

"DEMOGRAPHIC GROWTH AND ENERGY RESOURCES"

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The Foundation for the Urban Environment - FFUE, on the initiative of Aloïs Michielsens, Honorary President of Solvay SA, had Jacques de Gerlache, Coordinator of the international platform "Greenfacts", draw up a factual summary report on the sources of energy available at the 2030 horizon, taking into account the future needs induced by the demographic transition and having a European standpoint on sustainable development. It was presented at the University Foundation on 7th Nov. 2018. This position paper of the FFUE has been prepared by Pierre Laconte, President, Aloïs Michielsens and Philippe Joye, Advisers.

1. THE GLOBAL CONTEXT.

Since the rise of the industrial revolution and the subsequent massive urbanisation, energy sources have been, and will remain, a major challenge for the economy, which has now become more and more globalised. The interests at stake linked to energy supply differ depending on the sector, and for each of these sectors there is a divergence of interests if the perspective is global, regional or national.

The economic growth of Asia (with China and India in the lead) and other regions of the world, and their adoption of the Western lifestyle, have resulted in an exponential growth of global energy consumption, just partly offset by the increase in energy efficiency of industrial processes and devices of daily use.

Rapid population growth in these same regions and in megacities of the Third World will further accelerate the pressure from the demand side. Moreover, the coupled growth of per-capita consumption and energy production is the corollary of the global economic model, strongly shaped on the Anglo-Saxon one. Although a slight decoupling between per capita income and energy consumption is observed in some Westernized countries, it is mainly due to the relocation of production plants in Asia.

The major consequences of fossil fuel consumption are emissions of CO₂ and other greenhouse gases (GHGs), accounting for about 80% of the total, according to N. Stern (https://en.wikipedia.org/wiki/Stern_Review). The most important effect of GHGs emitted by

human activities is, according to a large majority of scientists, global warming, which differ by region. The link between energy use and GHG emissions requires further investigation.

This energy demand is currently satisfied, for about three quarters, by hydrocarbon fossil fuels, and most of these are produced by the Persian Gulf countries. Global growth therefore largely depends on energy extracted, for the most part, from countries that do not share Western values and see within them the development of fundamentalist groups that actively jeopardize these values. Climate change induced by the consumption of fossil fuels is thus intertwined with a threat to the values of the Western world.

The Paris Agreements call for global warming to be limited at 2 °C maximum. Their implementation would require a global energy transition, the attainment of which calls for a factual approach, independent of the interests involved.

2. INCREASING THE ENERGY / ELECTRICITY SUPPLY.

According to Jacques de Gerlache's report, electrical energy will undoubtedly represent the most widespread energy carrier that will condition our lifestyles, as shown in particular by the gradual shift in the automobile sector towards hybrid or electric cars, or by the growth of powerful batteries to countervail the intermittency of renewable energies.

COAL, with its significant reserves, whose duration is estimated at more than a century at the current rate of extraction, will however remain the most important primary energy for the production of electricity for years.

In those countries, such as France, highly relying on nuclear power, NUCLEAR FISSION will still play a significant role. This could only be progressively reduced by an accelerated development of renewable energies, in order to decrease the dependency on fossil fuels, the main source of GHG emissions.

In other countries, on the other hand, the option of redeploying nuclear fission seems problematic, given the ever increasing costs of nuclear safety in the light of global accidents, and, on the other hand, the opposition of the populations to the construction of new power stations in Western countries, in particular through the legal procedures of impact studies. These show that the risk of accidents is low but their consequences are devastating in densely populated regions.

In addition, as years go by, it appears that the treatment of highly radioactive waste and the dismantling of older plants represent a considerable technical and financial challenge.

The option of the NUCLEAR FUSION, seductive in principle and less dangerous in case of accident, is not located in the chosen horizon. The only semi-industrial reactor currently under construction, in Cadarache (France), with a production capacity of 500 MW, equivalent to around

half of the production capacity of a modern nuclear fission power plant, is expected to be up and running by 2060, provided there is no further delay. Therefore, it cannot be considered as a suitable option to address the urgent challenges we are faced with.

The current share of HYDROELECTRICITY in the electricity mix is not expected to increase significantly. The deployment of large dams in Western countries is mature as most of the suitable sites have been exploited and that, for the remaining sites, the environmental associations and the population they represent will slow down any project for new big dams. However, the small dams, with low impact on ecosystems, could contribute to renewable electricity production.

Depending on geographical peculiarities, GEOTHERMAL or WAVE POWER, along with other future technological developments, will complement the renewable energy mix.

The production costs of electricity from WIND & SOLAR POWER have greatly decreased in recent years. They are currently competitive compared not only to fossil fuel but even to nuclear power. Continuous innovation is reducing the construction costs, such as in the case of wind turbines designed to seek optimal position relative to the wind, and small electric engines that lower the turbine's start-up threshold. The same holds for solar power.

An additional advantage of wind and solar energy is the "democratisation" of the means of production. Investment in a wind turbine or in a solar panel field can be achieved by a cooperative, unlike in the case of conventional production means, which remain in the hands of institutional investors or States.

Another advantage to be pinned is the small consequence of a technical shutdown in one of these specific production units, as opposed to the shutdown of one or more nuclear reactors.

The priority remains to strengthen the interconnectedness of national electricity grids and to develop storage facilities for these intermittent energies. The report by Jacques de Gerlache contains a valuable inventory of these storage facilities and of recent technological developments.

The interconnection of networks between the South of Europe, more suitable to exploit solar power, and the North, more suitable to exploit wind power, should therefore be on the agenda of European leaders, as energy is indispensable to our way of life.

European aid in this area must be adapted and strengthened to encourage and promote exchanges between national networks and, in these times of resurgence of nationalism, help to revive the European project for the 2030 horizon.

The above considerations demonstrate how WIND & SOLAR energy will be GROWING POTENTIAL contributors to power generation.

3. REDUCING DEMAND FOR FOSSIL ENERGIES AND FOSTERING RENEWABLE ENERGY.

Jacques de Gerlache's report discusses the means available to our societies to reduce fossil energy consumption, and therefore GHG emissions, such as: insulation measures for the existing and future buildings, recycling of materials, changes in farming practices, vehicle sharing, production of durable, repairable and recyclable devices, as opposed to their planned obsolescence, and the relocation of manufacturing industries near consumer centres.

These changes require appropriate regulatory and tax measures.

These measures must entail intelligent harnessing of global free trade linked to globalisation. They must enable a reduction of energy waste, of consumption of non-renewable resources and of production of all sorts of waste.

Recent technologies in information and communication and digitalisation can contribute to this optimisation, provided that the perverse effects are controlled at international level. To cite just one example, the dematerialisation offered by the spread of the "Cloud" has caused an explosion of energy-intensive "data centres", devoted to a content whose usefulness for the future of the whole of humanity is still to be demonstrated.

4. CONCLUSION.

There is no one-size-fits-all solution to tackle the energy and resources needs for a world population of up to 10 billion. Jacques de Gerlache's report proposes a complex panel of technical solutions that can be adopted or adapted according to the geographical circumstances, the diversity of societies, the evolution of behaviours and the change of paradigm of well-being tackling its currently inherent propensity to waste.

Since our overall quality of life heavily depends on energy, it is first necessary to take a global look at the loss of energy (entropy).

Lastly, the report contributes to defining the role of fossil and fissile energies in Europe over a period sufficient to allow renewable energies, especially solar and wind, to take over.

ANNEX

J. de Gerlache "How to (better) manage the issues related to energy transitions" (PPT)