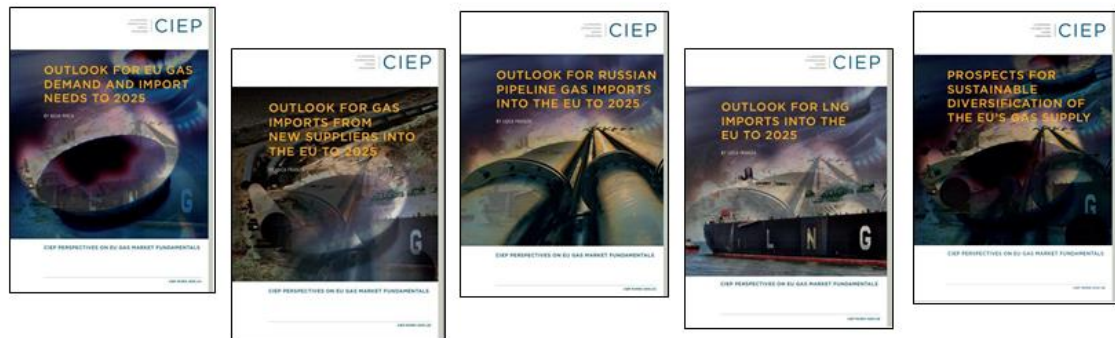


EU Gas Market Fundamentals

Prospects for a Sustainable Diversification of EU Gas Supplies



Ladies and Gentlemen, it is a great pleasure to present the new gas study by the Clingendael International Energy Programme. In the past 9 months we have worked hard on this project inspired by the European Union efforts on improving security of gas supply. In addition to internal measures, such as those in the Winter Package and announcing pipeline interconnection projects of common interest, the EU wanted to achieve Sustainable Diversification of Gas Supplies. Sustainable Diversification implied finding alternative sources to Russian supplies.

How this should be achieved was left unanswered. It is this question that kicked off this new project and led to a CIEP series of 5 separate papers, which you can download as of today from our website. The papers stand on their own, and are also the building blocks to assess the prospects for achieving Sustainable Diversification. We looked at the EU-28 and not at the import situation of specific member states or regions in the EU. We cover the external EU-28 supply potential. Also this analysis does not take BREXIT into account, nor any uncertainties relating to the relationship with Turkey because our research was completed before these new events.

Content

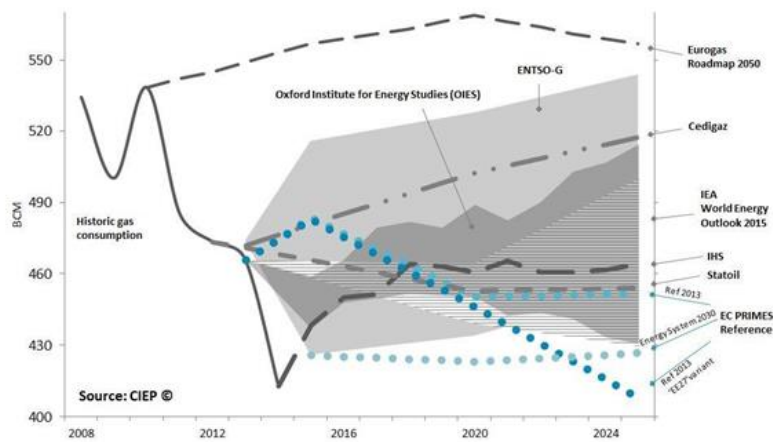
- EU natural gas demand and import needs outlook
- Alternative gas import sources
 - Russia and alternative suppliers
 - LNG
- Sustainable diversification of natural gas supplies into the EU: competitive diversification

The plan of the presentation, based on the analysis of the separate papers is then as follows:

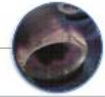
1. Total EU demand uncertainty translates into uncertainty of demand for additional imported gas;
2. The positions and interest of current and potential suppliers of gas to the EU;
3. The current market situation and implications for sustainable diversification as part of EU security of Gas Supply.

EU Gas Demand outlook to 2025, selected scenarios

Major uncertainty, hinging on policy directions in the power sector



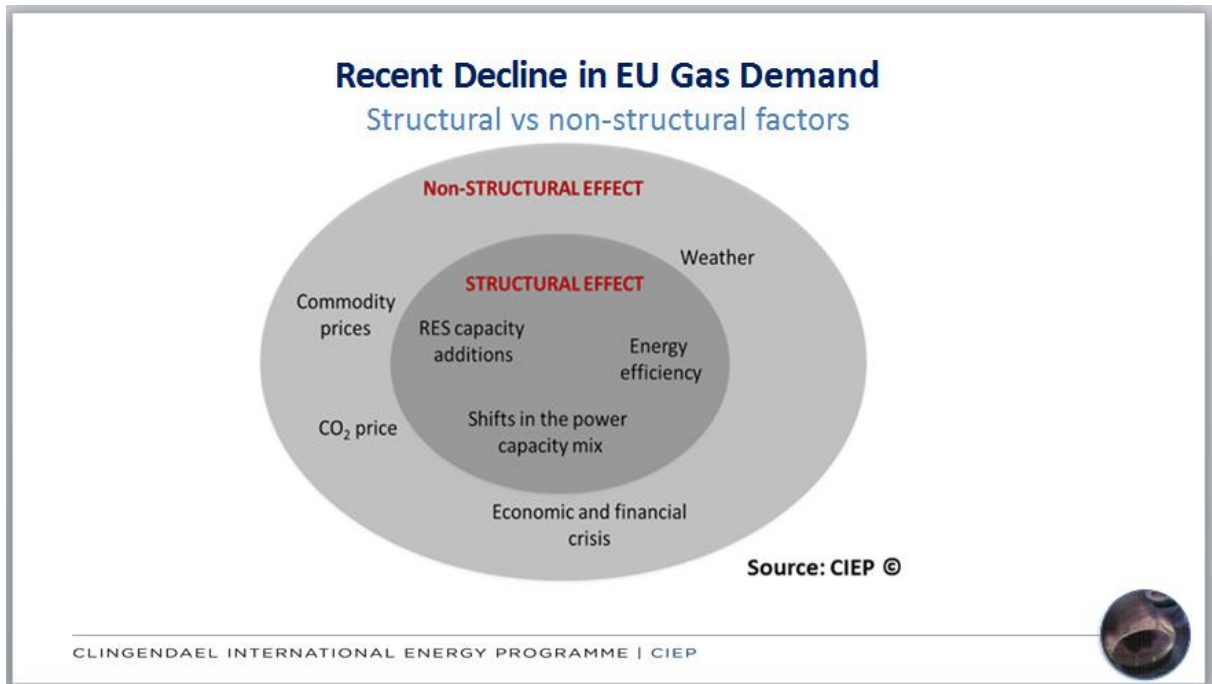
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So what is then the Outlook of EU gas Demand? Looking at a **selection of demand Outlooks**, it is clear that the **range** of where demand could be in a few years' time **varies widely**, depending on the assumptions of the various organisations presenting these Outlooks. These assumptions can vary from policy drive to address the GHG emission reduction commitments to economic market circumstances, putting an emphasis on specific variables. What it is clear from a sector break-down is that the **power sector represents the largest uncertainty for the future gas demand** in the EU, as natural gas for electricity generation faces strong competition from alternative energy sources entering the power mix, but on the other hand may also make a larger contribution to emission reduction, depending on policy decisions. In any case this leaves EU market players with significant uncertainty regarding the future of their markets, which affects their ability to prepare effectively for the future.

Also note that the Primes model, used by the European Commission, is at the lower end of the demand projections, which does not give a great deal of hope for policies leading to a larger role for gas.

Another important notion is that gas demand declined substantially between 2010 and 2015.

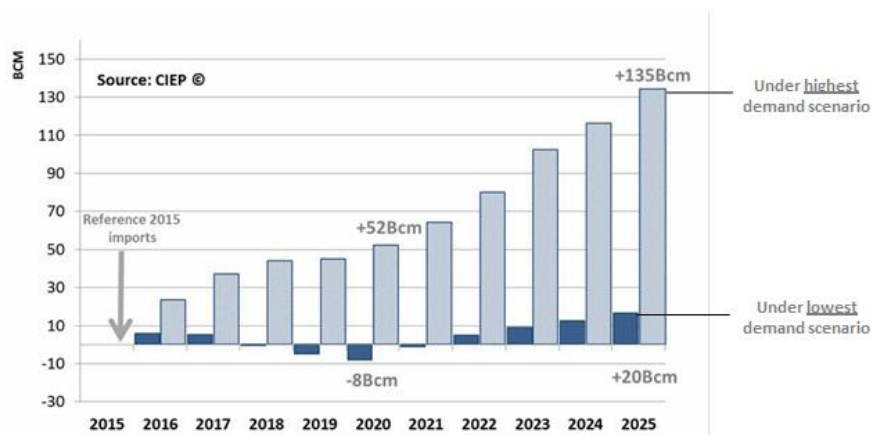


The recent decline in EU gas demand is caused by structural and non-structural factors and part of the **large uncertainty** in the future is how these non-structural factors will play out in the demand developments until 2025.

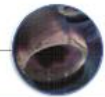
What we do know is that EU-28 gas production is declining, and this afternoon we will undoubtedly hear more on the impact of low gas prices on EU-28/domestic supplies. Bringing together developments in EU-28 domestic supplies and the demand projections, we can **derive demand for additional import of gas into the EU-28.**

Additional Gas Import Needs Into the EU (Reference to 2015)

Due to declining domestic production, import needs rise in all scenarios



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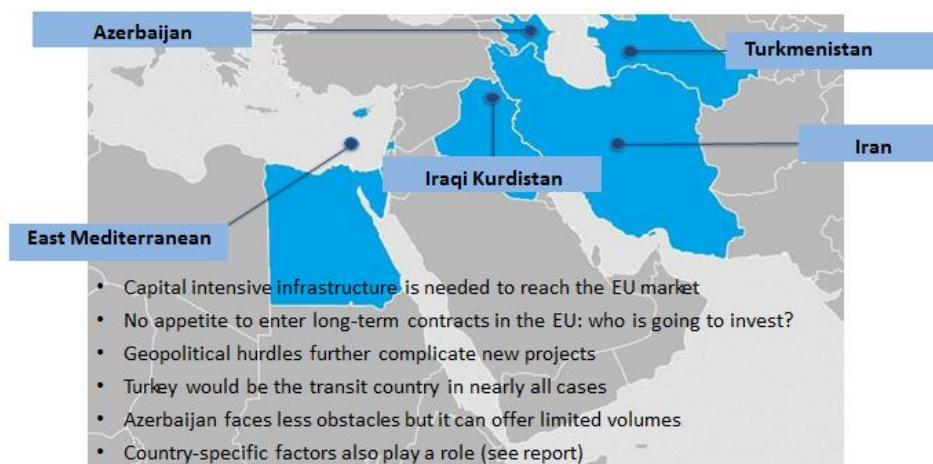


If we take **2015 as a reference year for additional imports**, the projections of domestic EU-28 supply and the Outlook of demand shows a wide range of uncertainty for EU market players and for outside suppliers..

In 2025, this range of uncertainty shows additional demand for imported gas supplies of 20 bcm to 135 bcm. Such a wide range of uncertainty makes it difficult for external suppliers to assess their investments if they would want to export to the EU.

Let us now examine the capabilities and interest of the current and potential suppliers to the EU. First we will look at pipeline gas suppliers and then to LNG.

Outlook for Gas Imports from New Pipeline Suppliers into the EU to 2025



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First we examined the outlook for imports from **new pipeline suppliers**. For the EU these suppliers are seen as potential sources of diversification.

The regions with supply potential considered by the study are Azerbaijan, Turkmenistan, Iran, Kurdistan and the East Mediterranean.

Prospects for future supply from these countries face **major common obstacles**:

- 1.) the upstream and especially the transportation infrastructure to reach the EU market require large investments – given the uncertainty about future import needs, no EU market player is willing to make a **firm commitment** to unlock these investments;
- 2.) Therefore, a pipeline to the EU cannot develop into a preferred option of these countries for the expansion and supply of their gas resources. Apart from commercial factors, **geopolitical hurdles** make all of these projects difficult to realise. The only partial exception could be **Azerbaijan**, but this country can offer limited volumes to the EU apart from those already committed.
- 3.) Besides the common obstacles that I mentioned, there are **country-specific issues** that need resolving which are discussed in the report.

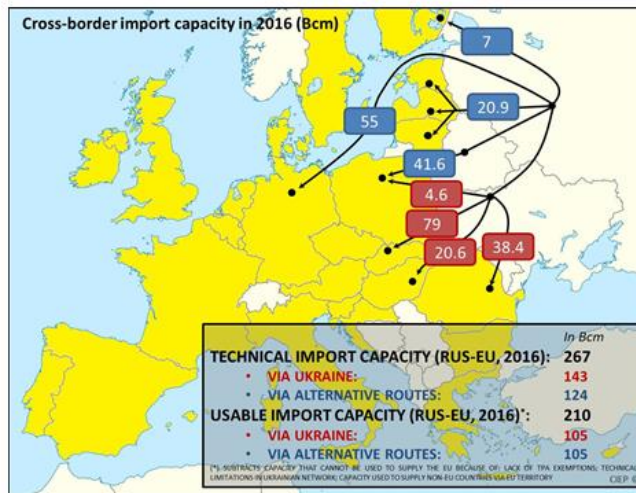
The overall conclusion is that the outlook for imports from new pipeline suppliers is very dim.

Among current pipeline suppliers to the EU, Russia is the only supplier which can offer us more gas.

So let us turn to Russia.

Outlook for Gas Imports from Russia into the EU to 2025

- Russian gas is very price competitive
- In 2025, contracted volumes will be around 150 Bcm, but the 'floor' is set by take-or-pay commitments (100-125 Bcm)
- Russia has at least 100 Bcm of spare capacity above its contracted volumes
- Transport as potential bottleneck



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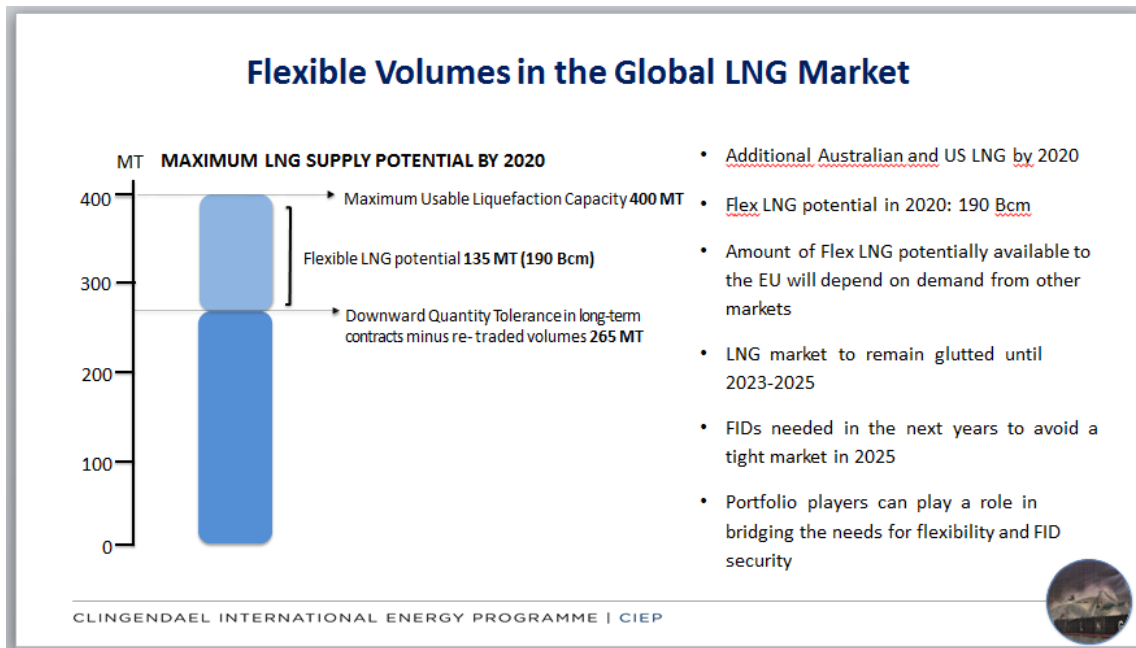
The outlook for additional supplies from Russia looks much more promising. There are many numbers going around about total supply capacity, but conservatively Russia has the spare capacity to produce at least 100 bcm of additional gas on top of its contracted volumes (of about 150 bcm). This gas could be brought to the market with little or no additional investment.

Russian gas is indeed very price competitive in Europe and could withstand lower gas prices. In the study we show how Russian gas could effectively compete with LNG in case Russia decides to protect its market share and also meet future requirements, if Europe will have to import more gas in the next 10 years.

One main potential bottleneck for additional Russian supplies is **transportation**. There have been a lot of discussions and developments about **new pipeline routes** which Russia wishes to build to **minimize transit risks through Ukraine**. From the analysis of various scenarios in our study, we concluded that even if some of the proposed pipeline routes are built, Turkstream, Southstream or Nordstream 2, at least a partial renewal of the Ukraine transit contracts would still be required to deliver contracted volumes. Let alone to deliver the additional volumes. At the same time, additional pipeline supply options enhance security of supply for the EU.

To sum up, regarding pipeline supplies to the EU, any higher demand in the next ten years is unlikely to be met by new pipeline suppliers, and more likely to be supplied by Russia.

This leaves us with one last category of potential external gas supplies we analysed: LNG



Due to FIDs taken in the last years, a lot of Australian and US LNG is coming to the market. More will come by 2020. This has already created a substantial overhang in LNG supply.

In theory, flexible LNG capacity could be as much as 190 Bcm in 2020. Much of that LNG does not have a market as yet. Europe is not likely the market of choice for this LNG. For many, if not most LNG suppliers it is the market of last resort.

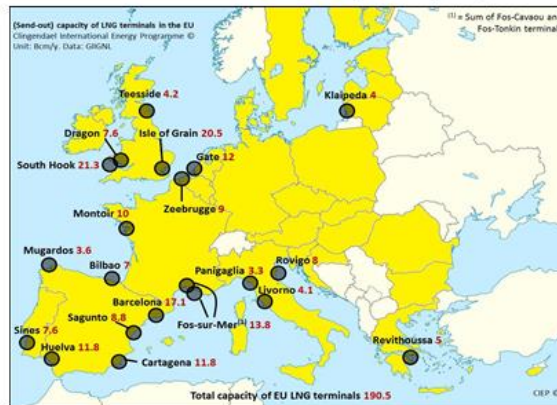
- 1.) Therefore, the amount of flexible LNG potentially available to Europe will depend on demand from other markets, particularly non-OECD Asia.
- 2.) Finally, the amount of LNG that will come to the European market will be determined by the dynamics of competition between LNG and Russian pipeline supplies.

Even if Asian demand recovers, the LNG market is expected to remain glutted until 2023-2025. Until then, Europe may very well continue to play the role of sink market and enjoy abundant LNG supplies at low prices. However, projections point to a tightening market towards 2025. To avoid such tightening by then, FIDs on new projects would already be needed in the next years.

The appetite for new FIDs seems low in the current market environment but, it cannot be ruled out that some players could take counter-cyclical decisions. In particular, we think that portfolio players could play a role in bridging the needs for flexibility and FID security.

LNG Import Terminals in the EU

- EU continues to play the role of 'sink market' but its absorption capacity is not endless



- Additional flexible LNG will come to Europe and can be accommodated by considerable idle capacity in import terminals (45 Bcm used of 190 Bcm available)

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The absorption capacity of the EU market for surplus LNG is possibly constrained by demand. But it does not appear constrained by regasification capacity.

In fact, additional flexible LNG can be easily be accommodated by idle capacity in import terminals, since of the 190 Bcm available only about 45 are currently being used.

Taken together, this leaves us with an uncomfortable EU market in which:

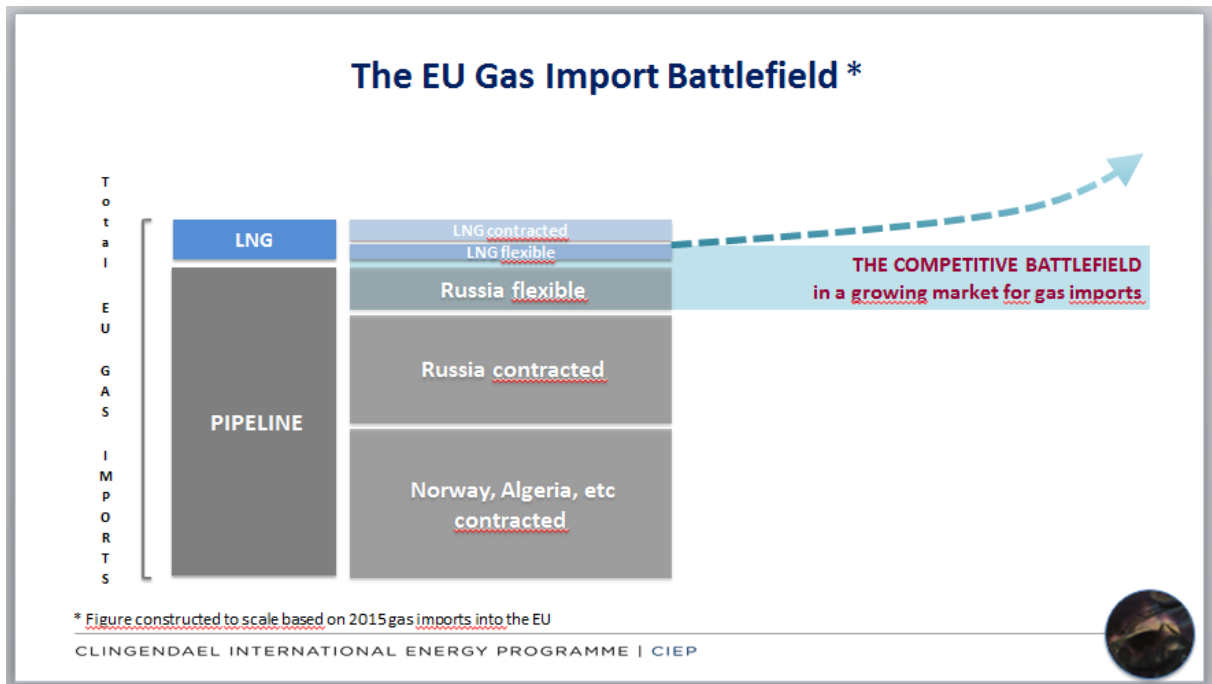
- The demand outlook is uncertain, but there is no decline in imports
- EU market players are not in a position to prepare for the future

But this EU market is comforted by:

- An unprecedented surplus supply capacity in the next 10 years from Russia and the global LNG market.
- Import infrastructure does not pose an obstacle for these flexible supplies to flow to the EU-28 market.

This sets the scene for growing competitiveness among external suppliers to the EU and for more security of supply for the duration of the surplus.

Let us then first look at the competitive 'battlefield' in the coming years.



Natural gas demand in the EU remains highly uncertain but import needs will, nevertheless, increase in the period to 2025.

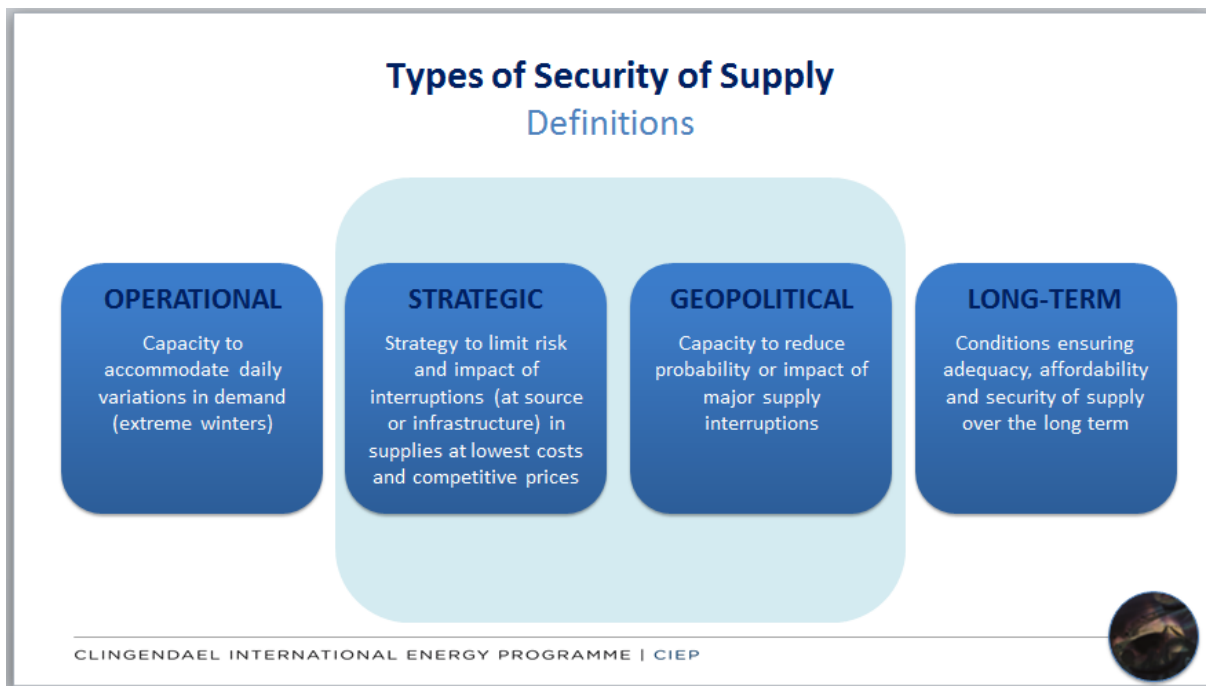
We assume that all Norwegian and Algerian pipeline supplies will be absorbed by the EU market, and that at least the contractual minima of Russian gas, under their long term contracts with the EU market, will be taken.

This leaves a space for growing **competition between Russian and LNG suppliers, hence the emergence of a growing competitive battlefield for the duration of the surplus (possibly until 2023-2025)**

For gas consumers this may sound like good news in the short and medium term, but in the longer term there may be some concerns with regard to future import flows.

Based on these EU Market Fundamentals what are then the
**Prospects for Security of Supply and Sustainable Diversification
of EU Gas Supplies until 2025?**





There are four different aspects of Security of Supply, each with their own solution space. **Diversification of Gas Supplies is an important part of Security of Supply policy-making relevant to two of the four aspects:**

Strategic, addressing ways to limit the risk and impact of interruptions of supply and **Geopolitical**, focussing on ways to reduce the probability or impact of major, politically-driven supply interruptions.

The remedies to manage these risks have changed over time.

Security of Supply for the EU

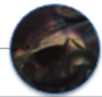
Traditional solutions

STRATEGIC

- Supply diversification through long-term contracts (LTCs); **CONTRACTUAL DIVERSIFICATION**
- Multiple import facilities
- UGS

GEOPOLITICAL

- Relationship management, supply diversification and/or strategic stocks



Until recently, Strategic security was largely based on physical diversification of gas supplies, realised by **contractual diversification** with various suppliers, i.e. long-term contracts.

Contractual supply diversification was equally relevant for managing geopolitical risks.

In the current market circumstances these policy tools have changed.

Security of Supply for the EU

Solutions in the current market

STRATEGIC

- ~~Supply diversification through long-term contracts (LTCs), Contractual Diversification~~
- Multiple import facilities
- UGS
- **Competitive environment by means of alternative import facilities/ optionality in the market; COMPETITIVE DIVERSIFICATION**

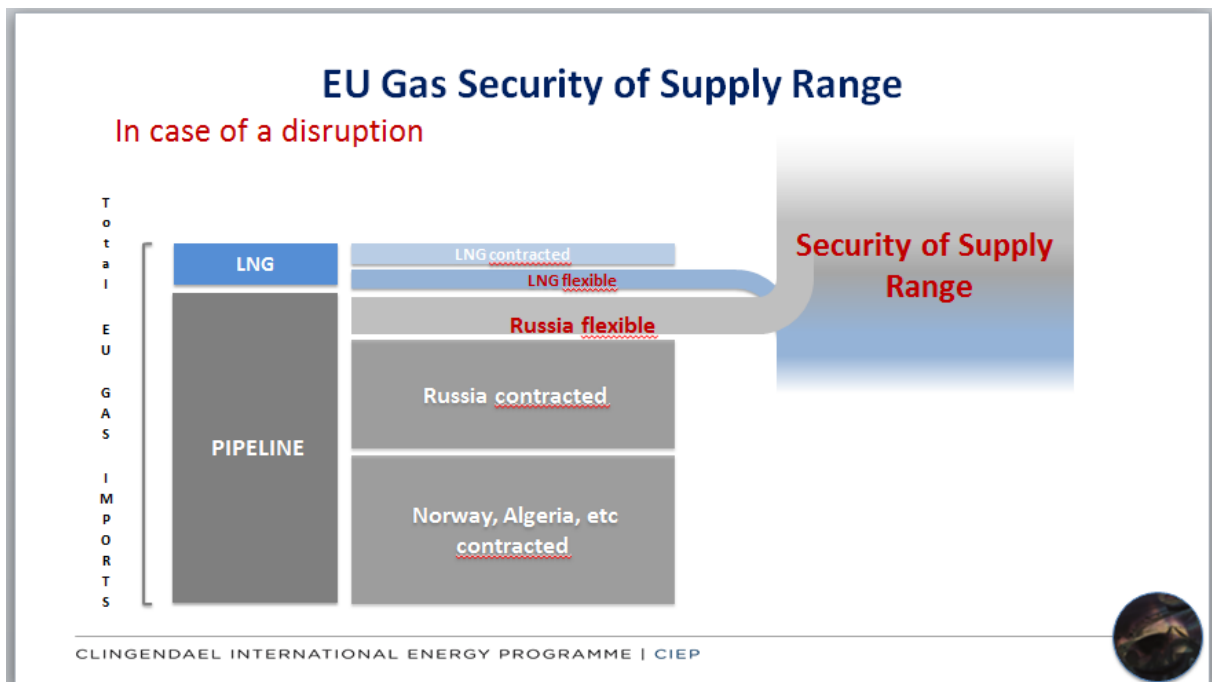
GEOPOLITICAL

- Relationship management, supply diversification and/or strategic stocks



In the **current EU-28 gas market conditions**, the option to engage in Contractual Diversification is no longer available: market players have a low appetite or ability to engage in long term commitments to purchase gas. However, diversification can be achieved by competing flows of gas and sufficient optionality to purchase from these competing suppliers. We have coined this **competitive diversification**. In such a market, market share becomes irrelevant due to optionality.

How does this contribute to Security of Supply?



In the current EU-28 gas market circumstances, **security of supply** comes from both the **availability of abundant gas import infrastructure** (both pipelines and LNG terminals) and the **availability of substantial flexible gas supply capacity** (pipelines and LNG).

These overlap considerably with the contracted supply volumes;

This means that a disruption in pipeline gas, be it from Russia, Norway or Algeria, can be compensated by additional LNG supplies, going well beyond the “competitive battlefield”. Equally, an interruption of LNG supplies can be filled by additional Russian gas.

For Strategic security, **which normally concerns limited disruptions**, this should offer security of supply cover for the EU-28, for as long as flexible LNG is available in the market.

For Geopolitical Security, which may have greater supply dimensions, the high surpluses could go a long way in offering back-up security of supply, although particularly for LNG this back-up availability varies with time and global market demand.

In conclusion, for a considerable period of time, both Strategic and Geo-Political Security of Supply are well tempered by the prospects of availability of capacity surrounding the EU, without the need for contractual diversification

In the longer term, Security of gas supply may be a cause for concern.

Security of Supply for the EU

Solutions in the current market

STRATEGIC

- Competitive Diversification
- Prolonged buyers market:
 - Overhang of LNG supply
 - Overhang of Russian gas supply
- Market liquidity;
- Abundance of LNG import terminals
- Limited import pipelines from Russia (*)

GEOPOLITICAL

- Current buyers market tempers effects of geopolitical risks



- For the current EU-28 gas market, security of supply is helped by competitive diversification. Yet this is all the more reason to pay close attention to international gas market developments in the coming years as the current market circumstances rely on the pre-condition of oversupply, market liquidity and ample available infrastructure to import gas.
- It is important to review the market developments closely, because the outlook for demand and liquidity in Asian gas markets is crucial for future market circumstances in the EU-28 market.
- Any tightening of the international gas market, particularly when Asia continues to import gas through Long Term Contracts, would challenge EU-28 market players while they may be unwilling/or unable to respond to changing market circumstances.

Prospects for Sustainable Diversification of the EU's Gas Supply

Conclusions

The EU is enjoying a prolonged buyers' market

- Significant **supply overhang** of both pipeline gas and LNG
- 'Competitive diversification' will offer **price competition and supply security**
- The **market share** of any supplier is **irrelevant**
- **Minimising obstacles to competition** will enhance competitive and security environment (this includes not opposing additional import pipeline capacity from Russia)

But the "holiday" does not last forever

- **The EU is not in a position to dictate the nature of the market**
- **Timely review needed** for signs of changing LNG supply/demand and business model outlook
- If Asian and/or LNG business models change to short term transactions, LNG supply to EU in a tight market will depend on EU gas prices
- If LNG supply gets tight while Asia resumes term contracts for new supplies, **EU will be ill-prepared to do the same**

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Conclusions

The EU is enjoying a prolonged buyers' market:

- 1.) Significant **supply overhang** of both pipeline gas and LNG
- 2.) 'Competitive diversification' will offer **price competition and supply security**
- 3.) The **market share** of any supplier is **irrelevant**
- 4.) **Minimising obstacles to competition** will enhance competitive and security environment (this includes not opposing additional import pipeline capacity from Russia)

But the "holiday" (for consumers) does not last forever:

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