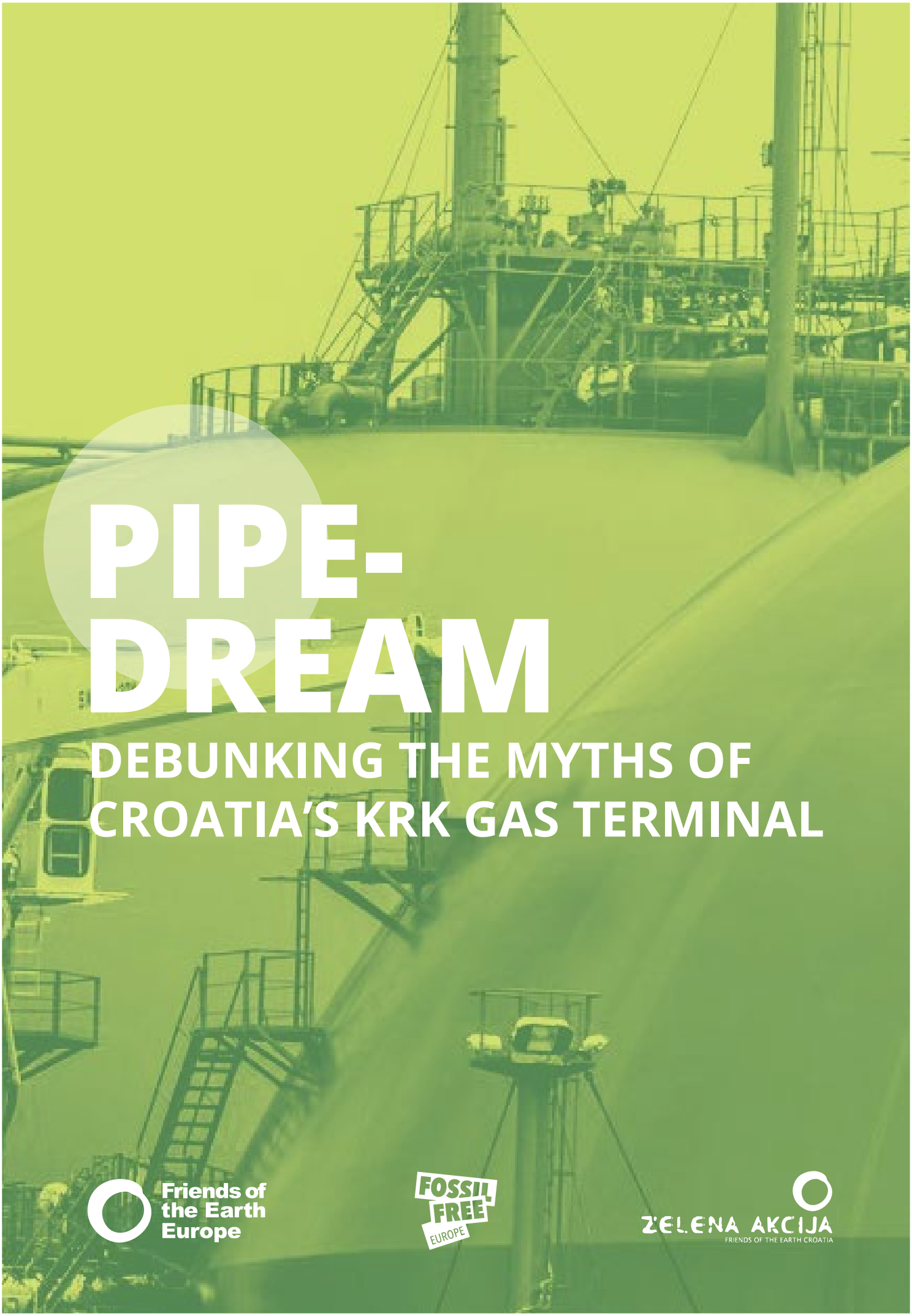


PIPE-DREAM

DEBUNKING THE MYTHS OF CROATIA'S KRK GAS TERMINAL

Friends of the Earth Europe

FOSSIL FREE EUROPE

ZELENA AKCIJA
FRIENDS OF THE EARTH CROATIA

Text
Marija Mileta & Antoine Simon

Editor
Rachel Tansey

Contributions and edits
Colin Roche, Paul de Clerck, Robbie Blake and Elena Gerebizza

Design
Capucine Simon

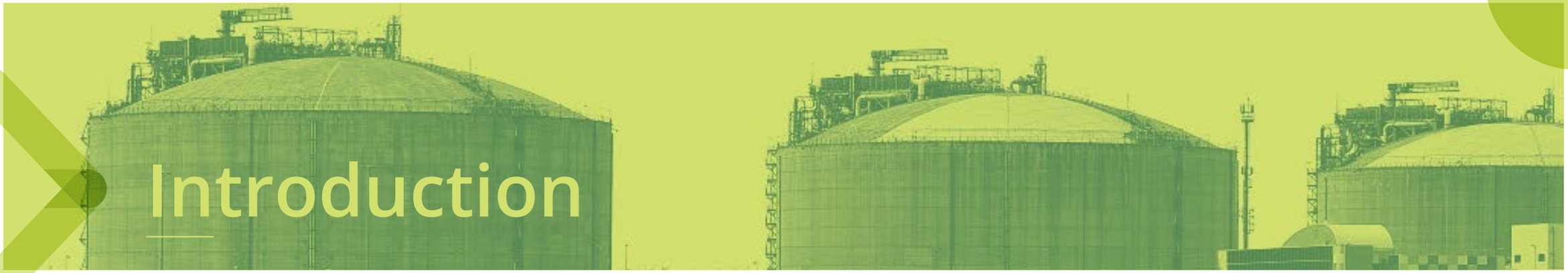
Published by Friends of the Earth Europe & Zelena akcija,
December 2018

Friends of the Earth Europe campaigns for sustainable and just societies and for the protection of the environment, unites more than 30 national organisations with thousands of local groups and is part of the world's largest grassroots environmental network, Friends of the Earth International.

Friends of the Earth Europe is campaigning for what the climate emergency demands: a fair and urgent transition to a fossil fuel free energy sector in Europe by 2030. This means a just transition to a 100% renewable, nuclear-free, highly energy-efficient energy system, for the clean energy future that people want and need.

FUNDERS: Friends of the Earth Europe and Zelena akcija gratefully acknowledge financial assistance from the European Union and from the European Climate Foundation. The contents of this document are the sole responsibility of Friends of the Earth Europe and cannot be regarded as reflecting the position of the funders mentioned above.

CONTENTS



Introduction

Climate change is happening more rapidly than expected and is already devastating lives in Europe and beyond. For a chance of limiting global warming to 1.5°C or even "well below 2°C", as agreed in the 2015 UN climate talks in Paris, unprecedented action needs to be taken now. As the Intergovernmental Panel on Climate Change (IPCC) reminded us earlier this year, we only have "a dozen years for global warming to be kept to a maximum of 1.5°C".[1]

Thanks to political inaction in recent decades, we have unwisely used up what little room for manoeuvre we had, in solving one of the biggest challenges faced by human kind. This means that from now on, there is no time for baby steps or half-hearted compromises. Even the International Energy Agency recognizes that to limit the average temperature rise to 2°C, we have "no room to build anything that emits CO2 emissions".[2] We must kick our addiction to fossil fuels, the biggest source of humanity's greenhouse gas emissions. This means stopping construction of new fossil fuel infrastructure projects.

Yet, political leaders continue to yield to the pressure of the fossil fuels lobby, by maintaining their political and financial support for new fossil fuel projects. At the European level, dozens of new fossil gas projects have been given priority status under the European Union (EU)'s list of 'projects of common interest'.[3] These include gas interconnections, mega-import pipelines and liquefied natural gas (LNG) import terminals. Presented as ways to improve Europe's energy security, they are in reality an open door to more dirty sources of energy – like shale gas, coal bed methane, and Arctic drilling – locking us in to harmful fossil gas for the long-term, and to a dependence on authoritarian regimes.

The plan to build a new LNG terminal on Krk Island, in north-west Croatia, is a stark illustration of this disturbing trend. Despite growing opposition, and mounting evidence about the negative impacts it would have on the environment, climate, local economy and health of residents, successive Croatian governments have, over the past two decades, promoted the terminal's construction. What's more, since 2013, the project has received the political and financial support of the European Commission.

BACKGROUND: THE KRK LNG TERMINAL

The Krk LNG terminal, a project pushed for by the company LNG Croatia d.o.o.[4], would be the first terminal of its kind in the Western Balkan region, and it has been loudly promoted as a hub for gas for South-East and Central Europe. The project would include the building and operating of infrastructure to receive, store, reload and regasify LNG. Its advocates claim it will secure energy needs, and increase the security of the region's gas supply, through the provision of up to 6.5 billion cubic meter (bcm) of gas from new gas supply routes.

The project, initially envisaged as an onshore regasification facility, was first mentioned in the 1990s, but was not developed significantly until the late 2000s. The decision to establish it at Port Omišalj, part of an industrial zone on the island of Krk, was taken by the Croatian government in 2008. In 2015, the government declared the terminal to be a Strategic Investment Project of the Republic of Croatia, and, based on the environmental impact assessment (EIA) that had been conducted, issued a location permit. In 2016, the government decided to accelerate the project through a phased development: Phase 1 would be a floating terminal (ie less expensive), which would then be turned into an onshore terminal, as Phase 2. In February 2017, thanks to its status as an EU 'project of common interest' (PCI), the project received a significant boost of €102 million of European public subsidies for the implementation of Phase 1.[5]

Yet the project is now in a state of limbo: despite high political support, the plans for an annual gas import capacity of 6.5 bcm – which is 2.5 times more gas than Croatia consumes each year – were put in question by the lack of interest from firms in booking capacity at the terminal.[6] It was for this reason that, in May 2018, LNG Croatia d.o.o. launched a new tender for a smaller floating storage and regasification unit (FSRU), designed for just 2.6 bcm of gas annually.[7] It remains to be seen whether downsizing the project will be sufficient to make it more attractive to investors.

The project has been highly politicised and strongly prioritised by the Croatian government and by the European Commission, despite the very serious economic, environmental and climate questions cast over it. In its Phase 1 floating terminal stage, the project is now strongly opposed by all local municipalities from Krk Island, the Primorsko-Goranska County and by local environmental NGOs. Environmental organisations at the national level oppose the project as a whole (ie not just the floating terminal phase). This report aims to present these questions, to debunk the myths developed to promote the Krk LNG terminal, and to present alternative solutions that should be developed instead of this unnecessary and climate-wrecking project.

MYTH 1 —

Gas contributes to reducing climate change

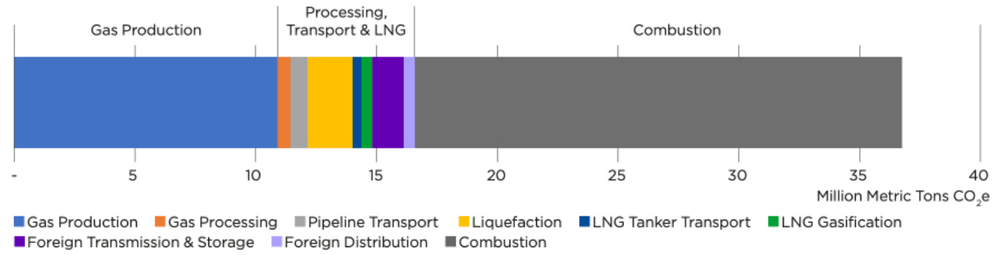
Fossil gas is often presented as a clean fossil fuel, compatible with the climate commitments made by European nations when they ratified the Paris Agreement, namely 95% decarbonisation of our economy by 2050, and global temperature increase kept to 1.5°C, or "well below 2°C" at worst.[8]
Gas companies heavily rely on this argument to justify the construction of new gas infrastructure and to legitimise continued and increased use of fossil gas. LNG Croatia d.o.o., for example, claims that the Krk project will "reduc[e] CO emissions in the region".[9] The company's co-owner, Croatia's public gas transmission operator Plinacro, echoes this by claiming that "gas is an environmentally friendly energy source that is not released into the atmosphere".[10]

This, however, is a very selective vision of the contribution of gas to climate change. To begin with, gas is far from being low-carbon: according to the IPCC, the life-cycle emissions of natural gas combined-cycle power plants are estimated at 410–650 gCO2eq/kWh, while most renewable technologies emit between 2 and 180 gCO2eq/kWh.[11] The gas industry may love to remind us that its product is colourless and odourless,[12] but it is still an extremely powerful greenhouse gas, comprised mainly of methane. According to the latest IPCC Assessment Report, methane has a global warming potential 86 times higher than CO2 on a 20-year time-scale.[13] It does not therefore require a large amount of methane leakage (be it deliberate or accidental) to trigger major impacts on our climate.

Today, methane is the second largest source of greenhouse gas emissions worldwide after CO2, and these emissions are growing fast.[14] In December 2017, NASA published a study concluding that the oil and gas industry has been the main contributor to the rise in global methane concentrations since 2006,[15] when the fracking boom began.[16,17]

Croatian and US leaders openly talk about using the Krk LNG terminal to import shale gas from the US.[18] Yet shale gas is recognised as the most climate-wrecking source of gas: in some US shale gas production sites, up to 9% of the total gas production is found to be leaking directly into the atmosphere.[19] The implications of this are very serious, since the climate benefit of switching from coal to gas is negated when there is methane gas leakage of anything above 3%.[20]

Figure 1: Full Lifecycle Emissions from a US West Coast LNG terminal (source: Oil Change International)[25]



What's more, despite attempts by the LNG industry to bury the fact,[21] the total lifecycle carbon footprint of gas gets even worse when LNG is involved (see Figure 1). As the US Department of Energy explains "compared to domestically produced and combusted gas, there is a significant increase in the life cycle GHG emissions that are attributed to the LNG supply chain, specifically from liquefaction, tanker transport, and regasification processes".[22] A survey of gas emissions studies by Dr Paul Balcombe found that total emissions from LNG can be nearly 2.5 times that of burning the gas alone.[23] Oil and gas industry consultancy Wood MacKenzie even foresees that "LNG will be the biggest source of carbon emission growth for the world's top oil and gas companies by 2025".[24]

Methane emissions are a systemic problem in the fossil gas sector, yet one that is poorly acknowledged. This is in part due to inappropriate inventories of these emissions (the consensus of the US scientific community is that reported emissions may be up to 60% below the real levels[26]), and the lack of capacity to monitor millions of wells and kilometres of pipelines, hundreds of ships and dozens of LNG facilities.[27] And, in part, because precise data on emissions are owned by the gas industry, which does not disclose the figures.

For all of these reasons, the Krk LNG project is anything but climate-friendly – or "sustainable", as Plinacro describes it.[28]

CONCLUSION

The idea that gas is a clean fossil fuel is erroneous and unfounded. Fossil fuels are by far the biggest drivers of climate change and none of them – gas included – can pretend to stop climate change. Fossil fuels are the largest source of greenhouse gas emissions,[29] and should not be seen as solutions to the problem they themselves created.

MYTH 2 –

Gas facilitates a good energy transition

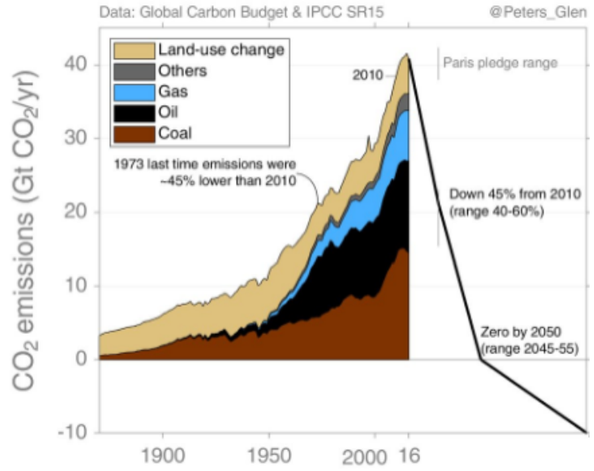
The industry likes to portray gas as a bridge fuel, cleaner than other fossil fuels, which can help decrease global CO2 emissions and act as a backup fuel to intermittent supply from renewable energy sources. This rhetoric, used to legitimise the use of gas for decades to come, and to justify the construction of new gas infrastructure, is at the heart of gas companies' communications and PR. LNG Croatia d.o.o. and Plinacro, the promoters of the Krk LNG terminal, are no exception.[30]

However, if our leaders were serious when they decided in Paris to "hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels",[31] then there is no room for gas in Europe beyond 2030. A very fast phase-out of existing fossil fuel infrastructure, including gas, needs to be started as soon as possible.

As noted by the IPCC, we have now reached 1°C average temperature rise compared to the pre-industrial era;[32] 17 of the 18 warmest years on record have occurred since the beginning of the 21st century; and, global CO2 emissions continue to rise.[33] Limiting the temperature rise means a limit to the amount of greenhouse gases that can still be emitted – our carbon budget. The room for gas in this budget depends on how we use our 1.5 or 2°C carbon budget. Unfortunately, this budget is diminishing rapidly: in the last six years, the world has consumed more than a quarter of the carbon budget we have left before we reach an average global 2°C rise.

A recent study by the Tyndall Centre for Climate Change Research shows that, in this context, the future of gas in Europe is incredibly limited if we're serious about staying below 2°C. Based on the remaining carbon budget distributed amongst different regions of the world, Europe's 2°C carbon budget will be entirely depleted in just six to nine years if we continue to emit CO2 at current levels. The study also shows that if Europe were to suddenly switch its coal and oil consumption to gas, this would only add three more years of carbon emissions before the budget was depleted, at best. Thus, the authors conclude that if the phase-out of all fossil fuels, including gas, is not completely achieved in Europe by 2035-2040, the battle to stay below 2°C will be lost.[36] And this date is even sooner for staying within 1.5°C. The IPCC's recent and worrying 1.5°C special report[37] once again hammered home just how urgent the need to phase-out fossil fuels, including gas, really is (see Figure 2).

Figure 2: CO2 emissions pathway to limit overshoot of 1.5°C (IPCC, Glen Peters)[34,35]



Given that LNG terminals, like the one in Krk, are designed to last around 40 years,[38] and even longer when they are onshore,[39] new gas projects in construction are being built to be in use far beyond the date when we need to have stopped consuming gas. Constructing the Krk LNG terminal now would, at best, soon become a stranded investment, as energy efficiency policies and the switch to renewables reduce gas demand, and, at worst, contribute to a new fossil fuel dependence that our climate cannot afford.

CONCLUSION

Fossil gas is not a 'good' fossil fuel. Considering current levels of greenhouse gas emissions, there is no bridging role to play for gas. The only debate we should have today is how to completely phase out all fossil fuels, gas included.

MYTH 3 –

Gas is a clean energy source

Gas is not perceived as negatively as coal and oil by the general public, its colourless and odourless nature perhaps partly behind the idea of “clean” gas. But the fact that you cannot see gas, does not make it harmless. Scientific analyses have repeatedly shown that, from its extraction to its end use, gas is the source of significant environmental and health impacts.

EXTRACTING GAS: A LARGE-SCALE DESTRUCTIVE INDUSTRY

Regular public statements by Croatian and US officials suggest that the Krk LNG terminal will likely be used to import gas from the US, the leader of the shale gas boom. Yet shale gas is so controversial that the technique used to extract it, ‘fracking’, has already been banned in many European countries. The shale gas boom in the US has been associated with dramatic, large-scale impacts on the environment and on the health of local communities. Thousands of cases of groundwater contamination, air and river pollution, overuse of water, poor treatment of waste water, and serious exposure to carcinogenic, radioactive, endocrine disrupting and/or highly hazardous pollutants have been documented by dozens of peer-reviewed scientific studies, in the last decade.[40] Shale gas is a symbol of the deeply destructive nature of the fossil fuel industry, which gives little to no attention to environmental concerns, and fights tooth and claw against attempts to legally improve environmental standards.[41] LNG Croatia d.o.o. has also declared its interest in importing gas from Mozambique,[42] where major oil and gas companies are developing infrastructure to export gas from new offshore reserves. Infrastructure which is causing dire impacts, including mass displacement of local populations, loss of wetlands and estuaries, and major negative effects on coral and other flora and fauna.[43]

FLOATING LNG TERMINALS: AN ENVIRONMENTAL BLACK BOX

Unlike gas production activities, such as fracking, the LNG industry’s environmental impacts remain largely unknown and undocumented. The experiences and studies that do exist, however, provide ample reason for concern:

- Gas storage tanks at LNG terminals often suffer from integrity failures, which have unknown causes, and lead to leaks that are “hazardous to life, property and the environment”, according to the U.S. Pipeline and Hazardous Materials Safety Administration.[44]
- Since 2013, Italy has a 3.8 bcm/y floating LNG terminal (similar to that proposed at Krk) with highly controversial impacts.[45] A report commissioned by the Tuscany Region revealed a series of structural shortcomings of the plant, exposing itself to likely breakages, losses and leaks.[46] Another study by WWF Italy highlighted the pollution of seawater by the use of active chlorine in the regasification process, leading to the release of toxic chemicals (chloro derivatives) and to an «almost total sterilization» of significant volumes of seawater.[47]
- Although the EIA for the Krk floating LNG terminal gave it the green light and considered it “environmentally acceptable”,[48] it nonetheless warned that the discharge of LNG vessels leads to significant emissions of nitrogen oxides (NOx), with hourly concentrations of NOx about 1000 times higher than the maximum allowed limit! NOx are known for causing diseases such as emphysema and bronchitis.[49]

TRANSPORTING GAS: A SWORD OF DAMOCLES FOR LOCAL COMMUNITIES

The Krk LNG terminal is at the heart of an even bigger cluster project which aims to connect the terminal to other countries, particularly Hungary, via new pipelines. There is much less known about detrimental impacts that occur during the transport of gas than those that result from its extraction. However, pipelines and compressor stations are known to be the source of significant environmental and health impacts for workers and local communities:[50]

- Gas compressor stations release hundreds of tonnes of contaminants (including nitrogen oxides, carbon monoxide, volatile organic compounds, formaldehyde and particulate matter), which put these facilities amongst the largest sources of industrial air pollution.[51]
- Between 1986 and 2016, pipeline accidents (mostly ruptures) in the US have resulted in 548 deaths, more than 2,500 injuries, and over $8.5 billion in damages.[52] US federal reports have noted a “continuing occurrence” of petroleum release incidents – including from natural gas pipeline ruptures – which have “the potential to cause mass casualties and environmental contamination.”

MYTH 4 —

The Krk LNG terminal is necessary for the security of gas supply

Promoters of the Krk LNG terminal often claim it would help improve energy security in the region, particularly in Croatia and Hungary.[53] A closer look at the infrastructure level and recent gas developments in these two countries, however, reveals this argument to be weak:[54]

CROATIA: ALREADY RESILIENT

Although Croatia consumed around 3 bcm of gas in 2017,[55] a large part – around 53%[56] – of its current gas requirements is covered by domestic production. For its remaining needs, Croatia has existing interconnections with neighbouring countries, namely Hungary (with a capacity of 2.6 bcm/y from Croatia to Hungary, and 7 bcm/y from Hungary to Croatia)[57] and Slovenia (1.84 bcm/y).[58] As a result, Croatia already has an annual capacity to import three times more gas than it needs.

HUNGARY, THE RUSSIAN GAS PARTNER

Hungary consumed around 10 bcm of gas in 2017[59] (down from 14 bcm in 2005).[60] Hungary produces 17% of its gas needs, and can rely on a variety of import infrastructure to fill the gap: 20 bcm from Russia (via Ukraine), 4.4 bcm from Austria, 4.5 bcm from Slovakia, and already existing interconnections with Croatia and Romania.[61] The country's gas needs are therefore covered, and largely met by Russian gas molecules. This does not, however, seem to be a problem for Hungary: the Hungarian government is, in fact, working with Gazprom to further increase exchanges with Russia, via the construction of Turkstream, a new 15 bcm Russian pipeline reaching Europe via the Black Sea.[62]

Figure 3: Europe's security of supply when exposed to Ukraine route disruption (source: ENTSOG, 2017)[63]

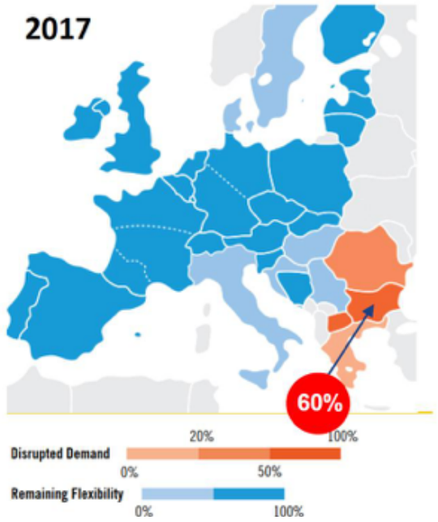
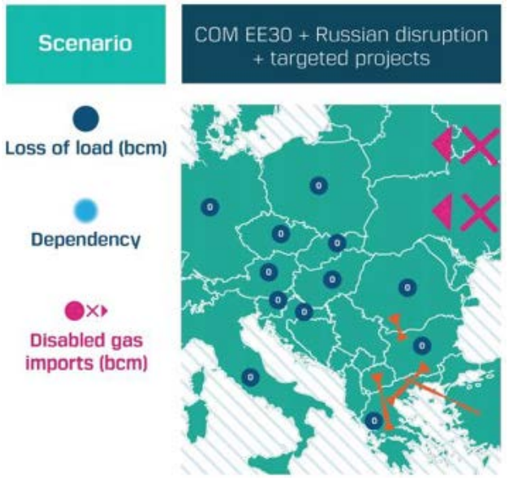


Figure 4: Gas infrastructure needs in a Russian gas disruption context (source: Artelys & European Climate Foundation, 2016)[64]



Both Croatia and Hungary already have sufficient options to receive the gas they need. The Krk LNG terminal is, therefore, simply not necessary. It is often said to be needed because these countries are overly reliant on Russian gas (see Myth 5), but the European Commission's own calculations show that neither Croatia nor Hungary would be exposed to risks of gas shortages should Russian gas arriving via Ukraine be disrupted (see Figure 3).

These risks will decrease even more in response to the EU's energy savings objectives – 32.5% reduction by 2030[65] – the gradual fulfilment of which will bring down Europe's gas demand (see Myth 7). Considering this alongside the region's existing gas infrastructure, and projects currently under construction (ie TANAP, Greece-Bulgaria and Greece-Serbia interconnectors, in particular), it becomes clear that the Krk LNG terminal is absolutely unnecessary, even in the unlikely case of a year-long Russian gas import disruption (see Figure 4).

It is confirmed in the European Commission's new 'strategic long-term' climate scenario where they foresee that measures to reach a net-zero emission would lead to a decline of up to 81% of gas imports by 2050.[66] The Krk LNG terminal is an outdated project which, if built, will quickly become stranded.

CONCLUSION

The gas systems of Croatia and Hungary are resilient in all potential disruption cases. They do not need the Krk LNG project to secure their gas supplies, especially with the planned decline of gas demand all over Europe, through energy savings in the next decades.

MYTH 5 –

The Krk LNG terminal will reduce dependence on Russian gas

It is often claimed that EU energy 'projects of common interest', or PCIs, like the Krk LNG terminal, are necessary to diversify Europe's gas supplies, and so help minimise the EU's current over-dependence on Russian gas, especially in South Eastern Europe. The major tensions between Russia and Ukraine in 2006 and 2009, which led to problematic gas shortages in Eastern Europe,[67] are at the root of Europe's recent rush for new gas infrastructure. However, this rush has so far been failing to reduce this dependence, and the Krk LNG terminal is also unlikely to solve Russia's energy and geopolitical dominance.

BUILDING NEW GAS IMPORT PROJECTS: THE WRONG STRATEGY

Europe's over-reliance on Russian gas is undeniably a liability, both in terms of climate and geopolitics. What happened in 2006 and 2009 demonstrated the dangers of depending so much on a regime that is ready and willing to use its energy assets to generate major political instability, for its own geopolitical or nationalist purposes. Together with the many worrying unknowns about methane emissions in the production, transportation and distribution of Russian gas,[68] there is more than enough reason for Europe to reduce (or even stop) gas imports from Russia. But building new gas import infrastructure like the Krk LNG terminal is a poor response to this problem.

First and foremost, in a post-Paris Agreement era, replacing one source of fossil gas by another one is a counterproductive use of our scarce resources to fight climate change.

Secondly, for several years now, the 25 already existing LNG terminals in Europe, capable of importing more than 200 bcm of gas each year, have been used at less than a quarter of their capacity.[70] Europe's gas storage facilities, meanwhile, which stand at over 100 bcm,[71] are used at only 23 to 30% of capacity.[72] Thus, existing infrastructure (LNG terminals in particular) would already suffice to replace Russian gas: no new terminals are required.

Finally, according to the European Commission's own figures, Croatia and its neighbouring countries already meet the EU's diversification objective of having at least three gas sources in a given year (see Figure 5). The Krk LNG terminal would not therefore respond to a lack of diversification, as PCI projects are supposed to. It is true that most Eastern and South Eastern European countries are particularly reliant on Russian gas, and often have a good diversification of routes but not necessarily of suppliers. However, it seems that many European countries consider the problem to be Russian gas coming through Ukraine, the supply of which has been subject to instability, rather than with Russian gas in general.

Figure 5: Access to at least 3 gas sources during a whole year (source: ENTSOG, 2017)[69]

BUILDING NEW GAS IMPORT PROJECTS: A FAILED STRATEGY

Building new gas import projects to counter Europe's over-dependence on Russian gas is not just the wrong strategy, it is a failed one. After a decade of investments in new pipelines and LNG terminals, allegedly to better diversify Europe's gas supplies, Russia's gas exports to Europe have never been higher. In 2017, they broke a new record, with 193 bcm of Russian gas exported to Europe, representing 40% of the EU's gas demand.[73] This record, however, may soon be beaten, in light of the new projects that Russia and the state-owned Gazprom are constructing to bring even more gas to Europe. Projects that have the hypocritical support of several European countries: Germany, together with Austria and Italy, strongly support the construction of the Nord Stream 2 pipeline to create a second 55 bcm/y direct connection between Russia and Germany.[74] Similarly, in South Eastern Europe, Gazprom is negotiating with Bulgaria, Romania, Hungary, Italy, Turkey, and others, over the (already ongoing) construction of the two 15 bcm/y segments of the Turkstream pipelines, which would also bypass Ukraine, to deliver Russian gas to Southern Europe.[75] While the first Turkstream segment will go directly to Bulgaria, it is a supreme irony that the second one will be connected in Turkey to the Southern Gas Corridor, the EU's flagship gas project aimed at reducing dependence on Russian gas! Last but not least, with the recent commissioning of the 23 bcm/y Yamal LNG plant,[76] Russian gas company Novatek could also use the Krk LNG terminal to transport yet more Russian gas into the Balkans.

The Krk terminal has been promoted as if it will reduce dependence on Russian gas, but in reality it will only increase total gas infrastructure capacity, and go along with ever increasing Russian gas exports to the EU, cynically supported by a large number of EU Member States more interested in cheap gas prices (see Myth 6) than in energy security.

CONCLUSION

Building new gas infrastructure to counter Russia's gas dominance is not just the wrong strategy, it is also a failed one. Reducing dependence on Russian gas must come from a larger deployment of renewable energy sources, and intensification of energy efficiency measures, not by building more climate-wrecking gas infrastructure, especially when yet more Russian gas projects are backed by many European governments.

MYTH 6 –

The Krk LNG terminal is a cheap investment that will reduce consumers' gas bill

As with many LNG projects, the Krk LNG terminal is presented as a cheap, no-regrets option that will increase competition and so bring gas prices down. In reality however, LNG infrastructure and investment costs are anything but cheap, with the bill often being paid by consumers, in ways they may not even be aware of.

COST OF THE TERMINAL IS JUST THE TIP OF THE ICEBERG

Following the recent downsizing of the project in May 2018,[77] LNG Croatia d.o.o. claims that the Krk LNG floating terminal would 'only' cost around €250 million.[78] This gives the impression of it being a compromise solution, compared to the much bigger and more expensive €600 million onshore option.[79] There is good reason to question the choice of investing €250 million – not a marginal sum for Croatia – in a fossil fuel project rather than in renewable or energy efficiency projects, but it must also be pointed out that this sum is just the tip of the iceberg. The Krk LNG terminal is the central part of a much larger cluster project aimed at building large pipelines to connect the terminal to the Croatian gas grid and to neighbouring countries.

According to the Agency for the Cooperation of Energy Regulators, the Krk cluster project starts with a €385 million Phase 1 (the 2.6 bcm FSRU at Krk, and the Omišalj – Zlobin pipeline) followed by a €282 million Phase 2 (expansion of the Krk terminal above 2.6 bcm/y, and other pipelines).[80] And even these costs could spiral, according to the 2018 Ten-Year-Network-Development-Plans prepared by the European Network of Transmission System Operators for Gas (ENTSOG) for the European Commission. These latest plans present a third phase in which the FSRU is replaced by an onshore version, with a capacity increased to 7 bcm/y.[81] Thus, the offshore FSRU project is not necessarily an alternative to the more expensive onshore terminal, but rather a foot-in-the-door.

TAXPAYERS FOOT THE BILL FOR AN UNNECESSARY PROJECT

LNG Croatia d.o.o. says that the Krk LNG terminal will "increase market opportunities for market players in central and south eastern Europe, and their competitiveness in the region".[82] But if the project truly were so useful and lucrative, it would surely attract many energy market players (ie gas operators, energy providers, big gas consumers like petrochemical companies) interested in booking capacity at the terminal, as well as investors (ie private banks) eager to assist LNG Croatia d.o.o. gather the necessary funds to develop it.

However, despite several Open Season Procedures (which test market demand for use of an LNG terminal), and three deadline extensions for the latest calls, almost no gas companies or customers have shown an interest in booking capacity at the terminal, if it gets built.[83] In other words, the so-called 'market' has no interest in the project, and does not, therefore, want to pay for it.

Despite, or rather due to the market's disinterest in this fossil fuel folly, the project

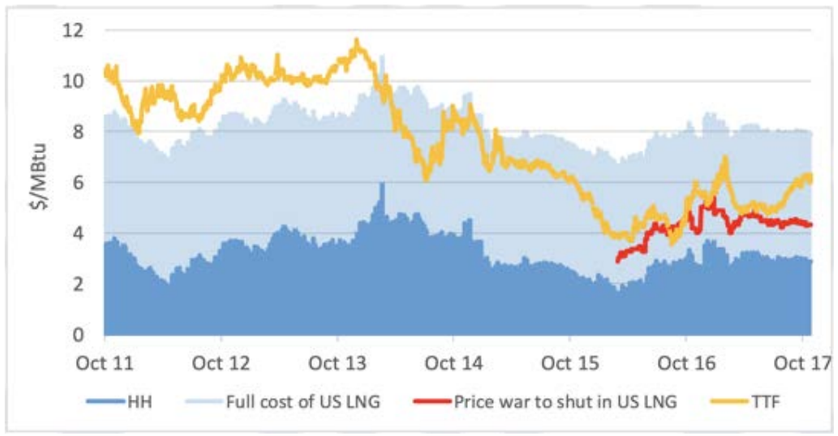
is set to be largely paid for with taxpayers' money. Thanks to its Connecting Europe Facility programme, the European Commission has already committed to provide €101 million of public subsidies for the construction of the Krk floating LNG terminal.[84] This sum has been confirmed despite the downsizing of the project. In the absence of interest from other actors, there are worrying signals that the remaining gap could be filled by even more public money. For example, when the plan was to build an onshore terminal, the European Investment Bank (EIB) was considering providing a €339 million loan at very favourable rates.[85] But the gap is also likely to be partly covered by an increase of gas prices for Croatian gas consumers, and/or by the diversion of some of state-owned Plinacro's annual revenues.[86]

TAXPAYERS FOOT THE BILL FOR AN UNNECESSARY PROJECT

Betting on LNG to increase competition in the gas market and push gas prices down is a very dubious strategy. LNG involves very costly processes (liquefaction, shipping and regasification), which significantly affect the final price of imported gas. When these costs are added up, LNG prices – such as gas imported from the US – appear to be far higher than the average pipeline gas prices coming into Europe (see Figure 6).

It is therefore unsurprising to hear European leaders such as the German Federal Minister for Economic Affairs and Energy, Peter Altmaier, state that he has "always been skeptical about [LNG] in the past because we can see many of the terminals [in Europe]... are not really profitable". And whilst Germany is also considering an LNG terminal, this is purely for geopolitical reasons – "a gesture to our American friends"[88] – but it does not, realistically, aim at lowering gas prices.

Figure 6 - US LNG vs. Russian pipe - Prices (Source: Oxford Institute for Energy Studies, Nov 2017)[87]



CONCLUSION

The Krk LNG terminal, whatever form it may take, is far from cheap, and its high cost will mostly be borne by tax payers and consumers, without their consent. The market does not want it and is not willing to pay for it. What's more, LNG is expensive, and it is therefore highly unlikely to help bring down gas prices in Croatia. It could actually even increase them.

MYTH 7 –

The Krk LNG terminal is a democratic and transparent project

Since 2013, the Krk LNG project has had the status of European 'project of common interest', or PCI.[89] This status bestows considerable political, regulatory and financial benefits to the project and its promoters, but also a number of duties. One of these duties concerns democratic process, requiring "increased transparency and enhanced public participation".[90] The process around the Krk LNG terminal has, however, been far from truly consultative, transparent or democratic.

A PARODY OF AN ENVIRONMENTAL IMPACT ASSESSMENT

While it is compulsory for projects of this kind to conduct environmental impact assessments (EIA), the EIA carried out for the Krk LNG terminal was full of omissions and procedural mistakes. It has been heavily criticised by Croatian environmental groups for a number of reasons:

- The jurisprudence of the European Court of Justice (ECJ) is clear that when an EIA is carried out, it should look at the potential impacts of the entire project. Dividing-up a project and looking at only some of the potential impacts – a practice called "salami-slicing"[91]– is strictly forbidden by the EU EIA Directive.[92] Yet this is precisely what occurred in the Krk EIA: it looked only at the potential impacts of Phase 1, the small floating LNG terminal. The EIA not only ignores the specific impacts of the other phases of the project, it also ignores the cumulative environmental effects of all the different phases. It is, therefore, only a partial impact assessment, and a violation of the EU's EIA rules.

- The impartiality of the EIA is very questionable. The links between the very small number of institutes performing such EIAs and the project promoters commissioning them tend to result in the green light being given to projects, whilst many legitimate concerns of citizens are discarded. The authors of the Krk LNG terminal EIA, for example, rejected 80% of the 845 objections made by the 160 respondents to the public consultation.[93]

- Three lawsuits have been filed against the Croatian Environment Ministry for its acceptance of this controversial EIA: one by Zelena akcija, jointly with local NGO Zelena Istra, one by the Omišalj Municipality, and, one by the Primorsko-Goranska County. There is now an ongoing legal procedure, in the courts.[94]

A SPECIAL LAW FOR PRIVATE INTERESTS

In June 2018, the Croatian Parliament adopted a special law to fast-track the construction of the Krk LNG terminal.[95] Although the law aims to regulate the settlement of property relations at the terminal's location, it in fact consists of a long list of favours to LNG Croatia d.o.o. Favours which endanger the preservation of some of Croatia's truly most valuable things; its sea and coast, and its environment more generally. The law grants the concession for the maritime area where the terminal would be located for a 99 year period, as well setting out a fee for security of supply, and so on. Aside from obvious concerns over such a long concession – we need to phase out fossil fuels in the next decades, not a century! – there are also worries over the annual fee for security of supply that would be paid to LNG Croatia d.o.o. if there is not a sufficient amount of gas consumed. This raises the question of who will bear the costs; will it be tax payers and citizens, via increased bills? How will it be guaranteed that this does not happen?[96]

Beyond the law's problematic content, the process of making it was also paved with procedural errors. It was given only 15 days of public debate, despite Croatia's Environmental Protection Act requiring that projects with significant environment impacts, such as this one, undergo a minimum of 30 days public debate. This speeding-up of the legislative process was exacerbated by the urgent procedure used to further reduce time for parliamentary and public debate.

CONCLUSION

The democratic process and public participation dimensions in the Krk LNG project have been nothing more than a tick box exercise for the Croatian government and LNG Croatia d.o.o. With a flawed EIA process and a special law to fast-track procedures and give even more rights to the company, a mockery has been made of the public's legitimate concerns, whilst the risk of serious environmental impacts have been knowingly ignored.

Our solutions

New LNG infrastructure projects, like the Krk LNG terminal, are always promoted in the EU with promises that they will help to better integrate their host country into the European energy market, bring gas prices down and strengthen Europe's energy security. All these promises, however, ignore the fact that building yet more gas projects is not the best way to fulfil these objectives. Other much more sustainable and cost-competitive alternatives exist, which can – and should – apply to Croatia and its neighbouring countries.[97]

GREATER ENERGY SECURITY WITH LESS ENERGY CONSUMED

The best energy source Europe has is the energy it does not consume. In other words, the more energy saved, the less gas we need. It is well recognised that the EU's energy savings potential is huge, and still largely untapped. This is the reason why the Efficiency First principle is one of the five pillars of EU's Energy Union.[98]

According to the European Commission, for every 1% improvement in energy efficiency, EU gas imports fall by 2.6%.[99] Reducing gas demand through dedicated building renovation programmes can therefore improve energy security, by making countries less dependent on imports (from Russia, in particular). They can also drastically reduce the need for spending on supply infrastructure, particularly in the South Eastern European region. As Figure 4 demonstrates, the drop in gas demand entailed by a 30% energy consumption reduction in Europe by 2030, makes the Krk LNG project completely obsolete.[100] And the official EU 2030 energy savings target is now even higher than this, at 32.5%.[101]

A study by the Buildings Performance Institute Europe shows that a 20-year investment programme of €81 billion in South-East Europe would deliver energy-cost savings of €106 billion. This would allow all buildings currently using gas (a sector representing 30% of Croatian gas demand) to be renovated within 20 years, and gas consumption for heating and hot water to be cut by 70%.[102] This would dramatically reduce gas bills, improving the lives of millions of people currently living in energy poverty, and it would decrease vulnerability to gas supply interruptions and effectively reduce dependence on Russian gas.

WE NEED MORE RENEWABLE ENERGY, NOT MORE GAS

Fossil gas is far from being a low-carbon energy source, as demonstrated in Myth 1 and 2. This is why we must instead massively invest in renewable energy sources, the only suitable low-carbon solution that can help us achieve our decarbonisation objectives, as set out in the Paris Agreement. What's more, renewable energy sources have become cheaper to produce than any energy produced with fossil fuels, gas included.[103] This means LNG terminals may quickly become stranded assets, as highlighted by various energy experts, including some working for the European Commission.[104] Given this context, it is hardly surprising that, in 2017, across the world more renewable energy capacity was added than new fossil fuel generation.[105]

Much greater efforts however are needed. Although Croatia has already met the EU's 2020 renewable energy targets, this is mostly thanks to hydropower, which is not a 'green' and sustainable energy source.[106] Ineffective legislation and a strong fossil fuel lobby have prevented further development of renewable energy sources, particularly wind and solar. This is a missed opportunity, considering that solar energy alone has enough technical potential to completely meet Croatia's electricity needs.[107] Renewable energy projects are the only kinds of development with the potential to build the socially sustainable, decentralized energy system we need.[108]

Krk island is particularly symbolic in this regard as, ironically, its local authorities are currently leading renewable energy development in Croatia.[109] They are aiming to become the first zero-emissions, fossil-free and fully energy-independent island in the Mediterranean region by 2030. They plan to build a 5MW solar plant by the end of 2019, which would be owned by a local municipality.[110] The island is also a member of the EU Smart Islands Initiative,[111] which aims to increase efficiency in the management of island infrastructure, improve quality of life, and achieve savings for taxpayers.[112]

CONCLUSION

The plan to locate the heart of a major new fossil fuel infrastructure project on the island of Krk goes against the new economic dynamic in the sector, whereby renewable energy is now more cost-competitive, neglects the energy security benefits of investment in energy savings, and tramples all over the sustainable decarbonisation initiatives being taken locally.

Setting the facts straight

1. A new LNG terminal is at odds with the Paris Agreement and the newest IPCC scientific report;

2. Gas is a carbon intensive fossil fuel that does not deserve its climate-friendly reputation, nor its transition fuel designation;

3. Gas infrastructure, such as the Krk LNG terminal, creates significant environmental and health impacts, and does not merit its clean and safe reputation;

4. Taking into account existing gas infrastructure, and projects currently under construction in the region, Croatia and its neighbouring countries are already energy secure, and sufficiently resilient. This means the Krk LNG terminal is unnecessary, and doubly so given the planned decline of gas demand all over Europe in the coming decades;

5. Building new gas infrastructure to counter Russian gas dominance is not just the wrong strategy, it is a failed one: many existing infrastructure are largely underused and several new projects under construction will in fact bring even more Russian gas to Europe;

6. The Krk LNG terminal is an unnecessary but expensive project, with questionable market demand, and so it will largely be paid for with taxpayers' or consumers money;

7. The Krk LNG terminal is being pushed forward against the interests of the local population and consumers, with little transparency or consideration given to public opinion;

8. To improve the energy security of Croatia and its neighbouring countries, and to decarbonise their energy systems, there are other proven, cost-competitive and much more sustainable solutions. Namely, reducing our energy needs through energy efficiency programmes, and large-scale development of renewable energy sources.

It is for all of these reasons that opposition to the construction of the Krk LNG terminal has sprung up locally, nationally and at the European level. Groups of concerned citizens, local municipalities, and NGOs are fighting against the project, contributing to public consultations, launching legal actions, putting pressure on decision-makers, and building bridges with other communities fighting similar toxic projects in other European countries.

Climate change is a threat we cannot ignore, and the time for baby steps and compromises has run out. Fossil fuels are the main contributors to humanity's greenhouse gas emissions, and so we must phase them out as soon as possible, and immediately stop constructing new fossil fuel infrastructure.

OUR DEMANDS

— BASED ON THE NEWEST CLIMATE SCIENCE, GAS DEMAND PROJECTIONS, AND THE INCREASINGLY LOW COSTS OF RENEWABLES, THE CROATIAN GOVERNMENT – AS THE MAIN SHAREHOLDER OF LNG CROATIA D.O.O. - SHOULD RECONSIDER ITS POSITION, AND GIVE UP ON THE KRK LNG PROJECT;

— FURTHER PUBLIC INVESTMENT INTO NEW GAS INFRASTRUCTURE SHOULD BE STOPPED, BOTH IN CROATIA AND AT THE EU LEVEL;

— INSTEAD, THOSE FUNDS SHOULD BE INVESTED INTO RENEWABLE ENERGY ALTERNATIVES, PRIMARILY SOLAR AND WIND, AND INTO ENERGY EFFICIENCY;

— THE NEW CROATIAN NATIONAL ENERGY STRATEGY, WHICH IS CURRENTLY BEING DRAFTED, SHOULD REFLECT ALL OF THE PRECEDING POINTS;

— SINCE THE KRK LNG PROJECT DOES NOT FULFIL THE EU'S ENERGY UNION OBJECTIVES REGARDING SUSTAINABILITY AND REAL ENERGY NEEDS, THE EUROPEAN COMMISSION SHOULD REMOVE THE PROJECT'S PCI STATUS, AND CANCEL THE FINANCIAL SUPPORT IT PROMISED IN 2017. LIKEWISE, THE EIB SHOULD REFUSE IT FUNDING;

— THE EU SHOULD GO FOSSIL FREE BY 2030, IN ORDER TO HAVE A CHANCE OF KEEPING ITS CLIMATE COMMITMENTS, AND KEEPING THE GLOBAL TEMPERATURE INCREASE BELOW 1.5C.

References

1. The Guardian, We have 12 years to limit climate change catastrophe, warns UN, 08/10/18, https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report
2. The Guardian, World has no capacity to absorb new fossil fuel plants, warns IEA, 13/11/18, https://www.theguardian.com/business/2018/nov/13/world-has-no-capacity-to-absorb-new-fossil-fuel-plants-warns-iea
3. European Commission, Projects of Common Interest, https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest
4. In 2016, LNG Croatia d.o.o. was nominated by the Croatian Government to develop the project. The company is owned by electricity firm HEP and natural gas transmission system operator PLINACRO, which are 100% state owned.
5. €101.4 million for construction and €747,000 for development studies. European Commission, EU invests €444 million in key energy infrastructure, 17/02/17, http://europa.eu/rapid/press-release_IP-17-280_en-.htm
6. Total Croatia News, Disappointing interest for potential LNG terminal in Croatia, 14/04/18, https://www.total-croatia-news.com/business/27469-disappointing-interest-for-potential-lng-terminal-in-croatia
7. VL, Manjim troškovima do većeg interesa za zakup LNG-a, 19/06/18, https://www.vecernji.hr/vijesti/manjim-troskovima-do-veceg-interesa-za-zakup-lng-a-1252758
8. UN Paris Agreement, 2015, https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf
9. LNG Croatia, About us, https://www.lng.hr/en/about-us
10. Plinacro, Environmental Protection in Plinacro, http://www.plinacro.hr/default.aspx?id=667
11. Climate Action Tracker, Foot Off the Gas: Increased Reliance on Natural Gas in the Power Sector Risks an Emissions Lock-In, June 2017, https://climateactiontracker.org/documents/55/CAT_2017-06-16_DecarbNaturalGas_CATAnalysis.pdf
12. See, for example, Terega, The advantages of natural gas, https://www2.terega.fr/en/who-we-are/natural-gas/the-advantages-of-natural-gas.html
13. Myhre, G., D. Shindell, et al., Anthropogenic and Natural Radiative Forcing, Contribution of Working Group I to the Fifth IPCC Assessment Report, 2013, https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf (page 714)
14. Center for Climate and Energy Solutions, Main Greenhouse Gases, https://www.c2es.org/content/main-greenhouse-gases/
15. The annual increase of methane emissions globally (25 teragram per year) is the equivalent of the yearly gas consumption of the Netherlands, the fifth biggest gas consumer in Europe
16. Worden, J., Bloom, A., et al., Reduced biomass burning emissions reconcile conflicting estimates of the post-2006 atmospheric methane budget, in Nature Communications, Vol. 8, 2017, https://www.nature.com/articles/s41467-017-02246-0
17. Plinacro, Social Responsibility, http://www.plinacro.hr/default.aspx?id=465
18. Biznes Alert, Croatia's President to BA: Trump promised LNG for 3Seas, 10/07/17, http://biznesalert.com/croatias-president-ba-trump-promised-lng-3seas/;Balkan Insight, US Confirms Backing for Croatia's LNG Terminal, 18/01/18, http://www.balkaninsight.com/en/article/the-us-again-backs-croatia-s-planned-lng-terminal-01-18-2018; Croatia, USA: "Krk LNG Terminal Strategically Important", 12/02/18, https://www.total-croatia-news.com/business/25820-croatia-usa-krk-lng-terminal-strategically-important; Reuters, Trump backs Croatia's LNG facility, urges reconciliation in Balkans: White House, 06/07/17, https://www.reuters.com/article/us-poland-usa-trump-croatia-idUSKBN19R1SP
19. Schneising et al, Remote sensing of fugitive methane emissions from oil and gas production in North American tight geologic formations, 2014, http://onlinelibrary.wiley.com/doi/10.1002/2014EF000265/abstract; Peischl et al, Quantifying atmospheric methane emissions from oil and natural gas production in the Bakken shale region of North Dakota, 2016, http://onlinelibrary.wiley.com/doi/10.1002/2015JD024631/abstract
20. European Commission, A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, 28/11/2018, https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf
21. The Guardian, 'Nothing to hide?' Oil and gas lobby pushes to limit data on its emissions, 15/11/18, https://www.theguardian.com/environment/2018/nov/16/nothing-to-hide-oil-and-gas-lobby-pushes-to-limit-data-on-its-emissions
22. US Department of Energy, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States, 29/05/14, https://www.energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf (p.10)
23. Balcombe, P. et al., The natural gas supply chain: The importance of methane and carbon dioxide emissions, in ACS Sustainable Chemistry & Engineering, 2016, doi:10.1021/acssuschemeng.6b00144
24. Reuters, LNG growth to propel oil and gas industry's carbon emissions -WoodMac, 20/09/17, https://www.reuters.com/article/lng-emissions/lng-growth-to-propel-oil-and-gas-industrys-carbon-emissions-woodmac-idUSL5N1LZ4K9
25. Oil Change International, Jordan Cove LNG and Pacific Connector Pipeline Greenhouse Gas Emissions Briefing, January 2018, http://priceofoil.org/content/uploads/2018/01/JCEP_GHG_Final-Screen.pdf
26. Brandt et al, Methane Leaks from North American Natural Gas Systems, in Science, Vol. 343, Iss. 6172, 2014, http://www.sciencemag.org/content/343/6172/733; Zavala-Araiza et al, Reconciling divergent estimates of oil and gas methane emissions, in PNAS Vol. 112, No. 51, 2015, http://www.pnas.org/content/112/51/15597.full.pdf;, Schwietzke et al, Upward revision of global fossil fuel methane emissions based on isotope, in Nature, Vol. 538, 2016, http://www.nature.com/nature/journal/v538/n7623/full/nature19797.html
27. IASS, The Uncertain Climate Cost of Natural Gas, Working Paper, December 2016, http://www.iass-potsdam.de/sites/default/files/files/wp_dec_2016_en_uncertain_climate_cost_of_natural_gas.pdf
28. Plinacro, Social Responsibility, http://www.plinacro.hr/default.aspx?id=465
29. World Resources Institute, This Interactive Chart Explains World's Top 10 Emitters, and How They've Changed, 11/04/17, http://www.wri.org/blog/2017/04/interactive-chart-explains-worlds-top-10-emitters-and-how-theyve-changed
30. CGA, 32nd International Scientific & Expert Meeting of Gas Professionals, May 2017, https://hsup.hr/en/international-meeting/32nd-international-scientific-expert-meeting-of-gas-proffesionals/; Plinacro, Social responsibility, ibid.,
31. UN Paris Agreement, ibid.
32. IPCC, Global Warming of 1.5 °C – Summary for policy-makers, October 2018, http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf
33. Carbon Brief, Analysis: Global CO2 emissions set to rise 2% in 2017 after three-year 'plateau', 13/11/17, https://www.carbonbrief.org/analysis-global-co2-emissions-set-to-rise-2-percent-in-2017-following-three-year-plateau
34. IPCC, Global Warming of 1.5 °C, October 2018, http://www.ipcc.ch/report/sr15/; See also: https://twitter.com/Peters_Glen/status/1050651292178075648
35. IPCC, Global Warming of 1.5 °C, October 2018, http://www.ipcc.ch/report/sr15/; See also: https://twitter.com/Peters_Glen/status/1050651292178075648
36. FoEE, Can the climate afford Europe's gas addiction?, November 2017, http://www.foeeurope.org/NoRoomForGas; Zelena akcija, Imamo samo 9 godina za prestanak korištenja fosilnih goriva!, November 2017, https://bit.ly/2j1XFFc
37. IPCC, Global Warming of 1.5 °C, ibid.
38. ISSUU, Floating Storage and Regasification Units, September 2016, https://issuu.com/lr_marine/docs/floating_storage_and_regasification (p.27)
39. The oldest LNG terminal in Europe is in Barcelona; it was commissioned in 1969 with no plan to stop it.
40. Concerned Health Professionals of New York and PSR, Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking, Fifth Edition, March 2018, http://concernedhealthny.org/wp-content/uploads/2018/03/Fracking_Science_Compendium_5FINAL.pdf
41. Financial Times, Trump administration plans to relax methane regulations, 11/09/18, https://www.ft.com/content/56e049d8-b60b-11e8-bbc3-ccd7de085ffe
42. ENTSOG, Ten-Year Network Development Plan (TYNDP) 2015, Annex_A_Infrastructure_Projects, https://www.entsog.eu/publications/tyndp#ENTSOG-TEN-YEAR-NETWORK-DEVELOPMENT-PLAN-2015
43. Daily Maverick, The SA export credit agency that can invest billions in public money on shadowy projects, 03/09/2018, https://www.dailymaverick.co.za/article/2018-09-03-sa-export-agency-invest-billions-in-money-shadowy-projects/ & https://www.youtube.com/watch?v=I-M6-loDooE&t=6s
44. Desmog, Safety Officials Order Partial Shutdown of Sabine Pass LNG Export Facility After Discovering 10-Year History of Leaks, 18/02/18, https://www.desmogblog.com/2018/02/18/cheniere-sabine-pass-lng-export-facility-history-leaks
Re:Common, "In gas we trust", la nuova pubblicazione di Re:Common, 17/09/13, https://www.recommon.org/in-gas-we-trust-la-nuova-pubblicazione-di-recommon/
45. Analisi Del Rapporto Finale Sulla Sicurezza, Olt Offshore, GNL Toscana, https://cloud.foeeurope.org/index.php/s/k5i42M5QCP7kRTY
46. WWF, L'utilizzo di Acqua di Mare Negli Impianti di Rigassificazione del GNL, 2011, http://www.comitati-cittadini.org/wp-content/uploads/2013/11/wwf_approfondimento-rigassificatori.pdf
47. N1, NGO sues Environment Ministry over LNG terminal, 21/05/18, http://hr.n1info.com/a303948/English/NEWS/NGO-sues-Environment-Ministry-over-LNG-terminal.html
48. Rainforest Action Network, A bridge to nowhere: The climate, human rights & financial risks of LNG export, October 2016,
49. https://www.ran.org/wp-content/uploads/2018/06/LNG_Report_Updated_11.7.pdf
50. Concerned Health Professionals of New York and PSR, ibid., (p.198-210)
51. Russo, P. N., & Carpenter, D. O. Health effects associated with stack chemical emissions from NYS natural gas compressor stations, 2008-2014, October 2017,.https://www.albany.edu/about/assets/Complete_report.pdf

52. Joseph, G. , 30 years of oil and gas pipeline accidents, mapped, CityLab, 30/11/16, https://www.citylab.com/environment/2016/11/30-years-of-pipeline-accidents-mapped/509066/
53. LNG Croatia, About us, ibid., and LNG Terminal Krk in Croatia, https://lng.hr/upload_data/editor/files/LNG%20terminal%20Krk_presentation_Open%20Season.pdf
54. Energy Union Choices, A Perspective on Infrastructure and Energy Security In the Transition, http://www.energyunion-choices.eu/wp-content/uploads/2017/08/EUC_Report_Web.pdf
55. Oxford Institute for Energy Studies, Natural gas demand in Europe in 2017 and short term expectations, April 2018, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/04/Natural-gas-demand-in-Europe-in-2017-and-short-term-expectations-Insight-35.pdf
56. Poslovni dnevnik, Hrvatska ima naftu i plin, no ti potencijali nisu dovoljno iskorišteni, 15/05/18, http://www.poslovni.hr/hrvatska/hrvatska-ima-naftu-i-plin-no-ti-potencijali-nisu-dovoljno-iskoristeni-340928
57. https://fgsz.hu/en-gb/rolunk/beruhazasok/varosfold-slobodnica & https://fgsz.hu/en-gb/Documents/41/FGSZ_Annual%20report_2015.pdf (p.60)
58. BPIE, ibid,
59. Oxford Institute for Energy Studies, ibid.
60. Eurostat, Supply, transformation and consumption of gas - annual data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_103a&lang=en
61. ENTSOG, Transmission Capacity Map 2017, https://www.entsog.eu/maps/transmission-capacity-map/2017
62. Reuters, Hungary joins Gazprom pipeline, as Trump touts U.S. LNG, 05/07/17, https://www.reuters.com/article/us-russia-hungary-gas-idUSKBN19Q1YE; Caspian News, Russia May Expand TurkStream Gas Pipeline To Hungary, 22/09/18, https://caspiannews.com/news-detail/russia-may-expand-turkstream-gas-pipeline-to-hungary-2018-9-20-50/; Kommersant, Gazprom made pipe selection, 22/11/2018, https://www.kommersant.ru/doc/3806415
63. ENTSOG, TYNDP 2017 Presentation, https://cloud.foeeurope.org/index.php/s/IHbOqqPJmE0F2qt
64. Energy Union Choices, Evaluation of security of supply and gas infrastructure needs in NSI East, 2016, https://www.energyunionchoices.eu/wp-content/uploads/2017/07/EUC_NSIEast_final.pdf
65. European Commission, Energy efficiency first: Commission welcomes agreement on energy efficiency, 19/06/18, http://europa.eu/rapid/press-release_STATEMENT-18-3997_en.htm
66. European Commission, A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, 28/11/2018, https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf
67. Oxford Institute for Energy Studies, The Russian-Ukrainian gas crisis of January 2006, by Jonathan Stern, 2006, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/Jan2006-RussiaUkraineGasCrisis-JonathanStern.pdf, and, The Russo-Ukrainian gas dispute of January 2009: a comprehensive assessment, 2009, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG27-TheRussoUkrainianGasDisputeofJanuary2009AComprehensiveAssessment-JonathanSternSimonPiraniKatjaYafimava-2009.pdf
68. Pacific Northwest National Laboratory, Estimating Methane Emissions From the Russian Natural Gas Sector, March 2001, http://www.globalchange.umd.edu/data/aisu/publications/PNNL-13462.pdf
69. ENTSOG, TYNDP 2017 Presentation, ibid.
70. IGU, 2018 World LNG Report, https://www.igu.org/sites/default/files/node-document-field_file/IGU_LNG_2018_0.pdf (p.49)
71. Cedigaz, Gas Storage in Europe, recent developments and outlook to 2035, 29/01/2015, http://www.cedigaz.org/documents/2015/Gas%20Storage%20in%20Europe,%20recent.pdf
72. Trinomics, The role of Trans-European gas infrastructure in the light of the 2050 decarbonisation targets, 05/11/2018, https://cloud.foeeurope.org/index.php/s/6ePMMBRtR2L8jWn
73. Reuters, UPDATE 1-Russian gas exports to Europe hits all-time high in 2017, 03/01/18, https://af.reuters.com/article/africaTech/idAFL8N1OY2I2
74. Gazprom, Nord Stream 2, http://www.gazprom.com/projects/nord-stream2/
75. Natural Gas World, TurkStream 2 seeks routes into Europe, 16/08/18, https://www.naturalgasworld.com/ngw-magazine-vol-3/15-63042, Russia, Hungary Hold Talks, Sign 'Deal', 19/09/18, https://www.naturalgasworld.com/russia-hungary-hold-talks-sign-deal-64464, Bulgaria keeps close to Russia, 30/07/18, https://www.naturalgasworld.com/ngw-magazine-vol-3/14-bulgaria-keeps-close-to-russia-62898
76. Novatek, Yamal LNG infrastructure, http://www.novatek.ru/en/business/yamal-lng/yamal_infrastructure/
77. LNG World News, LNG Croatia plans smaller project, issues new FSRU tender, 09/05/18, https://www.lngworldnews.com/lng-croatia-plans-smaller-project-issues-new-fsru-tender/
78. Total Croatia News, LNG Croatia plans smaller project, issues new FSRU tender, 03/08/18, https://www.total-croatia-news.com/business/30191-lng-croatia-looking-for-floating-terminal
79. V4, Croatia announced a new tender for LNG terminal Krk, 08/04/15, http://visegradplus.org/croatia-announced-a-new-tender-for-lng-terminal-krk/
80. ACER, Consolidated Report on the progress of electricity and gas Projects of Common Interest for the year 2017, https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/Consolidated%20Report%20on%20the%20progress%20of%20electricity%20and%20gas%20projects%20of%20Common%20Interest%20for%20the%20year%202017.pdf (p.83)
81. ENTSOG Ten-Year Network Development Plan 2020, https://www.entsog.eu/publications/tyndp#ENTSOG-TEN-YEAR-NETWORK-DEVELOPMENT-PLAN-2018
82. LNG Croatia, LNG Terminal Krk in Croatia, ibid.
83. Total Croatia News, Disappointing interest for potential LNG terminal in Croatia, ibid.; Novac.hr, Tko će na kraju platiti izgradnju LNG-a? Ako ne bude isplativ ceh bi mogao čekati građane, 03/06/18, https://novac.jutarnji.hr/aktualno/tko-ce-na-kraju-platiti-izgradnju-lng-a-ako-ne-bude-isplativ-ceh-bi-mogao-cekati-gradane/7422306/; LNG World News, LNG Croatia opens new terminal capacity bidding round, 25/06/18, https://www.lngworldnews.com/lng-croatia-opens-new-terminal-capacity-bidding-round/ and, LNG Croatia extends terminal capacity bidding round deadline, 03/08/18, https://www.lngworldnews.com/lng-croatia-extends-terminal-capacity-bidding-round-deadline/;Novilist.hr, LNG ČEKA MAĐARE Još jednom produljen rok za obvezujuće ponude za zakup terminala, 28/09/18, http://www.novilist.hr/Vijesti/Hrvatska/LNG-CEKA-MADARE-Jos-jednom-produljen-rok-za-obvezujuce-ponude-za-zakup-terminala
84. Total Croatia News, EU approves 102 million euros for LNG Terminal in Croatia, 17/02/17, https://www.total-croatia-news.com/business/16623-eu-approves-102-million-euros-for-lng-terminal-in-croatia
85. EIB, KRK LNG Terminal, http://www.eib.org/en/projects/pipelines/pipeline/20140627
86. Novac.hr, Tko će na kraju platiti izgradnju LNG-a?, ibid.
87. Oxford Institute for Energy Studies, US LNG vs Russian pipeline gas: impact on prices, by Dr Thierry Bros, November 2017, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/11/Energetika-20171109.pdf
88. See Antoine Simon (FoEE) on Twitter: https://twitter.com/FoEE_Antoine/status/1042375619269591040
89. European Commission, Projects of Common Interest, ibid.
90. European Commission, PCI 2018 – 2019, Meeting of TEN-E Gas cross -Regional Groups and CO2 networks thematic group, 07/11/18, https://cloud.foeeurope.org/index.php/s/n3ZLCJCcWzFt8RS
91. European Commission, Report: How successful are the Member States in implementing the EIA Directive, 2003, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52003DC0334&from=EN
92. European Commission, Environmental Impact Assessment, http://ec.europa.eu/environment/eia/eia-legalcontext.htm
93. Zelene akcije, LNG terminal na Krku – neisplativ i neprihvatljiv gubitak!, 08/03/18, http://zelena-akcija.hr/hr/kampanje/aktualne_kampanje/kontra_lng_a/lng_terminal_na_krku_neisplativ_i_neprihvatljiv_gubitak
94. N1, NGO sues Environment Ministry over LNG terminal, ibid.
95. Zelene akcije, FoE Croatia's anti-LNG campaign continues despite the adoption of a special law!, 14/06/18, http://zelena-akcija.hr/en/programmes/energy_and_climate_change/foe_croatias_anti_lng_campaign_continues_despite_the_adoption_of_a_special_law
96. Zelene akcije, Sabor mora glasovati protiv lex LNG – 18.944 građana i građanki je tako odlučilo!, 08/06/18, http://zelena-akcija.hr/hr/kampanje/aktualne_kampanje/kontra_lng_a/sabor_mora_glasovati_protiv_lex_lng_18_944_gradana_i_gradanki_je_tako_odlucilo
97. IRENA et al, Cost-Competitive Renewable Power Generation: Potential across South East Europe, 2017, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/IRENA_Cost-competitive_power_potential_SEE_2017.pdf?la=en&hash=DE44F51BDDFB43D4CB8D880B5AB71713447BA043
98. European Commission, Energy Union - the year of engagement, 24/11/17, http://europa.eu/rapid/press-release_IP-17-4725_en.htm
99. European Commission, The EU will be in the driving seat of the clean energy transition, 14/11/16, https://ec.europa.eu/energy/en/news/eu-will-be-driving-seat-clean-energy-transition
100. Energy Union Choices, Evaluation of security of supply and gas infrastructure needs in NSI East, ibid.
101. European Commission, Energy efficiency first..., ibid.
102. BPIE, Safeguarding Energy Security in South-East Europe with Investment in Demand-Side Infrastructure, 2016, https://www.energyunionchoices.eu/wp-content/uploads/2017/08/Safeguarding-energy-security-in-South-East-Europe-with-investment-in-demand-side-infrastructure.pdf
103. Forbes, Production Cost Of Renewable Energy Now 'Lower' Than Fossil Fuels, 24/04/18, https://www.forbes.com/sites/gauravsharma/2018/04/24/production-cost-of-renewable-energy-now-lower-than-fossil-fuels/
104. The Brattle Group, LNG and Renewable Power Risk and Opportunity in a Changing World, 2016, http://files.brattle.com/system/publications/pdfs/000/005/249/original/lng_and_renewable_power_-_risk_and_opportunity_in_a_changing_world.pdf?1452804455; Trinomics, The role of Trans-European gas infrastructure in the light of the 2050 decarbonisation targets, November 2018, https://cloud.foeeurope.org/index.php/s/dix4E9EjTaawkmY
105. Reuters, Record amount of renewable energy installed in 2017 – research, 03/06/18, https://uk.reuters.com/article/uk-global-renewables/record-amount-of-renewable-energy-installed-in-2017-research-idUKKCN1IZ0YL
106. Climate Policy Observer, Nine EU countries achieved 2020 renewable energy target, 12/02/16, http://climateobserver.org/nine-eu-countries-achieved-2020-renewable-energy-target/
107. ZEZ, Prelazak Hrvatske na 100% obnovljivih izvora energije, 2015,http://www.greenpeace.org/croatia/Global/croatia/Prelazak%20Hrvatske%20na%20obnovljive%20izvore%20energije.pdf;Prelazak Hrvatske na 100% OIE (2015), http://www.zez.coop/prelazak-hrvatske-na-100-oie-2015/
108. Energy Democracy: Germany's Energiewende to Renewables, http://energiewendebook.de/; What is the German Energiewende?, https://www.youtube.com/watch?v=NBx493I0W7k
109. CASI, Krk Island: Towards Energy Independence and Zero CO2 Emissions, http://www.casi2020.eu/casipedia/cases/krk-island-towards-energy-independence-and-zero-co2-emissions/;see also: Eko zona HTV Konferencija Smart Islands Krk, https://www.youtube.com/watch?v=ikPbA9L7hrw
110. Energetika-net, Otok Krk bi uskoro trebao dobiti sunčanu elektranu od 5 MW, 13/09/18,http://www.energetika-net.com/vijesti/obnovljivi-izvori-energije/otok-krk-bi-uskoro-trebao-dobiti-suncanu-elektranu-od-5-mw-27405
111. Smart Islands, https://smartislands.org/
112. Covenant of Mayors, Krk Smart Island, 2016, https://www.eumayors.eu/IMG/pdf/Krk_2016.pdf

PIPE-DREAM

DEBUNKING THE MYTHS OF CROATIA'S KRK GAS TERMINAL

Friends of the Earth Europe

FOSSIL FREE EUROPE

ZELENA AKCIJA
FRIENDS OF THE EARTH CROATIA