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PATHWAY TO A CLIMATE NEUTRAL 2050: FINANCIAL RISKS FOR GAS INVESTMENTS IN EUROPE

JOSEPH DUTTON

Achieving climate neutrality and net-zero emissions means Europe must stop burning fossil fuels, including unabated natural gas. Innovation and new lower carbon technologies are unlikely to offer a climate-proof future for the gas industry. This means investments to preserve, upgrade, or expand gas infrastructure are at risk of not recovering their value. This paper proposes a framework for investors to consider the range of transition risks facing the European natural gas industry across its value chain.

Key points

- **Future unbated use of gas is not compatible with the Paris Agreement**. It is also not compatible with the EU reaching climate neutrality by mid-century. This means that the business model of existing gas companies, infrastructure, and operations will no longer work in the mid-century.
- **Risk to the gas industry is growing from numerous sources.** Reductions in the costs of renewables, political and regulatory pressure to reduce gas use more rapidly, and the increasing loss of its social licence to operate are already threatening the industry. As these threats strengthen on greater climate ambition, the case for investment will be further undermined.
- **All parts of the gas industry are under threat from climate neutrality.** It will undermine the case for new investment in the industry, with network owners and producers most at risk for the transition.
- **Understanding the existential and systemic nature of risks facing the gas industry is the next frontier for the management of climate-related risks**. The lessons learnt in climate-related risk management that led investors to reduce exposure to coal must be applied to investments in the gas sector.

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Introduction – climate neutrality means phasing out gas

The EU is advancing in its plans to set an objective of climate neutrality by 2050, in line with the objectives of the Paris Agreement.[1] The scope for gas to play a role in the transition to climate neutrality is limited, and the industry must shrink in the medium to long term. In a 2°C warming scenario over half of the world's existing natural gas reserves are unburnable.[2] Under a 1.5°C warming scenario this unburnable total is even greater, as its carbon budget is only a quarter of that in a 2°C scenario. Demand for unabated natural gas by 2050 must therefore fall if the EU is to be aligned with a 1.5°C warming scenario.

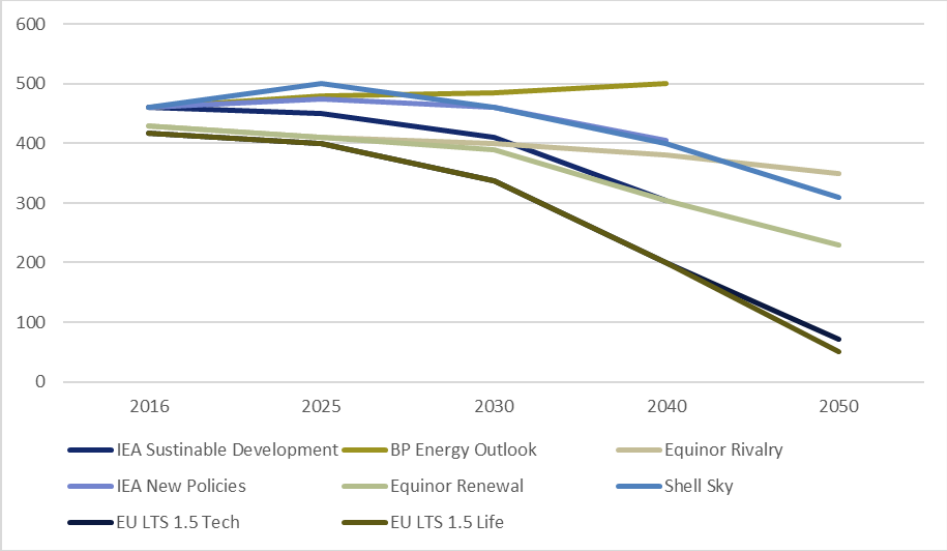

Figure 1: Indicative comparison of EU gas demand scenarios (bcm)[3]

[Note: gap filler data added by the author where relevant]

Gas is rapidly becoming the essential fossil fuel to tackle if the EU is to achieve climate neutrality, as emissions from the use of gas overtook those from coal in 2018.[4] The average grid emissions factor is now below the emissions from a modern gas power plant.[5] The burden of emissions in the gas industry is linked to the demise of coal in the power sector and the accelerated deployment of renewable energy. The EU is also increasingly concerned about methane released during the production of gas (and to a lesser extent, coal mining).[6]

[1] European Commission (12 December 2019) **European Council meeting – Conclusions**

[2] McGlade, C. & Ekins, P. (2015) The geographical distribution of fossil fuels unused when limiting global warming to 2°C, *Nature*, 517 (7533), 187-190

[3] European Commission (2018) A Clean Planet for all: A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy COM (2018) 773; Stern, J. (2019) **Narratives for Natural Gas in Decarbonising European Energy Markets**

[4] IEA (2019) 'World Energy Outlook 2019'

[5] EEA (2018) **CO2 emission intensity** [accessed 13 December 2020]

[6] Environmental Defense Fund (2019) **Limiting the climate impacts of the European Union's gas supply**

Methane is a much more potent greenhouse gas than carbon dioxide, meaning fugitive methane emissions from gas extraction and transport undermine its low-carbon and transition credentials. This is also true of 'alternative' gases such as producing hydrogen with natural gas, or biomethane from anaerobic digestion. Improvements in satellite data collection will soon enable policy makers and regulators to directly locate the source of leaks and emissions sources.[7]

The need to reduce gas use to 2050 diminishes the attraction of gas as a bridging fuel to help the EU economy transition from coal to renewables. Using gas in this way would not permit the reduction in global carbon emissions that is required by the Paris Agreement, nor ensure the EU meets climate neutrality by mid-century.[8] Proponents of the 'gas bridge' theory highlight demand will remain consistent entering the 2030s, with a fall thereafter. But the coal-to-gas switch will provide little long-term demand growth[9], and the decline through to 2050 clearly highlights why investments in new gas infrastructure should be considered a risk. To be compatible with the Paris Agreement, a gas 'bridge' would still require a significant fall in gas consumption, driven by accelerated decarbonisation policies, particularly in the power sector.[10] The continuing cost reduction in renewable generation mean gas will also struggle to compete with newbuild renewables, and advances in electricity system operation will also lead to less renewable (wind) curtailment, massively reducing the need for back up thermal generation.[11]

Gas use across the economy adds to transition complexity

The multi-dimensional use of gas means its phase out or replacement is more complex than that of coal. Gas accounted for 25% of the EU's energy demand in 2018 (behind oil), and was a key energy supplier in power, heating, and industry. Gas demand is split relatively equally between the largest sectors, with household heating the largest (44% in 2016), followed by industry (33%), and services (19%).[12]

This pattern is more equal than solid fuels and petroleum products, and demonstrates the widespread use of gas and its derivative products and services across the economy. Moreover, the complexity of gas demand can be seen within these sectors. For example, industrial sectors such as chemicals, refining, food, metals, and paper rely on gas for energy and heat provision as well as a feedstock for processes.[13] This means that investments beyond the traditional gas use sectors (such as power generation or heating) may also be affected by gas phase-out.

[7] Euractiv (28 June 2019) **Satellite data offers new hope for taming oil's methane emissions**

[8] Oil Change International (2019) **Burning the Gas Bridge Fuel Myth: why gas is not clean, cheap or necessary**

[9] Hogan-Lovells (14 June 2018) *Summer Gas Social*

[10] OIES (2017) **The Future of Gas in Decarbonising European Energy Markets: the need for a new approach** pp.23-24

[11] ECF (2019) **Towards Fossil free Energy in 2050**, p.6

[12] EEA (2018) **Final energy consumption by sector and fuel**

[13] CIEP (2017) **European Union Industrial Energy Use With a Focus on Natural Gas**

Gas industry evolution under climate neutrality

Achieving climate neutrality by mid-century necessarily means gas will have a changed and smaller role in the future energy system. Falling costs of low carbon technology and changing political, regulatory, and social environments are already threatening existing businesses – meaning some of these risks will materialise well within the time horizon of parts of the investor community.

This is forcing companies in the gas industry to develop new products and services, and enter new markets and geographies to reduce their exposure to the energy transition.[14] Those elements of the industry that remain in the mid-century will have markedly different structures. The risk the transition presents to investments in gas will only increase as climate policy ambition becomes higher, and the social, economic, and technical 'headwinds' grow stronger.

Alternative gases and CCS are not viable alternatives at scale

The gas industry and policy makers are exploring technological solutions and innovation to decarbonise the gas supply chain, with alternative 'low-carbon' gases as part of the medium to longer term energy mix. Significant levels of investment are likely to be directed at developing alternative gases such as hydrogen, synthetic gas and biomethane, which have lower carbon emissions than natural gas during combustion.

Developing carbon capture and storage (CCS) technologies is also of growing interest. While the gas industry has previously positioned itself as the lower carbon alternative to coal, it now believes it can contribute to climate neutrality and net zero in the mid-century by supplying low carbon gas for residual gas demand.[15] This is why many gas network companies have engaged in raising the profile of alternative gas solutions (e.g. Gas4Climate coalition).

However, there is no guarantee that alternative gases, such as hydrogen, can be fully decarbonised and therefore aligned with climate neutrality. It is also likely these alternative gases would need to be blended with conventional natural gas or biomethane for use in existing infrastructure; alternatively, dedicated hydrogen infrastructure may need to be developed.[16] Given their low efficiency, hydrogen and other alternative gases may only be used in cases where other decarbonisation options such as more energy efficiency, renewable electricity generation and electrified transport are not available. This means the final demand will be much lower than gas demand today.[17]

[14] EY (5 November 2019) **Should oil and gas invest in what it knows or what it thinks will be?**

[15] See for example: **BP Gas offers a cleaner alternative to coal for power generation and can lower emissions at scale** [accessed 28 November 2019]

[16] IEA (2019) World Energy Outlook, pp.589-594

[17] Committee on Climate Change (2018) **Hydrogen in a low-carbon economy**

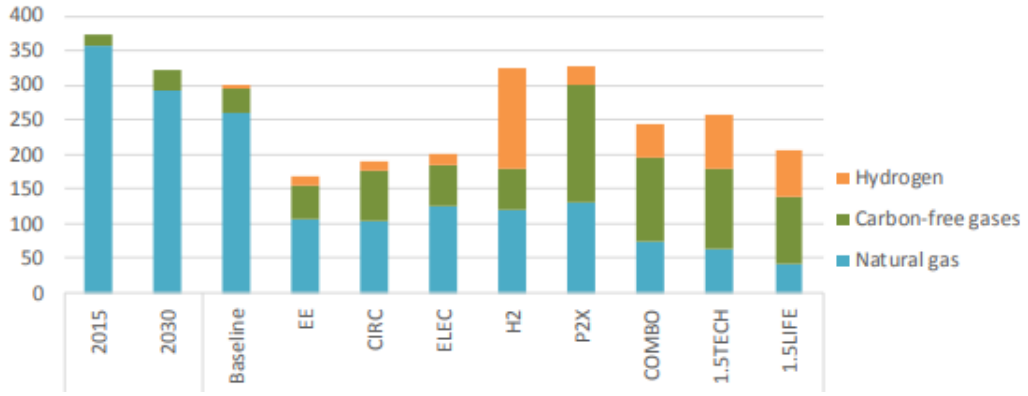

Figure 2: EU gaseous fuel consumption scenarios in 2050 (Mtoe)[18]

Hydrogen produces no carbon when it is combusted, but there are still carbon and methane emissions along its production chain if it is produced from natural gas. The most common hydrogen production method, Steam Methane Reformation (or SMR), uses natural gas as the feedstock, meaning fugitive emissions undermines its low carbon credentials.

The carbon produced during the SMR process would also need to be captured using CCS, which remains a nascent and unproven at-scale technology. In the absence of CCS, the SMR process delivers little benefit to the climate and would generate emissions considerably higher than renewable electricity sources. Moreover, even if CCS was used alongside SMR, it would still not remove all carbon emissions from the process.[19]

This means that future investments in alternative gases will be exposed to the same transition risk from climate neutrality as the existing gas industry. These technologies and gas vectors will struggle to meet the strict requirements of net zero, and primary and induced transition risks will threaten these investments. Despite investment in developing the infrastructure for alternative gases in coming decade, it may still need to be phased out from operation in the 2030s because of the remaining carbon and methane emissions.

Regulation will not save the gas industry

One solution proposed to this challenge is changing regulation to protect investment in alternative gases such as hydrogen and biogas. This is clearly technically possible; however, the fact that there are limited climate benefits from alternative gases, and that there are cost-effective alternatives across most of the economy, means this is unlikely to be sufficient. Regulators will only create the conditions for an industry, sub-sector, or business model to succeed if it is likely to achieve the wider objectives it is

[18] European Commission (2018) In-depth Analysis in Support of the Commission Communication COM (2018) 773

[19] BEIS (2019) **H2 Emission Potential – Literature Review**, pp.14-16

expected to deliver (in this case climate and social) and has the social licence to operate. There is little evidence so far that alternative gases will deliver this.

Non-energy demand for gas could become more significant

Although the long-term picture for gas in the EU is decline, there are some isolated 'tailwinds' supporting specific sub-sectors. Increased awareness of air pollution means demand is growing for gas in road haulage, shipping, railways, and domestic heating as a cleaner alternative to solid or liquid fuels. Growing demand for plastics in developing economies will also preserve markets in some regions.[20] There is also likely to be some remaining gas demand in industry where electrification is not possible, such as ceramics, petrochemicals, steel production, shipping, and back-up power generation.

The demand for natural gas for nitrogen-based fertiliser production is also likely to remain for some time. Production of nitrogen fertiliser accounts for 3-5% of global gas demand, and this could increase on higher global fertiliser demand from changing agricultural practices and growing food demand. In the EU, nitrogen fertiliser remains the most commonly used type, and demand for it has been growing annually through the last decade.[21] However even this may also change, as the EU's "Farm to Fork" strategy will increase the level of ambition to significantly reduce the use of fertilisers.[22]

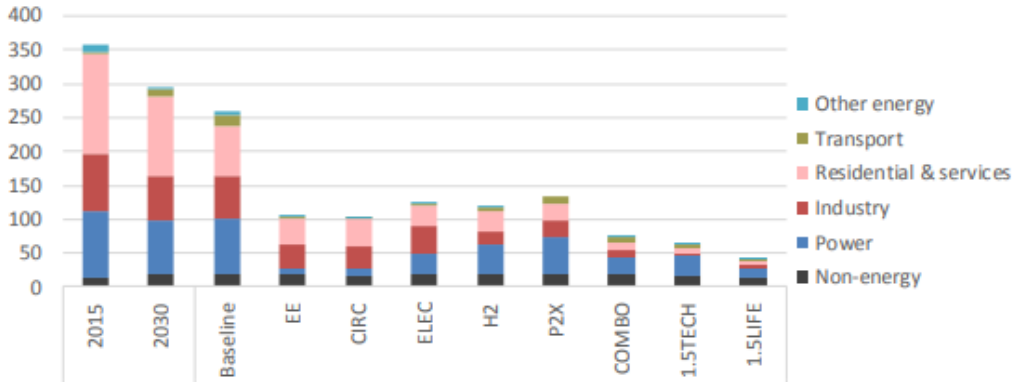

Figure 3: EU gas demand scenarios by subsector in 2050 (Mtoe)[23]

[20] Platts (19 February 2019) **Consumer push for sustainability masks massive growth in plastic demand**

[21] European Commission (June 2019) **Fertilisers in the EU: Prices, trade and use**

[22] European Commission, **Farm to Fork strategy for sustainable food** [accessed 3 January 2020]

[23] European Commission (2018) In-depth Analysis in Support of the Commission Communication COM (2018) 773

A framework for analysing transition risks to the gas industry

This section sets out a framework that can highlight for investors how the gas industry is at risk from climate neutrality. Consistent climate-related financial risk disclosures ultimately gives investors, lenders, and the insurance sector a better understanding of the risks posed by climate change.[24] This will enable the investor community to better invest, and help governments make better policy and regulatory decisions.[25] We adapt the transition risk categories from the 2017 report of the *Task Force on Climate-related Financial Disclosures* (TCFD).[26]

The first level of risk for the gas industry is **primary transition risks**, formed of *technology risk* and *social and reputational risk*. These are where the most prevalent headwinds for the gas industry are found. These risks create direct **potential financial impacts**, and lead to change that creates **induced transition risk,** (across *policy and regulatory risk* and *market risk*). These culminate in creating **potential financial impacts** for each of the gas industry sub-sectors.

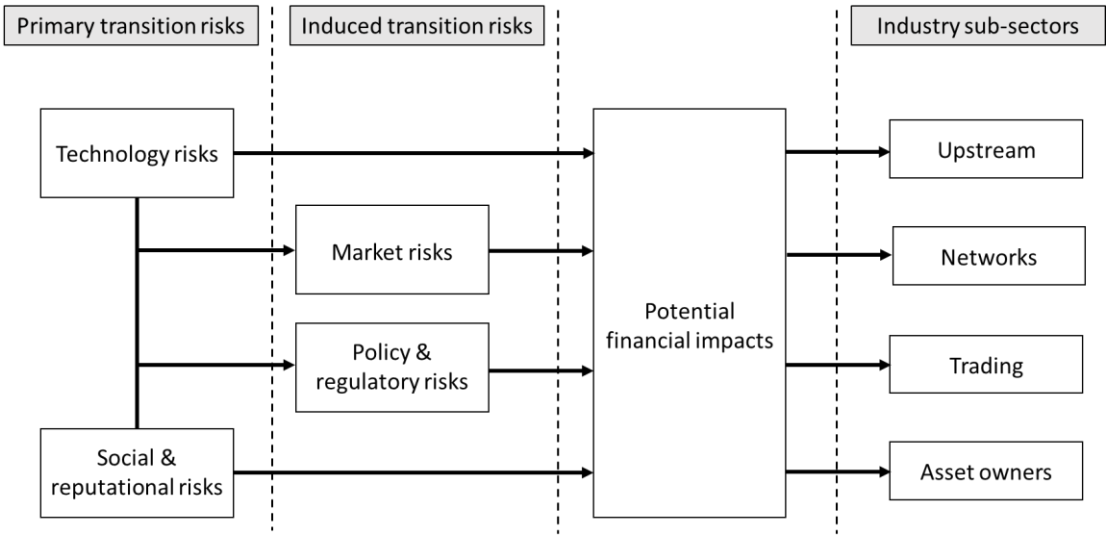

Figure 4: Transition risk evolution

[24] G20 Financial Stability Board Task Force on Climate-related Financial Disclosures (2017) **Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures**

[25] Bank of England (2015), **Breaking the Tragedy of the Horizon – climate change and financial stability**, speech given by Mark Carney

[26] Policy and legal risks; technology risk; market risk; reputation risk

Primary transition risks

The gas industry is facing challenges to its operation and future existence from a number of sources. The most significant of these so-called **primary transition risks** are *technology risk* and *social and reputational risk.* Increased research and innovation in low carbon technologies have changed the technical and operational environment within which the gas industry sits. Alongside this, in recent years there has been growth in social awareness of climate change, development of social movements calling for greater action from companies and policy makers, and emergent shifts in consumer behavior.

PRIMARY TRANSITION RISKS	
Technology risks	○ Falling cost of renewables ○ Improved battery storage capabilities ○ Decentralisation of electricity generation ○ Improved heating, cooling and insulation solutions
Social and reputational risks	○ Changing consumer behaviour ○ Lack of a social licence to operate ○ Public consensus on climate action ○ Climate-related litigation

Figure 5: Primary transition risks

Technology risks

The primary driver of risk in this category is the falling cost of renewable energy solutions and the growth of low carbon innovation.[27] The steep falls in cost of technologies such solar PV and offshore wind are already challenging the use of gas and other fossil fuels in the power generation sector. Future improvements in battery storage technology and the electrification of space heating (in technical, cost and efficiency terms) could weaken demand for gas by reducing the need for back-up generation, something already becoming a reality in the US.[28] The evolution of electricity supply with decentralisation and digitalisation aiding decarbonisation are also a threat, as they will reduce demand.

[27] Frankfurt School-UNEP Centre/BNEF (2018) **Global Trends in Renewable Energy Investment 2018**

[28] IRENA (29 May 2019) **Falling Renewable Power Costs Open Door to Greater Climate Ambition**

The growing use of smart and digital systems, alongside local generation, are also challenging the traditional structure of energy supply.[29] As more users switch from gas, the fixed costs of networks will have to be spread over fewer users, raising the costs, and inducing further switching.

Case studies

- *The auction price for new offshore wind in the UK fell to a record low of £40/MWh in 2019 (for delivery in 2025), with electricity from windfarms set to be cheaper than existing gas plants and nuclear power stations by the 2020s.*[30]
- *Co-location of renewable electricity generation and battery storage has started to undercut gas fired power stations, coal, and nuclear generation.*[31]
- *Steep falls in production costs mean lithium-ion batteries for some EVs could reach price-parity with conventional engines in 2024.*[32] *This is significant for emission-free vehicles (rather than using gas), as well as deployment of better battery storage for decentralised solar generation.*

Social and reputational risks

The high levels of public awareness and growing concern about climate change across Europe are beginning to influence consumer preference on product sustainability.[33] Impacts of this include more utilities offering renewable electricity tariffs, stigmatisation of plastics, and opposition to fossil fuel extraction – all of which threaten the gas industry. The growth of climate awareness also threatens the 'social licence to operate' for the gas industry with local communities and wider society.[34] The lack of a social licence can inhibit the development of new gas business areas (as with the failure to develop shale gas in Europe[35]) and threaten the revenue of existing companies. Social groups are also increasingly turning to climate-related litigation as a way of challenging energy companies' operations.[36]

[29] E3G (2017) **Infrastructure for a changing energy system**

[30] Carbon Brief (20 September 2019) **Analysis: Record-low price for UK offshore wind cheaper than existing gas plants by 2023**

[31] Renew Economy (9 October 2019) **US energy giant says renewables and batteries beat coal, gas and nukes** [accessed 19 December 2019]

[32] BNEF (December 3 2019) **Battery Pack Prices Fall As Market Ramps Up With Market Average At $156/kWh In 2019** [accessed 6 January 2020]

[33] **Eurobarometer 91** (June 2019)

[34] Moffat, K., et all. (2016) The social licence to operate: a critical review, *Forestry*, 89, pp. 477-788

[35] Bradshaw, M J., and Waite, C. (2017) Learning from Lancashire: exploring the contours of the shale gas conflict in England. *Global Environmental Change*, 47, pp. 28-36.

[36] Grantham Institute (2019) **Global trends in climate change litigation: 2019 snapshot**

Case studies

- *Social movements pressing for more climate action reached a new level in 2019, with strikes and protests across European cities – most notably the widespread protests and direct action by Extinction Rebellion in London.*[37]
- *Rising public awareness and concern was also one of the drivers for strong performances by the Green movement in European parliamentary and national elections.*[38]
- *Over 40,000 people signed a petition in 2019 for the European Investment Bank to stop funding fossil fuel infrastructure.*[39]

Induced transition risks

The primary transition risks (across *technology risk* and *social and reputational risk*) are threats in themselves to the gas industry; however, their disruptiveness also produces responses from policy makers and regulators, and the finance sector – so called **induced transition risks.** Responding to technological and social changes is already within the remit of policy makers and regulators, but the need to respond to climate change will increase in prominence in a manner that will threaten the current structure of the gas industry.

INDUCED TRANSITION RISKS	
Policy and regulatory risks	○ Reformulation of infrastructure financing ○ High ambition on energy efficiency ○ Increased deployment of renewables ○ Carbon tax and/or emissions trading
Business and operational risks	○ Shareholder pressure and culture change ○ TCFD-related disclosures ○ Central banks responding to climate change

Figure 6: Induced transition risks

[37] The Guardian (15 October 2019) **Extinction Rebellion activists defy London-wide protest ban**

[38] The Independent (26 May 2019) **European election results: Green parties surge as 'Green Wave' hits EU** [accessed 16 December 2019]

[39] Act 350 (2019) **Final stretch: Fossil Free EU Bank!** [accessed 19 December 2019]

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Policy and regulatory risks

The combination of technological and social risks means that the shift to climate neutrality will lead to responses from policy makers and regulatory authorities. Government support for renewable energy, including generation targets, already presents risks to the gas industry and these policies are likely to become more widespread and ambitious in future. This could also lead to a fall in subsidies that fossil fuels receive from governments, and a redirection of research and innovation funding. In support of the policy changes, the remits of national regulators could change in future to include specific requirements on decarbonisation and fossil fuel use.[40]

With deeper decarbonisation and climate neutrality leading to lower gas demand or a changed demand profile, regulators may in future rethink consumer-supported infrastructure development if insufficient benefit for consumers is being delivered. This would increase the risk for developers and weaken the economic case for both preserving existing infrastructure and building new infrastructure in future.[41]

Case studies

- *Energy regulators in France and Spain refused permission for the construction of the Midcat section of a cross-border gas pipeline, because it was deemed unnecessary and too expensive. Analysis showed the pipeline would deliver little economic value to either country.*[42]
- *The Spanish regulator also proposed cutting the level of remuneration for existing gas infrastructure assets because of low utilisation rates.*[43]
- *The Dutch government's Climate Accord would phase out unabated use of natural gas by 2050, and the government intends to end all gas grid connections for new houses grid by 2021 and make the entire housing stock sustainable by 2050. This would negate the need to expand gas grid infrastructure.*[44]

[40] The Guardian (22 July 2019) **Energy regulator is out of touch over climate crisis, say businesses**

[41] CNMC (2019) **Common Decision of CRE and CNMC concerning the gas interconnection between Spain and France**

[42] Pöyry (2017) **Cost Benefit Analysis of STEP, As First Phase of Midcat – Final Report**

[43] OIES (October 2019) **The future of gas infrastructure remuneration in Spain**

[44] OIES (July 2019) **The Great Dutch Gas Transition**

Business and operational risks

The changing technology and social landscape in the EU will also change the business and operational environment for the gas industry. The awareness of climate change is beginning to permeate into the financial practice of companies, and those exposed to climate related risks from policy and technology will need to change significantly. Similarly, the growth of sustainability and environmentalism in corporate culture will see companies restructuring their internal operations and workplace culture.[45] At a macroeconomic level, growing concern among central banks about climate risk will also lead to responses in banking supervision and monetary policy to ensure financial stability.

Case studies

- *The European Investment Bank's decision in late 2019 to stop funding unbated fossil fuel projects from 2022 is also significant in this context. The new lending criteria include Emissions Performance Standards that favour lower carbon infrastructure.*[46]
- *In 2019 Exxon's credit rating was downgraded and its outlook changed from stable to negative. Among the factors behind this were exposure to climate related litigation the threat of government policies on climate change mitigation.*[47] *It also looks set to divest LNG assets in the Asia-Pacific region, instead prioritizing existing assets and being more focused in its operations.*[48]
- *Recently adopted disclosure requirements for investors means pressure from shareholders will grow for companies to lay bare their strategy for managing sustainability risks, which could prompt a re-evaluation of business models.*[49]

[45] National Association for Environment Management (2018) **Planning for a Sustainable Future**

[46] EIB (14 November 2019) **EU Bank launches ambitious new climate strategy and Energy Lending Policy**

[47] Moody's (19 November 2019) **Rating Action: Moody's changes ExxonMobil's outlook to negative**]

[48] Wood Mackenzie (7 October 2019) **What are ExxonMobil's top 5 divestment targets in Asia Pacific?**

[49] Pinsent Masons (12 December 2019) **EU confirms sustainability disclosure requirements for financial firms**

Implications for gas industry sub-sectors

Climate neutrality and deep decarbonisation in the EU threatens the gas industry as a whole. But scope and immediacy of exposure will differ as different parts of the supply chain have a different relationship with gas, and create value in different ways. All of them will be affected by the demand side risk from policy alternatives. Their capacity to adapt however will vary.

PRODUCERS	NETWORKS	ASSET OWNERS	TRADING
Associated gas	Trunk line (domestic)	LNG terminals	Suppliers
Non associated gas	Trunk line (international)	Storage facilities	Wholesale
Onshore	Transmission system	Power stations	Retail
Offshore	Distribution system	Petrochemicals	Portfolio

Figure 7: Natural gas industry sub-sectors[50]

Risks vary across sub-sectors

Analysis of financial risk from the transition to carbon neutrality has largely been focused on the upstream gas sector (and indeed, other extractive and fossil fuel industries).[51] **Gas producers are very exposed to the climate neutrality transition** because of their dependence on methane itself for revenue and the operation of their business. The primary business concern for producers is demand for their product, and having markets in which to sell their gas. This makes falling gas demand the foremost threat to them.

Companies operating **networks of transmission and distribution grids** are primarily concerned with the utilisation of their infrastructure. This makes falling gas demand a major threat to their business, because lower demand reduces the use of their infrastructure and revenue generated from it. This could lead to a spiralling effect, where fewer consumers on the network means increased unit costs, incentivising even more users to switch to alternatives. This in turn increases regulatory risk, as regulators will find it increasingly difficult to guarantee returns for assets that are used less and less, and which are being paid for by fewer and fewer customers.

[50] Adopted from Stern, J. (2019) **Narratives for Natural Gas in Decarbonising European Energy Markets**

[51] For example: E3G (2018) **Crude Awakening: Making Oil Major Business Models Climate-Compatible**

Asset owners need to maximise revenue on the initial investment across the asset's operating life, until they end operation or stop returning a profit. **This area of the gas industry is threatened similarly to producers, with falling gas demand under climate neutrality a major risk.** In addition, new standards across Europe are emerging to indicate plant compatibility with EU climate targets. The sustainable finance taxonomy stipulates a threshold of 100g CO2e/kwh and the EIB of 250g CO2e/kwh over asset lifetime to be eligible for financing.

Energy trading companies are the least exposed within the value chain, but that does not mean the clean transition will leave them unaffected. Depending on how the role of gas within the energy system changes there may be either disruption or opportunities: for example, in the heating sector, diverging pathways of hydrogen and electrification will have different consequences for market structures.

Mitigating the risks and adapting to climate neutrality

Mitigating risks will depend on either holding on to demand, or repurposing assets to use alternative gases. Maintaining demand is limited by the fact that the market would decline anyway, as cheaper renewables, plus more efficiency and electrification will all reduce gas demand. This will particularly affect **producers**, which have relatively few options to diversify or make a transition away from gas compared to other parts of the industry. Production companies' future development plans are also at risk. Moreover, given the nature of their assets, which can be easily targeted by protests, this sector is particularly visible to reputation risk. **Currently low gas prices are also reducing revenues that could be used to invest into new business models.**

Repurposing gas networks for hydrogen or biomethane is an alternative strategy to mitigate regulatory change that penalises natural gas. Retrofitting and repurposing existing assets to use other gases (for example blended or pure hydrogen rather than methane) could be an option for owners of storage or transportation assets to mitigate policy risks. **However, this will not fully shelter them from falling demand induced by other technologies.** Furthermore, the technical feasibility and additional investment required for repurposing pipelines remains uncertain. For example, the ability of LNG terminals to use hydrogen is currently unclear. In any case, the high shipping costs will often outweigh cost advantages from low cost renewables for hydrogen production elsewhere reducing competitiveness with pipeline or locally sourced hydrogen.[52]

Traders will still be required to change how they operate to ensure that they take advantage of new markets and the clean transition. Opportunities for new products and trading methods may also be created by a more digitised, decentralised and electrified energy system.

[52] BNEF (2019) 'Hydrogen: The Economics of Production From Renewables'

Conclusions: potential financial implications for gas investments

The key issue for investors and financial markets in looking at the transition to climate neutrality is to quantify how the carbon-intensity of assets will affect their value over time, and, in turn, the profitability and financial stability of the companies, sectors and economies they have invested in.[53] The primary and induced risks that we have outlined above will become financial risks of one or more of the types in Figure 8 below.

POTENTIAL FINANCIAL RISKS	
	○ Stranded assets (e.g. write-offs, asset impairment, early retirement) ○ Increased operating costs ○ Reduced product demand and revenue ○ Reallocation of R&D expenditure ○ Reallocation of capital ○ Reduced availability of capital and inability to refinance existing debt ○ Increased cost of capital ○ Negative impacts on staff retention and recruitment

Figure 9: Gas industry potential financial risks

None of these **potential financial risks** are new in themselves. They are well understood and readily visible across many economic sectors and industries. However, they are becoming more imminent – and investors in the gas industry need to be able to assess the emerging threats to business models from climate neutrality and understand how these translate into these familiar financial outcomes.

They will also need to recognize that these risks cannot be hedged within the gas industry – they are existential, in that the gas industry will contract, and potentially be phased out as a result of climate neutrality. And companies are already responding by radically re-orienting their businesses. Companies that move faster in this regard may well have better outcomes than those that are not analysing the situation and responding appropriately. This development is already visible in the upstream sector (see Box 1).

[53] Chatham House (2018) **Carbon Risk and Resilience: How Energy Transition is Changing the Prospects for Developing Countries with Fossil Fuels** p.26

Spanish oil and gas company Repsol has unveiled plans to become a net zero emissions company by 2050, by expanding its renewable energy portfolio and moving away from upstream operations not aligned with the Paris Agreement.[54] **This follows a decision by Danish state owned Ørsted** to move from oil and gas to renewables and have 100% green energy by 2025.[55] **Norwegian state owned Equinor has also made similar moves** to develop more offshore wind, and focus on 'low-cost and low-carbon' upstream developments in future, while taking the TCFD recommendations in to consideration.[56] **Chevron announced plans in 2019 to sell its share** in the Kitimat LNG terminal in Canada, as part of a wider decision to write down $11bn worth of gas assets in North America because of a weak market outlook.

Box 1: response strategies by major gas companies

The case for investing in gas companies and infrastructure – and, the rationale for new entrants to emerge – is predicated on believing there will be a continuing or growing role for gas in the energy system in the coming decades. This would only be a credible view of the direction of travel if the EU were to fail to deliver on climate neutrality by 2050. Given the strong political commitment to act, and the pressure from society supporting action, investors urgently need to look to alternative investment opportunities, such as clean energy, sustainable infrastructure and other areas of the low-carbon economy.[57]

[54] Repsol (2 December 2019) **Repsol will be a net zero emissions company by 2050**

[55] Ørsted (2018) **Sustainability Report 2018** p.4

[56] Equinor (2018) **2018 Sustainability Report** pp.16-17

[57] *Ibid*

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About E3G

E3G is an independent, non-profit European organisation operating in the public interest to accelerate the global transition to sustainable development. E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere.

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