IMfT Workshop at Sheffield Forgemasters

Thursday 26th November 2009

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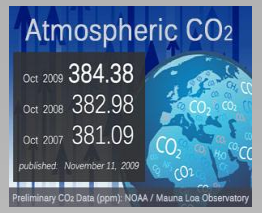
The Energy Market 2009-2020



Opportunities in the UK Energy Supply Chain

By

John Yarnall

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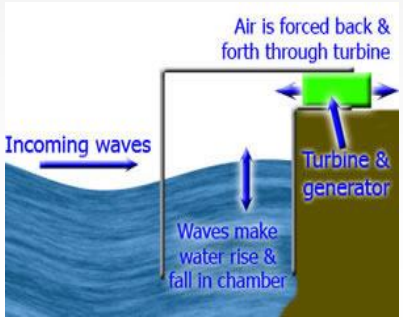

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Contents:

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HOT ISOSTATIC PRESSING
MATERIALS TESTING
METALLURGICAL COATINGS

Introduction:

Opportunities for UK engineering manufactures to supply a variety of parts to energy services companies has never been more assured in view of the urgent need to replace aged power stations, and newer renewable energy systems.The UK government has recognised the ever growing demand for ‘clean power’, via a ‘new mix’ of energy supply technologies. World demand for electricity demand is forecast to grow at an unprecedented rate well beyond 2050’s. Moreover, global warming predictions have added additional emphasis on greener and less polluting energy generation technologies.Such technologies gives particular focus to:

- Nuclear
- Wave, Tidal
- Wind
- Solar
- Bio energy
- Clean coal and oil/carbon capture.

Over the next 12 years, the UK will lose about one third of its existing generation capacity primarily due to the closing of aging its coal-fired and nuclear power stations (Equivalent to 20GW of power). These stations will be replaced by newer and more cost efficient/less polluting types.

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Will there be a shortage of supply

- How is the UK going to survive ?
- Will the lights go out?
- Will there be a return to the four-day week with major power cuts?
- Will the UK rely mostly on imported energy ?
- How will the UK meet its commitments to carbon reduction?
- Has the UK got the necessary skills and manufacturing base to meet the challenges for new clean energy?
- Has the UK got the sustainable political will to support the challenges that lie ahead?

Background

- The UK government has announced its support programme to introduce a ‘new energy mix’ for power generation to 2050 and beyond.
- Climate change commitments will dictate that only ‘green/clean’ power generation will be considered.
- Wave, tidal & wind power will form part of the energy supply mix, but would never amount to more than 20% of UK requirements. And that Nuclear & coal fired stations would handle the remaining 80%
- The EU’s and UK’s environmental targets to 2020 will require 20% reduction in GHG with 20% consumption of energy being met by renewable.
- The UK is leading the world in offshore wind, wave and tidal energy.
- The UK has the largest plans for offshore renewables in the world.
- There are major opportunities for UK manufacturing business.
- The UK’s ‘New Nuclear’ build programme will run from 2009 to 2025
- Preferred sites for 4 of New Nuclear power stations are at existing sites.Namely,Hinkley Point & Sizewell , Suffolk coast.
- New Nuclear’s two reactor designs: Westinghouse AP 1000 PWR & Areva’s EPR

Energy providers:

The main energy providers:

- EDF of France- EDF has recently taken over British Energy (BE). EDF now operate 19 reactors at 8 operating sites, and one coal-fired station. Further plans include a gas-fired power station and wind farms. In comparison EDF operate 58 on 19 sites in France which is equivalent to 1350 years of operating experience!
- RWE and E.ON German consortium- they have also announced that they intend to build 4 nuclear stations over a similar time scale
- GDF Suez, Iberdrola and Scottish and Southern Power has also formed a consortium to try to enter the UK market.

Predicted UK power station closures

COAL FIRE POWER STN CLOSURES (2007 DATA)

TILBURY	COAL	1.1 GW
COCKENZIE	COAL	1.2 GW
DIDCOTE	COAL	2.1 GW
FERRYBRIDGE	COAL	1.0 GW
IRONBRIDGE	COAL	1.0 GW
KINGSNORTH	COAL/OIL	2.0 GW
LITTBROOK	OIL	1.2 GW
FAWLEY	OIL	1.0 GW
GRAIN	OIL	1.4 GW
	TOTAL CAPACITY	**12 GW**

NUCLEAR POWER STN CLOSURES

PLANT	CLOSURE DATE	GEN (GW)
OLDBURY	2008	0.5 GW
WYLFA	2010	1.0 GW
HINKLEY B	2011	1.3 GW
HUNTERSTN	2011	1.2 GW
HARTLEPOL.	2014	1.2 GW
HEYSHAM	2014	1.2 GW
DUNGERNS	2018	1.1 GW
TOTAL		**7.5 GW**

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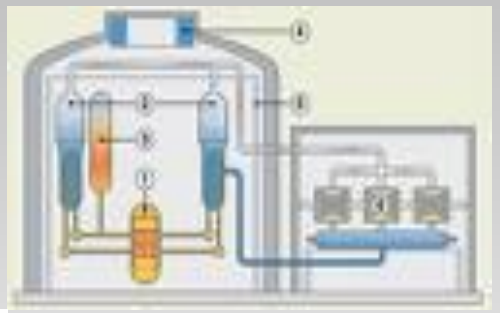
New Nuclear Energy-advanced PWR design

Consortium agreements in build: Westinghouse, BAE Systems,R-R and Doosan Babcock

Westinghouse's AP 1000 is the latest design with advanced safety features. It is of modular design and simpler to build with fewer components. Output: 1150 MW.Can deliver in excess of **£30 billion to the UK economy**



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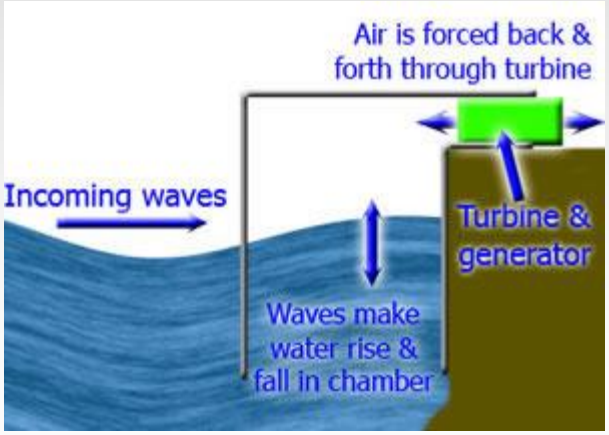
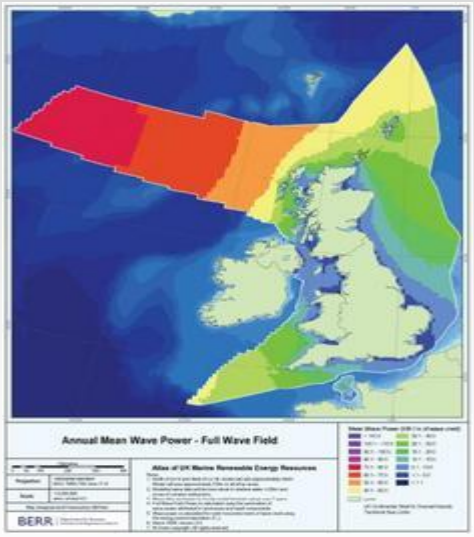
Tidal & Wave Energy

A variety of technologies have been proposed to capture the energy from waves. Some of the more promising designs are undergoing demonstration testing on commercial scales.

Countries with a strong wave resource, such as the UK are in extremely favourable position. It has been estimated that marine renewables could meet 15 to 20% of current UK electricity demand, the bulk of that contributed by wave power

Rendition of a Wave Farm Made Up of Permanent Generator Buoys





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Wind Energy

- The UK is in a unique position of having the best off-shore wind energy than most other countries.
- The UK has more development work focused in three prime areas than anywhere else in the world.
- The UK Government was targeting 30% renewable electricity by 2020. Onshore wind :14 GW

  Offshore wind :20GW

  Win offshore and onshore is currently 3.3 GW,~2%
- Offshore wind: 598 MW installed; 774 MW under construction; 3866 MW consented; 1320 MW planned
- The time table for renewable energy is great for UK business

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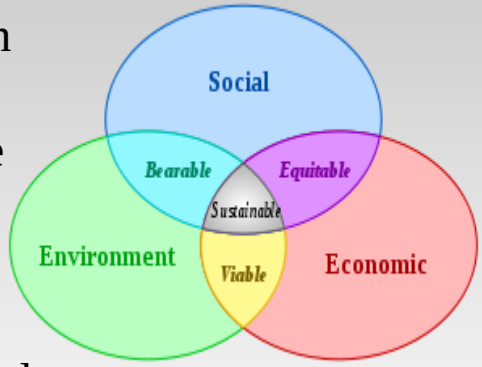
The UK energy programme

- The present UK energy mix cannot continue
- The climate change commitments made be the UK Government means that fossil fuel power must decrease whilst renewable energy sources must increase.
- However, there will be a need for a non-carbon reliable “base-load” power source means that nuclear power is destined for a revival in the UK
- Political opposition to nuclear is changing:there is now agreement by the vocal green lobby, with some notable environmentalists in support of new nulcear
- The UK Government has published a bill to get UK training providers to address skills shortages in nuclear engineering, and UK Universities will be expected to play their part to meet the challenge.
- Energy providers will encourage wherever possible to source services and component manufacture locally in the UK. Areva and Westinghouse are strongly promoting this.
- UK Supply chains will be formed to provide equipment and services via accredited vendors

Sustainable Development

“Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment”

What is sustainable development in the context of energy supply: One of the easiest ways to understand sustainable development is to consider the legacy that we leave to those who follow us. Whether through environmental pollution,depletion of non-renewable resources or social inequity, we need to understand the impacts that our actions today will have on the opportunities for future generations to develop and live healthy, happy and full lives.



By the use and thoughtful selection of energy type and materials, the environmental and economic costs can be reduced.

Nuclear supply chain opportunities

- UK manufacturing companies must be pro-active and lead the way to promote there services.
- Action for companies to join supply chains is now urgent
- China for example is already building four AP 1000 PWR's and most services & equipment is sourced locally in China. The Westinghouse plan is that the first Chinese plant will be operational by 2013.
- Four AP1000 PWR's will be built for the USA, with a further 10 reactors being considered.
- A fleet of AP1000 plants for the UK could be worth **£30 billion** to the UK supply chain in equipment supply, jobs and fuel supply.
- Product requirements: Valves, forgings, fasteners, turbine systems, various metal formed and cast parts, surface coatings, technology services, electronics and motors drives and various analytical/ computer modelling/training services

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Nuclear energy supply chains

Impact on Supply Chain:

The Westinghouse approach is to "Buy Where We Build™". This means local sourcing of materials and skills wherever possible. The problem is that it has been estimated that only 70% of the required materials and skills can be currently sourced from within the UK. This includes the whole life-cycle of a nuclear station. The timescales are very tight. Even with the correct approvals, it will take 4 years before construction can start. However, it is necessary to prepare by getting involved at an early stage. Westinghouse have already become involved with significant UK companies in the nuclear field:

Rolls Royce
BAE Systems
Doosan Babcock

Any company wishing to register interest can do so by using the Westinghouse Supply Chain Management Portal on their website at: www.westinghouse.com

The major reactor designers are: Westinghouse and Areva plus the major players Rolls Royce, BAE Systems and Doosan Babcock.

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Where to begin?

- The commercial and manufacturing supply opportunities could provide huge benefits for UK companies to 2050
- To decide if your company and its service capability is ready to consider entering UK manufacturing energy supply chain- research should be first priority!
- If there is a positive answer to these questions, then attend one of the planned supply seminars or events organised by one of the listed providers-SMF , namtec, R-R & Westinghouse.
- The route to supply for manufactures and service providers can be complicated and very lengthy. There is always a need for prospective suppliers to follow a route of best methodology stipulated by the energy supply chain convention. To ignore can prejudice solid progress and opportunity to gain long-term partnership in the chain.

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Thank you for your attention

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