

# Winning the battle for the home of the future

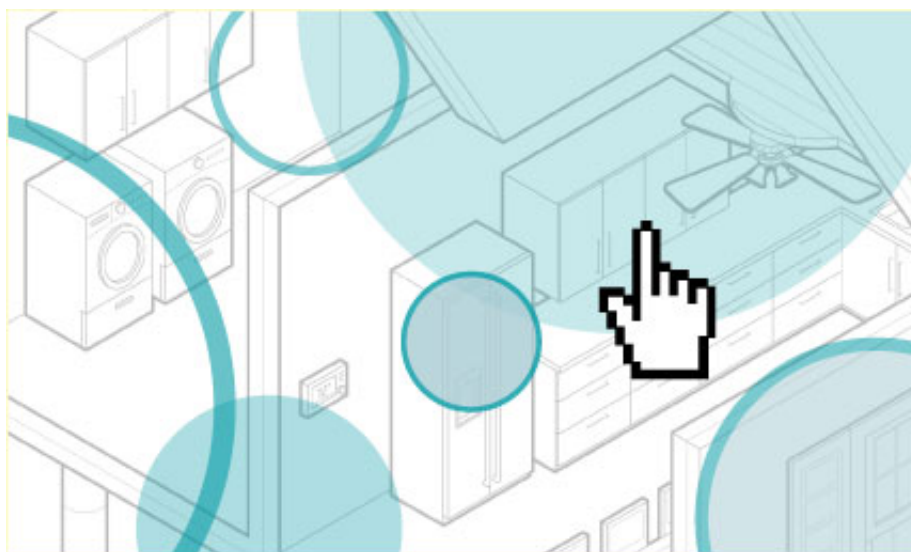
**European utilities may soon have to earn a growing share of their profits by helping households save energy rather than consume it.**

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Source: Sustainability & Resource Productivity Practice

**Energy consumption** is growing more slowly in Europe as energy efficiency measures begin to take hold—and that’s just the beginning. Our research indicates that if selected existing technologies were deployed to the fullest by 2020, a new home could consume around 90 percent less energy, whether gas or electricity, from the grid than it does today. The opportunity for existing homes, which form the majority of housing stock, is substantial too: cuts of 35 to 40 percent could be achieved. (For more on what this entails, tour the interactive exhibit, “The home of the future—demanding less from the grid”).

Energy utilities would thus be hit by lower revenues and profits, both in retailing and generating power. For the latter, margins could fall by 30 percent in a scenario in which new homes became almost energy neutral. Margins would still drop significantly—by close to 10 percent or more—in our less aggressive deployment scenarios.



## **The home of the future—demanding less from the grid**

Explore existing technologies and see their potential for reducing a home's consumption of energy from the grid.

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Business as usual will not be an option for most energy utilities. To cope with this discontinuity, they must seek new sources of revenues and profits in emerging energy-related businesses. These include building fabrics (for example, roof and wall insulation), central systems (including heat pumps and lighting), appliances and electronics (energy-efficient white goods), “smart” applications (home area networks and energy storage devices), advanced metering infrastructure, microgeneration (for instance, small-scale wind turbines and solar panels), and the delivery of power for charging electric vehicles, as well as financing, insurance, and consulting services.

Energy utilities, with their technical competence in managing networks, see themselves as natural “owners” of the metering and infrastructure for charging electric vehicles. They are also potential players in microgeneration, energy-efficient products, and smart applications, where they can draw on their brands, relationships with energy customers, and knowledge of consumption patterns. But in most of these categories, utilities face strong competitors, including technology and telecom companies and retailers, as well as construction and media companies.

Our research covers four countries—Germany, Italy, Sweden, and the United Kingdom—that combined make a good proxy for the European market.<sup>1</sup> It shows how technology, regulation, and consumer behavior are likely to transform the residential energy market in the coming ten years. To succeed in this new environment, utilities must place fine-grained bets on the segments where they can best create value for themselves and develop winning capabilities beyond their traditional business, often by seeking partnerships with companies from other sectors.

## **A crowded marketplace**

We found that more than 200 companies from a wide range of industries, many of them leaders in their segments, are operating in this market, often as entrants exploring ways to compete most effectively. Among these companies are utility incumbents moving fast and seeking to deploy portfolios of products and services from basic insulation to systems that automatically adjust energy consumption to the needs of people in homes. Other utilities offer targeted solutions—for example, microgeneration—that have regulatory support from governments in the markets where they operate. Some utilities are not responding at all. We also observed companies in other sectors (for example, telecom, technology, and media) developing and selling energy efficiency products, as well as automotive

players operating across the electric-vehicle value chain.

Developing or acquiring new capabilities will be essential for utilities as they move beyond their comfort zones. They must, for example, help customers overcome the investment barrier by providing financing options through partnerships with banks or by creating internal financial units. Many players also realize that they have to join hands with other new entrants to cover the value chain effectively. The pan-European utility RWE, for example, has announced partnerships with a range of players, including Microsoft and EQ3 (for a central control unit linking all appliances) and Renault (to test the performance of electric vehicles in Germany's commuter traffic). British Gas collaborates with the UK grocery retailer Sainsbury's. Under their partnership, consumers can purchase energy-management products (such as solar panels and insulation) in a supermarket and British Gas installs them.

The growth of the opportunity will depend on the consumers' speed in adopting measures that reduce the consumption of energy from the grid. We analyzed three key adoption drivers and found multiple uncertainties at play—companies may commercialize their technologies at different speeds, much as regulators are likely to continue their support for energy efficiency measures at different speeds across different markets, and consumers are unlikely to drive change for energy efficiency but may respond to technology advances and regulatory stimuli.

## **Technology development**

We don't expect truly disruptive technologies to boom over the next ten years and lead the way to the low-energy home of the future. The pace at which a wide range of relatively mature and emerging technologies develop and become commercially viable will therefore determine when we can see a critical level of consumer adoption. That in turn would enable production at scale, further reducing costs and paving the way for mass adoption.

Many technologies already recoup their investments today, sometimes with regulatory support. These include heat pumps, double- and triple-glazed windows, energy-efficient lighting, and microgeneration products (such as solar panels). Other technologies have a largely unexploited potential, most notably heating, ventilation, and air-conditioning systems using occupancy sensors that automatically manage when and where heating and air conditioning are applied. Still other technologies, now under development, have a huge potential and could be commercially viable by the end of the decade. One example is "active windows" with coatings that block incoming light when temperatures are high. They could recoup investments in less than three years when installed in new homes.

## **Regulation**

Many European governments are pursuing a mix of supply- and demand-side measures to meet the European Union's commitment to a 20 percent reduction in greenhouse gas emissions by 2020. On the supply side, they can increase the share of low- or no-emission power generation sources, such as natural gas, nuclear, and renewables. But there are challenges. Natural gas raises security-of-supply issues; nuclear power is again under scrutiny in Europe; renewables require costly incentives that make energy more expensive for all consumers and may be at risk given current budget deficits. Therefore, we expect the push for low-energy homes, where energy efficiency measures reduce demand for power, to remain strong or even be reinforced in some countries.

As the regulatory outlook for different home energy technologies varies by country, companies need to watch developments closely and act on opportunities as they arise. Sweden, for example, increasingly supports the conversion of electric heating to heat pumps and biofuels, and the United Kingdom is introducing a "green deal" to help consumers finance energy efficiency packages.

## **Consumer behavior**

Consumers are positive about saving energy, according to our market research in the United Kingdom. Yet they expect business and the government, not themselves, to take the lead on the journey toward the low-energy home.

For most consumers, cost is the only reason to reduce energy consumption. But functionality, technological simplicity, brands, and design take priority over saving energy when people purchase appliances. Most consumers perceive low-energy products to be below par on these attributes and on performance as a whole. This finding suggests that energy-management companies must work hard to bring down costs, raise the quality of products, and educate consumers about the long-term savings they can achieve.

Our research revealed an interesting route to winning higher share of mind and wallet: consumers do have a latent need to control their energy usage. They were most excited about technologies that helped them do so, such as sensor-lighting and home automation systems, when they tested energy-management products and services. But the need for control also poses a challenge for utilities, which are perceived to have a conflict of interest in promoting energy efficiency. While consumers see these companies as possible suppliers of specific products—for example, microgeneration and insulation offerings—some are concerned about giving them more power.

## Three scenarios

The combination of technology, regulation, and consumer behavior generated three scenarios leading up to the year 2020. The first assumes incremental reductions of technology costs, a relaxation of the European carbon reduction targets, and uptake only of some measures that recoup consumer investments. The second scenario implies a faster reduction of technology costs, a regulatory push for meeting Europe's carbon targets through incentives, and the adoption by consumers of most measures that offer attractive returns. The third scenario assumes even faster development, in which many new homes are almost energy neutral (Exhibit 1).

### Three key areas will affect the path toward energy-efficient homes in 2020.

Main drivers	Scenario 1 Incremental development	Scenario 2 Aggressive deployment	Scenario 3 Energy-neutral homes
Technology development	Reduction in technology costs follow past trends	Technology costs decrease, on average, by 15% over 10 years	Costs for new technologies decrease by up to 60%
Regulation	Regulators maintain status quo (implies relaxation of 2020 carbon targets)	Regulators push for meeting 2020 CO <sub>2</sub> targets through incentives	Regulators increase incentives to achieve 2020 CO <sub>2</sub> targets by 2018
Consumer behavior	Consumers adopt some economically viable initiatives	Consumers adopt a majority of the economically viable initiatives	Consumers adopt a majority of the economically viable initiatives

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We quantified the opportunities across the three scenarios for Germany, Italy, Sweden, and the United Kingdom, looking at new and existing homes and apartments, as well as existing rented homes and apartments, where the motivation to invest in energy efficiency is lower. The 35 measures we analyzed ranged from window glazing and air heat pumps to smart dishwashers and solar microgeneration gear. The key findings make clear why utilities must look for new revenue sources and where to find them:

- Across the three scenarios and four markets, the potential profits that utilities could capture from new value pools would just about compensate them for their losses in power-retailing margins. But as energy efficiency measures are deployed more aggressively, utilities will be hit harder by lower generation volumes (Exhibit 2). In the most aggressive scenario, we estimate that margins would drop by almost 30 percent.

- In the 2020 time frame, low-energy homes will not be “smart homes.” Building fabrics (such as roof and wall insulation) and central systems (including heat pumps) represent approximately half of the total value pool across the four countries (Exhibit 3). Appliances (such as energy-efficient white goods) represent a bit less than a third, and microgeneration around 10 percent. While growing fast, smart applications (for instance, metering) do not represent much value. The same holds true for electric vehicles, which we see more as a post-2020 opportunity.
- These overall opportunities vary by market, scenario, and home type, underscoring the need for microsegmented strategies. The analysis should focus on identifying “win-win” products and services, which create positive net present value (NPV) for consumers as well as utilities. Building fabrics, for example, often have a positive NPV for consumers across most scenarios, markets, and home types. They are also attractive for utilities because the value created exceeds the value lost from reduced energy consumption. In contrast, solar panels offer consumers very favorable economics under current government subsidies but are a losing game for utilities. Since many companies are manufacturing, selling, and installing solar-power equipment anyway, however, a utility may choose to enter this business to recover part of the value lost from lower grid consumption.

### Aggressive deployment of energy efficiency measures will substantially lower utilities’ generation volumes.

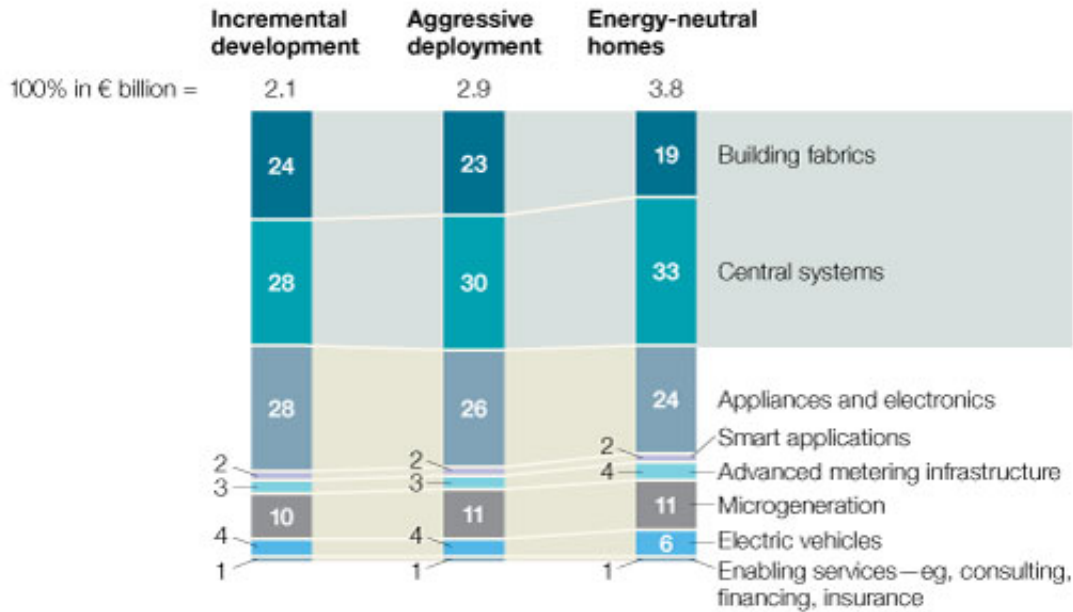
2020 value pool at EBIT level,<sup>1</sup> Germany example

2010 value pool	Value pool evolution, € billion					Potential value pool	Resulting decrease in margins
	Scenarios	Margin increase found in energy-efficient homes	Margin reduction caused by lower energy consumption				
			Retailing	Generation			
€22 billion	Incremental development	+0.9	-0.4	-1.8	€21 billion	~6%	
	Aggressive deployment	+1.2	-0.8	-3.9	€19 billion	~16%	
	Energy-neutral homes	+1.5	-1.3	-6.5	€16 billion	~28%	

<sup>1</sup> EBIT = earnings before interest and taxes. Assumes same volume and mix as 2010.

# Building fabrics and central systems represent approximately half of the total value pool.

Distribution of 2020 value pool at EBIT level,<sup>1</sup> average of Germany, Italy, Sweden, and United Kingdom, %



<sup>1</sup>EBIT = earnings before interest and taxes. Assumes same volume and mix as 2010.

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A transition to low-energy homes would be a discontinuity for European utilities. What’s more, the pace of change is fraught with uncertainty. But if utilities prepare for several possible scenarios, adapt their organization to the new competitive landscape, and make granular choices about where they can create the most value, they can shape a new future for themselves.



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### Notes

<sup>1</sup> We chose Germany, Italy, and the United Kingdom because they are the largest retail energy markets in Central,

Southern, and Northern Europe, respectively. We chose Sweden because of its full penetration of smart meters, which, interestingly, so far haven't greatly shifted energy usage patterns there.