



IEA Greenhouse Gas R&D Programme



European Large Scale Demonstration Projects

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IEA Greenhouse Gas R&D Programme

7th Carbon Annual Carbon Capture and Sequestration
Conference

Pittsburgh, USA

May 5th to 8th 2008



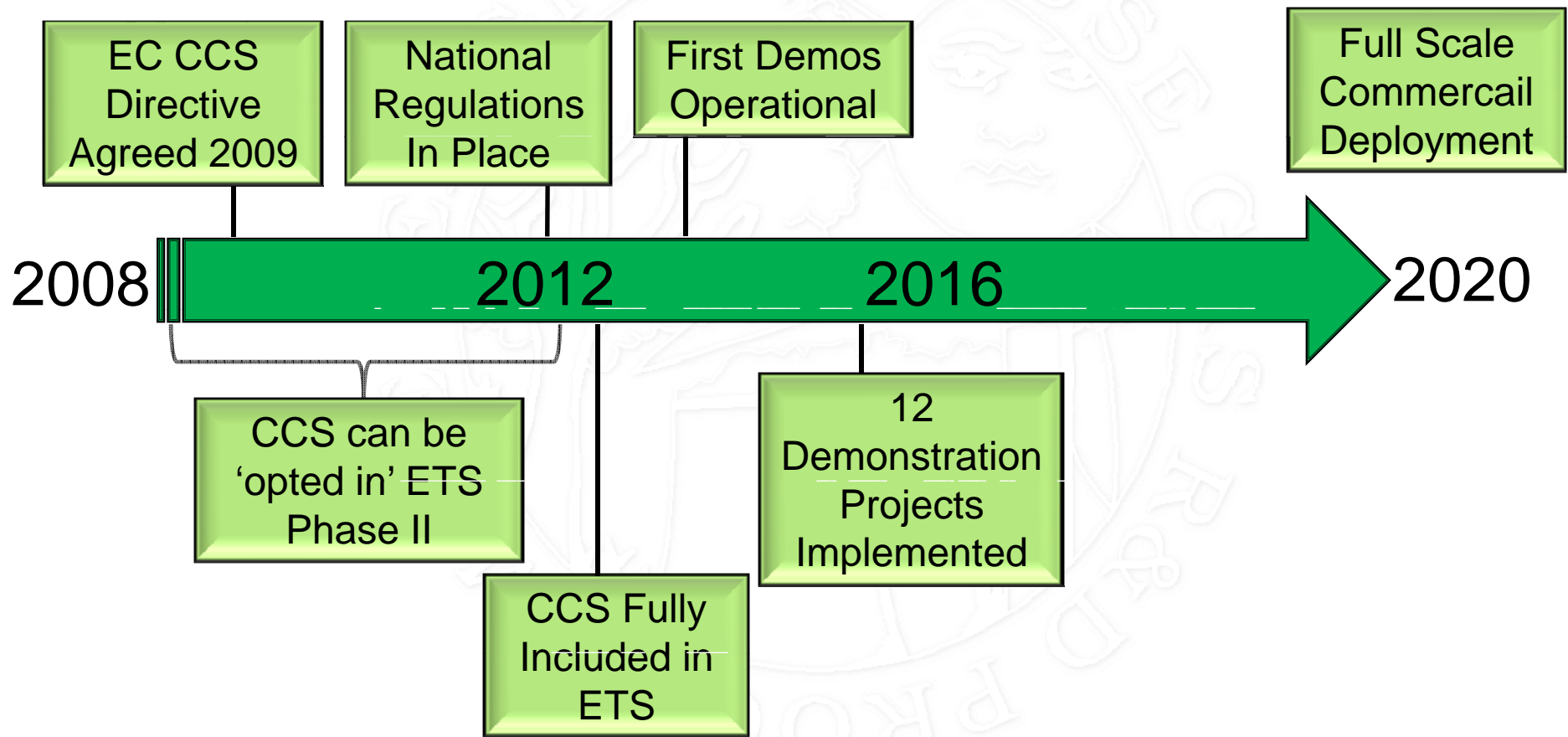


Introduction

- Time line for CCS demonstration in Europe
- Regulatory developments in Europe
- Range and type of projects being developed
- Where will the first demonstration be?



Time line for CCS deployment in Europe





EC Draft CCS Directive

- **Enabling regulatory framework to ensure environmentally sound CCS**
- **Focuses on storage component**
 - Consistent with OSPAR and IPCC GHG Guidelines
 - Objective is permanent storage
 - Permits required for exploration and storage
 - Storage permit only if “no significant risk of leakage”
 - Emphasis on site selection, characterisation, risk assessment, monitoring
 - Corrective measures
 - Financial security required from operator
 - Liability transfer to regulatory authority “when evidence indicates contained for indefinite future”
 - Removes regulatory barriers in other Directives – IPPC, Waste, LCPD, Water, EIA, ELD
 - Capture-ready



ETS Directive

- EC plans to strengthen, expand and improve the ETS from 2013
- CCS can already be included in Phase II (2008-2012) by 'opt-in'
- CCS fully included from 2013
 - Site and operation will need to comply with CCS Directive
 - Needs monitoring and reporting guidelines
- No free allocation to CCS (same as electricity)
- Separate permitting of capture, transport and storage
- If any leakage – surrendering of allowances



Efficiency Increase & CCS Combined

clean coal technologies (improvements in conversion efficiency) can help to reduce emissions, but are insufficient on their own to meet the CO₂ reduction demands of climate change. Indeed, neither the implementation of Clean Coal technologies alone (further improvement of energy efficiency in coal-fired power plants), neither the adoption of CCS technologies alone can provide an economic and environmentally sound approach. The technological solution must combine the advantages of further increasing the conversion efficiencies in power plant with those of the CCS processes;

COMMISSION STAFF WORKING DOCUMENT

accompanying document to the

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT AND THE COUNCIL

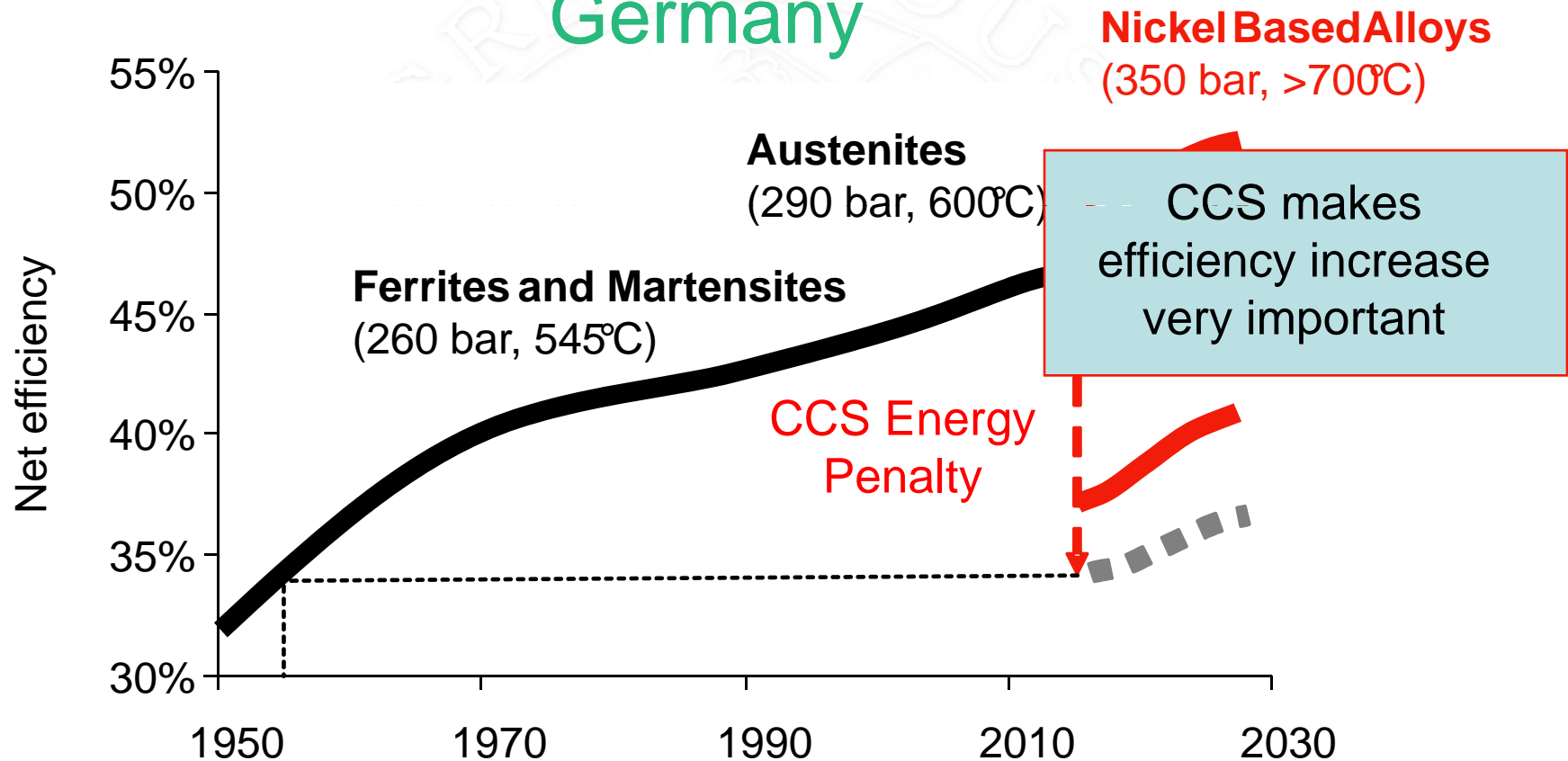
Supporting Early Demonstration of Sustainable Power Generation from Fossil Fuels

IMPACT ASSESSMENT

{COM(2008) 13}
{SEC(2008) 48}



Development of Efficiency in Coal fired PP in Germany





European Utility Position on CCS

- European utilities co-operating in EU research activities and national R&D programmes
- Technology preferences do differ - all options still on the table
- One position can be considered as:
 - Post combustion capture for near term application and retrofit
 - Second generation PCC technology needed
- Other technologies favoured by some and not others for future applications
 - Oxyfuel – Vattenfall
 - RWe , E.On and NUON - IGCC



Demonstration Project Initiatives

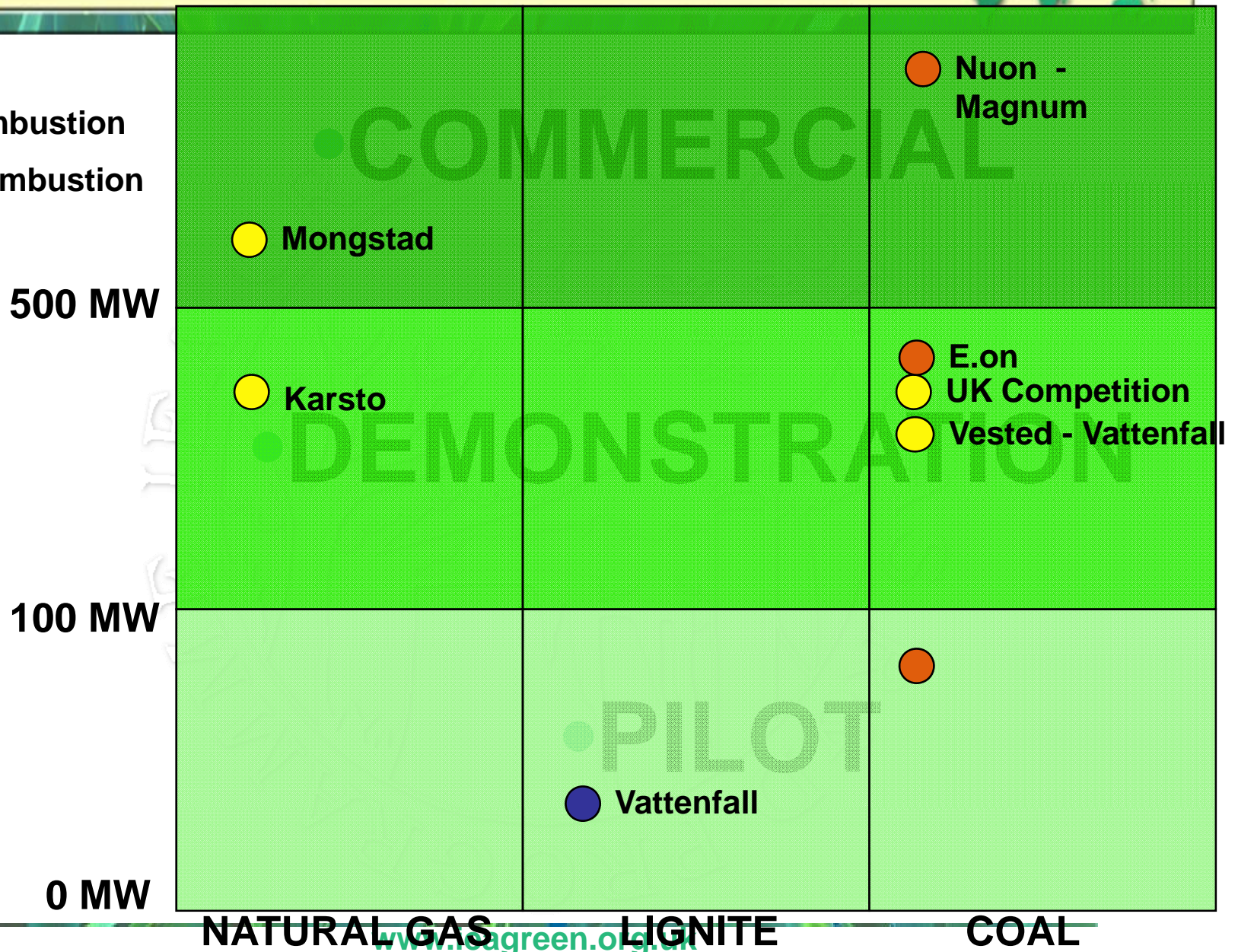
Country/Region	Action
Europe	Plans to support up to 12 demonstration projects under its 2007 Directive on Sustainable development of energy from fossil fuels
Norway	Incoming Government defined new policy to introduce new NGCC plant with CCS
UK	Demonstration programme announced with direct financial support for CCS component
Germany	Demonstration projects supported through national research programme COORETEC in combination with commercial activities
Netherlands	Demonstration programme supported by Ministry of Economics with commercial support
Denmark	Commercial developments will initiate a demonstration project



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- Pre-combustion
- Post-combustion
- Oxyfuel

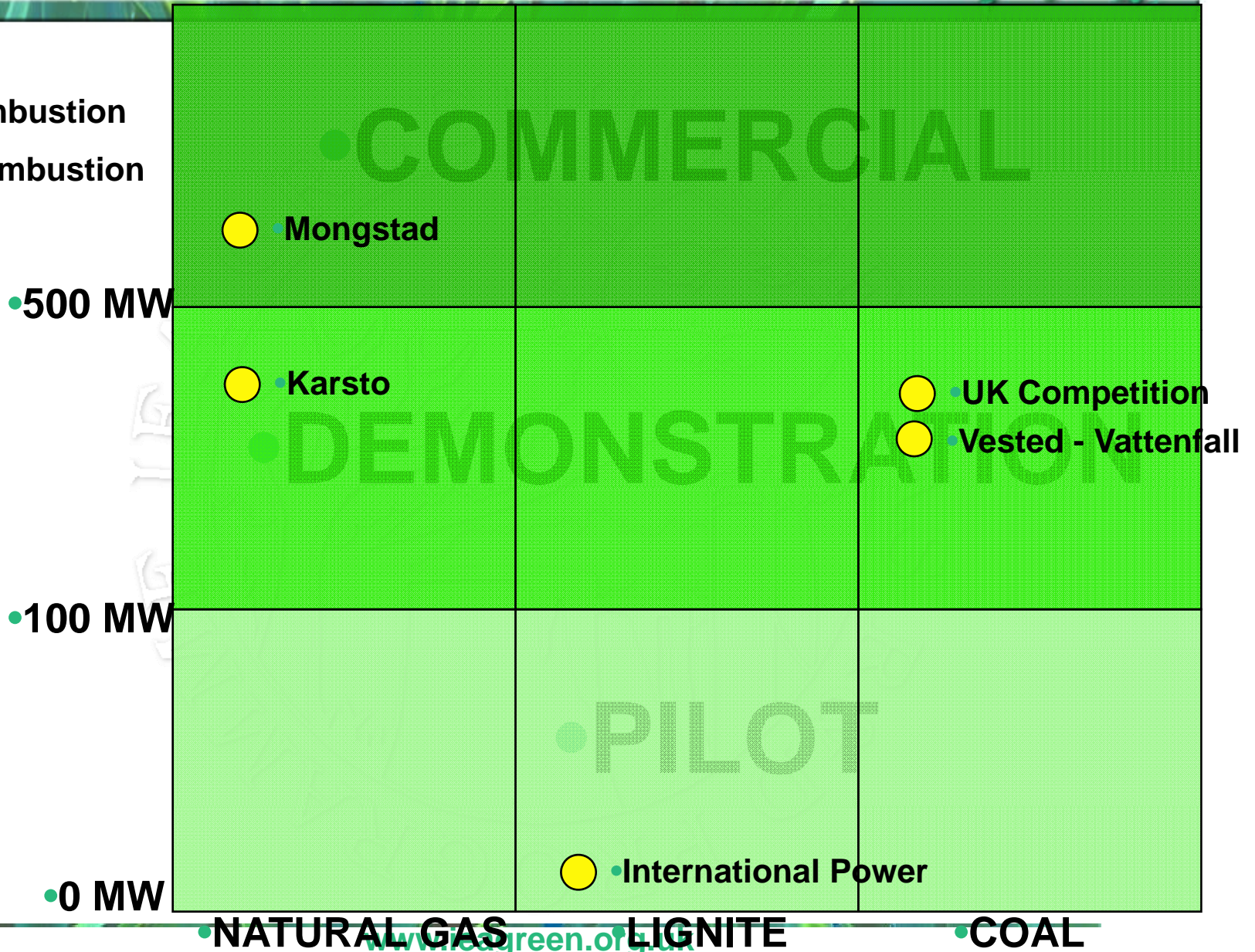




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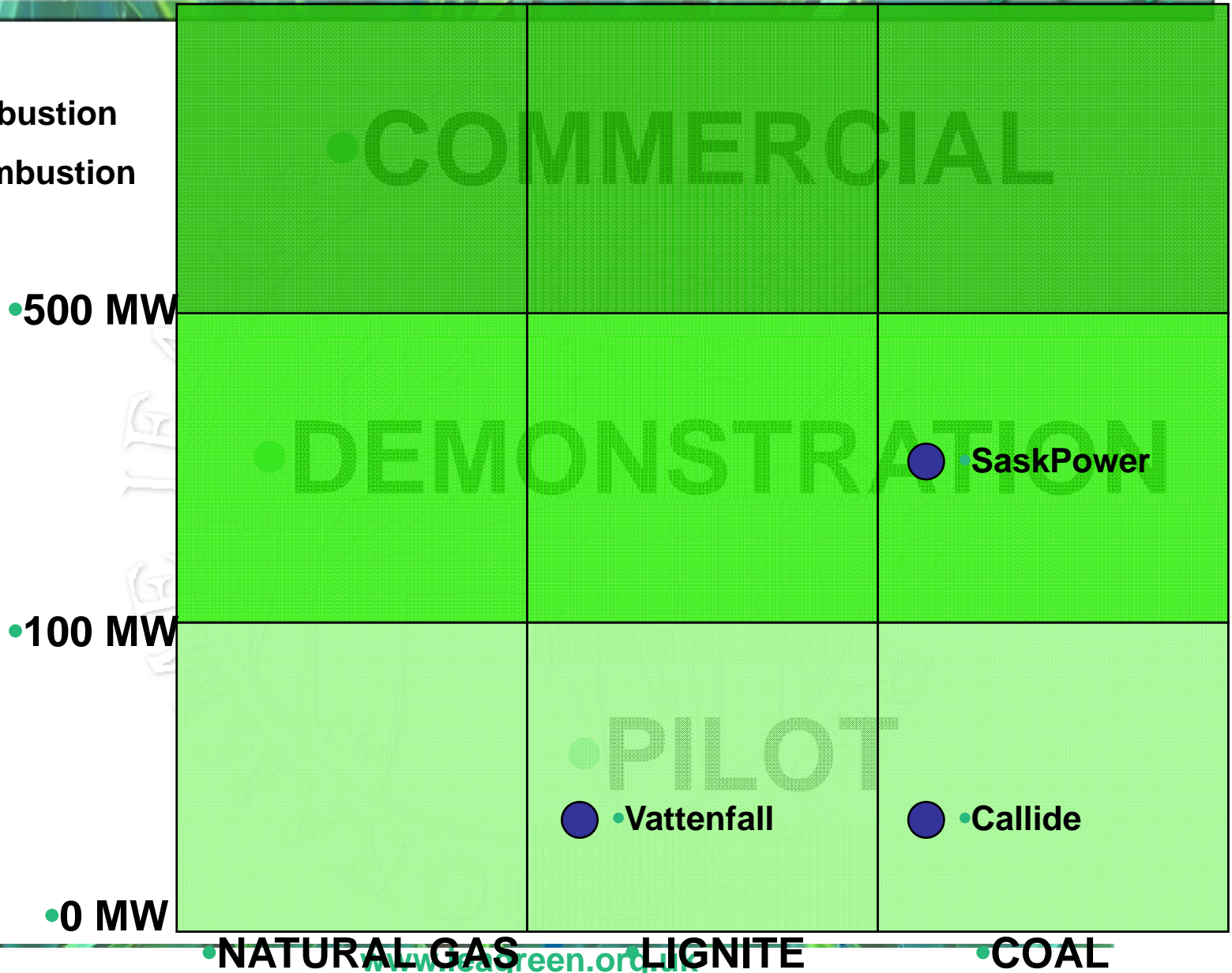




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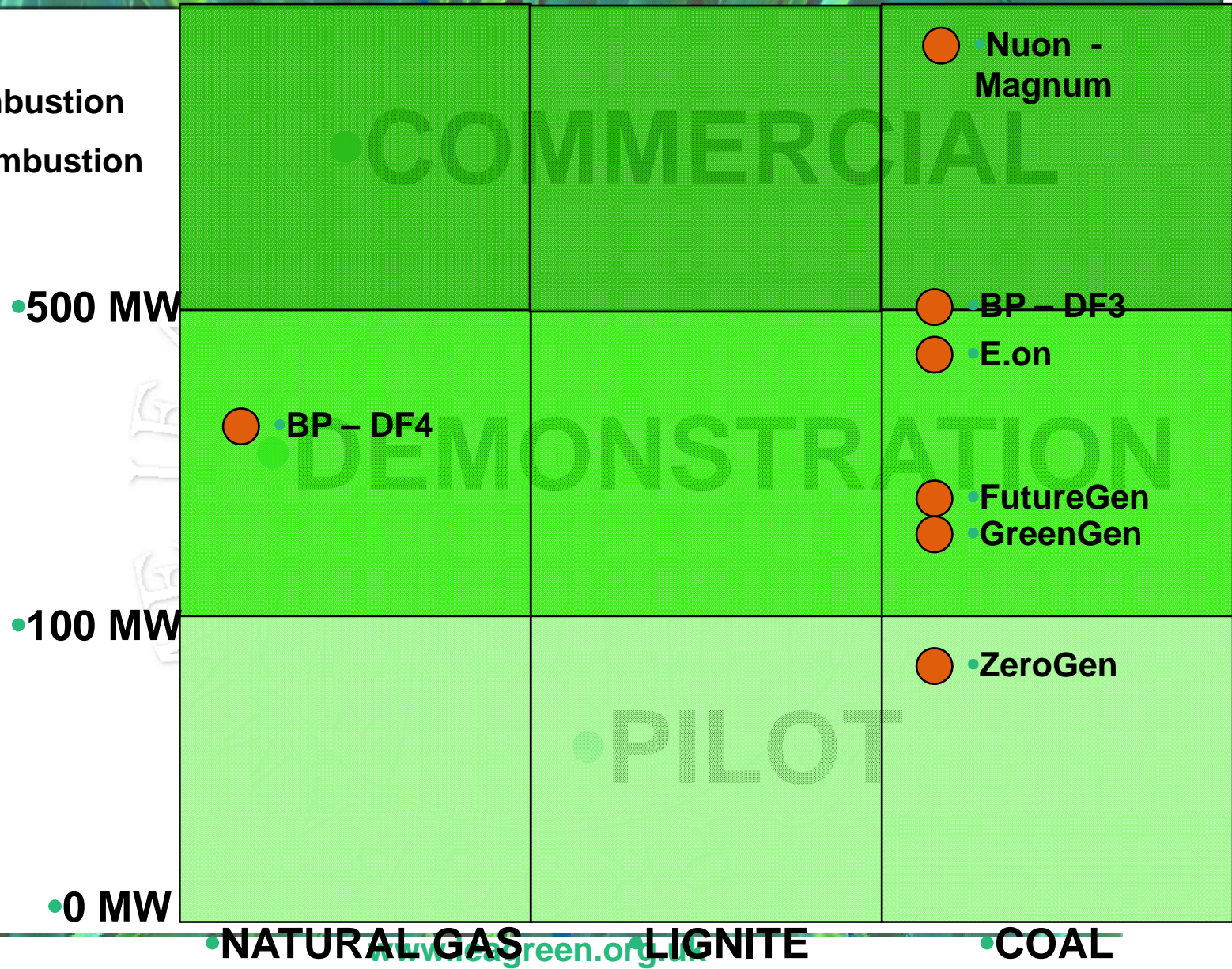




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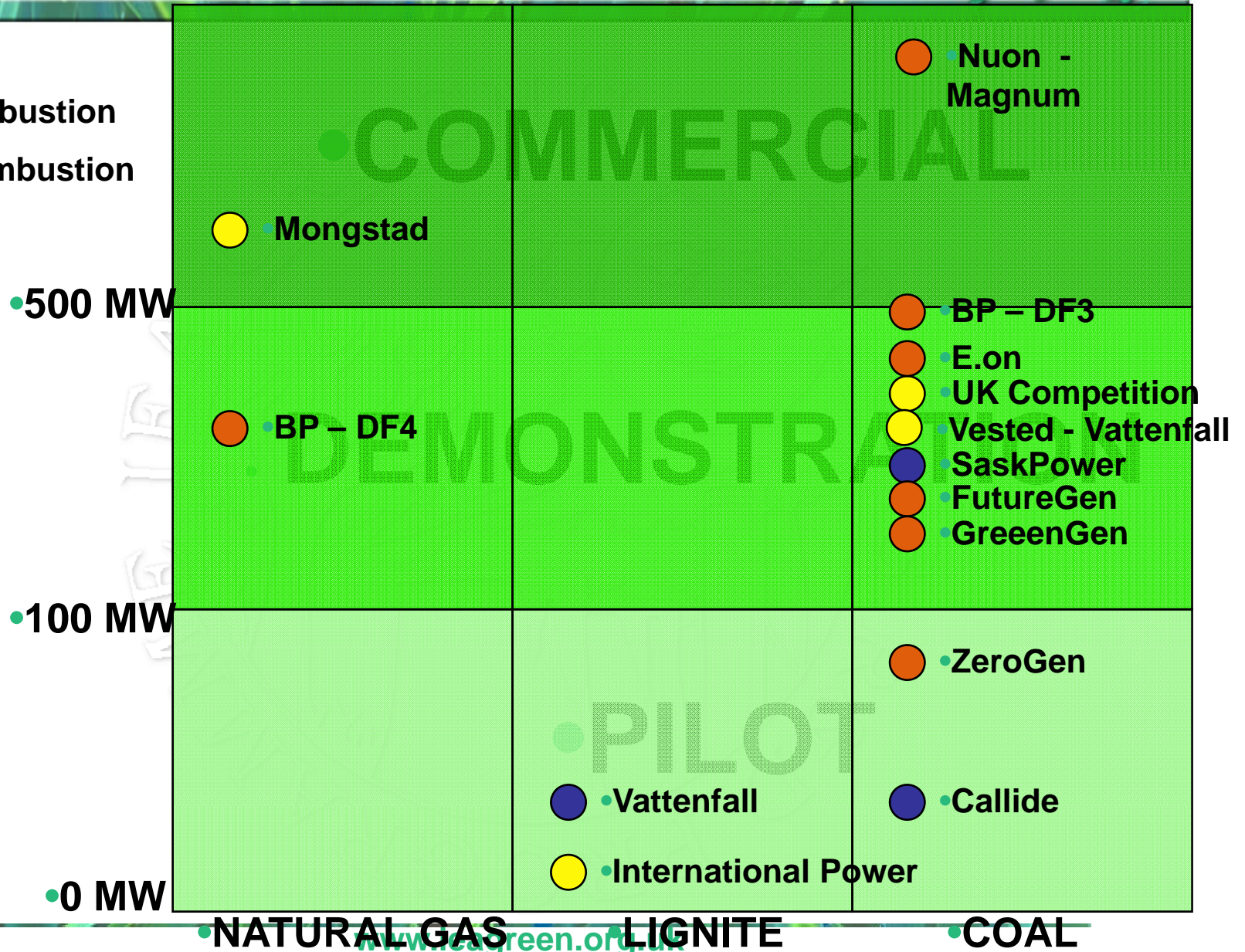




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Which Will Succeed?

Fuel Type	Project	Political Will	Financing	Regulations	Go Ahead
Natural Gas	Karsto Mongstad	Yes	Yes	Yes	2011 2014
	DF-1	Yes?	No	Yes?	NO
Coal (IGCC)	FutureGen	Yes?	Yes?	Yes	NO
	Nuon	Yes	Yes?	Yes	2015+?
	RWE	Yes	Yes?	?	2015+?
	DF-3	Yes	Yes?	Yes?	2014+?
	ZeroGen	Yes	Yes?	Yes	2015+?
Coal (PC)	UK Demo	Yes	Yes	Yes	2014
	Vaestad	Yes	?	?	2015?



Thank You
Any Questions?

General - www.ieagreen.org.uk

CCS - www.co2captureandstorage.info

GHGT-9 – www.mit.edu/ghgt9