

Pöyry Energy Consulting

Strategic storage and the security of UK gas supply

A presentation to BIEE

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Agenda

1. > About Pöyry
2. Introduction to this study
3. Our methodology
4. Determining the size of the 'gap'
5. Costs of strategic storage
6. Benefits of strategic storage
7. Implementation and unintended consequences
8. The way ahead

Introducing Pöyry Energy Consulting



- The leading advisor to the European energy sector

- A pan-European energy consultancy formed from the merger of three highly respected consultancies

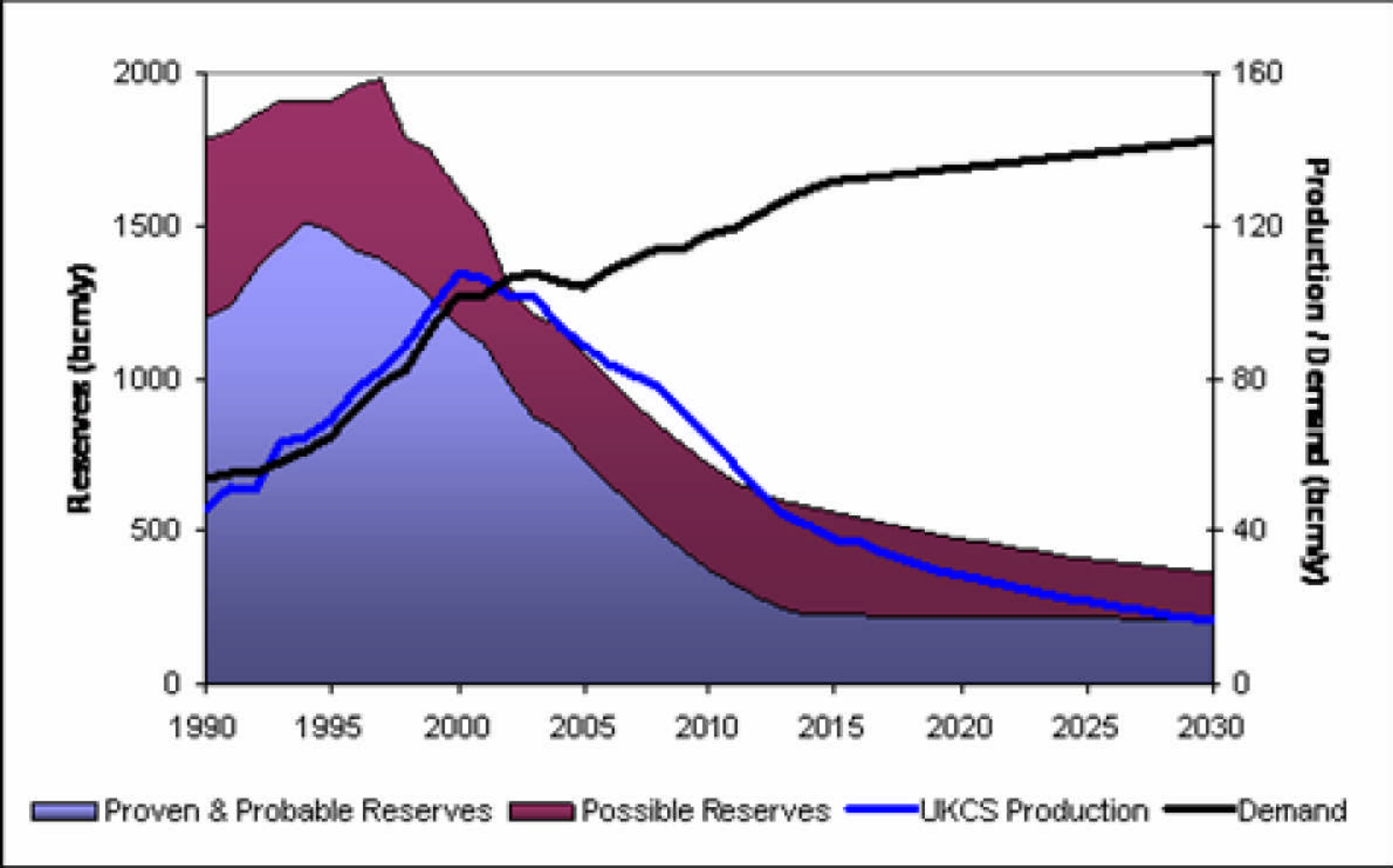


- 8 offices in Europe:
 - Oxford – Helsinki – Hamburg
 - Madrid – Zurich – Villach
 - Milan – Vienna
- Over 100 energy market experts

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A source of concern? Domestic gas production is falling, whilst demand is rising



Source: National Grid 2005 Ten Year Statement

Can the market provide security of gas supply?

- What is changing in the UK's gas market?
 - Our indigenous gas supplies are running out;
 - UK will be increasingly reliant on imports increasingly remote from the UK. Imports will arrive by pipeline through Europe and as LNG in tankers delivering gas production from countries outside Europe; and
 - UKCS production has a declining 'swing' capability.
- There is the possibility of a 'gap' between supply and demand. By definition the gap opens when the commercial supply cannot meet commercial demand.
- The only option left for ensure supply balances demand is for emergency measures;
 - Domestic gas customers must have gas; therefore
 - Firm demand load shedding is commanded by the National Emergency Co-ordinator with the consequent un-planned interruption to industry and industrial production.
- Interruption of firm gas demand would be a market failure: firm gas customers plan for a secure gas supply.
- There may be a basis for government intervention if the costs of the market failure are sufficiently high.

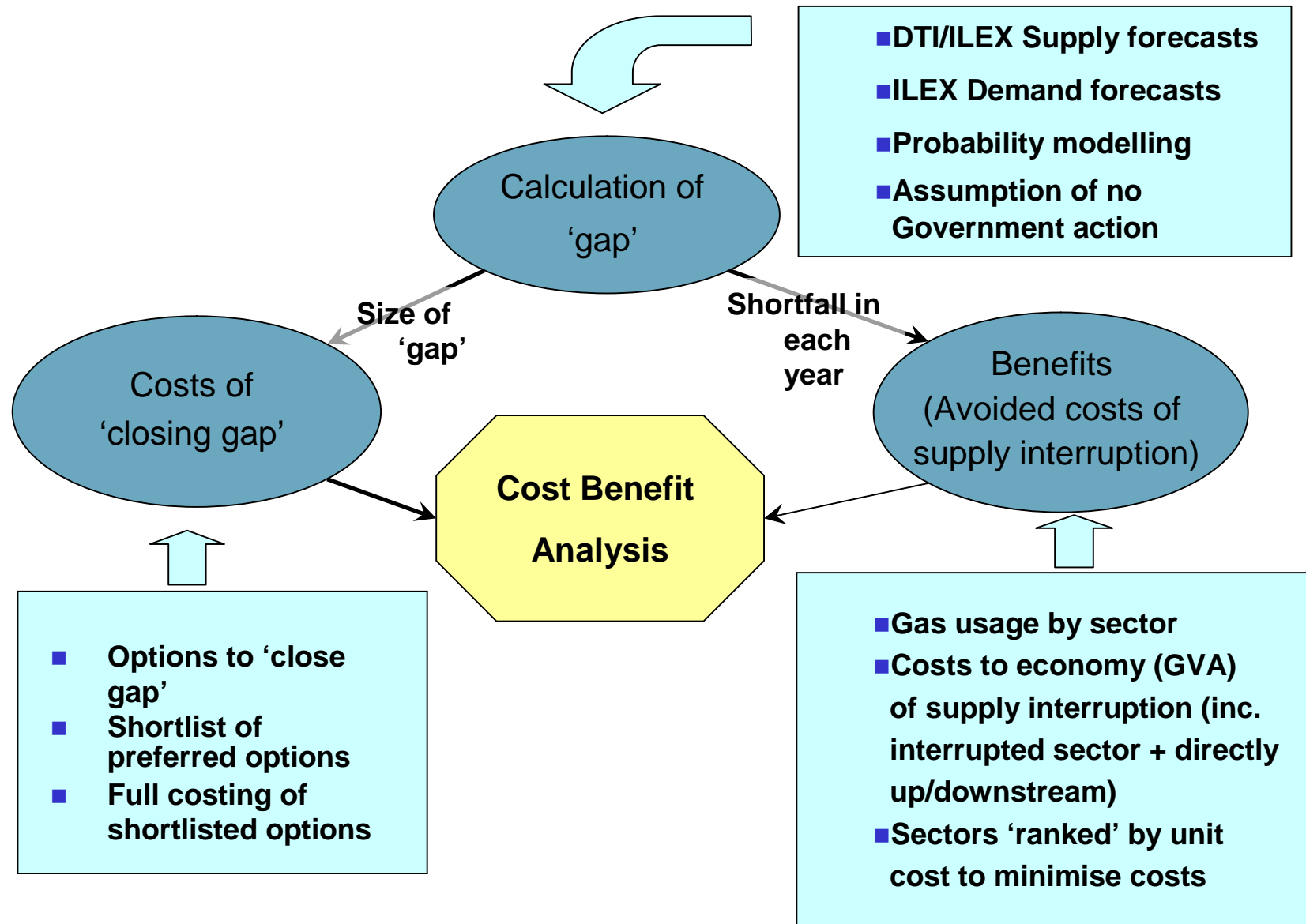
Introduction to our study

- In spring 2006, Poyry (ILEX) completed a study for the DTI on the macro-economic costs and benefits of developing strategic gas storage in Britain as part of the Energy Review
- We analysed the timeframe 2006-2020 quantitatively, and 2020-2050 qualitatively
- We addressed the following questions:
 - Will the commercial market deliver sufficient gas to avoid firm demand shedding?
 - What is the probability and magnitude of a supply shortfall?
 - What are the costs of developing new storage facilities to avert a shortfall?
 - What are the associated benefits (avoided costs to the economy)?
 - What are the unintended consequences of developing strategic storage?
 - How can strategic storage be implemented?

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Methodology: size of problem, costs of fixing it, benefits of so doing



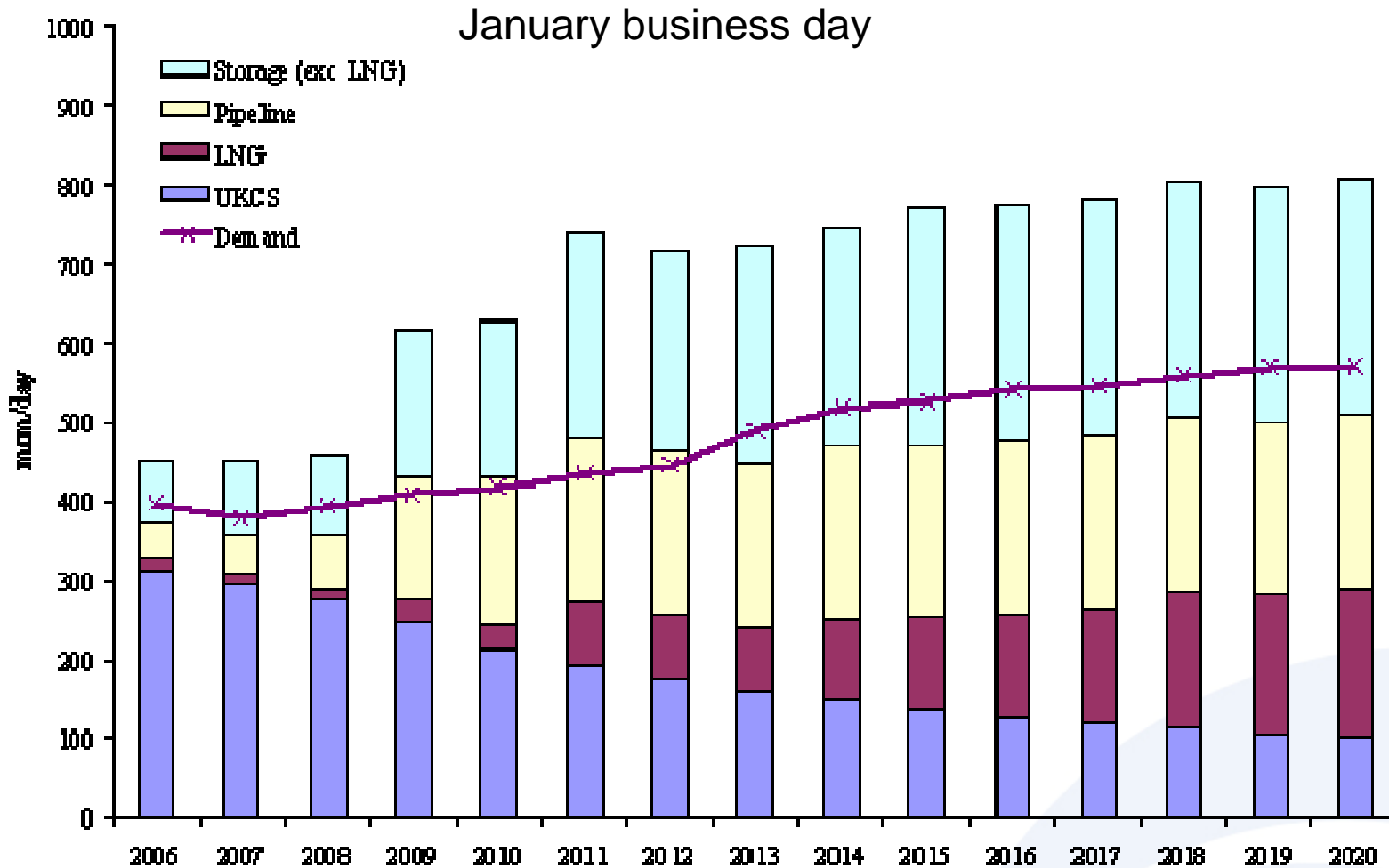
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Left to its own devices, will the commercial market deliver?

- We modelled the ‘gap’ between supply and demand assuming that the government takes *no action* to develop solutions to address the gap
- The expected gap is our estimate of the extent to which the market will not meet firm customer demand resulting in involuntary load shedding
- We modelled three scenarios corresponding to P10, P50 and P90 respectively:
 - **Constrained (high price) P10** - (High demand, Low Domestic supply, Low imports) + Low storage
 - **Balanced (central price) P50** - (Central demand, Central Domestic supply, Central imports) + Central storage
 - **Abundant (low price) P90** - (Low demand, High Domestic supply, High imports) + High storage
- These three scenarios are assigned probabilities and are based on normal conditions. The expected ‘gap’ is the mean of these scenarios weighted according to likelihood

In *typical* conditions - average weather and no source outages - there is plenty of supply, even in our Constrained scenario



But supply interruptions may arise from *untypical* events

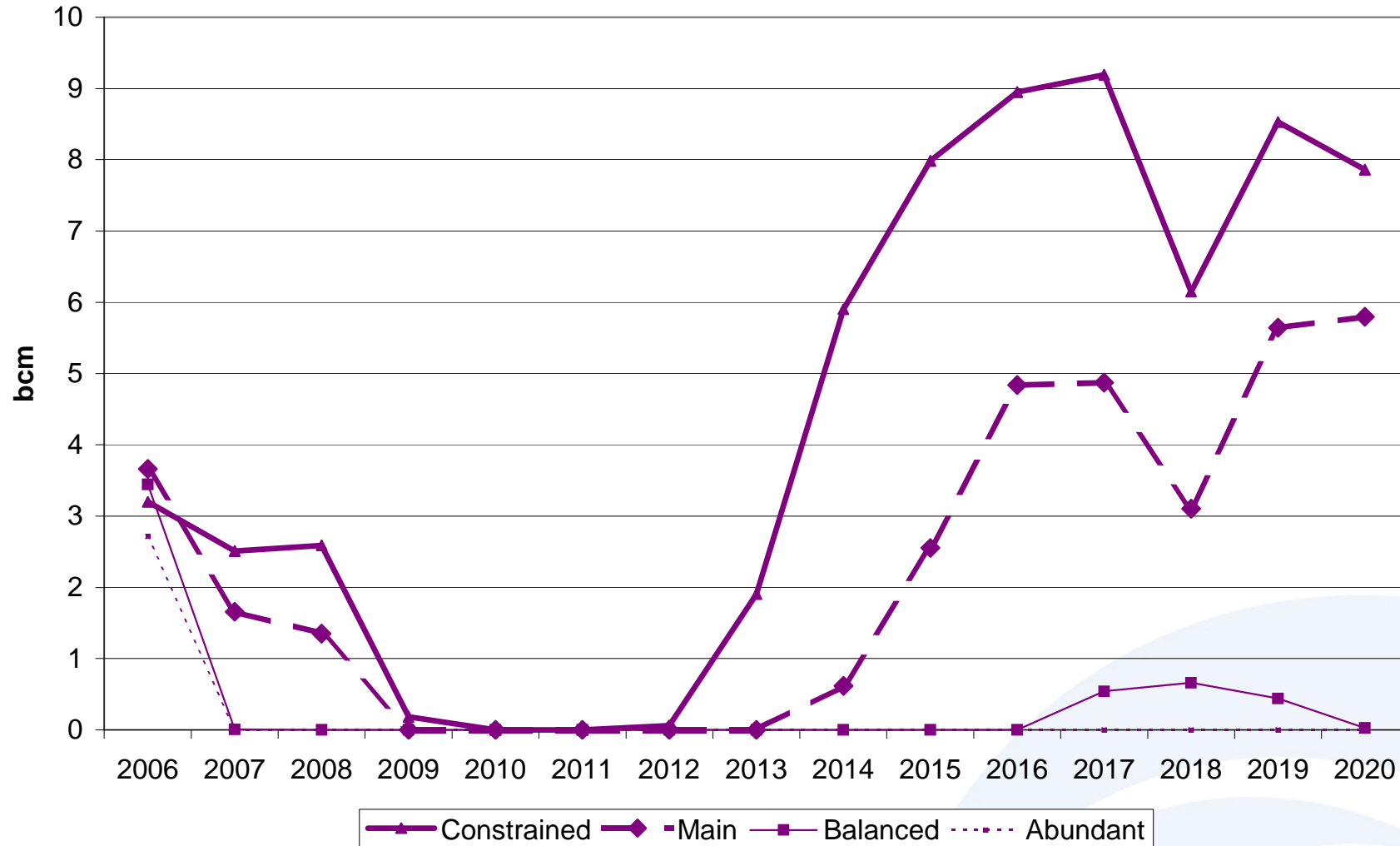
- We added in:
 - weather effects, and
 - source outages affecting different sources of gas for certain time periods using two sets of probability distributions (ILEX figures are indicative):

	ILEX	Alternative	
		Low	High
1 –day outage	3 per winter	1 in 500	1 in 5
2 week outage	1 in 10	1 in 1000	1 in 10
Balance of winter outage	1 in 33	1 in 10000	1 in 100
2 winter outage	1 in 500	n/a	n/a

- When using the Alternative (DTI) probabilities the source outages were so unlikely that almost all of the supply-demand ‘gap’ was attributable to the underlying supply-demand balance and to weather effects

We found there is a small chance of a large shortfall, if the government takes no action

Calculation of 'gap' (ILEX probabilities – 99% level)



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We examined several options for closing the 'gap' left by the commercial market

- The options examined were:
 - Additional gas storage in the UK
 - Gas supply from Europe
 - Oil storage at CCGT sites to allow gas to be diverted from power generation to other gas consumers
- The strategic reserve would cover 2 to 3 months
- We based our cost-benefit analysis on providing an amount of gas reserve similar in size to the UK's largest existing gas storage facility - a Rough Equivalent (around 15% of UK gas demand in winter for a period of 75 days - equivalent to 3.3 billion cubic meters)

Cost summary: Costs in £m of providing a Rough Equivalent (RE)

Costs based on DTI fuel price forecasts

£m	Depleted field storage	Salt cavern storage	LNG storage	Distillate storage at CCGTs
Low fuel price	1,281	2,145	2,301	860
Central fuel price	1,843	2,425	2,478	1,102
High fuel price	2,397	2,703	2,652	1,419

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We estimated the economic impact (GVA) of lost industrial output, resulting from interruptions to firm gas supply

- This stage of the analysis required a number of simplifying assumptions, some optimistic and some pessimistic

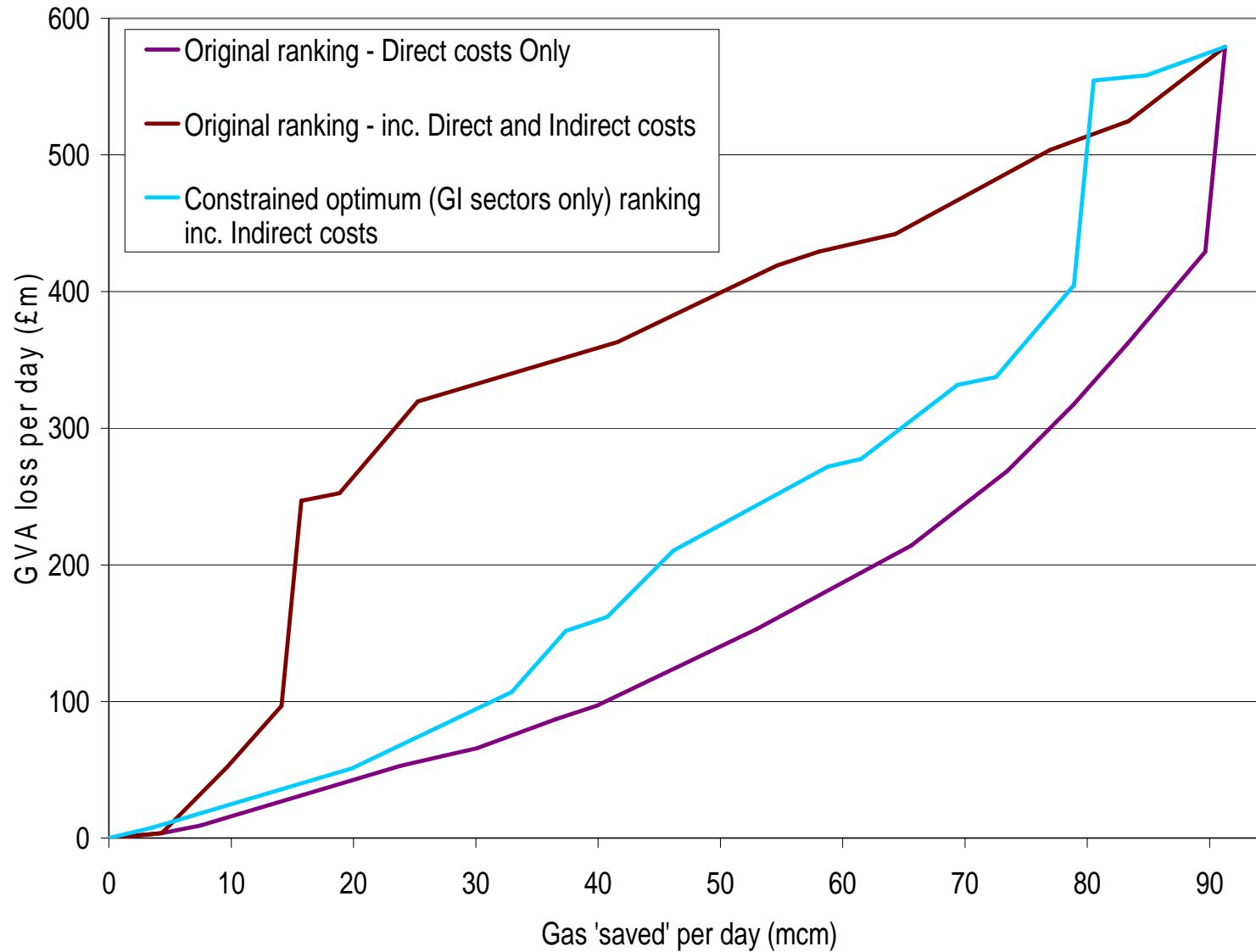
- Output restarts immediately, following an interruption
- No lasting damage to plant
- No lasting loss of market share
- No impact on economy outside of industrial sector

} optimistic

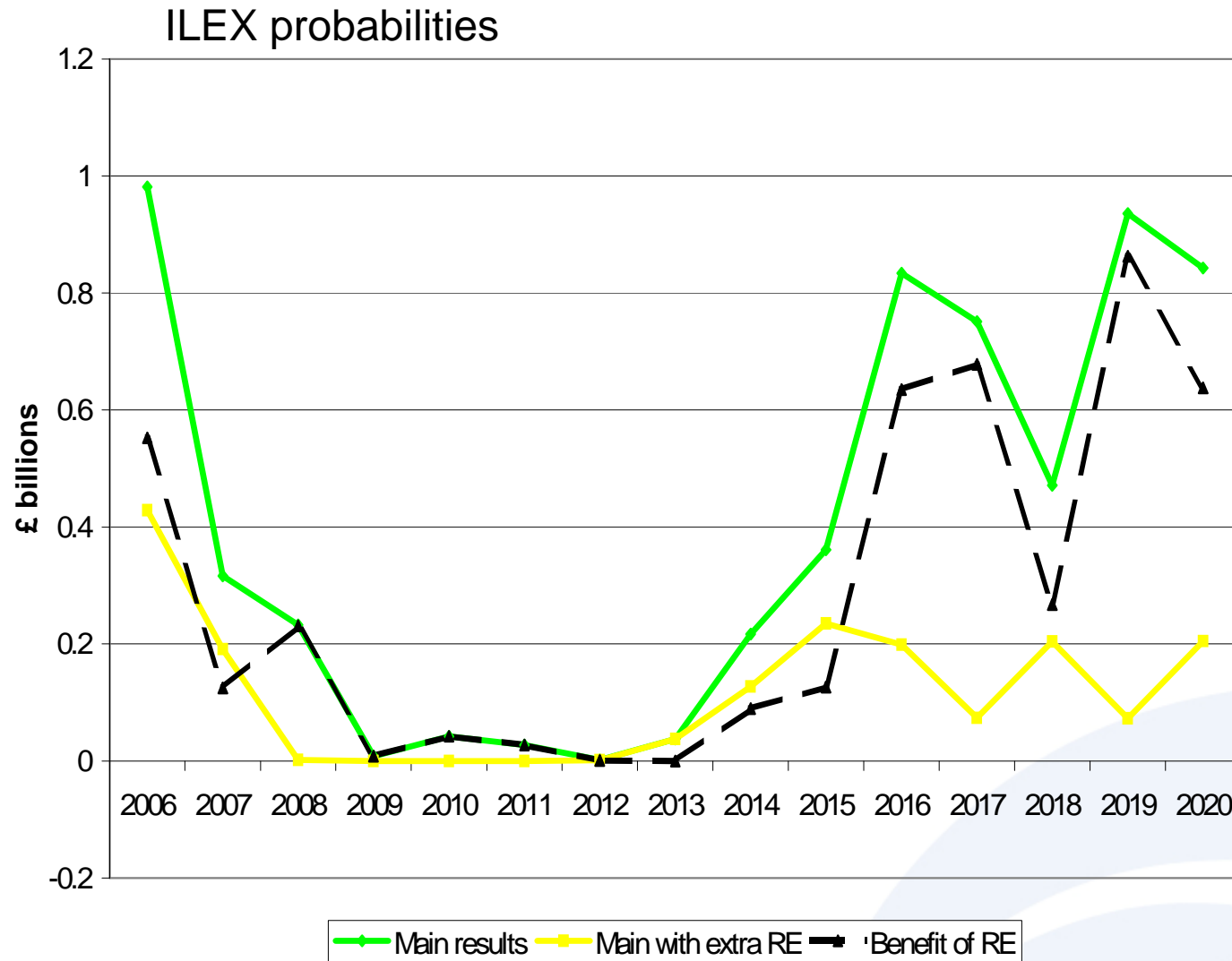
- No maintenance transfer during outage period
- No make-up of lost hours
- No draw-down of stocks

} pessimistic

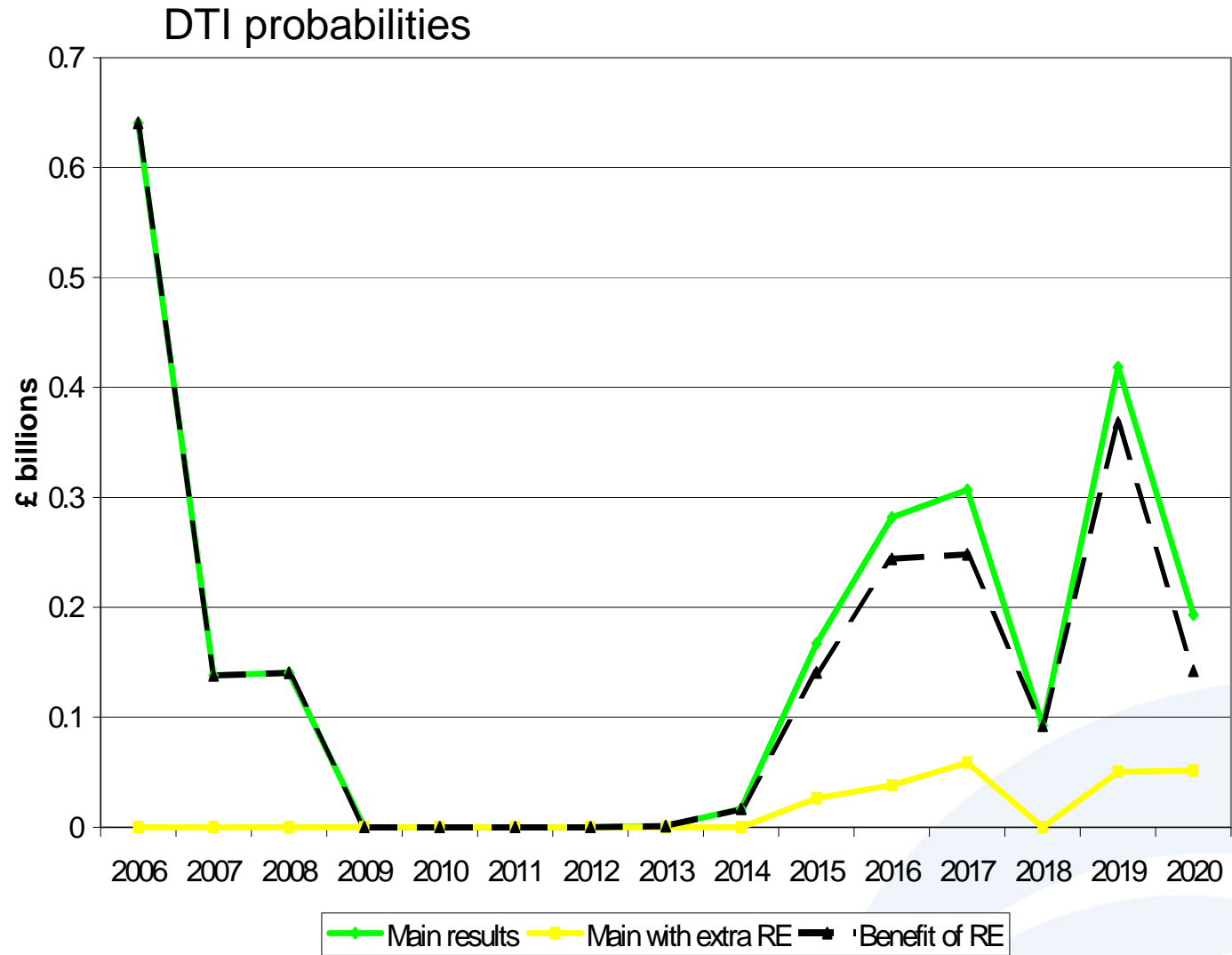
We established a relationship between the level of shortfall and the economic impact



Combining this relationship with our 'gap' analysis, we obtained a mean (expected) level of economic impact per annum



The impact is substantial in later years, even if we use very low probabilities for source outages



Summary of costs and benefits: a positive NPV for one Rough equivalent

	Investment in one Rough equivalent (3.3bcm) operational in 2014
Benefit	£8.6 billion (ILEX case) £3.4 billion (alternative case)
Cost	£0.9 to £2.4 billion
Net benefit	£6.2 to £7.7 billion (ILEX case) £1.0 to £2.5 billion (alternative case)

Benefits are discounted at 3.5% to 2012 (the year in which the costs are incurred)

Costs cover the full range of fuel price assumptions for depleted field storage (£1.2 to £2.4 billion) and for distillate storage at CCGTs (£0.9 to £1.4 billion)

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Implementation: three options

1. National Grid (NG) take on a new licence obligation to run a process requiring NG to pay for the strategic reserve options bid into a form of competitive process
2. Gas suppliers take on a new enhanced form of licence obligation for security of supply
3. Set a very high emergency cash-out price and compensate consumers who have been interrupted at this price which reflects economic damage

Unintended consequences

- Government intervention has an adverse impact on commercial storage projects and the provision of other alternatives to storage in the UK (option 1 and option 2)
- Faced with the potential exposure to extreme cash-out prices suppliers withdraw from the UK market leading to a decrease in the competitiveness of supply. Could eventually lead to a form of “re-nationalisation” where only a state monopoly is capable of survival (option 3)

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There is a strong case for taking strategic storage further

- Regardless of one's views on the probabilities of source outages, there is a minimum level of risk associated with demand variation and the underlying tightness in the commercial market
- Our analysis has assumed risk neutrality and focussed on 'mean' outcomes: had we assumed a degree of risk averseness, the results for strategic storage would have been more favourable, rather than less
- It is at least debatable whether the commercial incentives on gas suppliers are commensurate with the economic damage that could arise from significant shortfall
- Concerns about unintended consequences are valid, but perhaps not as decisive as they would be if the market was showing any indication of building a second Rough

Proposed next steps

- In our study, we proposed two alternative timetables:
- Fast Track: launch a strategic reserve initiative by the end of 2007, provide reserve by 2011
- Slow Track: detailed evaluation study in 2008 of supply/demand position, using experience of new importation projects
 - Instigate a strategic reserve initiative by the end of 2009, leading to strategic reserve in place by 2014
 - Our analysis suggests 2014 is when the risks of shortfall become significant

Government View from “The Energy Challenge”

- Managing gas import risks
 - Consult on planning regime for gas infrastructure projects
 - Consult with energy suppliers and users on the effectiveness of current gas security arrangements and whether they need strengthening as UK becomes more dependent on gas imports
- The case for strategic gas storage
 - A concern that building strategic gas storage would deter projects which would otherwise come forward



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