

The Global Energy Problem: The Challenge of Renewable Energies

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I was born in 1956. Spain at that time was a developing country from the energy standpoint and, as a result, from all other standpoints. I remember how life in the country was at the time: there was no running water in many villages and minimal electricity, just about enough to provide a weak light at night time. I think I remember that the average power per inhabitant in Spain was around 100 W. And at school in the 1960s, I learnt that nearly 2,000 million people lived on the planet. Clearly, most of these people lived in conditions far worse than those in my village, which is why on Domund Day (World Mission Sunday) all of us schoolchildren went out, collection box in hand, to try and collect as much money as possible for the children of Africa. It was the golden age of oil, with films such as *Giant* giving us a glimpse of large American family cars, and allowing us to dream of a happy world full of prosperity.

Just 40 years have passed, and in the interim the world has experienced a brutal change – in all respects. The social and economic imbalance (which has always existed) has widened and increased hand-in-hand with technology, communications, the exploitation of resources and, of course, the population. There are now over 6,500 million of us. And we have many problems, one of the most important of which is energy.

The energy problem is so complex, and encompasses so many issues (supply, technological, industrial, social, political (including war-related), environmental, security, etc.), that I would not even attempt to write an article setting out a viewpoint on the problem as a whole.

Take supply. A citizen of the United States uses up twice as much energy as a European citizen, who in turn consumes three times that of the average of the rest of the planet's citizens with some access to electricity. Over 2,000 million people practically do not use more energy than that provided by biomass.

A few days ago, the former Indian energy minister, Shures Prabhu, announced: "There will be an explosion in the Indian energy sector".

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In China, ambitious plans to increase coal-based electrical production are known by everyone. The country is already the number one emitter of greenhouse gases and nuclear energy.

Other emerging Asian and Latin American countries are also increasing their resources on the basis of coal and oil, which aggravates the problem of emissions.

Developed countries, meanwhile, have improved their efficiency, above all in transport, but there is still much to do and we continue to increase demand.

In the so-called developing countries there are two very different scenarios: the urban societies and the rural ones. In the latter there is practically no access to energy.

And the urban ones have a deficient service, based above all on coal and gas oil.

In other words, energy is not divided up fairly, and its production is mainly based on non-renewable fossil fuels. In addition, climate change is, generally speaking, having an adverse effect on hydro-electric power in poor countries as well as in rich.

And this is merely the current situation. In order to plan ahead we need to bear in mind that in 40 years the global population is expected to reach 9,000 million people!

Is there a solution to this gloomy panorama?

Oil is a magnificent fuel. In recent years it has given many countries energy and helped them to develop, but all indicators point to the fact that we have reached peak oil. Consequently we should only use it when it is essential. And this does not include generation of electricity.

Cars are becoming cleaner and increasingly efficient, with technology advancing toward hybrid engines powered by electricity and hydrogen batteries. But, at the same time, the total number of cars in the world continues to grow, demanding more fuel.

Biofuels offer good opportunities for development, but the basic economic and even ethical problems must first of all be solved.

Coal will remain essential for electricity generation, but an effort will have to be made to limit its terrible environmental impact, above all in developing countries.

Gas is also insufficient for medium and long-term needs, and poses serious geopolitical problems.

Nuclear energy still has some mighty barriers to overcome before it can be further developed. It will be difficult to do without the power that has already been installed, but for purely private initiatives the global costs are not all that competitive, and its development is limited to countries that are politically and economically stable.

We now come to renewable energies. The industrial revolution of the 19th century was fuelled by coal, the 20th century's development was based on oil, and in the current century it is the turn of renewable energies. Their timid beginnings at the start of the 1970s, as a result of the oil crisis, laid the foundation for their subsequent technological and industrial development.


We are now at the dawn of a third industrial revolution, whose engine will be an energy model based on renewable energies, in small and clean systems, which will be decentralized and widely distributed. According to Jeremy Rifkin, professor at the Wharton School of Finance and Commerce and president of The Foundation on Economic Trends, the trend will be similar to that of the IT and telecommunications revolution, which “was the origin of the Internet and the World Wide Web, which have signalled a major change in the way in which human beings communicate” by democratising information or, to put it another way, returning power to the people.¹

The energies of the second industrial revolution – oil, coal and natural gas – will retain an important role throughout the 21st century. However, there is an widening consensus that we are at the beginning of the end of fossil fuels, since the cost of our addiction to these sources is having an increasingly negative impact on the global economy and on geo-strategic relations between countries and regions.

The path toward the third industrial revolution is characterized by a coherent strategy that will integrate the management of different renewable energies, guarded by latest generation (hydrogen) accumulation systems and intelligent electric grids. These are the three pillars on which the revolution will be founded.

In the case of renewable energies, their unstoppable increase in importance has led to a strong development of each of the corresponding technologies in recent years.

Wind-powered energy has experienced such a boom that it has become one of the main sources of energy supply in the countries which have already invested in it. At certain times Spain has been the most important generator of this type of energy, with production quotas of around 40 per cent, a ratio that was unthinkable just a few years ago. And it continues to advance and build on the current installed capacity of over 100,000 megawatts (MW). In addition, wind-powered energy has an enormous potential in developed and developing countries. It is also a highly flexible techno-



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1. Jeremy Rifkin, *The Economy of Hydrogen*. Tarcher/Penguin: New York, 2002, p. 12.

logy, with wind turbines of seven KW and up to five MW that can connect to large grids or supply electricity to small mini-grids in isolated hybrid systems in rural areas.

Solar energy is also beginning to take off and will soon be unstoppable. Its jump from the laboratory to an industrial process has created a scenario in which this type of renewable energy could become genuinely competitive in many countries by 2015.

Low temperature collectors of solar thermal energy are also gradually becoming one of the main sources of energy. They currently account for more equivalent energy than that provided by wind turbines. The ease with which they can be incorporated into buildings and industrial installations is a huge advantage.

Low temperature collectors of solar thermal energy, meanwhile, are taking giant steps towards consolidation, with numerous plants already producing in areas that provide the required levels of direct high radiation.

To a lesser extent, geothermal energy and tidal energy are two other forms of energy production that are advancing to a significant degree. And, finally, modern biomass also has great potential, albeit insufficiently harnessed by Spain for reasons too complex to explain here.

The support being given to the industrial development of renewable energies has meant that significant funds have become available for R&D&I. Large numbers of scientists and researchers are concentrating on the development of renewable energies, and new advances are being made on a daily basis.

In short, the challenge for renewable energies is to continue developing at their current speed, while incorporating new challenges. Today ten times as much is being invested in the sector compared to 2001, with over 100,000 million dollars in cash flow related to this area of investment according to the Worldwatch Institute. The fight against environmental damage and climate change, allied to the need to provide more energy for development purposes, is serving to create a business and economic scenario where the sky is the limit.

Nowadays no energy is dispensable, but our planet and its inhabitants need a new energy model, one which is sustainable and which respects our natural surroundings, and which will create a more balanced and just world. This is the path we are embarking on, and the first few steps are giving cause for encouragement. Our mission should be to take the success obtained thus far and build on it so that we can face the important challenges posed by the energy sector in the near future with better knowledge, experience and resources. And renewable energies are set to play a leading role in the third industrial revolution, acting as a true engine of change in this new scenario we are creating.