Chapter 9
A Smart Future? The EU Digital Agenda Between Broadband, the Grid and Energy Efficiency

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Digital technologies have the transformational power of making the world smarter and have a profound impact on foundational industries including energy, transport and education. This is why the achievement of a smart, sustainable and inclusive growth has to look at ways to integrate information and communication technologies (ICT) at all levels. By putting intelligence and allowing for data communication in networks, such as the electric grid, that traditionally used to be dumb, ICT allows for a dynamic use of energy, greater consumer empowerment, new business models and efficiency gains. However, unleashing the transformational power of ICT requires a new policy-making style, breaking policy silos and encouraging greater synergies across sectors. The 2010 Digital Agenda for Europe combines a bold approach to high-speed broadband deployment with a firm commitment to green ICT and to the use of ICT to contribute to energy efficiency, the deployment of smart grids and smart meters. This article illustrates some of the main initiatives in this field, highlights the importance of synergies and integrated policy-making and indicates that there is an important potential for transatlantic cooperation to be untapped.

The Digital Agenda for Europe

The Digital Agenda for Europe (DAE),[1] adopted in May 2010, is one of the flagship initiatives of the Barroso II Commission in the context of the Europe 2020 strategy for a smart, sustainable and inclusive growth.[2] It marks an important step in the

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[1] Communication on "A Digital Agenda for Europe" COM(2010) 245 final/2. See Digital agenda website: http://ec.europa.eu/information_society/digital-agenda/publications/index_en.htm

[2] Communication on "Europe 2020. A strategy for smart, sustainable and inclusive growth". COM(2010)2020 final. See: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF

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approach of the European Commission to the digital economy, recognising the cross-cutting key relevance of information and communication technologies (ICT) and the internet for all the sectors of the economy and for European society as a whole.

It is worth recalling the vision behind the policy goal of "Every European digital" that informs the Commission's activities in this field. The DAE is built around seven main pillars addressing (1) the creation of a digital single market in the EU, (2) fostering interoperability and standards, (3) ensuring trust and security in the digital environment, (4) deploying fast and ultra fast internet access across the Union, (5) promoting research and innovation, (6) enhancing digital literacy, skills and inclusion and (7) promoting ICT-enabled benefits for the society, including on energy efficiency. These "pillars" are the main elements of what is referred to as the "virtuous circle of the digital economy" whereby the creation of content and border-less services, the increase in service demand and the roll-out of networks are mutually reinforcing elements to produce more jobs and growth.

It is in this context that the transformational power of ICT as an engine for growth and as an enabler for a greener economy and society has to be seen. The Digital Agenda provides the background against which broadband targets and sustainability and energy efficiency goals not only coexist, but can translate into policies that capitalise on synergies for building a smart digital society. This is the challenge European policy-makers are facing.

Every European Digital: Building the Broadband Highways

Broadband connections are the motorways of the digital economy and carry its life-blood: the data, digital content, services and applications that are essential to the functioning of our society. Today, being online is not just a "nice-to-have" but increasingly a must-have as both commercial and key public services, including government, health and education, move into the digital space. The Europe 2020 vision of a smart, sustainable and inclusive growth will depend on the efficient use and effective availability of the internet. The deployment of competitive broadband networks is one of the fundamental elements of the virtuous circle of the digital economy mentioned above: high-capacity networks will allow new innovative and bandwidth-hungry services to flourish, encouraging mass take-up and citizen demand which in turn will stimulate further investments in the networks.

For this reason, the deployment of high-speed broadband is one of the key actions of the Digital Agenda, which sets up ambitious penetration and take-up targets for Europe: by 2020, all Europeans should have access to internet of above 30 Megabits per second (Mbps) and 50 % or more of European households have subscriptions above 100 Mbps. The DAE also recalls the objective endorsed by the European Council to bring basic broadband to all Europeans by 2013. The EU broadband strategy is further defined in a specific 2010 Communication.[3]

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[3] Commission Communication on "European Broadband: investing in digitally driven growth" COM(2010) 472 final

In order to reach these ambitious objectives, the European Commission has started setting in place a comprehensive policy, based on a mix of technologies (fixed and wireless) and synergies between the national broadband plans and the EU level. As Commission Vice President Neelie Kroes put it in a recent speech "we will meet those targets with a gradual approach based on a mix of technologies. Whether it's fibre to the home, fibre to the cabinet, next generation mobile solutions, or of course upgraded cable: they all have their part to play. We need a complementary combination of solutions, introduced incrementally, and tailored to local needs".[4]

Financing Smart Infrastructure in Europe

Connecting Europe with high-speed broadband requires high investments. In particular, investment in fibre is very expensive mainly due to the important civil engineering works it entails. With a view to the importance of providing incentives for the rollout of broadband networks, the Commission has recently put forward the proposal for a new financial instrument, the Connecting Europe Facility (CEF), as a part of its multiannual financial framework for a competitive, sustainable and inclusive Europe "A Budget for Europe 2020". If approved, this 50 billion Euros facility would finance infrastructure projects for transport, energy as well as digital infrastructures. It is to be noted that it is the first time that the Commission proposed a single funding instrument for three network sectors, with the objective to create synergies and simplify rules. It is also significant that for the first time broadband networks are considered as key infrastructures alongside roads, railways, energy grids and pipelines.

The proposed budget allocation for ICT/digital infrastructure is in the region of 9 billion Euros that are intended to serve as a stimulus to complement and attract more investment in broadband rollout and also digital services, such as those related to smart energy distribution. The CEF, if approved, will mark an important step in fostering the rollout of vital infrastructures for the digital age.

The "Green Chapter" of the Digital Agenda

The EU has committed to ambitious environmental goals for 2020: reducing its greenhouse gas emissions by 20 %, increasing the share of renewable energy to 20 % and improving energy efficiency by 20 %. These are often referred to as the "20-20-20" objectives in the area of energy and climate policy. ICT can play a fundamental role in helping achieve these goals via less resource-intensive products

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[4] SPEECH/12/166 of 08/03/2012 on "Unblocking the broadband bottleneck", http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/12/166&format=HTML&aged=0&language=EN&guiLanguage=en

and services, smarter buildings, smarter and energy-efficient electricity networks and intelligent transport systems. The Digital Agenda highlights the key importance of ICT for the transition to a low carbon economy, both addressing the challenge of reducing the carbon footprint of the ICT sector itself and of using ICT to improve the carbon footprint of other sectors. It also emphasises the importance of smart grids and smart metering, both for energy efficiency and as new markets for ICT technologies and services.

The Digital agenda outlines four main streams of work on (1) agreeing on common metrics across the ICT industry in order to measure the carbon footprint of the sector, (2) using ICT to improve the energy/carbon footprint of other sectors, (3) working on smart grids to implement them in a sustainable way and exploring interoperability with broadband networks and (4) working on developing common functionalities for smart meters.

ICT for Energy Efficiency v. a More Efficient ICT

The use of ICT can have a positive impact in improving the energy performance of several sectors: building and construction, transport and logistics, water and energy distribution, cities. It also contributes more in general to the dematerialisation of the economy thanks to alternative ways of doing business and of doing government such as e-commerce, e-government and replacing travel with teleconferencing or telepresence. This aspect is one of the most interesting in terms of innovation, creativity and interplay across sectors.

The Digital Agenda announces the Commission's intention to "support partnerships between the ICT sector and major emitting sectors (e.g. buildings and construction, transport and logistics, energy distribution) to improve the energy efficiency and greenhouse gas emissions of these sectors".

However, ICT itself does not come carbon-free. It is energy-hungry both directly and indirectly. It is sufficient to visit a data centre or a network operation centre, the operating heart of any major telecom operator, to become immediately aware of the level of energy required for its operations, with hundreds of fans turning non-stop to keep computers cool and massive generators ready to intervene in case of shortage. Just the visual representation, if not the actual numbers, of the energy needed to make the internet run smoothly is rather impressive. And this is just one example of the energy consumption associated to the ICT sector.

Current estimates indicate that the ICT sector in Europe accounts for some 8 % of EU electricity consumption and is expected to double by 2020, bringing the sector energy consumption up to 15 % of the total EU consumption. These figures are tentative in the absence of a single methodology for accounting the energy/carbon footprint of the sector. In this respect, Europe's Digital Agenda states that "The ICT sector should lead the way by reporting its own environmental performance by adopting a common measurement framework as a basis for setting targets to reduce

energy use and greenhouse gas emissions of all processes involved in production, distribution, use and disposal of ICT products and delivery of ICT services." It further calls on industry to adopt common measurement methodologies for the sector's own energy performance and greenhouse gas emissions and indicates that the Commission will monitor and assess compliance.

It is clear that measuring the energy/carbon footprint of the ICT sector is a complex task. Already before the adoption of the Digital Agenda, the EU Commission worked hard to ensure consistency among the ICT industry efforts, which are now beginning to bear fruit. In 2010 the ICT for Energy Efficiency (ICT4EE) Forum, gathering European, Japanese, Korean and American companies started working to ensure more coherence in ongoing European standardisation efforts and the work lead by the International Telecommunications Union that aims at developing a common methodology for the whole ICT value-chain. It is crucial that these efforts continue to be sustained in order to be able to compare ICT energy performance on a global scale.

Setting in place the right metrics and a common methodology to measure the carbon impact of ICT is also relevant to carry out sound cost-benefits analyses and assessing the contribution that ICT can make to other sectors in terms of efficiency gains and smart solutions.

Smart Grids

The work on smart grids and smart metering is one of the most interesting areas of interaction between ICT and energy. As mentioned in the 2009 Commission Communication, and subsequent Recommendation, on mobilising ICT to facilitate the transition to an energy-efficient, low carbon economy: "Smart grids and smart meters are innovative new markets for IC Technologies and services".[5] The Digital Agenda calls upon the Commission to "Assess by 2011 the potential contribution of smart grids to the decarbonisation of energy supply in Europe and define a set of minimum functionalities to promote the interoperability of Smart Grids at European level by the end of 2010".

Smart grids,[6] the new intelligent energy networks, are today at the centre of a Copernican revolution in the way we produce and consume energy, with a strong ICT component. Europe has set out in its *Internal Energy Market 2009 Directive*[7] what the smart grid should achieve in terms of improvements: more efficient distri-

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[5] C(2009) 7604 final. See: http://ec.europa.eu/information_society/activities/sustainable_growth/docs/recommendation_d_vista.pdf

[6] For a definition of "smart grid" see the one by the European Smart Grid task Force: http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/expert_group1.pdf

[7] Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity

bution of energy, the integration of renewable energy resources on a large scale into the power grid. The Digital Agenda also recognises the importance of smart grids for innovating the energy sector and states to "assess by 2011" the potential contribution of smart grids to the decarbonisation of energy supply in Europe and define a set of minimum functionalities to promote the interoperability of smart grids at European level. However, if the benefits are widely recognised, the biggest challenge, as it is often the case, lies in the implementation. A multi-departmental task force was set up to this effect[8] with the participation of all major stakeholders including utilities, ICT companies and national regulators. The *European Smart Grid Task Force* focuses on several cross-cutting issues including technical aspects, privacy and security requirements and the role and responsibilities of the various actors involved.

This work resulted in the 2011 Communication on *Smart Grids: from innovation to deployment* [9] where the Commission set out the policy framework for the future deployment of electricity networks in Europe. The EU approach focuses on the following elements: (1) developing common European-wide standards, (2) ensuring data protection, which in Europe, it is worth recalling, is a fundamental right, (3) setting up regulation that provides incentives for the deployment of smart grids, (4) guaranteeing an open and competitive retail market and (5) providing continued support to innovation via RTD activities. On all this aspects, close interdepartmental cooperation is required.

The Commission services[10] also set up in 2011 a joint working group, gathering utilities and telecom operators, to explore the possible synergies in the deployment of smart grids. The work of this group will be crucial in exploring the synergies between broadband and smart grid deployment and in defining innovative solutions for both sectors. It will also help building bridges and developing a common culture across sectors that are not traditionally used to working together.

Smart Metering

ICT is key also to intelligent metering: a fundamental part of the smart grid ecosystem and the one closest to consumer interests and concerns. The essential ICT contribution to smart metering is well described in a 2009 paper from the High Level Advisory Group on ICT for smart electricity distribution networks.[11] The report highlights that large-scale implementation of smart metering can be achieved via a

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[8] http://ec.europa.eu/energy/gas_electricity/smartgrids/taskforce_en.htm

[9] Commission Communication on "Smart Grids: from innovation to deployment" of 12 April 2011, COM(2011) 202 final

[10] Directorate General Information Society and Media

[11] ICT for a Low Carbon Economy, Smart Electricity Distribution Networks, July 2009. See: http://ec.europa.eu/information_society/activities/sustainable_growth/docs/sb_publications/pub_smart_edn_web.pdf

mix of technologies, including broadband and wireless solutions as well as power line communication. Smart meters allow users to better control their energy consumption and make important savings. Although today in Europe only a minority of households has smart meters, there is evidence that when smart meters are used they can allow for energy savings up to10 %.

The action of the European Commission in this area aims at ensuring EU-wide interoperability and defining common functionalities for smart meters, as recalled in the Digital Agenda. The Commission tasked the European standardisation organisations to establish European standards for the interoperability of smart meters for utilities (gas, electricity, water, heat) and, notably, to extend interoperability to the functions that interface with consumers, such as the systems for secure communications with consumers. The 2009 Electricity Directive[12] asked the Member States to assess their roll-out of smart metering systems. The European Commission adopted recently, in March 2012, a *Recommendation on smart metering systems*[13] that indicates to the EU Member states the elements they should take into account in terms of minimal functionalities and requirements for smart meters and in terms of data protection and security when rolling out smart metering systems. This will allow for monitoring progress to ensure consistency of approaches across the EU.

From a consumer point of view, smart metering are "gadgets" that can help managing one's energy consumption and yield considerable savings. The wider adoption of a dynamic "demand-response" model, whereby utilities apply different pricing according to peak and off-peak consumption times, would help maximising the benefits of smart metering. This business model is not yet adopted in Europe and so far experience on the US market has been mixed because cheap off-peak prices can be offset by disproportionate increases during peak hours. It will be important to encourage solutions that can lead to a balanced implementation in the EU.

In order to allow the best products and solutions to flourish, it is important to keep the market for smart metering competitive and open to various players. It is also crucial to avoid consumers' lock-ins and allow for alternative ways for managing one's energy consumption, software-based and/or via smart phones and other devices. A vibrant market, open to innovation in this field, will encourage the development of consumer-friendly solutions and facilitate early adoption on a large scale.

Smart Policy-Making

Putting ICT and innovation at the service of smart solutions for energy, transport and urban development requires a great deal of out of the box thinking and a new policy style that would be able to develop and optimise synergies across sectors.

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[12] Directive 2009/28/EC

[13] Commission Recommendation of 9 March 2012 on preparations for the rollout of smart metering systems. See http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/20120309_smart_grids_recommendation_en.pdf

These considerations apply to several policy areas as the transformative power of the internet and digital technologies revolutionises ways we do things in all domains. However, when it comes to ICT, energy efficiency and smart grids, developing synergies is a political and economic imperative. Another important reflection that needs to be made, as we develop innovative policies for smart grids, is about the fundamental role that consumers have for the success of those policies. In this perspective, the local dimension, notably the urban environment, seems to provide an ideal test-bed for ICT solutions related to sustainability and energy efficiency.

Breaking-up Policy Silos

Policy-making in the area of energy efficiency has today a political imperative: creating synergies, avoiding unnecessary duplications and enabling for a smart growth. In the current economic context, this is clearly a must. The energy efficiency challenge indicates that governments should increasingly get ready to cope with cross-sector issues. This would take finding creative solutions for policy-making as well as overcoming often entrenched administrative culture. Public administrations, on both sides of the Atlantic, are not traditionally well equipped for cross-departmental cooperation. The temptation of locking up polices in compartments remains a risk, although there are encouraging signs that matrix management and task-force coordination have started to be implemented at various levels, and more vigorously than in the past, both in the EU and in the US administrations.

The need to break-up policy silos is true for policy-makers and industry alike. It does not only take the creation of a couple of interdepartmental task-forces, but the nurturing of a new mentality and approach. If we look, for instance, at the interplay between telecoms and energy, one should keep in mind that for as great the potential synergies can be, today these sectors are at very different stages of development. Telecoms in Europe have been almost entirely liberalised and are subject since 2002 to a regulatory regime that ultimately aims at reducing ex-ante regulation in favour of competition law. They are subject to a regular market review and the number of regulated markets, where it was deemed that intervention was needed, has shrunk drastically over the last years.

The energy market liberalisation, on the other hand, is still in its infancy. Distribution System Operators (DSOs), which are responsible for delivering electricity to end users, are considered "natural monopolies" and operate in heavily regulated markets. Therefore the actors, the rules, the stakeholders and, more in general, the "cultural norms" that preside over the two sectors differ greatly. This implies that bringing together telecom operators and DSOs in broadband and smart grid rollout will require some time and possibly regulatory changes. It seems clear however that only a progressive but steady integration of the networks and an intelligent use of innovative technologies will allow Europe to take full advantage from the rollout of high-speed broadband and further develop the smart grid and its functionalities.

Empowering Digital Consumers

A 2010 article titled *What's really wrong with the smart grid*[14] argued that the main problem with the political discourse in the United States was that it lacked a coherent political philosophy and failed to explain why the smart grid would be good for consumers, the economy and the society as a whole. Indeed, this seems to be largely the case still today and consumers' benefits are often overlooked in the current debate. However, consumer awareness and take-up of new solutions to manage energy consumption, including software-based ones and smart meters, is essential to the transition to a low carbon economy. A stronger focus on consumer empowerment on both sides of the Atlantic could only be beneficial to reaching the 2020 goals and it would be desirable that current forums that gather industry are opened up as appropriate to consumer participation, in a truly multi-stakeholder fashion.

It is also worth noting that in the internet age, putting people at the centre of policy-making goes beyond simple "consumerism" rhetoric. In the internet ecosystem the interplay between consumption and production is so strong that sometimes the term "prosumers" is utilised to refer to consumers who are also creators and producers of content, applications and internet solutions. We have also recently witnessed, with reference to a different policy area, the power of social networks as a vehicle for mobilising public opinion across the globe in real time. At a time when the generation of digital natives (born in the 1990s) has reached the legal age and will progressively take over the digital immigrants, leaving people out of the equation is not just a tactical mistake but a fundamental lack of understanding of policy-making dynamics in the internet age and one which can have a high political cost.[15]

Going Local

The urban environment is increasingly the place to experiment and innovate, and a practical test-bed of cross-sector policy-making (energy, transport, ICT) and citizens' involvement. This is already happening or is about to happen in several European cities and metropolitan areas.

The so-called "Smart cities" are a good example of a policy space where ICT, energy, transport and digital citizenship converge to give life to innovative solutions and shape the digital habitat of the future. An interesting example is the *Green*

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[14] Lisa Margonelli, "What's really wrong with the smart grid", 19 November 2010, http://www.theatlantic.com/national/archive/2010/11/whats-really-wrong-with-the-smart-grid/66832

[15] This has become apparent in 2012 when mass public opinion mobilisation via internet social networks has determined the faith of US draft legislation on online piracy and in Europe sparkled a debate on the legitimacy of an international anti-counterfeiting agreement (ACTA), leading to halt in the ratification process and a referral to the European Court of Justice

Digital Charter intercity partnership launched in 2009 that focuses on ICT and sustainable urban development.[16] It brings together 24 cities, representatives of 11 member states of the European Union that have committed to use ICT as a main driver to improve energy efficiency. Each city has the objective to reduce its carbon footprint by 30 % by 2020 and is expected to deploy five major ICT-based pilots over the next 5 years. ICT can be used to improve efficiency in the urban context in multiple ways, from making buildings more resource efficient, to optimising city transport, for instance, via traffic management, using solid state lighting and so on.

These cities commit, among other things, to the promotion of integrated approaches and large-scale solutions through a process that involves, on the one hand, the use of digital applications for the measurement, transparency and visibility of energy use and, on the other, the participation of all stakeholders (citizens, service providers, public sector and industry) in the testing of implementation projects. It is also very interesting to note in this context the strong focus put on to "transformational approaches to ICT, which drive new values and behaviours". This points at the role of cultural and societal change driven by innovation and, in turn, the importance that citizens and the community become an agent of such a behavioural change.

In the United States, some regional initiatives for reducing greenhouse emissions and improving sustainability are also taking place, such as the Regional Greenhouse Gas Initiative (RGGI)[17] that is the first mandatory, market-based CO_2 emissions reduction program in the United States. There are also several cities and city mayors committed to sustainability, such as the City of Alexandria in Virginia, that has adopted an "eco-city-charter"[18] in 2008. However, a large-scale initiative focusing on the role of ICT for a greener urban environment, comparable to the European smart cities, seems to be lacking.

The Potential for Transatlantic Cooperation

The potential for transatlantic cooperation on ICT, smart grids and energy efficiency is clear, not only because our societies and economies face similar challenges, but also because setting a transatlantic EU–US blueprint will set the standard globally, helping the planet develop smart solutions for industrialised economies and for leapfrog in developing economies.

An important step on cooperation on smart grids was taken in November 2011 in the context of the joint EU–US Energy Council and of the Transatlantic Economic Council (TEC) that launched EU–US cooperation on electric vehicles and smart grids. The Letter of Intent on E-mobility and Smart Grids signed by the European

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[16] http://www.greendigitalcharter.eu/g-d-c

[17] http://www.rggi.org/

[18] http://alexandriava.gov/Eco-City

Commission Joint Research Centre and the US Department of energy signalled the willingness to foster transatlantic cooperation on standards and interoperability for e-vehicles, recharging systems and smart grids. Discussions are currently ongoing on a further specific joint initiative on smart grids that would look at several areas of cooperation, including how to increase the reliability of the grid, reduce network losses and integrate renewable energies into the grid. It is clear that the ICT component is relevant to all the above and the exchange of experience and know-how across the Atlantic will enable to find optimised solutions for the future evolution of smart grids.

If the work on smart grids, for the above-mentioned aspects, seems to be on a good track, it is worth reflecting how transatlantic cooperation on other aspects of ICT for energy efficiency could be further improved and taken forward. Today, Europe is leading the game in terms of capacity to integrate ICT in energy solutions. The current US approach to energy efficiency does not highlight the use of ICT as a main element and, according to recent studies, the US would not be listed among the global top ten countries integrating ICT for low-carbon applications.[19] Also, while the Obama administration launched a very ambitious broadband plan, almost in parallel to Europe's Digital agenda, the reflection on integrating broadband and electricity grids does not seem to be very advanced in the United States and there is little reference to it in the public discourse.

This indicates that there is an untapped potential and that Europe can lead the way in stimulating a reflection and joint transatlantic initiatives on the use of ICT. This reflection could be led in the context of the TEC, but also at other levels. Going "transatlantically" local, one could envisage, for instance, an initiative for twinning EU and US smart cities and showcase the best ICT integrated solutions, or cooperation programs on ICT that would involve European companies and business incubators, in Silicon Valley and beyond. What is certain is that the demand for sustainable ICT and ICT for a sustainable growth will continue to rise and that, like in Renaissance times, it will require from policy-makers on both sides of the Atlantic a new holistic vision and approach to our common digital future.

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[19] http://www.gesi.org/LinkClick.aspx?fileticket=fzmFL3kXfOU%3d&tabid=60