EUCERS Newsletter

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Introduction

Dear readers and friends of EUCERS,

It is my great pleasure to welcome you to this edition of the EUCERS newsletter, in which we present you with two articles.

In the first article, Marie-Louise Arlt, a PhD candidate at the University of Freiburg, Germany, and currently a Visiting Student Researcher at Stanford University and Lawrence Berkeley National Lab, demonstrates how electricity markets need to be prepared for a world that is dominated by renewable energies.

The second article, by Fernanda Delgado, Klaus Stier and Casemiro Campos from the Getulio Vargas Foundation (FGV) in São Paulo analyse how South America finds itself at the heart of the geopolitics of renewable energy by examining the case of lithium case.

At this point, we would like to ask you to safe the date for our next Energy Talk on 11 September 2018. An invitation will follow shortly.

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

Preparing electricity markets for renewable energies

By Marie-Louise Arlt

Global warming and the potential implications of further increases in average global temperature have pushed the international community to take action and to decarbonize their economies: The European Union (EU) is aiming to decrease greenhouse gas (GHG) emissions by 40% compared to the 1990 level and to increase the share of renewable energies in electricity generation to at least 27% by the year 2030. [1] For the year 2050, the EU sees the potential for a reduction of emissions in the power sector to close to zero. [2] Other countries have formulated similar targets. [3] For the power sector, this objective, however, requires far more than a mere substitution of power plants and will have wide-ranging implications on how we organize and operate our electricity system.

Marie-Louise Arlt is a PhD candidate at the University of Freiburg, Germany, and currently a Visiting Student Researcher at Stanford University and Lawrence Berkeley National Lab. Her research focuses on the market integration of flexible loads in distributed energy systems. She holds a B.Sc. and M.Sc. in Economics from the University of Tuebingen and FernUni Hagen as well as B.Sc. in Engineering Sciences from the Technical University of Munich. Before her graduate studies, she has been working as an analyst of energy markets and systems for the consultancy Ecofys in Berlin.

The vision generally formulated foresees a highly integrated energy system, with technology as a crucial enabler. Suppliers and consumers are connected to a "smart grid" which coordinates between both sides and takes full advantage of existing flexibility potentials to ensure the balance of demand and supply at every point in time. Batteries and other storage options bridge the gap when needed and other sectors such as transportation with fleets of electric vehicles will be neatly integrated. [4]

Many specific questions on how exactly power systems and electricity markets will operate, however, remain unanswered and are subject to intensive research worldwide, requiring contributions from diverse fields such as economics and social sciences, engineering, physics or computer science. This article will not discuss if the set objective is the correct one1 but will rather give insights into selected research questions on market and system operations which need to answer during the process of implementation, and advancement therein.

Progress is made in today's electricity systems with low and medium shares of renewable energies

Today, in Europe's unbundled electricity sector, the wholesale market is designed as a two-sided auction: Generation companies (supply) bid based on their marginal costs and forecasts for renewable energy feed-in while the demand side is represented by retailers setting market positions according to their demand estimates. Demand is largely inelastic because retail prices for the consumer are usually time-independent and do not reflect real-time scarcity. The market is cleared for discrete time intervals, and closes - depending on the country - between 15min and two hours before physical dispatch ("gate closure"). In the likely event of system imbalances and a deviation of the ex post physical dispatch from the ex ante market result, additional reserve control markets with pre-contracted reserves ensure balancing. An overview on the technical details of selected European countries can be found in frontier economics' „METIS Technical Note T4". [5]

This setup with a focus on satisfying existent load through a cost-minimizing dispatch of generation resources by a centralized market operator has worked mostly well for conventional power systems where generation is dispatchable and demand sufficiently forecastable. Increasing shares of renewables, however, challenge this framework on both sides of the market: First, electricity from photovoltaics and wind is not dispatchable but obviously weather dependent. They enter the supply function on the lower side of the merit order and can introduce significant uncertainty for the resulting clearing price and quantity. Second, while system operators were using average load profiles to estimate demand, this strategy is less reliable with an increasing number of customers owning decentral energy resources like photovoltaics (then called "prosumers"), changing their net load profile significantly. Those uncertainties increase risk in market and system operations and balancing costs, especially at the beginning and end of periods of high infeed of renewables. Third, depending on the specific energy systems, the new generation facilities have shifted away

from load centers, sometimes resulting in expensive congestion events like in Germany, see [6], resulting in physically not dispatchable market allocations.

Fortunately, supported by research, changes in market design and regulations have helped to integrate new energy sources and to limit related costs. Most countries have decreased market clearing intervals and postponed gate closure, reducing differences between the market allocation and physical dispatch. Forecasting quality for supply and demand has improved significantly thanks to better models and higher resolution for measurement and simulation. Presumably, new forecasting technologies and algorithms based on machine learning are likely to push that area of research further and translate into actual cost savings, e.g. [7] and [8]. Furthermore, European countries started sharing reserve control and the respective markets have been opened to new participants, increasing competition. Even batteries are now supplying reserve control as the example of Tesla in Australia impressively shows. [9] As a result, total reserve capacity requirements and, therefore, costs could be reduced significantly. In Germany, for instance, positive primary reserve control capacity could be reduced by about 10% from 2009 to 2016, secondary and tertiary about a third. Actual activation has dropped even more [6], consequently decreasing costs for reserve control. [10] Additionally, congestion has been addressed by comprehensive grid infrastructure projects, e.g. [11].

While reducing system imbalances by an improved management of the supply side is certainly important, including demand flexibility could decrease system cost even more. Markets have been opened for demand response, especially in balancing markets. [12] provides an overview of demand response participation in European markets. However, only limited progress has been made in shifting demand into times when renewable energies are abundant and prices low. Some countries and retailers have introduced time-dependent retail rates (Time-of-Use rates) which, however, can only reflect an average scarcity. A big part of the load is on time-independent prices and has no incentive (nor ability) to adjust, with the biggest bottleneck certainly being the technical ability to respond to real-time events, i.e. the availability of smart meters. Changes are likely to be ahead - in its directive COM/2016/0864, the European Commission proposed a roll out for Europe, equipping potentially 72% of European consumers with smart meters until 2020. [13]

A system dominated by renewable energies needs a different approach

Despite the general progress, systems dominated by renewable energies will most probably need a different approach than further flexibilization along the lines of the past years. The following phenomena already occur in today's energy systems with medium shares of renewable energies but will probably be more pronounced or even dominating in the future:

First, weather-dependent electricity supply by wind and solar is unlikely to match the current price- unresponsive demand. [14] shows the time series for Germany, with shares of renewable energies in terms of consumption ranging from a few percentage points (dispatchable biomass and hydropower only) to close to 100% during significant infeed of wind and solar power (e.g. on January 01, 2018). Significant research efforts are made to develop suitable storage technologies, however, enhanced demand flexibility is most likely needed to achieve cost-efficient system operation. Current research is investigating how much flexibility or demand response can practically be provided, see e.g. [15] for industrial loads. Pilot projects have been deployed to estimate price-responsiveness of residential customers (without automation), finding an average price elasticity of 3 to 6% for time of use rates. [16] Smart control algorithms have been developed for relevant appliances in residential households, e.g. [17], amongst many, increasing price responsiveness further. However, it is unclear by how much demand flexibility can be unlocked in the long-term and how much storage would eventually be needed to bridge the gap.

Second, negative prices are becoming common. For Germany, 185 hours of negative intraday market prices were counted in 2017 [18]. Also, wholesale market prices have about halved during the last ten years. In this context, conventional power plants and gas plants in particular which are generally seen as short-term flexibility providers are increasingly not able to recover their costs. Power plants relevant for system security could only be prevented from shut-down by different capacity mechanisms. In this context, the debate between advocates of energy-only and capacity markets is gaining new momentum, e.g. [19] and

[20]. The question to be answered is what exactly provides value in a renewable system with zero marginal costs – energy, power or capacity – and, accordingly, which market designs will be able to capture that while ensuring short- and long-term efficiency.

Third, negative prices may be a sign of market instability. Theoretical concerns have been expressed about potential price oscillations and instable market behavior when loads are fully integrated into real-time markets and market operation is not designed properly, see e.g. [21] or [22]. Another suggestion to integrate flexible loads is the direct control by retailers or aggregators (quantity-control instead of price-control), see e.g. [23].

Fourth, we are seeing increased grid congestion, e.g. for Germany [6]. Certainly, with progressing grid expansion, major bottlenecks can largely be eliminated. Nevertheless, one characteristic of a renewable energy system is its high degree of decentralization with generation on low and medium voltage levels. Adding new loads like electric vehicles and batteries to the grid therefore requires an active system management on the distribution grid. An example for a market-based control is the PNNL project Olympic Peninsula. [24] Aggregators could also play a role, as described in the previous paragraph. Simulations as well as pilot projects will need to show which concepts – most probably a mixture of economic and technical approaches – will be able to efficiently and effectively control local systems.

Fifth, a solution to finance the public infrastructure has to be found. Expenses for the grid or system operations like ancillary services is currently mostly financed on the basis of grid tariffs. Those can be a constant fee charged per unit of energy fed, peak consumption, a lump sum, etc. or a combination of each of them. In most countries with renewable energies, grid tariffs have been taking an increasing share in customers' bills. While simultaneously facing high expenses for grid expansion and modernization, exemptions as for photovoltaics owners ("net-metering") have been revoked and capacity-based or scarcity-based grid pricing are becoming discussed alternatives. The question of infrastructure financing has to be clarified to ensure sustainable grid investment even when consumers are increasingly self-sufficient or circumvent retailers in peer-to-peer trading altogether.

Challenges for policy makers ahead

Progress is made towards the politically set targets for generation from renewable energies. Advancement in technology, combined with significant decreases in costs for photovoltaics, wind farms as well as batteries have brought given objectives within reach. Energy systems research as well as efforts by system and grid operators and utilities have been contributing significantly in developing improved market and system operations processes to enable an improved integration of renewable and fluctuating energies. Nevertheless, policy makers have to bear in mind that the solutions found for systems with medium shares of wind and solar energy are not necessarily the ones suitable for energy systems with very high penetration levels. Significant efforts will have to be taken to develop a concept which copes with the economic and technological complexities ahead.

The challenges, however, are not restricted to economic and technological ones alone. Social aspects are certainly important, including the distribution of costs among consumers and how we can integrate customers of different ability (and willingness) to adapt their consumption and make use of technology. Privacy and data security will be crucial when coordinating large numbers of customers. Energy security needs to be redefined – the energy transition is not a local issue! – focusing less on fuel but rather on materials for the production of generation units and batteries. We have achieved first successes but there is still a long - yet exciting - way to go.

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South America at the heart of the geopolitics of renewable energy: the lithium case

By Fernanda Delgado, Klaus Stier, Casemiro Campos

For many decades, energy geopolitics was synonymous to that of the oil and gas sector, which at one point accounted for more than 70% of total investment in energy supply in the world. The transportation sector depends, almost exclusively, on oil supplies. The global energy economy, however, is changing and with it, its geopolitics. The definition of geopolitics as the influence of geography in the international relations of States no longer fits the current reality, in which other sectors end up sharply motivating and influencing this relationship.

Fernanda Delgado holds a PhD in Energy Planning, with emphasis on petroleum geopolitics, and Master's degrees in Management Engineering and International Finance. She published several books on Petropolitics and is an affiliated professor at the Brazilian Navy Officers University. She gained international professional experience at Deloitte, Vale S.A., Royal Shipping Services and Dickinson Maritime Agency.

Klaus Stier holds a B.A. in International Relations from PUC-Rio and an M.A. in Public Administration from FGV EBAPE. At FGV´s International Affairs Division (FGV DINT), Klaus is responsible for coordinating international activities within FGV. Prior to FGV, he worked at the WHO in Geneva.

Casemiro Campos is an Economics student at the Brazilian School of Economics and Finance (EPGE/FGV). Previously, he interned at the Latin-American Center of Public Policies, at FGV (FGV CLPP).

The reduction of solar and wind energy production costs has helped change the energy mix, crossing international barriers and, in some cases, taking the place of fossil fuels. Even companies outside the electric power sector have sought to invest in renewable energy as a new area of capital investment, including in poorer countries. Examples like Google´s construction of wind plants in Kenya illustrate this context.

In this scenario, the massive insertion of renewables could potentially alter current geopolitics[1]. The development of cartels involving materials that are scarce in the earth's surface can give powerful influence to countries that possess them in their territory. A good example of this is lithium, abundant in Chile, Bolivia and Argentina, and today largely used in batteries, such as those of electric vehicles.

Due to the technological advancements of the last decades and the possibilities of future progress that will allow for lower costs and better performance, lithium-ion batteries have been the more indicated for light electric vehicle (LEVs) development. Consequently, the extractive lithium market has quickly evolved in the last years. Compared to 2014 prices, lithium carbonate´s spot price grew, in 2015, between 10% and 15%[2], and growth in the decade is expected to reach 75% until 2025. A recent study published by UBS Global indicates that, in 2025, for every six new cars sold in the world, one will be electric[3]. Furthermore, market needs include not only electric vehicles, but also stationary storage in which batteries are used in households and by power utilities.

According to a Deutsche Bank[4] report, the global demand for lithium, which was 184 *kt* in 2015, will reach 534 *kt* in 2025, with electric batteries representing 70% of that search. This information raises a fundamental question in order to comprehend the future development of the production chain of lithium and electric batteries, as well as to conjecture a new geopolitical outlook from the growing demand of lithium in the global economy: where are the main lithium resources[5] in the world found?

Still according to this report, about 70% of current lithium extraction in the world is from Australia and Chile. When the location of the main lithium resources currently known is verified, however, what stands out is the extreme concentration of mineral resources in a region

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[5] Mineral resources are defined as deposits with a economically viable extraction potential, either currently or in a near future. Mineral reserve, on the other hand, are defined as a specific group of resources in which deposits are legally, technically and economically viable for extraction. Source: U.S. Geological Survey (https://www.nwrc.usgs.gov/techrpt/sta13.pdf).

shaped by Andean salt flats that belong to Argentina, Bolivia and Chile. The ABC of Lithium, or Lithium Triangle, concentrates nothing less than 54% of known resources of the mineral[6]. Additionally, as already mentioned, the transition to a renewable energy system eventually will displace part of the world's fossil energy. A society based on alternative energy sources will have decentralized storage modules, public and electric mobility systems, and smart grids that manage the energy used.

We live in a planet undergoing a process of geopolitical and ecological transition, where nature finds itself serving a new field of financial accumulation and appreciation. In turn, the accelerated and continuous consumption of Earth's vital resources increases their worth daily. Until recently, strategic resources were tied to the traditional idea of security and national development, revolving around oil, natural gas, carbon and food. Nowadays, however, we must also consider their environmental aspects: freshwater reservoirs, biodiversity, clean air, rare earth metals, among others. It was not a coincidence that the European Union included lithium in its list of minerals critical to security of supply.

In general, none of the governments in countries essential to lithium exploration wants to stay out of what is described as the future of the automotive market, since the technological and economic benefits of the automotive supply chain are substantial. Even more so when combined with the strength that the mastery of new technologies for this market implies. This way, many nations are actively promoting research and development on electric cars. For example, the United States' Department of Energy allocated 2.4 billion dollars in subsidies for the development of batteries and electric drive components through the American Recovery and Reinvestment Act of 2009, of which 940 million were for research on batteries.

Nevertheless, all this technological advancement is accompanied by environmental concerns. There is no prospect, currently, of sustainable lithium exploration. Mining is, by definition, a contaminating activity that plunders the environment. Given this, if governments don't intervene in an active and dynamic way, the perspectives open to possessing a resource with rising valuation such as lithium present themselves as a risk, not only environmental and territorial, but also productive when re-primarisation of the economy occurs.

Still, in the lithium case, specifically, we speak of a neo-extractivism as its exploration, unlike other mining activities, not only involves the extraction of raw material, but also offers the countries that possess it a possibility of addressing the process that will result in technological transformation and development of the energy matrix.

The South-American countries, nonetheless, are at risk of retaining only a smaller participation on this process, almost like what previously occurred in history. Therefore, the countries in the region would, ironically, finance the new development of dominant countries, given that, in the long run, they might end up with only contaminated lands, invaded and displaced populations, intoxicated environments, water waste and leased territories, while the most powerful, once again, would maintain their control over developing countries.

That way, in this international geopolitical scenario, the global dispute for strategic minerals will be crucial to direct the flow of producers, consumers, providers and investors. The tough dilemma, though, seems to be how to prevent problems so that, in the future, some countries are not mere providers of raw materials. On the other hand, regulation should occur with enough flexibility to not undermine processes not yet consolidated, implying the need to adapt in the face of unexpected events. On the contrary, we will repeat past mistakes, with known and sad consequences for the exploited people.

DISCLAIMER

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ANNOUNCEMENTS

Report of the 2nd EUCERS/KAS Energy Talk 2018: Africa - Climate Change, Security and Violent Conflict

The panel on 13 June 2018 was chaired by Professor Dr Friedbert Pflüger, Director, EUCERS, King's College London and Felix Dane, Director of the Konrad Adenauer-Foundation (KAS) UK Branch. The panellists were:

- Harriet Edwards, Senior Policy & Advocacy Advisor UNICEF UK
- Brendan Bromwich, PhD Candidate, Department of Geography, King's College London
- Dr Moses Ekpolomo, Director, Energy Industry Research, ESIRGroup

The second EUCERS/KAS Energy Talk of 2018 took place in the King's College London Anatomy Museum on 13 June. This year's Energy Talk series is looking at climate change as a disruptor with far reaching implications for global security. This 2nd talk had a regional focus, examining the link between climate change, human security and violent conflict in Africa. Through examining cases of civil unrest in Somalia, conflict in Sudan, or violence in the Niger Delta, this talk questioned the underlying causes of climate-exacerbated conflict, while examining the relation between security and the climate challenge.

The event, chaired by EUCERS Director Professor Dr Friedbert Pflüger, looked at the politics behind security concerns and climate change, examining the realities on the ground for Africa and what is being done to address this challenge. In his opening remarks Professor Pflüger stressed that while a lot of climate change analysis focuses on reducing CO_2 emissions, the security dimension is often missed. As a result, the 2018 EUCERS/KAS talk series is focusing on this, often over looked, aspect of climate change. Water wars, mass migration, civil conflicts, competition over resources – there are many threats that are exacerbated by a changing climate. It is rarely disputed that Africa will be hit faster and with a higher magnitude by a changing climate then many other parts of the world, and it is fitting that this talk focus on this region.

Professor Pflüger thanked the Konrad-Adenauer Foundation as well as the European Climate Foundation for their continued partnership, before welcoming the new Director of the KAS office, Felix Dane. Mr Dane than gave his remarks, first by thanking his predecessor in KAS UK, Hans-Hartwig Blomeier, for the smooth and elegant handover. He spoke about his own passion for African affairs, having been involved in election observation in the Congo and Rwanda. He reaffirmed the importance of looking at security policy for KAS, stating that in the Middle East, the nexus between climate and conflict was an important factor during the Arab Spring.

Harriet Edwards - Children are inherently a vulnerable population.

The first intervention came from Harriet Edwards, Senior Policy and Advocacy Adviser for UNICEF. Harriet explained that UNICEF was created after the Second World War to protect children. Since 1990, their work has been grounded on the UN Convention on the Rights of the Child. Much of their work in climate change is advocating within the United Nations Framework Convention on Climate Change (UNFCCC). For example, UNICEF lobbied for children's rights to be recognized in the 2015 Paris Climate Change Agreement. This commits member states party to the agreement to respect, promote and consider children's rights within climate change strategies. Harriet noted that this has been a success, as countries are already integrating these rights into their national climate policies.

It has been documented that children are at once the most impacted, while at the same time the least responsible when it comes to climate change. Physically, the youngest populations are often located in the most vulnerable areas. UNICEF put out a report last year entitled No Place to Call Home. This report looks at the impact of climate change on

children. It examined the number of children living in areas of high flood risk. Similar patterns can also be drawn from drought and famine affected areas. Africa, with some of the youngest populations in the world is particularly susceptible.

When speaking about climate change, a key word is vulnerability. Children are inherently part of a vulnerable population. They are less resilient to the impacts of climate change, and least able to adapt. Africa, with its rapidly expanding young population are at high risk. Harriet explained that young people bring with them their own set of security challenges and risks. In Africa there are clear trends regarding the challenge of migration for children. UNICEF has found that, particularly when it comes to children, movements of populations in Africa occur within the continent itself, and not necessarily to Europe. Climate change combined with conflicts throughout the region are the main drivers of migration.

When it comes to the children's rights, as set up by the Convention on the Rights of the Child, climate change is impactful in a multitude of ways. It can violate a child's right to adequate nutrition and sanitation, their right to health, right to be play and even a child's right to life. Through this Convention, countries have an obligation to protect the most vulnerable people. This will be achieved by funding adaptation and resilience programmes either bilaterally with countries in Africa or by contributing to global mechanisms, such as the Green Climate Fund.

Climate change exacerbates already complicated socio-economic problems within Africa. For example, Kenya has a rapidly growing population, ethnic and religious tensions, high unemployment rates, widespread poverty and slow economic growth. This is then compounded by climate change and the low adaptive capacity of its populations. UNICEF looks at future risks and scenarios through a children's rights lens to advice governments. They also consider population growth and urbanisation trends that are in of themselves a security challenge, for example, the number of people living in informal settlements and how likely that is to increase. In all these situations, it is children that are most impacted.

On the global stage, UNICEF has involved youth within the international climate negotiations. In Zambia, they initiated a programme called Youthful Climate, which is aimed at training young climate change ambassadors. They were able to bring young people to the 2015 Paris climate talks, where they addressed world leaders. Ambition post-Paris is at an all-time high. With regards to migration and refugees, one of UNICEF's recommendations to governments is that it be linked to climate change in their national policies. In fact, they advocate putting a climate risk analysis format into their humanitarian aid work, which puts children at the centre of policy making. Finally, Harriet emphasised the need to scale up ambition on climate change; there is a lot of work to be done to get on the right path for the next international climate talks in December this year.

Click here to access UNICEF's report No Place to Call Home: Protecting children's rights when the changing climate forces them to flee.

Brendan Bromwich – Conflict is Political

The next intervention came from Brendan Bromwich, King's College London PhD researcher and independent consultant. Finding the academic literature on climate and conflict polarising, Brendan explained that the problem with the existing literature was that it tends to be very policy relevant but missing out on some of the detailed analysis. There are two camps in both the climate conflict discourse and the public discourse. In 2004 Samantha Power wrote a piece entitled 'Remember Rwanda but take action in Sudan,' where she categorised the Darfur conflict by drawing on ideas that came out of the Rwandan genocide. Power put the blame squarely at the government's feet – it is slaughtering its own people, so we must stop them. With the academic discourse anytime anyone mentions links natural resources to conflict, the question is: Are you a genocide apologist for the government of Sudan? Linking climate change to conflict is seen as letting the government off the hook.

One side of the debate is emphasising justice, you cannot oversimplify things, you have to look at the political drivers. But then on the other side, you have Ban Ki-Moon, writing in 2007, drawing attention to the fact no it is not

just the fight between Darfuri government and the rebel groups, there's also an intertribal conflict, of which natural resources are a part. Politically, he was attempting to accomplish two things. One, he tried to get the UN African Union peacekeepers mobilised. To achieve this, he needed the cooperation of the Sudanese government. Two, he was trying to set up peace talks. Ban Ki-Moon's narrative in Darfur was to try and put the politics on hold so that they could come together around working on climate. Brendan explained the importance of understanding the policy bias from the outset. People present the natural resource conflict discourse in a way that suits their political perspective, their policy preference.

Brendan then provided the background on the two wars in Sudan. One, the war between Sudan and Southern Sudan, and two the conflict in Darfur. In 2004, when the Darfur conflict was concluding, the Darfuri wanted to be at the table if the government was going to renegotiate political dispensation. Not wanting to distract from signing a peace agreement, the backers of the talks did not invite the Darfuris to the table. When the Darfuris rebelled, the government reignited a long-running 30-year conflict between the Arab and non-Arab tribes within Darfur. They pitted the historical landowners – such as the Fur – against others who wanted land titles by arming them, thereby quelling the rebelling population. Those who want to state emphasise the natural resources aspect will talk about the local conflict, and those that do not will emphasise the national level conflict. Darfuri observers acknowledge both of these two levels of conflict as being concurrent.

In examining rainfall, policy bias also exists. In 2007, the United Nation's Environmental Programme (UNEP) data analysis supported Ban Ki-Moon. The report linked the conflict to a decline in rainfall in the 1980s. Refuting this report, Kevane and Gray produced an alternative analysis, stating that the conflict started in 2003, and therefore the climatic events of the 1980s were of no relevance.However, there are times when we can remove our policy-bias lens, as conflict and climate change interact. The 1987-89 Arab war was significant in Sudan. The drought displaced several hundred thousand people. At the same time Muammar Gaddafi was pushing his Arab Unity agenda. During this time, he sent convoys of food and guns to Darfur and supported the predominantly pastoralist Arab populations in the emerging violence. This once again stirred up long-term conflicts around land tenure between the Fur and the Arab populations. Then the upheaval caused by the drought, allowed other actors to try and manipulate the system. Brendan stressed that we should not say that climate change causes conflict, because in so doing, we take agency away from the political actors who cause conflict. However, he also argued that drought in Darfur was relevant to the pattern of violence in the 1980s.

This is key to the academic debate. Conflict is political. However, to say that natural resources has nothing to do with conflict is also wrong. The Fur have stated that the conflict began as an economic war but assumed a genocidal course aimed at driving them out of their ancestral land. The armed Arab tribes aimed at destroying the Fur's economic base, making it impossible to practice agriculture. On the other side, the Arab tribes claimed to have lived peacefully alongside the Fur until the Fur raised the slogan 'Darfur is for the Fur' depicting the Arabs as foreigners that should be evicted. They claim self-defence, defending their right to access water and pasture that the Fur had closed off. Brendan explained that you must look at the intricacies and nuances of the livelihoods and cultural dynamics in the region.

To read more of Brendan's research in Darfur, please access the following articles:
'Power, contested institutions and land: repoliticising analysis of natural resources and conflict in Darfur' in the Journal of Eastern African Studies.
'Nexus meets crisis: a review of conflict, natural resources and the humanitarian response in Darfur with reference to the water–energy–food nexus' in the International Journal of Water Resource Development.

Moses Ekpolomo – Climate change is an economic threat

The final intervention was from Moses Ekpolomo, Director of Energy Industry Research for Esirgroup and former EUCERS/KAS fellow. Moses emphasised the need to view climate change as an economic threat. Although some argue that the security

link to climate change is not obvious, Moses argues that in Africa, the threat is very real, as is demonstrated by the deforestation and desertification across the continent. As African countries look to become resource and energy independent, issues of security and climate change cannot be ignored. Even in the UK, the number one threat to security is not terrorism or a disease, it is flooding.

In Africa, Lake Chad sustains four countries: Chad, Niger, Nigeria and Cameroon. It has been steadily shrinking to the point that it is almost gone. This has displaced 50 million people, the majority of which are farmers and cattle herders. There are those who are crossing into Libya to get to Europe, and those moving south in search of water. As desertification in the arid and semi-arid lands is spreading across the continent from Senegal to Kenya, the evidence that migration is linked to climate change has become clear. When populations move into already occupied areas, competition for resources leads to violence.

As natural resources and water levels in Lake Chad diminish, food sources become scarce. These areas become recruitment grounds for jihadist militant groups like Boko Haram or Al-Shabaab. They exploit the situation of people and communities to put new recruits on the payroll. If you have lost your farm and your livelihood, and the government is not forthcoming, then groups of desperate people see little option than to work for terrorist groups. This year alone, over two thousand people have been killed by Boko Haram in Nigeria, Niger and Chad. In addition, food shortages have also forced people to leave; many of whom end up in refugee centres. It's not Al-Shabaab that is forcing people into these camps. They are looking for food and water. However, these militant groups have also used refugee camps such as Dadaab in Kenya – the largest camp in the world – as recruitment zones to strengthen their numbers.

At seven thousand square kilometres, the Niger Delta is the size of the UK. Oil and gas exploration and extraction has polluted much of the delta, leaving only 30 per cent left where people can live and farm. As a result, there are populations that have resorted to violence, piracy and kidnapping. Whether it is damns constructed on the Nile River, drought and famine in Somalia, or shrinking lakes, such as Victoria or Chad, in Africa, climate change is forcing people to leave areas they have traditionally inhabited, bringing them into conflict with neighbouring villages and communities.
For more information please see Moses' book 'Ethnicity and Dynamics of Oil Conflict in the Niger Delta of Nigeria' published by LAP Lambert Academic Publishing.

Discussion
Following these interventions, the audience entered a lively discussion with the panellists. Questions around governance, growth of the solar energy sector, capacity building within countries and the role of international and academic institutions were key elements in the discussion. It was highlighted that Africa needs to industrialise and much of the money that countries are using to industrialise is coming from developing partners and the private sector whose main goal is not necessarily to tackle the climate challenge but rather to push economic growth. The role of digitalisation was also brought up as an important tool for advocacy as more information is made available for the public and governments. Finally, there was vigorous debate around the need for European and international research institutions need to collaborate with African universities – not only the main universities in Khartoum or Nairobi, but also more remote specialised institutions. It is important to collaborate to develop technologies and systems to tackle climate change in Africa. Politics and technologies are intertwined, in fact, politics has the potential to enable the institutional arrangements around new technologies.

This second panel discussion for the 2018 KAS/EUCERS Talk Series was the first to have a regional focus. Looking at the African continent, the panel of distinguished guests used examples in Sudan, Kenya, and Nigeria to highlight the connection between climate change and violent conflicts. Keeping with the theme of security challenges surrounding climate change, the 3rd KAS/ECERUS talk will take place on 11 September 2018. It also has a regional theme, this time looking at the Arctic. The talk will focus on security issues associated with a melting Arctic. How have the melting icecaps exacerbated existing economic, military and environmental challenges? What is the probability of another 'Cold War' over the Arctic? It will build upon discussions surrounding this year's workshop theme – the future of global climate policy. Please join us and keep the conversation alive!

EUCERS/KAS Energy Talks 2018

The Arctic Melt: A revival of Cold War tensions between Russia and the US?

11.09.2018, 13-15:00, followed by a reception

River Room ♦ 2nd floor King's Building ♦ King's College London ♦ Strand Campus ♦ WC2R 2LS

The 3rd energy talk in the 2018 series on Climate Change and Security, jointly hosted by Konrad Adenauer Foundation in London and EUCERS, will examine the security implications of opening up the Arctic. We will welcome **Dr Rebecca Nadin**, Head of the Risk and Resilience programme for the Overseas Development Institute and **Dr Petra Dolata**, Associate Professor in the Department of History, University of Calgary and Tier II Canada Research Chair to the panel discussion. A full programme will be distributed in the coming weeks.

Over the past decade, the Arctic has experienced some of the most rapid climate changes on earth, almost twice the global average. As the Artic melts, many stakeholders are talking about the potential to unlock the vast tracts of petroleum not to mention opening up the Arctic seaway to international traffic. However, there is another dimension that needs to be explored: the security implications of opening up the Arctic. Climate change has propelled the region into the centre of geopolitics, as commercial interests clash with environmental and security concerns. At the heart of this debate are two countries that have an economic eye on the region, Russia and the United States. A quarter century after the end of the Cold War that saw both countries trying to outperform each other in a nuclear arms race, Russian-US relations are back in the spotlight due to allegations of foreign influence in the 2016 US presidential election that saw Trump elected, prompting national security concerns and multiple federal inquiries in the US. Among the world's largest emitters and fossil fuels producers, both country's relationship to the UNFCCC process and Paris Agreement has been inconsistent. While the Trump Administration decision to withdraw from the Agreement may have impelled Russian to release statements reaffirming its commitments, they remain the only large emitter yet to ratify the Paris Agreement.
The Arctic melt has several disturbing consequences, notably the changes in the permafrost that covers 25 per cent of the Northern Hemisphere and the release of carbon and methane into the atmosphere. The security threats around retreating ice are twofold: First, long-dormant microbes are being exposed after centuries trapped in the frozen soil and ice, releasing diseases long thought extinct. Second, shrinking ice creates more space to compete over. Trump overturned Obama's 2016 ban on offshore Arctic drilling, while neither sanctions nor the drop in oil prices has deterred state-controlled Russian oil giant Rosneft from developing oil resources in the Arctic. The Arctic melt exacerbates already existing economic, military and environmental challenges to governing the region. This talk will focus on security issues associated with a melting Arctic. What is the probability of another Cold War over the Arctic? What are the unintended outcomes of a retreating permafrost for human security? What is the potential for industry (petroleum, shipping) to aggravate security concerns? How are the economic prospects of opening up the aligned Arctic with environmental and security concerns?

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