Energy & Climate

How to Achieve a Successful Energy Transition

Alexandre Rojey
Former Director for Sustainable Development at IFP,
Rueil-Malmaison, France

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SCI Preface

The demanding challenges of the 21st century will only be met if science and business work hand in hand to secure the commercial application of sustainable innovation for the benefit of society. The crucial areas for such application are energy, water and affordable food production for a rising global population, coupled with the urgent need to mitigate environmental pollution.

SCI, an established member-led organisation linking science and business, has selected John Wiley and Sons as its publishing partner for a new range of books designed to stimulate the knowledge exchange that is critical to success.

Each title will summarise scientific research and commercial development in one of the key areas of application, and will seek to establish new paradigms for progress.

This, the first book in the range, examines why we need a sustainable energy system and looks at the spread of technologies that must be harnessed if we are to move successfully away from our current dependence on fossil fuels. Dr Rojey's experience as Director for Sustainable Development at IFP (formerly L'Institut Français du Pétrole) informs a concise and knowledgeable approach to one of the world's most pressing challenges.

Preface

From the discovery of fire and the use of wood for heating and cooking, the implementation of wind energy and fossil energies (coal, oil and gas) up to nuclear energy, one type of energy has always been replaced or succeeded by another. The transition generally occurred before the previous energy supply was completely depleted. There has never been a shortage of energy and, although we experienced serious warnings with the oil crises at the end of the last century, our societies have never really had to worry about its availability. This is no longer true today.

Energy is at the heart of our modern societies. Its importance can now be measured using the yardstick of the debates and controversies it generates. There is fear on the one hand of a future shortage and, on the other hand, concern regarding the damaging effect of its CO_2 emissions in terms of global warming. Concerning the first point, the actual situation is not as black as some people would try to paint it, since hydrocarbon reserves still represent several decades of consumption. As regards the second point, however, we have to admit that urgent action is required. We are at the dawn of an unprecedented scenario: fossil energies are not inexhaustible and cannot be consumed any longer without a significant reduction in their CO_2 emissions. Alternatives are available or emerging, for example the renewable energies, but the conditions of meeting ever-increasing demand at world level, without damaging the environment, are not currently met.

It is difficult to imagine that, from one day to the next, we can suddenly do without hydrocarbons, especially in the fields of transport and chemistry, since there is no substitute which is available in sufficient quantities or which can be used on a large scale under satisfactory economic and environmental conditions. It is even more difficult to imagine that we can maintain the current level of consumption indefinitely without taking action to fight global warming. This last point is vital and represents a global stake for which there is no alternative but to succeed. Relying solely

on the progress resulting from technological innovation will not be enough to solve the problem completely. At the same time, our economic and social development model must be rapidly revised, and our consumption modes, and therefore our behaviour, modified. To preserve our planet and our way of life, we must now take a different approach to energy.

Between today and what we think the potential consequences will be tomorrow if nothing is done, we must conceive without delay the most balanced and logical path which will allow future generations to evolve and continue their own development under acceptable economic, social and environmental conditions. The aim is not to set the two objectives against each other – energy availability and use versus the fight against global warming – but, on the contrary, to reconcile them. This is where the immediate implementation of a 'controlled' energy transition takes its full meaning and importance. In order to make this transition a success, all players must be convinced that there is a real need for urgency and that consequently, there is an unprecedented need for all parties to act together and implement the means required. We must also accept that there is no single 'miracle' solution in the immediate future and that several complementary solutions must be set up, without any preconceived ideas and without criticising one compared with another. The role of the public authorities is to motivate and control this movement through financing, regulation and other incentives. The economic players, especially companies, must integrate it into their development strategy. For companies, the expression 'citizen company' has never had as much meaning and importance as it does today. Emphasis must be placed on research, whether public or private, to develop the technical solutions we will need and this requires the allocation of finance and human resources. It is the duty of all individuals in their daily lives to reconsider their actions and radically change their consumer behaviour. Energy savings must now be our main concern. Lastly, and not the least of the success factors, all players must take concerted action and not act individually.

As described in this book, the economic and social components of all sectors of activity are concerned with the stakes relating to availability of energy and environmental issues. The solutions and developments known or to be expanded may sometimes be common and sometimes specific. Some sectors of activity have a technological lead over others. This is the case with housing, for example, which has a number of immediately operational solutions and a relatively clear roadmap. The difficulty is not so much in the existence of technologies and materials but in the conditions of their deployment, in terms of the level of investment required and, also, the slow rate of renewal of dwellings – a house or building is built for a

period of 50 to 100 years. Nonetheless, there is still room for progress even in the housing sector, and research must be conducted accordingly.

All countries in the world are equally concerned. We are faced with a global problem. Some technologies can be deployed everywhere, others will be specific to countries or geographical areas and will depend on choices related to local weather conditions, the economic and social situation or quite simply the availability and nature of energy sources.

Making the energy transition a success is undeniably everyone's concern. Every person has a role to play at his or her own level. IFP, a public research and training organisation whose mission is to develop the transport energies of the twenty-first century, is firmly committed to making its contribution.

On the strength of its achievements, with its men and women, their experience, their skills, their know-how and, above all, their outstanding capacity for innovation, IFP intends to actively and efficiently take part in a controlled transition in the fields of energy, transport and the environment.

This book, which extends far beyond IFP's scope of action, is as complete as possible and provides a vision and global expertise of the energy transition issue. Obviously some of the subjects discussed are included in the various fields of research covered by IFP. The five strategic priorities of IFP can be summarised as follows: capture and store CO_2 to combat global warming; diversify fuel sources; develop clean, fuel-efficient vehicles; convert as much raw material as possible into energy for transport; and push back the boundaries in oil and gas exploration and production. While the analysis and proposals in this book reflect the author's point of view, the description of the stakes and solutions required in each of these priorities are globally in line with the IFP vision. Making the energy transition a success is an objective, as much as an obligation, shared by all IFP scientists in their daily work. Apart from the analysis proposed, this book is above all a warning and a strong incentive to act without delay. IFP fully agrees with this need for action.

Olivier Appert
IFP Chairman and CEO

About the Author

Dr Alexandre Rojey was, until recently, Director for Sustainable Development at IFP (Institut Français du Pétrole) in France, responsible for new developments in the energy sector such as the use of hydrogen, long term energy supply and issues related to global climate change including CO_2 capture and storage. He is also the Chairman of CEDIGAZ, an international association in the area of natural gas, and an active member of IDéEs (for Innovation, Développement durable, Energie et Société), a think tank concerned with energy and sustainable development in France. He graduated from the Ecole Centrale de Lyon, one of the most prestigious French engineering colleges and has contributed to more than 70 publications including six books. He also holds over 100 worldwide patents.