Doosan Babcock Energy

The Energy White Paper - a view from Doosan Babcock - part of a group which supplies coal, gas, nuclear and renewable power generation plant globally

Mike Farley

IPA session at ALL- Energy'07 Conference Aberdeen

23 – 24 May 2007

Company update

Nuclear

Thermal

Turbine & Generator

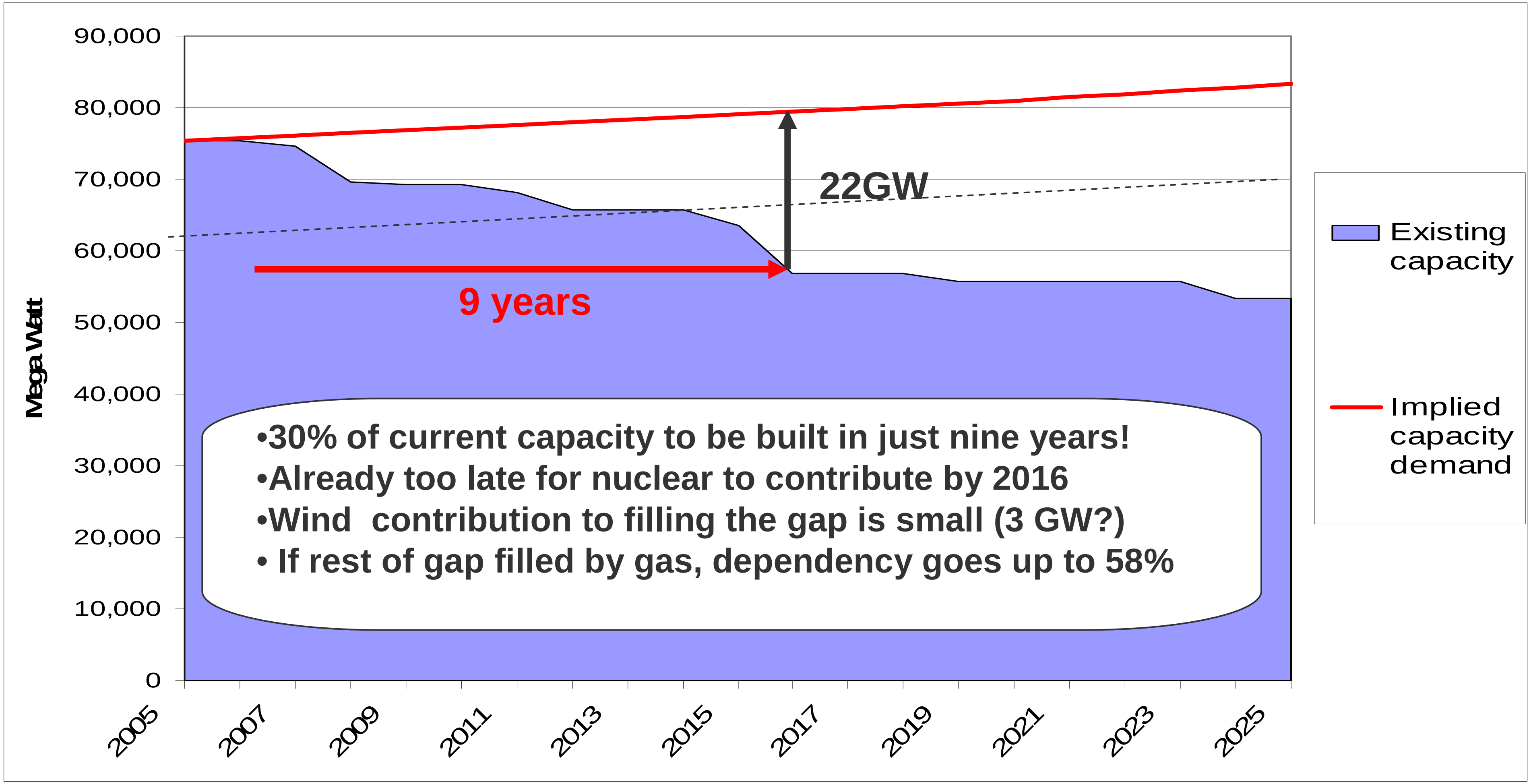
Desalination

Casting & Forging

Construction

- Our new name is Doosan Babcock Energy Limited,
- We are now a subsidiary of Doosan Heavy Industries and Construction of South Korea, part of the Doosan Group – the oldest and one of the top 10 conglomerates in Korea
- Doosan Heavy is a market leader in gas, coal, nuclear power generation and desalination . Orders in 2007 to date total 5 Bn USD
- Doosan Babcock remains committed to all forms of power generation, including clean coal, nuclear, gas and renewables
- Doosan Babcock will be the Doosan global Centre of Excellence and global R+D Centre for Boilers (including Clean coal and Carbon dioxide capture)

22GW of new power plants need to be in operation in 9 years !



* Assuming an illustrative peak capacity margin of 20%

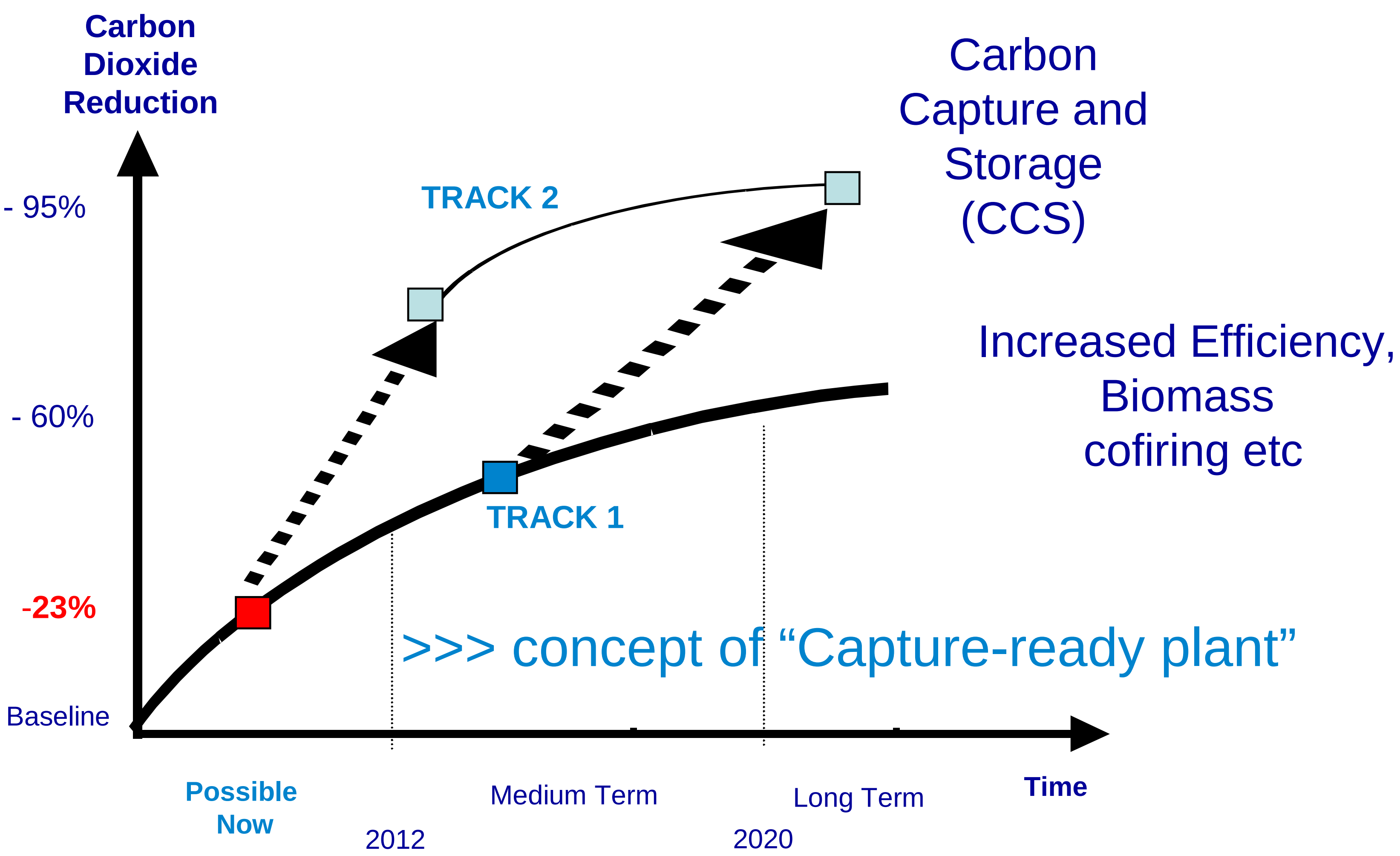
UK Coal Forum

- ***"The Government will convene a coal forum to bring together coal-fired generators, coal producers and suppliers, power plant suppliers, trade unions, small businesses and other parties in order to help them to find solutions to secure the long-term future of coal-fired power generation and UK coal production"***
- *Announced in the DTI Energy Review report 2006*
- *Four meetings held, chaired by Sir John Collins, attended by the Energy Minister Lord Truscott*
- *Sub groups established on Planning, Infrastructure, Power generation and Future markets, looking at what is needed for Low, Medium, or High Coal scenarios*
- **Coal Forum is exploring options based on Low (5GW), Medium (10GW), and High (15GW) amounts of new/replacement Coal power plant (cf 8 GW of coal power plants which will close by 2016)**

How things have changed for coal in about a year

- Recognition that the world scene will continue to include massive amounts of coal generation, and coal fired power plant must be cleaned up, not substituted
- Loss of confidence in gas, and recognition that gas too needs to be much cleaner to achieve climate change targets
- EU and UK politicians and officials are now talking about the *whole* generation mix, not just about the renewables part and are recognising that renewables and energy efficiency - whilst vital - cannot do it all.
- Coal important in the new EU Energy Package – capture ready from 2010, CCS from 2020, 10-12 demonstrations of CCS operational by 2015
- UK coal fleet, already old (21 - 46 years), is one year older and the time available to start building new power plants that can fill the generation gap is only five years
- Wide acceptance, evidenced by our customers' plans, that Clean Coal can be Supercritical or Gasification and that plants can be designed to be "Capture Ready"
- 38% of UK electricity is from coal (48% in winter 2007)

CO_2 Abatement from Fossil Fuels – Twin Track Approach



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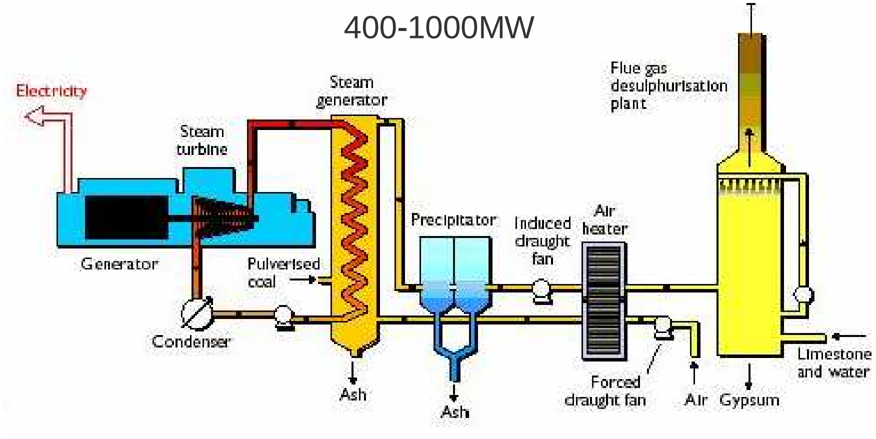
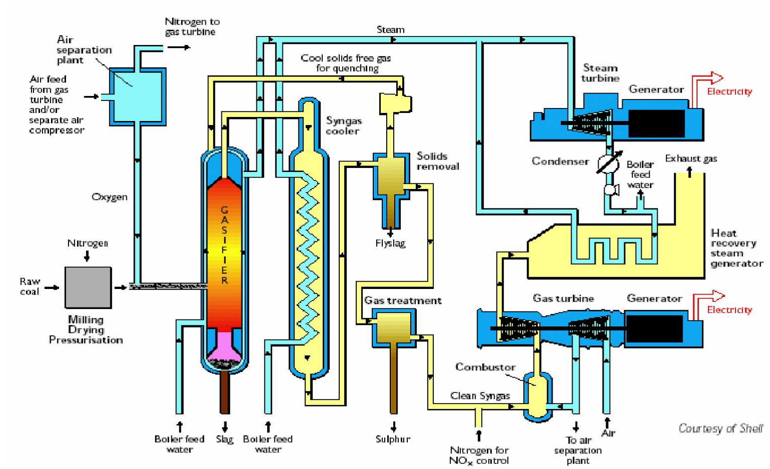
Clean Coal Technologies available now

- **Higher efficiency / lower emissions than current coal, better than LCPD standards**
- **Lower cost electricity than gas or renewables**
- **Suitable for UK or imported coal**
- **Suitable for Carbon Capture and Storage (CCS)**
- **ASC PC offers Capture-Ready Retrofit options**
- **IGCC offers Hydrogen options and is especially suitable for Petcoke**

Advanced Supercritical Pulverised Coal
Boiler/Steam Turbine
400-1000MW



Integrated Gasification Combined Cycle
250-900MW



New Coal-fired Power Plant- Overseas

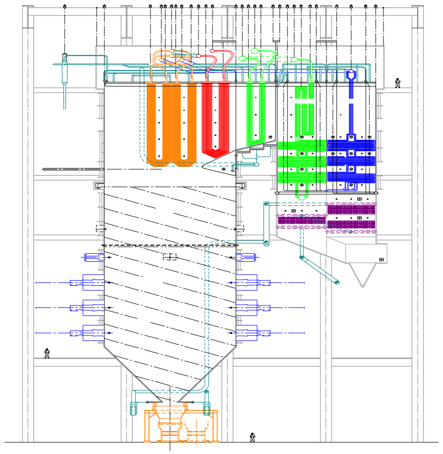
…..Numerous inquiries for new coal fired power plant

….Almost all are for Supercritical Pulverised coal

Doosan order last week for 5 X 800MW Supercriticals in India

Doosan Babcock 10GW of further orders for 600MW supercritical boilers in China

Current enquiries in Germany, South Africa ….



eg Trimble County 750MW for EON USA

Coal Fired Plants planned in the UK

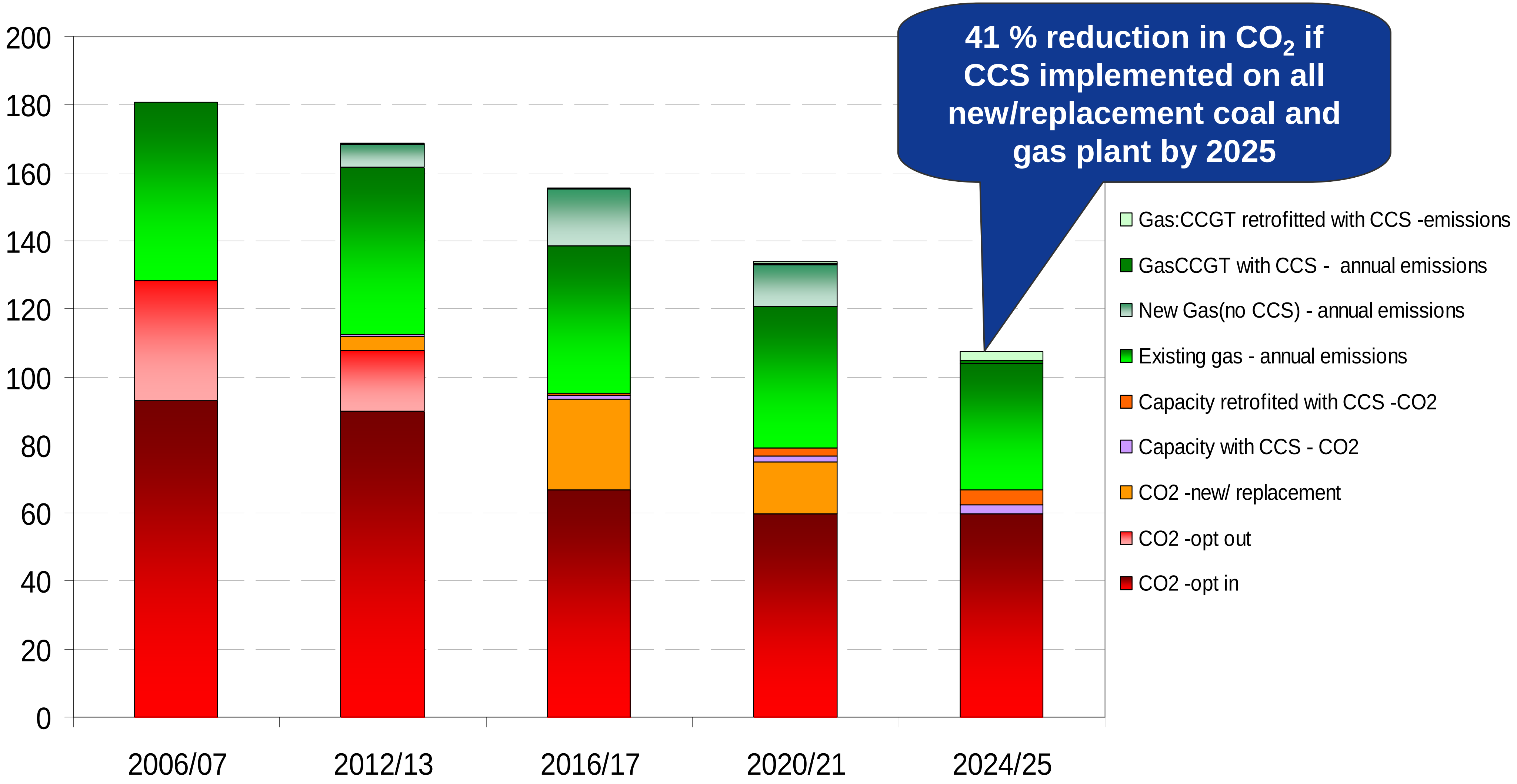
	Location	Size/Technology	Date	Status
New Capacity				
Powerfuel	Hatfield	2 x 430MW IGCC with Capture	2011	Section 36 consent. FEED study starting
E.ON	Killingholme	450-500MW IGCC with CCS	2012	Internal feasibility study underway
Centrica	Teesside	800 MW IGCC with CCS	2011	FEED study started
RWE npower	Blythe	New build ASC (Capture ready) 3x800 MW		
Replacement / Retrofit				
SSE	Ferrybridge	1 or 2 x 500MW ASC Retrofit (Capture Ready)	2011	FEED study well advanced
RWE npower	Tilbury	1600MW ASC (Capture Ready)	2013 + 14	Scoping Report submitted 13/3/07
E.ON	Kingsnorth	2 x 800MW ASC (Capture Ready)	2012	Section 36 applied for 11/12/06
Scottish Power	Longannet and Cockenzie	ASC retrofit (capture ready), up to 3390MW	2012 onwards	Feasibility study announced 17/05/07

FEED study contracted with Doosan Babcock and Siemens

Concluding Remarks – Technologies

- **Technologies exist, don’t need to be invented**
  - **Available with full commercial guarantees for Capture - ready plant now**
- **Carbon capture technologies (all) need scale up and full size demonstration for coal and gas**
- **Storage technologies need demonstration for all three types of storage sites**
- **Government support needed for need for R,D *and* Demonstration**

CO_2 Emissions – Medium Coal scenario



- **Can the new stations be built?**

Optimum programmes – Coal Power Plant

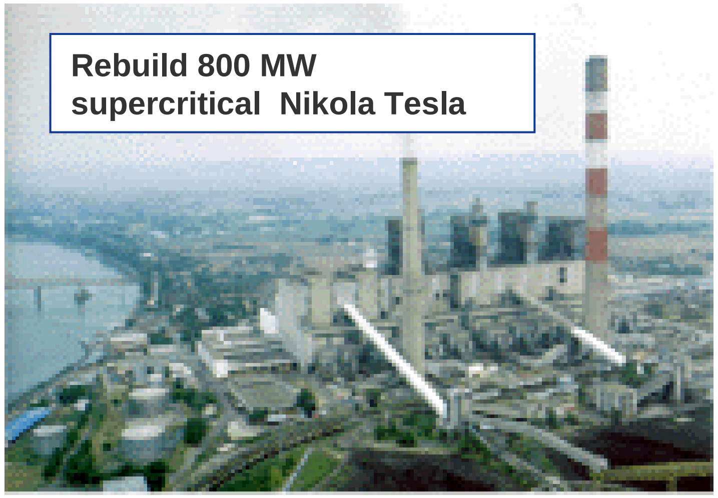
	Retrofit	New Plant
Planning , consents and FEED	1 year	2 - 3 years
Design and engineering	1 year	1 year
Manufacture	1 year	1 year
Construction and commissioning	1 year	2 years
Total	4 years	6 - 7 years

Only 9 years to go to 2016 !

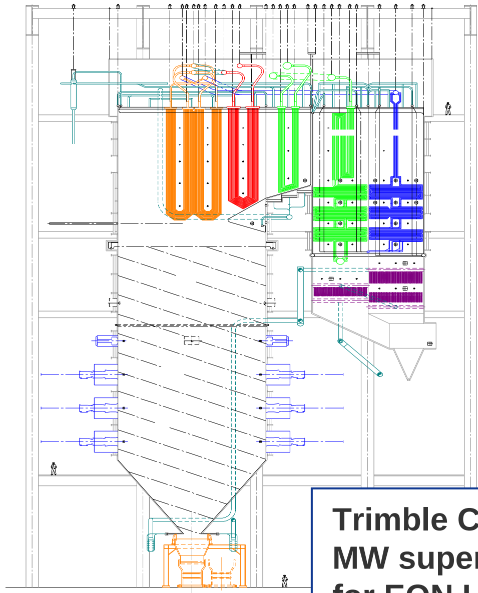
Huge risks if projects are delayed by Planning or Consents or Resources !!

Key resources maintained –Doosan Babcock

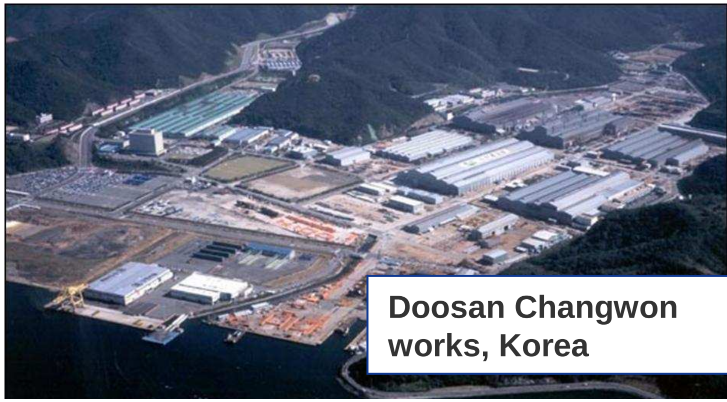
Changshu 3 x 600 MW supercritical boilers



Rebuild 800 MW supercritical Nikola Tesla

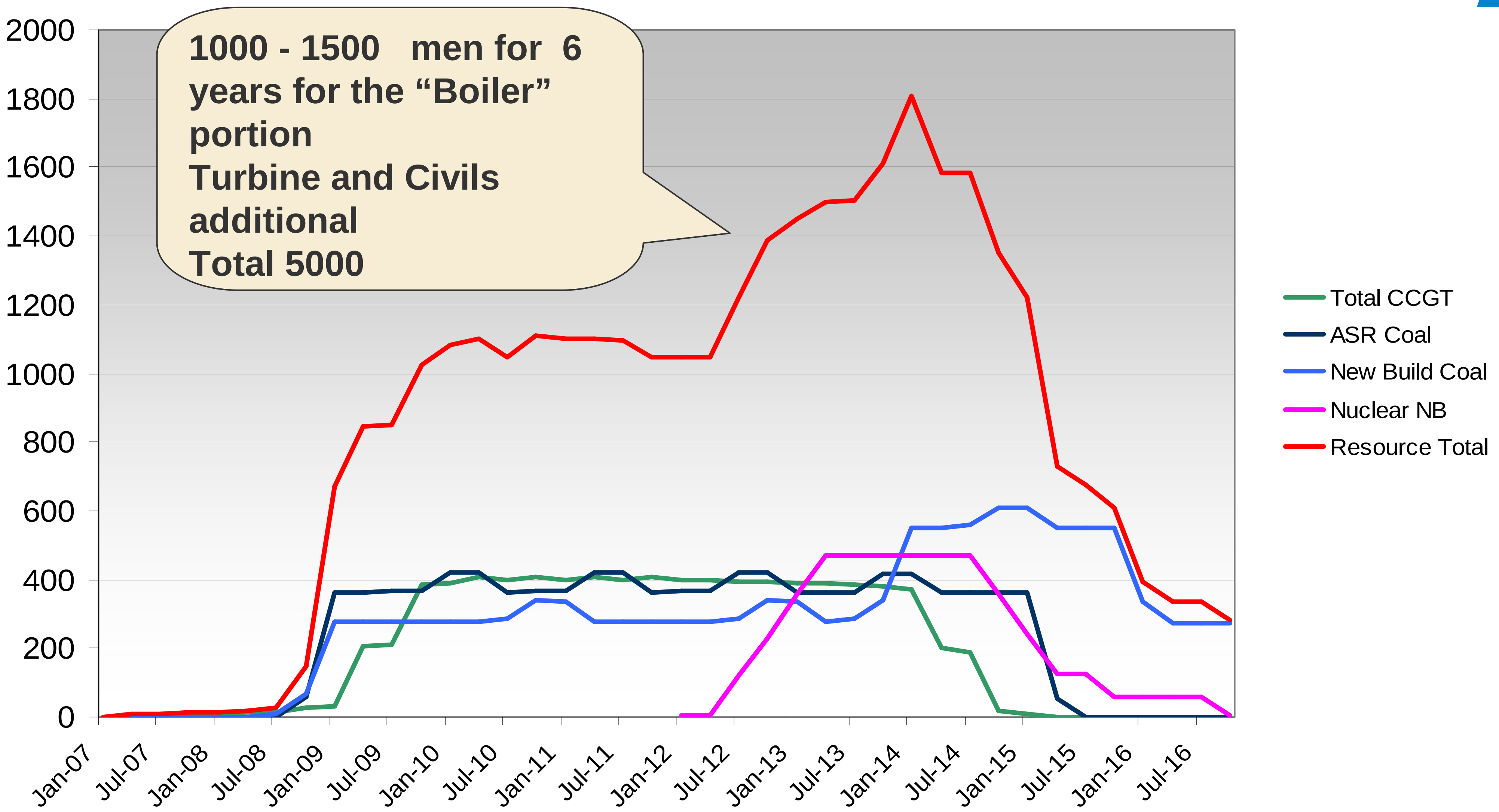


Trimble County B 750 MW supercritical boiler for EON USA



Doosan Changwon works, Korea

Construction labour resource 'Phased build' scenario



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- **What do we need from the government ?**

Messages to the Government ahead of the 2007 Energy White Paper

- **We need recognition that it is already a major challenge to fill the generation gap!**
  - **Never forget that if plants are not built the lights will go out**
  - **Phasing of build essential, "just in time" not feasible**
- **EWP must be absolutely clear that new/replacement coal and gas power plants are necessary**
  - **Unnecessary planning and consent hurdles must be avoided**
  - **Statement of Need required for fossil fuel power plant (coal and gas), FGD and SCR retrofits, CCS facilities, and coal mining**
  - **Remove discrimination in UK ETS NAP against new clean coal**
- **Adopt EU policy on fossil power plants (Coal <u>and</u> Gas) - capture ready from 2010, CCS from 2020, 10-12 demonstrations of CCS operational by 2015**
- **Kick- start *multiple* CCS demonstration projects via Treasury competition**
- **Re-establish confidence in long term support for R+D**
- **Ensure Training Agencies, Universities and Trade Unions recognise new build coal and gas power plant (and CCS) in their forward planning**

2007 Energy White Paper

What we wanted….

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What we got…..

- “Need for timely investment” stated to be the 2nd main challenge to security of supplies
- Discusses risks due to likely narrowing of margin and how to prioritise power cuts !
- “Fossil will continue to provide the great majority of power out to 2020 and beyond”
- Recognises generators’ plans for state of the art capture- ready coal fired plant
- But no detail on removing hurdles

\+ positive endorsement by the new Scottish government for Clean coal in Scotland

2007 Energy White Paper

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What we got…..

- EU announcement "welcomed" and global importance of CCS stressed but no clarity on whether or not the policy will be adopted
- Commitment to one demonstration
- Fine words on R+D but no clarity on budgets
- Issue recognised but needs more detail

World Market for CATs for coal –preliminary estimates

Countries/ Region	CATs market GW	Total global market value for CATs in £M	Market share for Scottish Companies GW							Carbon Dioxide Transpor and Storage
Total Europe	481	255,362	124						7	48,68
Total China	976	535,013	188						,061	29,45
Total India	103	48,980	22	2,956	95	18,741	9,686	3,414	31,986	86,42
Total USA	353	156,023	66	14,655	205	92,024	44,031	16,752	161,486	7,76
Total ROW	1,073	525,423	186						,161	62,79
Breakdown by Product										
ASC retrofit in 2005 - 2020	146	23,774	37						,986	
ASC retrofit in 2021 - 2030	2	454	1	176	0	1,296				
ASC New Build Licence	-	0								
ASC New Build 2005 - 2020	497	524,114								
A										
A						42,979				
						46,527				83,08
Fitted with CCS in 2031 - 2050	148	74,616	42	2,284	1,827	38,598	38,754	6,920	22,145	152,03
Total		**1,520,801**	**577**	**107,078**	**8,072**	**659,837**	**354,635**	**120,836**	**1,134,670**	**235,12**

1.Estimate market in GW for each CATs product by period and by country/region consistent with IEA estimates and Gleneagles "targets"

Product

3.Estimate a potential share for Scottish /UK companies

Total market is £1,500 Bn over 50 years

Potential market for Scottish/UK companies is £107 Bn +

More than 1M man years of work over 50 years in quality jobs !!

“We remain committed to development and global implementation of cleaner power plants clean coal, clean gas, nuclear and renewables as rapidly as the market allows”

Thank you for your attention

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