



THE
ENERGY CONTRACT
COMPANY

The UK Gas Market

Presentation to MOL

9th September 2015

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UK Gas Market

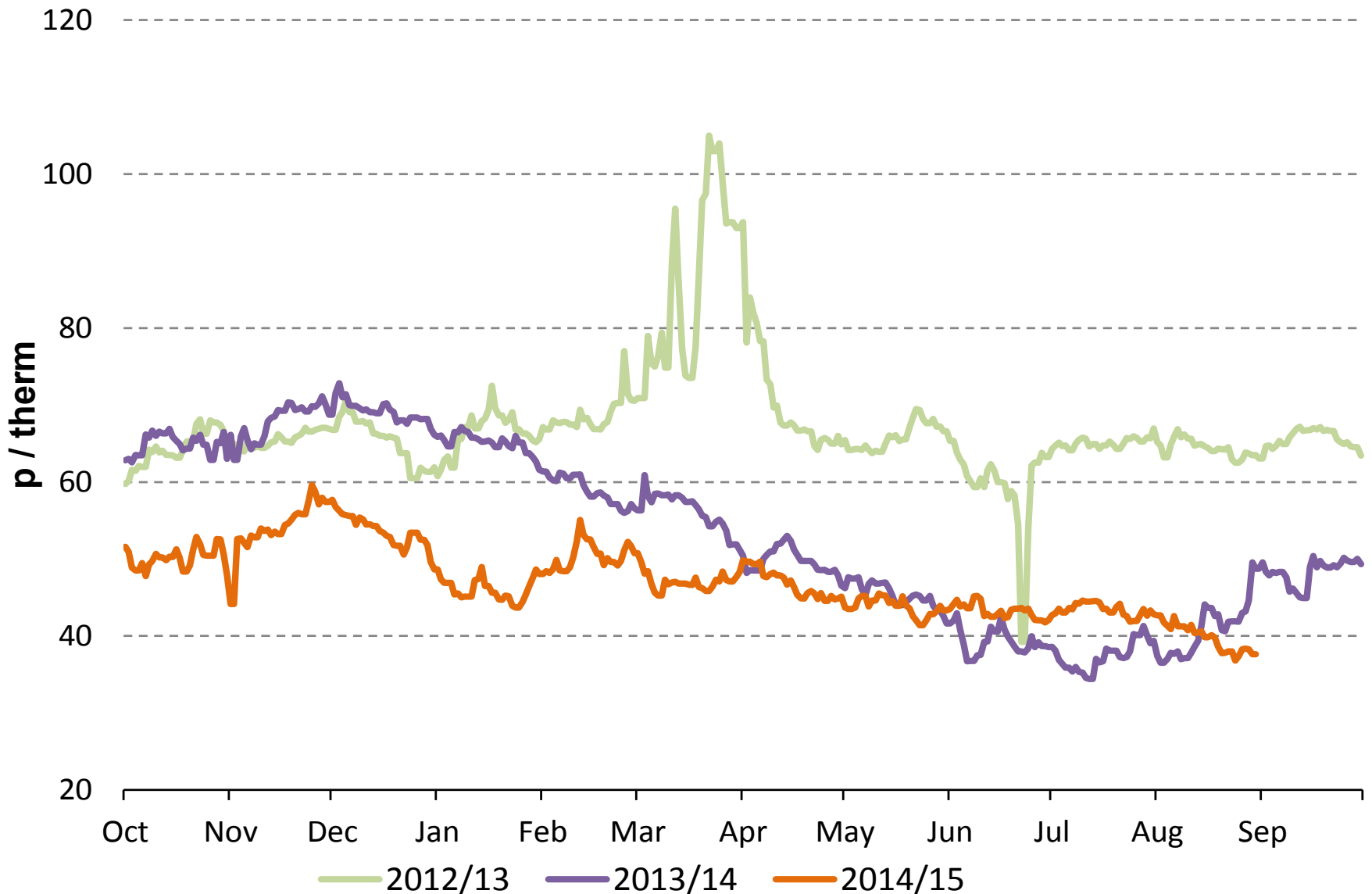
- Recent Spot Market History
- Recent Developments in the Market
- Forecasts of UK Gas Supply and Demand
- European Gas Market
- Gas Price Forecasts



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- Recent Spot Market History



Day Ahead Prices for 2012/13 to 2014/15 (p/therm @ NBP)

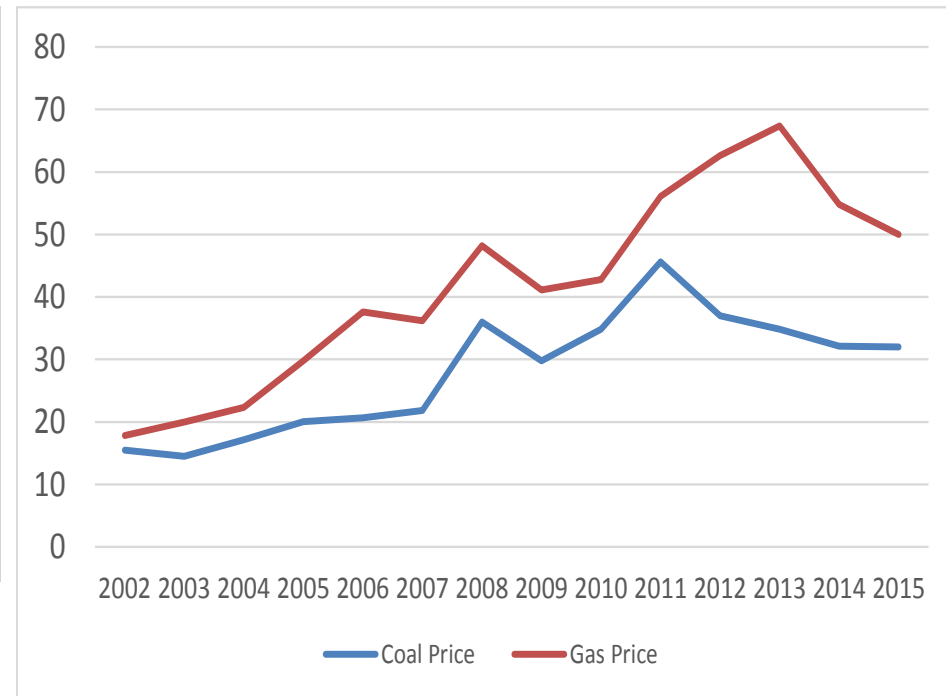


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- Significant Developments in the Market Place



Change in gas share in generation market(p/therm)

	2005	2010	2012	2013	2014
Coal	33.2%	27.1%	38.4%	35.3%	28.3%
Oil	1.2%	1.1%	0.6%	0.6%	0.6%
Gas	38.7%	45.7%	27.8%	26.7%	28.9%
Nuclear	19.4%	15.0%	18.1%	18.2%	17.2%
Renewables	5.3%	7.5%	11.9%	15.5%	19.2%



Gas sale to generation - change in 2014

- Coal Market Share down
 - > Plants closing due to EU LCPD
- Coal price advantage eroded
 - > Gross Advantage in early 2015 18p/therm
 - > Reduced to 10p/therm after UK Carbon tax
- Gas sales to generation up 17% in 9 months to Q1 2015
- Key question will gas sales to generation recover in medium term ?
- ECC believes they will



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- UK Gas Supply Demand Forecasts



Forecasts different from UK Gas Market Review - June 2015

Now Based on European Gas Market Review

- What has changed?
- More focus on Europe wide supply demand .
 - > Declining Pipeline supplies to Europe in future
 - Further restrictions on Groningen output
 - > Increasing dependency on LNG
- Market tightening in UK
 - > End to policy support for onshore wind
 - > Further delays in shale gas
 - > Lower LNG arrivals than expected in summer 2015
- Overall market slightly tighter at end of this decade and next decade



Uncertainty in Forecasting

- Three key issues
 - > Demand – Impact of Government Energy Policy
 - > Supply – potential for shale gas development
 - > Availability of cheap LNG?



Electricity Market Reform (EMR)

- Key aim is decarbonising electricity generation
 - > Replacement of fossil fuels with renewables
- Most Renewables are wind
 - > 71% of the total
 - > High cost
 - Nuclear £92/MWh
 - Onshore wind £90-95/MWh
 - Offshore Wind £140-155/MWh
 - > Current market cost around £45/MWh
 - > Renewables uneconomic in present market
 - > Government offers CfD to developers



Electricity Market Reform 2

- Wind cannot load follow
 - > back up generation needed
- Government offers capacity payments to gas generators
 - > Done on bid basis
 - > First Auction in early 2015
 - 1-2 new CCGTs
- Limits on emissions
 - > Large Combustion Plant Directive
 - No FGD means shut down from 2016 or earlier
 - > Max CO2 emissions 450g/kWh from 2023
 - > coal generation limited to peak load after 2023



Implications for gas industry of EMR

- Lower annual sales volumes
 - > Long term - Gas fired stations replaced by Wind
 - > Deep uncertainty about pace of replacement
 - > Gas is residual fuel in power market
 - > Significant uncertainty about extent of decline
- Peak daily demand may remain the same
- Massive daily volatility in gas
 - > Depends on whether wind blowing
 - > By 2020 daily variation in demand due to wind - 90 mcm/d
 - > Average daily demand 190-210 mcm/d
- Cant be supplied by
 - > UKCS fields/Pipeline imports/LNG
 - > Massive requirement for gas storage?
 - Salt cavities



Shale Gas Problems

- Shale gas is very difficult to assess and produce
- No production history in UK
 - > Only 1 well has flowed
- Extended well test will needed to assess viability
- Significant opposition
 - > Protest groups
 - > Local authorities lukewarm
- Significant environmental issues
 - > Not water table /earthquakes
 - > Traffic/noise/visual intrusion
 - > All manageable
- Significant Support from Central Government
- Very slow to get permits for wells
 - > no new wells until late 2015
 - > Earliest extended well test is 2016



Shale Gas Problems

Local Authorities

- Local Authorities very nervous about giving planning permission
- Lancashire County Council rejected Cuadrilla well applications in June 2015
- Led to change in Planning policy by government (August 2015)
 - > Shale gas planning applications to be fast tracked
 - > Secretary of State can “call in” planning applications



Shale Gas Development

- Still a lot of uncertainty
- No production history
- Could be no development!
- ECC is optimistic
 - > Substantial resource base
 - > Substantial depth of horizon
 - > High TOC
 - > Shale is brittle
- Economics Marginal
 - > Price needed 36 to 47p real (15% IRR)
 - > Forward curve price 40.3p real up to 2020

Gas Price to generate IRR

Case	10% IRR	15% IRR
Low Case	35p	47p
Base Case	32p	41p
High Case	29p	36p

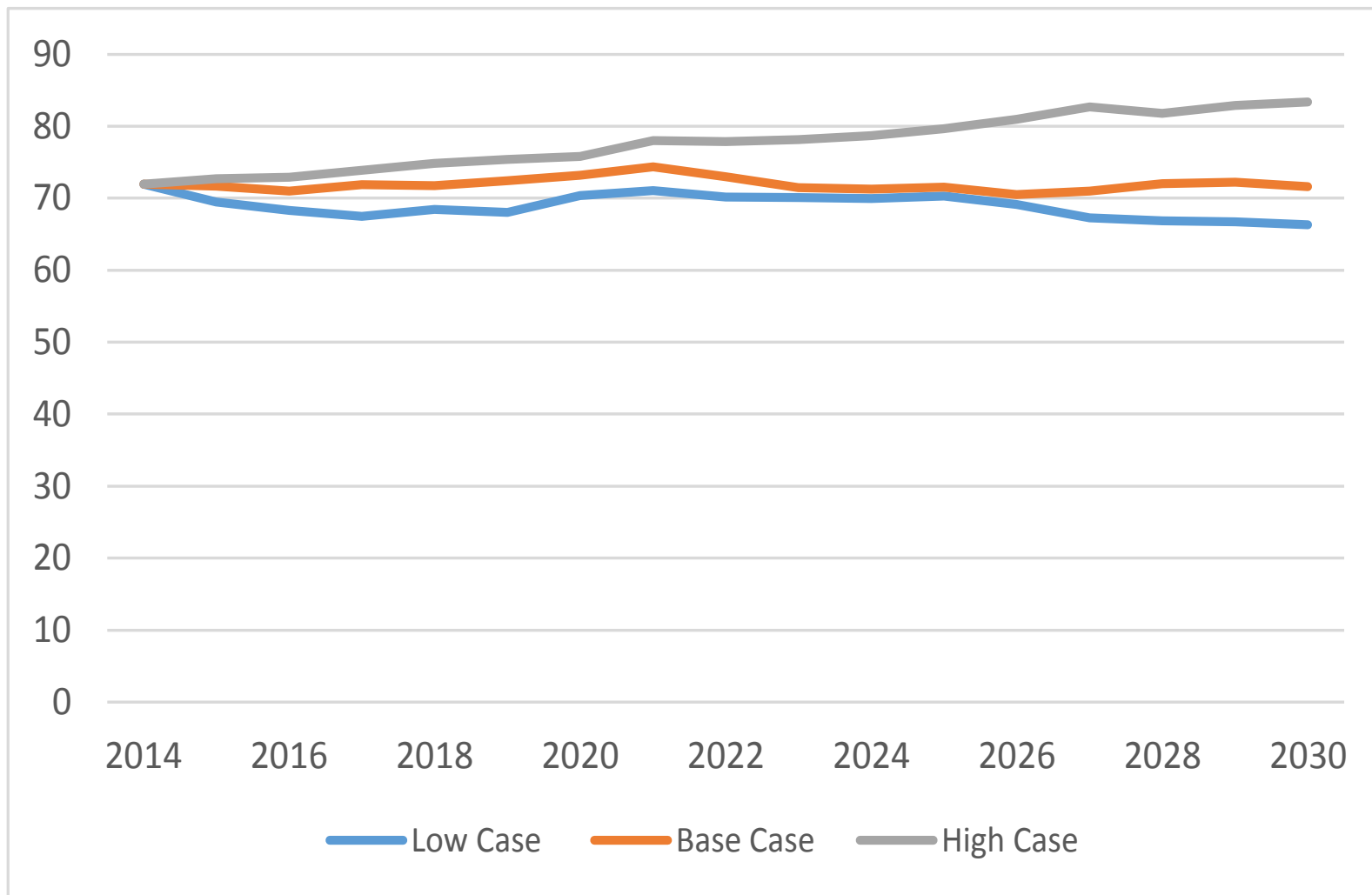


Forecast of shale gas output (bcm/year)

Year	Low Case	Base Case	High Case
2019	0.4	0.7	1.2
2020	0.7	1.3	2.1
2021	1.3	2.5	4.1
2022	2.2	4.2	6.7
2023	3.4	6.3	10.0
2024	4.9	8.8	13.8
2025	6.6	11.7	18.2
2026	8.9	15.7	24.2
2027	11.8	20.6	31.7
2028	14.4	24.9	37.8
2029	17.0	28.8	43.2
2030	19.4	32.4	48.0



UK Gas Demand Forecasts 2014 to 2030 (bcm/year)



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- European Gas Market



European Gas Market in future

Declining Pipeline Gas Supplies

- Indigenous gas production will fall (IEA 2014)
 - > 2012 – 278 bcm/year
 - > 2020 – 253 bcm/year
 - > 2030 – 225 bcm/year
- Netherlands exports to cease by 2030
- Norway gas exports
 - > 2014 108 bcm/year
 - > 2030 65 to 100 bcm/year
- Algeria gas/LNG exports to Europe
 - > Down 30 % in last 7 years
 - > unlikely to exceed half of historic export levels in future



European Gas Market in future

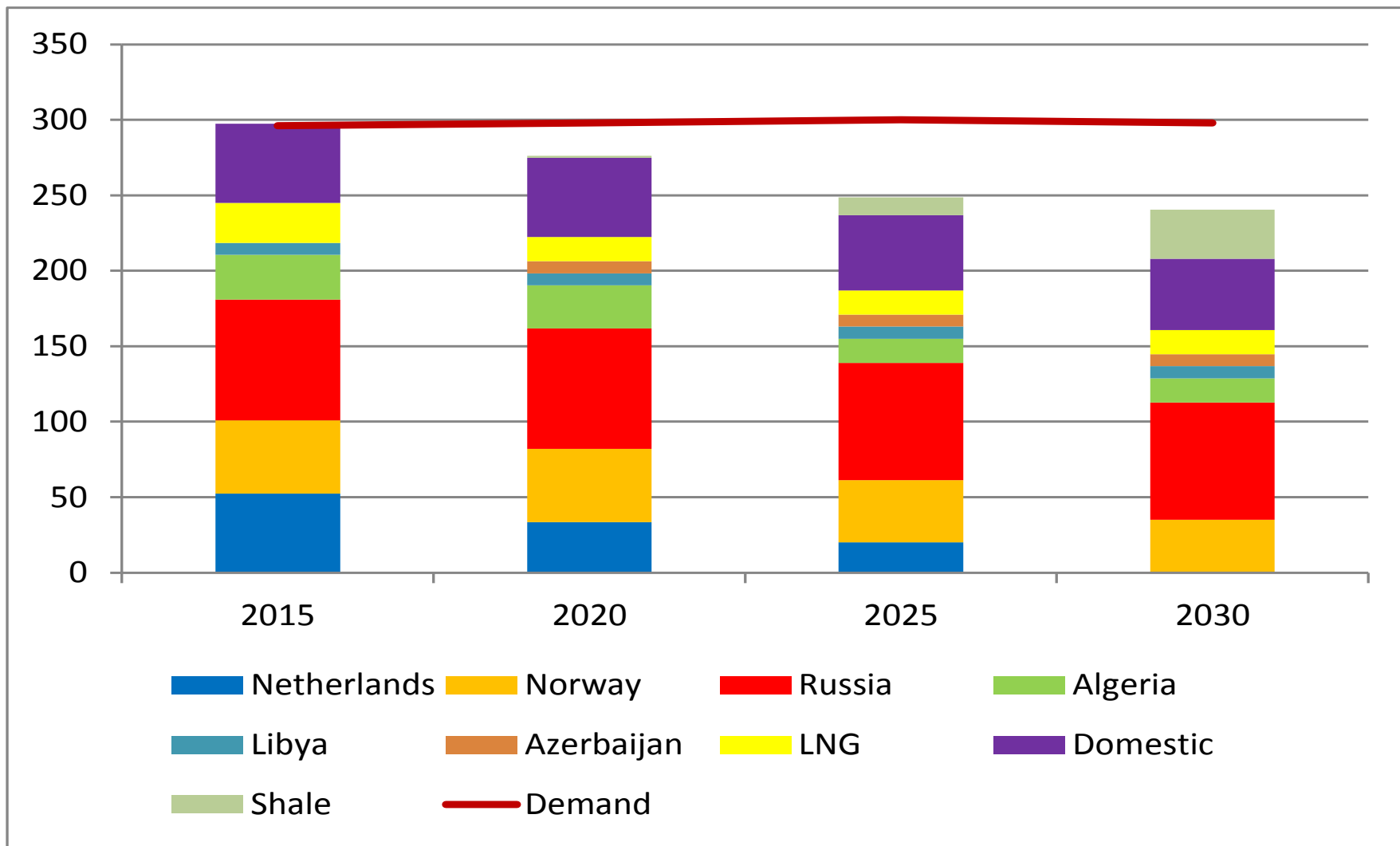
Gas demand static in future

Market	Case	Period	Annual Growth Rate
France		2014 to 2022	0.0%
Germany		2017 to 2024	-0.5%
Italy		2014 to 2025	0.0%
Netherlands		2014 to 2025	0.0%
UK	Low	2014 to 2030	-0.3%
	Base	2014 to 2030	0.0%
	High	2014 to 2030	0.9%
Weighted Average			-0.0%



European Gas Market in future

Still a requirement for new gas supplies



European Gas Market in future

Where will new gas come from

- Existing pipeline supplies in decline
- No appetite for increased dependence on Russia
- Some gas from Middle East Central Asia - TAP line
- Europe likely to become more dependent on LNG in future
- LNG more widely available and cheaper
- Implications for price ?



New Liquefaction Plants under construction

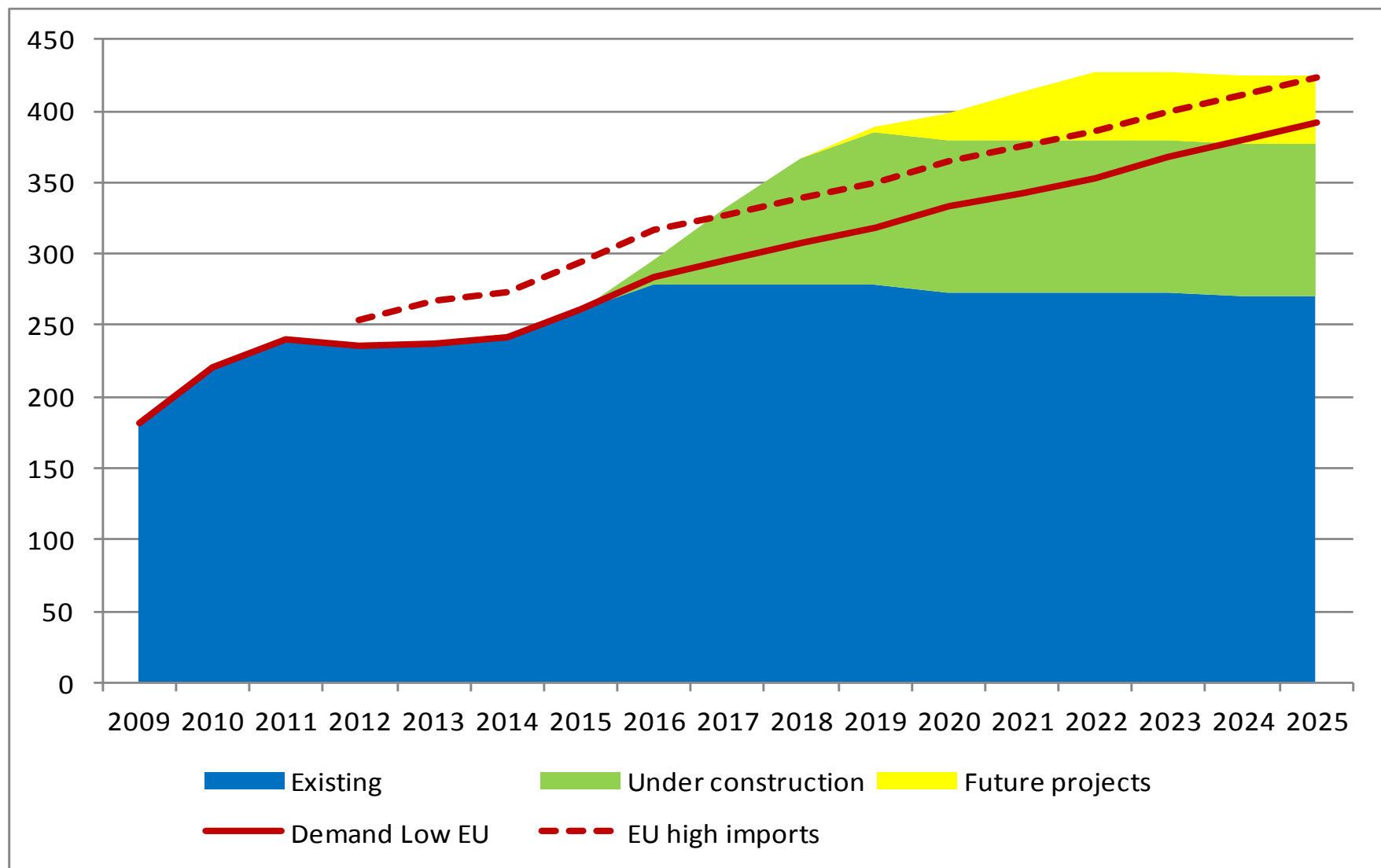
Million Tonnes/year capacity

Existing LNG terminals and terminals under construction				
Category	Country	Plant	Capacity (MTA)	On Stream
Existing plants 1/2014			286	
On stream in 2014 and early 2015	Algeria	Gassi Touill	4.5	
	Australia	Quensland Curtis	8.5	
	Indonesia	Donggi Senoro	2	
	Malaysia	MLNG T9	3.6	
	Papua New Guinea	PNG	6.6	
SubTotal			25.2	
Due onstream	Australia	Gorgon	15.6	2015
		Gladstone	7.8	2015
		Australia Pacific	9	2015/2016
		Ichthys	8.4	2016
		Prelude	3.6	2017
		Wheatstone	8.9	2017
	Malaysia	PF LNG	1.2	2015
		PF LNG 2	1.5	2018
	Russia	Yamal	16.5	2017/2020
	USA	Sabine Pass T1 + T2	9	2015/2016
		Sabine Pass T3 + T4	9	2016/2017
		Sabine Pass T5	4.5	2018
		Cameron	12	2018
		Freeport	13.2	2018/2019
		Cove Point	5.25	2018
		Corpus Christi T1 + T2	9	2019
SubTotal			134.5	
Total			445.7	
Less closures			30.0	
Net total by 2019			415.7	



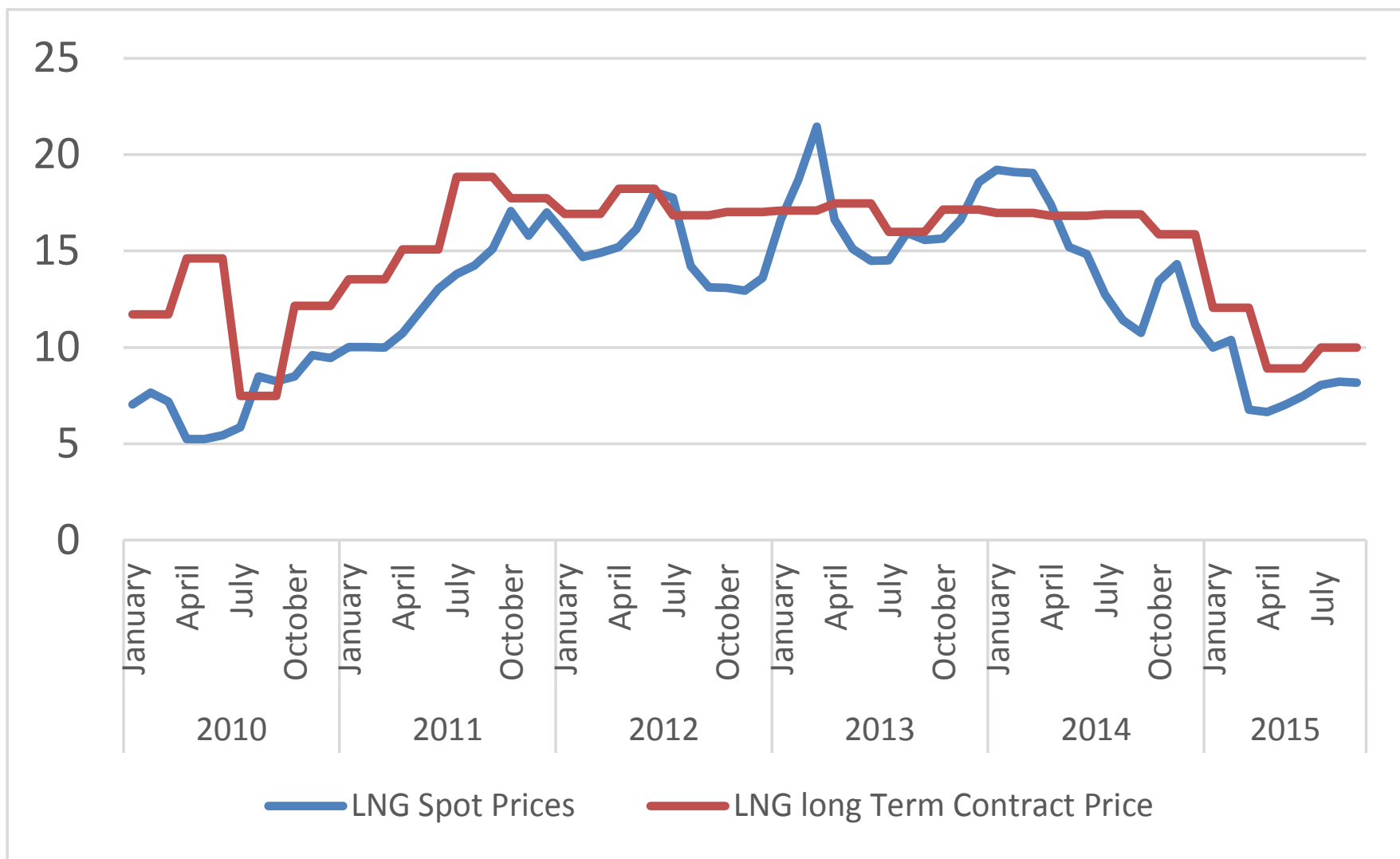
World LNG Supply Demand Forecast 2009 to 2025

Million Tonnes/year



LNG Import Prices into Japan 2010 to 2015

(\$/mmbtu)



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- Back ground to Gas Price Forecasts



Back ground to gas price forecasts - Oil Price Uncertainty

- \$50 oil
- New Permanent low or another short term dip?
- Three previous big dips in last 40 years
 - > 1-4 years in duration
- For new permanent low
 - > US liquids production still high
 - > Sanctions lifted on Iran
- Temporary Low
 - > Rising oil demand in Asia
 - World demand to grow 0.5 to 1% pa to 2020
 - > Low price will hit supply within 3 years
 - 50 % of new projects uneconomic at \$50
- Oil price assumptions
 - > Low case - \$60/barrel from 2018 (constant real thereafter)
 - > Base case - \$80/barrel from 2018 (constant real thereafter)
 - > High case - \$100/barrel from 2019 (constant real thereafter)



Back ground to gas price forecasts - 2

- Regulatory changes
 - > UK 8GW coal plant shut down + 3 GW oil
 - More to come
 - > UK Nuclear stations off line in 2016 and 2019
 - > All German nuclear plants to shut by 2023
 - > Increased gas sales to generation in medium term?
- Europe Gas Supply/Demand Balance
 - > Comfortable in 2015
 - > Tightening later in this decade
 - Rising gas sales to generation
 - Declining supplies from traditional sources
- World LNG
 - > Oversupplied especially in summer
 - > Surge in summer imports in Europe from 2016?
 - > Long term imports from later in decade



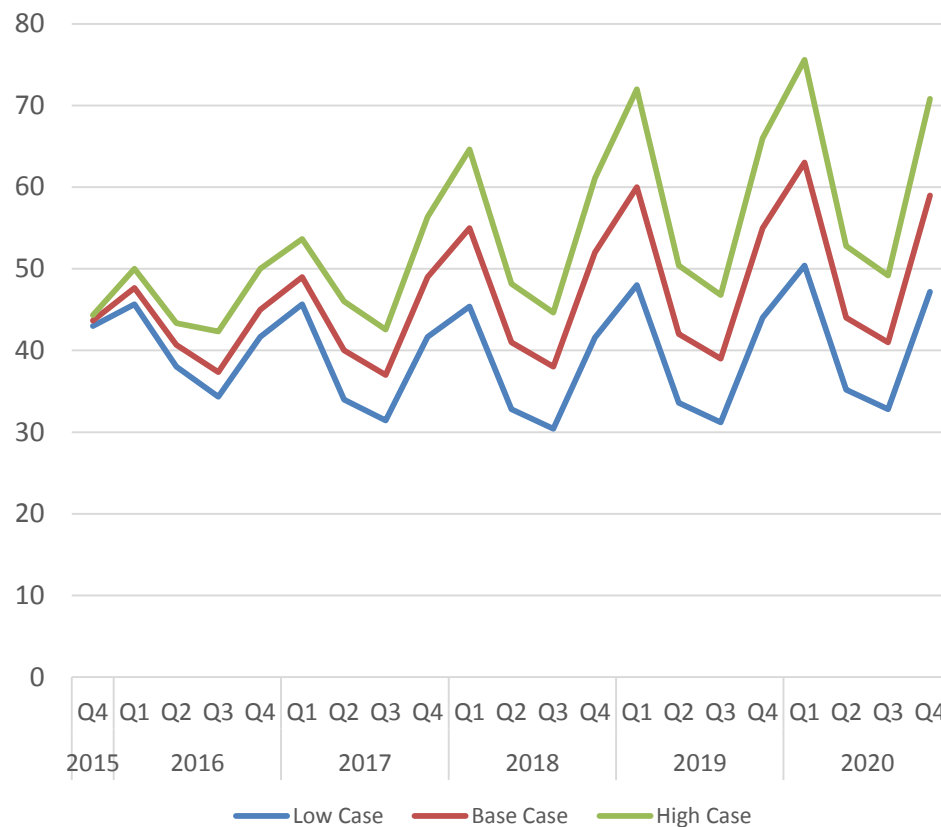
Back ground to gas price forecasts - 3

- World LNG Market dominated by Northern Hemisphere Winter
 - > Big surplus in summer?
 - > Europe - open market with import capacity
 - > Big increase in summer imports from 2016?
 - > More price seasonality from 2016
- Year Round LNG Imports needed from late this decade/early next decade
 - > Price will need to be close to Japan LNG net back
 - > Japan price lower than historic levels due to world surplus
 - > Europe price will need to be \$8-9/mmbtu by post 2020
 - = €26/MWh approximately
 - = 58p/therm approximately
 - > Prices will rise in last two year of this decade
- In longer term UK price much more volatile
 - > Renewables in generation
 - > Less volatility in Continental Europe
 - More Storage
-



Price forecast to 2020 – Day Ahead p/therm @ NBP

Year	Quarter	Low Case	Base Case	High Case
2015	Q4	43.0	43.7	44.3
2016	Q1	45.7	47.7	50.0
	Q2	38.0	40.7	43.3
	Q3	34.3	37.3	42.3
	Q4	41.7	45.0	50.0
2017	Q1	45.7	49.0	53.7
	Q2	34.0	40.0	46.0
	Q3	31.5	37.0	42.6
	Q4	41.7	49.0	56.4
2018	Q1	45.4	55.0	64.6
	Q2	32.8	41.0	48.2
	Q3	30.4	38.0	44.7
	Q4	41.6	52.0	61.1
2019	Q1	48.0	60.0	72.0
	Q2	33.6	42.0	50.4
	Q3	31.2	39.0	46.8
	Q4	44.0	55.0	66.0
2020	Q1	50.4	63.0	75.6
	Q2	35.2	44.0	52.8
	Q3	32.8	41.0	49.2
	Q4	47.2	59.0	70.8



Comparison of ECC Forecast with Forward Curve

Year	Quarter	Forward curve (ESGM 17 August)	ECC Base Case	Difference from Curve
2015	Q4	43.0	43.7	0.7
2016	Q1	45.2	47.7	2.5
	Q2	40.6	40.7	0.1
	Q3	39.8	37.3	-2.5
	Q4	44.5	45.0	0.5
2017	Q1	47.3	49.0	1.7
	Q2	41.0	40.0	-1.0
	Q3	40.9	37.0	-3.9
	Q4	45.5	49.0	3.5
2018	Q1	47.1	55.0	7.9
	Q2	40.4	41.0	0.6
	Q3	41.6	38.0	-3.6
	Q4	46.3	52.0	5.7
2019	Q1	46.3	60.0	13.7
	Q2	40.2	42.0	1.8
	Q3	40.2	39.0	-1.2
	Q4	45.9	55.0	9.2
2020	Q1	45.9	63.0	17.2
	Q2	40.0	44.0	4.0
	Q3	40.0	41.0	1.0





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