NUCLEAR POWER IN THE BALTIC MARKETS: GLOBAL TRENDS, LOCAL CHALLENGES

A presentation to Lietuvos Energetikos Konferencija

10 October 2012

Annette Berkhahn, Oliver Pearce

AGENDA

1. Global trends in nuclear power
2. Cost characteristics of nuclear power and impact on wholesale electricity prices
3. Challenges in the Baltic market

KEY MESSAGES

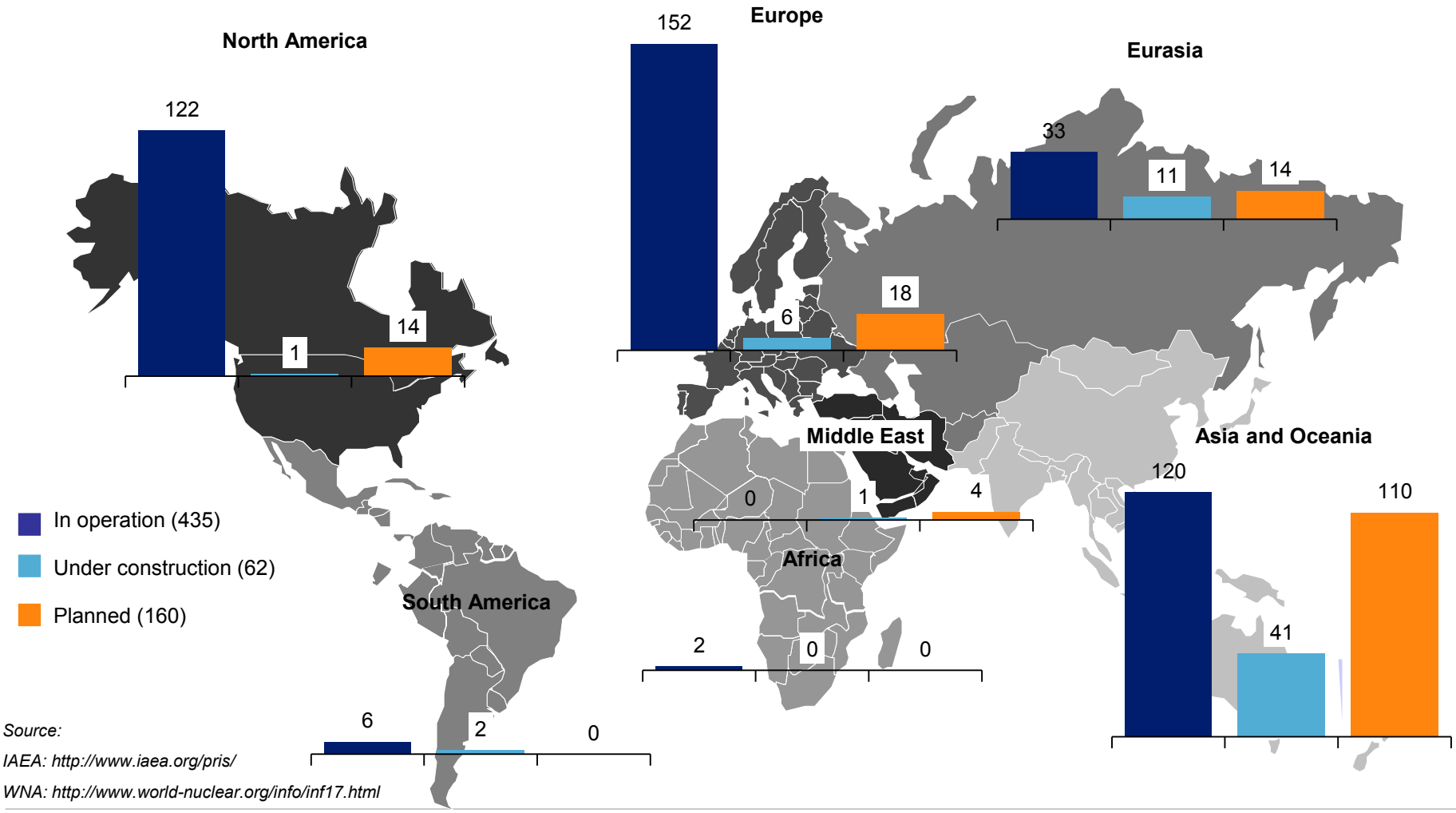
1. New nuclear remains on the global agenda
   - Attitudes keep changing and issues remain

2. Nuclear power is capital intensive, expensive and risky
   - Once the plant is built, financial risk remains with the investors

3. The Baltic electricity market is challenged by proximity of non-EU neighbours
   - More nuclear capacity in the area is unlikely to be of disadvantage from a price perspective

AN OVERVIEW OF THE GLOBAL NUCLEAR POWER STATUS QUO

There are 435 reactors in operation with a further 62 under construction



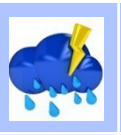
Source:

IAEA: http://www.iaea.org/pris/

WNA: http://www.world-nuclear.org/info/inf17.html

THE OUTLOOK FOR GLOBAL NUCLEAR DEPLOYMENT

Global nuclear growth is expected, but at a lower rate than pre-Fukushima

Policy Indicator	Countries
Negative policy developments since Fukushima 	Japan, Germany, Switzerland, Italy, Belgium, France, Mexico
Ongoing debate, may see some closures 	Taiwan, Spain, Jordan
Positive outlook, expected to proceed with pre-Fukushima plans 	China, India, Russia, UK, USA, Poland, Finland, Sweden, Czech Republic, Brazil, Argentina, South Korea, UAE

- Fukushima split the „nuclear world“ in virtually two „camps“
- Further nuclear development is expected in selected North/East EU countries, China, India and Middle East. In many of these countries new build is only possible with strong governmental support
- The slow economy in Europe is causing additional hurdles for investment

Source: UBS estimates, January 2012

(https://c.na3.content.force.com/servlet/servlet.ImageServer?id=01550000000rzGiAAI&oid=00D300000000M2BEAU)

IAEA projections for nuclear power in 2030 (September 2012):
Nuclear will remain an important option throughout the world with projections showing an increase in nuclear deployment across all scenarios. Most growth is expected in regions with plants already operating and is expected to be strongest in the Far East. However, the story is different at the regional level

NUCLEAR POWER PLANT DEVELOPMENT: DRIVERS AND ISSUES

Support for nuclear depends on the perceived balance of drivers and issues of nuclear as part of the generation mix at the national level

Drivers

Climate change / GHG emissions

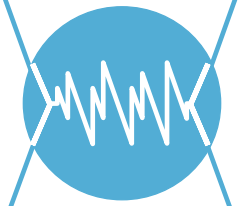
Security of supply

- Diversification of fuel supply
- Stabilizing cost of power generation

Meeting electricity demand growth

Emerging national energy contexts

- Stable, secure, large capacity power sources with long lifetime (80+ years for new plants)



Issues

Cost and schedule uncertainties

Fuel disposal and decommissioning

Public acceptance and political support

- Safety issues
- Waste disposal

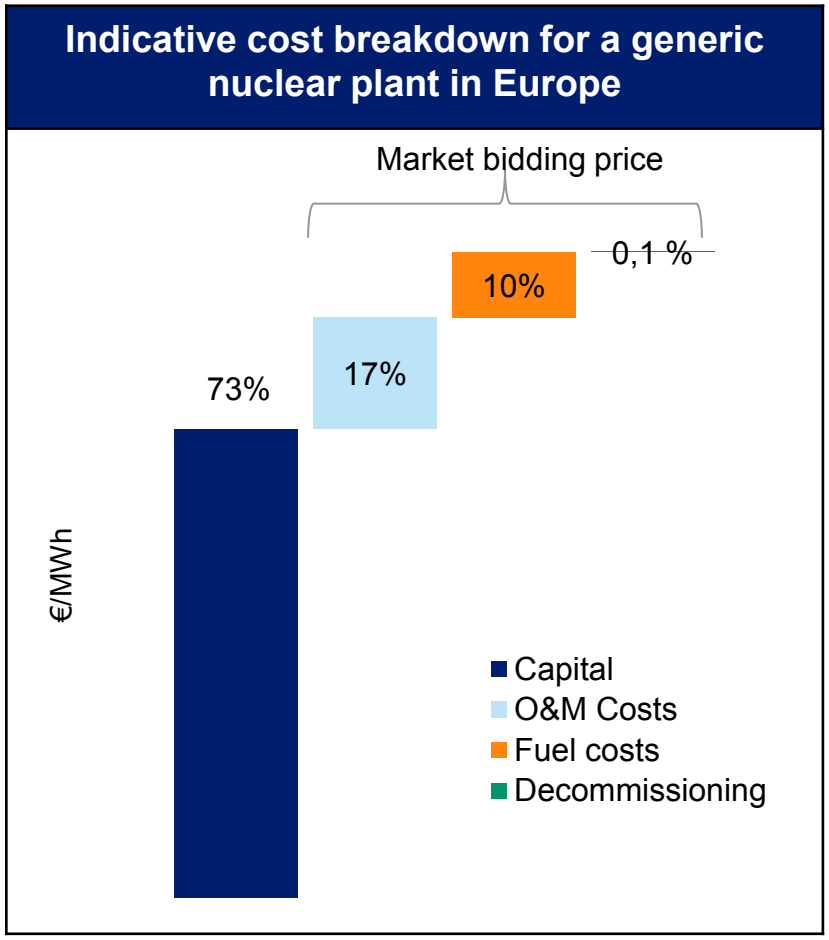
Financing challenges

AGENDA

1. Global trends in nuclear power
2. Cost characteristics of nuclear power and impact on wholesale electricity prices
3. Challenges in the Baltic market

NUCLEAR HAS HIGH FIXED COSTS AND LOW VARIABLE COSTS

Fixed costs dominate the levelised cost of nuclear plant



Datasource: adapted from IEA 2010; 10% discount rate case
http://www.iea.org/textbase/nppdf/free/2010/projected_costs.pdf

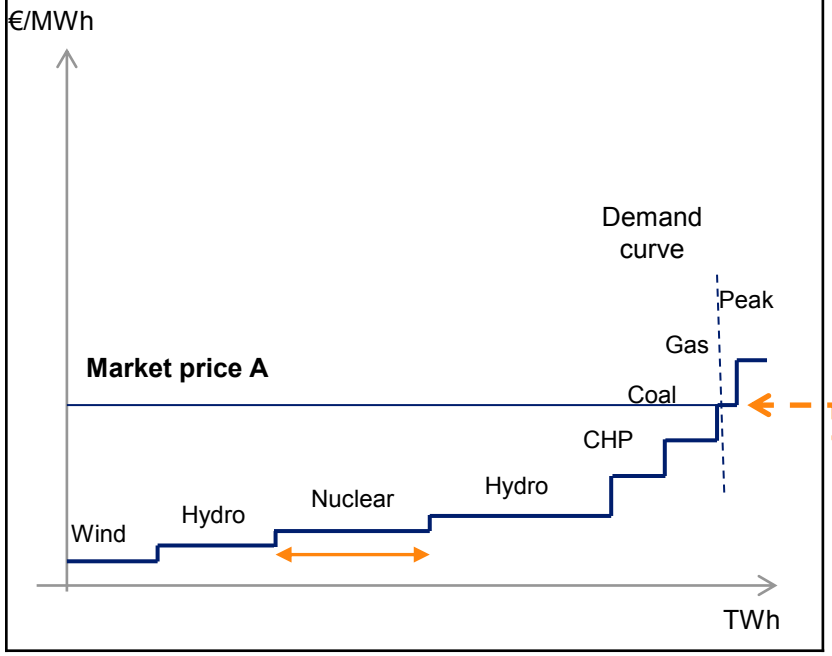
- The levelised cost is the sum of all capital, fixed and variable costs and defines the average revenue a plant will need to break even over its operating life
- A high proportion of nuclear plants cost is due to capital costs due to:
  - Complexity of the technology
  - Safety requirements
  - Cost of capital (critical parameter)
- Nuclear plant has relatively low variable costs: this is the cost it bids into the market
- Decommissioning of a nuclear plant is a controlled and organised process lasting 10-20 years after the plant has ceased operation
  - Funds for decommissioning are put aside during the operational period of the project

NUCLEAR PLANT TENDS TO LOWER AVERAGE POWER PRICES IN A WELL FUNCTIONING MARKET

The low variable cost of nuclear means that it tends to displace higher marginal cost plant in the merit order generation and lowers the average electricity price

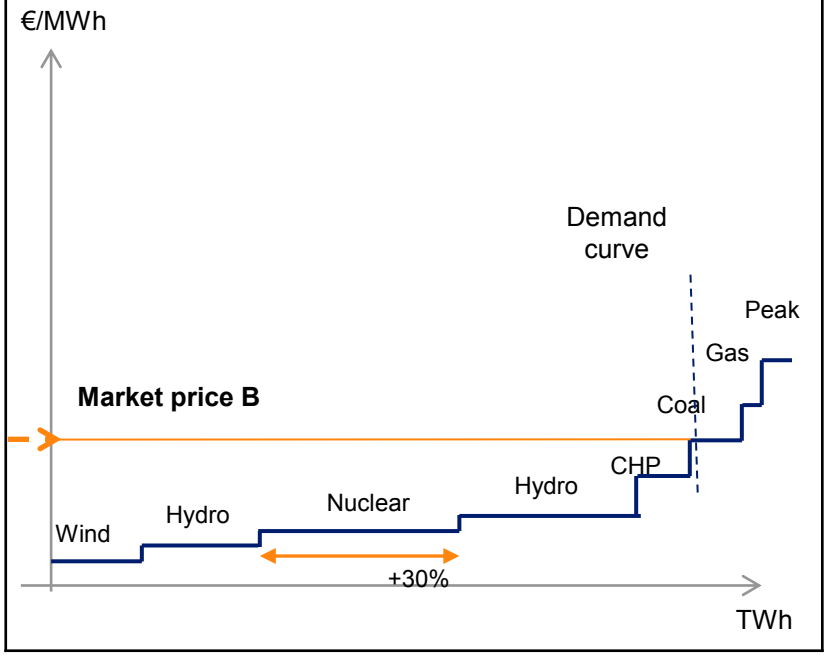
A

Illustrative cost curve of production in the Nord Pool market (€/MWh)



B

Illustrative cost curve of production in the Nord Pool market (more nuclear) (€/MWh)

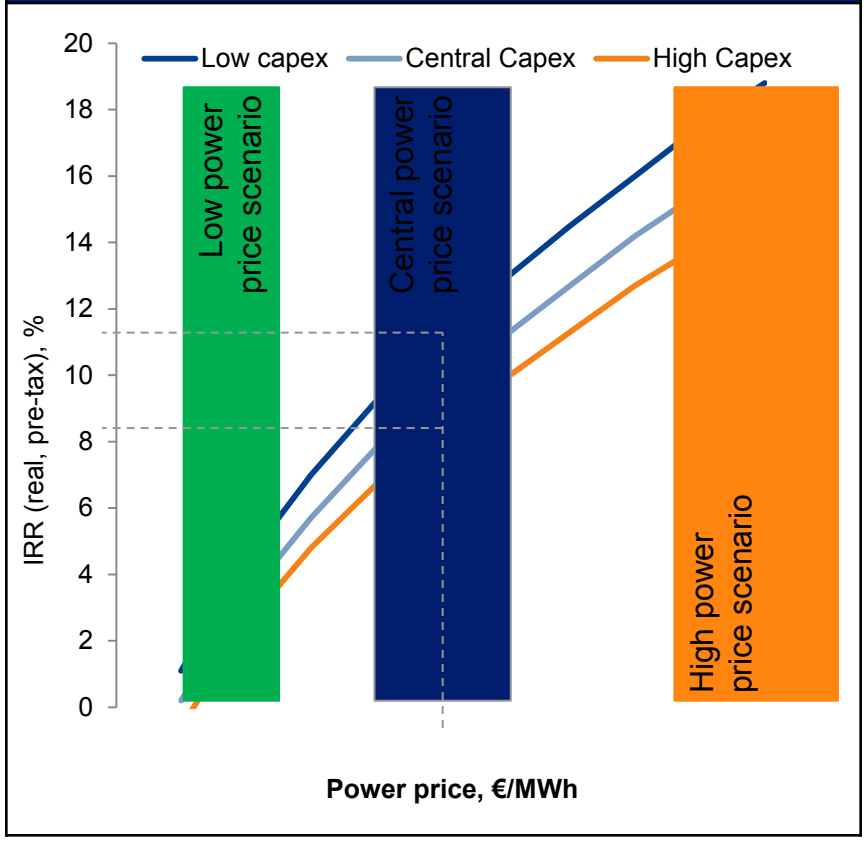


The curves are based on a cost basis, not a commercial basis and show an example of a wet hydro year

NUCLEAR PLANT PROJECTS ARE RISKY INVESTMENTS

Financial risk is one of the main hurdles to commercial nuclear plant developments

Indicative IRR of nuclear plant under different electricity price scenarios



- Delays and budget overruns have a high impact on project profitability for investors
- The main barrier to investment is the risk on the revenue side
  - Nuclear plants are price takers
  - Future price of power is extremely uncertain due to variations in fossil fuel and carbon prices and the likely impact of wind and solar generation on price volatility
- Within the final strategic decision, short/mid term power price plays only one part of the decision making - long term power price outlook and general company strength over the risky development period represent other key driving factors

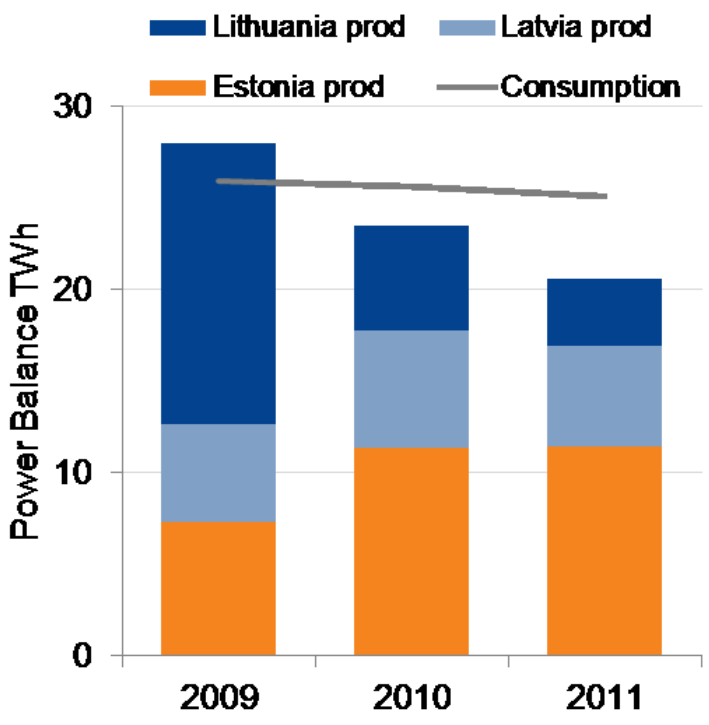
AGENDA

1. Global trends in nuclear power
2. Cost characteristics of nuclear power and impact on wholesale electricity prices
3. Challenges in the Baltic market

SECURITY OF SUPPLY IS A DRIVING FORCE

A new nuclear plant will help to improve security of supply and deliver energy independence

Evolution in power balance of the Baltic region (2009 – 2011)



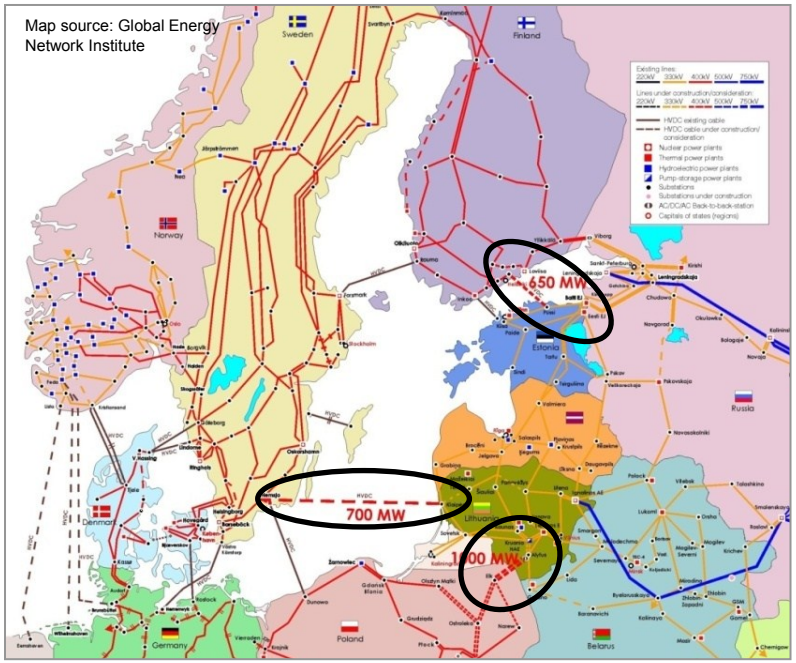
Datasource: ENTSO-E

- Baltic region moved to a net import position after Ignalina closure in 2009
- Imports are being priced at a level to undercut domestic generation even though there is sufficient capacity to meet demand across the Baltic markets (c.5.4GW v peak load of c.4.5GW)
- Energy demand is expected to grow to 2020 which coupled with plant closures and uncertainty over imports implies that new capacity will be required
- New nuclear would increase security of supply and energy independence for all Baltic market participants:
  - New low marginal cost generation base load generation
  - Compliment investment in renewable generation
  - Diversify energy supply

ADDITIONAL INTERCONNECTION TO EU MARKETS

Additional transmission capacity to Nordics and Central Europe will drive market integration and increase transparency

New interconnection projects to connect Baltic markets to Nord Pool and Central Europe



Three major interconnection projects:

- ESTLINK 2 (Finland-Estonia) 2014; 650MW
- NordBalt (Sweden-Lithuania) 2015; 700MW
- LitPol (Lithuania-Poland) 2016-2020; 1000MW

- New interconnector links to Nordic and Central European markets will play an important role in establishing reliable price formation and reducing market power
- Capacity to Nordics and Central Europe will balance import capacity from 3rd party countries
- This will help to establish a reliable reference price by reducing the influence of 3rd party imports
- Increased interconnetion to Nordics and Central Europe will help to give best utilisation of nuclear plant
- The additional connections will also provide a second corridor to transport the expected Nordic surplus to Central Europe

CHALLENGES REMAINING RELATING TO PREPARING THE MARKET

1 Full implementation of the Baltic Energy Market Interconnection Programme (BEMIP)

- The BEMIP programme must be fully implemented in all Baltic markets to help ensure a reliable transparent reference price based on Nord Pool market principles
- Establishment of a reliable reference price is key!
- Good progress to date but challenges remain

2 Cross border issues with 3rd party (non EU) countries (should be addressed under BEMIP)

- Trading arrangements with 3rd party countries need to be organised systematically at the regional level
- At present cheap imports as pose a risk to investment in new generation capacity (*potential* to be undercut or reduce market price)
- Developments regarding new nuclear plant in Kaliningrad

3 competition and liquidity in the Baltic markets (partly addressed under BEMIP)

- Promote use of financial markets to increase investor confidence in market liquidity and transparency
- Use of financial products e.g. contracts for difference, forward contracts, future contracts to hedge physical market price risk

KEY MESSAGES

1. New nuclear remains on the global agenda
   - Attitudes keep changing and issues remain

2. Nuclear power is capital intensive, expensive and risky
   - Once the plant is built, financial risk remains with the investors

3. The Baltic electricity market is challenged by proximity of non-EU neighbours
   - More nuclear capacity in the area is unlikely to be of disadvantage from a price perspective

THANK YOU!

CONTACT:

NAME: ANNETTE BERKHAHN
TITLE: PRINCIPAL
MAIL: ANNETTE.BERKHAHN@POYRY.COM

CONTACT:

NAME: OLIVER PEARCE
TITLE: SENIOR CONSULTANT
MAIL: OLIVER.PEARCE@POYRY.COM