Nuclear Generation’s Effect on Credit Quality

Moody’s Perspective On Operating Risks And New Build

PAUL LUND, VP-SCO, Project and Infrastructure Finance

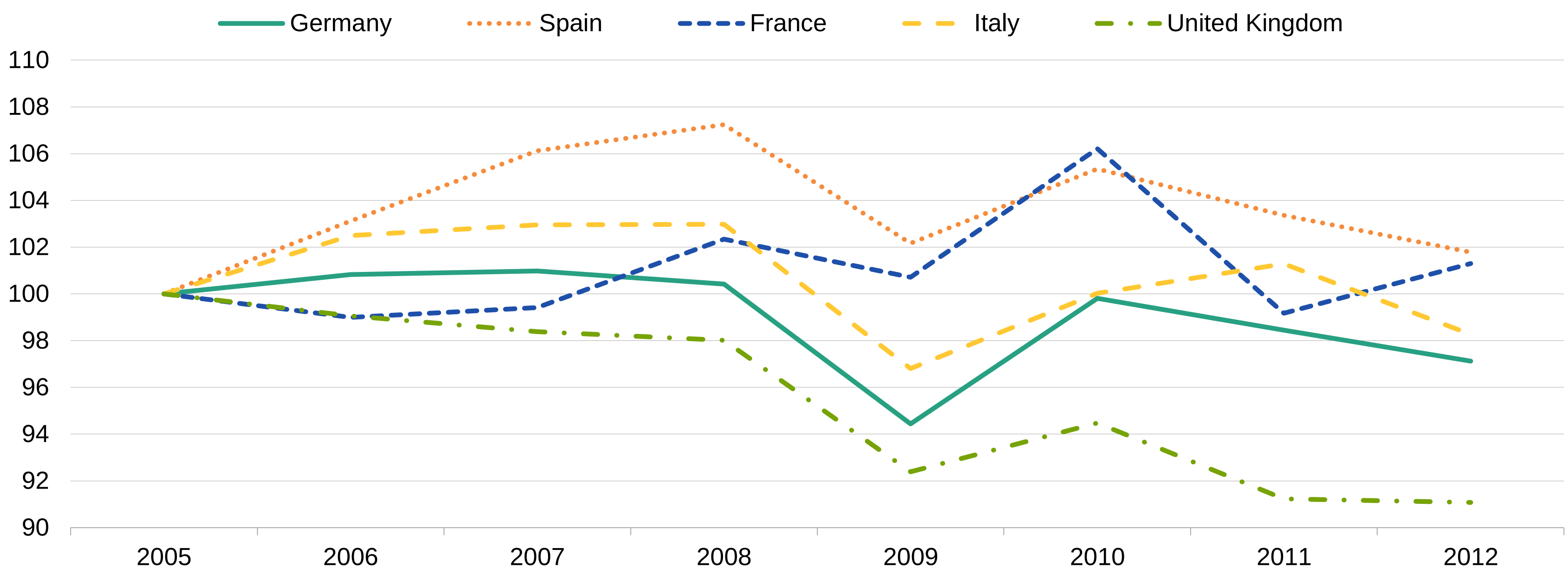
September 2013

Agenda

1. Power Price Outlook is Negative in Europe
2. Political Risk Is Credit Negative
3. Moody's Views on Nuclear Related Credit Events
4. Conclusions

1 Negative Outlook in for Power Prices Europe

Electricity Demand Recovery Constrained

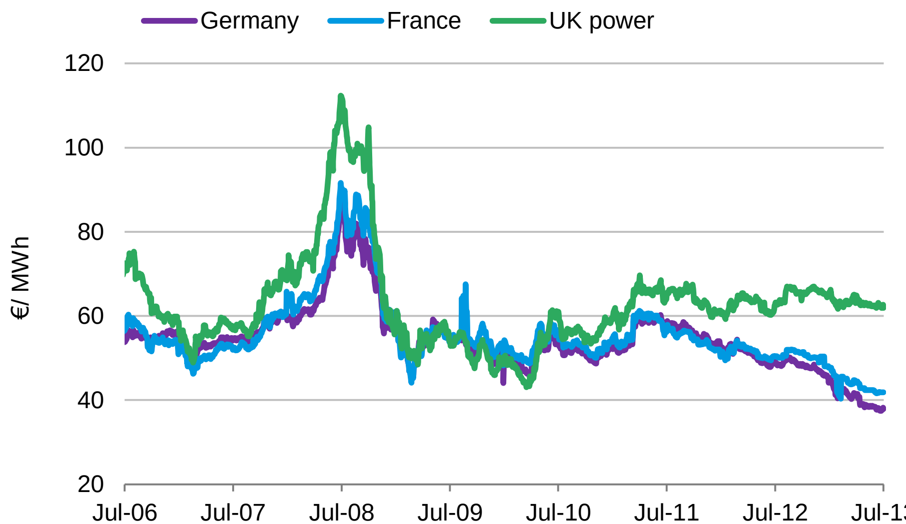


Source: Regional Transmission Operators, Bundesministerium für Wirtschaft und Technologie

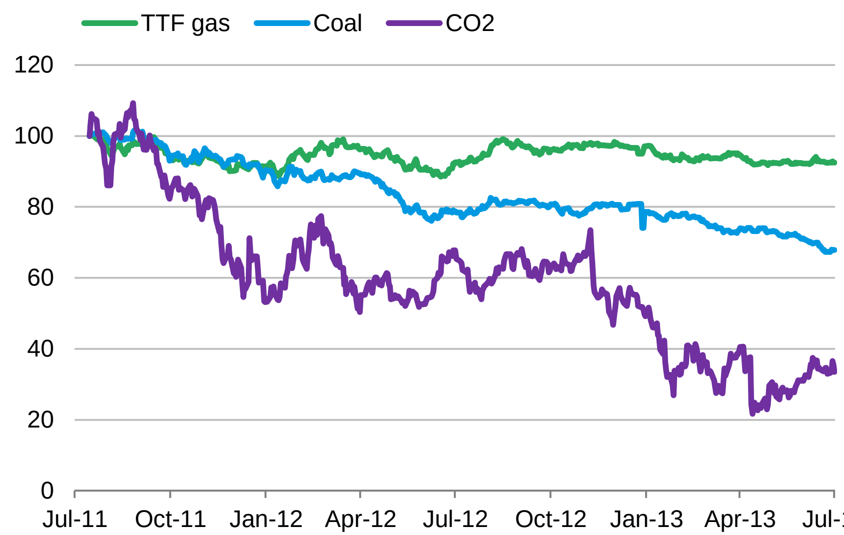
- 2011 demand in the 5 larger economies remained below 2008
- 2012 demand flat/lower; cold snap offsets weaker economic growth, energy efficiency
- 2013 weak euro area GDP growth =>limited energy demand growth from industry

Weak growth outlook for electricity demand

Power Prices Drift Down From Post-Fukushima Highs



Source: Bloomberg price data, one year forward baseload



Source: Bloomberg

- Euro area debt/economic concerns drive retreat from mid-2011
- Power prices in most markets subdued in 2012 and 2013
- Renewables, reserve margins and low coal/CO_2 price push down power prices
- Utility earnings will be pressured as hedging effects run down

Subdued price environment will continue to drag on earnings

Renewables Transform Wholesale Markets; Rising Electricity Bills

» Rise of renewables unsettling wholesale markets

» Negative effects on prices and intra-day peaks

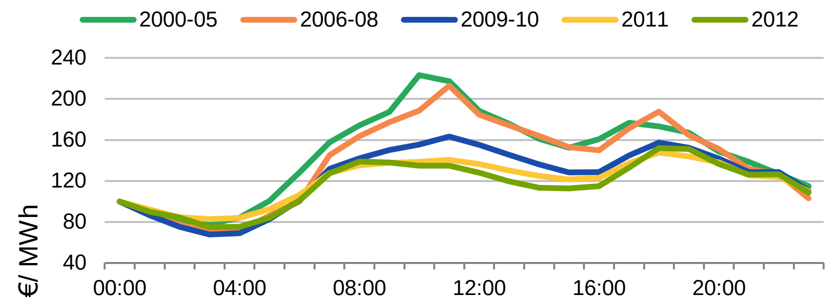
» Gas-fired profitability sharply reduced

» Closures, moth-balling prompt debate with governments

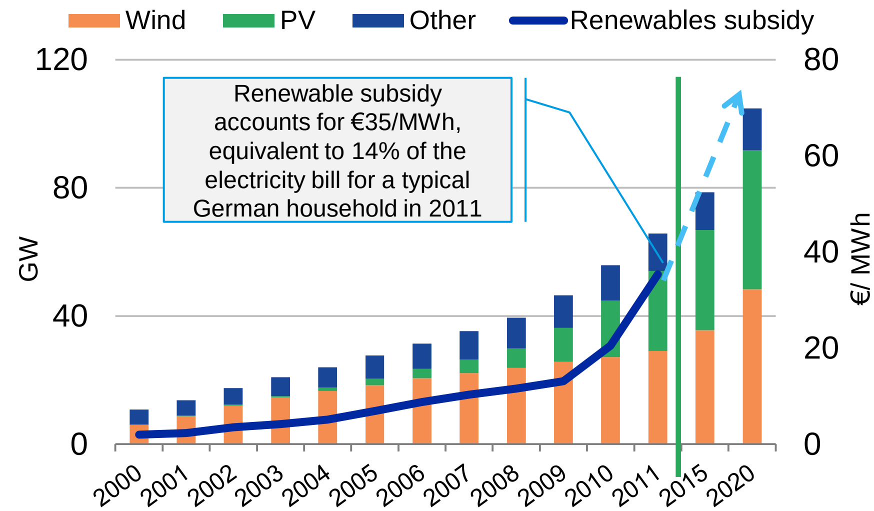
» Subsidies increasing consumer bills

» Major driver behind government intervention to reshape markets

Average intra-day power price profile change in Germany, 2000-2012



Installed renewables capacity in Germany vs. subsidies (household tariff, €/MWh)



Source: Federal Ministry of Environment and Federal Association of the German Energy Industry

With negative implications for business risk profiles

2

Political Risk Is Credit Negative

Political Risk Is A Negative Credit Factor

Government decisions can affect nuclear power:

- Nuclear Moratorium (Germany)
- Capacity tariffs – possibility of undercutting existing technologies
- Changing existing tariffs arrangements
- Promotion of Renewable Generation – cuts shoulder and peak prices
- Delays in life extension / decisions on new build
- Delays in granting licences to build and operate – front end costs
  - Construction lead times already long
- Promotion of cheap alternative fuel sources
- Taxation

3

Moody's Views on Nuclear Related Credit Events

Interruption Risk Depends On Market Location

JUNE 3, 2013

INFRASTRUCTURE

MOODY'S
INVESTORS SERVICE

ISSUER COMMENT

KEPCO's Nuclear Power Shutdowns Are Credit Negative

From Credit Outlook

Last Tuesday, Korea Electric Power Corporation (KEPCO, A1 stable) shut down two of its 23 nuclear reactors after the company discovered the presence of substandard parts in the reactors. KEPCO also said it would extend the overhaul of a third reactor undergoing planned maintenance, and likely delay commission of a fourth reactor scheduled to start commercial operation in the fourth quarter.

The stoppages and delayed commissioning of the reactors are credit negative for KEPCO because it will have to rely on expensive liquefied natural gas (LNG) power plants run by KEPCO's wholly owned power generation companies (gencos) and independent power producers (IPPs) to compensate for the lost power. This, in turn, will drive up costs.

Interruption Risk Depends On Market Location (2)

NOVEMBER 8, 2012 INFRASTRUCTURE

MOODY'S
INVESTORS SERVICE

SPECIAL COMMENT

US Utilities:

Low Gas Prices and Weak Demand are Masking US Nuclear Plant Reliability Issues

Market conditions have mitigated the financial and regulatory impact, although this will change as economy improves and gas prices increase

» **Nuclear plant reliability issues are negatively affecting several utilities.** Although the vast majority of US nuclear plants continue to perform well, operating problems at several plants have caused lengthy, unplanned outages and led to unexpected repair and replacement power costs. Serious outages have plagued both investor owned utilities, most notably Progress Energy Florida and Southern California Edison, as well as public power systems like the Omaha Public Power District.

Return on Assets Risk

FEBRUARY 7, 2013 INFRASTRUCTURE

MOODY'S INVESTORS SERVICE

ISSUER COMMENT

Centrica's Withdrawal from New Nuclear Plants Is Credit Positive

From Credit Outlook

On Monday, Centrica plc (A3 stable), the UK's leading independent energy company, announced that it would not exercise its option to take a 20% interest in the construction of new nuclear plants in conjunction with its partner, EDF Energy plc (A3 negative). This decision is credit positive because it removes the high investment and construction risks that would have resulted from the project. The costs, according to the company, were uncertain and the construction timetable had lengthened by a number of years since Centrica's original investment in 2009.

Centrica also announced that it would launch a £500 million share repurchase programme. Although this move will absorb cash that it would otherwise have used in the business, we consider this action significantly less risky to creditors than participation in the construction of new nuclear plants.

Return on Assets Risk (2)

DECEMBER 10, 2012

INFRASTRUCTURE

MOODY'S
INVESTORS SERVICE

ISSUER COMMENT

ENEL's Exit from Flamanville Project and Power Plant Cost Overruns Are Credit Negative for EDF

From Credit Outlook

Last Wednesday, French utility giant Electricite de France (EDF, Aa3 negative) announced that Italian utility ENEL S.p.A. (Baa2 negative) had pulled out of a partnership with EDF to construct a new 1,600-megawatt nuclear power plant at Flamanville in France, requiring the French company to reimburse ENEL's €613 million investment in the project.

The news came two days after EDF said that its European Pressurised Water Reactor (EPR) project at Flamanville was €2 billion over budget, raising the project's cost by one third to €8 billion.

Cost Overruns and Delays

Moody's
INVESTORS SERVICE

Announcement: Moody's: Cost Increases and Delays at Oglethorpe Power's New Nuclear Project are Credit Negative, albeit Manageable at the Current Rating Level

Global Credit Research - 27 Mar 2013

» Overall cost of Vogtle increased by USD1 billion to USD4.5 billion

» Delays receiving plant design approval, construction and operating licence

» Further cost overruns in litigation

» 18-month delays to generating start decreases return

Safety Is More Critical For Nuclear Power

JUNE 27, 2013 INFRASTRUCTURE

MOODY'S
INVESTORS SERVICE

ISSUER COMMENT

Raid on Korea Electric Power Subsidiary KHNP Is Credit Negative for It and Parent

From Credit Outlook

Analyst Contacts:

HONG KONG	+852.3551.3077
Mic Kang	+852.3758.1373

Vice President – Senior Analyst
mic.kang@moodys.com

Last Thursday, Korean prosecutors raided Korea Hydro and Nuclear Power Company Limited (KHNP, A1 stable), a 100%-owned subsidiary of Korea Electric Power Corporation (KEPCO, A1 stable). The raid was part of prosecutors' widening probe into KHNP's use of substandard parts at any of its 23 nuclear power plants. The expanded probe is credit negative for KHNP and KEPCO because it raises the risk that operation of the companies' nuclear reactors will be disrupted.

The Natural Disaster

MOODY'S

Announcement: Moody's reviews Tokyo Electric Power for possible downgrade

Global Credit Research - 14 Mar 2011

Tokyo, March 14, 2011 -- Moody's Japan K.K. has placed the Aa2 ratings of Tokyo Electric Power Co., Inc. (TEPCO) on review for possible downgrade.

This action has been triggered by the damage which has occurred at TEPCO's Fukushima Dai-ichi Nuclear Power Plant following the devastating earthquake on March 11.

TEPCO is now struggling to contain problems at the plant, 240 km north of Tokyo. Two reactors -- No.1 and No. 3 -- have been severely damaged and are expected to be out of commission permanently.

In addition, it remains highly likely that other reactors at the site will be out of commission for an extended period.

Changes to Regulatory Recovery

APRIL 11, 2013

INFRASTRUCTURE

MOODY'S
INVESTORS SERVICE

ISSUER COMMENT

Florida Considers Revising Nuclear Cost Recovery Law, a Credit Negative for State's Utilities

From Credit Outlook

Last Monday, the Florida Senate Communications, Energy and Public Utilities Committee unanimously approved a bill that would impose restrictions on a utility's ability to recover pre-construction costs associated with new nuclear facility development, a credit negative for the state's utilities.

The bill, SB1472, would require state regulatory commission approval of nuclear construction costs. Any activity in which elected officials or regulators look to tinker with automatic recovery riders, rate trackers or single-issue cost recovery mechanisms is credit negative because these provisions tend to support transparent, stable and predictable revenues and cash flows.

Some Government Actions Supportive for Nuclear Power

JANUARY 14, 2013

INFRASTRUCTURE

MOODY'S
INVESTORS SERVICE

ISSUER COMMENT

KEPCO Will Benefit from Korea's Electricity Tariff Hike and Nuclear Safety Measures

From Credit Outlook

Last Wednesday, two separate announcements from Korea's Ministry of Knowledge Economy (MKE) were credit positive for Korea Electric Power Corporation (KEPCO, A1 stable). MKE approved an average 4% increase to the country's electricity tariff as of 14 January, five months after a 4.9% increase in August. MKE also announced measures to overhaul the safety and soundness of Korea Hydro and Nuclear Power Company Limited (KHNP, A1 stable), a wholly owned subsidiary of KEPCO.

4 Conclusions

Conclusions

- New construction of nuclear power plants is generally credit negative
- Vulnerable to low power prices
- Cost overruns more frequent vs other technology types
- Stable political and regulatory environment very important to credit quality
- European power markets in their current state don’t support new construction

moodys.com

Paul Lund
Vice President – Senior Credit Officer
Project and Infrastructure Finance
+44.207.772.1955 tel
+44.207.220.5499 fax
paul.lund@moodys.com

Moody's Investors Service Ltd.
One Canada Square
Canary Wharf
London, UK

E14 5FA
www.moodys.com