



REBOOTING EUROPE'S ENERGY LEADERSHIP CONSUMER-FOCUSED ENERGY INNOVATION IS AN OPPORTUNITY FOR EUROPE

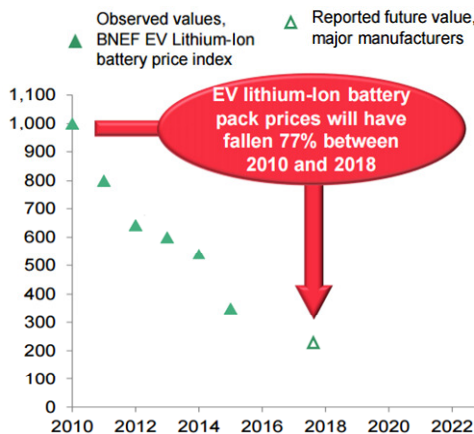
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The European Commission is working on a flurry of new initiatives and legislative proposals to deliver its “Energy Union vision”. Amongst these, two files have the potential to restore Europe’s status as an energy leader while boosting European competitiveness and taking the sting out of its decarbonisation objectives: the **new electricity market design** and the Energy Union **Innovation Strategy**. Here’s why.

1. The global energy landscape is changing and the pace is quickening.

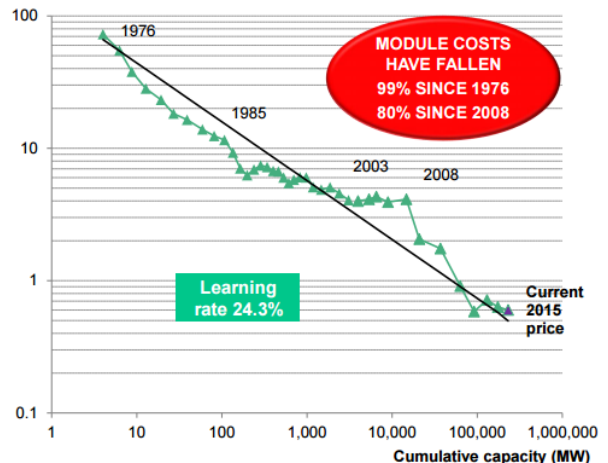
New behaviours and technologies have completely shaken up the established energy markets, and opened up a world of opportunities for the taking. A crucial element of this transformation is the development of the demand side of energy markets (energy efficiency, demand side response, distributed generation) and the use of digital technologies to build efficient and innovative markets, services and technologies.

Figure 1: EV Lithium-ion battery pack price (\$/KWh)



Source : Bloomberg New Energy Finance

Figure 2: Solar PV module cost (\$/MW)





This evolution is demonstrable **on the ground**, with 2015 being the first year that the clean energy investment outpaced oil and gas capital expenditure¹.

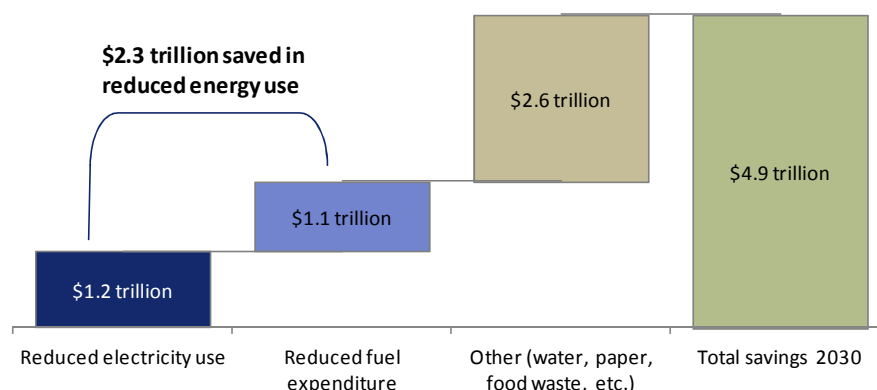
This evolution is demonstrable through **technologies**, with cost of LED lighting falling by 84% over the past five years, electric vehicle batteries and solar PV falling by 55% and 50% respectively over the same period².

Finally, this evolution is demonstrable **politically**. In December 2015, 195 countries set out a global action plan to put the world on track to avoid dangerous climate change by adopting the first-ever universal, legally binding global climate deal at the Paris climate conference (COP21).

2. The commercial opportunities and cost savings are significant.

The global market for low carbon and environmental goods and services is growing at over 4% a year and reach nearly €5tr in 2016³. Estimates show that the global market for smart grid technology is expected to grow to \$220bn to 2020, and \$500bn to 2030⁴. In 2012 Europe accounted for less than 10% of this market, behind the US (30%) and China (22%)⁵.

Figure 3: Cost savings form enhanced use of ICT by 2030



Source : GeSI, Global e-Sustainability Initiative

In addition to the revenue opportunities, the **cost savings from increased use of ICT are also considerable**. Estimates show that the ICT sector has the potential to cut economic costs across sectors by \$4.9tr by 2030, while enabling a 20% reduction of global CO2e emissions. Use of ICT in energy, manufacturing, buildings, mobility, etc.

¹ Bloomberg New Energy Finance <http://about.bnef.com/video/liebreich-state-industry-keynote-bnef-global-summit-2016/>

² LEDs: US Department of Energy (2014) Solid-State Lighting Research and Development Multi-Year Program Plan; Batteries: Carbon Brief (2015) Electric vehicle batteries 'already cheaper than 2020 projections'; Solar PV modules NREL (2015) Photovoltaic System Pricing Trends; Onshore wind: World Energy Council (2013) World Energy Perspective: Cost of Energy Technologies.

³ Low Carbon and Environmental Goods and Services Report for the UK's Department for Business, Innovation and Skills, July 2013

⁴ Zpryme Research

⁵ Bloomberg New Energy Finance



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can lead to savings of \$1.1trillion in reduced fuel expenditure, and \$1.2tr from reduced electricity use⁶ (see Figure 3).

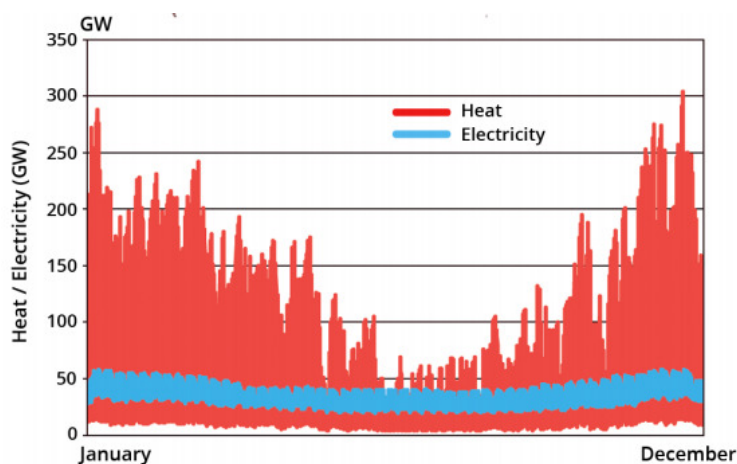
3. Smart energy systems are indispensable to the delivery of European energy policy objectives.

Taking advantage of the opportunities that increased use of digital technologies and enhanced demand-side participation is also a critical success factor in delivering on Europe's decarbonisation objectives. Development of smart homes, buildings, grids and cities, energy efficiency, demand side response, etc. is indispensable to decarbonise Europe's energy sector by mid-century.

First, it is the **most cost-effective way to integrate renewable electricity onto the system.** Research commissioned by the European Commission shows that demand response stands out as particularly promising among the various options to achieve integration of high shares of renewable electricity. An effective use of demand response can yield annual savings of the order of €60-100bn/yr⁷.

Secondly, building experience on how to engage with **end-consumers will be essential for the next step in Europe's energy transition: decarbonisation of heat and transport.** Initial efforts with the decarbonisation of the energy system have focused on electricity, but decarbonisation of other sectors must soon gather pace.

Figure 4: Heat and electricity demand in 2010 in the UK (GW)



Source : UKERC, Sansom & Strbac 2012⁸

Unlike the decarbonisation of electricity, this will generally require end consumers to actively participate in energy markets to effectively replace the huge storage capacity inherent to the current heat and transport systems (where the use of fuels such as

⁶ <http://smarter2030.gesi.org/>

⁷ Integration of Renewable Energy in Europe, DNV GL in cooperation with Imperial College and NERA Economic Consulting

⁸ <https://workspace.imperial.ac.uk/icept/Public/Energy%20System%20Crossroads.pdf>



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gas, petrol, coal, allows consumers to store energy and use it when required). It will require consumers to make significant choices over how they consume energy – how they will travel, how they will heat their homes, whether they'd rather take these decisions or have them taken automatically by their smart appliances, etc.

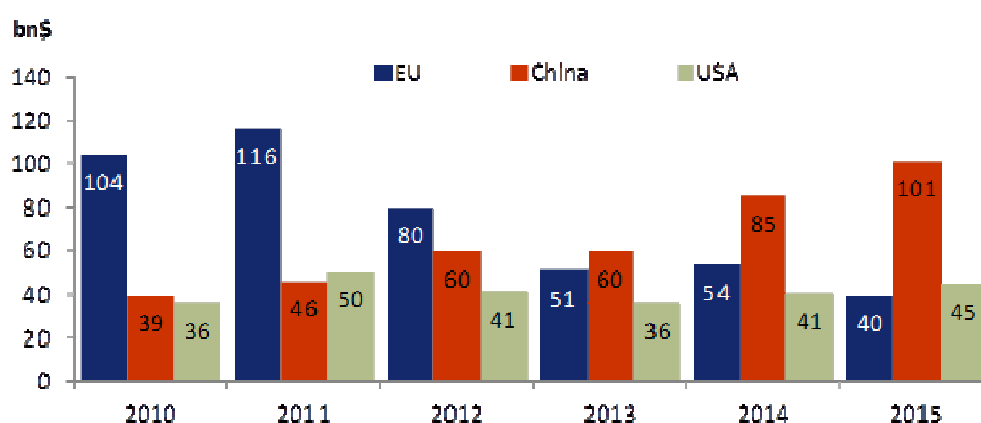
Decarbonisation of heat will require significantly higher demand-side flexibility than is required for the decarbonisation of electricity (see Figure 4). The delivery framework that is adopted to ensure the decarbonisation of heat and transport sectors therefore sets the context in which the adoption and remote control of smart appliances should be considered.

4. But Europe is on the verge of being left behind, with China taking the lead.

The EU has lost its lead in an increasingly competitive global market for clean and smart energy. China's sprint towards a low carbon economy should serve as a wake-up call to Europe: in the last five years China has overtaken the EU on renewable energy build rates, R&D spending, power transmission grids and electric vehicles.

Over the next five years, China aims to expand its lead in additional strategic areas such as high-speed rail, Information and communications technologies (ICT) and batteries. Although European companies currently maintain a technology edge in some of these sectors, their competitive advantage will be greatly reduced if no meaningful actions are taken in Europe in the medium term. Europe's challenge is no longer about showing climate leadership: it is about avoiding being left behind.

Figure 5: Clean energy investment (bn\$)



Source : Bloomberg New Energy Finance



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5. The EU must take urgent action to give smart energy centre stage. Current policy discussions are not sufficient.

The EU Energy Union project is Europe's chance to transform its energy system and unlock the potential of demand-side solutions, smart grids and digital innovation. If it succeeds, citizens and businesses across Europe stand to gain from more resilient, integrated, low-carbon and cost-effective EU energy markets and new economic opportunities from digital innovation and resource efficiency. If it misses the opportunity of the current legislative agenda, it will endanger European competitiveness and European decarbonisation objectives.

Current policy discussions are not sufficient. Whilst they cover important topics, they tend to focus too much on fixing the current market without focusing on future challenges and the full breath of the issue. Evidence from the US shows that significant policy action from top down mandates, to support from federal and state legislation, regulatory reform and public funding have been necessary in driving forward the demand side of the energy market⁹.

Without additional action by European and national policy makers, existing market rules, policies and market players will deliver too little, too late:

- Most **energy consumers** are currently not engaged in the market, have little to gain from engaging, and have little confidence in market actors. The main focus of the industry to date has been to find ways to change consumer behaviour in order to make it easier and cheaper to run the energy system. Instead, we should be looking at new digital opportunities and reflect on how they could be used to make consumers lives better.
- **Large incumbent players** that supply energy and operate the networks are often poorly incentivised to invest in the new systems and approaches that will enable them to develop a significant capacity of flexible demand services. Not only are the returns difficult to predict, they often involve some cannibalisation of core business profits.
- Opening the markets to **new entrants** focused on providing demand side services is an important way to apply some competitive pressures, particularly to large energy suppliers, but the ability of these start-ups to fund rapid growth is inevitably constrained due to the costs and risks involved.

⁹ Harnessing demand side resources in electricity markets – Evidence from the United States, E3G, June 2015



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Conclusions: principles for innovation and consumer-focused energy market design proposals.

European policy discussions - in particular those on energy market design and energy innovation - must aim to harvest the opportunities offered by the digital agenda while tackling the challenges of transforming energy systems. The main objectives of an innovative market design for the EU should be to:

- 1. Set out to deliver the Energy Union vision** of a sustainable and inclusive system built for citizens with strong, innovative and competitive European companies, and to assist decarbonisation of heat and transport.
- 2. Create open and competitive markets** where cost-effective investment in demand reduction is prioritised; where new business entrants, but also municipal energy companies and active consumers, can participate in energy markets.
- 3. Drive deployment of demand response**, possibly through the setting of obligations on large suppliers and by refining the role of Distribution System Operators (DSOs).
- 4. Create conditions for consumers** to feel comfortable with remote control of energy consumption and sharing of data, and to benefit from increased energy market participation.
- 5. Create space for innovation in consumer facing products and services**, accompany widespread adoption of smart appliances and control systems.

About E3G

E3G is an independent, non-profit European organisation operating in the public interest to accelerate the global transition to sustainable development. E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere.

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