

Madrid SESSA Conference “Investment for sustainability”

Scientific Consensus

SESSA, a programme financed by the European Commission, is a European forum on electricity reforms involving researchers and stakeholders. The first SESSA Conference, *Refining Market Design*, was held in Cambridge in July 2004, followed by conferences in Stockholm in October on *Addressing Market Power and Industry Restructuring for Consumer Benefits*, in Berlin in December on *Perspectives and Challenges of EU Electricity Enlargement*, and in Bergen in March 2005 on *Harmonizing Effective Regulation* respectively.

The intent of this report is to summarize the scientific consensus reached by the academic participants of the fifth SESSA Conference, *Investment for Sustainability*, organized by Comillas University at Madrid, Spain. The conference focused on the issues outlined in the work package seven of the SESSA programme, namely, long-term policy issues in European energy sustainability, including European security of supply and the building of environmentally friendly energy systems.

European energy policy is trying to address a number of main concerns: security of energy supply, presently and in the future; guarantee of the freedom of choice by consumers at affordable prices; efficiency in energy production and consumption; acceptable environmental impact; maintenance of the competitive position of the EU, while fixing, when needed, possible market failures.

But all these objectives only make sense if obtained in a sustainable manner. That means that there should be a lasting and dependable access to primary energy sources; adequate infrastructure to generate the required amount of electricity in a reliable way; energy-related activities performed so that no irreparable environmental damage is caused; compatibility with an adequate economic development; and finally a guarantee that fair universal access to modern forms of energy supply will take place, in Europe and also worldwide.

In short, environmental care and human development are two inextricably linked concepts, and no durable advances are possible in one front without proper consideration of the other one. Sustainability subsumes both kinds of considerations under a single name.

Prospective studies of current and alternative policies provide valuable insights. In a business as usual scenario, they show, on the positive side, a growing decoupling between energy consumption and GDP growth, as well as no pressing resource limitation during the next 20 years. Situation in later dates is debatable, as there are uncertainties on the magnitude of reserves of fossil fuels. On the negative side, it is noted an increasing European dependence on foreign fossil fuels (mainly natural gas and oil), coming from a decreasing number of countries with a concomitant political risk. Most of the growth of primary energy demand will be met with fossil fuels, with scant penetration of renewable energy sources. Of course, that implies as well increasing European carbon emissions.

In this scenario most of the energy consumption takes place in buildings and for transportation purposes, being the industrial sector less important than in the past. There is a high uncertainty on the future of nuclear energy after year 2020, which translates in a complementary uncertainty in the shares of other energy sources, as coal. In any case the studies show an significant growth in the use of coal in the medium term, which would require the development of advanced coal technologies. In that sense, natural gas, oil and nuclear stations can serve to bridge the transient period until those technologies have been developed. A large increase in electricity price seems very likely, due to the increasing cost of primary energy and the new needed investments. A cause of particular concern is the continuous growth of road and air transportation, for which there are no good oil substitutes. And, in any case, it should be taken into account the decreasing share of Europe on the world economy, which makes unilateral actions unlikely to have lasting effects.

Alternative scenarios can be devised by assuming implementation of measures related to promotion of renewable energy sources, higher efficiency in final uses, increased availability and public acceptance of nuclear energy, higher taxation on carbon, increased carbon trading, support to specific transportation technologies, and development of new energy technologies (such as carbon sequestration or hydrogen based devices). In some of these scenarios, carbon emission drop by more than 25% with respect to the business as usual scenario, and import dependence is sharply reduced. However, energy prices show a significant increase as well. In any case, given the very large inertia of the present energy system, these actions must be simultaneous and strongly pursued in order to have a significant effect. When consumption is very dispersed, as it happens to be in the building or transportation sectors, one should also stress the difficulties that are inherent in the implementation process.

In order to make possible a sustainable future of the energy system, several mechanisms of response should be jointly implemented. These ones were specifically considered:

1. Demand-side measures can promote the efficient use of energy. In the long run, about 40% of energy consumption is spent in buildings, 35% in transportation and only 25% in industry. Therefore, appropriate regulation of the right sectors (i.e. building codes or car efficiency standards) can be very effective. However, there are concerns related to the effect on competitiveness of certain measures, and in particular of energy price taxes or subsidies to energy-intensive industries. In order to deal with these cases, closer coordination (at least at European level) is required.

There is high uncertainty on the price elasticity of consumers other than industrial ones. Better electricity metering, including digital real-time meters, may lead to an improved demand profile showing a shift of peak consumption to non-peak hours and overall demand reduction, as well as more focused and effective emergency policies. However, it is doubtful that cost-reflective pricing can contain consumption to the required levels in all but the less ambitious policy scenarios, so it may be useful to impose targets of energy savings to suppliers or distributions, combined with a market for energy efficiency certificates. Eventually, the incentive so created could be enough for new energy-saving companies (ESCOs) to emerge.

2. The development and deployment of renewable energy sources is a major ingredient of all strategies aimed to a sustainable energy supply.

Wind generation of electricity is presently growing at an impressive rate, and although there are discrepancies on the precise figures, there is no doubt that at present there is still ample room for additional penetration in Europe. There are challenges concerning massive wind generation integration in the electricity power network, although it seems than

integration costs in the power system are significantly lower than investment costs. In any case, further development of this source of energy will depend on overcoming the integration problem.

It was also recognized the importance of solar energy, although some essential technological developments are to take place before its very high full potential can be tapped. In some scenarios, photovoltaic generation is a major source of electricity by 2040. If these developments were to take place, there would be a reduction in needs for new transmission lines. However, there are widely apart estimates of the magnitude of the investment costs for new photovoltaic equipment, so caution must be shown on the likeliness of these new developments.

Biomass potential is also very high, although its recent development in Europe has been much slower than initially expected.

Regarding regulatory issues, most specific renewable energy support measures can be left to subsidiarity, but a modicum of coordination among the State Members must be established in order to avoid conflicting measures and improper accounting, such as feed-in tariffs on top of a market price that is affected by CO2 emission trading. In this regard, note that the benefits of most renewable sources accrue at the locations where the facilities are physically located.

3. Nuclear energy is a controversial issue. The development of the nuclear sector up to the 70's was later halted by the antinuclear opposition and problems arisen in the nuclear sector itself, although it has received recently a new impetus coming from discussions on climate change. Both strong positive (lack of carbon emissions, widespread and abundant resources) and negative (safety concerns regarding both reactor operation and waste disposal, and

nuclear proliferation issues) points score high when analyzing its future. In any case, it is extremely difficult to abandon nuclear power in the short-term. It is very important to organize expertise in such a way that controversies and contradictions are manifest, in order that officials and, in the end, the public can make informed decisions on this topic. It has been suggested a new "SESSA project" on nuclear issues to attain this objective.

4. Our future hinges on the possibility of achieving a sustainable energy system, and therefore our R&D effort should be commensurate with it. We do not know which one of the present technological options can be brought to actuality, and even less at what cost, and, in any case, breakthroughs can not be delivered quickly. So, an R&D effort must be carried on across a wide range of options, and the present 25 years long trend of decreasing investment in energy R&D must be reversed.

Therefore, this new R&D effort should start now and continue for an extensive period of time. Selected topics must be those where a technical breakthrough would dramatically improve our chances of making our energy system sustainable.

5. Finally, it should not be forgotten that 1.6 billion people lack access to modern energy forms, severely hindering their efforts in search of a better lot. Most forecasts predict a negligible decrease of this figure by 2030. To be able to correct this situation and provide sustainable energy to all mankind require us to re-think the current supply system.

Moreover, there is a strong link between electricity access and economic development, although electricity supply appears to have low priority in the agenda of the governments. In any case, it is generally acknowledged that extending energy access to rural



areas only requires moderate amounts of money when compared to global energy expenses.

Energy access is a mean, not an end in itself. This is why is not explicitly included in the Millennium Development Goals. But access to modern forms of energy is, however, required to reach these goals. It should not be confused with full industrial access; neither to consider it contradictory with the pursuing of global climate change correction measures. From an institutional point of view, good government, market reform and stable investment climate are essential requirements to extend energy access to the poorest sectors of population.

An energy sustainable world will come, sooner or later. For it to come sooner, without degrading our standards of life and our natural environment, competitiveness is needed. The stronger actions that are required should be considered an opportunity (given its inevitability) rather than a hindrance. Public policy should provide strong incentives that help to achieve sustainability (while maintaining industry competitiveness) so early and so cheaply as possible. Governments should act as facilitators by providing clear goals and setting appropriate institutional frameworks.

The lack of sustainability of our energy model will require strong changes in energy consumption and production patterns in the medium and long term, so regulation should aim to

- Make clear strategic choices regarding appropriate generation technologies, setting goals on energy dependency and targets for investment effort on renewables.
- Harmonise legislation across Europe in some key topics (emission limits, support to renewables, biofuels, strategy for acquisition of gas, biofuels, etc.), while trying to find the right equilibrium between regulatory measures adopted at both the Member States and the European Union levels.
- Improve on energy efficiency, especially in buildings and transport.
- Increase market integration and competition, using market mechanisms as much as possible and correcting market failures while needed.
- Educate and communicate better, and open a public debate on the energy model.
- Think over aid programs for developing countries
- Incorporate all countries to the solution process, that is, engage in “environmental diplomacy”.