UK Nuclear Renaissance

Myth or Reality?

Simon Marshall
Westinghouse Electric Company
May 2013

AP1000 is a trademark or registered trademark of Westinghouse Electric Company LLC, its affiliates and/or its subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners.
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

Today, 50% of the world’s operating power plants are based on Westinghouse technology
UK Nuclear Renaissance - Myth or Reality?

Westinghouse and Toshiba

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
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
UK Nuclear Renaissance - Myth or Reality?
Forecast Generation Capacity

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

• "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
UK Nuclear Renaissance - Myth or Reality?
UK HMG Facilitating Actions

- Waste & Decommissioning Funding
- Regulatory Reform
- Regulatory Justification
- Generic Design Assessment
- National Policy Statement
- Infrastructure Planning
- Electricity Market Reform
UK Nuclear Renaissance - Myth or Reality?
National Policy Sites & Utilities ~ 2009

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

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 Hinckley and two at Sizewell
UK Nuclear Renaissance - Myth or Reality?
The Great Tohoku Earthquake
UK Nuclear Renaissance - Myth or Reality?
Fukushima Daiichi
UK Nuclear Renaissance - Myth or Reality?
Fukushima Impact on Europe

No change
Moratorium
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
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.
UK Nuclear Renaissance - Myth or Reality?

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

**NuGen**

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

**EDF Energy**

EDF Energy and Centrica intends to build two EPRs at Hinckley and two at Sizewell
UK Nuclear Renaissance - Myth or Reality?

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

Hitachi cools on UK nuclear ambitions
Pressure off company to build reactors abroad as Japan signals industry revival

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

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
## UK Nuclear Renaissance - Myth or Reality?

### Summary

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of capacity and carbon concerns =&gt; UK Government Policy of new nuclear build</td>
<td></td>
</tr>
<tr>
<td>HMG is adamant that new nuclear is for the private sector to fund</td>
<td></td>
</tr>
<tr>
<td>HMG have successfully put in place many enablers to reduce investor risk</td>
<td></td>
</tr>
<tr>
<td>World events have impacted utility interest and ability to invest in UK new nuclear</td>
<td></td>
</tr>
<tr>
<td>Will EMR be sufficient to bring investment?</td>
<td></td>
</tr>
</tbody>
</table>
Thank You