-grid applications are industrial applications such as repeater stations for mobile phones or rural electrification.

3.4.3 **Economics, incl. support systems.** At present, investment costs, which are still relatively high, are one of the major barriers to the development of PV markets in the short to medium-term, although a downward trend in the prices of systems can be observed over time as production volumes rise, and innovative steps forward in the use of the technology are constantly made. However, on average, the price of modules has fallen by ~5 % per annum over the last 20 years, and is projected to continue to fall, while still being in the range of EUR 0.5/kWh. The current capital cost of a typical installed photovoltaic system ranges from EUR 5/W to EUR 8/W, thus making photovoltaic electricity at present by far the most costly form of renewable energy.

3.4.4 **Availability and role in security of supply.** Solar radiation provides a huge amount of energy to Earth. The total amount of energy, which arrives from the sun at the earth surface within the space of a year, is equal to approximately 10 000 times the annual global energy consumption. PV can contribute to increase the security of electricity supply in all cases: grid connected systems, stand-alone systems or hybrid systems.

3.4.5 **Environmental performance.** While generating solar power involves none of the polluting emissions or environmental safety concerns associated with conventional generation technologies, the production of photovoltaic cells is related to technologies which use also poisonous substances. Certain environmental and landscape problems associated with plants located in open country do not apply to plants installed at or on existing buildings.

3.4.6 **Prospects for future growth and role.** Total capacity in the region of 520 MWp was expected in the European Union for the end of 2003. By the end of 2004 in Germany, 800 MWp was in place, after growth of 94 % over the year, well in excess of the 650 MWp objective in the 'Campaign for Take-Off'. Future European Union installation capacity is estimated at approximately 1 400 MWp in 2010. Forecasts made by the EPIA (European Photovoltaic Industry Association) are much more optimistic. The European Commission scenario of 3 000 MWp at the end of the year 2010 is altogether attainable, but its success depends above all on the political will of each Member State.

3.5 *Solar thermal*

3.5.1 Recent growth and development.

The enormous potential of solar thermal is a key issue in moving the heating and cooling sector towards sustainability, reducing environmental impact as well as energy imports. The total technical potential is estimated at 1,4 billion m^2 of collector area, resulting in an annual solar yield equivalent to nearly 700 TWh/year. The market in the EU has more than doubled compared to the mid 1990s and is three times bigger than in the late 1980s. Between 1990 and 2001, the average yearly market growth has been 13.6 %. Since 2000, the market has clearly passed the mark of 1 million m^2 newly installed collectors per year. After a significant contraction in 2002, mainly originated in Germany, a new peak over 1,4 million m^2 was reached in 2003. The use of solar thermal energy is, so far, very unevenly spread in the EU, with Austria having a high coverage while some Mediterranean states — though climatically favoured in this respect — have had hardly any development and in others (e.g. Greece) its use is widespread. This cannot be explained by a lack of economic viability.

3.5.2 Role in electric systems and implications for networks.

Thermal energy can only be transported where district heating systems exists. There is yet no direct impact of solar thermal systems on the electric system. Converting solar heat into electrical energy by Concentrated Solar Thermal Energy systems ('Solar Troughs' or 'Solar Towers', large scale mirror and focussing technology to produce high-temperature heat to be converted in electricity) is just leaving its R&D-Status ([5]) and entering the demonstration and commercialisation phase with some plants in Spain.

([5]) http://europa.eu.int/comm/research/energy/pdf/cst_en.pdf.

3.5.3 Economics, incl. support systems.

Solar thermal mainly competes with conventional heating systems based on fossil fuels or electricity. Compared to those, it has a high ratio of investment costs (90 % — 99 % of the total costs) but rather low running costs. The total cost of a typical solar domestic water system for a one family house is in the range of EUR 700 — EUR 5 000. Well-designed solar thermal systems currently produce/replace heat at prices in the range of EUR 3-9 cents/kWh. Given the current prices of electricity, oil and gas and expected increases, such systems could, in combination with modern, well insulated storage systems, become widely available for water heating and heat production.

3.5.4 Availability and role in security of supply.

The theoretical solar energy potential is immense. However, the practical potential of solar thermal energy is restricted by both technical and socio-economic factors. Also, during cloudy winter days, when heat demand is at its peak, the energy is least available.

3.5.5 Environmental performance.

Solar thermal energy cause virtually no pollution or emissions during their operation. The impact is higher during their manufacture, installation, maintenance and removal. Whilst solar thermal energy is a clean technology, it is not free of impacts on the environment.

3.5.6 Prospects for future growth and role.

If the intensity of policies to support solar thermal will remain unchanged, it is expected that the area in operation at EU level will grow by almost 12 % annually. Assuming constant growth rates, then half of the growth in absolute terms will take place between 2010 and 2015. Solar thermal power will grow rapidly in the solar belts of Asia and Africa when the oil price stays as high as presently (around 60$/barrel).

3.6 *Geothermal*

3.6.1 Recent growth and development

3.6.1.1 ***Electricity***

Only five European countries possess the natural resources needed to produce electricity from geothermal energy with reasonable efficiency. At the end of 2003, installed geothermal capacity in the European Union for electricity production was 820 MWe. More than 96 % (790 MWe) of this installed capacity is in Italy.

3.6.1.2 ***Heat***

The production of heat from geothermal energy can be obtained in two very distinct ways. The first consists of directly exploiting the aquifers whose temperature is included between 30°C and 150°C (so-called low and medium energy applications). The second way to produce heat uses geothermal heat pumps. Total installed capacity for the low energy geothermal sector in the European Union was estimated at 1 130 MWth, i.e. 7,5 % growth with respect to 2002.

3.6.2 **Role in electric systems and implications for networks.** So far**,** geothermal electricity can contribute to electricity generation only in areas where geothermal potential exists.

3.6.3 **Economics, incl. support systems.** The exploitation of geothermal energy is regarded as a high risk investment. In case of investment in an electricity generation plant, the proportion of investment in each phase can be strongly influenced by conditions specific to the site.

Investment costs and operating costs for heat production vary considerably between countries and between type of use, as well as depending on the characteristics of the resource (local geological conditions), the local heat demand and heat consumption pattern (such as district heating systems, or individual or building geothermal heat-pump systems). Representative costs in European countries are in the following ranges:

— investment costs vary from EUR 0,2 — 1,2 million/MW

— production costs vary from EUR 5 — 45/MW.

3.6.4 **Availability and role in security of supply.** The thermal energy of the earth is immense, but without very deep drilling (technology, cost) only a tiny fraction can be utilised. So far the utilisation of this energy has been mainly limited to areas of geothermal anomalies, in which geological conditions permit a carrier to transfer the heat from deep hot zones up to the surface. Hot dry rock (HDR) resources or other deep-drilling (3 to 5 km) technologies (see 3.6.6) which are currently under research are hoped to open new areas in the production of electricity within the next decade.

3.6.5 **Environmental performance.** The increase in deployment of geothermal energy could have a large, positive net effect on the environment in comparison with the development of fossil fuels. Environmental problems arise during geothermal plant operation. Geothermal fluids (steam or hot water) usually contain gases such as carbon dioxide (CO_2), hydrogen sulphide (H_2S), ammonia (NH_3), methane (CH_4) and trace amounts of other gases, as well as dissolved substances whose concentrations usually increase with temperature. Sodium chloride (NaCl), boron (B), arsenic (As) and mercury (Hg) are, for example, a source of pollution if discharged into the environment. Sealed coaxial heat-pipes avoid transporting of these substances to the surface.

3.6.6 **Prospects for future growth and role.** First electricity: Efforts, notably in Austria, should bring the European total up to around 1 GWe. In order to supply energy which is technically useable for electricity generation in particular, geothermal reservoirs have to be located sufficiently deep. As this takes place at depths of at least 2½ km, but preferably 4-5 km or more, costly deep drilling is necessary.

The second European objective concerns the production of heat. Forecasts are based on an average growth of 50 MWth per year. All of these efforts should bring the sector up to 8 200 MWth, markedly higher than the targeted 5 000 MWth. Low surface heat pumps, often considered to belong also to the heading 'Geothermal', however, have a large potential for efficient low-temperature applications like heating of buildings etc.

The strategy should give appropriate emphasis to the R&D measures which are required to develop geothermal energy, until it becomes possible, in the context of a changing energy market, to provide a more accurate estimation and evaluation of the long-term costs and the achievable potential of such technology.

4. Views for the future role of renewable energies up to 2030-2040

4.1 The EU Commission has outlined energy scenarios up to 2030. According to the Commission's 'European Energy and Transport — Trends to 2030' [6] publication, the share of renewables under baseline conditions, including wind, hydro, biomass and other renewables would reach roughly 8,6 % of primary energy use and 17 % of electricity generation by 2030. This scenario does not take into account the effects of EU renewables policies introduced in the first years of this century

4.2 The International Energy Agency IEA forecasts a worldwide doubling of electricity demand by 2030, most of this occurring in developing countries. Renewable energy sources will increase their contribution from 2 % up to 6 % globally by 2030. In OECD countries, the share of renewables will increase from 6,4 % in 2000 up to 8 % by 2030.

4.3 The IEA has also developed scenarios for electricity production from renewable sources, predicting that Europe will lead the industrialised world in developing renewables. According to their '*reference scenario*', the share of renewable electricity in OECD Europe would amount to roughly 20 % by 2030. If a full range of policy tools now under consideration are employed in Europe, the share of renewable electricity could approach 33 % by 2030 ('*alternative scenario*'). This would undoubtedly require a full range of support policies to be used to their full extent.

4.4 The European electricity industry association EURELECTRIC produces scenarios where the share of renewables, including hydro, would increase from roughly 16 % in 2000 (in EU-15) up to 22,5 % in 2020 (in EU-25), including Norway and Switzerland.

4.5 The European Renewable Energy Council EREC has recently published its own vision, aiming for 50 % share of renewables in the global primary energy consumption by 2040. EREC also envisions that 80 % of the global electricity generation would be based on renewables by 2040.

4.6 The World Energy Council estimates that renewables will play a rather marginal role on a global scale on short term, but their importance will increase in the long term. WEC does not support any compulsory targets for renewable energy.

4.7 Summarising from the above scenarios, it can be concluded that the various bodies usually forecast a rather gradual change in fuel consumption, with the notable exception of EREC, which forecasts a rather revolutionary vision for the future.

[6] EU-Commission, Directorate-General for Energy and Transport, January 2003.

4.8 The European Parliament has (September Plenary) voted on a report on renewable energy, which includesa proposal for an EU target of 20 % of renewables in 2020.

4.9 The Commission will publish its communication on the state of play of the RES-E directive before the end of 2005. This will include an estimate of reaching set targets by 2010 and possible proposals for further action, including on harmonisation of support schemes in Member States.

5. **Conclusions**

5.1 The previous chapters have shown that renewable energy plays an important role in Europe's energy mix and holds considerable potential to increase its share in both total energy consumption and production in Europe. Many forms of renewable energy are particularly well suited for small-scale local solutions.

5.2 No one energy form or sector can meet the overall demands of the enlarged European Union and the growing demands worldwide. The EU needs a balanced energy mix, tying in with the objectives of the sustainable development strategy. Renewables have the potential to become a significant element of this future energy mix, but many problems need to be solved before this potential, which has also been foreseen by the European Commission and Parliament, can be tapped. The EESC is currently drawing up a separate opinion on the energy mix.

5.3 Much of Europe's RES development is based on intermittent sources like wind generation and photo-voltaic panels which adds to, rather than replaces, generation capacity and network needs. This raises issues about transmission reinforcements and operational aspects of ensuring security of electricity supply. While general consensus does not yet exist on the potential extent to which intermittent sources can be absorbed by the electricity system, the limit of 15 % to 20 % of the total electrical energy contribution is often cited. Beyond this limit, only additional storage technologies (e.g. hydrogen) could help.

5.4 The issue of dealing with the global oil dependence is so high on the political agenda. The Committee therefore recommends to further study the questions of net energy gain and net environmental benefit from liquid biofuels, based on different crops. Also the issues of EU security of supply and related economic and trade aspects of increased use of liquid biofuels need serious attention.

5.5 Technological development is required to make use of the full potential of renewables. The extraction of heat or cold from the environment through **heat pumps** — a technology with huge potential — hardly receives any attention in EU renewable energies policy. Equally surprising, little attention is given in RES development to solar thermal panels for hot water production — again a technology that is much closer to market conditions in large parts of Europe. The EESC considers that even today there are considerable areas of use where fossil energy can economically be replaced by renewable energy for heating purposes.

5.6 Renewables require economic support, because at present many RES technologies cannot yet compete in the market. However, changes in the global energy markets, in particular increased prices and price volatility of especially oil, as well as concerns over security of supply changes the situation for renewables. The potential they offer for innovation and, after successful market entry, new business and workplaces is of increasing importance. EU as a frontrunner in renewables technology can also stimulate global success of business in this sector.

5.7 While enhancing the use of renewable energy creates positive possibilities for new business and specific employment, it can, if wrongly managed, also become a burden on big parts of the economy, in particular consumers and energy intensive industries. Policies that contribute to ever higher energy prices can be dangerous in a situation, where all efforts have to be directed to the Lisbon Strategy, i.e. to competitiveness, economic growth and overall employment in Europe on a sustainable track. While high oil prices hit all economies on the globe, excessive electricity prices may hurt in particular the EU-25.

5.8 Some of the current national support schemes tend to be very costly, putting both consumers' interests and the competitiveness of European industries at risk. Support schemes and network costs, assuming the EU renewables objectives will actually be reached in 2010, represent an increase of 13 % in wholesale electricity prices, or even 25 %, if support levels — which are already applied in Germany — were actually required in order to reach the target. Including estimated network and regulation costs further raises the figure to 34 %. The resulting equivalent cost per ton of avoided CO_2 is estimated at EUR 88, EUR 109 and EUR 150 respectively.

5.9 Support mechanisms have hence to be carefully considered and designed. They must be efficient and cost-effective, delivering the desired results at least cost. Some forms of renewables which are already close to market prices hardly need any support, while others require still only support for

R&D measures. In the case of biomass, non-supported uses of the products from limited land areas have to be taken into account. Rise in generic (mainly fossil) energy prices gives reasons to re-evaluate the needs and levels of support. Particularly important are the effects of the EU emissions trading scheme, which as such has already caused rising electricity prices. To achieve the identical aim, double or overlapping measures have to avoided.

5.10 While support schemes are required for new technologies to ripen and enter the market, they cannot be indefinitely maintained. Influences on employment have to be carefully considered in order not to create jobs that will be lost when the support is ended.

5.11 The EU RES-E Directive leaves the organisation of such support to Member States. This has led to an incoherent and in some cases market-distorting patchwork of support mechanisms. The result is a loss of synergies and in parts of the EU a lack of market incentives and drivers, while elsewhere arise unnecessarily high costs. Most of this could be avoided through a common European approach. The EESC addressed this problem already in its opinion on the RES-E Directive (see footnote 1). While an ideal common European solution does not yet seem to be at hand, the choice of national support schemes seems to slide towards more use of green certificates. As experiences accrue the issue has to be further studied and developed.

5.12 After the initial 'pioneering' phase there is a definitive need to reassess EU policies for renewable energy sources. The changing situation in the global energy markets with high and volatile prices, effects of related EU policies and measures, in particular emissions trading, and the Lisbon strategy goals have to be taken carefully into account. Focus has to be set on ensuring a steady long term development by concentrating on R&D and technology development.

Brussels, 15 December 2005.

The President

of the European Economic and Social Committee

Anne-Marie SIGMUND

Opinion of the European Economic and Social Committee on the 'Green Paper: Mortgage Credit in the EU'

(COM(2005) 327 final)

(2006/C 65/21)

On 19 July 2005 the European Commission decided to consult the European Economic and Social Committee, under Article 262 of the Treaty establishing the European Community, on the *Green Paper: Mortgage Credit in the EU*

The Section for the Single Market, Production and Consumption, which was responsible for preparing the Committee's work on the subject, adopted its opinion on 11 November 2005. The rapporteur was Mr Burani.

At its 422nd plenary session (meeting of 15 December 2005), the European Economic and Social Committee adopted the following opinion by 97 votes in favour with 1 abstention.

1. Summary of the position adopted

1.1 The Green Paper on mortgage credit for residential properties in the EU forms part of the policy of integrating financial services at European level. The Green Paper is currently being considered by the sectors concerned.

1.2 The Committee, while agreeing with the aims proposed by the Commission, takes the view that full integration will be difficult to achieve in the short term. It must be borne in mind that mortgage credit markets in the EU differ to a considerable extent and that each has characteristics of its own.

1.3 In the Green Paper the Commission raises a number of questions, which the Committee endeavours to answer. The first series of questions concerns consumer protection: on this point the EESC asks that the codes of conduct be drawn up by the associations of European financial institutions in consultation with consumer associations, checked by the national