

Exploring The Long-Term Sustainability Of Gas In A Low-Carbon Environment: Examining The Potential Of Coal, Renewables, Nuclear & CCS And Their Impact On The Gas Industry

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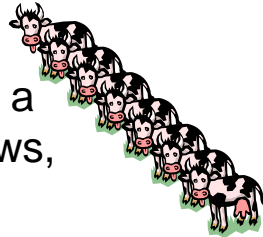


Long-Term Sustainability? I am afraid I am the wrong person to listen to – You better go to church and listen to your priest...

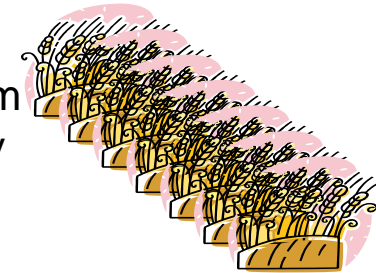
Bible, Genesis 41, it's Joseph who knows what will happen, certainly not me...



Once Pharaoh had a dream of seven cows, ugly and gaunt...



... but when he fell asleep again he had a second dream of seven ears of corn, healthy and good...



Pharaoh sent for Joseph to interpret the dreams...



“Seven years of great abundance are coming throughout the land of Egypt, but seven years of famine will follow them. The abundance in the land will not be remembered, because the famine that follows it will be so severe.”

Joseph knew what would come and knew what to do...

“Take a fifth of the harvest during the seven years of abundance and store up the grain in reserves for the country”

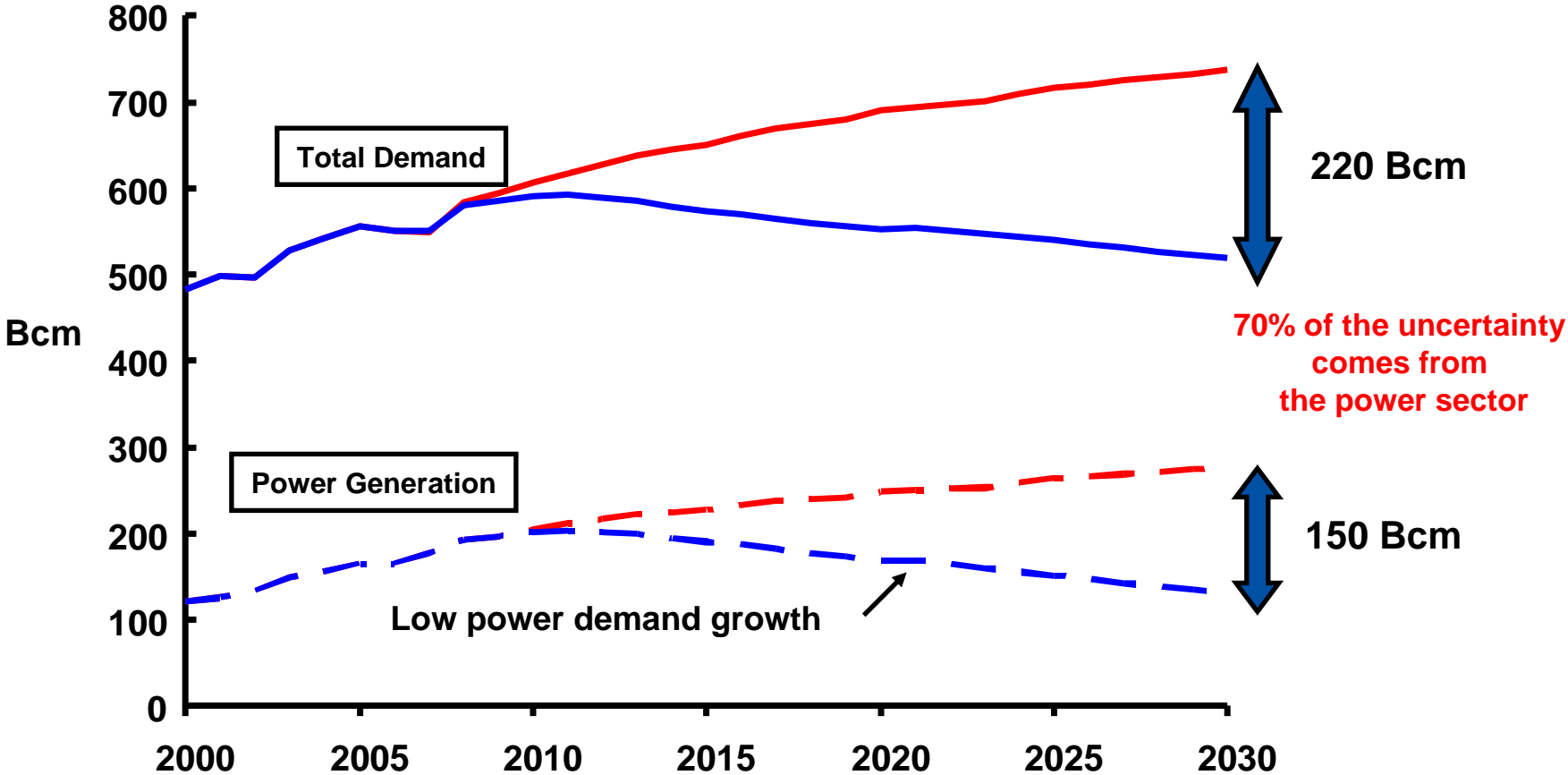


As I am not Joseph and cannot predict the future, I can only gear to George Eliot...

„The strongest principle of growth lies in human choice.“

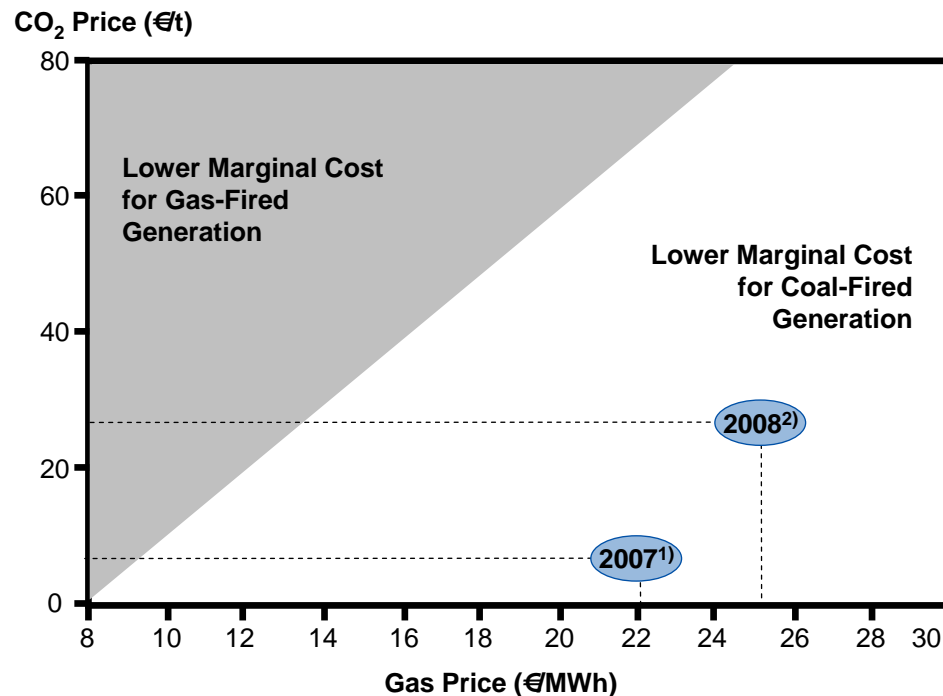
George Eliot
English novelist (1819 - 1880)

Gas: Most significant Driver – and Uncertainty – is the Power Sector. Increasing gas demand is no longer a predetermined element as...



... gas is an expensive peak-load fuel, an unprofitable base-load fuel!

Marginal Cost Economics of Combined Cycle Gas Turbine vs. Hard Coal Plants*



- 1) Average EEX-Gas Spot Market EGT 2007: 22.24 €/MWh
EEX EUA-Future 2007 (dated December 29th 2006): 6.54 €/EUA
- 2) Average EEX-Gas Spot Market EGT 2008: 25.45 €/MWh
EEX EUA-Future 2008 (dated December 28th 2007): 22.23 €/EUA

- > Gas-fired electricity generation is considerably more expensive than Coal-fired generation
- > Sustained Coal-Gas Spread makes Gas the Fuel of Default, not of First Choice
- > Gas is disadvantaged by today's Gas price level market, security of supply concerns
- > Environmental Advantages might continue to fail to benefit the Gas Sector

But Optionality is the name of the game in an increasing volatile and flexible energy world!

~~„If you can't predict the future, you're in trouble!“~~

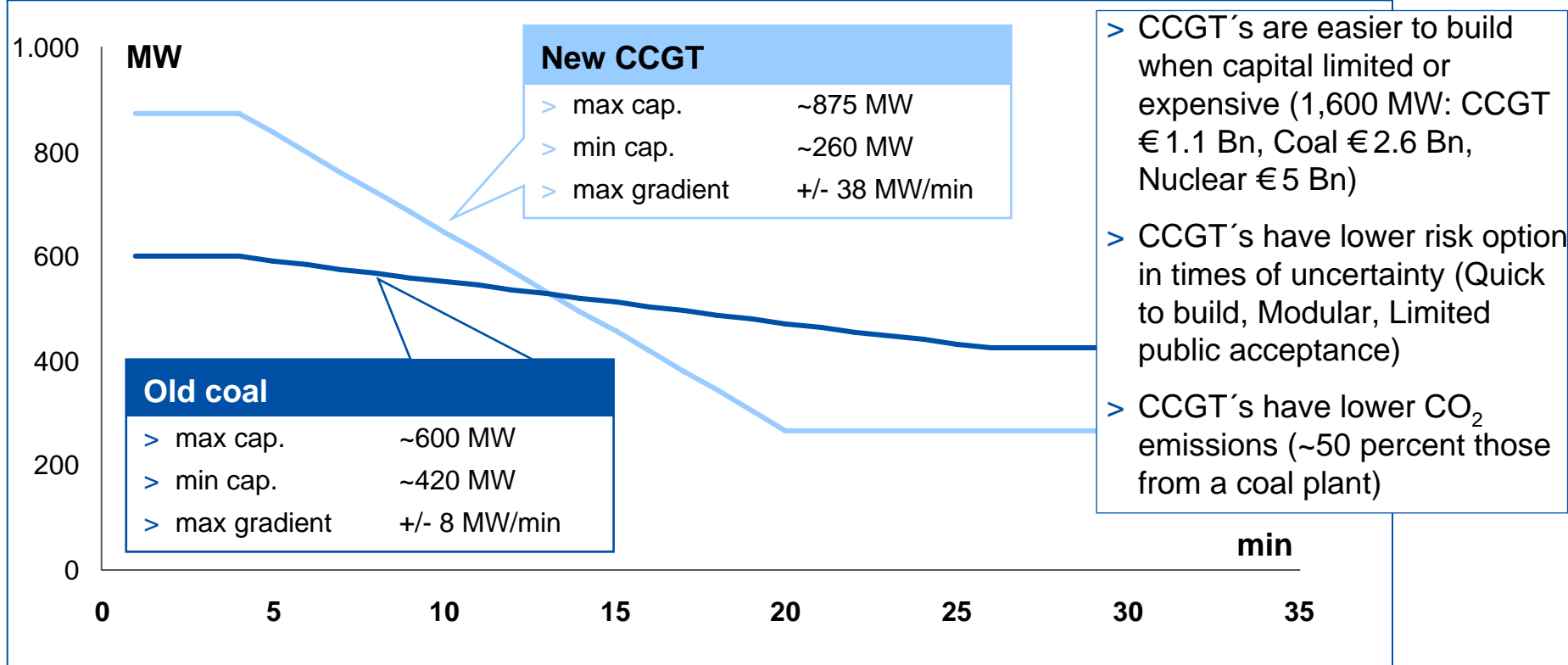
„You can't predict the future, but you can plan for it!“

Drivers for more Optionality in the new world:

- > Increasing demand fluctuation and decreasing base-load demand, e.g. due to increasing energy efficiency. Base-load drops significantly by 2020
- > Increasing import/export fluctuations due to a future European Copperplate (European countries are not an island anymore)
- > Increasing wind power production increases generation requirements on flexibility and volatility of power prices:
 - Price spikes in tight system margin / low wind conditions: Record price level of 2,437 €/MWh (hour 19)* in EEX spot auction for November 7th 2006 and in 2007 of 822 €/MWh (hour 18) for November 15th
 - Increase of spot volatility means increasing value of power plant flexibility!

Flexible units like CCGT's can react quickly enough to compensate for changes in wind output

Comparison of ramp capacities (new CCGT unit and old coal unit)



Our answer to use Optionality in the new world: Lingen 875-MW CCGT plant – a highly flexible unit for all load regimes

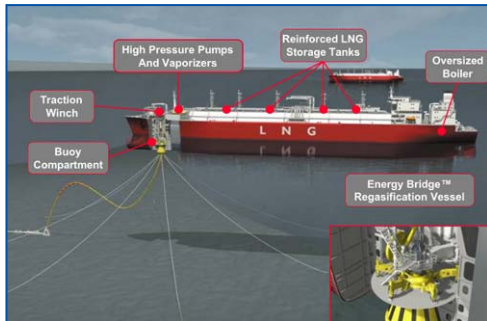


Lingen 875-MW CCGT

Provision of Peak and Balance Power with an Environmental Premium

- > Task: Input of electricity into the grid and supply of steam to neighbouring industrial firms
- > Status under construction since April 2007
- > Fuel: Natural gas
- > El. capacity: ~ 875 MW
- > Max. steam extraction: < 100 t/h
- > Net el. efficiency: > 59 %
- > Start-ups: up to 200 p.a.
- > Layout: 1x KA 26 – 2 MS 2 Gas & 1 Steam Turbine
- > Load regime: up to 5,500 full load operating hours
- > Combination of purpose built pipeline with use of line pack for independent and interdependent power and gas optimisation

Energy Dependency? Yes, but our Partnership with Excelerate increases Flexibility in Supply...



Excelerate Deepwater Ports

- > Gulf Gateway (USA) (since March 2005)
- > Northeast Gateway (USA) (commissioned May 2008)



Excelerate GasPorts

- > Teesside GasPort (since February 2007)
- > Third party GasPorts
- > German GasPort (development underway)



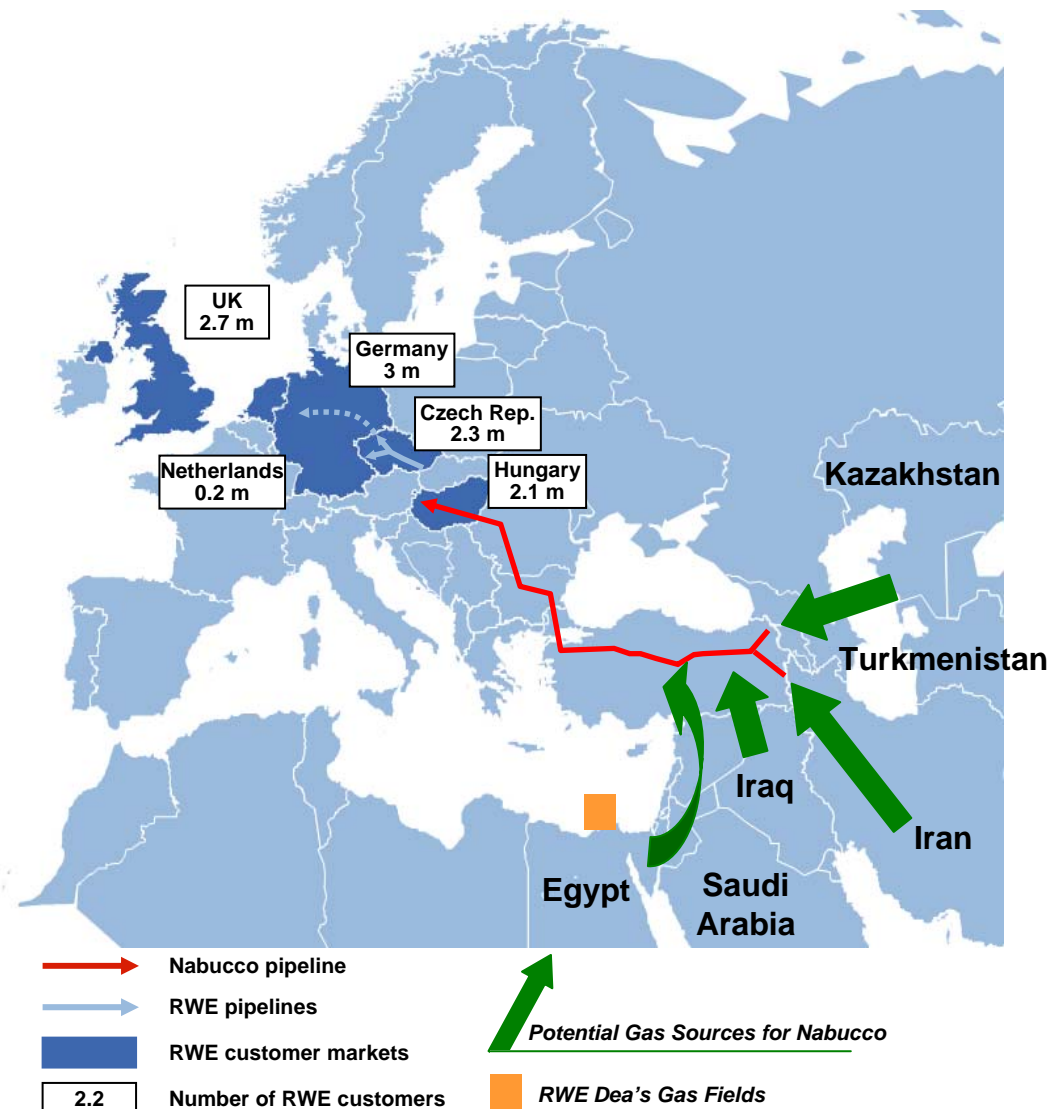
Ship to ship transfer (STS)

- > Transfer between conventional and Excelerate ships is possible

- > Main assets: two US offshore deepwater ports (ca. 10 bcm/a capacity); GasPort in UK (ca. 4 bcm/a capacity), a fleet of currently six LNG vessels with ca. 4.8 bcm/a transport capacity
- > Other import projects under development utilising these technologies
- > Discharge of LNG at conventional import terminals also possible

... and with Nabucco Caspian&Middle East's Supply will be linked to Europe's increasing demand

- > The Nabucco pipeline project links RWE's downstream positions with the Caspian region and other potential gas resources
- > 3,300 km pipeline link to large gas resources in the Caspian and Middle East
- > Construction of first phase expected to be finished in 2013; final phase finished by 2018 with 31 bcm/a
- > Required gas volume for the first phase is available in the Caspian region
- > Partners: BOTAS (Turkey), Bulgargaz (Bulgaria), Transgaz (Romania), OMV (Austria), MOL (Hungary) and RWE each holding 16.7%



Well, that's my story but you better ask Joseph...

**Who could be our
Joseph of the energy
market?**

