Life Begins at 40?

Delaying European Plant Retirements

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LIFE BEGINS AT 40? DELAYING EUROPEAN PLANT RETIREMENTS

KEY IMPLICATIONS

European power plants are aging, and the general outlook is that new plants will be needed to replace retiring plants in the coming decade. IHS CERA's analysis shows, however, that both the regulatory and economic drivers of power plant retirements are more uncertain than ever and that far fewer plants could be retired than is currently expected.

- **Regulatory changes could delay 40 gigawatts (GW) of planned retirements by 2020.** The Industrial Emissions Directive under discussion by the European Commission will change the plant emissions standards introduced by the Large Combustion Plant Directive (LCPD). The lifetime of a significant share of the 29 GW of (mostly coal and oil) capacity scheduled for retirement by 2015 could be extended. Similarly, earlier decisions to phase out nuclear in Germany and Belgium, representing 26 GW of retirements by 2025, are being reversed.

- **Plant mothballing could be an attractive option for riding out the business cycle.** In the short term, slower-than-expected electricity demand growth will likely lead to overcapacity in a number of European markets. IHS CERA estimates that about 40 GW of capacity could be temporarily mothballed or permanently retired because of widening reserve margins. Mothballed plants, which can usually be brought online faster and at lower cost than new-build plants, can be a valuable option for utilities if the market tightens.

- **Long-term uncertainties favor plant upgrades over new build.** Uncertainties about the growth of power demand, the development of renewables, and the cost of new build make new investments risky and could therefore give the existing fleet a new lease on life.

—January 2010

CERA

LIFE BEGINS AT 40? DELAYING EUROPEAN PLANT RETIREMENTS

by Sylvain Cognet and Fabien Roques

The reports of my death are greatly exaggerated.
—Mark Twain

NEW LIFE FOR OLD PLANTS?

A large portion of European installed power generation capacity will soon reach its originally designed operating lifetime of 40 years. Some industry observers assume that these plants will automatically be retired and will need to be replaced with new plants, requiring substantial investments in the coming decade. However, IHS CERA research shows that the current political and regulatory debates in Europe will likely result in delays in mandated plant retirements. Further, small improvements in operating power plants can bring high returns at relatively low cost, giving the existing fleet a new lease on life.

With the liberalization of power markets, economic considerations have gained a prominent role alongside regulatory and policy drivers for plant upgrades, mothballing, and retirement decisions. Older, less efficient power generation units will likely remain online as long as their operation remains profitable, since their investment costs have already been amortized. Fuel and carbon prices, investment costs, and the relative efficiency and position in the merit order play an important role in assessing the relative economics of new build versus existing plant life extensions or upgrades.

In this Decision Brief IHS CERA examines the outlook for European power plant capacity retirements in the coming years. We outline the policy, regulatory, technical, and economic drivers of these retirements. Finally, we discuss the implications for the timing of future power plant retirements and the need for new power capacity.

DRIVERS OF PLANT RETIREMENTS

A third of Europe's 850 gigawatts (GW) of power plant operating capacity was built before 1980 and by 2020 will be over 40 years old, and more than half of the currently operating capacity will be over 35 years old (see Figure 1).* Most of the oldest plants are coal fired, and 120 GW of European coal plants will be over 40 years old by 2020.

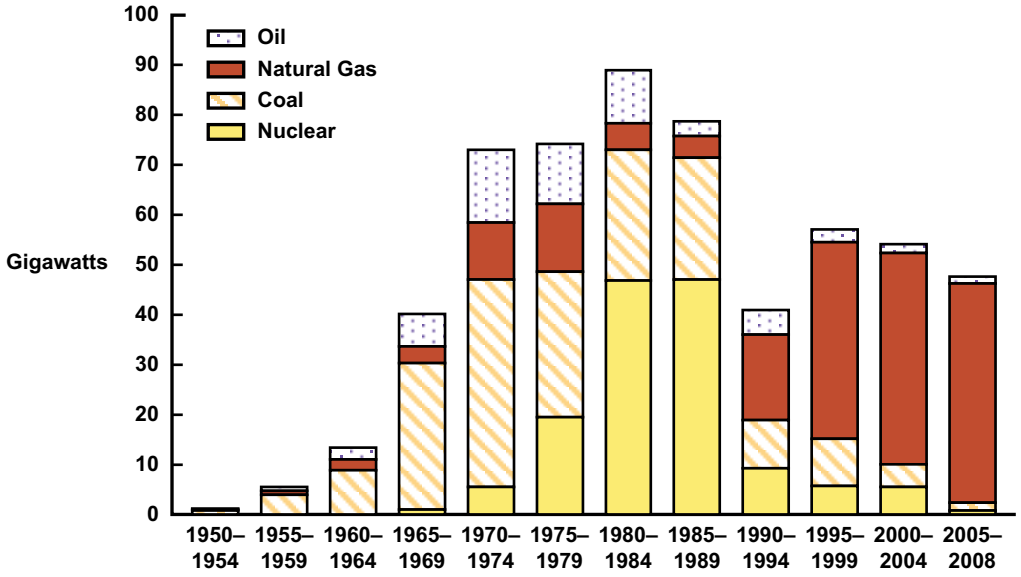
Based on announced plant retirements, IHS CERA estimates that around 85 GW of capacity, or about 10 percent of Europe's total current installed capacity, is scheduled to be decommissioned by 2020, driven by a variety of factors (see Figure 2):

- **Nuclear phaseout policies.** Belgium, Germany, the Netherlands, Spain, and Sweden currently operate nuclear plants and have historically established phaseout policies. The Netherlands, Spain, and Sweden have already revised their phaseout policies; and recent political developments in Germany and Belgium are likely to lead to an

*Europe is defined in this report as EU27 less the Baltics, Cyprus, Malta, and Slovenia and including Switzerland and Norway.

Figure 1

Commissioning Date of European Fossil Fuel and Nuclear Capacity in Operation



Source: UDI Power Plant Database.
Note: Europe is EU21+2 (EU27 less Baltics, Cyprus, Slovenia, and Malta; plus Norway and Switzerland).
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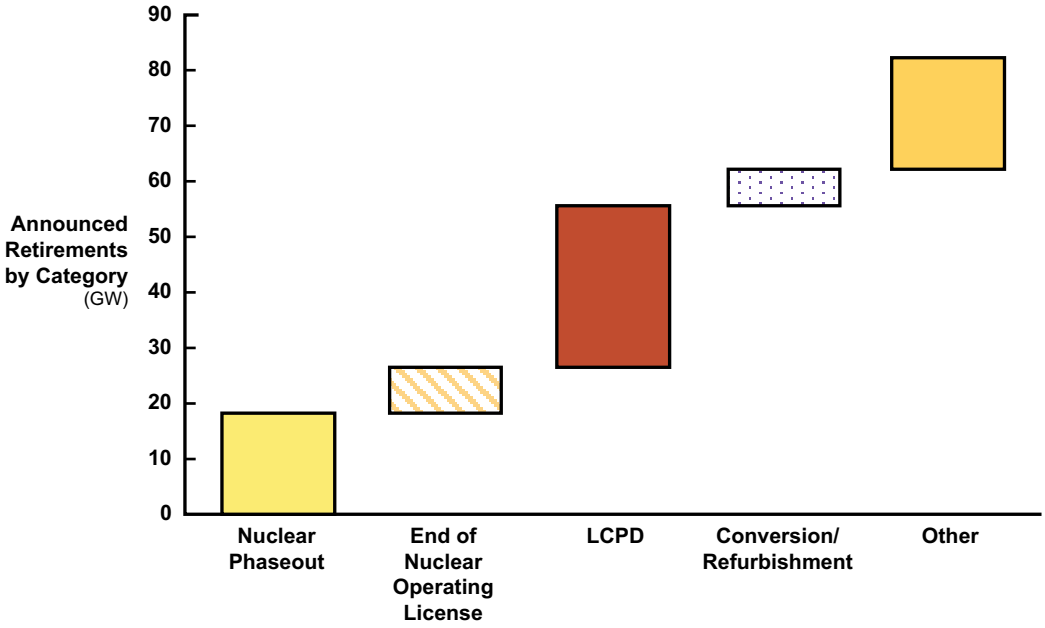
extension of nuclear power plant lifetimes in these two counties, which would delay the scheduled retirement of 18 GW of nuclear capacity by 2020.

- **Nuclear plant operating licenses.** Nuclear operating licenses are reviewed regularly by safety authorities who decide how long the units can operate. These reviews sometimes lead to requirements for additional investments or upgrades to ensure the plants' continued safe operation. In the United Kingdom the Magnox-type plants are unlikely to be granted further life extensions, and about 1.5 GW will retire by 2010. However, British Energy is seeking to extend the lifetime of its advanced gas-cooled reactor (AGR) fleet—which totals 8.3 GW and is mostly scheduled to close by 2020—by a further 15 years. Similarly in Spain the operating licenses for most nuclear plants will end over the coming decade. However although the Jose Cabrera unit was decommissioned in 2006, the Spanish government's recent decision to grant the Garona nuclear plant a two-year lifetime extension may indicate that further extensions are possible.

- **Large Combustion Plant Directive (LCPD).** Regulations on maximum emission limits for fossil fuel plants—such as the LCPD, which regulates nitrogen oxides (NO_X) and sulfur oxides (SO_X) emissions—have been implemented at both the regional and European levels. These regulations have led to the closure of some older units and the requirement for additional investments in emission control technologies for plant upgrades. About 29 GW of capacity—mostly coal-fired and oil-fired plants—have

Figure 2

Cumulative Scheduled* Retirements in Europe by 2020



Source: IHS CERA.
*Scheduled = announced + retirements driven by existing regulation as of December 2009.
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opted out of the LCPD and are scheduled to close by 2015. In addition, the regulation supposed to follow the LCPD, the Industrial Emissions Directive (IED), could further constrain emissions and could drive additional retirements from 2016.

- **Plant upgrades and conversions.** Several utilities are converting old gas-fired and oil-fired boilers into combined-cycle gas turbines (CCGTs) to increase their competitiveness by improving efficiency and reducing fuel and emission costs. In Italy alone around 15 GW of capacity has been repowered—either through a conversion from oil to coal or from boiler technology to CCGT—or is scheduled to be repowered in the near and medium term. IHS CERA estimates that an additional 30 GW of old gas-fired and oil-fired boilers could be retrofitted in Europe.

- **Local opposition and political deals.** The scarcity of sites for new build makes decommissioning a plant and replacing it with a new one advantageous. This is particularly relevant for nuclear plants and coal plants that face stiff local opposition. In some cases, the addition of new capacity has been authorized under the condition that older units would be decommissioned when the new unit starts operation.

- **Market-driven retirements or mothballing.** Decommissioning of capacity can also be a commercial decision. The fuel consumption and carbon emissions performance of the oldest units is generally poorer than for recent units, making their operating

costs higher. Nonetheless the larger capital expenditures associated with new build can make the continued operation or the purchase of second-hand plant an economically competitive option if it is already fully amortized. IHS CERA estimates that market overcapacity could lead to up to 40 GW of commercial plant retirements or mothballing over the next decade on top of the currently scheduled retirements.

However, several of these scheduled retirements may not materialize. In a context of high energy and carbon prices and ambitious greenhouse gas reduction targets, extending the lifetime of nuclear plants has become a topic of discussion for both utilities and governments. In addition, some EU member states face the risk that the retirements of power plants that have opted out of the LCPD could threaten their security of supply. Finally the current overcapacity in several power markets in Europe might lead to more retirements than are currently scheduled as the economics of older, less efficient power plants could be threatened.

NUCLEAR PHASEOUT POLICIES IN QUESTION

European countries have long been divided on the issue of nuclear power. Whereas France, the Czech Republic, and Finland have traditionally supported the civilian use of nuclear energy, Austria, Denmark, Greece, Ireland, and Norway have no nuclear plants and have restricted new plant construction. However, in the wake of volatile fossil fuel prices and rising concerns about climate change, there has been renewed interest in new nuclear build in Europe. The United Kingdom, Italy, and the Netherlands have recently adopted a pronuclear position. Germany, Belgium, the Netherlands, Spain, and Sweden currently operate nuclear plants but have historically established phaseout policies.

- Germany has by far demonstrated the most uncertainty about nuclear power at the European level, with 20 GW of capacity scheduled to close by 2025 under the 2002 Atomic Law. However Chancellor Angela Merkel's reelection during the September 2009 parliamentary elections and her new coalition with the liberals from the Free Democratic Party—who are pronuclear—rather than the Social Democratic Party (SPD)—which is traditionally antinuclear—will allow her to reverse the nuclear phaseout policy. This reversal is currently being negotiated with nuclear plant operators, and no final decision is expected before 2011. Among the key issues to be settled are which plants will be allowed to operate longer (as several defects have affected German nuclear power plants in recent years); the duration of the selected plants' continued operation; and, on the part of nuclear plant operators, an obligation to reinvest in renewables a portion of the additional revenues generated by the lifetime extension.*

- Belgium passed a law in 2003 banning new nuclear build and requiring early plant closures between 2015 and 2025 for the seven reactors currently operating. However, following years of debate the government decided in October 2009 to partially overturn the phaseout and granted a ten-year lifetime extension to the three plants that were scheduled to close by 2015. In exchange for the extension, nuclear operator GDF Suez will give the Belgian government between €215 million and €245 million per

*See the IHS CERA European Power Market Briefing *The 2009 German Parliamentary Elections: Rebalancing Act?*

year to 2014, accelerate its investments in renewable energies, invest €500 million in research for radioactive waste treatment, increase its staff by 10,000, and maintain some administrative centers in Belgium.

- In 1994 the Dutch parliament voted to phase out nuclear power. The Dodewaard power station was shut down in 1997 and the Borssele plant was scheduled to cease operation in 2003. But in 2003, with a new government in power, the shutdown was postponed to 2013. In 2006 the government decided that Borssele will remain open until 2033—a 60-year lifetime.

- Spain enacted a moratorium on nuclear plant in 1983, which led to the abandonment of several new units scheduled for construction. In addition since he was elected in 2004, Prime Minister José Luis Rodríguez Zapatero announced his ambition to phase out nuclear as the operating licenses of nuclear power plants expired and replace them with renewables. A first unit (at José Cabrera nuclear power plant) was shut down at the end of 2006, 40 years after its commissioning. However, in June 2009 the Spanish government approved a four-year lifetime extension for the Garona nuclear plant, which is now scheduled to close in 2013. Although this extension is for less than the 10 years that the nuclear safety authority proposed, it represents a change in stance by the government.

- In Sweden a referendum passed in 1980 mandated a phaseout of nuclear power by 2010. Two reactors at the Barsebäck plant were shut in 1998 and 2001, but ten remain. In 1997 the government decided to postpone the closure of further plants for three decades while it sought to fill the gap left by nuclear generation. The present Swedish government has now decided to allow new nuclear plants to be built to replace the ten existing reactors.

FLEXIBILITY IN THE IMPLEMENTATION OF THE LCPD AND IED?

New environmental legislation creates great uncertainties for plant investment decisions, particularly for coal unit plant upgrades. The prospect for the introduction of more stringent regulations for NO_X and SO_X emissions and for CO_2 emissions as part of the EU Emissions Trading Scheme (ETS) is a key driver of plant retirements and additions in Europe.

The impact of the ETS has been clarified by a series of recent legislation. The scope for free allocation of ETS credits in the power sector has been strictly limited for Phase 3 of the ETS (2013–20).* The impact on the economics of gas-fired and coal-fired plants will depend on the relative fuel and CO_2 credit prices, but the direction of European policy is clear.

In the short to medium term, regulations on noncarbon (NO_X and SO_X) emissions are the main source of uncertainty for fossil fuel plant retirement decisions. These emissions are regulated under the European LCPD, soon to be replaced by the IED (see below).

*See the IHS CERA Decision Brief *The East-West Divide: When the European Green Package Meets Realpolitik.*

The LCPD entered into force on November 27, 2001, and aims to reduce emissions of acidifying pollutants, particles, and ozone precursors from large combustion plants (those with a rated thermal input equal to or greater than 50 megawatts [MW]). All new plants (licensed since July 1, 1987) are required to comply with emission limit values (ELVs) (see the box "The LCPD"). IHS CERA analysis shows that plants equivalent to about 29 GW of capacity have opted out the LCPD and would have to retire by the end of 2015. The countries most affected are the United Kingdom, with 12 GW scheduled for decommissioning, followed by France (4 GW), Romania (3 GW), Spain (3 GW), Poland (2 GW), Portugal (1.8 GW), and Slovakia (0.8 GW).

The LCPD remains in effect only until December 31, 2015, and new initiatives are being developed to regulate emissions from power plants beyond this date. On December 21, 2007, the European Commission adopted a Proposal for a Directive on industrial emissions (the IED: "Towards a future policy on industrial emissions"). The proposal recasts seven existing directives related to industrial emissions, including the LCPD. The negotiation between the European Parliament, the Commission, and the Council of Ministers is expected to lead to an agreement on the new IED during 2010.

Several member states that are facing a substantial reduction in power capacity by 2015–16 owing to decommissioning under the LCPD and IED have been pushing for the introduction of derogations to extend the affected plants' operational lifetimes until 2020. The European Council agreed on June 25, 2009, to give national authorities until the end of 2020 to define "transitional national plans" for reducing emissions of NO_X, sulfur dioxide (SO_2), and particulate matter (PM), including a gradual decline in annual national ceilings, to allow

The LCPD

The LCPD (Directive 2001/80/EC) was enacted in 2001 and applies to combustion plants with a rated thermal input of 50 MW or more. The LCPD requires that member states reduce emissions of SO_2, NO_X and PM from combustion units within power plants, petroleum refineries, iron and steelworks, and other industrial processes. Some member states have chosen to set national ELVs for large combustion plants (LCPs) that go beyond those included in the LCPD.

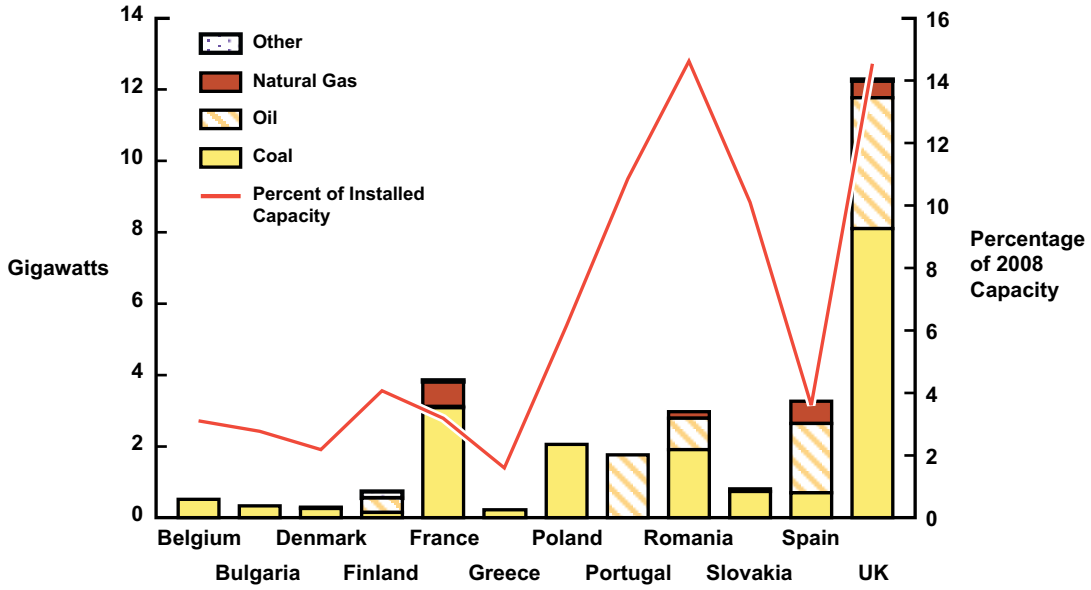
All new plants (licensed from July 1, 1987) are required to comply with ELVs. For preexisting plants (licensed before July 1, 1987), the member states had two options for implementing the LCPD: they could either comply with ELVs as set out in the directive or implement a national emissions reduction plan.

Some plants across the European Union have chosen to opt out of the LCPD and will be restricted in their operation of nuclear plants to no more than 20,000 hours from January 1, 2008, to December 31, 2015. Starting January 1, 2008, member states have had to report annually to the Commission on these "opted-out" plants and submit a record of the used and unused time allowed for the plants' remaining operational life (see Figure 3).

Several new member states have obtained derogation allowances under the LCPD. Those with the most extensive derogation allowances are Estonia, Lithuania, and Poland. Poland has by far the greatest number of plants with derogation allowances. However, Poland and Lithuania are also required to comply with conditions that set progressively tighter total emission ceilings for SO_2 and NO_X from the LCP sector.

Figure 3

LCPD Opted-out Capacity by Country



Source: IHS CERA.
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member states more flexibility and to reduce their compliance costs. The IED could be amended again by the European Parliament in its second reading in early 2010. In particular, the issue of including CO_2 emissions standards could resurface.

Given the high cost of new build and credit tightness, utilities might succeed in convincing their regulators and environmental groups that upgrades are environmentally preferable to new power plants and/or transmission lines. As a result IHS CERA expects some European governments to allow significant flexibility in the timing and modes of application of the LCPD and IED. In the United Kingdom, for instance, some 12 GW of opted-out generating capacity will close by 2015 as a result of the LCPD. Given the difficulty in permitting new coal plants in the United Kingdom and the growing reliance on gas-fired generation, the government could consider the opportunity to opt back in to the LCPD as the best way to maintain some fuel diversity in the UK system.

On the other hand the IED also proposes to tighten constraints further on future power plant emissions. Since the directive is still being negotiated, some have proposed to tighten limits not only on SO_X and NO_X but also on CO_2 emissions, which would add further technical and economic challenges to conventional coal-fired plants compared with gas-fired plants and could lead to another wave of retirements. Such proposals have raised strong opposition from some member states as well as industrial groups, highlighting the conflicting views of the European Commission, which is pushing for more limits on polluting emissions, and some member states, which risk losing their ability to maintain a diversified fuel mix with a strong role for coal. In IHS CERA's view, however, and as demonstrated by the LCPD

negotiations, flexibility in the implementation of the IED will be crucial in accommodating the varying interests of the member states.

COMMERCIAL DRIVERS OF PLANT RETIREMENTS: PERMANENT CLOSURE OR TEMPORARY MOTHBALLING?

Besides regulatory and policy drivers, economic incentives play a major role in driving the future of existing power plants. With the liberalization of power markets, decisions about plant investments, retirements, or temporary mothballing have become a matter of profitability. Old thermal plants are usually already amortized and provide cash flows to utilities as long as their lower efficiency and higher operating costs do not restrict their dispatch too much. Such old plants are generally less efficient than new power plants using the same technology, requiring more fuel and emitting more carbon to produce the same amount of electricity. On the other hand retiring them to replace them with new power plants is a risk for utilities, as it implies a large upfront investment in exchange for expectations of future higher margins. The economic drivers of plant retirement, new build, and plant upgrades can be classified into five categories:

- **Fuel and carbon prices** determine the relative profits and margins (spreads) that power plants can obtain on power markets. High fuel prices encourage the replacement of old inefficient units by more efficient technologies—for instance, the replacement of an old subcritical coal plant with a new supercritical one. Similarly high carbon prices favor highly efficient and lower-carbon-emitting technologies—for instance, the replacement of an old coal plant with a new CCGT. Conversely, low fuel or carbon prices, as is currently the case for gas, discourage the replacement of older inefficient plants by reducing the gain in operating costs from the new power plant.

- **The costs of new power plant build** in such a capital-intensive industry play a major role. Even if new power plants are likely to be more efficient and less carbon emitting than old ones, high capital costs favor existing plants and increase the value of old amortized assets relative to new build.

- **Plant upgrade potential** can be key. There are several ways to improve a plant's performance and extend its lifetime at a relatively low cost—which can increase the attractiveness of old plants over new-build plants when capital costs are high.*

- **Reserve margins and surplus capacity** can inflate or deflate general spread levels depending on the power system balance. An oversupplied market usually leads to the closure of the least profitable units as they become unprofitable.

- **The utilization rate of new power plant build,** combined with spreads, determines a power plant's revenues. For amortized plants that just need to recover annual operation and maintenance costs, the economic risks associated with a low utilization rate remain limited. However for new-build plants these risks become much greater, and the prospects of a stranded investments increase.

*This theme will be developed further in the forthcoming IHS CERA Decision Brief *Making the Most out of Old Plants.*

IHS CERA believes that two major trends in European power markets—the emerging overcapacity in most European markets and the long-term political and regulatory uncertainties—will play a decisive role in driving commercial plant retirements or temporary mothballing in the years to come.

Short-term Overcapacity Calls for Retirements…

The economic downturn has dramatically reduced the need for new capacity and the need for new plants and may even force old power plants into retirement. The combination of the Great Recession and the implementation of efficiency mandates for 18 types of electric appliances through the EU Ecodesign Directive (such as the banning of incandescent light bulbs) will put downward pressure on demand growth in coming decades and alleviate some of the need for net new capacity in the coming decade.* IHS CERA's reference case outlook is for a modest 6 percent increase in electricity demand between 2008 and 2020 for the EU27, much lower than historical growth rates. Assuming that the announced retirements proceed as expected and as new capacity already under construction and committed comes online, most European markets will likely be oversupplied until 2012 and some until 2020 (see Figure 4).

In addition to the currently scheduled retirements, IHS CERA estimates that market overcapacity could lead to up to 40 GW of commercial plant retirements or mothballing over the next decade. However, as illustrated by Figure 4, the situation varies widely among European regions. Whereas in Eastern Europe some countries will need additional capacity by 2020 to make up for retirements and meet growing consumption, in Western Europe several countries might be significantly oversupplied. This overcapacity could increase further if new power plant projects come online.

For utilities operating in oversupplied markets, the risk of stranded investments is high, and a sustained period of low spreads could lead to closures of a number of units. Plants that are higher in the merit order might not be able to recover their fixed costs, and depressed generation margins could lead utilities to consider mothballing plants and to avoid investing in new build once demand picks up again.

…But Long-term Uncertainties and Mothballing May Give Existing Units a New Lease on Life

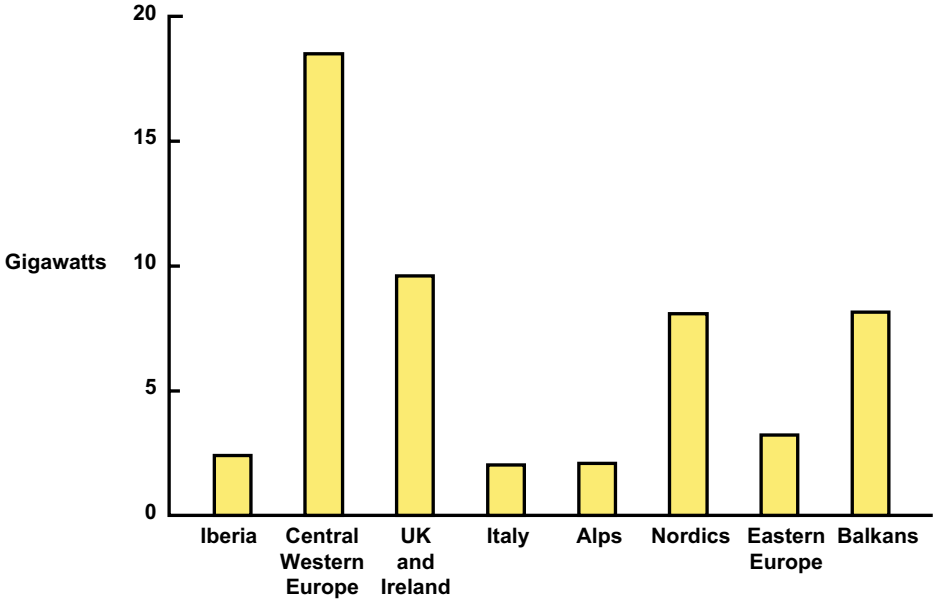
However two drivers in particular support the delay of power plant retirements rather than the construction of replacement plants:

- **The low-carbon agenda.** The 2020 renewables and efficiency targets and the renewed interest in nuclear power cast a dark cloud over the future utilization of thermal plants. Indeed the combination of stagnating demand and the increased penetration of next-generation technologies that are dispatched before the more expensive thermal power generation will inevitably limit the utilization of thermal plants. The low-carbon agenda thus puts new investments in thermal power plants at risk of being stranded.

*See the IHS CERA June 2009 European Power Watch *Economic Turmoil Puts Utilities under Pressure;* the IHS CERA European Power Market Briefing *European Electricity Demand: Heading for a Major Downturn;* and the IHS CERA Multiclient Study *Strategies for a Leaner Europe: Meeting the Challenge of Energy Efficiency.*

Figure 4

Potential Overcapacity in 2020 in Europe by Region



Source: IHS CERA.
Note: 2020 Potential overcapacity is computed based on IHS CERA's assessment of adequate reserve margins.
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- **The political uncertainties regarding retirements.** As discussed above, in some regions additional capacity could emerge owing to delays in retirements, potentially resulting in a prolonged period of overcapacity.

In IHS CERA's view, to mitigate both short-term overcapacity and avoid future risks, the mothballing of power plants could prove to be a valuable strategy for utilities. Mothballed plants have an option value, as they can be brought online faster and at lower cost than new-build plants if the reserve margins tighten again.*

LOCAL OPPOSITION AND SITE SCARCITY RAISE THE VALUE OF EXISTING SITES

With growing local opposition—also called the NIMBY ("not in my backyard") syndrome—in most European countries, finding suitable sites to locate new plant has become a challenge. For a number of recent projects, local opposition motivated by fears of pollution and negative impacts on landscape and tourism has led to delays, cost overruns, and even some cancellations. We estimate that at least 10 GW of mostly coal and some gas projects have

*Such strategic considerations have played a major role in past capacity retirements. For instance EDF recently brought back online 2.6 GW of previously mothballed oil-fired capacity in France to meet rising peak demand, and E.ON has made similar moves in the United Kingdom and Germany. So far in 2009 Finnish utility Fortum and Danish utility Dong have decided to temporarily close a total of 1.5 GW of capacity. This subject will be further developed in the forthcoming IHS CERA Decision Brief *Making the Most out of Old Plants.*

been canceled over the past years because of local protests. Administrative intervention and court actions have become commonplace and in some cases have led to additional requirements such as lower cooling towers or additional emission control equipment to limit the plant's environmental impact.

As sites have become scarcer, the value of existing sites has increased. Communities that have accepted the local siting of a power plant in the past are more likely to approve its replacement, as the original plant has often created local jobs and sometimes promoted industrial development (e.g., smelters, chemical factories). In addition, other cost considerations such as an existing grid connection and fuel supply routes also raise the value of existing sites for new build.

Several new power plant projects in Europe have been approved under the condition that the new units would replace older ones. Site scarcity can therefore be a driver of retirements, and the lifetime of some of the least valuable older plants might be shortened in order to install a new unit. In some countries, however, new build has become problematic even on existing sites, owing to the BANANA syndrome ("build absolutely nothing anywhere near anything").

GAS SECURITY OF SUPPLY CONCERNS RESCUE COAL

With gas-fired generation growing strongly over the past few years and expected to continue to dominate thermal capacity additions in Europe over the coming years, gas import dependency has become a hot issue.* This dependency was highlighted in January 2009 when Russian gas supplies to Europe were cut and several utilities—especially in Eastern Europe—considered burning backup fuels such as distillates or heavy fuel oil to meet power demand.

Coal still represents a significant share of European power generation: 28 percent of EU27 total gross generation in 2008. New coal build will likely face local opposition in some countries and runs counter to the European Commission commitment to decarbonize the power sector. Rising CO_2 prices, or a sustained period of low gas prices as is currently the case, could further undermine coal's share of the European fuel mix.

However, governments and utilities striving to keep a diversified portfolio to mitigate their reliance on imported gas might maintain a moderate stance toward coal plants and support some lifetime extensions or the replacement of existing coal plants by newer, more efficient, coal plants. This attitude was evident during the negotiations for the adoption of the Green Package in December 2008, as several Eastern European countries pushed for a less constraining regime for their coal plants under the ETS in order to ensure their economic viability.**

*See the IHS CERA's Private Report *Gas: Fuel of Choice or Fuel of Default in European Power Generation?*
**See IHS CERA's Decision Brief *The East-West Divide: When the European Green Package Meets Realpolitik.*

CONCLUSION: A SHIFT OF VIEWPOINT TOWARD THE EXISTING PLANT FLEET?

This Decision Brief proposes that today's general expectation about retirements—most studies assume an age limit for power plants—needs to be reassessed in the light of evolving market conditions and regulations. Uncertainty about mandated retirements associated with environmental legislation or nuclear phaseout policies creates a very challenging context in the short term.

The overcapacity in most European markets in the coming years will likely drive some commercial decisions to retire or mothball plants. But the European Commission's drive toward a low-carbon economy places additional risks on new build and increases the value of existing assets. This calls for a more flexible approach on how existing plants should be operated and makes the option value to restart mothballed plants in the future very advantageous. There is also significant potential for plant upgrades and refurbishments in the next decade, which are often cost-effective investments with short lead times, bringing capacity online faster and at lower cost than new-build plants if the reserve margins tighten again.*

All these uncertainties call for a pragmatic approach toward retirements of old power plants—and consequently investments in new power plants. In the current market climate, the age and viability of a power plant is a commercial judgment made under regulatory and policy mandates rather than simply a matter of the year it was commissioned. ■

*See the forthcoming IHS CERA Decision Brief *Making the Most out of Old Plants.*