How Europe is approaching the smart grid

Uncertainty about standards and support is slowing progress, though smart meters have passed 50-percent penetration in some market.

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Public awareness of smart grid technology has expanded in Europe, especially as a result of the adoption by the European Union of the Third European Energy Liberalization Package. The main goal of this agreement is the installation of "intelligent metering systems" in 80 percent of households by 2020.[1] New services by pioneering utilities such as Germany's Yello Strom have also helped raise the profile of this new technology. Yet while almost all consumers in Italy now have smart meters, investment and development activity vary widely across the region and among smart grid segments.

More comprehensive adoption has been slowed by several factors: the lack of clear technology standards for smart meters and home-area network (HAN) communications; uncertainty about the level of regulatory support for necessary investments; and disappointing demand for smart grid-enabled services by consumers, who do not perceive a strong value proposition for bringing this technology into their homes. The evolution of the smart grid landscape in the EU will depend on how national regulators and governments decide to support investments and how these decisions influence the investment behavior of leading European utilities.

[1] The 80 percent target is described as binding wherever a "positive long-term business case" for deployment has been made, or where no business case at all has been developed by 2012. While these caveats are present in the language of the agreement, most EU politicians and regulators (CRE, Ofgem, NVE, et al.) are generally interpreting it as binding.

In order to understand this evolving context, three key aspects of the European smart grid must be examined:

- The status of key segments
- Challenges slowing investment
- The outlook for growth.

Status of key segments

Although some governments and utilities have made significant investments in the introduction of smart meter technology, medium- and low-voltage network automation, local network management, and HAN remain in early stages of development.

Smart meters: increasing market penetration

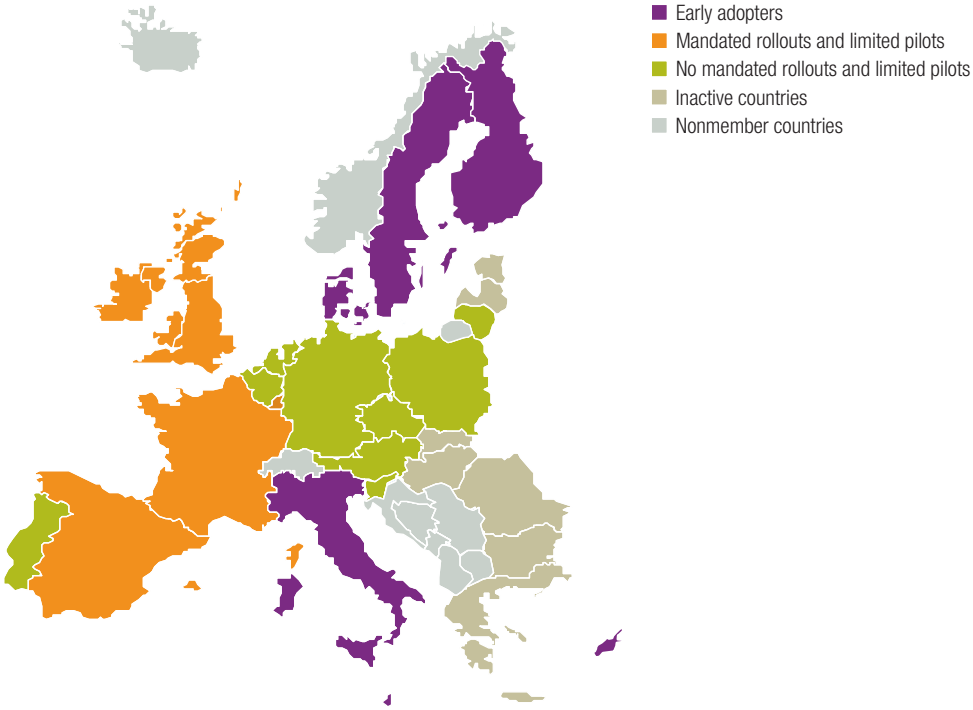
Within the European Union, country-level deployment of smart meters falls into four categories (Exhibit 1).

- *In early adopters,* rollouts have been completed or are well under way. In Italy the "Progetto Telegestore" initiative begun in 2002 has resulted in installation of over 30 million smart meter points covering close to 100 percent of Italian households. In Norway, Sweden, Finland, and Denmark, penetration rates have risen above 50 percent, with continued increases expected.

Exhibit 1

EU progress

Smart meter deployment by EU member states



- *In countries with mandated rollouts, but limited deployment,* national regulators and governments have imposed strict timelines for full deployment of smart meters: 2016 in France, 2018 in Spain, and 2020 in the U.K. As a result, utilities have launched or are launching pilot projects, some as large as 300,000 meter points, in preparation for subsequent nationwide rollouts.

- *In countries with active pilot projects, but no mandated rollout,* such as Germany and the Netherlands, thousands of smart meters have been installed in experiments led by local utilities. This activity comes in the absence of specific implementation deadlines for new metering systems. The Netherlands, for instance, has made deployment voluntary.

- *In inactive countries, primarily the former Eastern Bloc states,* despite the significant potential benefits attributable to reductions in electricity theft and losses, budget constraints have discouraged the launching even of small pilot projects.

Adoption rates of smart meters will be pushed higher in the next decade by elements of Third European Energy Liberalization Package, promulgated in September 2009 to help the EU achieve two overarching energy goals. First, member states are trying to foster a decrease in—or optimization of—energy consumption by their citizens, in order to reach EU energy targets for 2020. The 20/20/20 Directive (December 17, 2008) established several goals for 2020 related to energy use by EU member states: cut greenhouse gas emissions by 20 percent from 1990 levels; source 20 percent of total energy (heat, transport, electricity) from renewables like wind and solar; and make efficiency savings of 20 percent relative to all forecast consumption. Second, smart meters are seen as a tool to foster competition among utilities by increasing the transparency of energy costs while allowing more precise pricing segmentation by utilities, both of which would encourage switching between operators.

Network automation and local network management: limited new investments

In most major EU countries, automation of medium- and low-voltage networks remains at a low level of development. In all but one of the largest European countries, fewer than 20 percent of the medium-voltage and low-voltage stations are remotely monitored and controlled and fewer than 25 percent of the medium-voltage lines are equipped with automatic fault detection. The exception is Italy, where significant investments have been made to improve grid reliability and quality of service. To date, the only change to the *status quo* has been Malta's pledge in February 2009 to spend up to €85 million to automate its network fully as part of its smart grid plan. The growing importance of distributed generation and the greater penetration of renewable energy sources, however, have led several large utilities to study the technical and economic feasibility of local network management.

HAN: early development but increased interest

Interest in home-area network applications is rising rapidly in Europe, and many utilities are piloting new applications. Yello Strom in Germany, for example, has partnered with Digital Strom, Google, and others to offer some customers the ability to monitor and control their electrical consumption in real time, enabling them to remotely dim lights or alter the status of appliances. Another sign of increased interest came at the Cleantech Conference in Copenhagen

in April 2009, where discussions about the smart grid focused mainly on HAN (two out of three invitees in the smart grid panel operate in this space). Development of HAN solutions, however, is still in an early stage, even in countries like the United Kingdom, where public attention to the smart grid has been more pronounced.

Barriers to greater smart grid investment

Despite much discussion about the smart grid, development has been slower than expected, with deployment of smart meters generally falling below expectations, and investment in other smart grid segments limited in size. Three factors are slowing the pace of development:

- Lack of a clear regulatory framework and incentives
- Absence of significant consumer demand
- Segment-specific issues.

Lack of clear regulatory framework and incentives

Member states have neither shared definitions for the functions that make up the various segments of the smart grid, nor provided a clear description of what investment incentives would be needed. Although the Third European Energy Liberalization Package represents a step forward, three important uncertainties remain. First, the "Package" refers explicitly only to meters; reference to the other segments is not specific, but generally encourages the modernization of distribution networks, such as by introducing smart grids. Second, the directives need to be localized and then adopted by each member state—creating the potential for country-by-country differences in the required capabilities of smart meters.[2] Third, the Package does not address whether (and how) member states will financially support investments made by utilities in smart grid technologies.

In the short term, full development of the smart grid within the European Union will continue to be impeded by these uncertainties. It will also be hampered by the limited availability of incentives due to dire budgetary conditions in most EU states and by the weakened financial condition of many large European utilities. Several of these utilities have reduced investments in renewables by 20 percent or more despite strong public incentives for investment.

[2] The Energy Liberalization Package defines smart meters as "intelligent metering systems that shall assist the active participation of consumers in the gas and electricity supply markets."

Lack of customer demand for smart grid-enabled services

While development of the smart grid has been slowed in part by a lack of clear, publicly supported incentives, weak demand from customers has also contributed to the delay. The lack of customer interest stems not only from the generally low level of awareness among European customers about the size of their electricity bills, but also from the still limited understanding of what the smart grid is and how its implementation could create value. A recent survey carried out in the United Kingdom showed that, despite a lively political debate over the issue in the second and third quarters of 2009 (extensively covered by the media), only 32 percent of British citizens understand what smart meters are.[3]

[3] The survey was conducted in August 2009 and had 2,014 adult respondents; it was commissioned by the Energy Retail Association, which represents the major electricity and gas suppliers in the U.K. domestic market.

Segment-specific issues

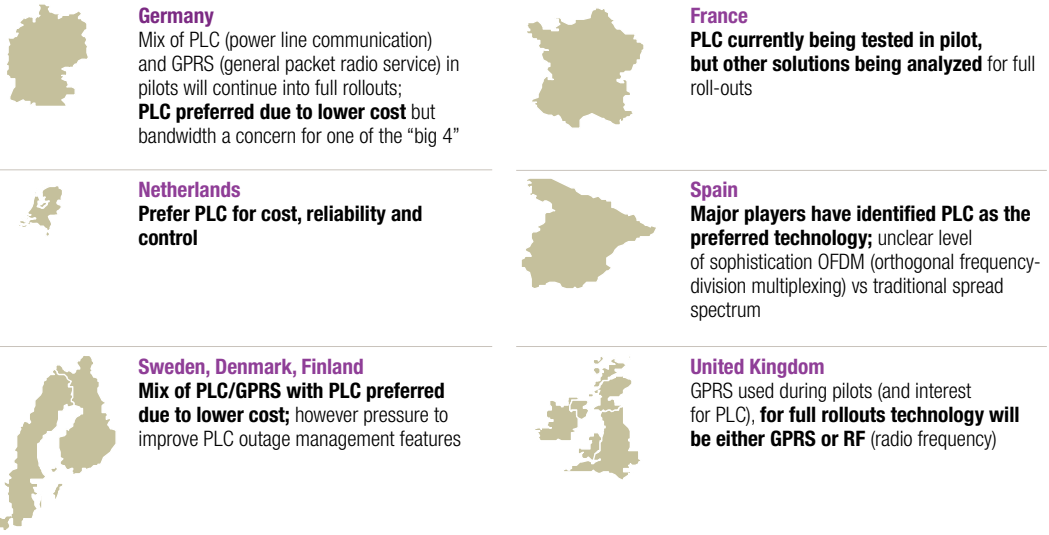
Smart meters and HAN applications have been hurt by EU-mandated unbundling of distribution and retailing of electric power, which has created uncertainty about whether the distributor or the retailer should make these investments. In addition, these two segments have been negatively affected by the lack of EU-wide technical standards. In the case of meters, for example, different meter manufacturers and utilities are using different communication solutions (Exhibit 2) and protocols such as Lontalk and DLMS (device language message specification) creating a risk that utilities will be locked into suboptimal technologies and limited economies of scale in sourcing.

Investments in network automation and local network management have also been held back by

Exhibit 2

EU standards vary

Varying technology standards are emerging for smart meters in key EU countries.



Source: McKinsey analysis, utilities interviews

While some of the segment-specific issues will continue to slow smart grid development, the good news is that definition of EU-wide technical standards for smart meters and HAN should soon be in sight

a combination of causes. With service and reliability of the medium-voltage and low-voltage networks at levels considered generally satisfactory, automation appears to be relatively costly, particularly in the absence of significant amounts of distributed generation and with limited expectations for the penetration of electric vehicles in the short and medium terms.

Outlook for the future

Consumer demand for smart grid-based services will likely increase slowly, unless targeted marketing campaigns heighten customer awareness of the economic benefits. While some of the segment-specific issues, such as those around network automation, will continue to slow smart grid development, the good news is that definition of EU-wide technical standards for smart meters and HAN should soon be in sight. Major utilities and key equipment makers in this space have launched the Open Meter project and the PRIME Alliance with the aim of defining these standards by 2010 or 2011. It is still unclear which standard will be proposed by German utilities, while an upgraded version of the current solution is likely in Italy.

Unfortunately, the fiscal difficulties facing EU members create a real risk that the lack of proper regulatory incentives will persist. The absence of incentives could lead utilities to opt for solutions designed solely to minimize their investments, thus foregoing the societal benefits of smart grid implementation.

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To avoid that outcome, regulators and utilities will need to work together to find an optimal solution that develops both a societal business case for investment in the smart grid and coherent regulatory measures and incentives that can maximize the societal benefit.

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