

UK Nuclear Renaissance

Myth or Reality?

Simon Marshall

Westinghouse Electric Company

May 2013



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UK Nuclear Renaissance - Myth or Reality?

Agenda

Introduction

Westinghouse Toshiba

UK New Build in the 2000's

2 Black Swans?

Current Status

Summary

UK Nuclear Renaissance - Myth or Reality?

Westinghouse Electric Company

Yesterday.....

Founded in 1886 by George Westinghouse

Responsible for

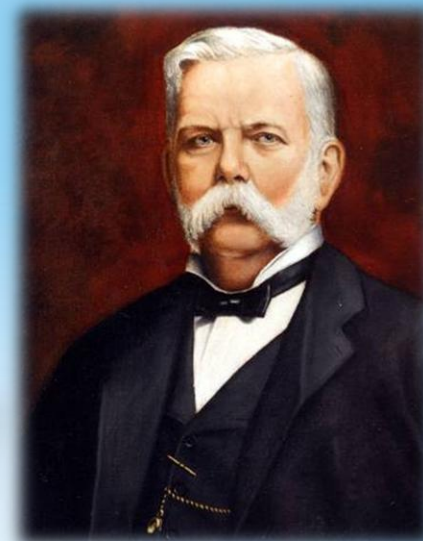
- Alternating Current (AC) Technology
- Shippingport NPP, PA

Today

Our **ONLY** business is
civil nuclear power!

Our Owners Now....

- Majority Owner Toshiba
- All Owners Committed to Nuclear Industry



TOSHIBA
Leading Innovation >>>



Today, 50% of the world's operating power plants are based on Westinghouse technology

UK Nuclear Renaissance - Myth or Reality?

Westinghouse and Toshiba



Nuclear Island (NI)



Turbine Island



Digital Instrumentation And Control



NI Equipment



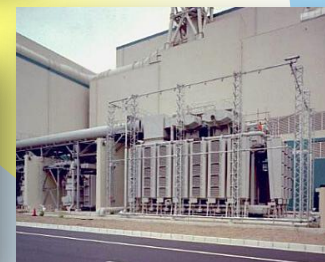
Nuclear Fuel



Construction Planning & Modularization



NI Equipment

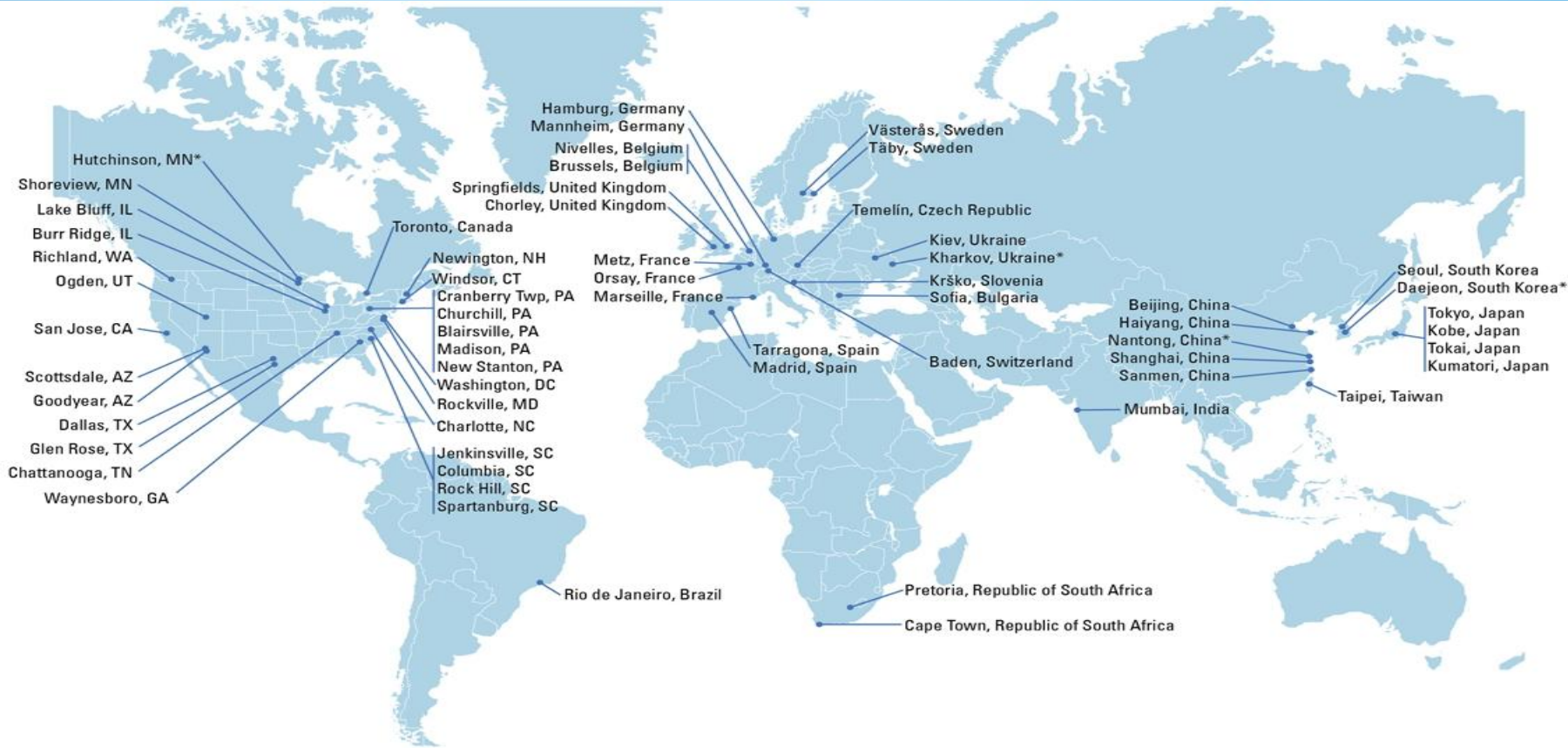


Transmission Distribution

*Experience, Strength & Capability to Deliver
'The best athletes for success'*

UK Nuclear Renaissance - Myth or Reality?

Westinghouse Locations



15,000 People in 20 Countries



UK Nuclear Renaissance - Myth or Reality?

AP1000 Plant Global Project Delivery

- Eight **AP1000** units under construction worldwide
 - Four units in China
 - Four units in the United States



HAIYANG ●

SANMEN ●

V.C. SUMMER ●

VOGTLE ●

UK Nuclear Renaissance - Myth or Reality?

Sanmen Site Progress: Time Lapse View

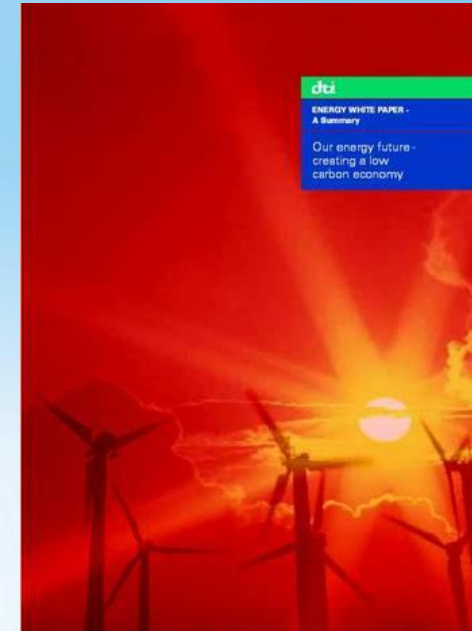
2009 to 2013



UK Nuclear Renaissance - Myth or Reality?

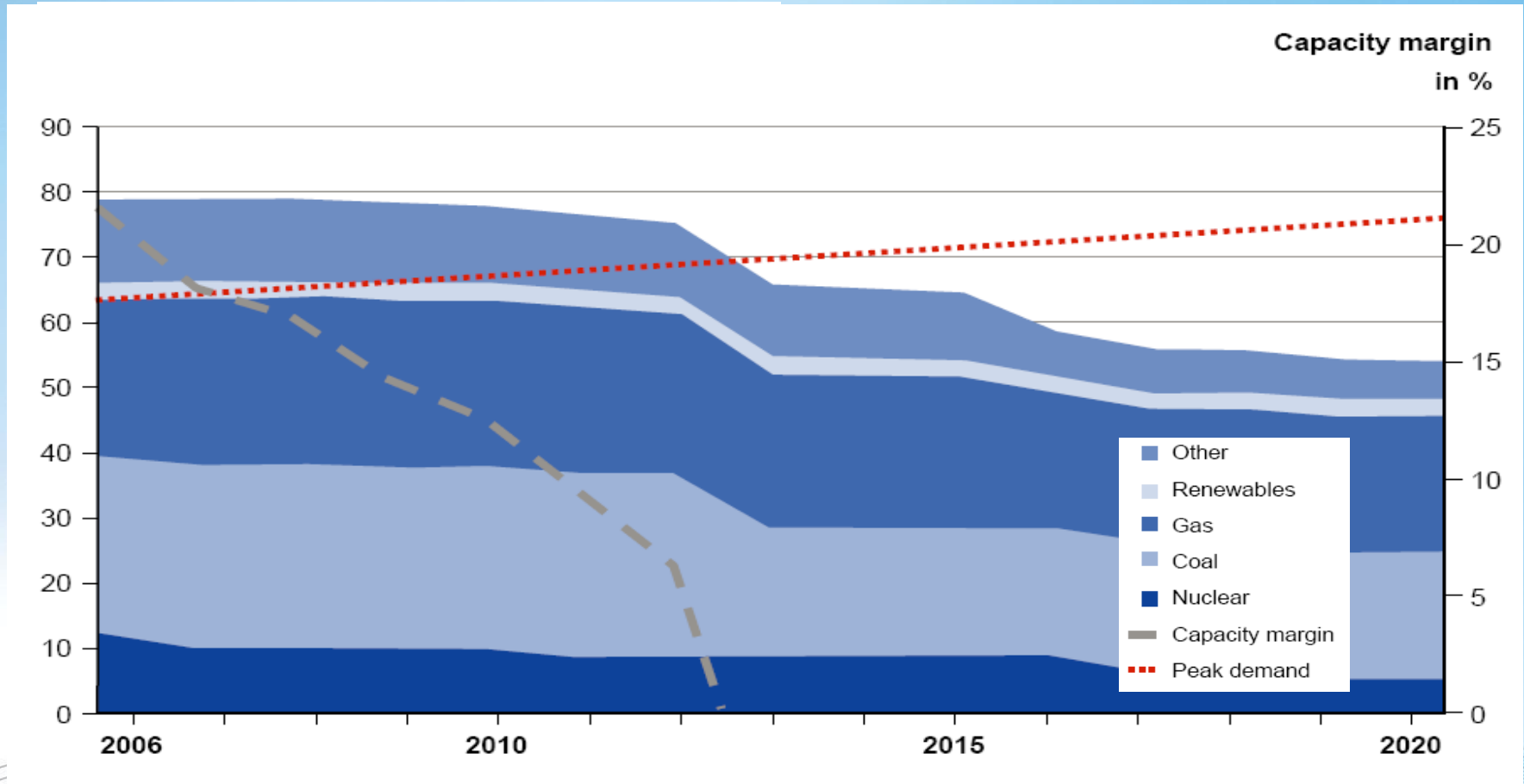
Energy White Paper 2003

- *Nuclear power is currently an important source of carbon-free electricity. However, its current economics make it an unattractive option for new, carbon-free generating capacity and there are also important issues of nuclear waste to be resolved. These issues include our legacy waste and continued waste arising from other sources. This white paper does not contain specific proposals for building new nuclear power stations. However we do not rule out the possibility that at some point in the future new nuclear build might be necessary if we are to meet our carbon targets.*
- Establishment of Nuclear Decommissioning Authority
- Break up and demise of BNFL



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Forecast Generation Capacity



Loss of capacity and carbon concerns => UK Government Policy of new nuclear build

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10:00am 23 April 2013: <http://www.gridwatch.templar.co.uk/>

U.K. National Grid Status

Data courtesy of BM Reports

Download entire data set (CSV):

Download

Links

Info



Demand 40.33GW



Frequency 50.102Hz



Coal 14.44GW



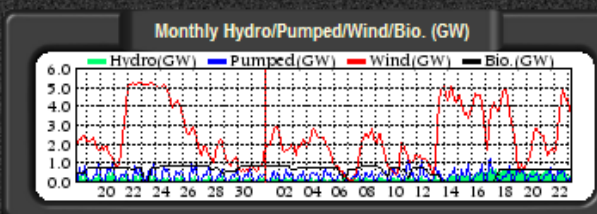
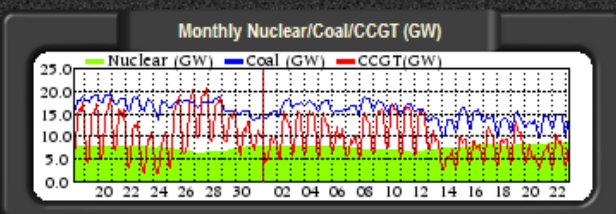
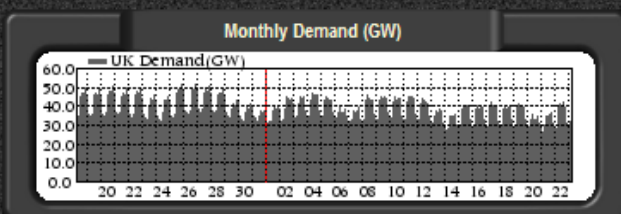
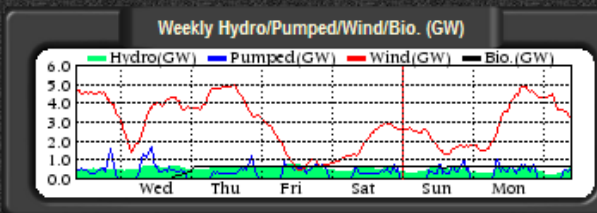
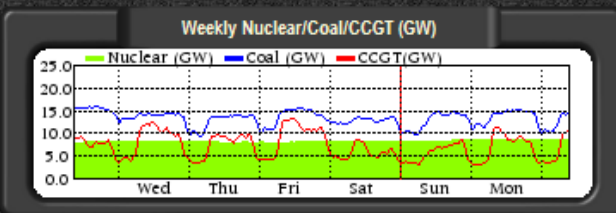
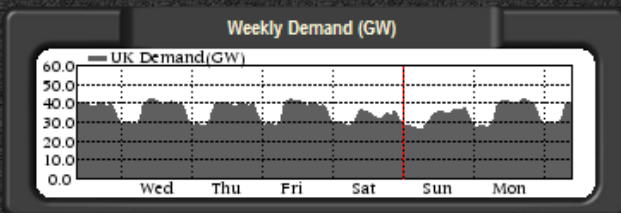
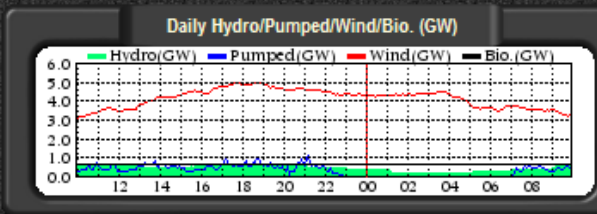
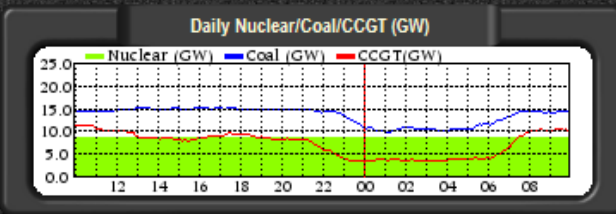
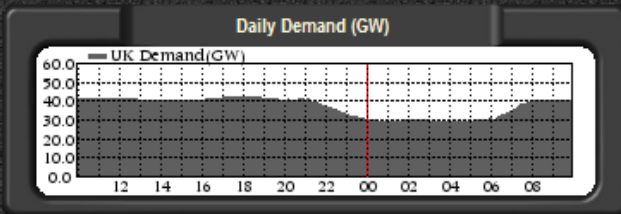
Nuclear 8.64GW



CCGT 10.23GW



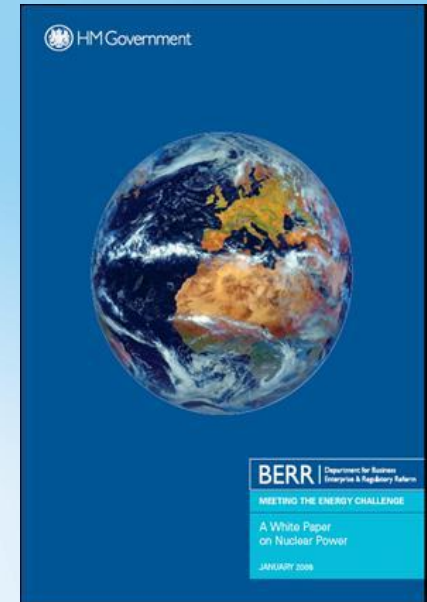
Wind 3.27GW



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2008 - Nuclear Power White Paper

- *“The Government believes new nuclear power stations should have a role to play in this country’s energy mix alongside other low carbon sources....and that the Government should take active steps to facilitate this.”*
 - Strong political support for new nuclear with desire to go well beyond replacement of existing nuclear
 - Government is committed to private sector investment
 - no US style incentives
- Created Department for Energy & Climate Change and Office for Nuclear Development
- National Skills Academy for Nuclear created
- National Nuclear Laboratory created



Published 10 January 2008

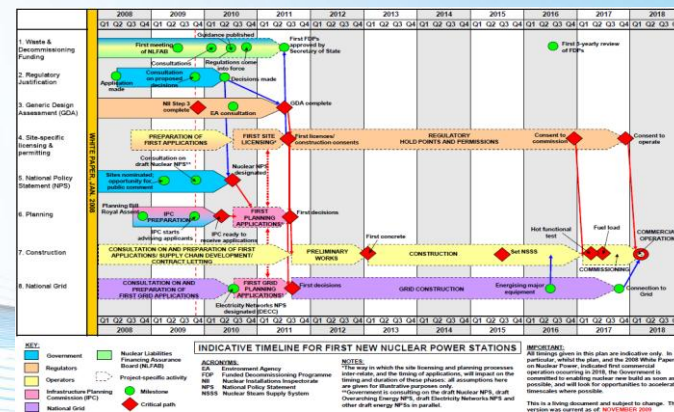
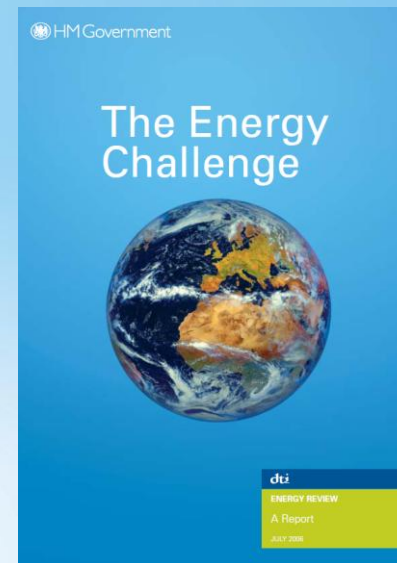


Nuclear firmly back on the government’s agenda

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UK HMG Facilitating Actions

- Waste & Decommissioning Funding
- Regulatory Reform
- Regulatory Justification
- Generic Design Assessment
- National Policy Statement
- Infrastructure Planning
- Electricity Market Reform



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National Policy Sites & Utilities ~ 2009

HORIZON

NUCLEAR POWER

Horizon (RWE/Eon) intends to build 6 GWe nuclear and has acquired land at Wylfa and Oldbury.

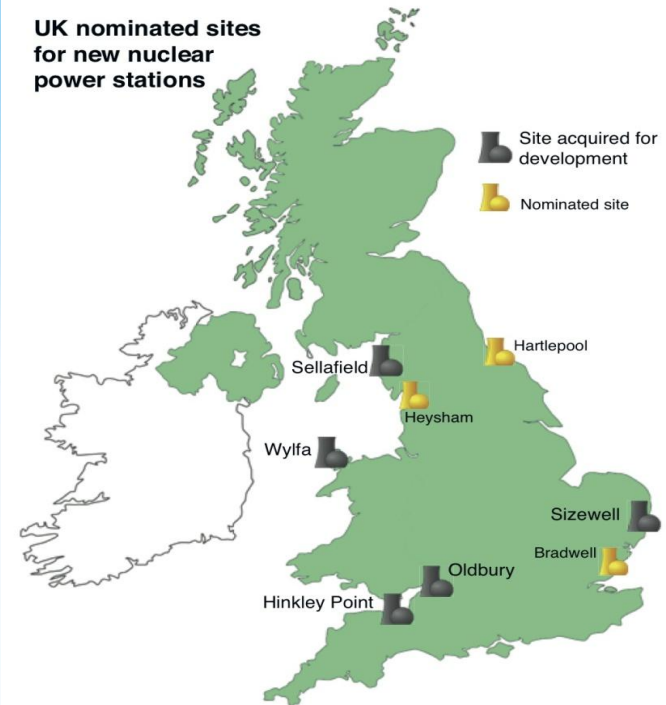
NU'GEN

NuGen (Iberdrola, GDF Suez, Scottish and Southern) intends to build 3 GWe nuclear and has acquired land at Sellafield



EDF Energy (having bought British Energy for £12Bn) and Centrica intends to build two EPRs at Hinkley and two at Sizewell

UK nominated sites for new nuclear power stations



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The Great Tohoku Earthquake



UK Nuclear Renaissance - Myth or Reality?

Fukushima Daiichi

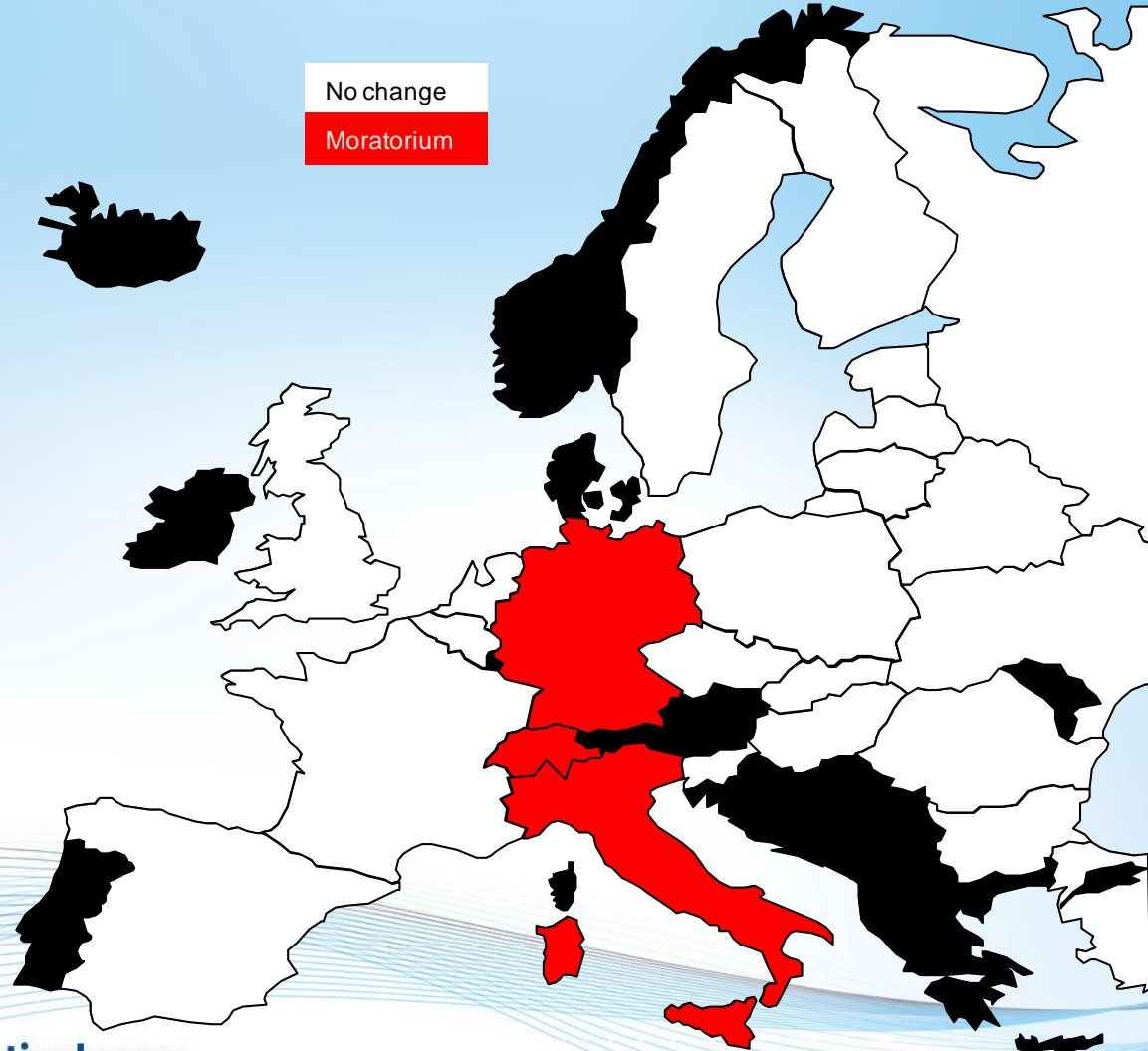


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UK Nuclear Renaissance - Myth or Reality?

Fukushima Impact on Europe



UK Nuclear Renaissance - Myth or Reality?

Fukushima Impact - Regulator and Political Views



I remain confident that our UK nuclear facilities have no fundamental safety weaknesses. The Office for Nuclear Regulation already requires protection of nuclear sites against the worst-case scenarios that are predictable for the UK. We will ensure lessons are learned from Fukushima. Action has already been taken in many cases, with work under way to further enhance safety at UK sites

Mike Weightman, Chief Inspector ONR



Having considered the findings of both your interim and final reports I continue to see no reason why the UK should not proceed with our current policy: that nuclear should be part of the future energy mix, as it is today, providing that there is no public subsidy, beyond that available to other low-carbon energy sources

Chris Huhne, Secretary of State



The AP1000's passive safety systems provide the ability to maintain core cooling for at least 72 hours with little human intervention. 72 hours to make repairs, transport emergency equipment, and take other actions in response to the earthquake and tsunami that assaulted the Fukushima site would have made a very significant difference

USNRC Commissioner William D Magwood IV

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Economic Environment



Euro zone slipped deeper than expected into recession in the last three months of 2012 after its largest economies, Germany and France, shrank at the end of a wretched year for the region.

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Economic Environment

Utilities

- EDF (83%)
- Iberdrola (69%)
- GDF Suez (65%)
- Exelon (65%)
- Fortum (58%)
- Vattenfall
- CEZ (39%)
- ENEL (63%)

Combined

- CGNPC
- SNPTC
- KEPCO
- ROSATOM

Vendors

- Hitachi (40%)
- Toshiba (46%)
- GE (46%)
- Areva (49%)
- Mitsubishi (42%)

Numbers in brackets is fall in share price from ten year high to price on 30 January 2013

Source: KPMG

UK Nuclear Renaissance - Myth or Reality?

NPS Sites & Utilities

Hitachi



Horizon (~~RWE/E.ON~~) intends to build 6 GWe nuclear and has acquired land at Wylfa and Oldbury.

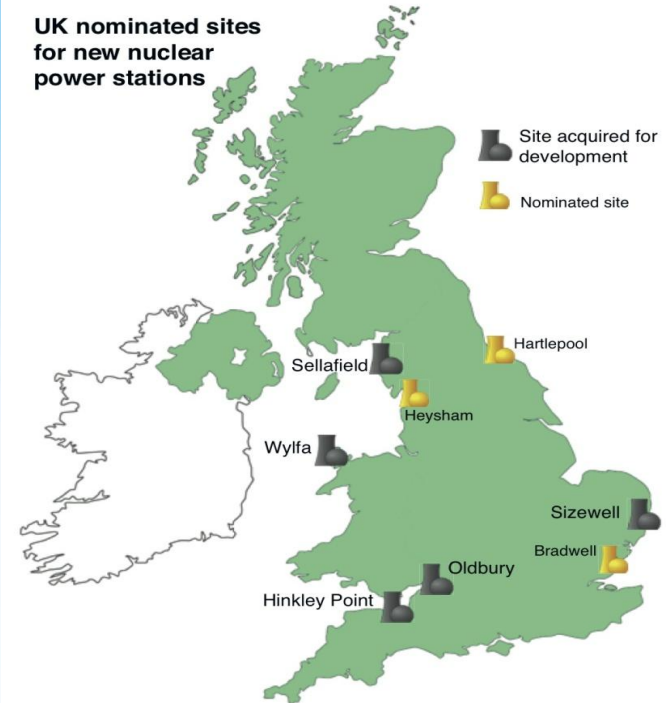


NuGen (~~Iberdrola~~, ~~GDF Suez~~, ~~SSE~~) intends to build 3 GWe nuclear and has acquired land at Sellafield



EDF Energy and ~~CenXica~~ intends to build two EPRs at Hinkley and two at Sizewell

UK nominated sites for new nuclear power stations

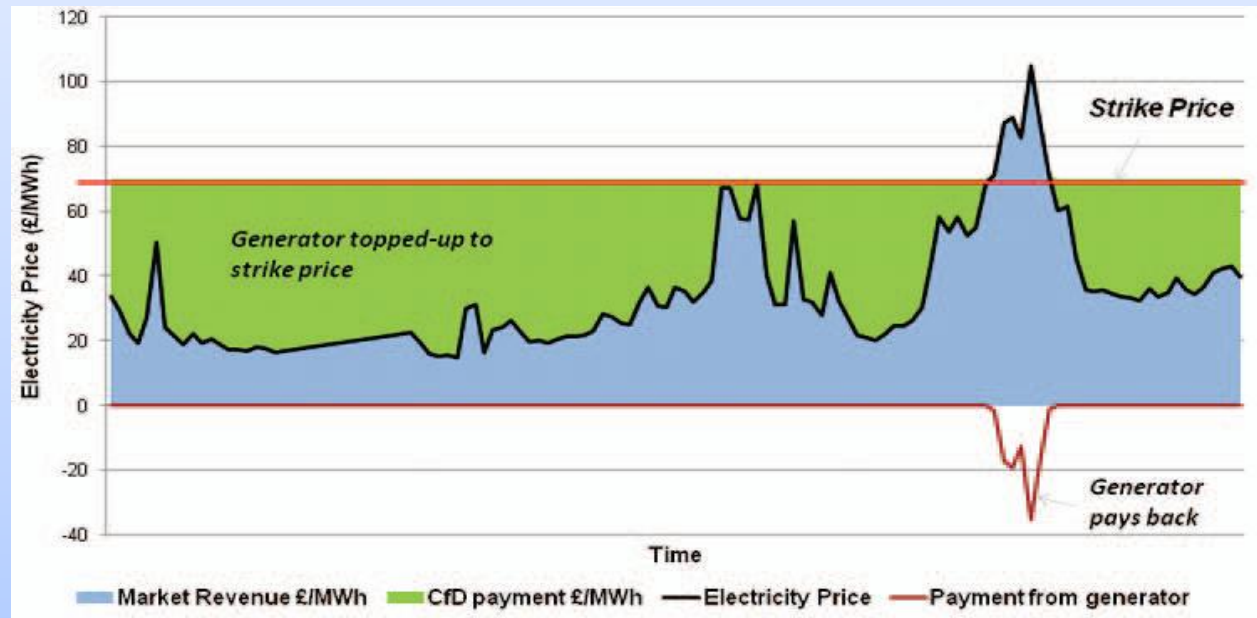


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Electricity Market Reform

•Commercial Investment Decision

Provides the revenue certainty for the investment case



•Financial Investment Decision

EMR doesn't of itself bring the investors.....

UK Nuclear Renaissance - Myth or Reality?

What the Papers Say.....

Whitehall dithering delays nine new power stations

Danny Fortson

EDF and UK closing in on nuclear deal

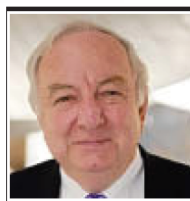
Crossing one's fingers is not an adequate or responsible approach when the UK's legally binding climate change commitments and energy security are at stake. For a department whose principal priorities are to ensure energy security and carbon reductions, DECC appears to be overly reliant on aspiration and hope.

House of Commons

Energy and Climate Change Committee

Hitachi cools on UK nuclear ambitions

Pressure off company to build reactors abroad as Japan signals industry revival



GUEST COMMENT
By Lord Foulkes of Cumnock

Why the free market can't do nuclear power

Treasury warned on EDF deal

- Nuclear industry predicts higher bills if plant talks fail
- Deadlock over Hinkley Point could hit energy sector



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Summary

Loss of capacity and carbon concerns => UK Government Policy of new nuclear build

HMG is adamant that new nuclear is for the private sector to fund

HMG have successfully put in place many enablers to reduce investor risk

World events have impacted utility interest and ability to invest in UK new nuclear

Will EMR be sufficient to bring investment?

Thank You



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