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# Reducing energy supply security risks by diversified gas sourcing and adequate investments in pipelines & LNG terminals

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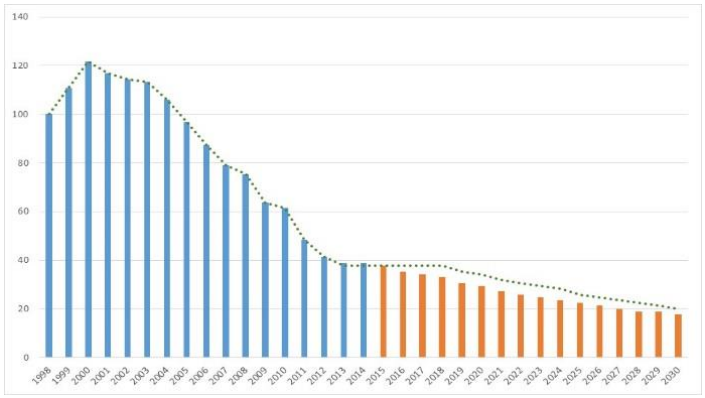
# European gas security: long term supply and infrastructure questions

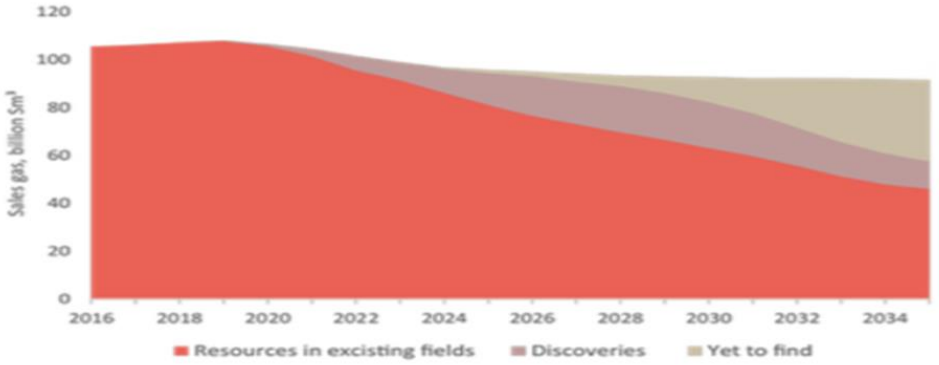
- European gas security: acceptable level of threat of supply and price disruptions in any part of gas chain (sources transport/transit infrastructure, facilities)
  - Longer term supply: from where is Europe likely to receive additional gas post-2020?
  - Infrastructure: which new pipelines and LNG terminals are likely to be built and how will they impact on European gas security?
- Risks: governmental (political relationships between suppliers, buyers & transit countries); contractual (renegotiation /arbitration/cancellation); legal/regulatory (e.g. EU/EnCT 3rd Package); facility (e.g. underinvestment, sabotage)

**Perceptions of longer term gas availability, and security implications of new infrastructure, differ across Europe and impact EU policy making. Perceptions of threat as well as acceptable levels of threat also differ.**

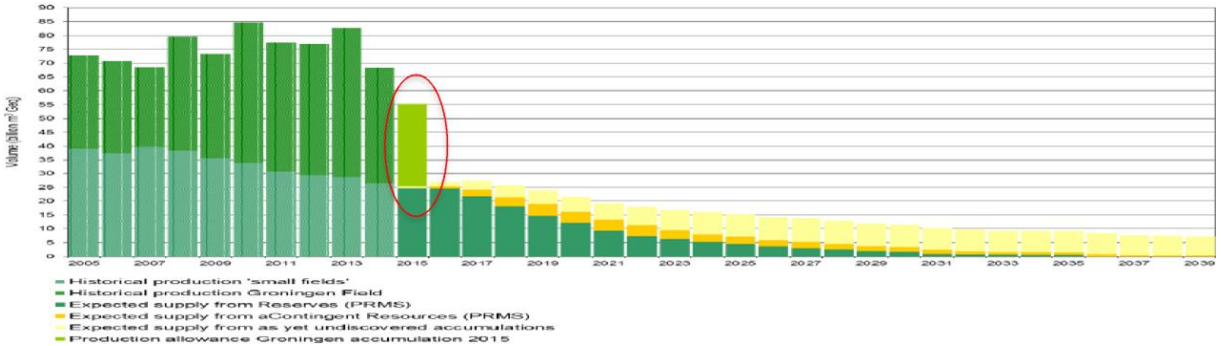
# European conventional gas production



Source: DECC, March 2015 (dotted line = March 2014)




Source: Norwegian Petroleum Directorate, Flame 2016




Sources: GTS, updates Honore/OIES

**Norwegian, Dutch and UK will continue to dominate European conventional gas production, which will decline by 87-120 Bcm by 2030. EU unconventional gas production is expected to remain well below 20 Bcm by 2035 thus having little impact on the decline in conventional production**

# Non-European non-Russian pipeline supplies: southern corridor


Source: BP

- Azerbaijan: maximum exports in early 2020s are 16 bcm (significant downward revision due to domestic supply problems)
- Turkmenistan: highly unlikely politically (Trans-Caspian pipeline opposed by Russia and Iran) and commercially (low gas prices)

- Iraqi Kurdistan: earlier assumptions of 10 bcma by 2020 (and ramping up to 20 bcma) hugely optimistic, baseload secure exports unlikely until domestic power demand satisfied, Turkey is immediate export market, security issues
- Iran: possible post-2025 (but not likely) as pipeline exports to Europe depend on enlarged link with Turkey (perennial price disputes), LNG is likely to target Asia

**"Southern Corridor" major element of the EU supply diversification (route and source)/security policy since late 1990s & enjoys favourable regulatory treatment & political support BUT maximum firm exports in early 2020s are only 16 bcm from SD2 (to Turkey and Europe)**

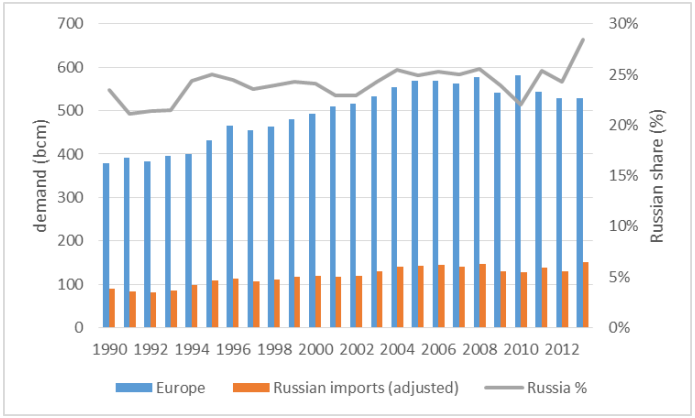
# Non-EU/non-EEA non-Russian pipeline supplies: north Africa and eastern Mediterranean

- Algeria: no increase in exports likely by 2020; outlook for 2030 is unpromising:
  - rapidly growing domestic demand & stagnating gas production mean exports will decline to 15 bcma by 2030, and in low production/high demand scenarios, will cease altogether.
  - unless production can increase faster than domestic demand there is no possibility of turning this around despite ample reserves BUT exports have increased in 2016

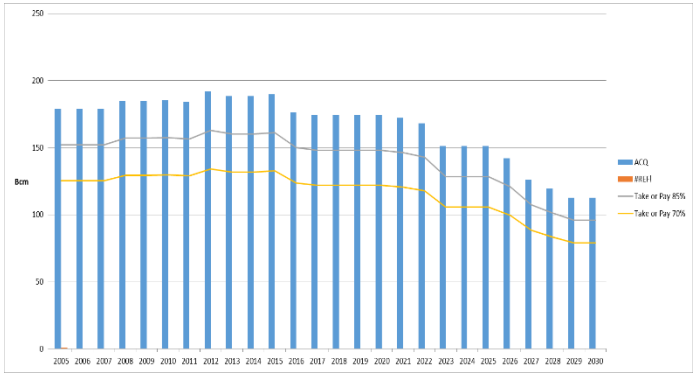
- East Mediterranean: 10 Bcm exports of Israeli gas as LNG via Egypt questionable since the Zohr discovery, and pipeline gas exports to regional countries (but not Turkey) are likely if politics permit

**The only significant sources able to increase production in a 5-10 year time frame is global LNG and Russian gas**

# Russian gas to Europe: varying degrees of dependence




Source: OIES 2014 based on 40 European countries



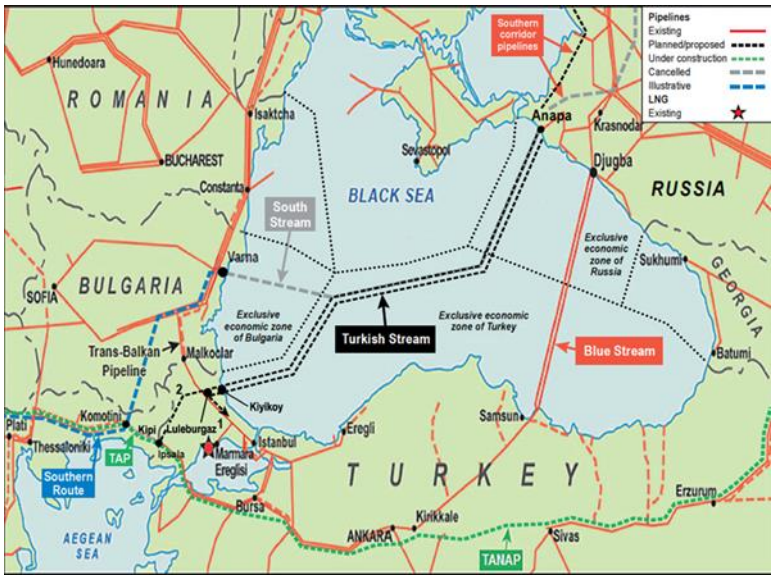

Source: ERI RAS in OIES 2014

- Europe <u>overall</u> depends on Russian gas for some 25-28% of demand – a healthy share from a commercial point of view
  - Even at 70% ToP, Gazprom's average annual sales exceed 100 Bcm/year until the mid-2020s
- NW & SW European countries (<u>more than ¾</u> of Russian gas exports to Europe): relatively low levels of supply concentration, (mostly) meet N1 standard
- But CE, SE, Baltic countries, which account for <u>less than ¼</u>, remain highly dependent and vulnerable:
  - N-1 standard not met (2013): Bulgaria, Greece, Lithuania, Estonia, Slovenia
  - SCI>30 (2012): Austria, Bulgaria, Czech Republic, Estonia, Finland, Greece, Hungary, Lithuania, Latvia, Poland, Slovakia. Non-EU, SCI > 30 (2013): Serbia, Bosnia & Herzegovina, FYROM, Turkey

**Europe <u>overall</u> is well diversified <u>but the Baltic region, Central Europe, South East Europe are highly dependent on gas from one source – Russia</u>, this is problematic, irrespectively of whether viewed from commercial or geopolitical point of view, hence more attention needed to these regions**

# The Nord Stream & Turkish Stream/ "southern route" pipelines


Source: OIES



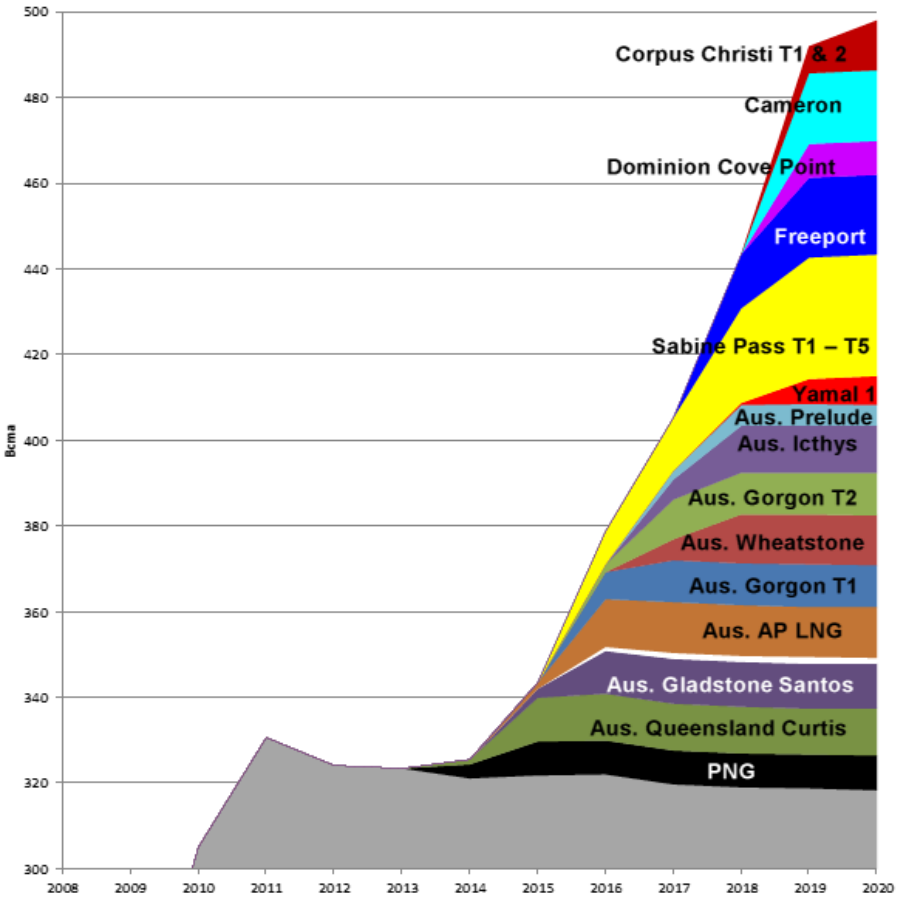

Source: OIES

**Nord Stream: 55 bcm (in two strings): operational since 2011-12.**

**Nord Stream 2: 55 bcm (in two strings): under development but faces formidable political & regulatory obstacles making 2020 start unlikely.**

**Turkish Stream: revived in August 2016, with strong likelihood that at least one string will be built by 2020. The second string of Turkish Stream or "southern route" (via Bulgaria) connecting to TAP or ITGI are possible but not likely by 2020**

# Global LNG supply: existing & FID/under construction 2008-2020



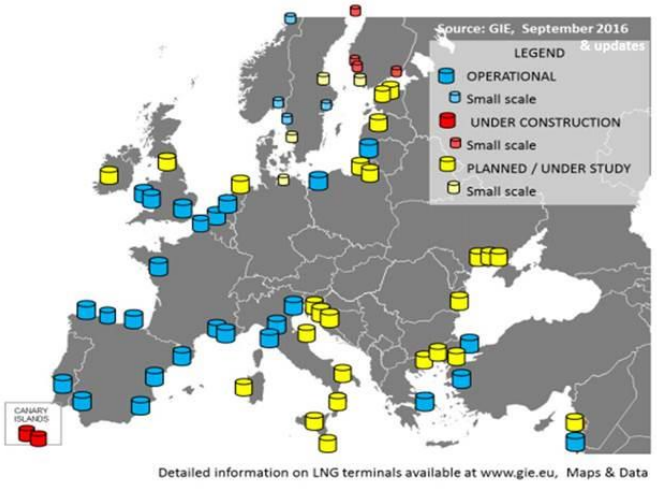

Source: Rogers/Ledesma OIES

- **In a <u>surplus</u> global LNG market 2016-2023 (??):**
  - **Europe could be the recipient of substantial LNG supplies (even if not actively seeking them)**
  - **Gazprom would need to compete against these supplies at prices which could go as low as HH + $2/mmbtu**
  - **Failure of Gazprom to compete could lead to significant additional LNG supplies arriving in Europe which <u>would significantly reduce dependence on Russian gas</u> (at least for the duration of the surplus)**
- **But this will be <u>time-limited</u> as global LNG supply/demand may tighten by early/mid-2020s**
  - **LNG will disappear when Asia needs it & …**
  - **<u>Dependence on Russian gas might increase</u>**
- **By the mid-2020s: Russian gas and ??**

**The 2016-20 period: Russia does not want a price war with LNG but this could happen & Russia is in a position to `win' but at a cost**

# European LNG infrastructure: 210 bcm, 25% utilisation (2015)

- NW & SW European countries: access to LNG via massive regasification capacity & high level of interconnection
- CE, SE, Baltics European countries:
  - The Baltics region: with Lithuanian (4 bcm), Polish (5 bcm) & two more new LNG facilities, the Baltics & Finland could diversify away from Russian gas (up to elimination) by 2020 if agree sharing facilities & expanding interconnections
  - SE Europe: with (envisaged to be expanded to 7.3 bcm ) Greek LNG terminal, (to be built) Croatia terminal (2 bcm), reinforcements & interconnections, and access to Italy's LNG capacity, could diversify away from Russian gas (up to elimination) by 2020
  - CE Europe: due to much higher demand, will depend on reverse flow of LNG from NW&SW Europe which could be limited due to infrastructure bottlenecks, could reduce (not eliminate) dependence on Russian gas by 2020
- CESEC & PCI lists appear to suggest the focus being made on developing infrastructure in SEE rather than on connecting it with already existing infrastructure in NW/SW Europe




Source: Gas Infrastructure Europe


Source: ENTSOG map, compiled by EnCT Secretariat

**Ability of most dependent/vulnerable 'east' European countries to access non-Russian supplies (LNG and pipeline) has been limited by infrastructure constraints but this can be solved by 2020 – but at a cost (infrastructure cost & potential price differential)**

# European gas security (2015-2030): conclusions

- **Sources: global LNG and Russian pipeline gas will be the two main sources competing for European market up to 2030. No significant new non-Russian pipeline gas for Europe before 2025, projections beyond 2025 highly speculative. Russian gas will be competitive with all other gas supplies (LNG & pipeline) in a hub-priced European market**
- **Transport/transit infrastructure: abundant LNG regasification capacity in NW/SW Europe, limited but expanding (with EU financial support) LNG capacity in CE/SE/Baltics + interconnections enabling the region's access to LNG and non-Russian pipeline gas, but the issue of transit across Ukraine post-2019 remains unresolved**
- **Main risks are governmental (political), legal/regulatory, and contractual, threatening to upset existing commercial relationships, and must be mitigated**

**Threat of supply & price disruptions up to 2030 from any source is acceptable for overall Europe but CE/SE/Baltics could reduce their overdependence/vulnerability by 2020 through additional infrastructure**

# OIES Gas Programme published research on this topic

## This presentation mostly draws on:

- Stern (ed), Reducing European dependence on Russian gas: distinguishing natural gas security from geopolitics (2014)

## With further update & detail available in:

- Henderson & Pirani (eds), Russian gas matrix: how markets are driving change (2014)
- Aissaoui, Algerian gas: troubling trends, troubled politics (2016)
- Pirani, Azerbaijan gas supply squeeze and the consequences for the Southern corridor (2016)
- Corbeau & Ledesma (eds): LNG markets in transition: the great reconfiguration (2016)
- Yafimava, The OPAL exemption decision (2017)

# Thank you!

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