Chapter 5
Natural Gas' Changing Discourse in European Decarbonisation

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Abstract Natural gas plays a key role in the European Union's energy system, which is partially predicated on its favourable environmental characteristics. These qualities have allowed key stakeholders to facilitate a positive discursive and ideological inscription of the fuel to ensure their continued ability to capitalise on it. European Commission-led climate action poses a significant challenge to the status quo, which industry incumbents first sought to address by promulgating the message that natural gas is the *transition* or *bridge fuel* to a renewable society. As it became clear that this would not be sufficient to maintain the fuel's role in EU's future energy mix, producers and infrastructure owners devised energy futures in which they would complement and gradually substitute natural gas with sustainable (biomethane) and decarbonised (hydrogen) forms of gas. Discourse on the role low carbon gases can play in EU's decarbonisation proliferated, partly due to the limitations of electrification and renewables, but also reflecting the deep entrenchment of ideas society pairs with the (fossil) fuels it relies on.

Keywords Natural gas · Discourse · Transition fuel · Climate change · Inscription

5.1 Introduction

Natural gas has a well-established role in the European Union's (EU) energy mix, but its continued consumption poses a growing threat to the bloc's climate action commitments. The fuel constituted 23% of the EU's total energy supply in 2018, the second largest share behind oil and petroleum products (Eurostat 2020). Natural gas may be the *cleanest* fossil fuel, but it is nonetheless a greenhouse-gas-emitting non-renewable source of energy. Members of the EU urgently need to phase it out of their energy mixes to meet decarbonisation targets (Anderson and Broderick 2017).

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This vast undertaking is impeded by its lock-in (Seto et al. 2016; Unruh 2000), given the deeply entrenched energy consumption practices developed over the past decades. It is a prominent, infrastructure-intensive, convenient energy carrier with well-established interests supporting its sustained consumption. Its lock-in is further consolidated by EU-level institutions and private corporations promulgating the discourse that substituting the consumption of other fossil fuels with natural gas is desirable, since it is a *transition* or *bridge fuel*. This chapter looks at how this dimension of the discourse on natural gas has evolved alongside the EU's rising climate commitments. It assesses how the narratives framing natural gas' relative cleanliness have impacted its role in the EU, driven by an understanding that these can codify its appeal and unnecessarily prolong society's reliance on it.

The climate-friendly qualities of natural gas tend to be overemphasised, *greenwashing* the resource (Stephenson et al. 2012). Statements hailing the *golden age of gas* (IEA 2011), or its *transition* and *bridge* qualities (Cañete 2017; MITEI 2011) are not squared with the EU's climate agenda, since it is unclear how the fuel will be phased out and what sort of pushback the hydrocarbon industry will initiate to prolong its consumption. This chapter assesses the European case because the European Commission has long been touted a leader in climate policy, in addition to which the region is highly natural gas-dependent (Oberthür and Kelly 2008). It offers a terrain to test how the natural gas industry has responded, and how the contradictions in narrative and material qualities of the fuel clash. The findings offer a more rigorous understanding of how the discursive inscription of a fossil fuel can perpetuate its consumption and vice versa. This informs our understanding of the dialectics between ideology and fossil fuel-based relations of production. Even if the Europeans consume natural gas in a manner compatible with climate change goals (e.g. in a decarbonised form), ambitions to attain sustainability are swapped for carbon neutrality, while existing power relations are sustained, leaving issues such as resource depletion or supply security unresolved.

This chapter builds on the critical discourse analysis of policy documents and statements of key stakeholders in the EU's natural gas scene, issued in the period between the Paris Climate Agreement (adopted in 2015) and 2019. Secondary literature and probing interviews led the author to select the time interval, which is based on the understanding that the Paris Agreement was a significant turning point in the EU's determination to decarbonise. In ensuing years, energy sectors and their respective incumbents undertook vast action to maintain their relevance in the bloc's future energy plans. A key element of this undertaking was their promulgation of key discourses in a number of reports, policy papers, position papers, public statements, etc. This chapter focuses on such texts published by key actors in the EU's natural gas scene, most prominently, the European Commission, Gazprom, Equinor, natural gas advocacy groups, and the work of prominent research institutions (e.g. the International Energy Agency [IEA]). The chapter is structured as follows: it first discusses the role ideology and discourse play in entrenching energy systems. To do this, it draws on energy humanities, which offers insights into how these modes of narrative creation and ideological inscription can sustain certain ideas, which, in turn, maintain prevalent relations of production and social power structures. To illustrate these

points, the chapter then turns to the early days of natural gas in the EU to untangle ideological drivers of its consumption, which leads to the exploration of the dominant transition and bridge fuel narratives a wide array of actors adopted in the late 1990s and early 2000s. The chapter subsequently traces the EU's unfolding climate agenda and the response that the natural gas industry and policymakers offered to the need to decarbonise their fuel.

5.2 The Role of Discourse and Ideology in Conserving Energy Systems

Discourses play formative roles in reifying or disintegrating the institutionalised social practices actors have adopted in relation to energy systems. Critical discourse analysis (CDA) delineates three analytical categories to trace these dynamics: text, discourse practice, and sociocultural practice (Fairclough 2013). The approach understands texts as multi-semiotic artefacts, as they combine language with other semiotic forms—think about a presentation which combines speech, written text, pictures, and so on. Texts manifest two fundamental social processes: cognition/representation and social interaction, leading them to form systems of knowledge and belief, social subjects, and social relations between subjects (Foucault 2012). These properties are also essential for actors' ability to promulgate ideology and inculcate subjects by diffusing meaning and connotation via discursive means mediated through language. Discourse practice is by-and-large constituted of the production, distribution, and interpretation of a text. Tracing this builds our understanding of the institutional and discoursal practices within which texts are embedded. Discourse practices mediate links between text and sociocultural practice, reflecting, reproducing, and transforming an imprint of the latter. These three analytical categories allow us to assess how texts and social practices form a dialectic, shaping one another.

Discourse is an articulatory practice dialectically constituting and organising social relations, which social relations recursively reify and transform (Howarth 2010). It is a manifestation of power and a vehicle of ideology that interpellates subjects through apparatuses and their practice(s) (Althusser 1971; Purvis and Hunt 1993). A material existence of ideology in practices enables powerful coalitions of actors to shape ideology through discourses per their normative and ethical positions, according to their broader strategies (Jessop 1991; Jørgensen and Phillips 2002). Currently, the structural setting underpins an ideology of fossil fuel-based capital accumulation (Boyer 2014). This is also reflected in the actions of the state, the outcomes of which are imprinted on the discourses emanating from the state's executive arm, the government (Barrow 1993; Johnstone and Newell 2018). The EU may not be a state per se, but the actions of its executive body, the European Commission, also reflect the broader structural setting of fossil capitalism and are susceptible to the interests of the fossil fuel industry (Szabo and Fabok 2020). Policymakers are ideologically interpellated and the discourses they emanate reflect this,

despite their (self-proclaimed) aim for neutrality. Policy language is a key form of discourse encoding dominant ideologies, as well as structural and strategic objectives or accomplishments of certain political coalitions (Hajer 1995). By deciphering policy discourse, we can trace the power relations it embodies.

Existing literature has typically focused on the socio-technical, economic, and political domains of energy, but it "is dialectical, operating at once on the level of infrastructure *and* on the level of superstructure" (Kinder 2016, p. 8; original emphasis). The energy humanities introduces an impetus for the need to focus on the ideological inscription of fossil fuels, thereby comprehending their deep permeation of social relations (Szeman 2016; Szeman and Boyer 2017; Wilson et al. 2017). Assuming a dialectic between the structure/infrastructure/base (relations of production) and superstructure (the political and the ideological) allows for a much richer understanding of the deeply embedded nature of our energy consumption practices. The energy humanities urges for the need to trace the ideological inscription of energy in the superstructure to map its deep-seated role in organising relations of production. Accordingly, this stream of academic work emphasises the need to unpack how fossil fuel-based capitalism has permeated all facets of our lives, from the economic to the cultural. Critical discourse analysis allows us to trace the discourses pertaining to energy consumption, and the intimate linkages they have formed with material practices and their embodiment of power relations (Fairclough and Graham 2002; Scrase and Ockwell 2010). This is especially pertinent given the urgent need to decarbonise our energy systems with the looming threat of climate change (Petrocultures Research Group 2016). The energy humanities has been heavily preoccupied with the role of oil and the *petrocultures* that it warrants, but this chapter argues and demonstrates that this focus should also be expanded to natural gas and possibly other fossil fuels as well.

Natural gas is a convenient, infrastructure-intensive source of energy that is the least emitting fossil fuel. These qualities have been fundamental in shaping its political economy and lock-in (Balmaceda 2018; Smil 2015; Unruh 2000). This has become evident in Europe, where decades of investment into the infrastructure and the political-legal apparatus governing the trade of the fuel have paved the way for its crucial role in the region's economy. The European Commission (1998, 2003a, 2009, 2015) has developed policy packages facilitating the creation of a competitive market for natural gas and has systematically included it into its visions for the bloc's energy future. There has been a widely accepted crucial prerequisite for this: natural gas is a clean (fossil) fuel. The statement may be based on the physical characteristics of the fuel, since it yields the least amount of greenhouse gas emissions upon combustion (IPCC 2006), but this idea has become an element of discourse that actors in the structural setting of fossil capitalism have welcomed, adopted, and reified to legitimise its heightened uptake. This leads to its imprint in the discursive events of the European Commission, which are subjugated to the ideological domination of the vast entrenched interests of the sector. In its discourses, the Commission codifies the positive connotation of the fuel, further inscribing this idea and fortifying its lock-in.

Fossil fuels underpin the operation of capitalism, but climate change and the ensuing global climate action are threatening these relations. Natural gas stakeholders

have long built on an understanding that their fuel's favourable characteristics will allow it to become a transition or bridge fuel to a renewable-based society. This has been a focal element of natural gas' ideological inscription manifest in the discourse pertaining to the fuel. Sectoral incumbents have actively backed this narrative to shape the fuel's future trajectory, which the Commission has also adopted, reflecting and reifying this ideology. Policy papers also reflect these power relations at play, suggesting their non-neutrality with regards to ideologies linked to certain fuels. A shift has occurred in this field since the bridge fuel narrative was increasingly questioned by policymakers en route to taking more drastic climate action. Fossil capital's relations of production remain intact, as natural gas sectoral incumbents have pushed to shift the discourse from one that favours natural gas as a bridge fuel, to one that emphasises the need to incorporate *gases* into the EU's energy future, shifting emphasis away from *bridge fuel* to an *end fuel*. In response to the crisis posed by climate change, the political coalition that the European natural gas industry constitutes has begun to alter the superstructure in order to sustain the structure of fossil capitalism.

5.3 The Early Days of the Cleanest Fossil Fuel

Since it became an important source fuel in the 1960s, natural gas has established a tremendous lock-in in the EU. It was initially locally consumed in gas-producing regions (e.g. northern Italy or parts of Austria) until the middle of the 20th century (Högselius 2012). Western Europe began to widely utilise it during the 1960s, when the Dutch developed the Groningen field and the United Kingdom began to exploit its offshore resources. An expanding energy-hungry European economy underpinned the fuel's uptake. The UK also viewed it favourably since it alleviated urban air pollution. Its acceptance amongst politicians and the broader public was predicated on their pre-existing favourable perception of town gas, which they had consumed since the early 1900s (Thomas 2018). Natural gas drew on the favourable perception Western European society had linked to town gas to establish its appeal, since it also offered a cleaner alternative to burning other fossil fuels—it yields lower levels of emissions during combustion, as well as low levels of sulphur and particulate matter (Smil 2015). These considerations became pertinent during the aftermath of the Great Smog of London in 1952, with ongoing air pollution crises sustaining through 1962 in the UK. The introduction of the Clean Air Act in 1956 and a push from urban areas to switch to cleaner sources of energy from polluting coal also favoured various forms of gas. The fuel's momentum continued during the 1970s, driven by rising environmentalism and a bid from countries to diversify away from oil to natural gas (Högselius 2013). The generally accepted favourable environmental characteristics of natural gas encoded in energy discourses boosted its uptake in Western Europe during the 20th century.

Countries in the eastern areas of the European continent also shifted to natural gas consumption during the 1960s and 1970s. This was supported by multiple dynamics.

On the supply side, Soviet leadership sought to diversify away from the lopsided oil reliance that the Eastern bloc had developed (Szabo and Deak forthcoming). Oil production in the Soviet Union was unable to meet the rapidly climbing energy demands of industrialising Warsaw Pact signatories, requiring leaders in Moscow to push for a diversification of fuels. Soviet and national governments framed natural gas as a modern, clean, and convenient source of energy. Additionally, they could draw on the existing popularity of town gas, as was the case in Western Europe. "By the early 1970s, Europe was seen to have 'fallen in love with natural gas'" (Högselius 2012, p. 167), which continued into the 1980s. The Commission of the European Communities noted that (1981, p. 5):

> [t]he considerable existing infrastructure this network represents is one of the advantages of natural gas. It is also transported unobtrusively and is environmentally attractive because of its cleanliness during use. It is a flexible and convenient fuel to use which also helps to explain its popularity in the domestic sector and in certain specialised industrial uses.

The fuel ticked all the boxes, allowing a discourse emphasising its favourable characteristics to proliferate, establishing a bedrock for its positive appeal.

5.4 Natural Gas as the Transition Fuel

Consumers have understood natural gas as a *smokeless* source of energy since the onset of its uptake, capable of alleviating air pollution and warranting its descriptor of the cleanest fossil fuel. Its appeal has expanded in recent decades since its physical characteristics allow the mitigation of air pollution *and* greenhouse gases (GHG) during combustion. The latter has become pertinent as the need for global society to take concerted action to tackle climate change rose on the global agenda. The Intergovernmental Panel on Climate Change (IPCC) was focal in compiling scientific work on climate change, since it published its *First Assessment Report* in 1990 (IPCC 1990). This publication continued the positive discursive coding of natural gas, emphasising the relative climate benefits that fuel switching from coal to natural gas would yield, while allowing countries to maintain economic competitiveness. Discourse on climate change proliferated following nation states' decision to launch the United Nations Framework Convention on Climate Change in 1992, expanding the number and scope of actors involved in climate governance (Paterson and Grubb 1992; Pettenger 2016). By this time, those with an interest in the fossil fuel industry understood that the objectives of fossil capitalism and avoiding a climate catastrophe were set to collide. Natural gas interests were isolated from these discussions, since expert opinions that countries should switch *to* the fuel and that it was the cleanest fossil fuel were set to provide it a buffer from climate action. Authoritative IPCC reports (1995, 2007, 2014) reiterated this position, emphasising the relative gains substituting more polluting fuels for natural gas could yield, but noting that methane emissions remained a hazard.

Experts established a discourse, later reified by the hydrocarbon industry and policymakers, that natural gas is a transition fuel leading society away from more polluting fossil fuels to renewables. Nebojša Nakićenović was amongst the first to use the *transitional* and *bridge fuel* descriptor for natural gas in a paper published by the authoritative U.S. Geological Survey in 1993 and subsequently reprinted by the International Institute for Applied Systems Analysis in 1994. He argues that the evolutionary dynamics of the global energy system suggest a move away from coal to less polluting fossil fuels. This hypothesis is supported by three factors: (1) a trend of fuel substitution favouring natural gas has begun; (2) it is the most environmentally and climate-friendly fossil fuel; and (3) it is available in abundant quantities. These led natural gas to become an optimal choice as a fuel en route to decarbonisation. Nakićenović's paper echoes the messages of the IPCC report, and concludes by claiming that "methane is the transitional hydrocarbon" and positing the "methane economy as a bridge to hydrogen" (1994, pp. 674, 672). The scientific and expert community established the descriptor that natural gas could be a bridge or transition fuel, but the hydrocarbon industry did not draw on it yet. Instead, it was preoccupied with a misinformation campaign to protect coal and oil assets (Banerjee et al. 2015), while industry incumbents perceived natural gas to be insulated from significant threats.

The material conditions warranting the active diffusion of a discourse emphasising the bridge fuel qualities of natural gas only came to the fore following the European Commission's (2008, 2011) decisions to launch its 2020 agenda and plans to decarbonise by 2050. Climate action remained subdued in the 1990s and early 2000s. The EU natural gas industry was preoccupied with energy security considerations: imports were increasing and tension between the Russian and Ukrainian governments rose—the latter culminating in the supply disruptions of 2006 and 2009 (Balmaceda 2013). These crises tarnished the image of Russian natural gas, but also weighed on the positive perception of the fuel in general, since the EU sourced a large portion of it from Russia. It took years of efforts to re-establish the positive standing of the fuel, to which its favourable environmental and climate qualities were able to contribute. Following the Commission's (2009) launch of the Third Energy Package and the resolution of the 2009 natural gas crisis, policymakers turned to the implementation of climate policy, backed by Germany's *Energiewende* (BMWI and BMU 2010). The hydrocarbon industry sought to reify the transition fuel narrative that had been paired with natural gas. The material conditions were ripe for the consolidation of a favourable discourse, since it became clear that the European Commission and its member states were going to take climate action. GasTerra—owned by Royal Dutch Shell, ExxonMobil, and the Dutch Government—was amongst the first to take action. It published an influential report titled *Natural gas as a transitional fuel: For a sustainable energy future* (GasTerra 2009), which sketched a natural gas-dependent energy transition through 2050 and beyond.

The natural gas industry took small steps to entrench a positive narrative paired with its fuel, but research institutions were the prime sources of impetus in the early 2010s. Again, material factors played a key role in development since the shale revolution in the U.S. kicked into full swing. Researchers and experts all over the

world began to heed more attention to the fuel's favourable qualities, given that its rising availability could allow it to play a focal role in the global energy transition, as envisioned by Nakićenović (1994). How the world was going to phase out the fuel was a question that very few raised, allowing fossil capitalism to *greenwash* its inherent unsustainability by relying on less emission-intensive fossil fuels (Byrne et al. 2006). MIT's Energy Initiative's prominent report *The Future of Natural Gas* (MITEI 2011) discussed natural gas as a bridge fuel, further codifying this descriptor. The message was amplified by the International Energy Agency's authoritative World Energy Outlook report proclaiming the forthcoming "golden age of gas" (IEA 2011). The IEA's position reflected the potential of U.S. non-conventional production and the boom it expected for global natural gas markets, but its position on prospects in Europe was slightly gloomier, although still upbeat. These positive discourses and the lack of imminent threats from the climate action of policymakers allowed the natural gas industry to believe that it was in a comfortable position with a bright future.

As soon as it became clear that the EU was serious about climate action, its largest natural gas suppliers began to take action: they emphasised the fuel's climate-friendliness. EU's largest natural gas supplier, the Russian Gazprom, first emphasised that natural gas could and should substitute coal to reduce emissions in its *2007 Environmental Report* (Gazprom 2007). It also expanded its regularly published reports with a *Sustainability Report*, launched with the 2008–2009 issue, emphasising the company's commitments to sustainability (Gazprom 2009). In the inaugural edition, it highlighted the beneficial qualities of natural gas in reducing emissions. The report emphasised that natural gas is the most "preferable component of the 'energy basket'" (ibid., p. 17) and incorporated, inter alia, Günther Oettinger's (Energy Commissioner at the time) viewpoint that "[a]s a relatively clean fuel, gas can contribute in a significant way to the sustainable development of our economies" (ibid., p. 44). Statoil—now known as Equinor—was also quick to discursively emphasise the need for natural gas in energy futures, with the "Fuelling the UK with The Telegraph and Statoil" op-ed campaign launched in 2012 (Statoil 2012). The move could be read as a campaign to capture Gazprom's markets, as the Russian supplier was deemed unreliable in the wake of the 2006 and 2009 supply disruptions. However, Statoil not only emphasised the benefits of Norwegian natural gas in these pieces but attempted to contextualise the fuel's beneficial qualities more broadly. These narratives were further backed by the European Gas Advocacy Forum (2011), which emphasised that natural gas is an integral part of the EU's *green* journey.

5.5 The Natural Gas Sector Responds to Climate Action

The EU upheld its leading role in global climate action by signing the Paris Agreement in 2015 and committing to *green* its energy mix, but the role natural gas would play came into question in 2015. The Paris Agreement provided supranational and national policymakers with an impetus to decarbonise their societies. The European

Commission translated broad commitments to reduce greenhouse gases into policy when it introduced the Clean energy for all Europeans package (2016). This proposed a framework for providing low-carbon electricity to consumers, predicated on extensive electrification and the diffusion or renewables. The Commission's plan offered a blueprint for the electricity and renewable sectors in the EU's future, but did not elaborate on the role of natural gas. This was a jolt for the natural gas industry, since incumbents realised that the EU was moving ahead with decarbonisation and, despite the positive inscription of their fuel, they may be left off the bandwagon. The natural gas industry deemed that it was in a secure position and engagement with decarbonisation policies could wait.

Following the release of Clean energy package, the Commission had to adjust its electrification- and renewable-dominated discourse to include other fuels as well. This shift was spurred by a push from technocrats, who emphasised that not everything can be electrified. Eurelectric (2018), the influential advocacy group of electricity producers, calculated that only 60% of the EU's economy can be electrified—anything beyond that would be extremely costly or technologically impossible. These forecasts maintained assumptions that the underlying disposition of capitalism would not be radically altered, but greened. Natural gas industry incumbents also mobilised their power by emphasising the beneficial qualities of natural gas in the short term *and* the ability to decarbonise the resource in the long run. Industry incumbents began to actively participate and propose energy futures for the EU, in which natural gas or its decarbonised variants would play a crucial role. They sought to shape policy by using their power to diffuse an ideology that responded to the irreconcilability of fossil capitalism and the threat of climate change. The industry followed a two-pronged strategy, first emphasising the bridge fuel qualities of natural gas, including its ability to complement renewables. Second, it turned to articulating that the fuel was decarbonisable and a valuable component of any energy future. The common thread between these strategies is their use of discourse to draw on the physical characteristics of the fuel in response to the material characteristics threatening their exploitation—climate action.

Experts reinvigorated arguments that natural gas is an optimal bridge fuel, given its ability to curb emissions and complement renewables (IEA 2017). Eurogas, the prime advocacy group for natural gas producers, claimed that coal-to-gas switching can curtail emissions by up to five percentage points (Braaksma 2018), while Statoil (2017) argued that such fuel switching was focal in underpinning the credibility of the EU's climate strategy. Commissioner Miguel Arias Cañete clearly articulates these points when noting that (2016, [n.p.]):

> [g]as will therefore play an important role in Europe's energy transition towards clean and more sustainable societies and economies because: natural gas pollutes half as much as coal, and will therefore serve as a bridge between more polluting fossil fuels and cleaner sources of energy; gas serves as a back-up to renewable energy sources; finally, it plays an important role in the decarbonisation of the transport sector as an alternative to fuel for trucks and ships.

The messages of experts that the natural gas industry had picked up began to surface in the positions of policymakers. Their statements heavily reflected the deeply entrenched ideology of fossil capitalism, given their backing of a fuel that would introduce a temporary technological fix to a deep societal crisis predicated on unsustainable modes of living. Policy discourse was not neutral; rather, it took a normative stance predicated on the ideological inscription of fossil capitalism that emphasised the relative benefits of natural gas amidst a climate crisis.

Fuel switching to natural gas may reduce emissions, but it also extends fossil capitalism as a primary mode of social organisation. Fuel switching carries numerous benefits, as has been clear from the onset of town gas consumption that alleviated air pollution. It could bring significant short-term air pollution and GHG improvements in coal-dependent countries such as Poland or Germany, a point that the U.S. shift away from coal to natural gas (on economic grounds) has underscored. However, the EU has not been able to replicate this, with the low prices of coal and CO_2 allowances inhibiting any significant switch (Stern 2017). This may be changing as allowance prices increase (Sandbag 2019), but simultaneously, the expansion of natural gas can be to the detriment of renewables. Natural gas can also reduce emissions in non-EU Emission Trading System (ETS) sectors such as transport or industry. Gazprom claims that "[n]atural gas is the most economical, eco-friendly and safe type of fuel available today [for vehicles]" (2018, [n.p.]), while shifting industrial coal consumption to natural gas also yields significant benefits (Smil 2015). Despite these benefits, it is crucial that actors pushing for the uptake of natural gas have presented few feasible scenarios for its phase-out in the future. Discursive acts emphasising the benefits of the fuel carry the risk of further entrenching unsustainable fossil fuel-based practices, even if they alleviate some emissions.

A further consideration when society opts to switch to natural gas is the risk of methane leakage. Natural gas may alleviate GHG emissions upon combustion in comparison to other fossil fuels, but methane leaks throughout its entire supply chain. Rising methane levels in the atmosphere accelerate climate change since the compound has a stronger greenhouse effect than CO_2. This is paired with a shorter atmospheric lifetime—decades as opposed to carbon dioxide's centuries—but it poses a significant risk in accelerating global society's nearing of climatic tipping points, ushering in the collapse of vast ecological systems. Total atmospheric methane levels are disputed, but generally increasing concentrations have been measured (Hausmann et al. 2016). The causes of this rise are contested amongst the scientific community but are—at least partially—linked to heightened oil and gas production. Approximately 2% of the natural gas-related methane produced slips into the atmosphere, exacerbating the climate problem (Balcombe et al. 2017). Slippage rates vary based on the form and location of production, but the IEA's (2018) findings suggest that higher global natural gas production leads to the exploitation of reserves that leak more methane into the atmosphere. These can be exacerbated with lifecycle methane emissions, which scientists have not yet quantified. For instance, methane slippage from shale gas production or the slips from carriers of liquefied natural gas (LNG) and LNG-fuelled ships are little understood (Anderson and Broderick 2017). The relative benefits of switching to natural gas consumption from other fossil fuels

are not trivial, since heightened methane emissions can exacerbate GHG emission concentrations in the atmosphere.

5.6 From Gas to Gases

The European Commission's post-Paris Agreement policies focused on the roll-out of renewables and a sweeping push to electrify the bloc's economy. This agenda pushed the natural gas industry to contemplate, formulate, and discursively articulate its own role in the EU's future energy mix. The transition fuel narrative provided some lift for the industry, following the realisation that the entire economy cannot be electrified. However, it increasingly became clear that the European Commission (2011) would uphold its earlier decarbonisation commitments, entailing an 80% or higher reduction of GHG emissions by 2050. The Paris Agreement and subsequent actions were an affirmation of this, indicating that the EU would phase out fossil fuels from its energy mix in their current form. The bridge or transition fuel discourse was not sufficient to ensure the future of natural gas, since now policymakers began to focus on what is at the end of the bridge, i.e. how a carbon-neutral Europe would look. In its current form, natural gas could not play a role in this, given its emissions. This position was underscored by a report commissioned by Friends of the Earth, unequivocally concluding that "[f]ossil fuels (including natural gas) have no substantial role in an EU 2 °C energy system beyond 2035" (Anderson and Broderick 2017, p. 5). Policy discussions turned to renewables and other low-carbon technologies, but (reflective of the entrenchment of fossil capitalism) it was not the phase-out of natural gas that came to dominate the EU's energy policy agenda, but rather what role it will play in the bloc's energy future.

The natural gas industry had to shift the bridge fuel discourse to an end fuel narrative to establish its inclusion in the policy-making process and thereby the EU's energy future. It linked two crucial caveats of decarbonisation to argue for its sustained role: (1) the EU's economy cannot be fully electrified; and (2) Europe has already invested billions, if not trillions, into natural gas infrastructure. The first point was made clear by Eurelectric's *Decarbonisation Pathways* report (2018), which allocated ample room for decarbonised sources of energy in difficult to electrify areas. Natural gas infrastructure owners also became aware that the shift towards an all-electric society would render their services redundant. They realised the need to convey their infrastructure as a component of a decarbonised energy sector, by emphasising that electricity should be complemented with (decarbonised) gas to meet energy demand. Limitations in electrification and arguments emphasising the efficiency gains of utilising existing gas infrastructure anchored the natural gas industry's concerted response to decarbonisation, by concluding that gas will be a part of the process. First natural gas can play the role of a bridge fuel, by offering a low-carbon substitute for more polluting fuels; then, producers can provide consumers with decarbonised gases. Sectoral incumbents shifted the bridge fuel of natural gas

to an end fuel by introducing decarbonised or carbon-neutral alternatives, such as biomethane or hydrogen.

The natural gas industry and policymakers began to plan the role of natural gas in the EU's energy transition, predicated on the role the fuel plays in mediating relations of production and the vast infrastructure that underpinned the industry's prominence. The discourse on the fuel was deeply rooted in the base of fossil capitalism. The pro-gas energy transition argument was clearly reflected in, for example, the positions of Gas Infrastructure Europe, an advocacy group for natural gas infrastructure owners. It claimed that (GIE 2019, p. [1]; original emphasis):

> [g]as infrastructure operators will continue to supply *reliable, clean, affordable energy* throughout the EU to 2050 and beyond […] [u]sing the existing gas infrastructure to deliver and store increased quantities of renewable and decarbonised energy, rather than build new electricity networks, will result in *significant cost savings*.

These sentiments surfaced in the positions of the European Commission as well (Borchardt 2019; Cañete 2017; Simson 2019). Most prominently, the European Commission-ordered study on *The role of Trans-European gas infrastructure in the light of the 2050 decarbonisation targets* developed storylines of how the EU's gas infrastructure can be utilised and transit various forms of gas, including natural gas, biomethane, and various forms of hydrogen (Trinomics 2018). These discourses bundle various forms of gases together and introduce them into the EU's energy future.

Key interests and policymakers reify the positive perception of gas, which has become a bundle of fuels, including decarbonised and emitting forms of methane. Strategic interests per the logic of fossil capitalism dictate that sectoral incumbents find ways to sustain the role of natural gas in the energy mix. A shift from a sole focus on natural gas towards gases achieves precisely this by expanding the discursive inscription of the fuel. Actors have expanded the term *gas* to include its decarbonised forms, essentially lumping its variants together under a single descriptor. However, the materialities of fossil capitalism suggest that these will still be dominated by the continued exploitation of natural resources. This has trickled into policy language as well. The European Commission states in its influential *A Clean Planet for All* communication (2018, p. 8):

> [s]ustainable renewable heating will continue to play a major role and gas, including liquefied natural gas, mixed with hydrogen, or e-methane produced from renewable electricity and biogas mixtures could all play a key role in existing buildings as well as in many industrial applications.

Here, the Commission discusses and includes LNG into the admixture of sustainable or decarbonised gases expected to play a key role in the EU's energy future. The discursive coding in policy language reflects the broader power relations at play, and the result of the systematic lumping together of gases undertaken by researchers, the industry, and policymakers.

To make matters more convoluted and thereby opaque, sustainable or renewable gases lack a comprehensive definition in the EU policy, and stakeholders are only

beginning to address the limitations of their production. Sustainable gases generally include biogas, biomethane, biomass fuels (gaseous and solid fuels produced from biomass), renewable liquid, and gaseous transport fuels of non-biological origin (e.g. renewable-based hydrogen used for transportation). While biogases are much discussed, the costliness of processing biogas into biomethane has generally led biogas to be consumed on location instead of being fed into the natural gas distribution network. This may change with the advent of sustainable gases, but biogas' potential upper production limit in the EU is expected to reach 98 billion cubic meters by 2050—less than a quarter of the EU's current natural gas demand—in a scenario favourable for the resource's expansion (Ecofys 2018). Thus, the fuel cannot be scaled up sufficiently to become the silver bullet of the energy transition. This suggests the need for renewable-based hydrogen production to become a key component of the gas admixture in order to legitimise its sustainable connotation. Otherwise, natural gas and decarbonised natural gas are set to appropriate the *sustainable* or *green* descriptor while maintaining the role of non-renewable gases in the EU's energy mix. Policy language accepts and encodes the substitution of carbon-neutral for sustainability.

A double dynamic is unfolding in EU policy language and the positions of sectoral incumbents, whereby gases are formally distinguished from one another, but their discourses with regard to their role in the energy transition are fused. Gas needs to be decarbonised for it to be consumed in the long run, but currently, *green gas* or *sustainable gas* is only applicable to a marginal fraction of the total gas currently produced. Despite this negligible role, sustainable gases legitimise the inclusion of gas (in a broad sense) into the EU's energy future. Non-renewable gases can draw on this form of discursive and ideological inclusion into the region's policy planning, fortifying their role based on the apparatuses linked to the superstructure of relations of production. Ultimately, fossil capital interests can leverage this additional source of power to maintain pre-existing fossil fuel-based relations of production and maintain a (decarbonised) fossil capitalism. This sort of narrative creation and ideological inscription is essential to untangle, given the material impact it carries on the future developments of the EU's energy transition. Policy language is not a neutral tool reflecting the decisions of the executive arm of the state, but much rather a medium susceptible to the influence of interests that wield structural power in society. It is a crucial medium that readily translates the narratives offered in a plethora of discourses backed by powerful interests into EU-led action.

5.7 Role of Sustainable Hydrogen Discourse in Legitimising Natural Gas Production

Society's ability to consume natural gas in the long term hinges on producers decarbonising the fuel, which is set to lead to their appropriation of a hydrogen utopia. Hydrogen has a lengthy history in which science fiction writers and various energy experts have understood it to play a foundational role in fuelling a sustainable society

(Zubrin 2007). Visionaries saw this high-density energy carrier as the silver bullet for meeting the global energy demand, given its lack of emissions and general convenience (IEA 2019). A hydrogen utopia is, however, reliant on the mode of the fuel's production. This can be based on the electrolysis of abundantly available water, with necessary electricity generated from renewables (green hydrogen) or fusion nuclear reactors. Such a positive narrative dates back to Jules Verne's *The Mysterious Island* (1874) and Max Pemberton's *The Iron Pirate* novels (2008), and has been a recurring theme in science fiction[1] (Cassedy 2000; Romm 2004). Scientists and other experts have also dwelled on a hydrogen utopia and proposed a multitude of grandiose schemes, in which renewable or nuclear fusion-based energy is stored and carried in the form of hydrogen (Hoffmann 1981). This long-standing history has been essential in establishing hydrogen as the *ultimate fuel* (Dell and Bridger 1975). However, society has made little progress in widely adopting hydrogen, given the unfettered fossil fuel consumption that recent centuries have been interlaced with.

Policymakers of the European Union have also been strong proponents of hydrogen, dating back to the early 2000s. During the inauguration of the High Level Group on Hydrogen and Fuel Cell Technologies, Research Commissioner Philippe Busquin claimed that (European Commission 2002, [n.p.])

> [u]p until now in the 'fossil fuel civilisation', we have been trying to strike a balance between the need to foster economic growth and at the same time to ensure this has a minimum impact on the environment. With an extensive use of hydrogen as an energy carrier, this conflict will be resolved.

The Group was launched as an informal advisory body to the European Commission and argued that hydrogen is an ideal energy carrier that should be paired with renewable electricity generation, nuclear-based energy, and carbon capture and storage (CCS)-equipped fossil fuel combustion to meet the energy demand of EU member states (European Commission 2003b). This yields an energy system that ensures energy security, underpins economic competitiveness, improves air quality and health, and reduces greenhouse gases. Policymakers followed this initiative by establishing the Fuel Cells and Hydrogen Joint Undertaking in 2008, which they extended in 2014 (Council of the European Union 2008, 2014). Most recently, they reconfirmed their commitment to hydrogen by launching the non-binding Hydrogen Initiative (EU Energy Ministers 2018). These attempts underpin the EU's continued positive framing of a (sustainable) hydrogen society which has become entrenched in the superstructures of the bloc's energy future but offers little indication of the source of hydrogen.

In contrast to the hydrogen utopia envisioned by many, hydrogen is already a key element of industrial production and is primarily linked to the oil and natural gas sector. Dedicated pure hydrogen production amounted to 73.9 million tonnes in 2018 and was consumed by the oil refining (52%), ammonia production (43%), and other (5%) sectors (IEA 2019). Producers overwhelmingly rely on steam methane reforming to produce hydrogen. This yields H_2 and CO_2, where CO_2 can either be

[1] See, for example, Ben Bova's *Return to Mars* (2010).

released (grey hydrogen) or captured and stored (blue hydrogen). CCS is a technology that has been very slow to materialise, due to its shaky economic foundations, relatively low levels of investment, and social unacceptability of storing CO_2 in geological formations (Herzog 2018). The impediments sustain despite CCS being a mature technology, first applied in natural gas and oil production, with the CO_2 from burning (associated gas) during natural gas processing being used for enhanced oil recovery already in 1972. Nonetheless, "the global portfolio of CCS projects is not expanding at anything like the rate that would be needed to meet long-term climate goals" (IEA 2017, p. 61). There is a discrepancy between the actual development and deployment of CCS, and the proliferating discourse placing an emphasis on the need to deploy the technology to meet climate agreements, which also limits the ability of companies to deploy the technology and produce carbon-neutral blue hydrogen.

Oil and natural gas companies have nonetheless deployed strategies to capture the notion of a sustainable hydrogen utopia. This is a crucial component of their discursive switch from gas to gases, whereby their products (natural gas and blue hydrogen) are still set to dominate the bundle of gases that customers consume in forthcoming decades. Europe's second largest natural gas supplier, Norway's Equinor, has placed strong emphasis on the narrative that hydrogen is a long-term solution to the EU's energy needs (Eikaas 2017; Equinor 2020; Szalai 2017), which it can readily capture given its vast natural gas deposits and infrastructure, experience with CCS, and ventures in steam methane reforming. The firm currently leads multiple hydrogen projects in Europe (e.g. H21, H-vision, Magnum, and the Net Zero UK partnership) that it claims will help the EU in executing its energy transition (Equinor 2020; European Commission 2017). Equinor's largest competitor, Gazprom, has sought to eliminate the need for CCS by developing methane pyrolysis (methane cracking), a nascent technology that splits methane into carbon and hydrogen without combustion (Weger et al. 2017). Pyrolysis is becoming a hedge for Gazprom's strategy, as it allows the Russian firm to further exploit its natural gas reserves and utilise its infrastructure in a decarbonised era (Shiryaevskaya 2018). Accordingly, it has begun to discursively back the narrative of a blue hydrogen economy by underlining its ability to utilise current infrastructure, maintain a cost-competitive energy source for the EU's economy, and help the bloc meet its climate targets (Burmistrova 2018).

5.8 Conclusion

The European Commission and the national governments of the European Union have positioned themselves as frontrunners of climate action, but this has been paired with them consistently framing natural gas in a favourable light. They have linked a bridge fuel narrative with natural gas and emphasised that it is the cleanest fossil fuel. By assessing the texts produced by key sectoral incumbents (e.g. European Commission, Gazprom, Equinor, and advocacy groups), the discourse and sociocultural practices shaping these discourses, we see that they embody the core ideological tenets of

fossil capitalism. The discourses emanating from the EU's executive arm are reflective of the power struggle taking place in society, whereby fossil fuel interests seek to respond to the climate crisis, posing an existential crisis to their operations. Expert opinions and inputs of the fossil fuel industry are discourse-constituting, and capable of shaping the specific positions and texts that the executive arm of the EU conveys in its discourses. The subjugations of the Commission to these positions reflects the broader structural setting, where the fossil fuel capitalist relations of production seek to shape the superstructure through a medium that many understand as neutral—policy language. In turn, the discursive events pave the way for a structural sustainment of fossil capitalism by creating and consolidating a narrative that enables the continued exploitation and consumption of fossil fuels. It is crucial to unpack the ideological inscription of these fossil fuels in order to identify the constituents that potentially hinder an energy transition. The presumption that natural gas is a bridge fuel poses such a risk. It is a "bridge to nowhere" (Howarth 2014).

The EU's ambitions to decarbonise its society have rendered the bridge fuel narrative problematic, leading stakeholders to alter this discourse. We see that fossil capitalism's relations of production are left intact or subject to slight change, predicated on actors and political factions altering constitutive elements of the superstructure. They have shifted the prevalent ideology from the discursive inscription of emphasising the cleanliness of natural gas to one that bundles natural gas with other gases. Biogas, various forms of hydrogen, and natural gas are conflated into a category which maintains the favourable perception of gas as a fuel. This is essential for policymakers to include natural gas in the region's energy future since they lump it together with sustainable or decarbonised gases. They can formally distinguish between these fuels, but this prolongs the lock-in since they continue to presume the availability of the fuel and its infrastructure, both of which further its lock-in. Stakeholders have also begun to develop technologies and proliferate discourses that emphasise that they can decarbonise their fuel to ensure markets for it in the forthcoming decades. This maintains fossil capitalism's structure, while, once again, slightly altering the infrastructure by shaping ideology and politics. Entrenched power relations of fossil capitalism have now begun to appropriate the narrative of a sustainable hydrogen society, enabling their continued operations with relatively little change. The ideological inscription of the discourse embodied in the gas-dependent energy future of the EU creates a narrow path for change, leaving power relations essentially unmodified. By shaping the EU's energy future, these sectoral incumbents are able to secure their sustained existence.

This chapter set out to explore natural gas' changing discourse in the EU at a historical juncture when the contradiction of fossil capitalism and climate change began to unfold. By tracing the ideological and discursive inscription of descriptors society has linked to fuels, this research to convey just how deeply entrenched certain fossil fuel systems are. Their lock-ins are not only limited to the sociotechnical or political economic realms, but, as the energy humanities have consistently pointed out, go much deeper: they form a dialectic with ideology and culture. A fuel's role in a specific mode of social organisation is manifested in a plethora of forms, ranging from artistic endeavours, through media products, to what is frequently perceived

as a neutral medium—policy language. Unpicking how powerful actors frame and discuss various fuels in policy language can enrich our understanding of how their actions are subjugated to specific ideologies and how they reify these positions. While oil has typically been the object of the energy humanities, the analytical insights researchers have derived from inquiries can be applied to enrich our understanding of other (fossil) fuels as well.

References

Althusser, L. (1971). Ideology and ideological state apparatuses. In L. Althusser (Ed.), *Lenin and philosophy and other essays* (B. Brewster, Trans.). (pp. 127–188). New York: Monthly Review Press.

Anderson, K., & Broderick, J. (2017). Natural gas and climate change. *Friends of the Earth Europe*. http://www.foeeurope.org/sites/default/files/extractive_industries/2017/natural_gas_and_climate_change_anderson_broderick_october2017.pdf. Accessed December 6, 2017.

Balcombe, P., Anderson, K., Speirs, J., Brandon, N., & Hawkes, A. (2017). The natural gas supply chain: The importance of methane and carbon dioxide emissions. *ACS Sustainable Chemistry & Engineering, 5*(1), 3–20. https://doi.org/10.1021/acssuschemeng.6b00144.

Balmaceda, M. M. (2013). *The politics of energy dependency: Ukraine, Belarus, and Lithuania between domestic oligarchs and Russian Pressure*. Toronto: University of Toronto Press.

Balmaceda, M. M. (2018). Differentiation, materiality, and power: Towards a political economy of fossil fuels. *Energy Research & Social Science, 39,* 130–140. https://doi.org/10.1016/j.erss.2017.10.052.

Banerjee, N., Cushman, J. H., Jr., Hasemyer, D., & Song, L. (2015). *Exxon: The road not taken.* New York: CreateSpace Independent Publishing Platform.

Barrow, C. W. (1993). *Critical theories of the state: Marxist, neo-marxist, post-marxist*. Madison, WI: University of Wisconsin Press.

BMWI, & BMU. (2010). *Energy concept (Energiewende).* https://web.archive.org/web/20161006040920/ http://www.bmwi.de/English/Redaktion/Pdf/energy-concept%2Cproperty%3Dpdf%2Cbereich%3Dbmwi%2Csprache%3Den%2Crwb%3Dtrue.pdf. Accessed November 11, 2019.

Borchardt, D. (2019). *Exclusive! Borchardt (EU Commission)\From the latest Madrid forum to the next gas package*. https://www.youtube.com/watch?v=qHCAc_5Yrh4. Accessed April 29, 2019.

Bova, B. (2010). *Return to mars.* New York: Rosetta Books.

Boyer, D. (2014). Energopower: An introduction. *Anthropological Quarterly, 87*(2), 309–333. https://doi.org/10.1353/anq.2014.0020.

Braaksma, A. (2018). *Session 01.A.03: A study of scenarios to 2050 using Primes.* Presented at the Madrid Forum, Madrid. https://ec.europa.eu/energy/en/content/31st-madrid-forum-presentations. Accessed February 14, 2019.

Burmistrova, E. (2018). *Perspectives on the future of European gas market*. Presented at the ONS Conference 2018, Stavanger. http://www.gazpromexport.ru/files/Stavanger_270818260.pdf. Accessed March 14, 2019.

Byrne, J., Toly, N., & Glover, L. (Eds.). (2006). *Transforming power: Energy, environment, and society in conflict*. London & New York: Routledge.

Cañete, A. (2016). Speech by EU climate action and energy Commissioner Miguel Arias Cañete at the Bruegel event "How will the Paris agreement impact EU climate and energy policies?". *European Commission: Press Release Database.* http://europa.eu/rapid/press-release_SPEECH-16-264_en.htm. Accessed March 9, 2018.

Cañete, A. (2017). Commissioner Arias Cañete to discuss role of gas in clean energy transition. *European Commission: Energy*. https://ec.europa.eu/energy/en/news/commissioner-arias-ca%C3%B1ete-discuss-role-gas-clean-energy-transition. Accessed February 13, 2018.

Cassedy, E. S. (2000). *Prospects for sustainable energy: A critical assessment*. Cambridge: Cambridge University Press.

Commission of the European Communities. (1981). *Communication from the Commission to the Council Concerning Natural Gas (COM(81) 530 Final)*. Brussels: Commission of the European Communities. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:51981DC0530&rid=3. Accessed February 13, 2019.

Council of the European Union. (2008). Council regulation (EC) No 521/2008 of 30 May 2008 Setting up the Fuel Cells and Hydrogen Joint Undertaking. *Official Journal of the European Union*, (L153/1). https://www.fch.europa.eu/sites/default/files/documents/regulation_521-2008_en_1.pdf. Accessed February 6, 2019.

Council of the European Union. (2014). Council regulation (EU) No 559/2014 of 6 May 2014 Establishing the Fuel Cells and Hydrogen 2 Joint Undertaking. *Official Journal of the European Union*, (L169/108). https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:JOL_2014_169_R_0007&from=FR. Accessed February 6, 2019.

Dell, R. M., & Bridger, N. J. (1975). Hydrogen—The ultimate fuel. *Applied Energy, 1*(4), 279–292. https://doi.org/10.1016/0306-2619(75)90029-X.

Ecofys. (2018). *The role of renewable gas in a decarbonised energy system*. Presented at the Madrid Forum, Madrid. https://ec.europa.eu/energy/en/content/31st-madrid-forum-presentations. Accessed February 14, 2019.

Eikaas, S. (2017). *Statoil—Strategic fit of hydrogen*. Presented at the oil and gas seminar. https://www.loyensloeff.com/media/1477760/presentation-oil-gas-seminar-2017-strategic-fit-of-hydrogen-by-steinar-eikaas-statoil.pdf. Accessed August 21, 2018.

Equinor. (2020). Renewables and low-carbon. *Equinor*. https://www.equinor.com/en/what-we-do/renewables.html. Accessed January 22, 2020.

EU Energy Ministers. (2018). *The hydrogen initiative*. Linz: Federal Ministry, Republic of Austria, Sustainability and Tourism. https://www.eu2018.at/dam/jcr:9b0c0051-2894-4bc6-86ba-ea959dc82c0d/The%20Hydrogen%20Initiative%20(not%20available%20in%20an%20accessible%20format)%20(EN%20only).pdf. Accessed October 29, 2018.

Eurelectric. (2018). *Decarbonisation pathways*. Brussels: Eurelectric. https://cdn.eurelectric.org/media/3457/decarbonisation-pathways-h-5A25D8D1.pdf. Accessed February 5, 2019.

European Commission. (1998). *Directive 98/30/EC of the European Parliament and of the Council of 22 June 1998 concerning common rules for the internal market in natural gas*. *Official Journal of the European Union*, L204(1). http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31998L0030&from=EN. Accessed May 5, 2020.

European Commission. (2002). Commission to launch high level group on hydrogen and fuel cell technologies. *European Commission*. http://europa.eu/rapid/press-release_IP-02-1282_en.htm. Accessed February 6, 2019.

European Commission. (2003a). *Directive 2003/55EC—Internal market for natural gas*. Brussels: European Commission. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Al27077. Accessed 21 April 2018.

European Commission. (2003b). *Hydrogen energy and fuel cells: A vision of our future* (No. EUR 20719 EN). Brussels: European Commission: Directorate-General for Research and Directorate-General for Energy and Transport. https://www.fch.europa.eu/sites/default/files/documents/hlg_vision_report_en.pdf. Accessed February 6, 2019.

European Commission. (2008). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions—20 20 by 2020*. Brussels: European Commission. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52008DC0030. Accessed August 7, 2019.

European Commission. (2009). *Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas*

and repealing Directive 2003/55/EC. Brussels: European Commission. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32009L0073&from=EN. Accessed April 21, 2018.

European Commission. (2011). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*. Brussels: European Commission. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52011DC0112. Accessed November 21, 2017.

European Commission. (2015). *Energy union package: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank. A framework strategy for a resilient energy union with a forward-looking climate change policy*. Brussels: European Commission. http://eur-lex.europa.eu/resource.html?uri=cellar:1bd46c90-bdd4-11e4-bbe1-01aa75ed71a1.0001.03/DOC_1&format=PDF. Accessed February 19, 2018.

European Commission. (2016). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank. Clean Energy for All Europeans*. Brussels: European Commission. https://eur-lex.europa.eu/resource.html?uri=cellar:fa6ea15b-b7b0-11e6-9e3c-01aa75ed71a1.0001.02/DOC_1&format=PDF. Accessed August 17, 2018.

European Commission. (2017). Projects of common interest—Energy—European Commission. *Energy*. https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest. Accessed November 16, 2017.

European Commission. (2018). *A clean planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM/2018/773 final)*. Brussels: European Commission. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0773. Accessed March 14, 2019.

European Gas Advocacy Forum. (2011). *The future role of natural gas*. http://www.gazpromexport.ru/files/Making_the_green_journey_work_-_web_version395.pdf. Accessed March 14, 2019.

Eurostat. (2020). European Commission > Eurostat > Energy > Data > Database > Energy (nrg) > Energy statistics—Quantities, annual data (nrg_quanta) > Energy balances (nrg_bal) > Complete energy balances (nrg_bal_c). *Eurostat*. https://ec.europa.eu/eurostat/web/energy/data/database. Accessed January 27, 2020.

Fairclough, N. (2013). *Critical discourse analysis: The critical study of language*. London & New York: Routledge.

Fairclough, N., & Graham, P. (2002). Marx as a critical discourse analyst: The genesis of a critical method and its relevance to the critique of global capital. *Estudios de Sociolinguistica, 3*(1), 185–229. https://eprints.qut.edu.au/29764/1/graham__29764.pdf. Accessed March 10, 2018.

Foucault, M. (2012). *The archaeology of knowledge and the discourse on language* (A. M. Sheridan Smith, Trans.). New York: Knopf Doubleday Publishing Group.

GasTerra. (2009). *Natural gas as a transitional fuel: For a sustainable energy future*. Groningen: GasTerra. https://www.gasterra.nl/uploads/fckconnector/ad10e972-6213-42e7-8063-52b1ffa39f71. Accessed February 7, 2019.

Gazprom. (2007). *Environmental report 2007*. Moscow: OAO Gazprom. https://www.gazprom.com/f/posts/27/512661/gazprom-environmental-report-2007-en.pdf. Accessed January 30, 2020.

Gazprom. (2009). *Sustainability report 2008–2009*. Moscow: Gazprom. http://www.gazprom.com/investors/disclosure/reports/2009/. Accessed March 13, 2019.

Gazprom. (2018). Gas use in vehicles. *Gazprom*. http://www.gazprom.com/about/production/ngv-fuel/. Accessed August 22, 2018.

GIE. (2019). *GIE vision 2050*. Brussels: Gas Infrastructure Europe. https://www.gie.eu/index.php/gie-publications/position-papers. Accessed February 22, 2019.

Hajer, M. A. (1995). *The politics of environmental discourse: Ecological modernization and the policy process*. Oxford: Oxford University Press.

Hausmann, P., Sussmann, R., & Smale, D. (2016). Contribution of oil and natural gas production to renewed increase in atmospheric methane (2007–2014): Top-down estimate from ethane and

methane column observations. *Atmospheric Chemistry Physics, 16*(5), 3227–3244. https://doi.org/10.5194/acp-16-3227-2016.
Herzog, H. (2018). *Carbon capture*. Cambridge, MA: The MIT Press.
Hoffmann, P. (1981). *Forever fuel: The story of hydrogen.* https://www.osti.gov/biblio/6744880. Accessed February 3, 2020.
Högselius, P. (2012). *Red gas: Russia and the origins of European energy dependence*. New York: Palgrave MacMillan.
Högselius, P. (2013). *The European natural gas industry and the oil crisis of 1973/74*. https://networks.h-net.org/european-natural-gas-industry-and-oil-crisis-197374-hogselius-h-energy-1973-energy-crisis. Accessed May 29, 2019.
Howarth, D. (2010). Power, discourse, and policy: Articulating a hegemony approach to critical policy studies. *Critical Policy Studies, 3*(3–4), 309–335. https://doi.org/10.1080/19460171003619725.
Howarth, R. W. (2014). A bridge to nowhere: Methane emissions and the greenhouse gas footprint of natural gas. *Energy Science & Engineering, 2*(2), 47–60. https://doi.org/10.1002/ese3.35.
IEA. (2011). *World Energy Outlook—2011 edition*. Paris: IEA/OECD.
IEA. (2017). *World energy outlook 2017*. Paris: IEA/OECD.
IEA. (2018). *World energy outlook 2018*. Paris: OECD/IEA.
IEA. (2019). *The future of hydrogen*. Paris: IEA/OECD. https://webstore.iea.org/the-future-of-hydrogen. Accessed July 25, 2019.
IPCC. (1990). *Climate change—The IPCC scientific assessment*. Cambridge: Cambridge University Press. https://www.ipcc.ch/ipccreports/far/wg_I/ipcc_far_wg_I_full_report.pdf. Accessed October 30, 2018.
IPCC. (1995). *IPCC second assessment full report—IPCC*. https://www.ipcc.ch/report/ipcc-second-assessment-full-report/. Accessed October 12, 2019.
IPCC. (2006). *Guidelines for national greenhouse gas inventories*. International panel for climate change. http://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf. Accessed March 8, 2018.
IPCC. (2007). *IPCC fourth assessment report: Climate change 2007*. Intergovernmental panel on climate change. https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_full_report.pdf. Accessed November 5, 2017.
IPCC. (2014). *Fifth assessment report—Mitigation of climate change*. https://www.ipcc.ch/report/ar5/wg3/. Accessed October 7, 2017.
Jessop, B. (1991). Accumulation strategies, state forms, and hegemonic projects. In S. Clarke (Ed.), *The state debate* (pp. 157–182). London: Macmillan.
Johnstone, P., & Newell, P. (2018). Sustainability transitions and the state. *Environmental Innovation and Societal Transitions, 27,* 72–82. https://doi.org/10.1016/j.eist.2017.10.006.
Jørgensen, M. W., & Phillips, L. J. (2002). *Discourse analysis as theory and method*. London, Thousand Oaks, & New Delhi: SAGE Publications.
Kinder, J. (2016). The coming transition: Fossil capital and our energy future. *Socialism and Democracy, 30*(2), 8–27. https://doi.org/10.1080/08854300.2016.1193335.
MITEI. (2011). The future of natural gas. An interdisciplinary MIT study. *MIT energy initiative*. http://energy.mit.edu/publication/future-natural-gas/. Accessed November 5, 2017.
Nakićenović, N. (1994). *Energy gases—The methane age and beyond*. Laxenburg: International Institute for Applied Systems Analysis. http://pure.iiasa.ac.at/id/eprint/4079/1/RR-94-08.pdf. Accessed March 13, 2019.
Oberthür, S., & Kelly, C. R. (2008). EU leadership in international climate policy: Achievements and challenges. *The International Spectator. Italian Journal of International Affairs, 43*(3), 35–50. https://doi.org/10.1080/03932720802280594.
Paterson, M., & Grubb, M. (1992). The international politics of climate change. *International Affairs, 68*(2), 293–310. https://doi.org/10.2307/2623216.
Pemberton, M. (2008). *The iron pirate: A plain tale of strange happenings on the sea*. Gloucaster: Dodo Press.

Petrocultures Research Group. (2016). *After oil*. Edmonton: Petrocultures Research Group. http://afteroil.ca/wp-content/uploads/2016/02/AfterOil_fulldocument.pdf. Accessed March 28, 2018.

Pettenger, M. E. (Ed.). (2016). *The social construction of climate change: Power, knowledge, norms, discourses*. London & New York: Routledge.

Purvis, T., & Hunt, A. (1993). Discourse, ideology, discourse, ideology, discourse, ideology… *The British Journal of Sociology, 44*(3), 473–499. https://doi.org/10.2307/591813.

Romm, J. J. (2004). *The hype about hydrogen: Fact and fiction in the race to save the climate*. Washington, DC: Island Press.

Sandbag. (2019). *EUA prices*. https://sandbag.org.uk/carbon-price-viewer/. Accessed October 29, 2019.

Scrase, J. I., & Ockwell, D. G. (2010). The role of discourse and linguistic framing effects in sustaining high carbon energy policy—An accessible introduction. *Energy Policy, 38*(5), 2225–2233. https://doi.org/10.1016/j.enpol.2009.12.010.

Seto, K. C., Davis, S. J., Mitchell, R. B., Stokes, E. C., Unruh, G., & Ürge-Vorsatz, D. (2016). Carbon lock-in: Types, causes, and policy implications. *Annual Review of Environment and Resources, 41*(1), 425–452. https://doi.org/10.1146/annurev-environ-110615-085934.

Shiryaevskaya, A. (2018). Russia looks to hydrogen as way to make gas greener for Europe. *Bloomberg*. https://www.bloomberg.com/news/articles/2018-11-08/russia-looks-to-hydrogen-as-way-to-make-gas-greener-for-europe. Accessed December 20, 2018.

Simson, K. (2019). *Answers to the European Parliament Questionnaire to the Commissioner-Designate*. Brussels: European Commission. https://www.europarl.europa.eu/resources/library/media/20190927RES62444/20190927RES62444.pdf. Accessed February 1, 2020.

Smil, V. (2015). *Natural gas: Fuel for the 21st century*. Chichester: Wiley.

Statoil. (2012). Fuelling the UK with the telegraph and Statoil. *The Telegraph*. https://www.telegraph.co.uk/sponsored/earth/statoil/. Accessed May 5, 2020.

Statoil. (2017). *Statoil's climate roadmap—Creating a low carbon advantage*. https://www.equinor.com/content/dam/statoil/image/how-and-why/climate/A4-climate-roadmap-digital.pdf. Accessed August 21, 2018.

Stephenson, E., Doukas, A., & Shaw, K. (2012). Greenwashing gas: Might a 'transition fuel' label legitimize carbon-intensive natural gas development? *Energy Policy, 46,* 452–459. https://doi.org/10.1016/j.enpol.2012.04.010.

Stern, J. (2017). *The future of gas in decarbonising European energy markets: The need for a new approach*. Oxford: The Oxford Institute for Energy Studies. https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/01/The-Future-of-Gas-in-Decarbonising-European-Energy-Markets-the-need-for-a-new-approach-NG-116.pdf. Accessed March 9, 2018.

Szabo, J., & Deak, A. (forthcoming). The CEE energy transition: Recurring 50-year-old dynamics? In M. Mišík & V. Oravcová (Eds.), *From economic to energy transition: Three decades of transitions in Central and Eastern Europe*. New York & London: Palgrave MacMillan.

Szabo, J., & Fabok, M. (2020). Infrastructures and state-building: Comparing the energy politics of the European Commission with the governments of Hungary and Poland. *Energy Policy, 138,* 111253. https://doi.org/10.1016/j.enpol.2020.111253.

Szalai, P. (2017). Statoil VP: 'Natural gas has a home in the zero-carbon world'. *Euractiv.com*. https://www.euractiv.com/section/energy/interview/statoil-vp-natural-gas-has-a-home-in-the-zero-carbon-world/. Accessed August 21, 2018.

Szeman, I. (2016). On the energy humanities: Contributions from the humanities, social sciences, and arts to understanding energy transition and energy impasse. http://petrocultures.com/wp-content/uploads/2016/10/Szeman-OEH-KSG-Final-Report.pdf. Accessed December 5, 2017.

Szeman, I., & Boyer, D. (Eds.). (2017). *Energy humanities: An anthology*. Baltimore: Johns Hopkins University Press.

Thomas, R. (2018). The development of the manufactured gas industry in Europe. In J. Craig, F. Gerali, F. MacAulay, & R. Sorkhabi (Eds.), *History of the European oil and gas industry* (pp. 137–164). Bath: Geological Society.

Trinomics. (2018). *The role of trans-European gas infrastructure in the light of the 2050 decarbonisation targets*. https://publications.europa.eu/en/publication-detail/-/publication/1796ecd6-cb71-11e8-9424-01aa75ed71a1/language-en. Accessed February 15, 2019.

Unruh, G. C. (2000). Understanding carbon lock-in. *Energy Policy, 28*(12), 817–830. https://doi.org/10.1016/S0301-4215(00)00070-7.

Verne, J. (1874). *The mysterious Island*. PDF Books. https://pdfbooks.co.za/library/JULES_VERNE-THE_MYSTERIOUS_ISLAND.pdf. Accessed November 9, 2018.

Weger, L., Abanades, A., & Butler, T. (2017). Methane cracking as a bridge technology to the hydrogen economy. *International Journal of Hydrogen Energy, 42*(1), 720–731. https://doi.org/10.1016/j.ijhydene.2016.11.029.

Wilson, S., Carlson, A., & Szeman, I. (Eds.). (2017). *Petrocultures: Oil, politics, culture*. Montreal-Kingston: McGill-Queen's University Press.

Zubrin, R. (2007). The hydrogen hoax. *The New Atlantis, 15*, 7–20. https://www.thenewatlantis.com/publications/the-hydrogen-hoax. Accessed November 9, 2018.