ofgem Promoting choice and value
for all gas and electricity customers

Currie Lecture, CASS Business School

PROJECT DISCOVERY AND THE IMPORTANCE OF GAS FROM THE EAST

ALISTAIR BUCHANAN

28.10.2009

TODAY'S PRESENTATION – Part 1

WHAT IS PROJECT DISCOVERY?	A review of medium term security of supply for GB.
WHY DID YOU LAUNCH DISCOVERY?	Massive changes in landscape of GB energy and climate change.
WHEN DID YOU START?	Launched in March 2009 as Ofgem fast track project.
WHEN WILL YOU CONCLUDE?	Full options and recommendations to DECC and public in early 2010.
WHAT IS TODAY?	Currie lecture provides chance to review key supply side parameters.

CALM, CONSIDERED, TIMELY

Why is Ofgem's Discovery different?

- Independent and impartial – look at Retail Probe which nailed £0.5bn for customers in 2008/09.
- Many voices (and vested interests) – Ofgem represents consumers.
- We consult on our analysis to ensure that any proposals we make are based on evidence … many commentators simply assert.
- Our remit comes from statute: S47/48 Utilities Act.
- Our work informed by Sustainability duty.

FOCUS – ON HOW TO GET TO THE FUTURE

Ofgem has a good track record in monitoring markets for Consumers

1. Ofgem has acted on market oddities – our gas probe 2004/05 led to:

   - Full gas flow disclosure in GB from 2006.
   - Use it or lose it at LNG terminals from 2006.
   - Leadership in delivering EU 3rd Directive in September 2009.

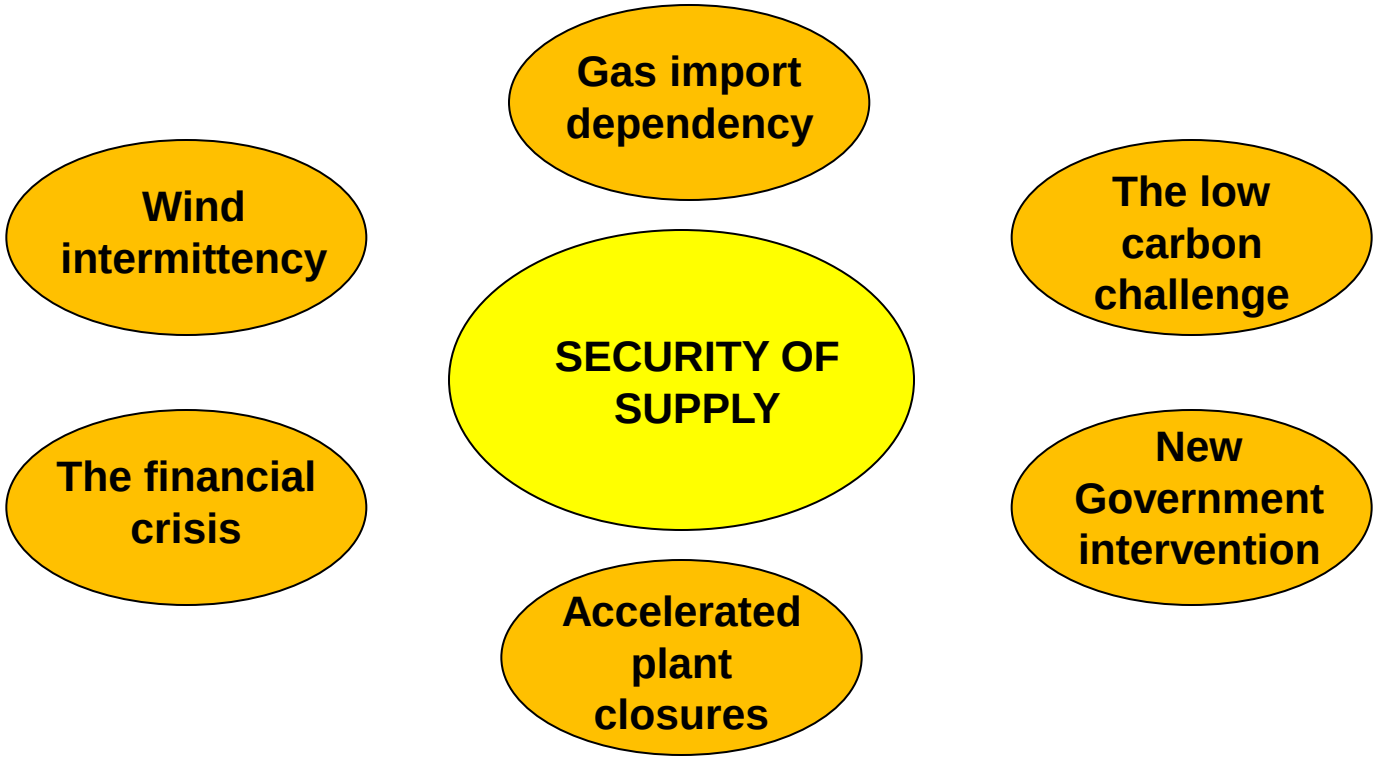
2. Ofgem has known when to leave markets:

   – 1990-2000: 30GW new plant built.
   24GW closed.
   - tight conditions in 2003 and 2006 managed.

BUT DISCOVERY UNCOVERS A SCALE OF UNCERTAINTY NOT SEEN BEFORE

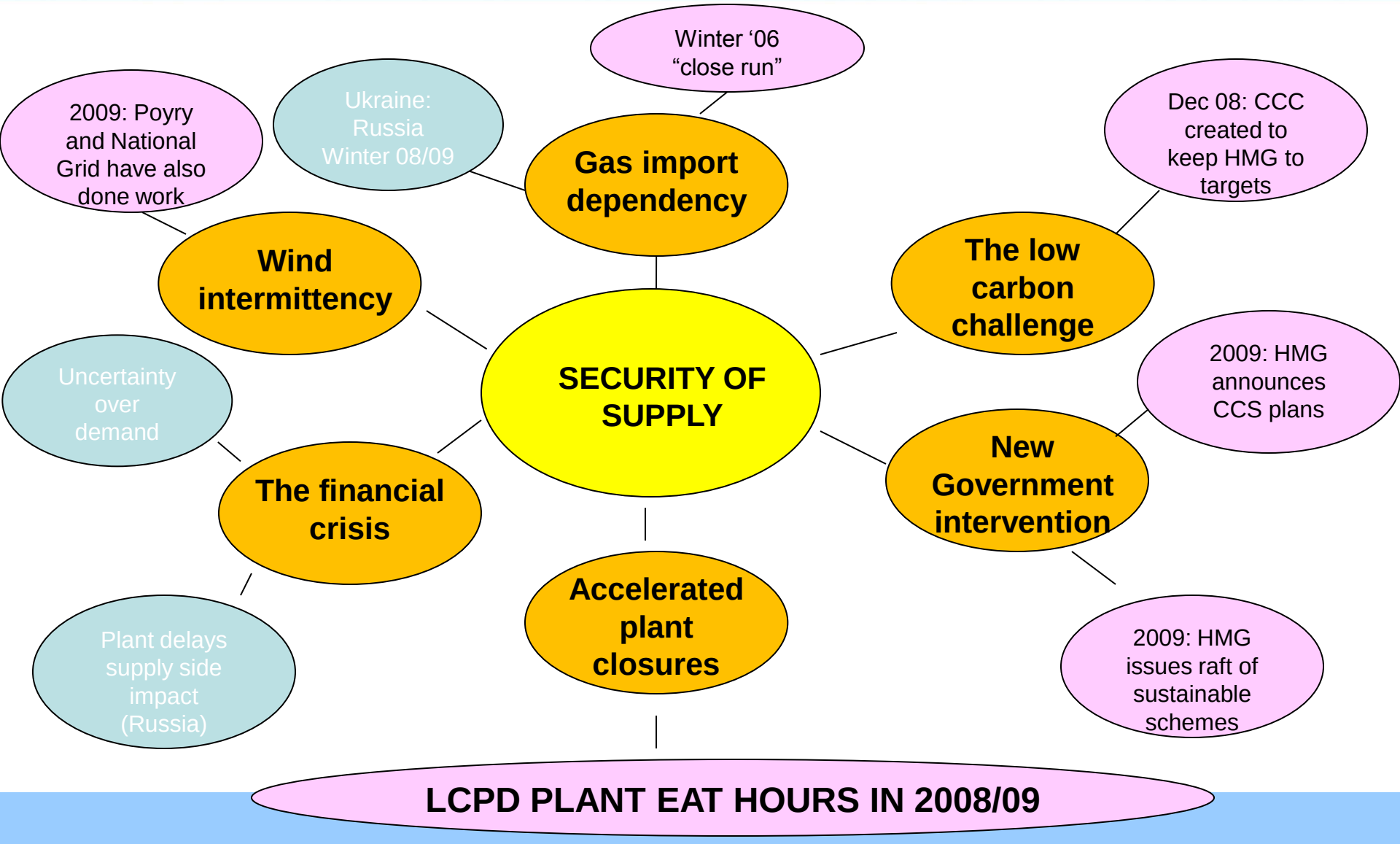
Project Discovery

Can GB markets deliver secure and sustainable energy supplies?



TESTS SEVERE AND COMPLEX

Project Discovery



Insights from the scenario work

GB markets will be severely tested

- Each scenario shows that energy supplies should be maintained.
- Investment needs to be **ramped** up - up to £200 billion.
- Consumer bills are likely to be higher:
- We highlight some **specific risks** to secure and sustainable energy supplies.

1. Maintaining gas supplies in a severe winter is the biggest risk we see.
2. Investments need to be made in a timely fashion.
3. Gas dependency and intermittency in power generation will present a challenge.
4. Potential risks to meeting climate change objectives.

THERE IS A HUGE RANGE OF UNCERTAINTY

A word about our approach

We cannot predict the future!

- Our scenarios are intended to be **plausible** and **internally-consistent** but also **diverse**
- These are **not forecasts,** but an **exploration** of possible outcomes
- We **assume** that markets respond to price signals
  - So our scenarios do not by themselves tell you if markets can deliver
- We are interested in **resilience** so we need to explore shocks through "stress tests"
- Our scenarios are **not policy choices** but reflect a global context

UNCERTAINTY AND RISK ANALYSIS ARE AT THE HEART OF OUR METHODOLOGY

Ofgem's global scenarios

		Economic recovery	
		Rapid	**Slow**
Environmental action	**Rapid**	Green Transition	Green Stimulus
	Slow	Dash for Energy	Slow Growth

FOUR SCENARIOS REFLECTING KEY GLOBAL DRIVERS

Headline themes from four scenarios

Good news: Emissions down in all four (-12% ⟶ -43%, from 2005 levels).

Bad news: Bills up in all four (domestic, by 2020: +14% ⟶ +25%, from 2009 levels – with the possibility of up to +60% in the interim).

Thematic news:

(1) Gas import dependence up in all four – but in two we have stable import demand from the middle of the next decade.

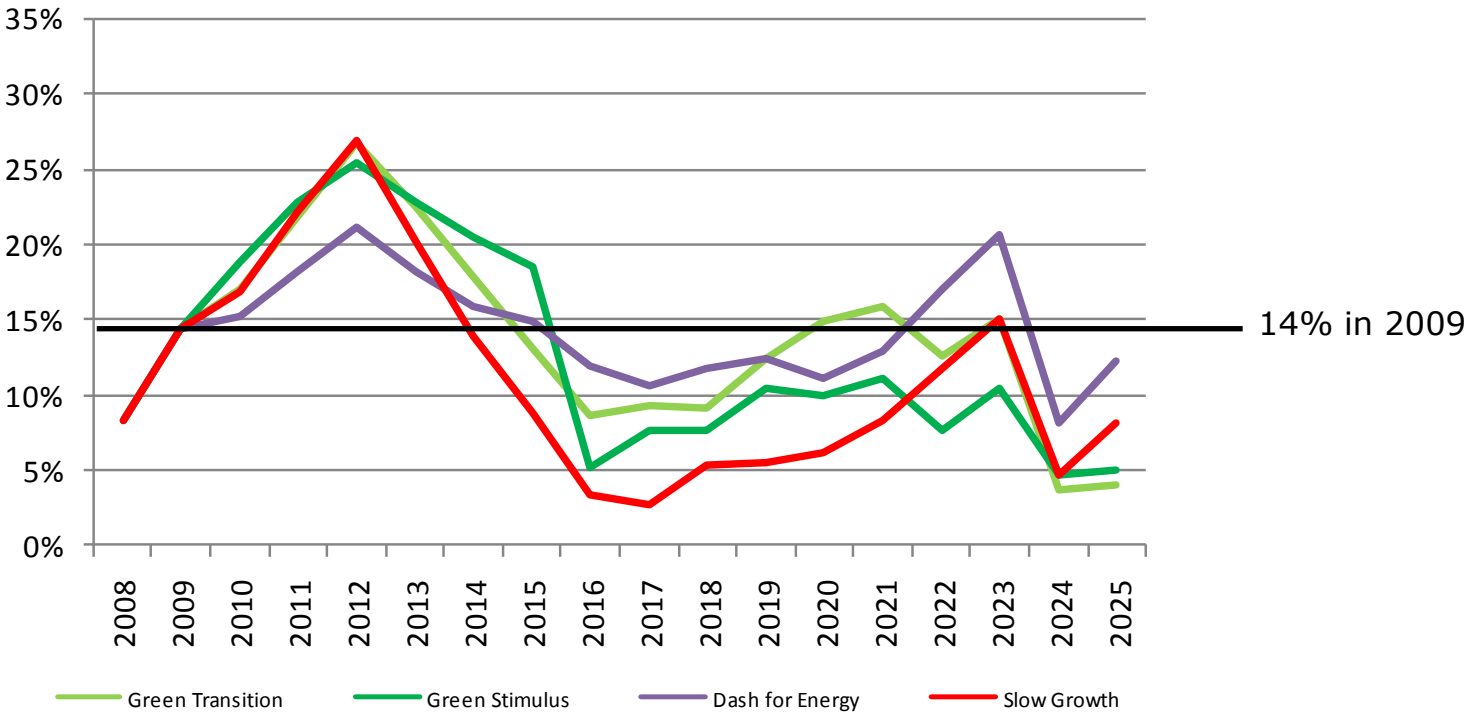
(2) Investment up in all four (£95bn - £200bn).

(3) In two out of four significant risk to 2020 climate change objectives and new nuclear not of much impact.

(4) The two Green Scenarios assume new nuclear and CCS are operational by 2020.

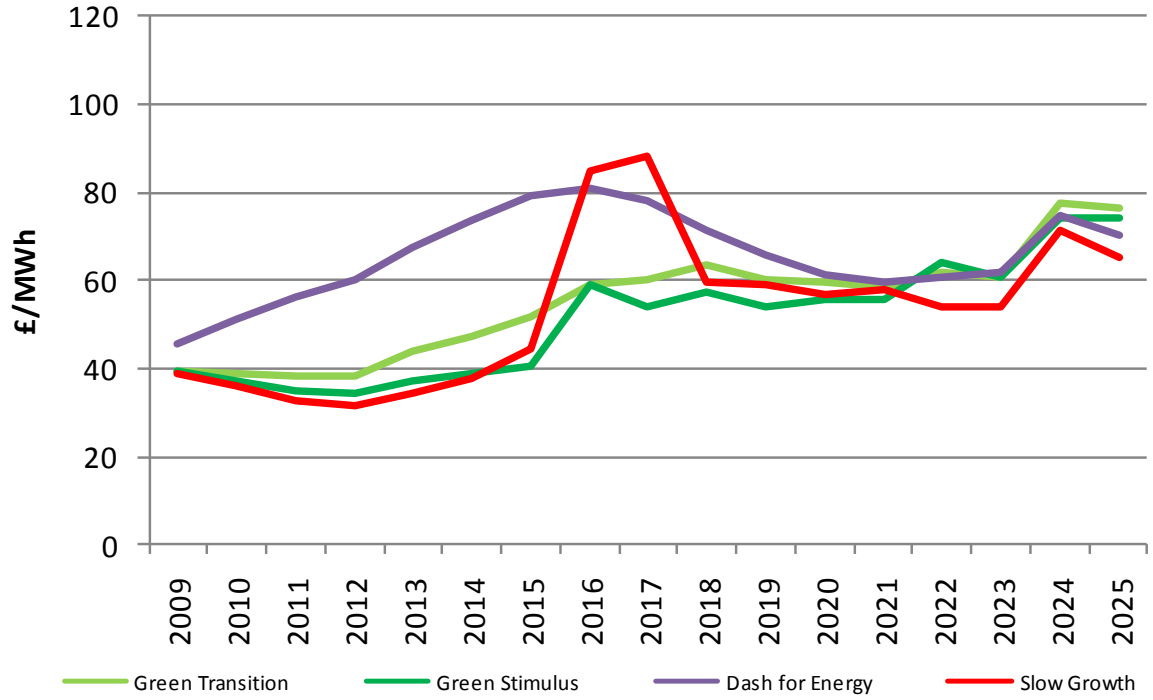
SEE APPENDICIES 1-4

De-rated capacity margins (pre stress tests)



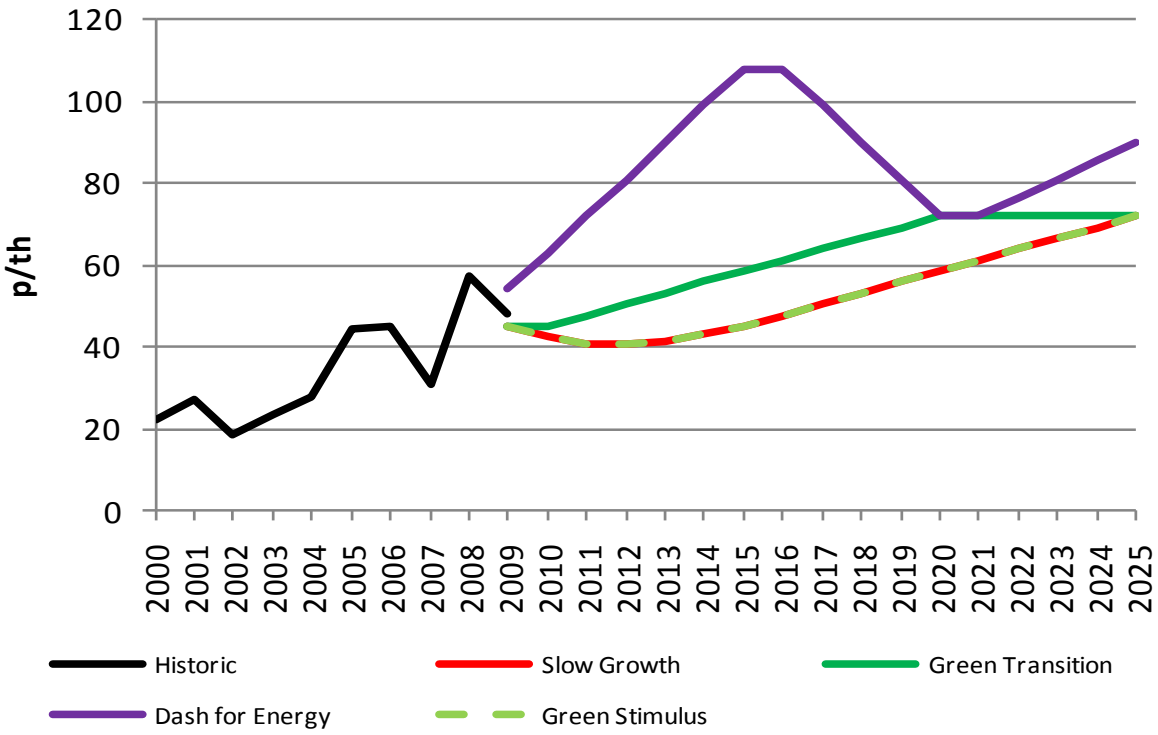
TIGHT MARGINS IN ELECTRICITY UNDER SOME SCENARIOS

Wholesale electricity prices



RISING PRICES A FEATURE – WITH A RISK OF PRICE SPIKES

Wholesale gas prices



Failure to develop renewables could lead to high levels of gas dependency

Domestic energy bills under the four scenarios

	By 2020
Green Transition	+23%
Green Stimulus	+14%
Dash for Energy	+25%
Slow Growth	+22%

Note: changes shown in real terms

THESE RISES MAY BE PARTIALLY OFFSET BY DEMAND SIDE RESPONSE

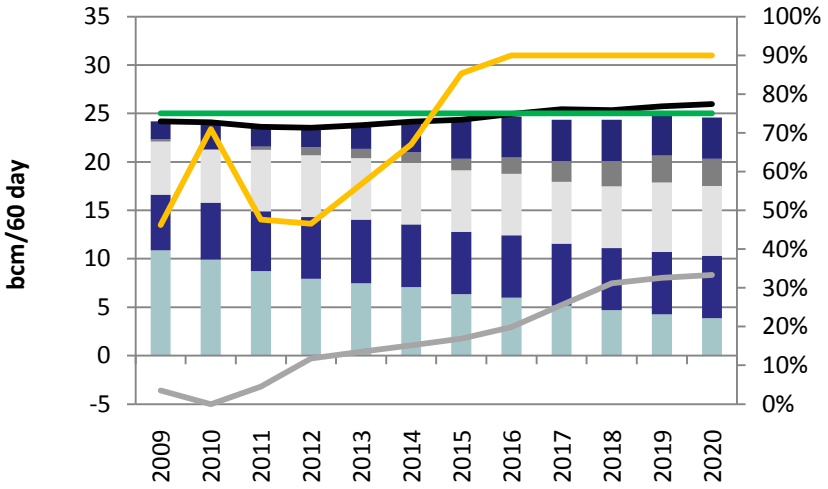
STRESS TESTS - TRAFFIC LIGHTS

Stress test	Period	Today	Green Transition	Green Stimulus	Dash for Energy	Slow Growth
Re-direction of LNG supplies	1-in-20 severe winter	🟢	🟡	🟡	🔴	🔴
Russia-Ukraine dispute	1-in-20 severe winter	🟡	🟡	🟡	🔴	🔴
Bacton outage	1-in-20 peak day	🟡	🟡	🟡	🟡	🟡
No wind output	1-in-20 peak day	🟢	🟡	🔴	🟢	🟢
Electricity interconnectors fully exporting	1-in-20 peak day	🟢	🔴	🔴	🟡	🟡

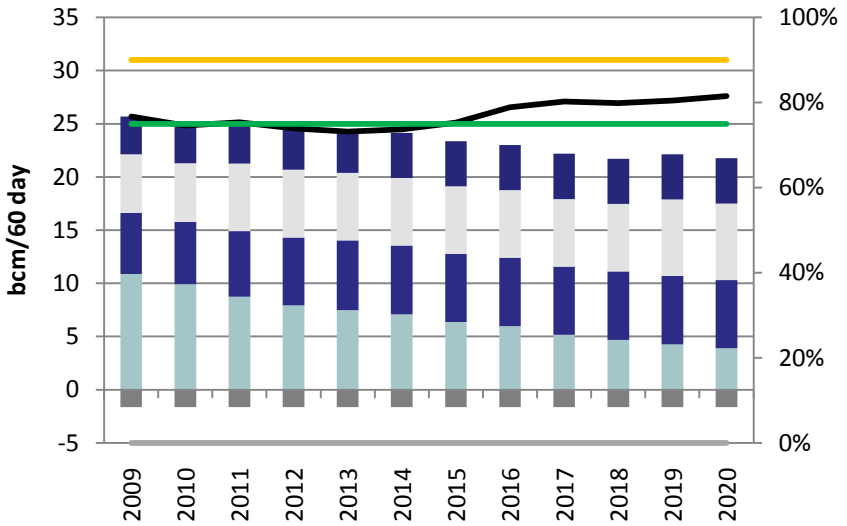
Low impact 🟢 Moderate impact 🟡 High impact 🔴

THE "REDS" CURRENTLY OUTWEIGH "GREENS"

Without Stress Test



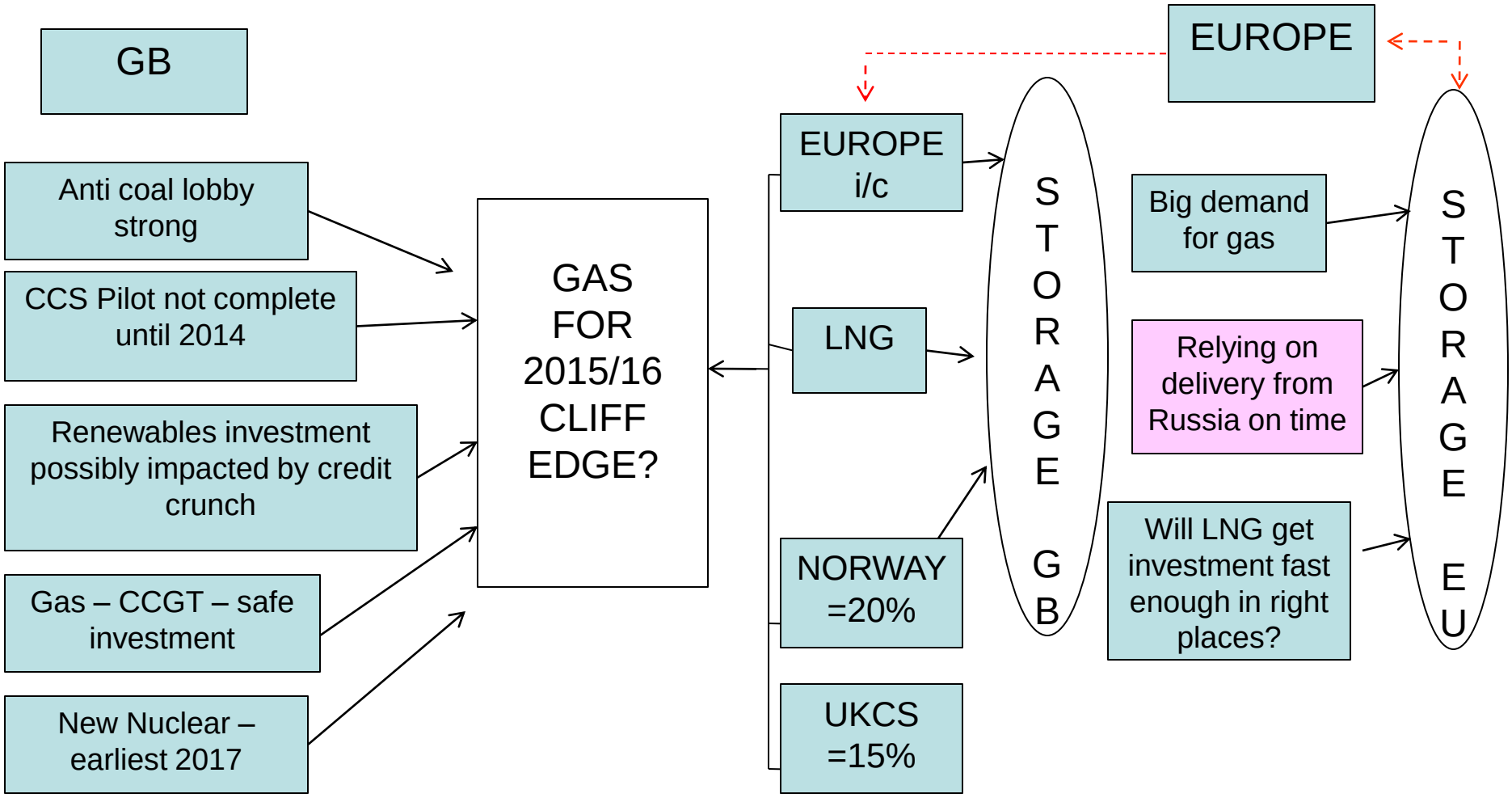
With Stress Test



Storage
Interconnectors (net)
LNG
Norway
UKCS
Demand
LNG terminal utilisation
Interconnector utilisation
Storage utilisation

MAKING SURE WE GET TO LUSH "GREEN" PASTURES OF 2025-2050

OUR FOCUS MUST BE ON THE BRIDGE



A LOT OF FINGERS DO POINT TO GAS….POINT EAST

TODAYS PRESENTATION – PART 2

- Can Russian pipe deliver the demand?
- Can global (including Russian!) LNG deliver Europe's gas needs?
- If delivery of pipe and LNG to Continental Europe are late does GB become vital gas hub of Europe?
- How does this export for GB gas mesh with 2015/16 cliff edge and further storage delays in GB?

SO SHOULD WE EXAMINE THE DELIVERY SCHEDULED ANEW = YES!

	2020 BCM	2015 BCM	BASE CASE COMMENT
Base case EU demand – consensus forecasts.	700	630	Of which UK demand is 98bcm/97bcm.
Gazprom to EU (bcm)	220	203	Relies on Shtokman delivering 57bcm/22bcm.
(Of which Middle Asia)	70*	60	Assumes pipeline constructed and that Turkmenistan has also 40bcm for China and EU direct.
LNG to EU	156	106	Assumes Qatar etc deliver.
Other supplies, Norway etc	324	321	Assumes Shtokman LNG, full Nabucco.
EU can balance its books - supply	700	630	

* See page 23

GAS SUPPLY = GAS DEMAND … JUST

ALEXEI MILLER QUOTE

" Gazprom invests sufficiently. We have always invested in production and transportation as much as needed to meet already signed contracts and not focusing on demand forecasts… As a result Gazprom has enough production capacity but does not suffer from surplus"

Alexei Miller June 2009

	2020 BCM	2015 BCM	BASE DEMAND CASE "DASH FOR GAS SCENARIO" IN DISCOVERY/ A LOWER SUPPLY CASE
High demand case	700	630	See notes.
Gazprom to EU	200	185	No Shtokman or South stream in 2015.
Gazprom Middle Asia	50	40	20bcm to China/Europe as did not develop enough capacity.
LNG to EU	156	106	Assumes Qatar etc deliver and Shtokman.
Other Supplies, Norway etc	311	298	No Iranian gas taken, Nabucco limited for 2015.
Total supply needed	700	630	
Shortfall in supply	33	41	

IMPACT WORRYING IF THIS CASE OCCURS

TURKMENISTAN – THE CHALLENGE AND THE OPPORTUNITY

	2007 Delivered	2020 Delivery?	MAX POSSIBLE 2025 Delivery?
Domestic	20	30	30
Gazprom	42	70*	85
Sub Total	62	100	115
Nabucco	-	10	20
Iran	*	14	14
China	-	30	40
TOTAL (bcm)	**62**	**154**	**189**

* Some flow under contract.

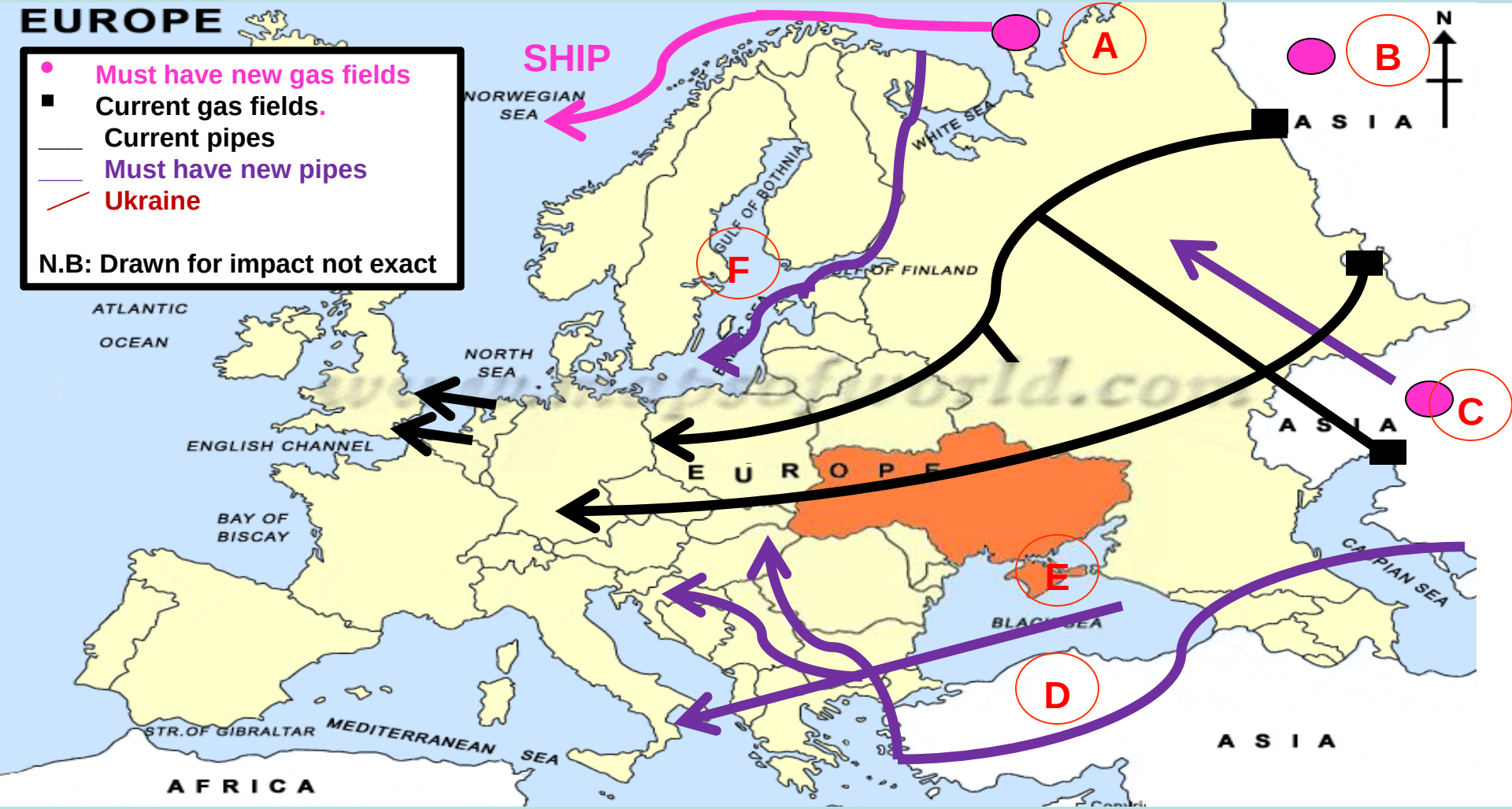
* Link to Page 20

CAN TURKMENISTAN DELIVER THIS KIND OF GROWTH IN THIS TIME FRAME?

THE 6 PROJECTS NEEDED TO ASSURE SUPPLY FOR 2015-2025

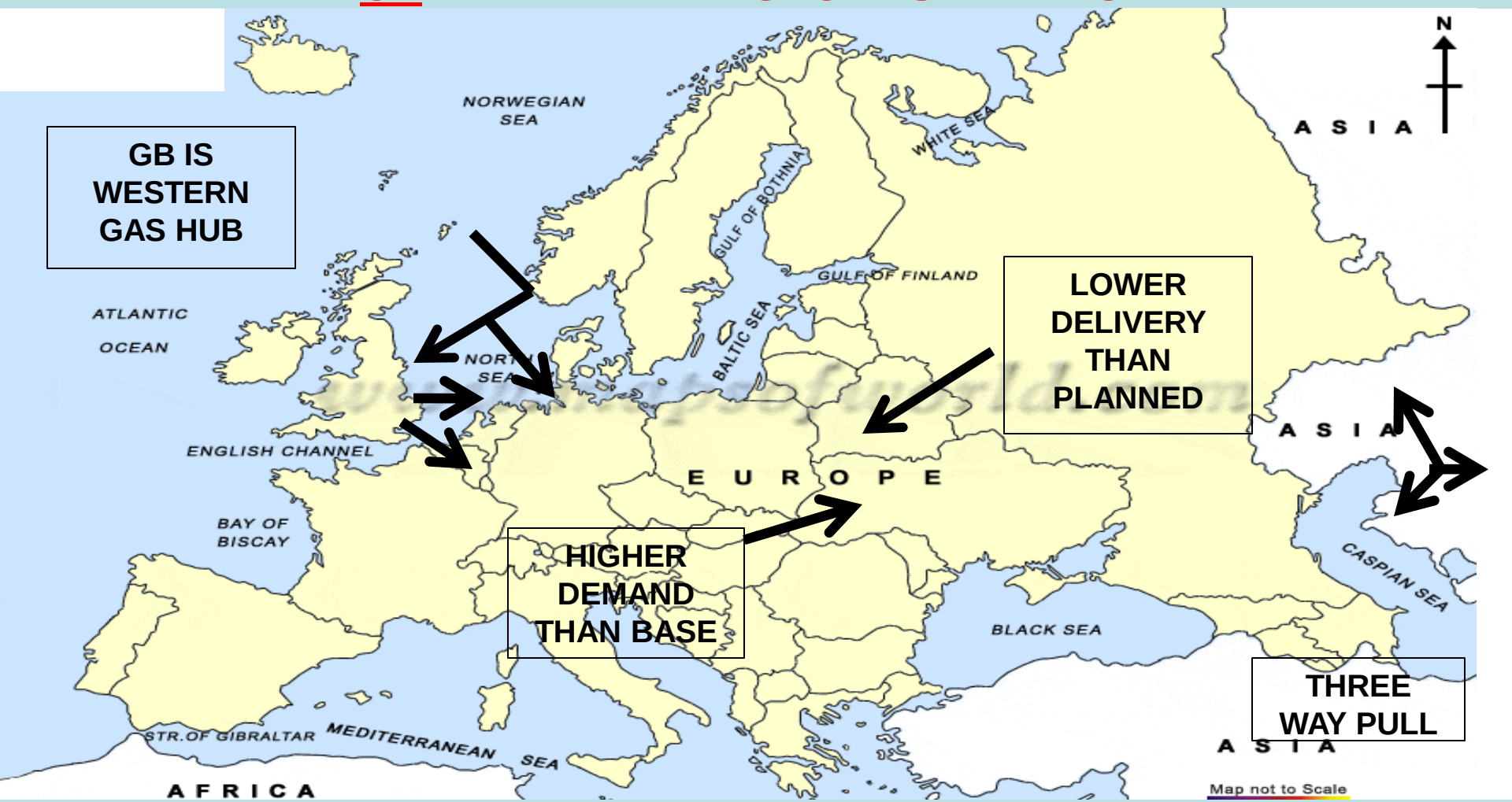
HUGE SUMS INVOLVED: $135BN MINIMUM MUST BE SPENT

EITHER RUSSIA/ASIA CAN DELIVER THE GAS ON TIME



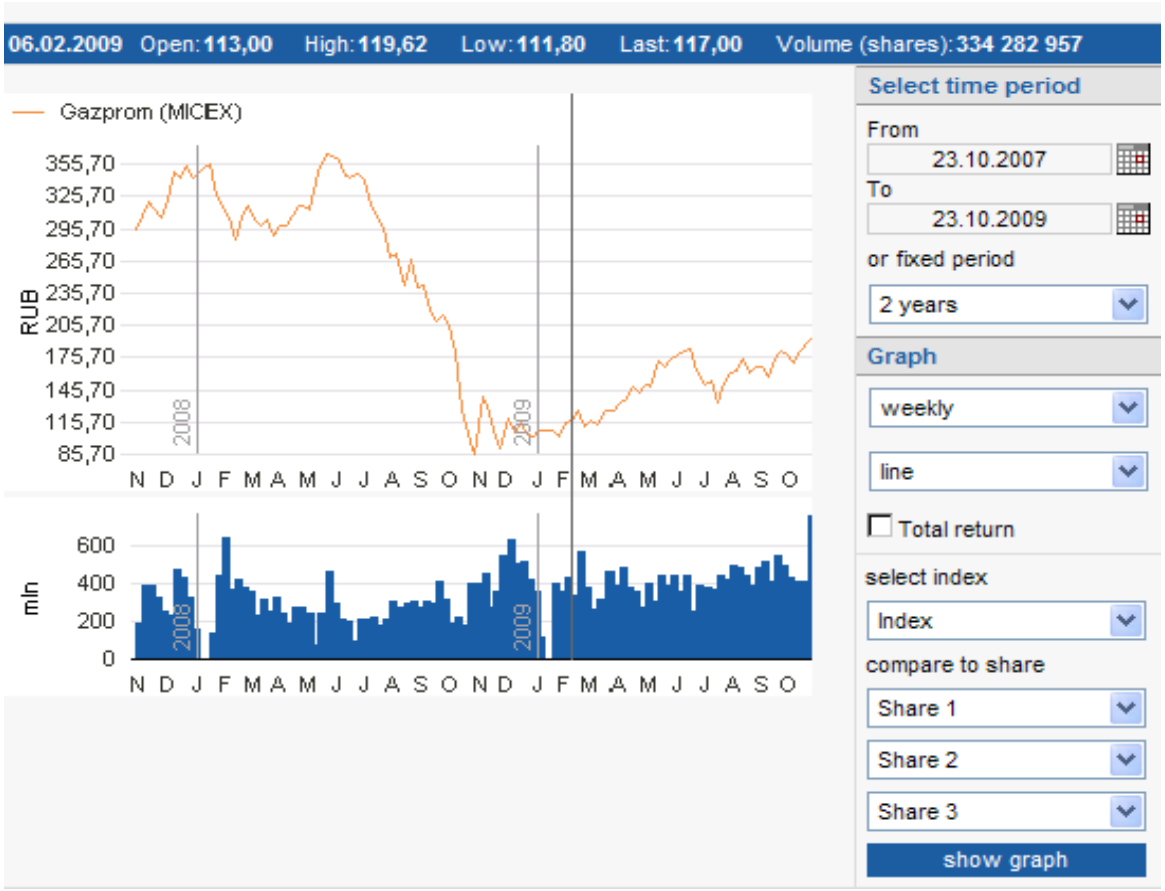
LNG AND STORAGE DEVELOPMENTS ASSUMED!

OR A MAINLAND EUROPE SANDWICH



IS THERE ENOUGH DOUBT TO CAUSE "SWEATY PALMS"

WHAT IS THE IMPACT OF FINANCIAL CRISIS/RECESSION ON GAZPROM



MC $142bn – a recovery but off May 08 high $350bn

WHAT IS THE IMPACT OF FINANCIAL CRISIS/RECESSION ON GAZPROM (2)

PRODUCTION INVESTMENT ↓

REVENUE FROM RUSSIA
(controlled price increase less steep
plus 10% volume drop) ↓

REVENUE FROM EU (Plus $2.8 bn short in
take - or – pay contracts) ↓

INVESTMENT IN FAR EAST ↑

FINANCIAL MUSCLE ↓

" In 2009 Moody's expects Gazprom's financial performance to weaken significantly compared to 2008 metrics"

KNOWN IMPACTS CAUSED BY DOWNTURN ETC

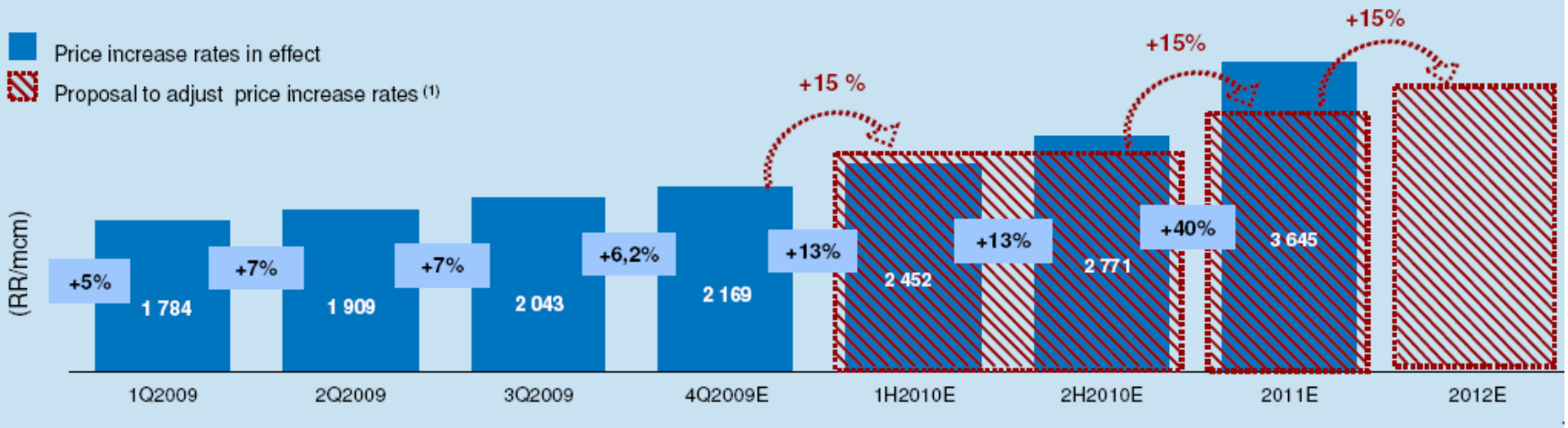
[Figs: Poyry, Citigroup, Renaissance capital]

- Capex down
  - Overall £11.8bn to£9.3 bn
  - Production investment £5.5bn to £2.7bn
  - 17% cut approved by board (sept 09)
- Bovanenkovo
  - Delayed by 1 year to end 2012
  - First of 3 critical new super gas fields.
- Legacy Fields O+M - Down 25 bn R to 10 bn R
- Nord Stream - Down 43 bn R to 31 bn R
- LNG in Yamal - Renaissance Capital doubt attractions
- Moody's suggests Shtokmanov shoye may have timing issues.

GAZPROM NOT ALONE IN DELAYING PROJECTS: IEF IDENTIFY 36 GLOBALLY

KNOWN REVENUE/ PRICE PROPOSALS IN RUSSIA

Domestic Wholesale Price Growth for Industrial Consumers



(1) *Pursuant to "General assumptions and forecast of social and economic development in Russia for the period from 2010 to 2012" designed by the Russian Ministry of Economic Development in July 2009*

GAZPROM CAN CONTINUE PROGRESS ON "PRICE CONNECTION" IN RUSSIA

WHAT DO WE KNOW ABOUT THE PROJECTS THAT MAY SUGGEST CHALLENGES TO MEET DEADLINES

- Are financial details unknown , not settled , and or unrealistic? A E D
- Are there further field delays B D C F
- Could legal challenges cause delays D
- Are there technical challenges so great that there is a credible chance of delay, cost overrun A B C D

Key

- A Shtokman
- B Yamal
- C Turkmenistan
- D Nabucco
- E South stream
- F Nord stream

AND THIS IS BEFORE POLITICAL FACTORS!

LISTEN TO ALL PARTIES

Pöyry on B : "A situation is likely to develop whereby the depletion of the main super giant fields in West Siberia is not matched with timely developments of Russia's next gas province.

Moodys on E : "The future of South Stream is highly certain".
(Sept 2009)

Renaissance Capital on B : "While we have no doubt that Yamal will become a major centre for the production of pipeline gas for Gazprom, we are more sceptical on its LNG prospects." "In this context tax breaks could be the deciding factor.
(29/9/09)

NOT AFTER EXACT ANSWERS – JUST SCALE OF DOUBT

AS EVER TWO OR MORE WAYS OF LOOKING AT THINGS

REAL PROGRESS BEING MADE

- Turkmenistan (and Uzbekistan) want to be involved.
- South Yolotan – Osman field is vast and verified now.
- Nabucco was struggling but hurdles being overcome (Turkey, Major utility backing).
- Russia might well change its crippling law of Offshore Field Development.
- Gazprom and Russia looking more at strategic partnerships:
  - LNG at Shtokman? – Total, Shell.
  - Yamal? – Shell, Total, E.ON
- Russia keeps momentum on domestic price increases.
- France enters the effort: EDF at E, GdF Suez at F.

NOT A COMMENT ON GAZPROM, NABUCCO CONSORTIUM ETC?

"Ongoing crisis will not affect Gazprom's long-term strategy … it remains intact"

Alexei Miller – June 2009.

"Moody's believes that Gazprom will still be in a position to maintain an adequate operating and capital efficiency, given the nature of the company's asset base and its strategic positioning.

Moody's report on Gazprom – September 2009.

LIKELIHOOD THAT KEY PROJECTS ARRIVE ON ORIGINAL DATES

	On time	Some delay	Big delay	Original date
A. Shtokman	🟡	🟡	🟡	2013
B. Yamal (new Fields)	🔴	🟡	🟡	2011
C. Turkmenistan double capacity	🔴🟡	🟡	🟡	2016/17
D. Nabucco	🔴	🟡	🟡	2014
E. South Stream	🔴	🔴🟡	🟡	2015
F. Nord Stream	🟢🟡	🟢	○	2011

Key 🔴 = No 🟡 = Maybe 🟢 = Yes

EVEN IF ONLY 'SOME DELAY' THE VOLUMES MAY BE VERY LOW AND OR/OR DISPLACED GAS

BUT … DOES A DELAY MATTER?

- Demand side never recovers from 2009/10 downturn.
- Demand side management techniques aggressively used.
- Much improved energy efficiency achieved.
- Other fuel sources easily displace (LNG?).
- Other changes initiated (storage etc).
- Newer fuel sources come on more quickly.
- If we get very tight the process will speed up:
  - Shtokman = 50% France's needs!
  - South Yolotan – Osman – even bigger than Shtokman.

PLAYING OFF SUPPLY SIDE CRUNCH WITH DEMAND SIDE SLUMP?

DISCOVERY IS WELL NAMED – WE LOOK FOR YOUR VIEWS AND INPUT?

- How does "gas from the east" rank in our traffic light stress tests?
- If our scenarios are sound will the extra gas be available given the supply side impacts from recession?
- How much danger is there if early or double counting the gas through different "routes to GB"?
- Does the L/T contracts of Gazprom to Continental Europe cause concern for GB Security of Supply?

ENQUIRY AND ADVISORY NOT POLICY

CONCLUSION

- Ofgem is known for independent and detailed reviews – open minded projects … not afraid to ask questions.
- Need to look at ways of handling what we find … supporting markets is our preferred starting point … and our statutory remit.
- Initial report in Summer 2009 to GEMA…GEMA authorised project to proceed to consultation stage…9th October that stage began.
- In 2010 Ofgem will report to and liaise closely with DECC on findings. Ed Miliband welcomed Consultation doc in Times on 12/10.

APPENDICES

SCENARIO OVERVIEWS

Scenario Overview – Dash for Energy

In this scenario….

- Global economies bounce back strongly
- Security of supply concerns prevail over environmental concerns: there is no global agreement on tackling climate change
- Gas supply is tight and fuel prices high
- Investment is forthcoming but not always timely
- Significant expansion of CCGT generation capacity
- Planning and supply chain constraints prevent new nuclear plant becoming operational before 2020
- Planning delays push back storage investment

Key features

- Sharp increase in gas import dependence
- Gas increases its share of the generation mix
- Shortage of gas storage coincides with peak energy prices in 2015
- 2020 renewables targets are not met: 15% electricity, 4% heat
- Carbon dioxide emissions from the electricity and gas sector: down 12% from 2005 levels – insufficient to meet carbon budgets
- Domestic consumer bills: rise with high and volatile commodity prices, increasing over 60% by 2016 before falling back
- Total investment costs between 2009-2020: £110bn

Scenario Overview – Green Transition

In this scenario….

- There is a rapid economic recovery and significant new investment globally
- A global agreement on tackling climate change is reached
- Energy efficiency measures are effective
- New nuclear and CCS demonstration projects come on-line before 2020
- Gas prices are moderate, carbon prices are high, and coal prices are relatively low as demand is suppressed by the high carbon prices
- GB gas demand falls but electricity demand grows on the back of wider deployment of heat pumps and electric vehicles

Key features

- Gas imports increase until 2016 and then stabilise
- Diverse generation mix
- Risk from generation intermittency towards the end of the period due to high levels of wind
- 2020 renewables targets met: 30% electricity, 12% heat
- Carbon dioxide emissions from the electricity and gas sectors: down 33% from 2005 levels
- Domestic consumer bills: increase by about 23% by 2020
- Total investment costs 2009-2020: £200bn

Scenario Overview – Green Stimulus

In this scenario….

- There is a slow recovery from recession and restricted availability of finance
- A global agreement on tackling climate change is reached and governments implement 'green stimulus' measures
- Energy demand falls globally in the near term
- Fuel prices are relatively low
- The combination of relatively high carbon prices and direct government support to nuclear, CCS and large scale renewables promote rapid decarbonisation of the generation sector

Key features

- Gas imports increase until 2012 and then stabilise
- Lower gas prices favour gas-fired generation over coal
- Risk from generation intermittency towards the end of the period due to high levels of wind
- 2020 renewables targets met: 30% electricity, 12% heat
- Carbon dioxide emissions from the electricity and gas sectors: down 43% from 2005 levels
- Domestic consumer bills: increase by about 14% by 2020
- Total investment costs 2009-2020: £190bn

Scenario Overview – Slow Growth

In this scenario….

- Impact of recession and credit crisis continues
- Low levels of investment
- Low commodity and carbon prices, reducing incentives for renewables, nuclear and CCS
- Generation build is dominated by CCGTs
- Energy efficiency measures have limited impact but demand is low initially due to slow economic growth

Key features

- Increasing dependence on gas imports and gas-fired electricity generation
- Tight supply margins due to lack of investment when economic growth returns
- 2020 renewables targets are not met: 15% electricity, 4% heat
- Carbon dioxide emissions from the electricity and gas sector: down 18% from 2005 levels – insufficient to meet carbon budgets
- Domestic consumer bills: relatively low in early years but increase by about 22% by 2020 as market tightens
- Total investment costs between 2009-2020: £95bn.