

Renewable energy and electricity markets

A view on the policy challenges from an international perspective

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2 November 2012

The Hague



Simon Müller

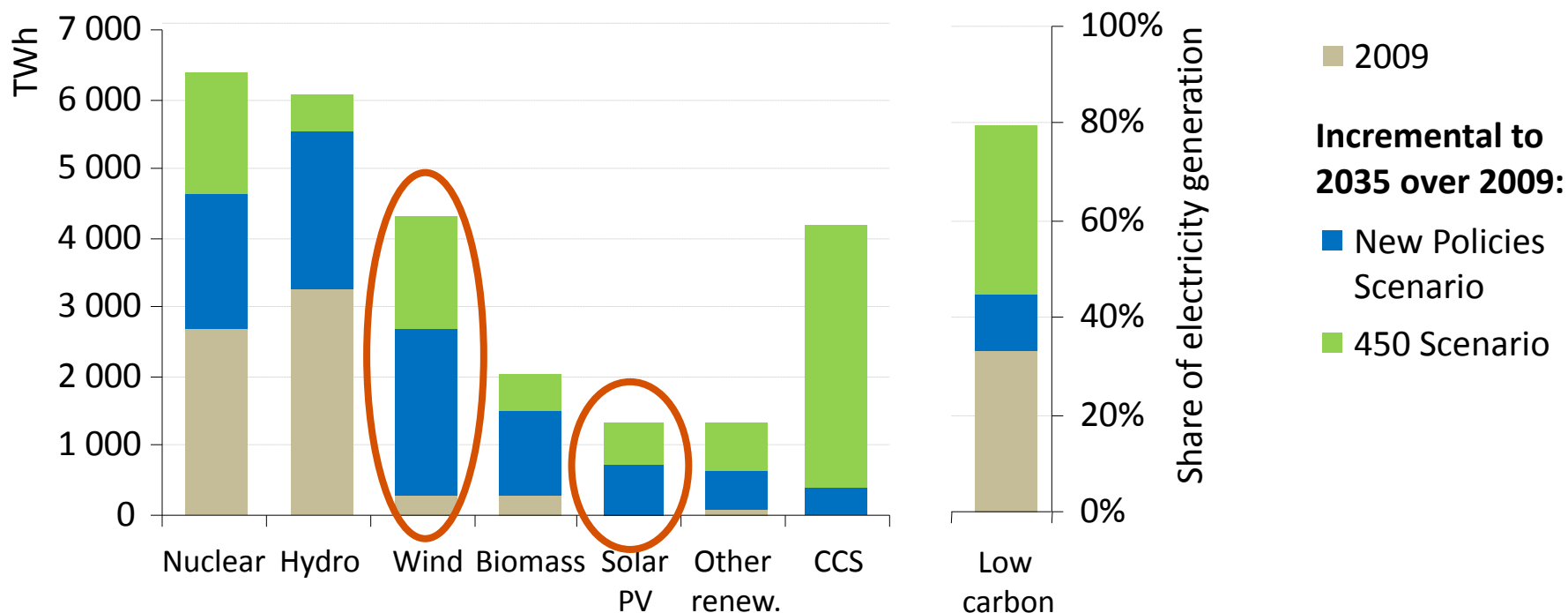
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Context

Variable RE are bound to grow

Electricity generation by selected low carbon technology & share of electricity generation by scenario, 2009 and 2035



Variable RE see a large increase in all WEO 2011 Scenarios. Share of PV and wind global generation up to 17.5% (450 Scenario).



Decarbonisation race: a troika with only one horse pulling







Is CCS deployment on track?

CCS | Netherlands stops Shell's CO2 storage project in Barendrecht

“The Dutch government said Thursday it will not allow oil giant Shell to store millions of tonnes of carbon dioxide in a depleted gas reservoir under a small town, upholding the fears of townspeople.

E.ON: incentive could have saved Kingsnorth CCS project

Company suggests "low carbon" version of the Renewables Obligation including CCS and nuclear might have kept project in the UK

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By Will Nichols

21 Oct 2010

Storage Concerns Delay Australian CCS Timeline

March 21, 2011

On 27 January 2011, Australia's federal government announced that it would delay and reduce the funding available to support its A\$2 billion carbon capture and storage (CCS) Flagship funding program in order to support Queensland's flood recovery efforts. As part of those efforts, A\$160 million in CCS Flagship funds will be deferred until after 2015, while A\$90 million will be cut from the CCS Flagship budget altogether. Key trends in this On Point include:

Carbon capture approvals behind UAE-BP project delay

Date: 14/04/2011 • Category: Projects & Communities, Projects & Communities - World

ABU DHABI (Reuters) - Delays in winning approvals on pricing and scheduling of a carbon capture and storage (CCS) project are holding up a \$2.5 billion hydrogen power venture by BP and an Abu Dhabi firm, an official document showed. ...See all stories on this topic »Reuters

<http://www.google.com>

Norway delays CCS project again, angers greens

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By Gwladys Fouche
OSLO | Tue Mar 1, 2011 9:08am EST

(Reuters) - Norway said on Tuesday it would delay again a decision to finance a top carbon capture project, this time to 2016, in a setback for a technology that is seen as key to mitigate climate change.

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Rotterdam offers the location for the construction of a large-scale power station, which has access to the sea for sea ships that can transport the CO2 and the solid fuel.

■ Updates

Announcement - Feasibility study stopped

After close consultation between Havenbedrijf Rotterdam NV and C. GEN NV it has been decided on October 26, 2010 to stop the feasibility study on the establishment of a hydrogen power plant (Integrated Gasification Combined Cycle) on the Kop van de Beer-site.

The reason is the technical feasibility of this location, coupled with uncertainties regarding regulation and storage of CO2 in the Netherlands

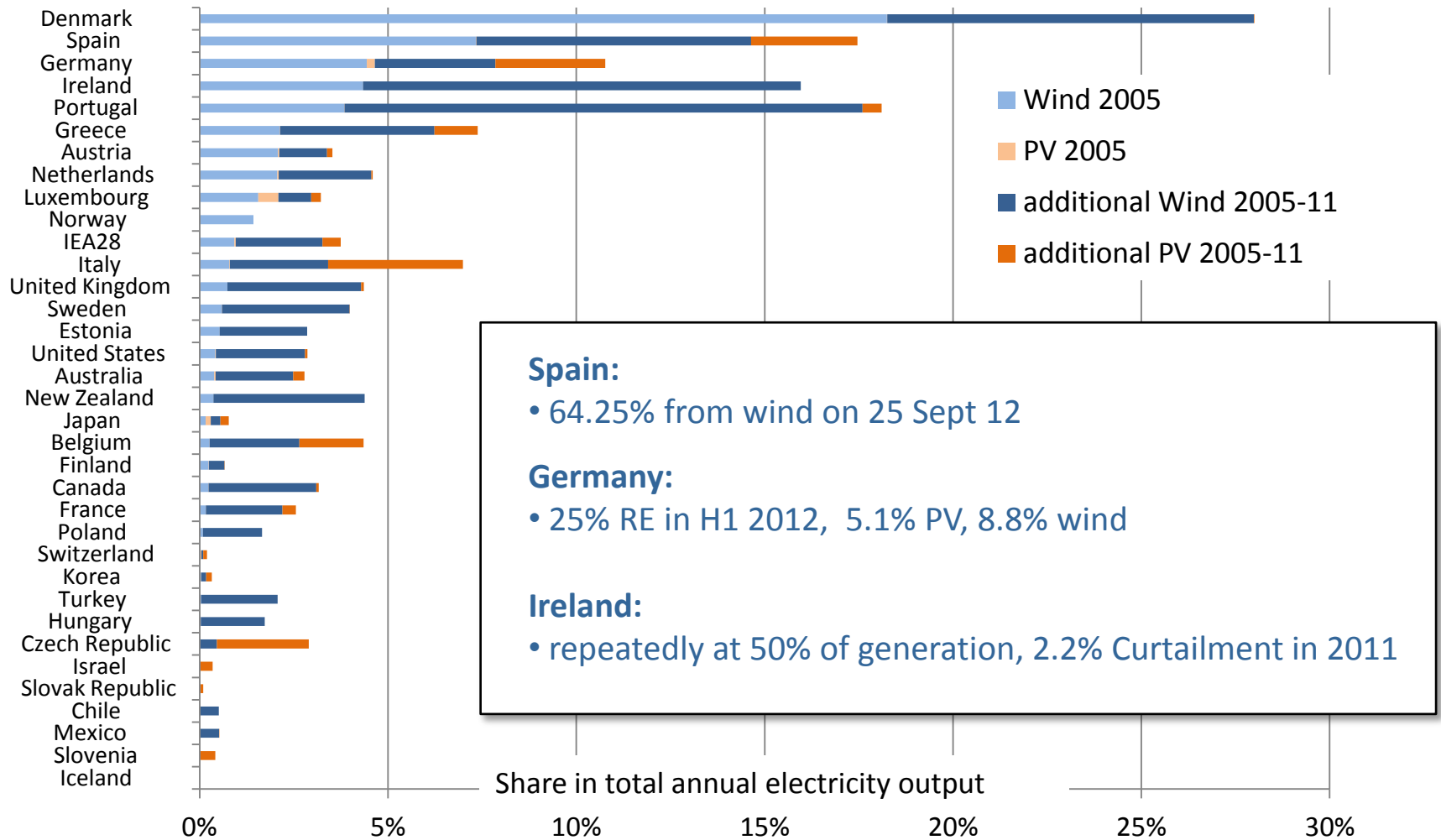
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Nuclear: baseload low carbon power

- But to reach its projected contribution, 100 projects would need to be under construction at any time until 2035
- And one year project time overrun wipes out 30% of NPV

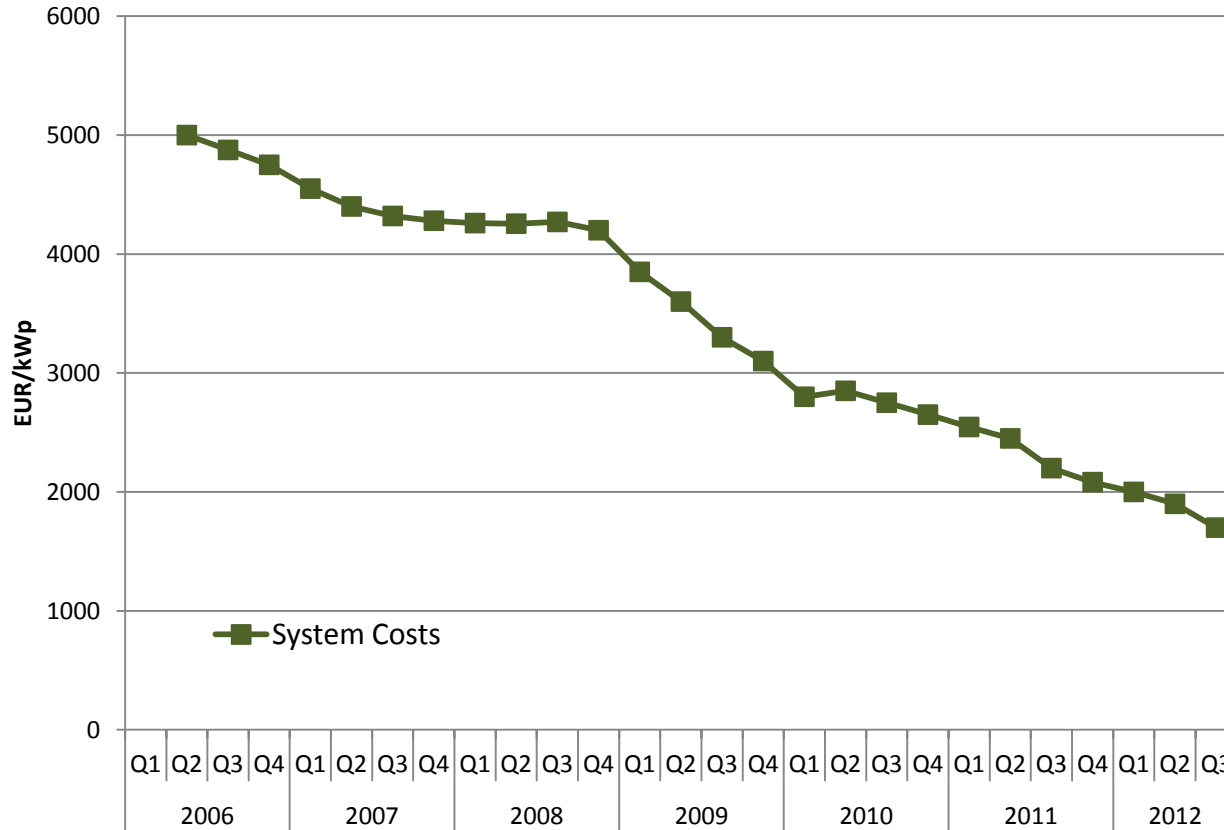


Rapid variable renewables increase



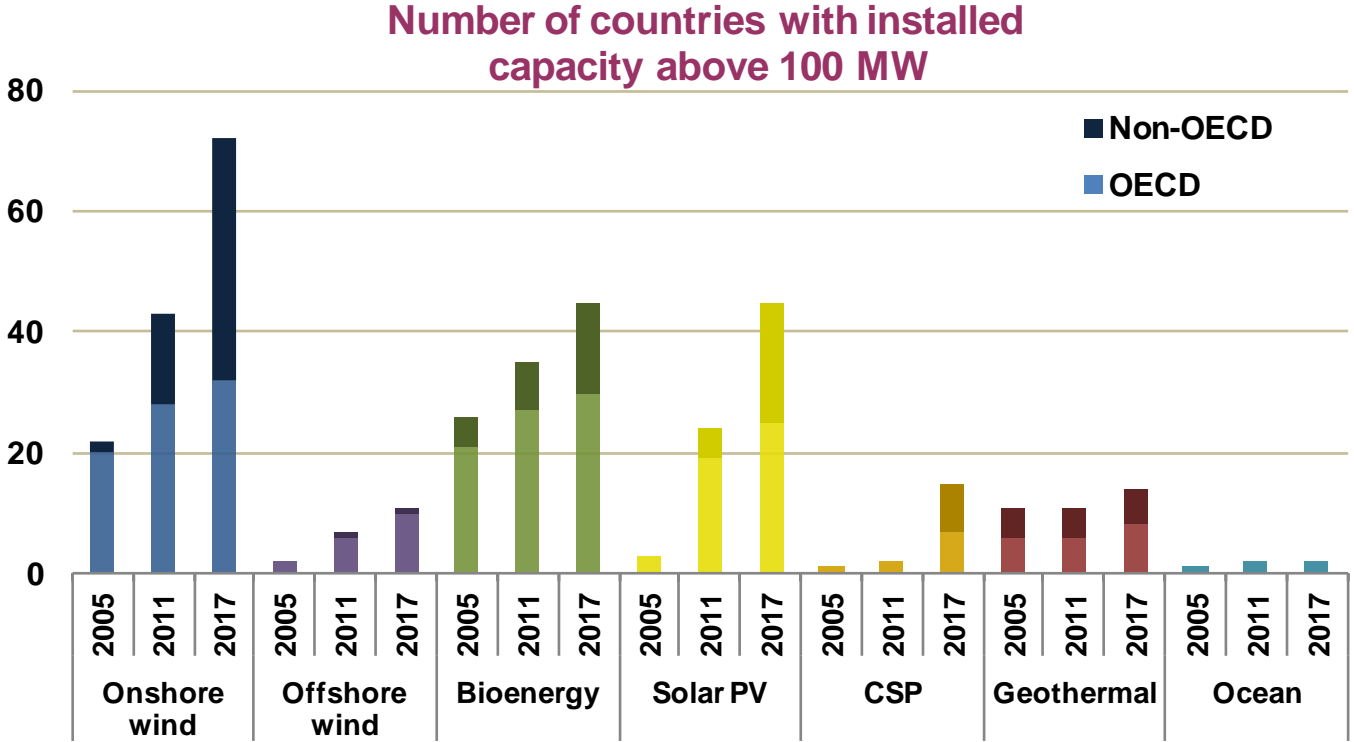
LCOE are decreasing rapidly

Retail prices of a PV roof top system up to 100 kWp



Source: BSW

Non-hydro technology deployment spreads out until 2017



- Medium Term RE Market Report:
 New growth areas include Asia, Africa, Latin America and the Middle East

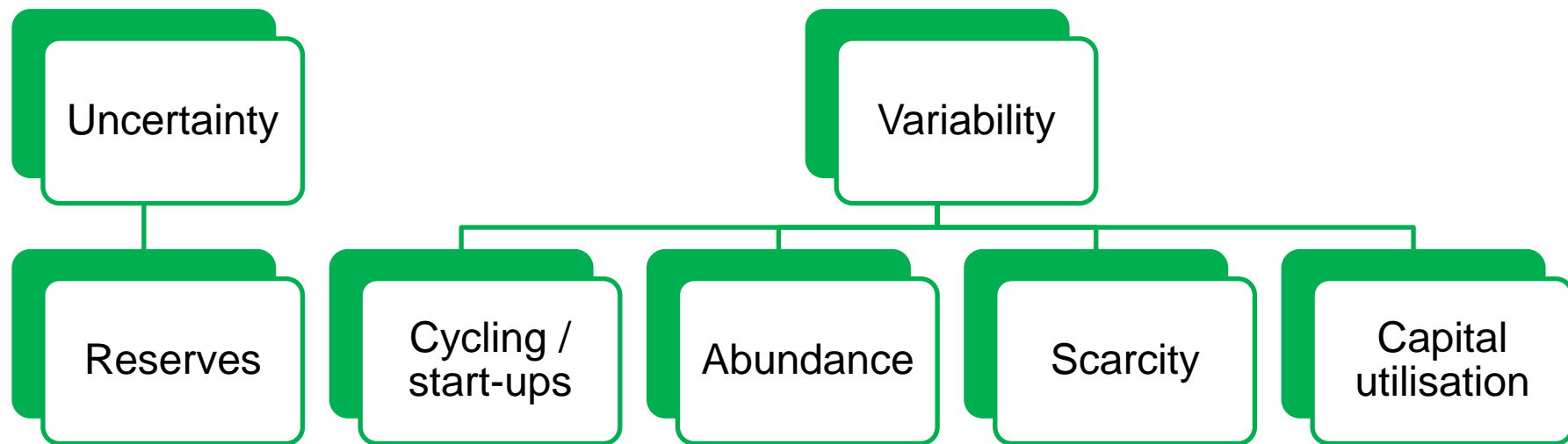
Mind the different contexts

- Apparent contradiction between markets:
 - OECD countries: RE perceived as driving up costs
 - China, India, Brazil: RE increasingly deployed due to attractive economics
- Very different contexts:
 - In most of OECD, RE drives generation from existing capacity out of the market
 - In emerging economies RE help to cover an energy deficit

Implications of increased (variable) RE penetration

Power systems with high shares of variable renewables

- Systems are different – impacts will vary too
- But common *groups* of effects



Consequences of business as usual

- Uncertainty
 - > *Unnecessarily high reserves*
 - Abundance
 - > *Unnecessarily high curtailment*
 - Scarcity
 - > *Low efficiency peakers*
 - Variability
 - > *More expensive O&M*
 - Plant-stack
 - > *More \$/kWh from conventional plants*
- Smart flexibility products are the right answer!**
-

Policy challenges

Policy challenges

- Provide sufficient certainty for *investment* for a low carbon transition
 - With growing shares of renewables
 - ensure their operational efficiency
 - and improve system flexibility
 - During transition, find a strategy to deal with an increasingly non-adapted conventional plant stack
 - While progressing towards the long term goal and keeping the lights on
-

Uncertainty & decarbonisation

■ Fossil paradigm

- Energy sector extracts, transports and converts fossil energy commodities
- Implication for power sector: (sunk) investment costs make up only part of total costs

■ Decarbonised paradigm

- Commodity flows are replaced by capital investments
- Capital costs dominate total costs

→ A decarbonised system is structurally more sensitive to uncertainty.

International co-operation & decarbonisation

- Independent of decarbonisation:
Increased interconnection and trade likely to increase efficiency for all participating systems
- At growing shares of variable renewables:
Interconnection key resource for integrating variable renewables (smoothing of variability, reducing uncertainty)

The (old) question – Will spot markets deliver

■ Without renewables:

- Classical missing money problem

■ During the transition:

- Uncertainty about RE deployment
- Uncertainty about carbon prices
- Markets driven away from carbon intensive equilibrium

■ With high RE shares:

- For dispatchable generation
 - ◆ Increased price volatility
 - ◆ Increased cycling and start ups
- For variable renewables
 - ◆ Prices low when generation is high

A good adaptation proposal should recognise:

- Risk asymmetry between high/low relative capex technologies
- Increasing need for market compatibility and trade
- ...

Thanks.

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