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A liberal perspective on energy and environmental reform

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A liberal perspective on energy and environmental reform

Energy plays a central role in today's society and its' production has been rising steadily. The consumption of primary energy increased from 6.106 Mtoe in 1973 to 13.371 Mtoe in 2012 [2], which means that energy consumption more than doubled in 40 years and worldwide consumption continues to grow at a rate of 2,4%/year. Worldwide, oil with 41%, coal with 10%, and natural gas with 15% represent the major energy sources. Negative effects of energy production (fossil fuels extraction and burning) need to be addressed. In addition, depending on the end user appliance, in many cases more than 90% of the primary energy is wasted in the whole chain of production, delivery and device losses [1]. Therefore, there is a huge potential for a more efficient energy use, especially in energy-intensive industries, by deploying today's best available technology (BAT) or switching to low-carbon fuel mixes, enhanced material recycling and eco-design. The target is saving 4.5 Gton of CO2 eq. emissions. Hydropower and wind power are renewable energy forms that contribute to the 22% share of renewables within electricity production, worldwide 22.728 TWh in 2013.

In order to decarbonize the economy, there exist two different methods: a top-down approach (divided into back casting or integrated modelling) or a bottom-up approach (divided into system modelling or techno-economic assessment) [3]. Using these approaches, from a base level of 32 Gton CO2 eq in 2012, some authors aim for a 0 Gton emissions target by 2050, others are less ambitious and range from 5 to 20 Gt in 2050. All of them agree that additional major joint efforts need to be performed to avoid the emission of 56 Gt expected by business as usual (BAU) in 2050. With the share of electricity gaining relevance, having a 100% renewable electricity production could be a first but very relevant step towards solving the problem.

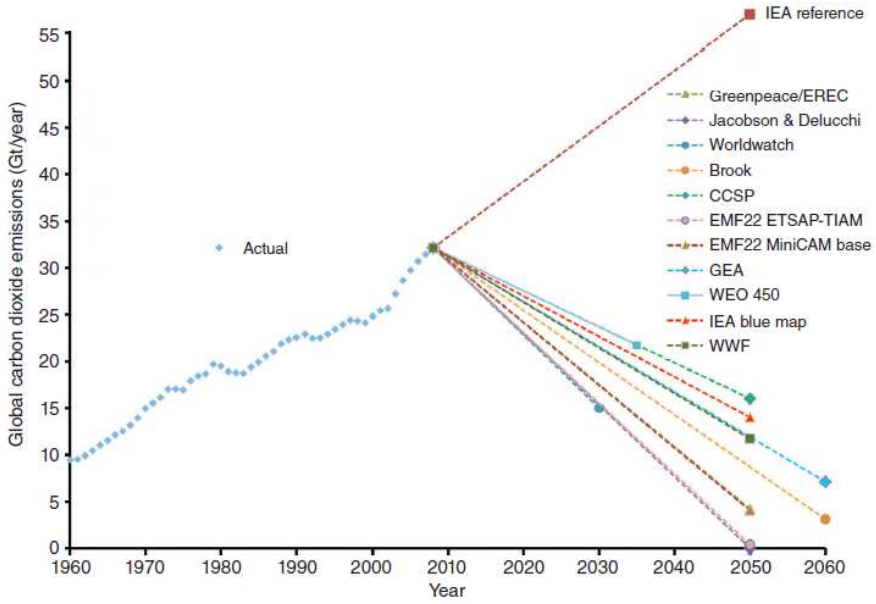


Fig. 1 – Scenarios for global CO2 eq emissions up to 2050 and 2060 [3]

Energy Policies in the EU

Following the successful path of global agreements on environmental issues like the Montreal Protocol in 1987, the Kyoto Protocol was defined to reduce CO_2-equivalent emissions (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) in 40 countries (Annex-1 parties) by -6% until 2012 from the reference year of 1990. Joint Implementation (JI) and Clean Development Mechanism (CDM) were additional mechanisms to bind

other parties into the agreement. Although some countries have registered a net decrease, global CO_2-eq emissions continue to rise (37 Gton in 2013 versus 21 Gton in 1990). The biggest share of the emissions is caused by energy production (using fossil fuels), transportation and cement sectors. These energy-intensive sectors together with production of iron and steel, manufacture of glass and ceramic products, production of pulp and paper are the sectors integrated in the European Union Emissions Trading Scheme (EU-ETS) launched in 2005. It sets limits per country and industry through National Allocation Plans for the amount of CO2 eq emissions. In case they are higher than expected, it shall purchase more allowances for instance entering into projects under the JI and CDM mechanisms. Allocation criteria are laid out in Annex III to the EU Emissions Trading Directive (2003/87/EC). Other relevant EU legislation to notice are: Energy Performance of Buildings Directive (directive 2002/91/EC), energy taxation (directive 2003/96), electricity market liberalization and security of supply (directive 2009/72/EC) and energy efficiency (directive 2012/27/EU).

In 2007, the EU formulated an integrated approach to climate and energy policy that aims to combat climate change and to increase the EU's energy security by setting mandatory targets to be met by 2020, known as the "20-20-20" targets. Namely:

• Reduction in EU greenhouse gas emissions of at least 20% below 1990 levels;

• 20% of EU energy consumption out of renewable resources;

• 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

In 2005, after extensive discussions, Denmark released its Energy Strategy 2025, focused on initiatives for energy saving and renewable energy, climate change, energy markets and technology. The long-term vision, Energy Vision 2050 [4], is a Denmark 100% independent from fossil fuels. Some countries take the lead, others will follow with specific defined targets [5]. To make the energy transition, the EU estimates that it would need to invest an additional €270 billion or 1.5% of its gross domestic product (GDP) annually throughout the next four decades. On the other hand, this will lead to energy supply security and tremendous savings in fossil fuel imports, since Europe spent on importing fossil fuels €406 billion in 2011 and €545 billion in 2012. In 2012, wind power energy avoided €9.6 billion of fossil fuel costs [6].

In 2014, EU Parliament decided on binding 2030 targets: a 40% cut in greenhouse gases compared to 1990, at least 30% of energy out of renewable sources and a 40% improvement in energy efficiency.

In March 2015, the European Council concluded that the EU is committed to building an Energy Union with a forward-looking climate policy based in 5 dimensions [7].

Liberals recognize that:

i) There is a need for a comprehensive change of energy systems in order to reduce significantly the climate impact of energy consumption.

ii) Greenhouse gas (GHG) emissions worldwide represent 31 Gton CO2 eq. and have an impact on local and global environment. First, the increasing trend shall be inverted. Secondly, mechanisms should be set in place in order to progressively reduce emissions aiming to achieve a CO2 emission-free society.

iii) A full decarbonization of the economy is possible with today's technology. Its implementation should go side by side with the natural fade out (end of its service lifetime) of products and infrastructures that rely heavily on carbon.

iv) Several strategies shall play a key role. Namely: energy efficiency improvement, eco-design of products and processes, resource closed loop mechanisms, incentives for energy savings, broad implementation of renewable energy and modal shift of transportation.

v) Defining a renewable energy mix using local resources is an excellent form of reducing CO2 emissions, guarantees safety on energy supply and reduces the risk of fuel cost fluctuation since

they get reduced to zero. Additionally, it enhances the creation of local businesses in the clean tech sector with good perspectives for early adopters to expand the export of goods and services.

vi) Sustainability means that resources will not continuously be exploited and dumped. It means that closed looped systems are set in place in order to secure future generations the availability of clean air, water, soil and other raw materials.

vii) Indicators of sustainability, life cycle analysis, recyclability, etc. shall be developed further as a way to measure the capability of a society to provide opportunities for future generations.

viii) The globalization of knowledge and of information technology, that enables high valuable services, is and will continue to be a key asset of developed societies. However, strategies to refrain any unnecessary transportation of persons or goods are welcome. Product re-usage (e.g. glass bottles, transportation bags) and local production of goods, especially parish ones like fresh vegetables, is an obvious example as the need for refrigerating capacity and long distance transportation are reduced in both cases.

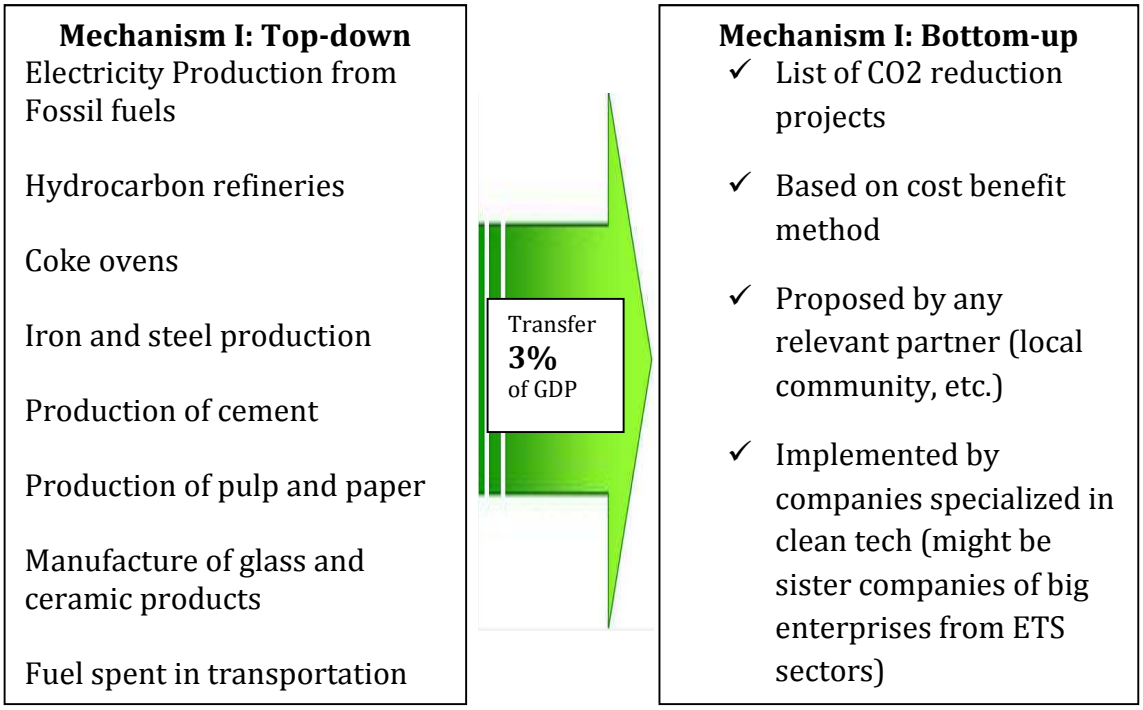
ix) The decentralization of producing certain goods and local electricity generation (e.g. small scale photovoltaic systems) are an important path to follow, since transportation losses and costs associated to the size of the support infrastructure can be reduced.

x) A modal shift in the usage of transportation to energy carriers with very low GHG emissions is another objective. Some alternatives are: electric engines powered by renewable electricity, hydrogen produced using renewable electricity or solar fuels [8].

A comprehensive model is proposed for discussion:

To avoid the BAU International Engery Agency (IEA) reference scenario leading to 57 Gton of CO2 eq emissions in 2050 and to an increase of 6ºC in average global temperature global GHG emissions have to be reduced. To achieve that aim, a revision of the ETS is necessary in order to embrace the sectors responsible for at least 90% of all GHG emission until 2030. These sectors should be supporting the energy transition into clean technologies. Currently, ETS applies to electricity use, aviation and energy taxation (directive 2003/96) for fuels used in land transport. A revision of the energy tax scheduled for 2015, which claimed taxation of carbon dioxide emissions and energy content instead of the current tax based on volume failed. A new scheme is needed, one that integrates two dimensions (clean tech transfer and absolute energy savings):

Part 1: A mechanism that enhances and accelerates clean tech transfer, removing resources from polluting sectors



This closed loop system would be introduced in 2017 and transfer 3% of the GDP from ETS sectors to investments on clean energy, managed by a Clean Tech Trust Fund that would approve a list of projects every year. It would have a zero balance taxation in the economy and it should aim at international cooperation for joint implementation. The sectors considered could vary from country to country, as long as within the period of 2017-2020 a reduction of 80% of the emissions would be achieved, increasing to 90% in the period of 2020-2030 and to 95% in the period of 2030-2040.

Part 2: A mechanism that enhances global reduction of GHG emissions on end consumers

Mechanism II: Energy Savings Reward

above well being-line, zone 2: 2x more the base service fee	3 Euro / service unit
above well being-line: 1x more the base service fee	2 Euro / service unit
below **well being-line**: base service fee	1 Euro / service unit
below **energy savings line**: base service fee – premium	0,5 Euro / service unit

This closed loop system would be introduced in 2017 and would transfer resources from consumers that have a higher level of consumption towards consumers that spend less and therefore would pay less for each service (or product) consumed. Services could be: electricity consumption per household, number of kilometers per car and water consumption among others. For each country, and taking into consideration climatic data, a different set point for the energy saving line and the wellbeing line would be defined. Every 3 years these lines would be revised, marking down the limits according to improvements in technological and energy standards. In developed economies the aim for global consumption would be to go onto a sustainable path based on innovation supported by IT, on the usage of less materials/resources for the same output and their re-usage in a closed loop.
This would be a Demand Side Management Pillar that would provide the right incentives for energy savings.

Policy Recommendations:

1) Review the ETS system (2003/87/EC), introducing the *Clean Tech Transfer* approach
2) Implement a closed loop taxation system to address environmental policies (e.g. reform the energy taxation directive)
3) Implement a mechanism to curb down absolute GHG emissions, applying the *Demand Side Transfer* to electricity and water bills with a progressive internal transfer system, so that heavy users would pay more per unit consumed and light users would pay significantly less per unit consumed
4) Focus not only on economic growth, but define sustainability indicators like Life Cycle Assessment methodology and recycling indexes to assess how valuable new projects are

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