# EUCERS Newsletter

**Newsletter of the European Centre for Energy and Resource Security (EUCERS)** **Issue 84, May 2019**

## Introduction

Dear readers and friends of EUCERS,

It is my great pleasure to welcome you to this edition of the EUCERS newsletter. As always, we present you with two articles concerning the topic of energy security.

In the first article, Dénes Csala, a lecturer at the University of Lancaster, outlines some sunny options for the petro-states Gulf region.

The second article, written by our Director Friedbert Pflüger, gives a European view on the North Stream II gas pipeline project.

As always, please feel free to keep us informed about your research projects and findings as we look to remain at the forefront of new knowledge and innovative ideas.

Thank you for your interest in EUCERS and for being part of our community.

Yours faithfully,
**Thomas Fröhlich**
EUCERS Newsletter Editor

**In this Month's Edition:**

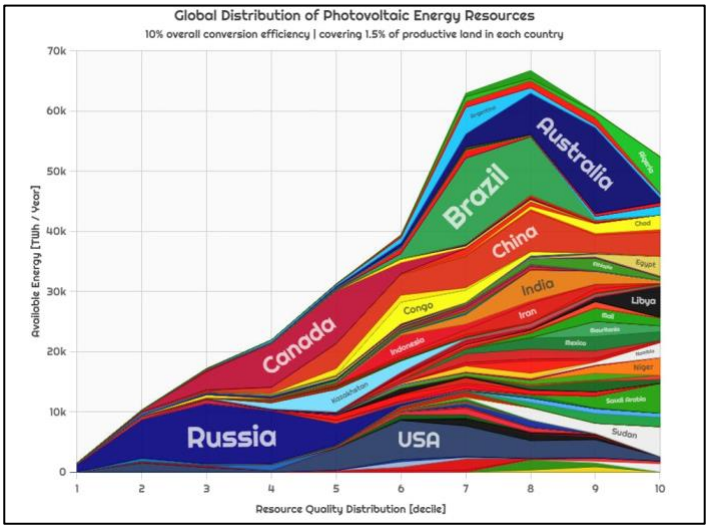
**ARTICLES**

## Why the new 'solar superpowers' will probably be petro-states in the Gulf

*By Dénes Csala*

***Every now and then, the idea of powering Europe using the vast solar resources of the Sahara Desert comes up. Were this to actually happen, we may witness the rise of new energy superpowers in Northern Africa. But a look at the economic and political energy system suggests what's more likely is the oil-rich countries of the Persian Gulf will continue to dominate energy trade even in the post-fossil era.***

Renewable energy, of course, is very location dependent – the sunnier a place is, the more energy you get out of photovoltaic panels. Over the course of a year, southern Algeria, for example, gets more than twice as much solar energy as southern England. The graph below, which I put together as part of my PhD, shows that some of the best solar resources in the world are indeed found in Algeria, Libya, Egypt, Niger, Chad and Sudan.

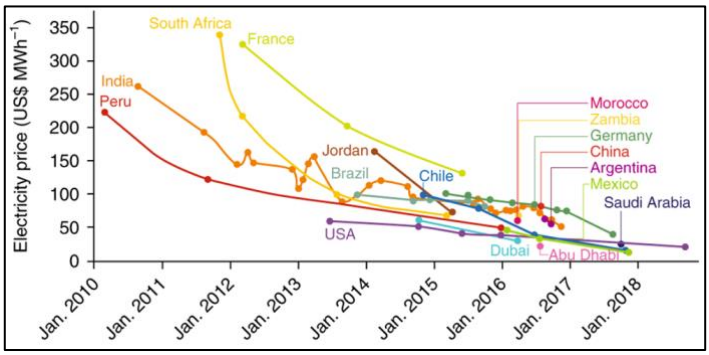



Russia and Canada have lots of low-solar land, but the most sunny areas are elsewhere. Denes Csala / NREL, Author provided.

So, one could build large Saharan solar farms and then transmit the power back to densely populated areas of Europe. Such a project would need to overcome various technical challenges, but we can say that in theory it is possible, even if not practical.

**Dénes Csala** is a lecturer in Energy Storage Systems Dynamics with Energy Lancaster. His research interests include system dynamics, energy transitions, energy storage, complex systems, multi-agent systems and data visualization. Dénes obtained a BSc in Electrical Engineering from the Technical University of Cluj-Napoca (2011). Later on, he moved to Masdar Institute of Science and Technology in Abu Dhabi to pursue an MSc in Engineering Systems & Management (2013) and continued for a PhD in Interdisciplinary Engineering (2016).

Yet plans to actually set up mass Saharan solar have floundered. The most notable project, Desertec, was fairly active until the mid 2010s, when a collapse in the price of oil and natural gas made its business case more difficult. At that time, the major technology considered was concentrated solar power, where you use the heat from the sun to run a steam turbine. Energy can be stored as heat overnight, therefore enabling uninterrupted energy supply and making it preferred to then expensive batteries.




Solar is getting cheaper and cheaper. Nature.

Since then, however, the cost of both solar panels and battery storage have dropped drastically. But, while conditions might look favourable for Saharan solar, it is unlikely that new solar energy kingpins will arise in North Africa. Instead, we should look one desert further to the East – the Rub al Khali on the Arabian peninsula, the home of the reigning energy powers.

### Sun shines on the Gulf

The economies of the United Arab Emirates, Saudi Arabia, Qatar and the other Gulf nations are built around energy exports. And as climate change imposes pressure on the extraction of fossil fuels, these countries will have to look for alternative energy (and income) sources in order to keep their economies afloat. The International Renewable

Energy Agency set up its headquarters in Abu Dhabi, and the region has no shortage of ambitious solar projects promising extremely cheap electricity. However only a small amount of capacity has actually been deployed so far. Low oil revenues have not helped with the megaprojects.

Countries in the Sahara also have little history of trading fossil fuels, outside of Libya and Algeria, while things are rather different for the petro-states of the Gulf. And this matters because, in the energy business, worries over longer-term security of supply mean countries tend to trade with the same partners.

This would be the Achilles' heel of a Northern African energy project: the connections to Europe would likely be the continent's single most important critical infrastructure and, considering the stability of the region, it is unlikely that European countries would take on such a risk.

Which brings us to an alternative way to transmit energy: hydrogen. A process called electrolysis can use renewable electricity to split water into hydrogen and oxygen, and the resulting hydrogen can store lots of energy. Soon it will become feasible to move energy around the world in this form, using shipping infrastructure similar to that already in use today for liquefied natural gas.

Sure, there are disadvantages compared to batteries. It would mean introducing two more conversion stages and thus reduced efficiency (30% roundtrip efficiency compared to 80% for batteries), but it would overcome the distance barrier. And perhaps just as importantly: shipping energy by hydrogen would mean no significant change to the existing maritime trade infrastructure, which will hand an advantage to established energy exporters.

If this means the Sahara is unlikely to develop renewable energy superpowers, then perhaps this is for the better. With the booming populations of Sub-Saharan Africa in dire need of electrification, clean solar power might be better used to alleviate the energy crisis in somewhere like Nigeria rather than sent to Europe. While these countries may eventually be able to shake off any solar resource curse, in the short term, exports like these could just look like yet another European attempt to extract natural resources from Africans.

This article was first published in The Conversation.

## A European View: Europe, Nord Stream 2, and Diversification

*By Friedbert Pflüger*

***During his 2019 State of the Union speech, President Donald Trump claimed credit for getting European NATO members to pay an additional $100 billion in military outlays to the alliance by the end of 2020. Similarly, instead of raising the specter of further sanctions on Russia that would impact European allies, the United States should claim credit for ameliorating European energy security by contending that these improvements—including additional liquefied natural gas (LNG) capacity, storage, and reverse flow capability—are ultimately a result of US efforts following the Ukraine gas crises of 2005–2006 and 2008–2009.***

The Russian-Ukrainian gas crises of the last decade demonstrated how susceptible the European Union (EU) was to supply shortages and showed the power individual suppliers were able to wield when deciding (or even only threatening) to shut off supply. Therefore, at the time, the onus was on the EU to address the persisting supply security concerns of Central and Eastern European countries particularly affected by the crises.

Over the past decade, the EU has achieved security of gas supply by significantly expanding its LNG infrastructure, building additional storage capacities, implementing pipeline reverse flow capabilities, eliminating restrictive destination clauses, and constructing a multitude of energy infrastructure projects. It is now well on its way to achieving a highly competitive, liquid, and transparent internal gas market, thus rendering sanctions on projects like Nord Stream 2 unnecessary.

LNG a Key Component of EU Energy Security

Today, the EU has roughly thirty LNG import terminals with a balanced distribution across countries (nearly half of all EU countries have import terminals), primarily along its northern and southwestern coasts. Over the past decade alone, it has added approximately 70 billion cubic meters per year (bcm) in large-scale re-gasification capacity, bringing the total to about 215 bcm, which is enough to cover over 40 percent of the bloc's annual gas demand, as of 2018. What is more, the EU's LNG import capacity is set to grow in the coming years. This is a result of additional terminals currently under construction, current and planned expansions at some existing LNG terminals, and roughly twenty new facilities with, at least, an additional 50 bcm in import capacity being planned or considered—such as in Germany, where discussions are intensifying.

**Friedbert Pflüger** is the director of EUCERS. He was a Member of the German Bundestag (1990-2006), Secretary of State in the German Federal Ministry of Defence (2005–2006) and Member of the Berlin House of Representatives (2006–2011). Friedbert is also is a senior fellow with the Atlantic Council Global Energy Center and senior advisor at the World Energy Council's Global Gas Centre.

On February 12, 2019, US Deputy Secretary of Energy Dan Brouillette attended a meeting in Berlin with German Minister for Economic Affairs and Energy Peter Altmaier, as well as with the heads of four German LNG projects to discuss opportunities for collaboration. It is clear that the EU takes its quest to ensure the security of gas supply seriously when it is still considering expanding LNG import capacities, despite an average utilization rate of only about 25 percent in 2018. This has partly to do with rising import needs due to dwindling European domestic production, which is expected to decline by 40 percent—causing the bloc's import dependency to increase to around three-quarters in 2040. However, the EU focus on security of gas supply also has to do with keeping all options open and maintaining leverage in price discussions. It is not necessarily the amount of gas that is sourced from a particular supplier that determines the grade of dependency, but whether supply alternatives are available.

Former US Ambassador Richard Morningstar put it very aptly in a recent speech at Piraeus University in Greece: "LNG must be price competitive and little will be sold unless it can compete with piped gas. In one sense, however, it doesn't even matter how much is sold. The key point from an energy security aspect is simply that the LNG is available, because if it is available…it will keep prices down. That will help keep gas from being used by Russia as a political tool and imposing monopolistic prices on gas." Case in point is the startup of Lithuania's LNG import facility in Klaipeda in 2014, which led to Gazprom

offering a 20 percent discount on deliveries in 2015. This investment paid off even before a single shipment of liquefied gas had reached the Baltic state.

EU Progress on Gas Storage and Reverse Flows

The EU has also significantly increased its storage capacity, by approximately 75 percent, since 2011, which now represents a fifth of annual consumption. In international comparisons, the bloc fares very well. Four of the top eight countries with the largest gas storage capacities in the world are in the EU. Furthermore, Germany—the EU country with the largest capacity—is ranked fourth globally behind the US, Russia, and Ukraine. Today, there are approximately two hundred operational gas storage facilities spread across nineteen EU member states, with over fifty more planned or under construction.

The wide geographical spread of storage facilities has a distinct advantage, as it offers the benefit of a physical asset located in close proximity to diverse demand centers. This allows member states and their respective transmission system operators (TSOs) to ensure system integrity and to provide backup supplies flexibly to neighboring states in case of delivery disruptions and unexpected events, such as prolonged cold spells or accidents. The resilience of the EU gas network was put to the test when an explosion occurred at Austria's Baumgarten gas hub in the winter of 2017, which would have had the potential to hamper the delivery of gas to Italy and southern Europe significantly. Yet, thanks in part to abundant storage capacities, markets continued to supply consumers in Italy and elsewhere throughout the period of disruption. Moreover, storage plays a crucial role in fostering competition and boosting market liquidity, as well as accelerating the expansion of renewable energy. As the growth in intermittent wind and solar power continues—combined with an increasing pivot away from coal—so too will the EU's reliance on natural gas as a flexible back-up fuel rise, for which additional storage capacities are necessary.

Today, gas can flow not only from east to west but in all directions, due to significantly improved "reverse flow" capabilities. The EU passed an extensive gas supply security regulation in 2010 (later amended in 2017) that requires permanent bi-directional capacity to be established in all cross-border interconnections between member states, thus allowing for physical reverse flows of gas. Any new cross-border interconnections are required to apply for an exemption and have to prove demonstrably that "reverse flow capacity would not significantly enhance the security of supply of any Member State or region or…the investment costs…significantly outweigh the prospective benefits for security of supply."

Since the enforcement of this regulation, a significant share of the EU's key gas pipelines have been outfitted or constructed with reverse flow capabilities, allowing for west-to-east and south-to-north gas flows and making European countries, which are particularly vulnerable to gas cut-offs of Ukrainian transit, considerably more resilient. Countries in the Baltics and Central and Eastern Europe have been constructing new gas links with each other in order to decrease their dependency on external suppliers like Russia. As a result, many reverse flow connections have been added at key EU intersections, including the Latvia-Lithuania interconnection, Lanzhot interconnection point between the Czech Republic and Slovakia, Arad-Szeged between Romania and Hungary, Veľké Zlievce between Hungary and Slovakia, the Hungary-Slovenia interconnector, and the Rogatec interconnector between Croatia and Slovenia, just to name a few. At the same time, Ukraine's position has also been strengthened with reverse flow pipelines like Hermanowice between Poland and Ukraine and the Bereg Darots interconnection point between Hungary and Ukraine, allowing it to reduce direct gas purchases significantly (coupled with its own domestic resources) from Gazprom. Additionally, a significant number of additional reverse flow projects are being upgraded, constructed, and planned to boost the region's energy security even further, for instance the Bi-directional Austrian Czech Interconnection (BACI), the Latvia-Lithuania interconnection, the Brod-Zenica reverse flow pipeline, and the Southern Interconnection pipeline. Moreover, the free flow of gas within Europe has been facilitated, not only by the physical construction of infrastructure, but also by a regulatory measure enacted by the EU Commission that has eliminated the use of territorially restrictive destination clauses by invoking Article 9 of its antitrust Regulation 1/2003, thus allowing member states to freely trade gas with each other.

Projects of Common Interest: Infrastructure Expansion

Additional EU-financed projects meant to increase competition are in the planning or construction phase, such as Projects of Common Interest. In 2014, the Atlantic Council and Central Europe Energy Partners (CEEP) drafted a joint report advocating for an accelerated construction of a North-South corridor of energy, transportation, and communications links, stretching from the Baltic Sea to the Adriatic and Black Seas. Ultimately, the goal was to help bolster the EU's commitment to funding energy infrastructure projects that lacked immediate commercial justification, but that were essential for long-term energy security—a "security premium" that European taxpayers should pay for the secure delivery of supplies. Given the historical experience of Central and Eastern European states, this was not only justifiable, but also widely accepted in Germany and throughout Europe. Since then, the EU has significantly expanded its energy infrastructure. In 2017 alone, European taxpayers, via the EU's "Connecting Europe Facility" funding scheme, granted €873 million to seventeen energy projects. An additional commitment of almost €9 billion until 2027 has been made for additional energy projects. These projects have included the interconnectors between Estonia and Finland, Bulgaria and Greece, and the new Baltic Pipe, which will transport gas from Norway to Poland. Gas infrastructure and gas supply have meanwhile become so developed that no single European country is faced with a monopoly any longer.

Diversification: New Gas from New Suppliers

Ultimately, at no point in history has the EU been better positioned to add new gas suppliers hovering on the horizon to its already diverse basket of providers, including Russia, Norway, Algeria, Libya, Qatar, the US and—in the near future—Azerbaijan via the Trans Adriatic Pipeline (TAP). The TAP project, which ultimately won the race against Nabucco to deliver Azeri gas to the EU via the "Southern Corridor," is scheduled to be operational in 2020. It will initially deliver 10 bcm annually to the EU with the option to ramp up volumes to 20 bcm in the future. Another promising new source of gas is the Eastern Mediterranean. After signing a Memorandum of Understanding in December of 2017, Israel, Cyprus, Greece, and Italy agreed in late 2018 to lay a pipeline connecting Israel's gas reserves in the Eastern Mediterranean to the three countries. There are significant political impediments but, if realized, the project would have a capacity of 10 to 20 bcm and would traverse 2,100 kilometers. This would make it the world's longest underwater gas pipeline, estimated to cost nearly $7 billion and expected to be operational as soon as 2025. The EU is backing the deal and has spent $100 million performing feasibility studies with positive results.

Such projects again underscore the EU member states' efforts to diversify their gas routes and sources of supply as much as possible, driven by the rationale that every gas delivery to the EU strengthens market liquidity, which, unlike ten years ago, is a classic buyers' market today. Political blackmail by external suppliers is hardly imaginable any longer against this backdrop – there is too much gas on offer and too many supply alternatives for this to happen.

EU Gas Directive

All this shows that the EU has made great advances in increasing its energy security over the past decade, not least due to the efforts of former EU Energy Commissioner Günther Oettinger. But, these measures have also come at great financial cost and much political compromise, most recently illustrated by the disagreement between France and Germany regarding the regulation of Nord Stream 2. A compromise was eventually reached, not just between the two countries, but by twenty-seven EU member states (Bulgaria abstained) that made an amendment to the EU Gas Directive to allow internal EU market regulations to be extended to pipelines to and from non-EU countries, including Nord Stream 2. This agreement underscores how seriously EU member states take the issue of regulation and ensuring energy security, even at the risk of fraying political relations.

Conclusion

Although significant work needs to be done to complete many of these projects, thanks to the EU's huge efforts, the mission will be completed. Washington should acknowledge the advances the EU has made in increasing its energy security, in part thanks to the US' own advice.

The Trump Administration has made significant effort over the past several months to enhance its strong working relationship with its European partners and to work with Europe to develop an integrated and competitive market. At the same time, it seems that the US may be overly willing to utilize extra-territorial sanctions in its diplomacy. Possible unilateral sanctions on Nord Stream 2 raise major concerns; from the perspective of many in Europe who are firm believers in a strong trans-Atlantic alliance, there is great concern that sanctions on Nord Stream 2—which could adversely affect some EU allies and their economic interests—will do serious damage to the alliance. Following the annexation of Crimea by Russia, the US and the EU jointly imposed a carefully-coordinated set of sanctions against Russia, with great success. The cooperation between the Americans and, notably, German Chancellor Angela Merkel was a textbook example of how two close allies can effectively take action for mutual benefit. However, if the US should enact unilateral sanctions that could marginalize and harm the EU more than Russia, such measures would foster divisions, not unity, in the West. If Washington pursues this path, many in Europe could well start to ask themselves why they should continue to cooperate with Washington in the energy area.

After the EU's numerous measures to enhance energy security and its decision to amend the Gas Directive, it is time to embrace the EU Commission's proposal for a "Grand Bargain," which suggests that Ukraine, Russia, and the EU engage in a trilateral dialogue to formulate an effective solution. This is the only way to guarantee that a meaningful amount of Russian natural gas continues to flow through Ukraine's transit system. Washington would achieve much by backing a multilateral approach based on mutual understanding to forge a reliable energy partnership that fosters regional peace and stability. To believe that a better outcome can be attained by halting Nord Stream 2 is illusory at best.

This article was first published on the website of the Atlantic Council.

## EUCERS ON THE ROAD

| | |
|---|---|
| 30.05.2019 Bonn, Germany | Friedbert moderated a panel discussion on "Natural Gas – Paving the Way to an Ecological Economy" at the International Business Congress. |
| 29.05.2019 Berlin, Germany | Frank participated at the Simulation-Expert Workshop "Nord Stream 2 – Coping with the Impacts", organised by the Konrad-Adenauer-Foundation (KAS). |
| 22.05.2019 Brussels, Belgium | Frank gave a presentation on "Energy Security in a Digitalized World and its Geostrategic Implications" at the European Political Strategy Centre (EPSC) of the European Commission. |
| 17.05.2019 Allendorf, Germany | Frank gave a presentation on "Globale Energiepolitik – Energiewende in der Kritik" at the Viessmann-KAS-Seminar. |
| 14.05.2019 Luxembourg | Frank gave a full-day training seminar with presentations on "The Security Union: Cybersecurity" at the European Institute of Public Administration (EIPA). |
| 15.04.2019 Islamabad, Pakistan | Frank gave a presentation on "Energy Efficiency and the Electricity Sector" presented at the UNIDO Workshop "Towards Sustainable and Greener Pakistan" on 'Promoting Energy Efficiency and Conservation for Future' at the UN Industrial Development Organization (UNIDO). |

## PUBLICATIONS

Umbach, Frank "The U.S.-China AI Race: A 'Third Way' for Europe?", Geopolitical Intelligence Service (GIS), 25 April 2019, 7 pp. (https://www.gisreportsonline.com/the-us-china-ai-race-a-third-way-for-europe,economy,2860,report.html).

— "New Prospects for EU-LING Imports from the U.S. and other Global LNG Suppliers", in: Central Europe Energy Partners (CEEP)-Report, No.1 (56) 2019, 1.Q., pp. 8-9 (https://gallery.mailchimp.com/d38a92aba449c750209f1f37f/files/32d8179b-eb69-487f-98aa-90c75b7982c5/CEEP_REPORT_Q1_2019.pdf).

## SOCIAL MEDIA

**Follow @eucers on Twitter.**

**Like us on Facebook:** www.facebook.com/EUCERS


**Catch up with us on www.YouTube.com/EUCERS**

## CONTACT EUCERS

If you have found our Newsletter interesting, wish to hear more about our activities, or, indeed, contribute with ideas or essays, please contact Thomas Fröhlich, Newsletter Editor EUCERS on thomas.froehlich@kcl.ac.uk or call 020-7848-1912.

**EUCERS ADVISORY BOARD**

The EUCERS Advisory Board supports the activities of EUCERS King's College London. We would like to thank and present the members of the board.

**Professor Michael Rainsborough,** Chairman of the Board, Head of War Studies, King's College London

**Marco Arcelli**, Executive Vice President, Upstream Gas, Enel, Rome

**Professor Dr Hüseyin Bagci**, Department Chair of International Relations, Middle East Technical University Inonu Bulvari, Ankara

**Andrew Bartlett**, Managing Director, Bartlett Energy Advisers

**Volker Beckers,** Chairman and non-Executive Director of Reactive Technologies Ltd, Vice Chairman (since October 2016) and Member of the Board of Directors (non-Executive Director) of Danske Commodities A/S, Denmark and Chairman, Chair Audit Committee of Albion Community Power Plc

**Professor Dr Marc Oliver Bettzüge,** Chair of Energy Economics, Department of Economics, University of Cologne; Director of the Institute of Energy Economics at the University of Cologne (EWI) and President of the Supervisory Board, ewi Energy Research & Scenarios

**Professor Jason Bordoff,** Professor of Professional Practice in International and Public Affairs, Founding Director, Center on Global Energy Policy, Columbia University, New York

**Professor Brahma Chellaney,** Professor of Strategic Studies, Centre for Policy Research, New Delhi, India

**Dr John Chipman**, Director of the International Institute for Strategic Studies (IISS), London

**Iain Conn,** Group Chief Executive, Centrica plc

**Professor Dr Dieter Helm**, University of Oxford

**Professor Dr Karl Kaiser**, Director of the Program on Transatlantic Relations of the Weatherhead Center for International Affairs, Harvard Kennedy School, Cambridge, USA

**Frederick Kempe**, President and CEO, Atlantic Council, Washington, D.C., USA

**Thierry de Montbrial**, Founder and President of the Institute Français des Relations Internationales (IFRI), Paris

**Chris Mottershead**, Vice-Principal (Research & Development), King's College London

**Hildegard Müller,** Chief Operating Officer (COO) Grid & Infrastructure of Innogy SE

**Janusz Reiter**, Center for International Relations, Warsaw

**Professor Dr Karl Rose**, Senior Fellow Scenarios, World Energy Council, Vienna/London

**Professor Jonathan Stern**, Chairman and Senior Research Fellow, Natural Gas Research Programme, Oxford Institute for Energy Studies

**ACKNOWLEDGEMENTS**

We would like to thank our Partners and Supporters


























**And our Media Partners:**