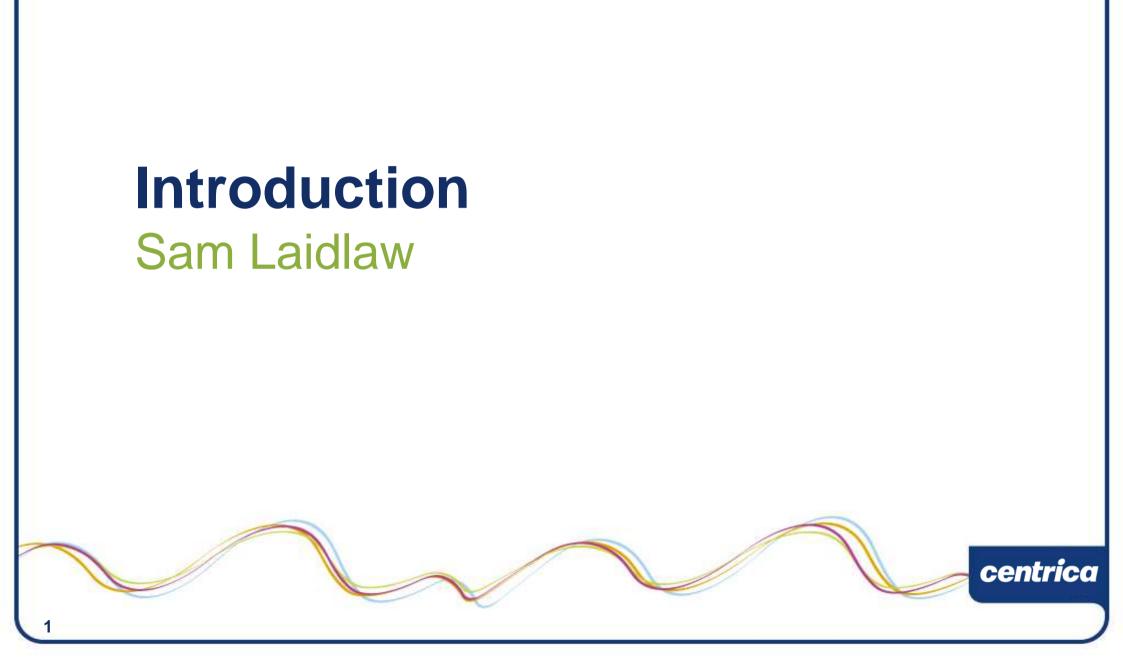
# centrica

## Langage Analyst Visit Centrica Energy and Centrica Storage

9 December 2009



### Introductions



Mark Hanafin Managing Director, Centrica Energy



Sarwjit Sambhi Director of Power Generation, Centrica Energy



Andrew Le Poidevin Finance Director, Centrica Energy



Simon Wills Managing Director, Centrica Storage



### Today's agenda

**Centrica Energy overview Power Generation Power Station Tour Upstream Gas Storage Financials** Wrap-up / Final Q&A

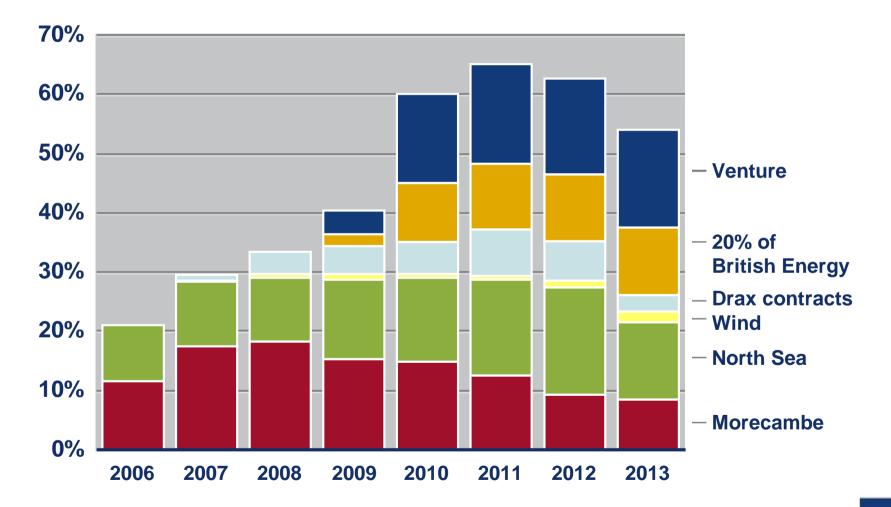
Mark Hanafin Sarwjit Sambhi

Mark Hanafin Simon Wills Andrew Le Poidevin Sam Laidlaw

### Strategic priorities now achieved

- / Transform British Gas
- Sharpen the organisation and reduce costs
- Reduce risk through increased integration
- Build on our growth platforms

### Integration improving our energy hedge ratio



Note: proportion of UK floating gas and power demand covered by own assets. Floating gas demand includes non-fixed price BGR and BGB demand, I&C gas demand, power station fuel requirements and equivalent gas requirements to meet floating power demand in BGR and BGB.

### Strong platform for growth across the Group

- Strong Group cash generative capability underpins ongoing investment
  - Robust Group cash flow even in low commodity environment
- Broad range of investment and growth opportunities
  - British Gas Integrated energy & services propositions in the existing business; take advantage of evolution to low carbon economy (e.g. smart meter revolution)
  - North America Potential for further building of the integrated energy model (opportunities upstream and downstream)
  - Centrica Energy Significant pipeline of opportunities under our control to drive growth
    - Power generation (CCGT, Wind, Nuclear New Build)
    - Gas (near field exploration, development, LNG)
  - Centrica Storage Development pipeline of three new storage projects
- Capital allocation process will assess competing opportunities
  - Well positioned to 'high grade' and select from opportunity set
  - Value enhancing returns required

## Centrica Energy Overview Mark Hanafin



### **Centrica Energy's vision**

1. Support Centrica's integrated energy model by procuring or acquiring gas and power for the downstream business

- Providing competitive cost of gas and power
- Security of supply and
- Contributing to a structural price hedge
- 2. Sustain and grow our upstream gas and power generation business contributing attractive returns for Centrica plc



### Centrica Energy strategy is based on fundamental beliefs in long term market trends

#### Security of supply

- Declining gas reserves in the UK and increased dependence on imports
- > Need for security of supply

#### Forward market trends

- Forward market trends in gas / power supported by fundamentals
- Short term volatility, yet long term gas and power prices expected to increase

### Infrastructure investment required

- Need for infrastructure replacement in generation as a result of LCPD
- Challenge to ensure incentives necessary for investment



**Climate change** 

Climate change policy driving

need for low carbon energy

Need for renewables and low

#### Government policy and incentives

- Governments are looking at options to address market reform and incentives for investment in low carbon economy
- Potential change in policy and market mechanisms (e.g. carbon floor)

#### Recession and recovery

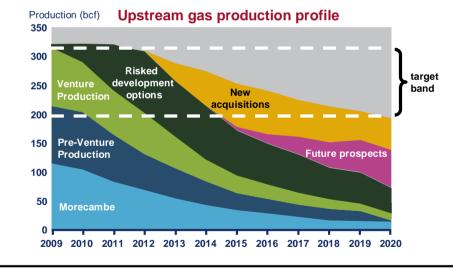
- Global financial / economic
   environment searching for direction
- Portfolio requires flexibility and ability to mitigate demand destruction



### Our strategy – a sustainable business, balanced generation and leading UKCS/NCS gas positions

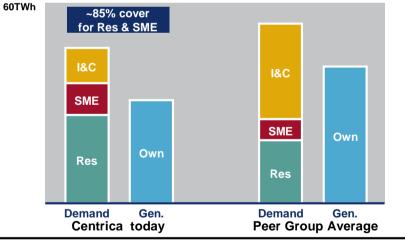
#### **Upstream Gas**

- Leading consolidator of mature and orphaned assets on the UKCS
- Exploration and development focused on existing hubs and infrastructure
- **Develop Atlantic Basin LNG**



#### **Power** Generation Provide cover for residential and SMF load Market neutral generation mix, but with lower carbon intensity Leader in renewable generation ~85% cover for Res & SMF

- **Competitive cost of generation**



#### ... supported by a Midstream function

- Procurement, hedging, and risk management for downstream (lower cost of gas/power)
- Maximise value through trading and optimisation

# Centrica Energy presents an attractive proposition for shareholders



### **Vertical integration confers a number of benefits to Centrica**

#### Security of supply

Reduced earnings volatility (margin migration)

Improved headroom with lower credit thresholds

Improved competitive position (in particular, gas integration)



**Stability** 

- Access to information and market insights across the value chain (e.g. better hedging decisions)
- Timing / sequencing on investments, selective capital allocation decisions



Across gas, renewables, nuclear, storage and coal

- Access to more options (downstream, upstream, midstream)
- Flexibility and optionality for trading decisions
- More 'make' or 'buy' options (e.g. Morecambe / CCGT)



- Lower balancing costs
- Lower weighted average cost of gas and power
- Less cash or collateral requirements
- Removes need to pay forward premium



### A robust platform for growth

#### 2008

#### 8 CCGT

Morecambe and non-operated JVs Rough **STORAGE** Accord **TRADING** 

#### 2009

British Energy **NUCLEAR** Langage **CCGT** Venture **GAS** Lincs **WIND** farm

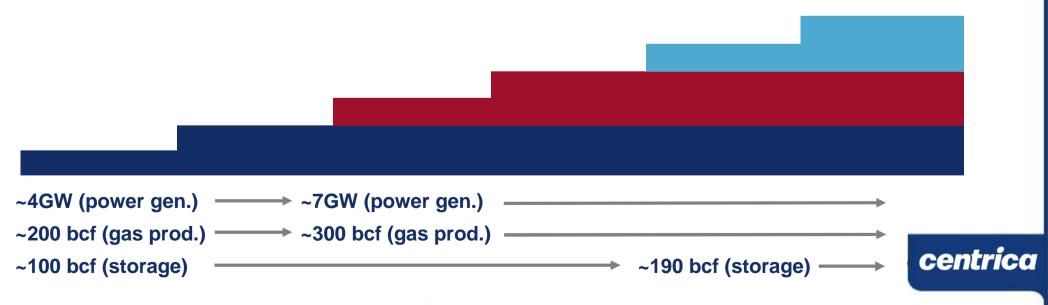
#### 2010 + options

**NEW NUCLEAR** 

**NEW GAS** development & exploration

2 more Round 2 WIND farms & potential Round 3 NEW WIND

Baird, Bains and Caythorpe **NEW STORAGE** 



### **Distinctive competitive advantages**

- Largest North Sea gas reserves for a UK Utility
- Leading position in Storage capability in UK
- Ability to manage shape and weather risk
- Sustainable production for the next decade
- Track record in new wind development
- JV with leading nuclear business
- Competitive new-build in CCGT
- Low carbon
- Balanced between peak and baseload



Power

- Only 'dual fuel' hedged UK supply business
- Track record of asset reliability, operational excellence
   ... will drive advantaged energy costs for British Gas

# Well positioned to deliver strong returns through the next 5 to 10 years

- Despite recent volatility in commodity prices, Centrica Energy remains a strong contributor to Group results
  - Strong EBITDA and cash generation
- Returns robust against changes in market fundamentals over the next 5 to 10 years
  - Portfolio provides us the flexibility to choose investments with highest returns
  - Balanced portfolio positioned to deliver consistent returns through the cycle
- Capabilities allow us to capture additional value and exceed our hurdle rates

# Power Generation Sarwjit Sambhi

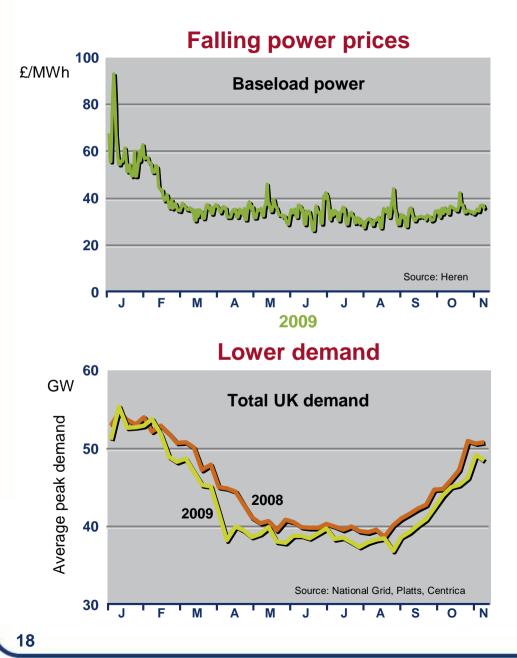


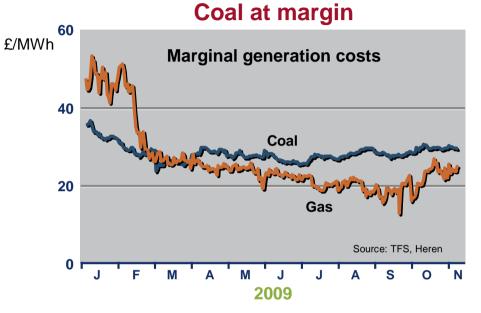
### Agenda

- UK wholesale electricity market
- Centrica power generation portfolio

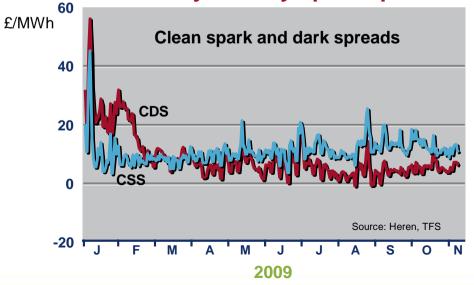
- CCGT
- Renewables
- Nuclear
- Summary

### **Recent market dynamics**



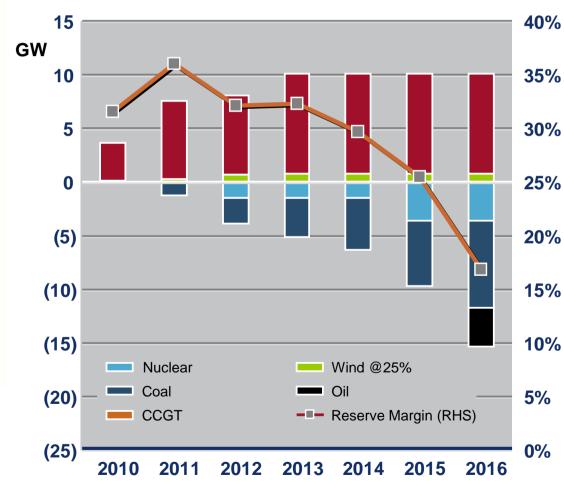


**Relatively healthy spark spreads** 



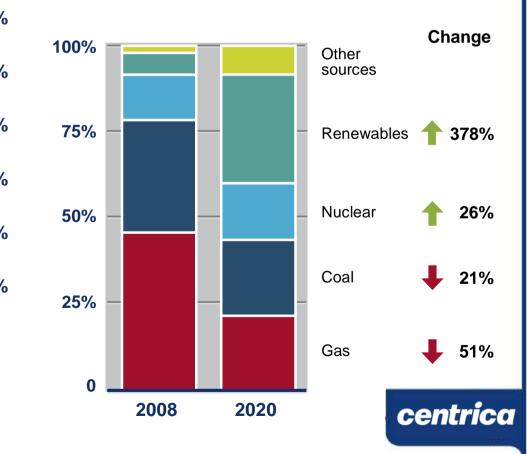
### **Future market dynamics**

# Declining reserve margin due to plant closures ...



#### Low carbon aspirations

Potential generating output if UK Government targets met

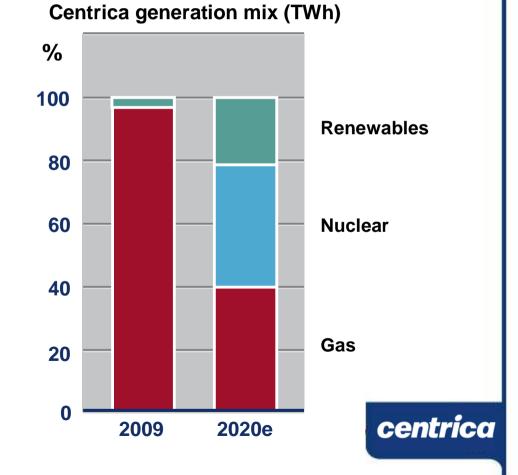


### **Centrica's power generation strategy**

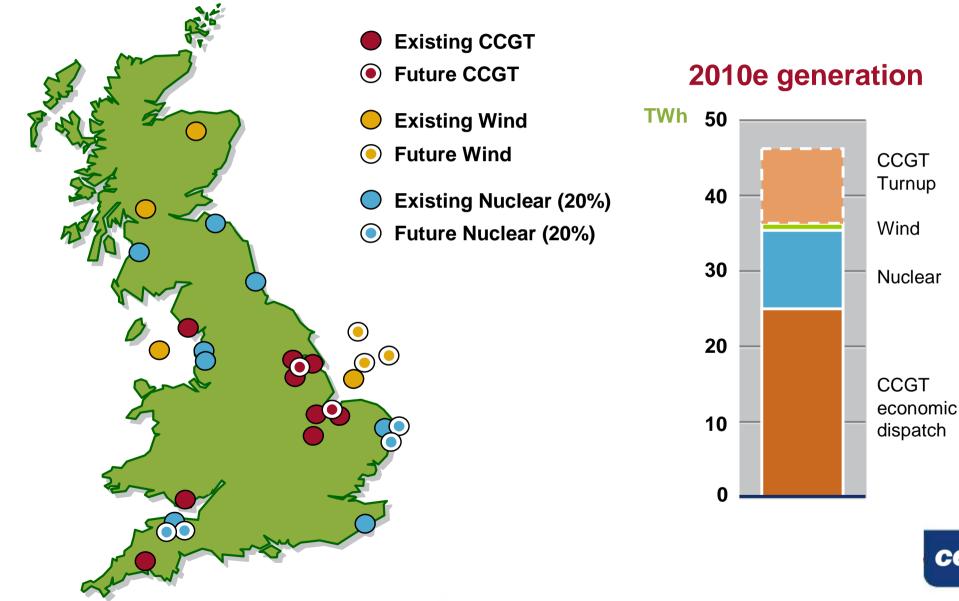
Strategy aims for increased cover and balanced fleet

- Target increased cover for downstream
- Target diversified generation fleet
- Specific strategies for:
  - Nuclear JV with EDF
  - Wind new build
  - Gas asset replacement
  - Coal contractual

Strategy leads to a mix more closely aligned to the market but with lower carbon risk



### Strategy execution well underway



### Agenda

• UK wholesale electricity market

### Centrica power generation portfolio

- CCGT
- Renewables
- Nuclear
- Summary

### **CCGT** generation portfolio - mix of vintages

A CONTRACTOR OF	
South	64 2 85
Second and	85

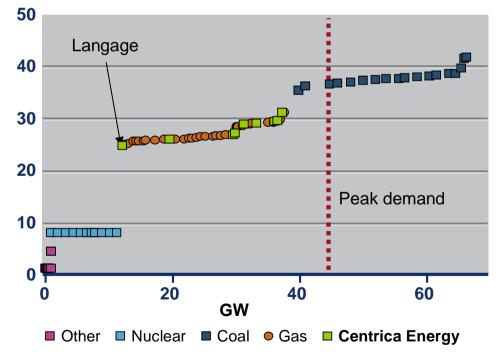
		Technology	Start Year	MW	Thermal Efficiency (HHV)
1	Roosecote	1 x Alstom GT13E	1991	229	44%
2	Brigg	4 x GE frame 6E	1993	240	41%
3	Peterborough	2 x GE 9E 9161/71	1993	360	43%
4	Killingholme	3 x Alstom 13-E1	1994	652	45%
5	Kings Lynn	1 x Siemens v94.3	1997	325	47%
6	Humber	3 x Alstom GT13E-2 2 x Alstom GT13E-2	1997 1999	750 500	49%
7	Barry	1 x Siemens v94.2 (Ansaldo)	1998	230	44%
8	Spalding	2 x GE9FA-e	2004	760	50%
9	Langage	2 x Alstom GT26	2009	885	53%



### **Centrica plants are benefiting from low gas prices**

Centrica Energy's CCGT fleet ....

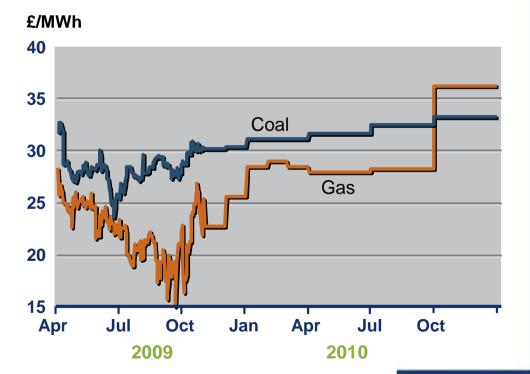
#### November 09 merit order\*



#### Generation cost £/MWh

#### Current gas prices benefit ... and the market looks favourable for much of 2010

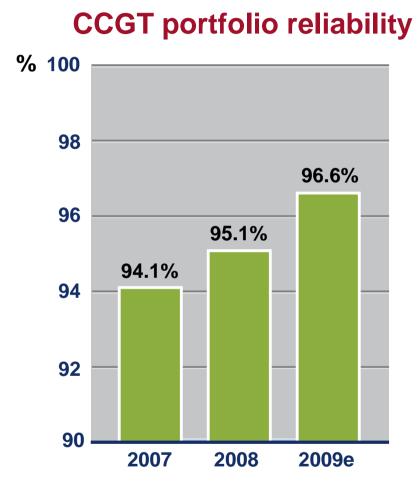
#### Gas and coal generation costs



centrica

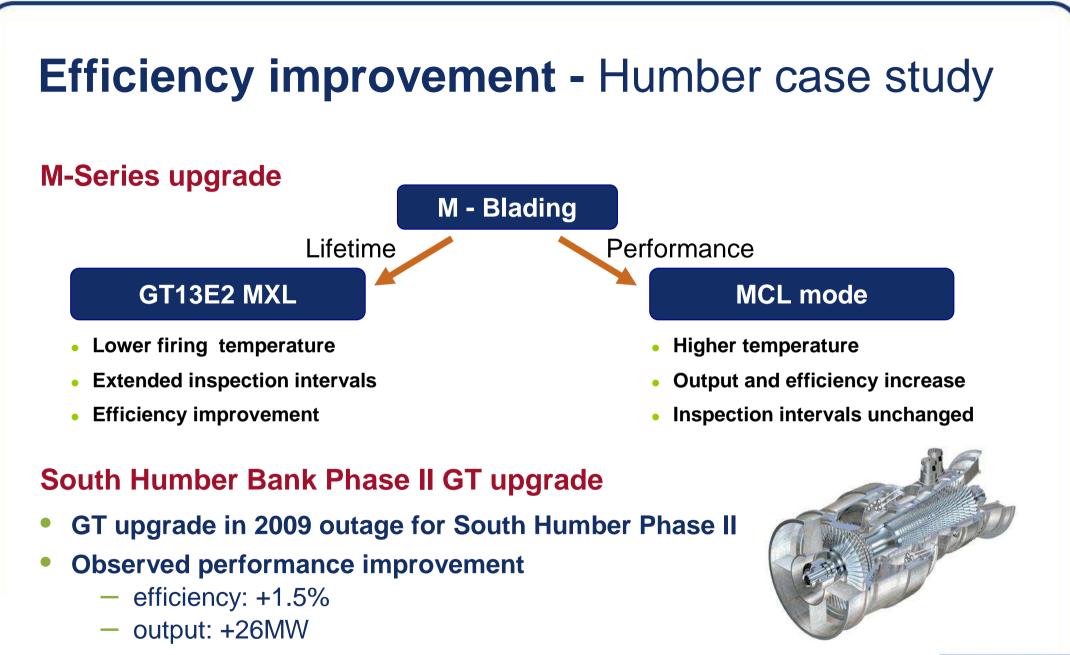
\* Assumes 100% availability

### **Focus on reliability**



#### **Focus areas**

- Asset strategy and capital management
- Best practice powertrain overhauls
- Effective balance of plant maintenance
- Optimised plant performance and efficiency

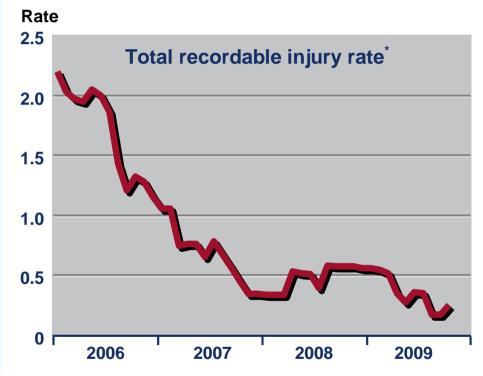


Interval between outages could be extended by 50%

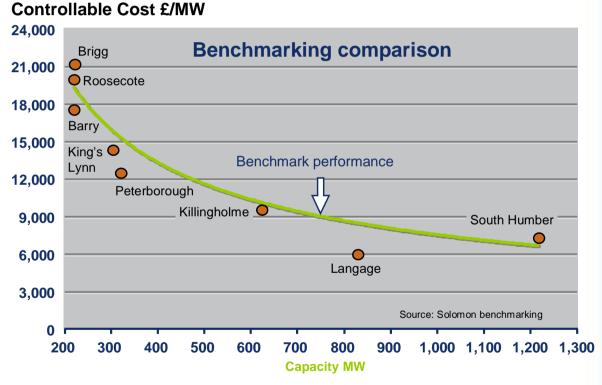
### **Operational performance**

# Strong safety culture built over time

# Competitive cost performance



Note: \* Per 100,000 hours worked



### Agenda

• UK wholesale electricity market

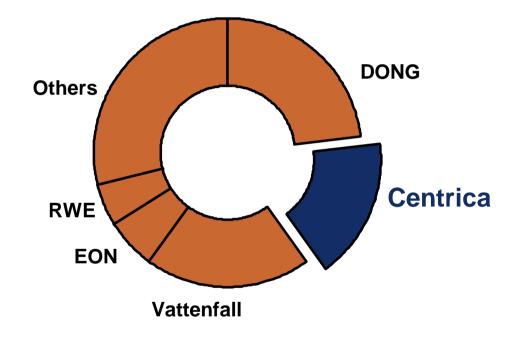
### Centrica power generation portfolio

- CCGT
- Renewables
- Nuclear
- Summary



### Leading position in offshore wind

#### **Operators of offshore wind (Global)**



- In house turnkey capability
- Lynn and Inner Dowsing delivered on budget and on time

#### Access to scarce resource



A2 Sea- Sea Worker

A2 Sea- Sea Jack







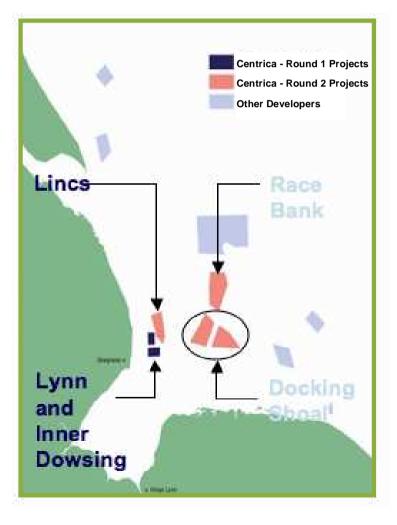


Jack-Up Barge BV -JB114

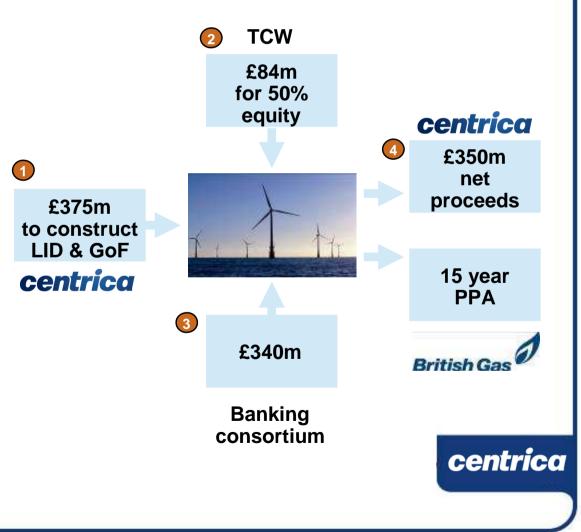
Siemens - Titan 2

### **Growing the offshore wind portfolio**

#### **Greater Wash developments**



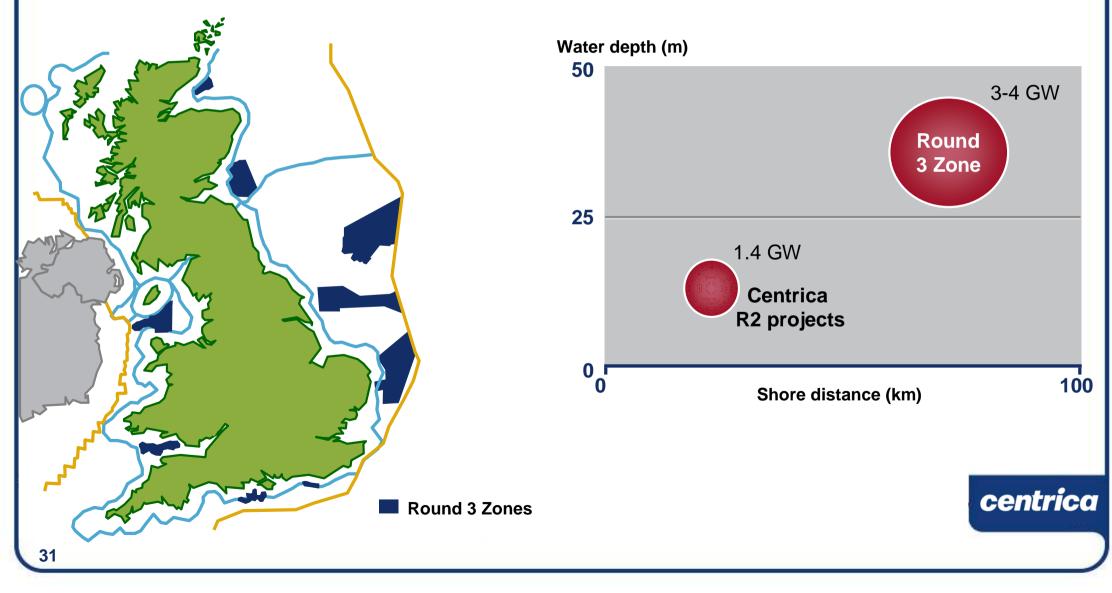
**Releasing capital** 



## Round 3 is a different technology proposition

#### **Strategic zones**

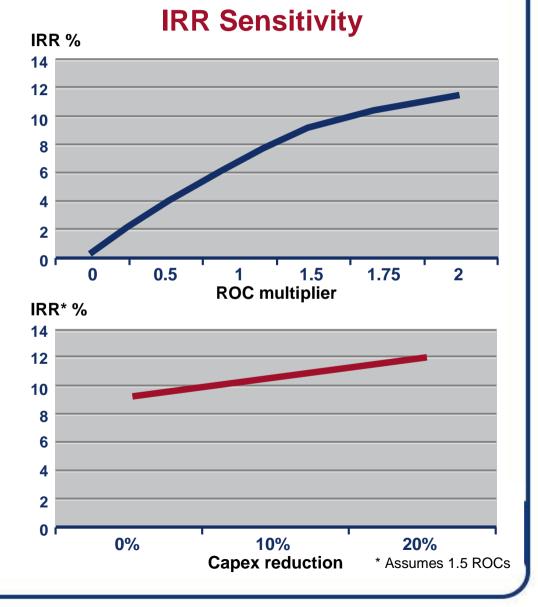




### **Future development dependent on economics**

#### 140 £/MWh Operating 120 costs 100 2 ROCs 80 60 Capital costs 40 Implied power 20 price 0

#### Cost of offshore wind

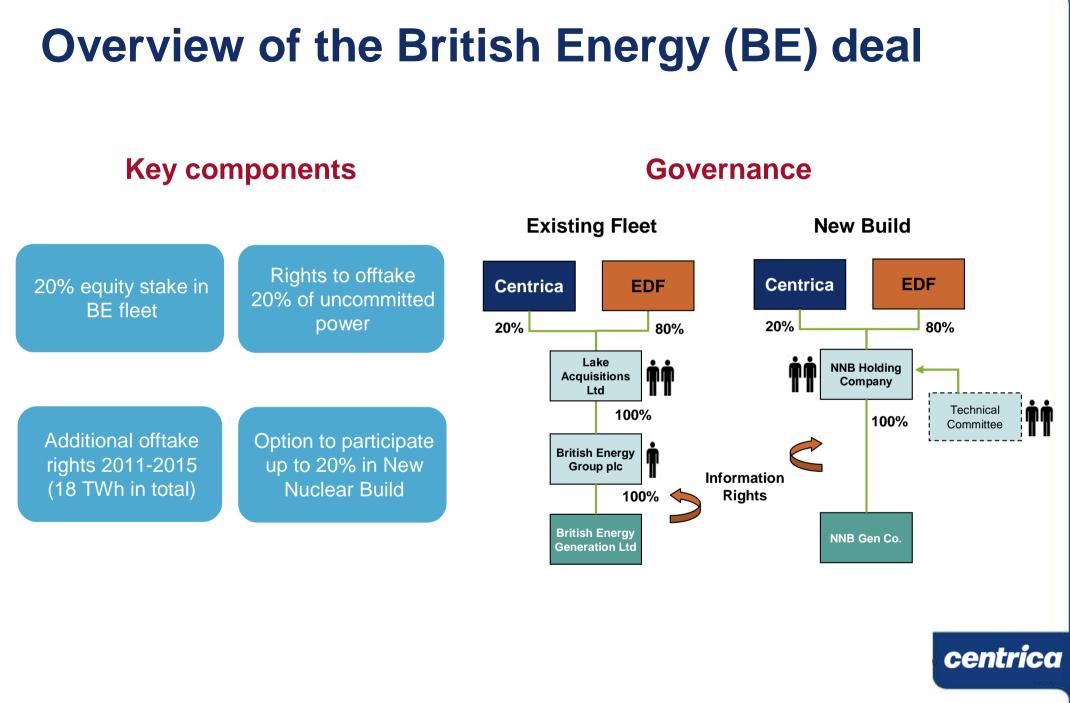


### Agenda

• UK wholesale electricity market

### Centrica power generation portfolio

- CCGT
- Renewables
- Nuclear
- Summary



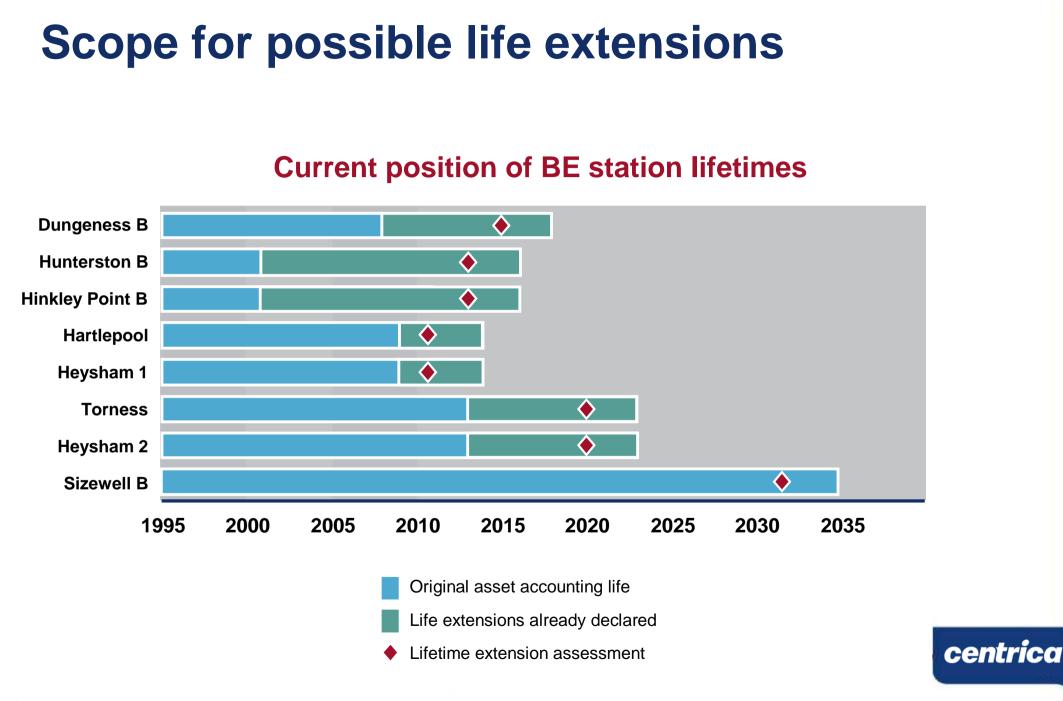
# Significant improvement in performance of BE fleet

**TWh** 18 55.5 TWh 42.5 TWh 51.9 TWh 40.2 TWh 16 Q1 - Q3 14 12 10 8 6 4 2 0 Jan- Apr- Jul- Oct- Jan- Apr- Jul-Jan- Apr- Jul- Oct-Jan- Apr- Jul- Oct-Mar Jun Sep Dec Jun Sep Dec Mar Mar Jun Sep Dec Mar Jun Sep 2006 2007 2008 2009

#### BE Nuclear fleet output

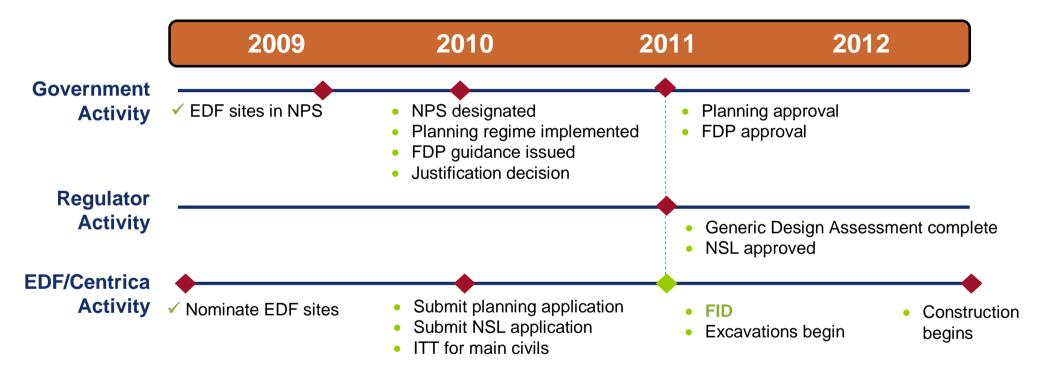
- 2008 technically challenging year
- 2009 output improved
- 50.7TWh output for 11 months to November 2009





# Key future decision is new build final investment decision

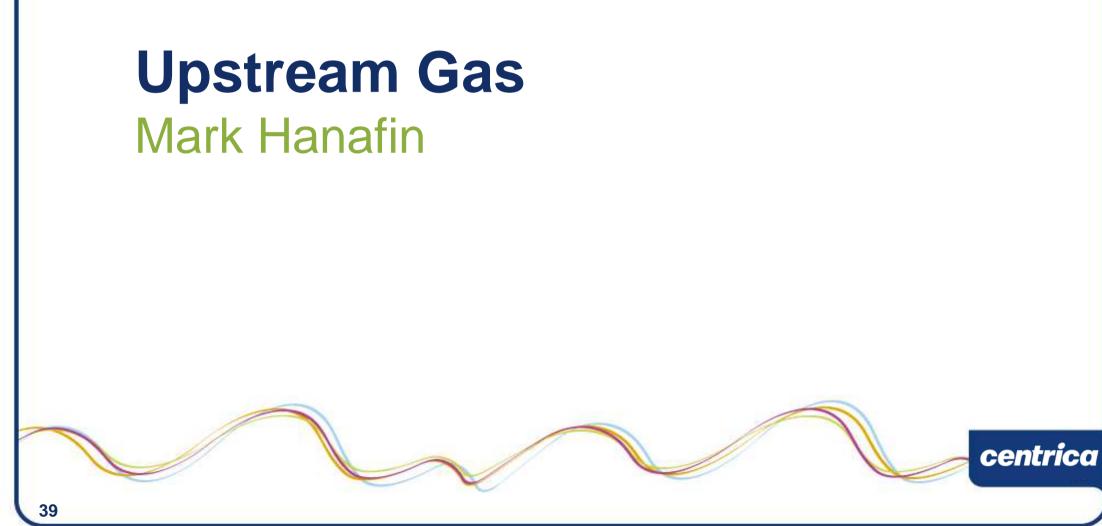
#### New build development



Abbreviations: NPS = National Policy Statement, FDP = Funded Decommissioning Programme, NSL = Nuclear Site Licence, ITT = Invitation to Tender, FID = Final Investment Decision

## Summary

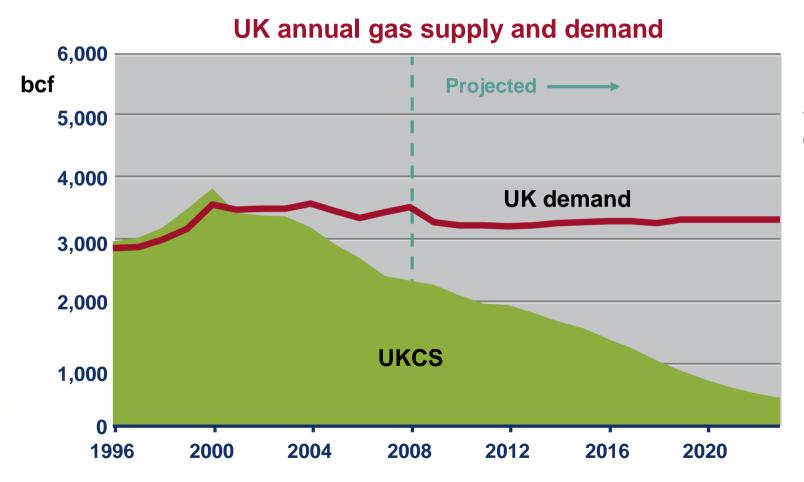
Competitively advantaged	<ul> <li>Increasingly diversified generation portfolio         <ul> <li>Range of fuel mix</li> <li>Lowest carbon intensity</li> <li>Combination of baseload and mid-merit</li> </ul> </li> <li>Performance of existing plant improving</li> </ul>
Growth platform	<ul> <li>Proven capability in wind development and financing</li> <li>World class nuclear joint venture</li> <li>Significant pipeline of future projects</li> </ul>
Strong returns	<ul> <li>New investment must meet required hurdle rate</li> <li>Economics dependent on incentives</li> </ul>



### Agenda

- UK gas market fundamentals
- Strategic rationale for investment
- Benefits from strategy
  - Capability
  - Sustainability
  - Flexibility
- Summary

# UK, as the 5th biggest gas market, is rapidly becoming a major importer



Balance of supply sources will be driven by:

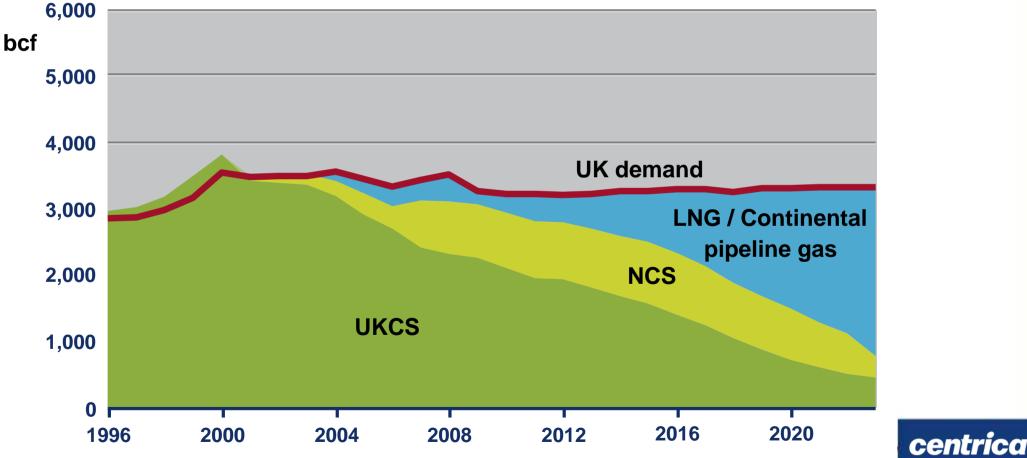
- Relative price
- Availability of supply
- Perceived reliability/security of supply

centrica

Note: 2008 UK demand and supply show slight variation due to IUK flows, storage and variability within data sets Source: National Grid

## UK gas will need to be sourced increasingly from NCS, LNG and potentially continental pipeline gas

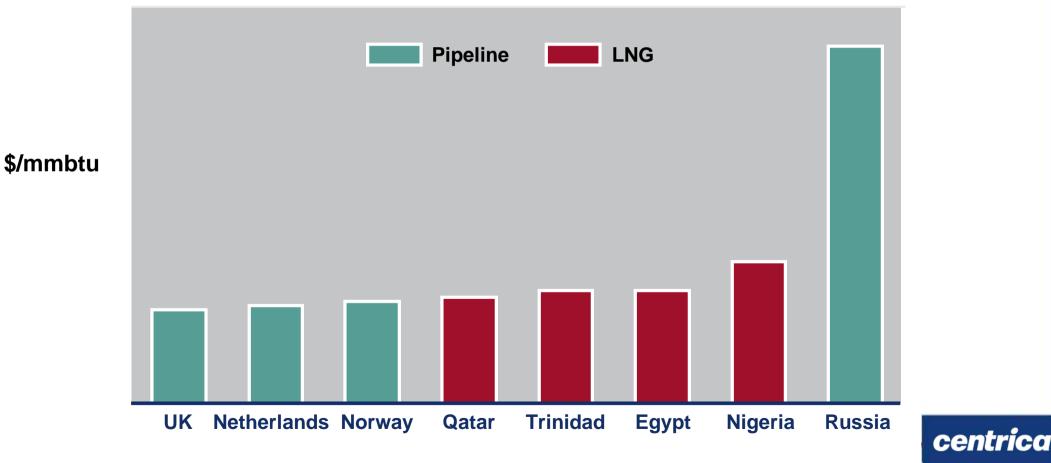
UK annual gas supply and demand



Note: Imports from NCS are low case, based on 90% utilisation rates of Norwegian pipelines to continent, with UK taking remaining gas Source: National Grid

# North Sea fields are currently the best value source of gas for the UK





# These fundamentals drive our strategy for upstream gas investment

- UK increased dependence on imports
  - Need for security of supply
- Volatile prices and potential supply disruptions increasing value of production flexibility
- Long term gas prices expected to rise in the UK
  - Downstream business must have access to competitive cost gas
- Opportunity as major players refocus their global portfolio
- We have the capabilities to execute
  - Delivery of synergies



# **Upstream Strategy:** Sustain and grow an upstream gas business contributing strong returns



#### **Upstream Strategy**

UK, Netherlands Offshore -Be the leading consolidator and operator of mature and orphaned assets



**Norway - Partner with leading NCS operators, progress into operation** 



LNG off-taker - Develop LNG structures with path to direct offtake rights into the Atlantic Basin



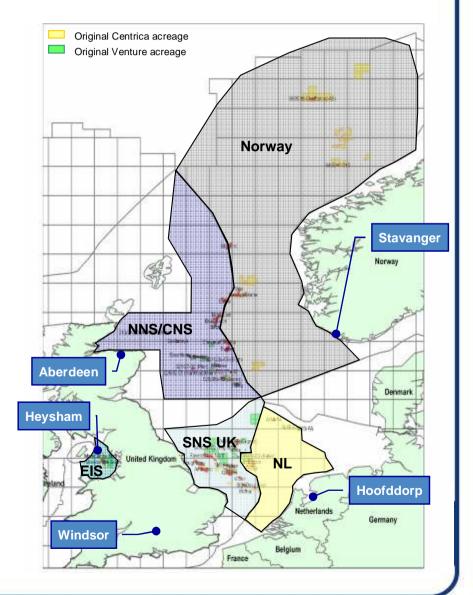
## Venture acquisition fundamental to strategy

Key benefits of Venture acquisition

- Experienced Venture team with industry leading skills - commercial, geoscience and engineering Capability Strong presence in the UKCS Transform Centrica Upstream business from 'blow' down' to sustainable production **Sustainability**  Portfolio of valuable development options going forward A full service operator (89% of Venture's production for 2009 is operated) **Flexibility** 
  - Greater control and flexibility in 'make or buy' decisions

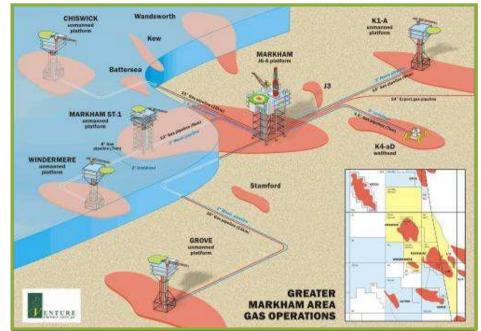
## Capability: Aligned around 'regional / hub' based strategy, with well-defined E&P capabilities

- Five core regions in the portfolio, each with a P&L
- Benefits of regional / hub based strategy
  - Builds detailed area knowledge and focus
  - Lower risk step-out exploration and appraisal drilling
  - Control of infrastructure
  - Diversifies export routes
  - Marginal cost of development and supply reduced
- E&P capabilities leading to higher value
  - Stewardship of mature assets
  - Efficient field development, sub-sea tiebacks
  - Directional drilling and horizontal wells
  - Subsurface engineering



## Capability Case Study: Greater Markham Area (GMA) - strategic hub investment

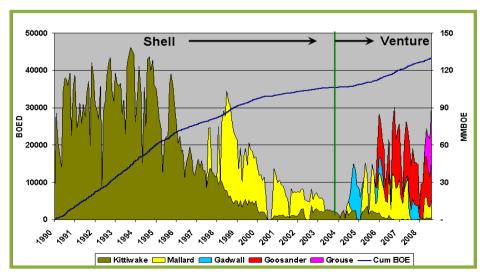
- Venture acquired operated interest in the GMA in 2006
  - At that time production was ~3 mboepd (net)
- Venture initiated a programme of upgrading facilities and has brought 2 new developments onstream
  - Current production is ~20 mboepd (net)
- In 2009, Centrica developed Grove with off-take via Markham
- Production to grow further in 2010 -2012 with new Chiswick wells coming on stream
- Significant other growth opportunities are being pursued



## Capability Case Study: Greater Kittiwake Area (GKA) rejuvenation

- Venture acquired a 50% operated interest in the GKA in 2003
- At that time ~5,000 boepd (gross) with forecast abandonment ~2005
- Venture initiated a programme of maintenance catch-up and has brought 3 new discoveries onstream with a 4<sup>th</sup> in planning
  - In 2007 a new pipeline was constructed from Kittiwake to the Forties Pipeline system
- Current production is ~25,000 boepd (gross) with abandonment ~2016
- Significant added value through focus and investment

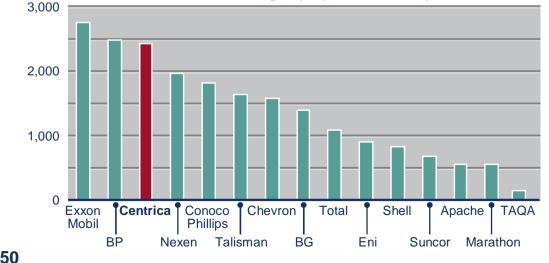




# **Capability:** Combined business has substantial scale and capability in the UKCS

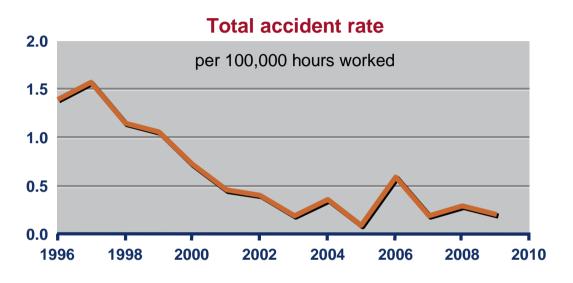
2009 production (mboe/d est.) 300 200 100 0 BP Centrica Chevron Talisman 🕇 Apache 🕇 Marathon Total Conoco Phillips Shell Exxon BG Nexen Eni Suncor TAQA Mobil Enerav

Net acreage (square miles)



- Centrica Energy now 7th largest gas producer in the UKCS
- #1 UK Utility with access to gas hedge
- #3 largest owner of net acreage
- Excellent portfolio fit between Centrica and Venture assets
- Industry leading operating and project development capability

# **Sustainability:** Strong HSE track record built over a period of time



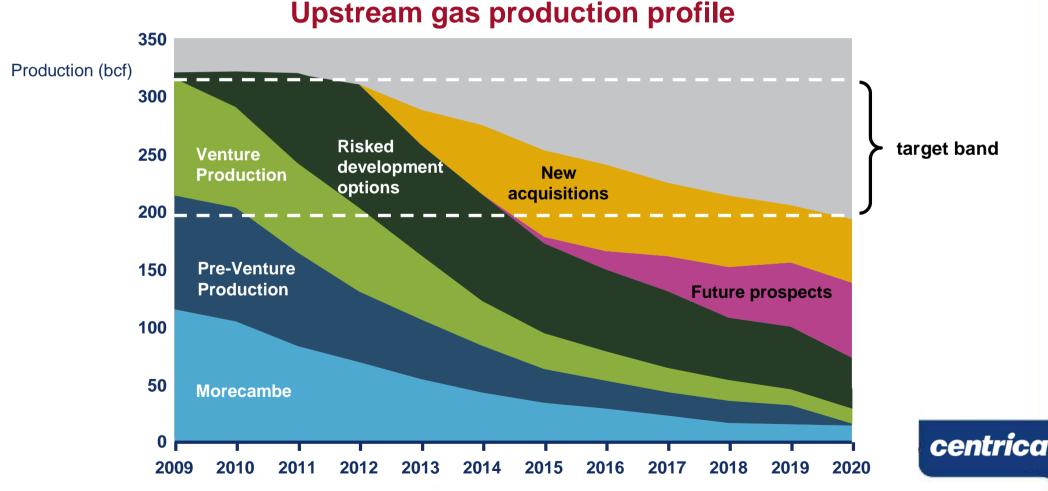


#### Strong HSE culture built over time People looking after people





## **Sustainability:** Leading operator of mature and orphaned fields, delivering sustainable level of production



## Flexibility: A unique portfolio of options

- Short term flexibility: Morecambe provides unique operating flexibility benefits
  - If spot market prices fall below economic signals, options exist to shut-in production and buy gas from the market
    - In November, we shut in production for 19 days
  - Where production is forward sold, we have the option to buy back at spot market prices
    - e.g. September gas was sold at 58.8p/th, and bought back at 20.6p/th

- Longer term development flexibility and control
- A majority operated portfolio across combined assets
  - 53% of fields operated
  - 66% of production operated
  - 65% of undeveloped fields operated

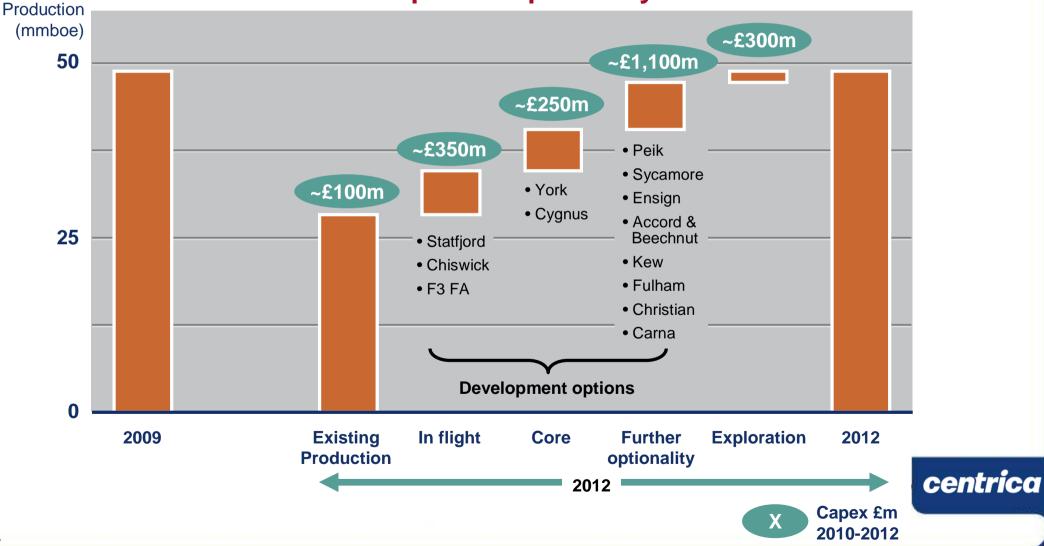
centrica

 Significant opportunities to target and time investments



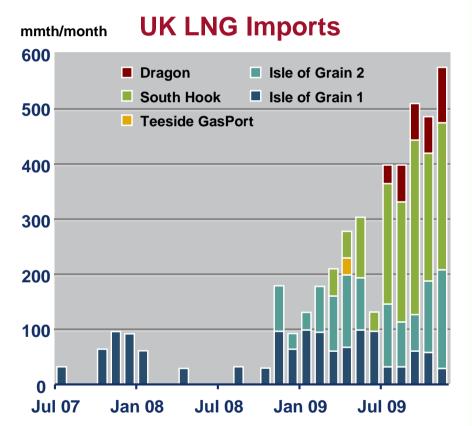
# Flexibility: Significant opportunities to target and time investments

#### **Development Optionality**



# Flexibility: Centrica capabilities makes us well positioned to procure LNG

- Centrica represents a 'major demand holder' in the UK, a market well placed for LNG
  - Significant partner for major resource holders
- Centrica is the largest holder of LNG import capacity and storage facilities in the UK
  - A significant buyer and shipper of LNG
  - Bought 26 LNG cargoes to date in 2009
- LNG represents flexibility to meet security of supply and create future value
- An attractive investment partner in new Atlantic Basin LNG liquefaction



## Summary



- Well defined capabilities across our core markets
- Significant flexibility to react to market conditions

Growth platform

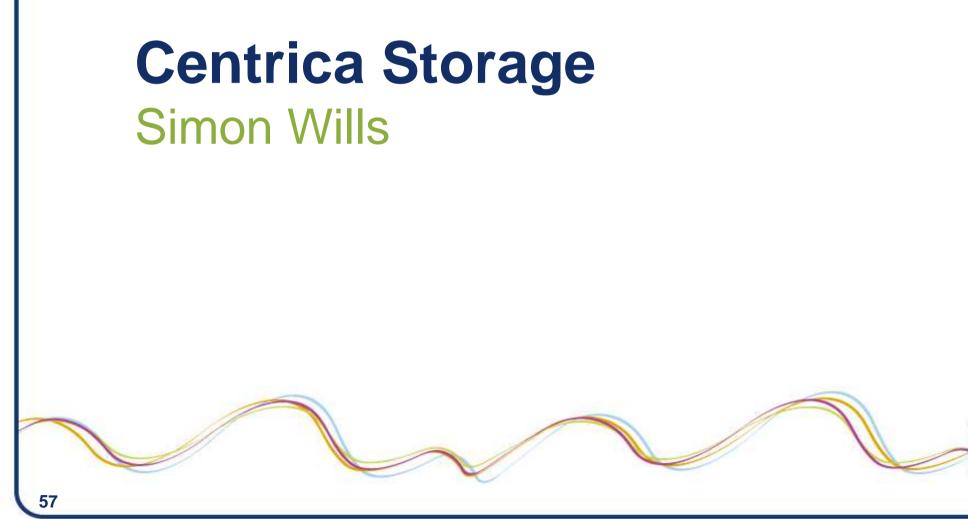
Competitively

advantaged

- Sustainable gas business, rather than 'blow down' reserves
- Access to a strong platform of growth options

Strong returns  Able to target and time investments with strong returns





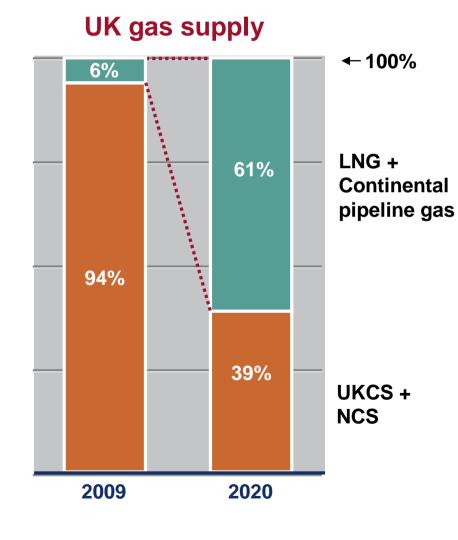
## Agenda

### • UK storage market fundamentals

### Centrica Storage

- Rough
- New projects
- Summary

# In future, the UK will need to import and store more gas to satisfy its requirements

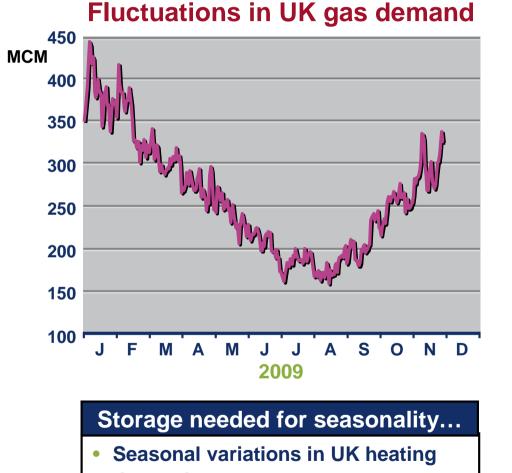


- UKCS decline will continue and Norwegian production will plateau
  - Gap created by declining UKCS and NCS supplies expected to be replaced by LNG and continental gas
  - After Norway, future UK prices expected to be set by LNG or Russian gas
  - Europe's most gas intensive economy will have moved from being a source of cheap gas to "end of pipe" importer requiring highest prices to support transportation costs across Russia and Europe

centrica

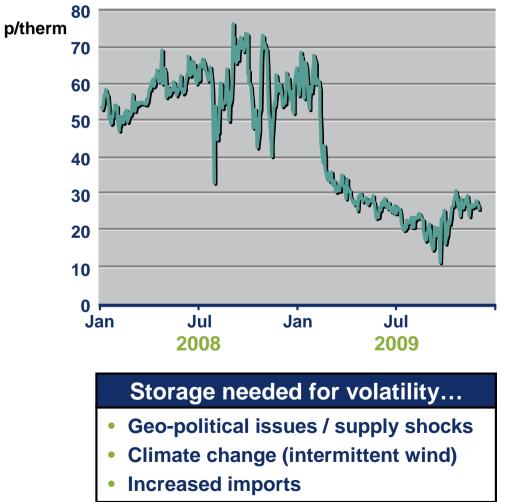
 Gas storage forms a critical part of ensuring security of supply for UK market stability

# Gas storage is required to address seasonal variations and short-term volatility



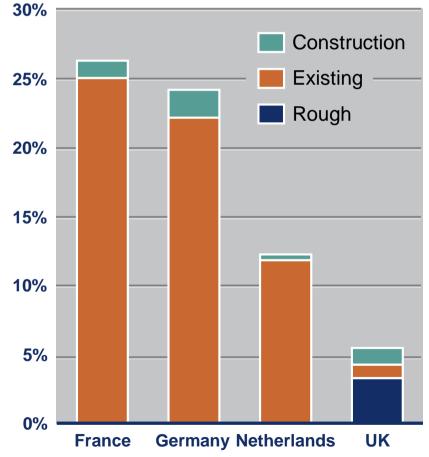
- demand
- NBP pricing fluctuations
- Increased imports

Volatility in UK gas prices



# UK storage capacity one of lowest in Europe, making strong case for additional investment

## Gas storage as a % of annual demand



	Working volume (BCM)	Annual demand (BCM)	Present storage capacity as a % of demand	Present storage capacity as days of average demand
France	12.3	49	25%	92 days
Germany	19.8	89	22%	81 days
Netherland	ds 5.1	43	12%	43 days
UK	4.2	102	4%	15 days

# Centrica Storage (CSL) owns and operates the Rough Storage facility in the UK

centrica storage

Our vision is to become the leading multi-asset, multi-product gas storage business in the UK

Rough is the 2nd largest gas storage facility in Europe and accounts for 75% of UK storage capacity

## Our innovative storage offerings instrumental in creating additional value through optimisation

#### **CSL Product and Service Offerings**

- S Store Standard Storage
  - WD and DA options
  - Customer books NTS capacity
  - Asset based

#### C Store - Entry Paid Storage

- WD and DA options
- NTS capacity built into the service
- Asset based

#### V Store – 'Virtual' Storage

- Available as DA only
- Includes NTS capacity
- Non asset specific

#### Incremental Capacity

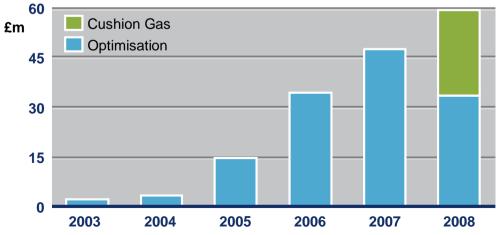
 Extra space, extra injection, extra withdrawal, gas in store sales

#### Interruptible Products

- SIS
- Bronze



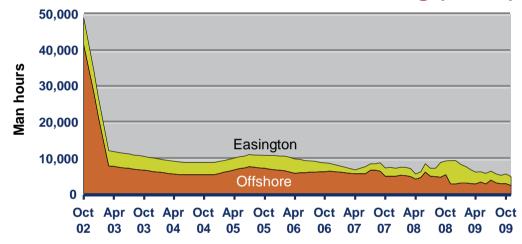
#### Additional value through optimisation

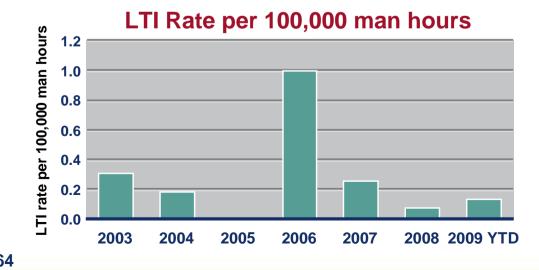


Note: WD = Within Day, DA = Day Ahead, NTS = National Transmission System, SIS = Standard Interruptible Service, SBU = Standard Bundled Unit

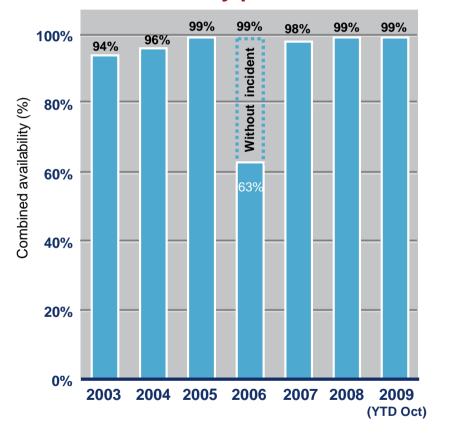
### CSL's operational performance is strong across all key parameters

Total offshore (3B & 8A) & Easington Terminal combined maintenance backlog (hours)



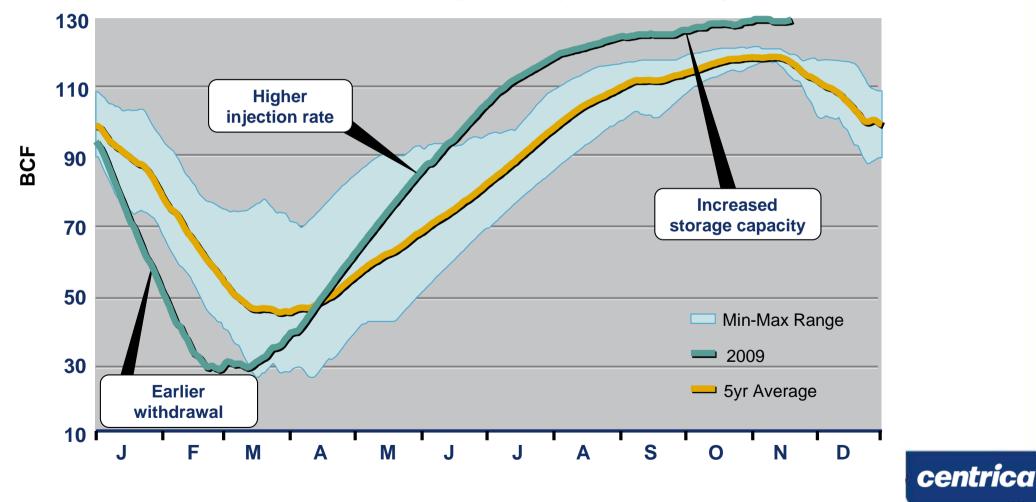


#### **Availability performance**



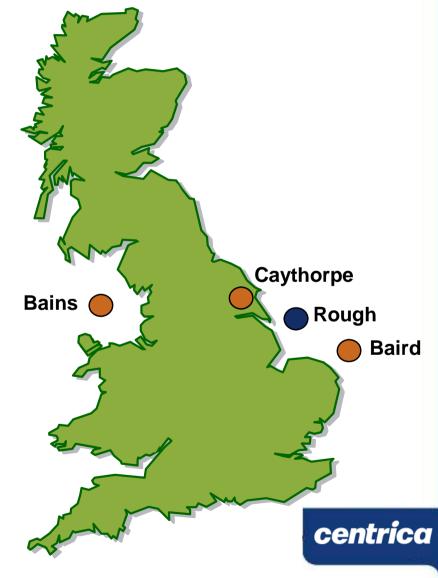
### In particular, our Rough storage facility has seen a record withdrawal and injection season

#### 5 Year historical profile (2004 – 2009)

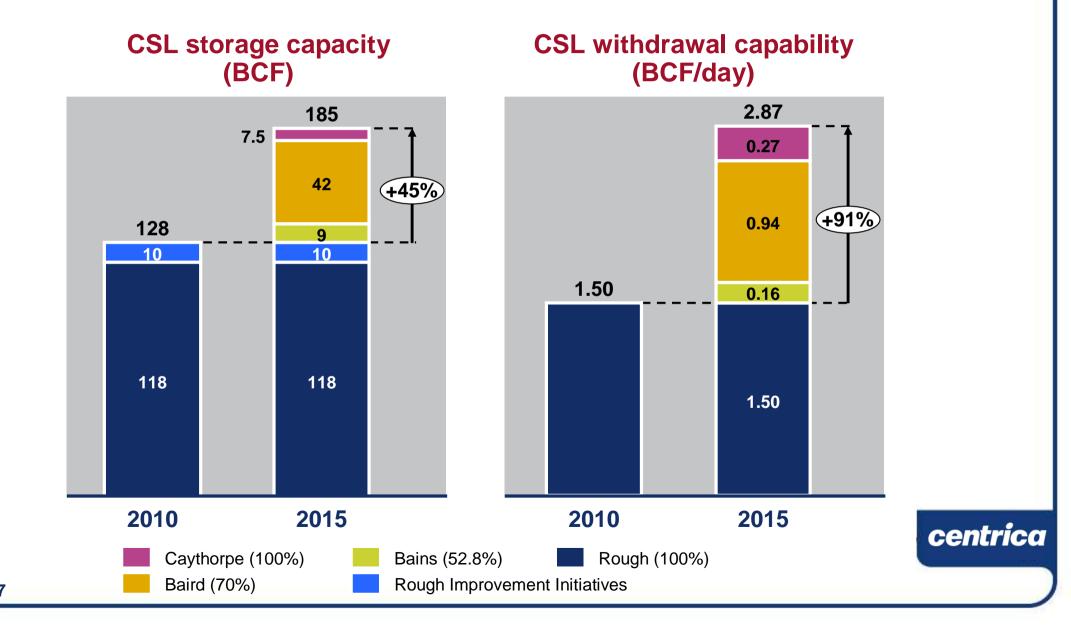


# CSL has announced new storage projects to address future UK requirements

	Caythorpe	Baird	Bains
Description	Onshore depleted gas field	Existing gas field in Southern North Sea	Existing gas field in East Irish Sea
% Owned by Centrica	100.0%	70.0%	52.8%
Working Gas (bcf)	7.5	60	15-20
Cushion Gas Required (bcf)	4	50-70	27
Injection / Withdrawal Duration (Days)	20 - 30	60	60
Planning Status	Planning permission granted; FEED completing December 2009	FEED commenced October 2009	Onshore planning granted
Final Investment Decision	Q3 2010	Q3 2010	Q4 2010
Operational	2012	2013/14	2013/14



## Development of CSL's three storage assets will make significant contribution to UK storage capacity



67

## **Summary**

Competitively advantaged	<ul> <li>Unique position in UK storage market         <ul> <li>Knowledge of UK storage market</li> <li>Extensive third party sales experience</li> <li>Excellent HSE &amp; operational record</li> </ul> </li> </ul>
Growth platform	<ul> <li>Proven capability in storage operation</li> <li>Proven development capability via Centrica Energy</li> <li>Pipeline of future projects</li> <li>Development of portfolio business/risk diversification</li> </ul>
Strong returns	<ul> <li>Continued strong performance of Rough</li> <li>New build must meet hurdle rate</li> </ul>
	centrica

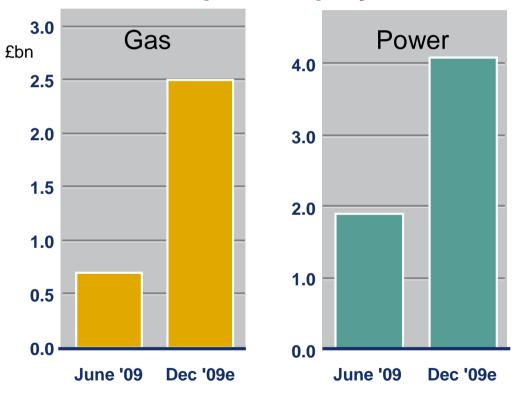
## **Financials** Andrew Le Poidevin

## Agenda

- Balance sheet
- Investment programme
- Cash generation
- Hedging
- Costs



# British Energy and Venture represent a step change in the size of Centrica Energy



#### **Capital Employed**

#### Venture Acquisition

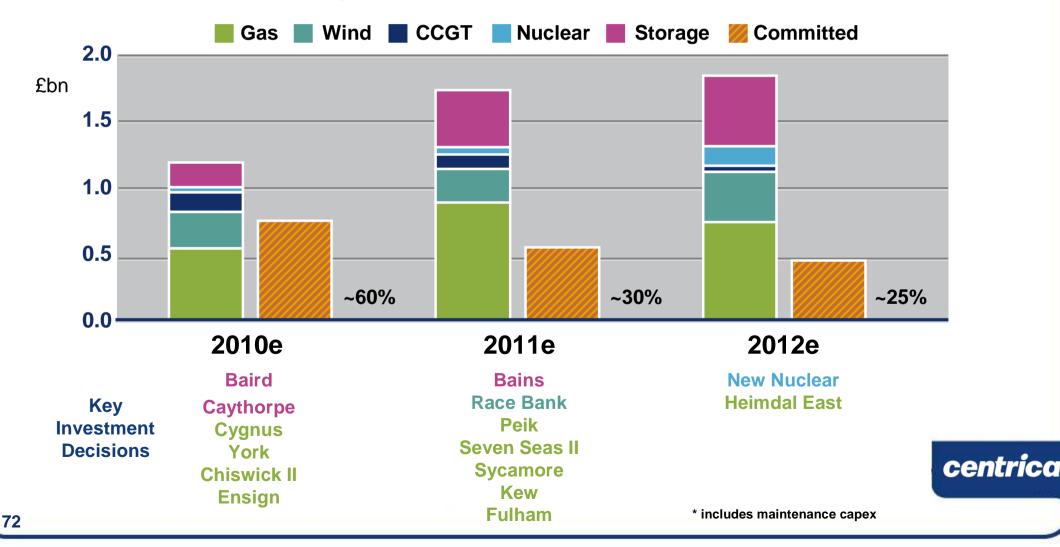
- Fair value uplift of producing and development assets
- Incremental depreciation will be separately identified – excluded from underlying EPS
- Mark to market of hedging transactions through middle column

#### Stake in British Energy

- Segment disclosure will include 20% of BE's operating profit
- Share of interest and tax shown separately
- Fair value uplift of existing nuclear plants
- Incremental depreciation will be separately identified – excluded from underlying EPS
- Mark to market of hedging transactions through middle column

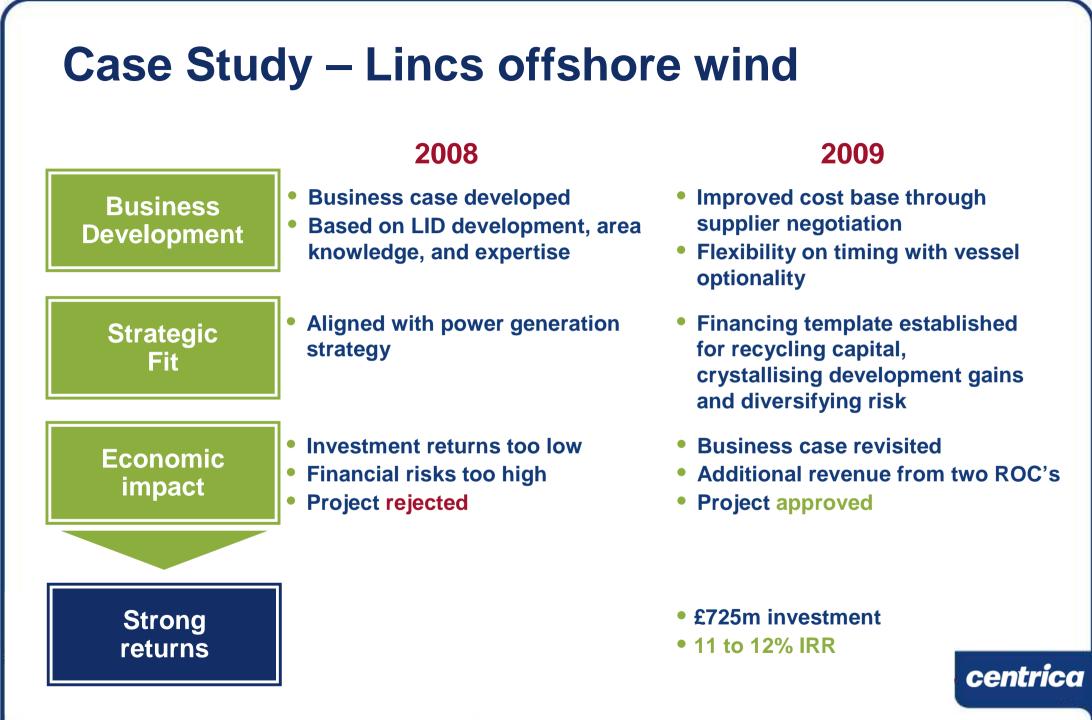
# Investment opportunities offer a growth platform with embedded optionality

Potential project pipeline – investment opportunities\*

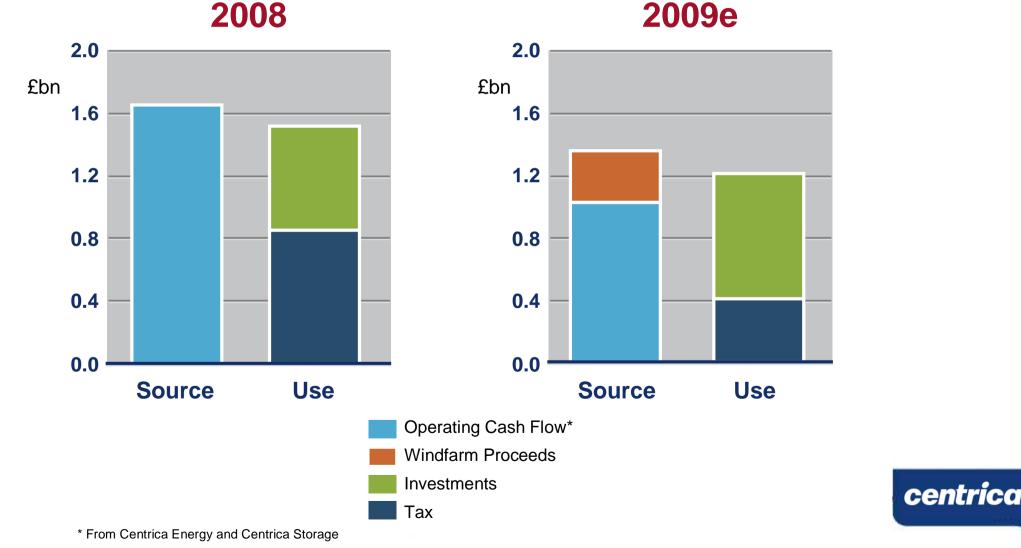


# Group capital allocation process ensures a portfolio view when prioritising investments





## Strong cash generation from underlying business to fund investments

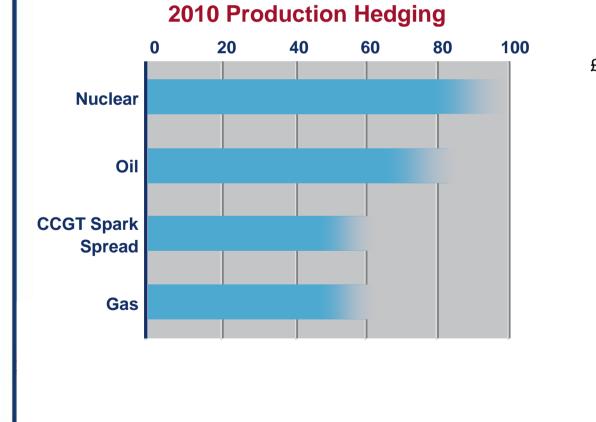


2008

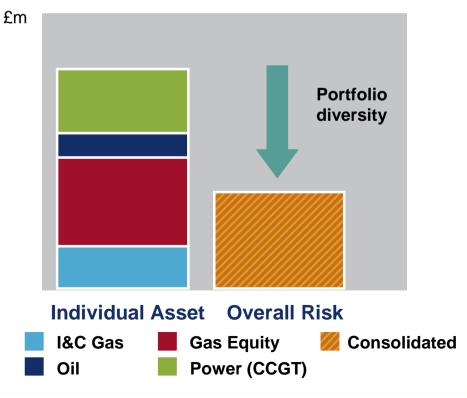
# Hedging underpins financial returns

## Hedging Principles

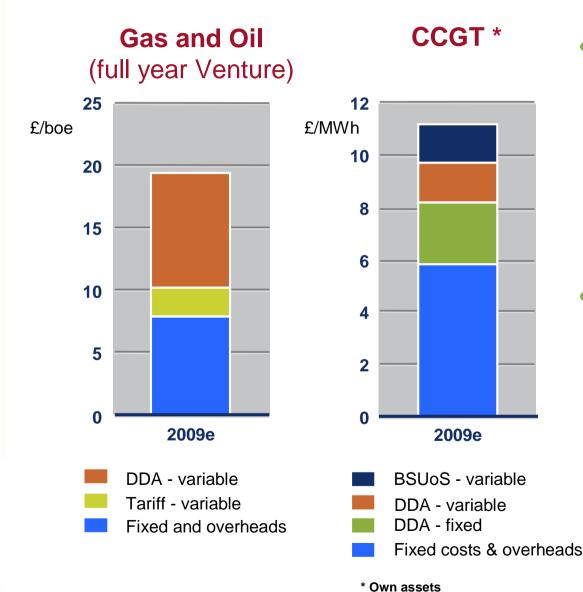
- Rateable selling strategies, profile approaching 100% by month ahead
- Flexibility to deviate to exploit fundamental view, maximise extrinsic value and asymmetric returns, subject to PaR limits



2010 Profit at Risk (PaR)



## **Gas and Power cost structure**



• Oil and Gas

- DD&A charged on unit of production basis by field
- Product and field mix affect
   Upstream average
- New developments leading to higher unit costs

### Power Stations

- Production varies with spark spread
- Langage operational in 2010, increasing unit costs
- Depreciation charged on unit of production basis by station

centrica

77

# UK Upstream Energy's tax rate will decline over time

	2010
	Tax Rate
Morecambe, Statfjord, Brae	75%
Other UK	50%
Venture	50%
Norway	~78%
Netherlands	48%
Power Generation	28%
Gas Storage	28%

- Morecambe production highly taxed
- Tax rate will reduce as Morecambe declines

## **Summary**

Competitively advantaged

- Capital allocation process ensures risk assessment and investment prioritisation
- Business capabilities allow us to create value

Growth platform

- Investment pipeline of ~£5bn (2010-2012)
- Portfolio provides flexibility around options and timing

centrica

Strong returns

- Balanced portfolio is cash generative
- Value creating investments
- Well positioned for market fundamentals

79

# Wrap up / Q&A Sam Laidlaw



# **Appendix 1: Centrica Group Weighted Average Cost of Capital (WACC)**

Risk Free Rate <sup>1</sup>	3.6%
Market Risk Premium <sup>2</sup>	6.0%
Beta	0.70
Cost of Equity	7.8%
Tax Rate	28%
Debt Premium <sup>3</sup>	1.5%
Cost of Debt (before tax)	5.1%
Cost of Debt (after tax)	3.7%

Equity / (Debt + Equity)	20%
WACC	7.0%

centrica

Note: 1) 10yr GILT 2) Implied market risk premium 3) Current credit spread

## **Appendix 2: Displays**

centrica

## Langage...

- · Will be one of the most modern and efficient gas fired power stations in the world.
- · Comes online at the end of 2009, generating enough power to serve 1 million homes
- · Increases Centrica's proportion of owned or operated capacity
- · The South-West has the lowest level of power generation in the UK. Langage negates the need for power to be brought in from elsewhere, reducing the cost of transporting electricity for the region.



### What is innovative about Langage?

- Architecturally innovative and designed to blend into the landscape.
- Uses 2 GT26 gas turbines, which will produce 885MW of power.
- The GT26 is highly efficient, using a 2-stage combuster, which also produces lower emissions
- The technology at Langage is proven and best in class.

# Langage

## **Benefits**

Lead Time Shorter lead times to. produce electricity faster

### Environment

and fieldbillty. Langage can run at part load in order Langage will meet stringent to meet variable demand environmental criteria and requirements be smaller in size, height and area than similar plants

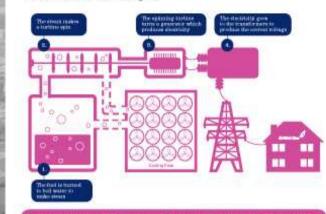
Availability

and Flexibility

Performance Hoher plant efficiency. Better reliability, availability for increased power output at a wide rande. of operational models. Lower emissions to meet environmental concern

## How does a power station work?

There are four main stages:



### What makes Langage Power Station different?

Gas Turbines

Air Cocked Condenser (ACC)	Heat Repo Steam Ger (HRSQ)
Ar Choked Carstenaer	He pair pross
(ACCT to Early)	longson direct
marching parternaero	meren officier
stating materner	tardis growt
lifter a got fid were	manimum any se
began fact verifiker	manimum y se
bolliof plant	manimum y se
	Conception of the

Control Room 1. Weighter Der Bitrer Dist concerning these resulting the states ITTLE THE ROOM OF STREET stad comparison of the paints



## Renewables

### Why renewables?

- · Centrica's existing and proposed wind farms will reduce emissions of carbon dioxide, the main greenhouse gas
- · Wind diversifies our generation mix and reduces the UK's dependence on traditional fuels
- · Centrica has a strong pipeline of renewable power projects.

### Current and future wind farms

The map shows how many homes each wind farm could provide power for.



# **Earling shull forms** Falters stand Income

In Founds 1 and 2, the Grows Estate

provided for 800% of offshare wirel power.

Fround Bladds another 25GW by 2020.

- · A 970MW wind farm project 5-trailes off. the Lincolnship coast
- Consisting of 75 turbiner
- Will receive 2 Renewable Obligation.
- Contributes (FOCIA) making the occurrenties attractive with an internet rate of return 104Rt of 11-124 · Conseating sufficient power for
- 200,000 hoganholds

- · Our approach ensures a low impact level on birds and marine mammals during the construction of wind famel
- It also ensures minimal impact on marine ecology with wind turbine structures being colorised by animals and plants providing additional tood sources for fish. and shallish



# Power

## Nuclear

### Why Nuclear?

- It reduces our exposure to volatile wholesale markets and helps us manage prices for our domestic and commercial customers
- Nuclear provides us with reliable baseload power and increases the share of electricity generated from our own sources from 60% to 85% of residential and SME power demand
- Its equivalent CO<sub>2</sub> emissions are almost zero, which is critical in helping the UK to meet its climate change target

### Building the future

- . We own a 20% stake in the existing British Energy fleet which equates to around 1.7GW power output
- · Our 20% stake also gives us the option to participate in EDF's new nuclear build. programme, including two new reactors at Hinkley Point and two at Sizewell
- . The new plants will use AREVA European Pressurised Reactor (EPR) technology - designed for improved safety and environmental performance
- Each unit will generate 1600MW of electricity enough to power 8 million homes
- · New build will create around 15,000 jobs across the supply chain over the next 25 years









## Where Venture was...

- · North Sea Operator since 2000, interests in 48 fields, 21 in production
- · Full complement of skills including sub-surface, drilling, field development and production operations
- · Proven track record of technological innovation
- · First North Sea oil field development to use the Sevan Floating Production Storage and Offloading vessel (FPSO) concept
- · Venture's operated infrastructure
- 2 manned platforms
- 1 FPSO
- 5 normally unmanned installations
- 11 subsea fields
- 2 onshore office locations.

Greater Kittiwake Area (GKA)

- Venture acquired a 50% operated interest in the GKA in 2003
- At that time production was -5,000 boopd (gross) with forecast abandonment -2005
- Venture initiated a programme of maintenance catch-up and has brought 3 new discoveries onstream with a 4th in planning. In 2007 a new pipeline was
- constructed from Kittheake to the **Fortios Pipeline System**
- Current production is -25,000 boopd (grous) with abandonment -2016
- This has created significant added value through focus and investment



# Upstream

### Chiswick and Annabel case study

 We used innovative sub-surface techniques in order to unlock 'orphaned' Southern North Sea (SNS) gas reserves in the development of the Chiswick field and the discovery of the Annabel field. These included

- Dataled understanding of the cathonile/out reservoirs. Existic depiti-curvesion in complex invit salt associaterit incom
- Delling of long horizontal wells through multiple sand bodies. Artificially fracturing reservoirs in multicle points alongitorizostat well bores

Future success is expected from our gas portfolio by using these technologies





### Chestnut case study

· Development of the Chestnut field required specialist skills and technology, including an innovative FPSO design. and complex seismic processing



**Building Centrica** Energy Upstream

### Centrica Energy Upstream now has well defined Exploration and Production (E&P) capabilities across our core markets

- · Venture was acquired by Centrica in August 2009
- · Official in 5 key locations
- Proven expertise in managing mature assets. · Proven track record of field development and sub-sea bebacies
- · Core capability in directional drilling and horizontal wells leading to lower well-costs and reduced Finding & Development (F&D) costs
- · Better understanding of the complicated reservoirs in the North Sea, helping maximise the asset value
- Ourrent developments coming on-stream will make Centrics one of the UK's top 3 cas producem in 2011



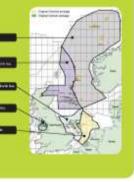
### Centrica Energy **Upstream Organisation**

### Capabilities aligned around regional hub-based strategy

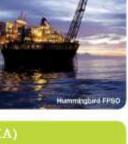
- · Five core regions in the portfolio
- 4 gas hubs and 1 oil hub - Each hub is a material business
- led by a P&L holder Significant upside potential in
- each of the hubs. · Benefits of regional

### hub-based strategy

- Oversities export routes Builds detailed area knowledge
- Lower mik step-out exploration
- and appraisal drilling
- Control of infrastructure
- Manainal cost of development.
- and supply reduced



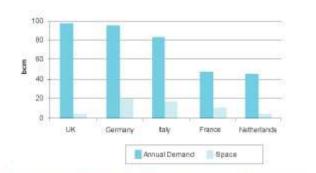




### The case for UK gas storage

The UK has a growing dependence on gas imports and relatively little gas storage capacity

Space vs Annual Demand in Europe



	Storage Working Volume (born)	Annual Demand (born)	Storage / demand (% of demand)	Days of avg demand
UK	4,3	98.00	4.4%	16.0
Netherlands	5.0	45,45	11.0%	40.2
Germany	20.2	96.16	21.0%	76.7
Italy	17.5	83.33	21.0%	76.7
France	11.5	47.92	24.0%	87.6

### A number of recent legislative changes support the development of UK gas storage

- Energy Act 2008
- Planning Act 2008
- · HMT clarification of capital allowances on cushion gas

## **Centrica Storage**

### Storage Projects

Shaping the future through	flexible and	reliable gas storage
----------------------------	--------------	----------------------

	Caythorpe	Baird	Bains
Description	Onshore depleted gas field	Existing gas field in Southern North Sea	Existing gas fold in East mith Sea
Working Gas (bet)	7.5	60	15-20
Cushion Gas Required (bcf)	4	50-70	27
Injection / production duration (days)	20-30	60	60



### **Our Capability**

UK's largest storage facility - Rough

### 24 hours

... on standby 24 hours a day, 365 a days a year

### 455 GWh

... can deliver more than 455 GWh (1.5 billion cubic feet) of gas per day

35 TWh stores around 35 TWh (120 bn cubic ft) of natural gas at pressures of over 200 bar

10x3km

... is approximately 10km long by 3km wide, and varies from 80 to 117 feet in depth

10%

... can meet approximately 10% of UK peak day demand

## centrica storage