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POLICY BRIEF
No. 86 • September 2016

ENERGY IN THE G20 FINANCE TRACK

G20 ENERGY TRANSFORMATION DURING THE GERMAN PRESIDENCY

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Key Points

- Climate change and the now largely market-driven transformation of the energy sector create financial stress in the fossil fuel and nuclear industries as well as in countries that export fossil commodities or will have obsolete nuclear plants on their territory. The risks are systemic and may lead to contagion or knock-on effects that could destabilize the global financial system.
- In consequence, energy should no longer be left primarily to the Group of Twenty (G20) "Sherpa track," but should be included prominently in the "finance track" as a matter for finance ministers and central bank governors.
- The G20 has addressed energy policy since 2012 in a mix of initiatives that seek to both protect the incumbent dirty and dangerous industries and their subsidies and privileges, and stimulate a transformation to clean, safe and sustainable energy systems. With changing economic realities, an ambitious G20 green energy shift is now overdue.
- Past G20 presidencies of countries that are exporters of fossil energy commodities were largely protective of incumbent businesses. China — as an energy-importing country — has begun to refocus the G20 energy agenda on sustainability. Germany now has an opportunity to complete that shift.

Introduction

Energy and climate are relevant to the G20 for many reasons. There is financial stress in the fossil fuel and nuclear industry: looming bankruptcies and very large unfunded legacy costs; denial of capital by "leave fossils in the ground" divestment; collapsing revenues from royalties and taxes from fossil energy, while large "perverse subsidies" persist; risk of damages and liabilities from nuclear catastrophes emanating from an industry protected by privileges; an increase in disasters resulting from rising global temperatures and sea levels; and costs of post-disaster recovery, relocation and climate adaptation.

Given the obvious risks climate change and market-driven transformation of the energy sector present to global financial stability and economic development, energy should no longer be left primarily to the G20 Sherpa track, but should be included prominently in the finance track as a matter for finance ministers.

For economic reasons alone, the global energy transformation is now self-sustaining, self-accelerating and self-replicating, unless perverse policies slow progress. Costs of fossil and nuclear energy rise over time; those of renewable energy, storage and smart energy management are falling sharply, due to technology learning[1] and economies of scale and of scope that are set to continue. Notably, since 2015, photovoltaic solar and onshore wind power are at cost parity with or better than new fossil or nuclear energy supply, and can even outcompete existing fossil and nuclear energy.

1 The phenomenon observed in many industries that incremental improvements along the whole value chain bring down costs by, as a rule of thumb, 15 percent with every doubling of aggregate output.

The G20 has addressed energy policy since 2012, with an initial focus on fossil energy commodities and the economic impacts of price volatility. While access to energy, energy efficiency, renewable energy and energy transformation have gained attention, the G20 agenda is still largely protective of the old dirty, dangerous and costly energy industries rather than promoting new clean, safe and increasingly cheap opportunities. With changing economic realities, a G20 green energy shift is overdue.

The past G20 presidencies of Mexico, Russia and Australia — as exporters of fossil energy commodities — were largely protective of incumbent businesses. China — as an energy-importing country — has begun to focus the G20 energy agenda on sustainability. Now Germany, host of the 2017 G20 summit, has an opportunity — and duty, along with the required credibility — to complete that shift, by, *inter alia*:

- addressing climate and energy risks in the finance track;
- holding a G20 joint climate and energy ministers meeting;
- focusing on G20 deep decarbonization and energy transformation strategies;
- initiating a process to make finance flows consistent with energy transformation;
- establishing consolidated reporting and verification for all relevant action plans;
- revealing the true environmental, social and legacy costs of fossil and nuclear energy; and
- replacing the 2014 G20 Principles of Energy Collaboration with G20 deep decarbonization and energy transformation strategies.

The German Context

The *Energiewende*, Germany's green energy shift away from nuclear and now also fossil energy toward renewable energies plus storage in a smart grid, will provide context and input to the G20 during Germany's presidency in 2016-2017. Energy and climate are priorities in German domestic and foreign policy, and the country will aim for ambitious conclusions at its G20 summit in 2017, based on the positive experience with its own energy transformation (Quitzow, Roehrkasten and Jaenicke 2016; Kraemer, forthcoming 2017; Morris and Jungjohann 2016).[2]

The 2030 Agenda for Sustainable Development, including the energy-related Sustainable Development Goals (SDGs) adopted in 2015, the Paris Agreement reached at the twenty-first session of the United Nations Framework Convention on Climate Change in Paris at the end of 2015 and the progressive outcome on climate and energy of the German Group of Seven presidency shape domestic expectations for Germany's G20 presidency.

The *Energiewende* has reduced Germany's dependence on imported fossil fuels and helped strengthen the balance of trade and payments. It has reduced wholesale and industrial power prices, stimulating innovation, inward investment and growth of power-intensive sectors. It has enabled the gradual phase-out of expensive and dangerous nuclear power by 2022, which will be the culmination of a process begun after the Chernobyl disaster in 1986 and sustained by successive governments of various political orientations.

Germany has created about 370,000 jobs in the renewable energy sector, of which perhaps 150,000 are net positive, as they would not exist without the *Energiewende*. The jobs are across all skill levels, with more in rural areas than in old industrial areas, resulting in co-benefits for regional development (Hockenos 2015a, 2015b; Kemfert et al. 2015; Löschel et al. 2015, chapter 9.4). The renewable energy industry turns over about €40 billion per year, with businesses and employees paying billions in additional taxes and social security charges. The *Energiewende* policy is fiscally positive by a wide margin. These and other benefits are obtained at no discernible cost beyond "business as usual," the maintenance of the pre-existing fossil and nuclear energy industry.

Concerning external policies, the *Energiewende* is similarly beneficial. It is one of the primary sources of soft power and a focus of Germany's diplomacy, with the annual Berlin Energy Transition Dialogue (BETD) becoming a highlight. Reducing dependence on Russian gas creates greater room for brokering agreement after Russia's invasion of Ukraine's Crimea and the Donbas region. The fall in coal, oil and gas prices is beginning to lift the "resource curse" from some autocratic energy-exporting countries, and to ease the effects of the "Dutch disease" in well-governed democratic ones.

Nuclear proliferation — the spreading of dangerous materials, equipment and expertise — including to rogue states and hostile non-state actors (terrorists) will diminish as the civilian veil over the true military intent of many nuclear power programs is lifted. Germany's foreign minister, Frank-Walter Steinmeier (2015), acknowledged the security policy benefit of domestic renewable energy production, which essentially cannot be interrupted or denied by enemy action in the same way supplies of fossil energy commodities can be interrupted.

2 Germany's *Energiewende* is often misrepresented in the German — and especially in the foreign — media. Good information sources include the following media, organizations and think tanks: www.cleanenergywire.org; www.energytransition.de; www.renewablesinternational.net; www.agora-energiewende.de/en; www.e3g.org; www.ecologic.eu/climate; http://ecologic.eu/8035; www.ecologic.eu/energy; www.iass-potsdam.de/en/research/energy; www.oeko.de/en/the-institute/research-divisions/energy-climate; and http://wupperinst.org/en/topics/energy.

G20 Activities Relating to Energy Policy, and Options for 2017

This positive domestic experience shapes expectations concerning Germany's G20 presidency, which will build on technical work and conclusions of previous presidencies, shown in Table 1.

Table 1: The Late Mushrooming of Energy in the G20 Agenda

Year	Host	Focus (from the summit conclusions and documents adopted)
1999–	Various	Not on energy; early meetings consisted of ministers of finance only
2009	US	Access to energy, fossil subsidy reform, fossil energy security (and climate)
2010	Canada	Brief mention of fossil subsidies for fossil energy consumption (re-narrowing agenda)
2010	S. Korea	Fossil fuel subsidies and price volatility; climate change and green growth
2011	France	Functioning and transparency of energy markets; clean energy; climate change
2012	Mexico	Volatility in commodity markets, energy technologies, energy and growth (finance track)
2013	Russia	Regulation and investment in [fossil] energy infrastructure; ESWG established
2014	Australia	G20 Principles on Energy Collaboration; G20 Energy Efficiency Action Plan
2015	Turkey	G20 Energy Access Action Plan; G20 Toolkit of Voluntary Options for Renewable Energy Deployment
2016	China	Three G20 Plans on Energy Access (Asia/Pacific), Renewable Energy and Energy Efficiency
2017	*Germany*	*Consolidated Action Plan; Energy Transformation, Integration of Climate, Finance Track*

Source: Author.

This overview shows that energy entered the G20 late but then grew into multiple, differentiated work streams. These are managed by different entities (see below). There is an obvious need to ensure follow-up and cohesion, especially after the addition of three new action plans or programs in 2016. Consolidation of work streams and reporting can improve policy coherence, which would also be boosted by including climate protection and adaptation to climate change. A joint meeting of climate and energy ministers is an obvious option to enhance G20 work in the field.

The establishment of the Energy Sustainability Working Group (ESWG) in 2013 and the Energy Ministers Meetings in 2015 and 2016 raised energy issues in the Sherpa track, but there is no equivalent development yet on the arguably more important finance track. Energy should be given more prominence in the work of the G20 finance ministers in view of the economic and financial risks emanating from the fossil and nuclear industries, and the decline of these sectors globally.

The concrete activities and processes initiated by the G20 provide frameworks for cooperation among those who are willing, including some countries from outside the G20. Such cooperation is not hampered by the need to find consensus or compromise with countries not willing to support progressive energy policies, such as fossil fuel-exporting countries or "petro-states."

In view of German priorities for domestic and international energy policy, there are a number of current activities, processes and work streams:

- Voluntary action on subsidies for fossil energy production and consumption as a peer-review process involving some but not all G20 countries, and improving the transparency of energy markets through the Joint Organisations Data Initiative (JODI) Oil and JODI Gas data banks, and a review of the International Organization of Securities Commissions Principles for Oil Price Reporting Agencies.
- On energy efficiency, the International Partnership for Energy Efficiency Cooperation has the following work streams, which may be strengthened, broadened in scope or added to:
  - Appliances: Networked Devices Task Group on standby energy use, and Super-Efficient Equipment and Appliances Deployment (SEAD);
  - Buildings: Buildings Energy Efficiency Task Group, and aspects of Energy Management Working Group (EMWG);
  - Industry and industrial processes: Energy Management Action network and EMWG;
  - Transport: Transport Task Group, focusing on heavy-duty vehicles;
  - Cross-sectoral themes: Energy Efficiency Finance Task Group, Improving Policies for Energy Efficiency Indicators, Top Ten Energy Efficiency Best Practices and Best Available Technologies Task

Group, Worldwide Energy Efficiency Action through Capacity Building and Training;

- Electricity generation;
- G20 Energy Efficiency Action Plan implementation, covering all of the above plus sharing high-efficiency, low-emissions technologies for electricity generation in the Global Superior Energy Power Performance Partnership Working Group; and
- The G20 Energy Efficiency Leading Programme (EELP) adopted during the Chinese G20 presidency is a recent addition to the work stream on energy efficiency. EELP focuses on Best Available Technologies, SEAD, District Energy Systems, the Energy Efficiency Knowledge Sharing Framework and Energy End-Use-Data and Energy Efficiency Metrics.

- On access to energy, the UN Sustainable Energy for All and SDG 7.1 call for ensuring universal access to affordable, reliable and modern energy services by 2030. The original focus of the G20 on Sub-Saharan Africa has widened in 2016 to include the Asia-Pacific region under the Enhancing Energy Access in Asia and the Pacific: Key Challenges and G20 Voluntary Collaboration Action Plan, partly through the involvement of the UN Economic and Social Commission for Asia and the Pacific.
- On renewable energy, with the 2015 G20 Toolkit on Voluntary Action for Renewable Energy Deployment, coordinated by the International Renewable Energy Agency (IRENA) and the International Energy Agency, with a focus on (trends) in energy technology costs and energy system integration of renewable energy. The German G20 presidency can build on progress under the leadership of China in broadening the scope to include low-carbon electricity generation and the 2016 G20 Voluntary Action Plan on Renewable Energy.
- Continuation of the new focus on global energy governance (or architecture) in the ESWG to help address North-South imbalances, a theme first launched by the Australian G20 presidency in 2014 and later taken up again by China.

From the German perspective, the 2014 G20 Energy Efficiency Action Plan and the 2015 G20 Toolkit on Voluntary Options for Renewable Energy Deployment are important building blocks of international energy policy coordination in the G20 framework. Both were also prominent in China's G20 presidency, and are complemented by the 2016 G20 Voluntary Action Plan on Renewable Energy.

Relevant G20 Documents

2014 G20 Principles of Energy Collaboration
www.g20.utoronto.ca/2014/g20_principles_energy_collaboration.pdf

2014 G20 Energy Efficiency Action Plan
www.g20.utoronto.ca/2014/g20_energy_efficiency_action_plan.pdf

2015 Communiqué: G20 Energy Ministers Meeting
(Istanbul, October 2, 2015)
www.g20.utoronto.ca/2015/151002-energy.html

2015 G20 Energy Access Action Plan
www.g20.utoronto.ca/2015/G20-Energy-Access-Action-Plan.pdf

2015 G20 Toolkit of Voluntary Options for Renewable Energy Deployment
www.g20.utoronto.ca/2015/G20-Toolkit-of-Voluntary-Options-for-Renewable-Energy-Deployment.pdf

2016 G20 Energy Ministerial Meeting Beijing Communiqué
www.g20.utoronto.ca/2016/160629-energy.html

2016 Enhancing Energy Access in Asia and the Pacific: Key Challenges and G20 Voluntary Collaboration Action Plan
https://ec.europa.eu/energy/sites/ener/files/documents/Enhancing%20Energy%20Access%20in%20Asia%20and%20the%20Pacific%20Key%20Challenges%20and%20G20%20Voluntary%20Collaboration%20Action%20Plan.pdf

2016 G20 Voluntary Action Plan on Renewable Energy
https://ec.europa.eu/energy/sites/ener/files/documents/G20%20voluntary%20Actio%20Plan%20on%20Renewable%20Energy.pdf

2016 G20 Energy Efficiency Leading Programme
www.ipeec.org/upload/publication_related_language/pdf/485.pdf

Germany will cooperate with its successor in the G20 presidency (as well as its predecessor, China) to guarantee a continuous development of those work streams. Effective cooperation will require two measures: first, the introduction of a consolidated reporting and verification mechanism on the implementation of the various action plans, and second, an independent analysis of progress as input to G20 deliberations leading to possible amendments of action plans and their level of ambition. While the G20 Information Centre at the University of Toronto provides valuable services in documentation and reporting, it does not currently have the facilities for the evidence-based critical analysis of policies and their success or failure that is needed to give effect to the various action plans and other initiatives of the G20.

Anticipating a G20 Energy Agenda under the German Presidency

The adoption of the SDGs and the Paris Agreement, together with reinforced understanding of both the urgency of action to protect the climate and the lowering economic cost of doing so compel Germany to push to accelerate the global energy transformation in the G20. The G20 is the right forum, because G20 countries are responsible for a large share of not only global greenhouse gas emissions but also investments in energy systems.

These investments can either create new path-dependencies and lock in fossil and nuclear energy or accelerate decarbonization by shifting investment toward renewable energy and storage in smart-energy systems that enable or even stimulate demand flexibility and dynamic efficiency. Accordingly, the Paris Agreement contains this exhortation especially for finance ministers, who should be making "finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."[3]

Initiatives toward that end would — under normal circumstances and in the interest of policy continuity and cohesion as well as procedural legitimacy in the G20 work program across presidencies — be guided by the 2014 G20 Principles on Energy Collaboration. However, the principles were already out of touch with reality at the time of adoption (Kraemer 2016, 28–30). In 2016, as trends in the energy sector and, in particular, the cost reductions in renewable energies, storage and smart-energy technologies have advanced further, the principles are even less in tune with the realities and economics of the energy landscape and are also clearly inconsistent with the objectives of other energy-related policy documents adopted by the G20. Germany should initiate a review and revision of the G20 Principles on Energy Collaboration, possibly replacing them with G20 deep decarbonization and energy transformation strategies.

Economic and Fiscal Relevance of Energy and Climate

As detailed as the (partly overlapping) energy-related activities, processes and work streams are in the broader G20 context, the issue of climate protection and energy transformation has yet to attract sufficient high-level attention. Finance ministries tend to regard energy as a "micro policy" for the management of one sector, and energy ministers as demandeurs for funds for their "spending departments." The relevance of climate change and shifts in energy systems — whether driven by technology development, markets or policy — for the economy, the fiscal position of governments and the stability of financial markets is yet to be understood (Financial Stability Board 2015; European Bank for Reconstruction and Development 2016; Gros and Schoenmaker 2016). Among the most prominent aspects are:

- The economic and fiscal impacts of changes in energy systems and sources, both from (short-term) volatility in market prices and volumes and (long-term) trends in the transformation of energy systems. In essence, the new clean, renewable energy system will most likely have lower long-term capital needs than the old fossil and nuclear energy system, and the harvesting of free environmental energy flows with ever-cheaper equipment will also reduce (top-line) business volume. Tax revenue from the energy sector will decline accordingly, and so will international and especially interregional trade as it shifts from energy commodities for consumption to energy conversion equipment as long-term investments for harvesting cost-free environmental flows (Kraemer and Stefes 2016).
- The impact of shrinking values of "carbon assets" in the fossil (coal, oil and methane gas) industry on company balance sheets, market valuations and the economic viability and future re-capitalization needs of state-owned enterprises (Carney 2015).
- Reductions in government revenue from royalties, taxes and charges on (fossil energy) extraction, trade and consumption. In the case of co-called petro-states, shrinking revenue may induce state failure with knock-on effects in terms of finance, economy, security and migration.
- Inevitable bankruptcies and/or nationalizations of current owners and operators of nuclear power plants, which will transfer to the public sector hundreds of billions or trillions of US dollars in unfunded legacy costs for the decommissioning and dismantling of nuclear plants, the processing of waste materials and their conveyance to long-term storage, management and safeguarding.

3 See https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf, article 2.1.

To this list of energy-related concerns for the G20, the following climate-related point should be added:

- The rise in the incidence of natural catastrophes induced by human alteration of the earth's climate system (Hansen et al. 2016) will aggravate financial needs for post-disaster recovery and relocation, and adaptation through the transformation of many economic sectors.

In view of the above, it is evident that the G20 leaders and ministers of finance cannot leave the coordination of energy policy and climate protection to energy ministers and regulators, but must address the issues in the finance track, as well as at the top and provide guidance. Some of the issues can then be processed through the existing G20 coordination and implementation systems; other issues may have to be taken forward elsewhere, such as in the World Trade Organization (WTO); in international financial institutions, including development banks; or through development policy institutions, such as those for general capacity building.

Options and Recommendations

Germany can be expected to do the obvious and showcase its own energy transformation and the benefits it brings in terms of innovation dynamics (IRENA 2016), economic growth and resilience, trade and the balance of payments, jobs and regional development, and broadening the tax base for increasing revenue. Energy transformation is a very important part of climate policies in all countries, and there are clear benefits to be had from coordinating policies among climate and energy ministers, which the G20 might facilitate by holding a joint meeting to adopt guidance and expectations for finance ministers as well as G20 leaders. Items for discussion and guidance might include:

- the rise in the incidence of (climate-induced) natural catastrophes;
- financial needs for post-disaster recovery and relocation, and adaptation; and
- Paris Agreement instruction (in article 2.1) to "make finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."[4]

With the BETD in spring 2017, the German ministries of foreign affairs, and of economy and energy, have an opportunity to focus on the abject economics of fossil and nuclear energy with their large social and environmental costs, and the subsidies and privileges that prop them up in many countries. The BETD can highlight current realities in the energy industry, where low-cost renewables, the energy storage revolution and innovations in smart energy systems now provide access to modern energy cheaper and faster than any grid-based approach could.

Against that background, the overall objectives of Germany's G20 presidency could be to:

- integrate climate protection and adaptation concerns fully with the G20 energy agenda;
- provide coherence of the whole G20 energy agenda across the Sherpa and finance tracks;
- ensure that climate- and energy-related risks and concerns for economic development, fiscal policy and financial stability are fully addressed by finance ministers;
- ensure transparency of all energy-related subsidies and phase out perverse subsidies for fossil and nuclear energy;
- begin a process of consolidation of the sprawling energy-related work streams that were started during the last few presidencies; and
- initiate reflection on changing the outdated remits and objectives of institutions and agreements in the global energy architecture (for example, the International Atomic Energy Agency or the Non-Proliferation Treaty).

Providing coherence of the energy G20 agenda in the Sherpa and finance tracks would require a shift in focus and raising of ambition among energy ministers, but also, more importantly, drawing the attention of the finance ministers to the need to make finance flows consistent with low-carbon development by pushing for a phase-out, by 2020, of all subsidies and privileges for fossil and nuclear energies, and ensuring that funds for "green finance" are available to the extent they might still be needed after perverse subsidies have been phased out.

Redirecting energy-sector investment toward economically advantageous renewable energy still requires political action to correct regulatory frameworks, which economic ministers should be encouraged to take forward. G20 finance ministers should also address the full range of climate- and energy-related risks to the fossil and nuclear parts of the energy industry, and knock-on effects on financial markets, government revenue and the fiscal position and credit rating of countries. There is a likelihood that contagion may lead to failures in the global financial system.

The language in the 2016 G20 Energy Ministerial Meeting Beijing Communiqué indicates that energy ministers still aim to defend the majority of subsidies in the energy sector. Only "inefficient fossil fuel subsidies that encourage wasteful

4 See https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf, article 2.1.

consumption"[5] are to be "rationalized" and "phase[d] out over the medium term," while "continued investment in [presumably fossil and nuclear] energy projects" are to be ensured with a view to avoiding "economically destabilizing price spikes," which can only occur for fossil energy commodities. The G20 energy and finance ministers should jointly address all energy-related subsidies. They have been catalogued (see, for example, Coady et al. 2015; Organisation for Economic Co-operation and Development 2015) so that the G20 can act without delay. Germany's G20 presidency will be judged not least on the scope and deadline of perverse subsidy phase-out.

The objective of consolidating the sprawling energy-related work streams in the G20 has two dimensions.

One is to keep track of, identify and exploit synergies among them, and consolidate the verification and reporting of the many action plans, programs and other initiatives that are part of the G20 energy agenda (see Table 1). Rather than adding to the plethora of action plans, programs and other initiatives, Germany could initiate a consolidation, by elaborating and adopting guidance for overarching G20 deep decarbonization and energy transformation strategies, incorporating the relevant work of the Deep Decarbonization Pathways Project and setting an overall indicative efficiency goal.

The other is to ensure that G20 policy guidance in other areas does not counter the objectives of climate protection and adaptation, and facilitates rather than hinders energy transformation. A number of G20 initiatives need to be scrutinized to ensure internal policy cohesion:

- G20 work with private and public banks concerning infrastructure, for instance, is at odds with the normative debates and goals in the United Nations, such as in the Agenda 2030 or on climate and finance flows.
- Mega-projects, so called because they are too large for any one country to implement and therefore require coordination among governments, are a busy and prominent work stream in the G20 (Flyvberg 2014). As long-term investments, they are meant to stimulate growth, and are a cornerstone of G20 ambitions to provide global benefits through leadership. They also lock in fossil-based technologies and make it harder to achieve effective climate protection and energy transformation.
- The growth strategies of the G20 countries show little or no attention to sustainability, with Germany (2014, 2015) being an exception. Framed by the objective to provide policy coherence, and on the basis of the new economic realities of the energy industries, Germany could encourage other G20 countries to provide an update of their growth strategies that take account of planetary boundaries, the accelerating erosion of the earth's ecosystems (as measured

5 "Inefficient" implies there are "efficient" subsidies that may be maintained; "fossil" implies that subsidies and privileges for the nuclear industry are to be ignored; "fuel" refers to downstream (liquid) energy carriers at the exclusion of electricity, for instance; "wasteful" implies the option to declare some consumption to be "not wasteful"; and the focus on "consumption" serves to exclude subsidies and privileges to the upstream segments of the energy industry, from exploration and extraction to distribution. The persistence of this language across international summits is a sign of the degree to which energy ministers have been captured by the fossil energy lobby.

by Earth Overshoot Day), and the UN SDGs in the Agenda 2030.

- With one exception, and even then in equivocal terms,[6] the G20 leaders have been careful not to say anything that could be interpreted as support for nuclear power. They have been silent on the issue, and it is time to break that silence. Energy ministers, in contrast, keep positive references to nuclear power, which is at odds with economic reality as well as the G20 work stream on fighting corruption. There appears to be capture of energy ministers by the nuclear lobby. G20 leaders could break their silence and rule nuclear power out of their list of mega-projects and stress the need to focus decarbonization strategies on technologies that are cost-effective, clean, safe and available at suitable scale.

In addition, the G20 leaders might send a message to the WTO, for instance, on tariff reduction that may be obtained through the Environmental Goods Agreement, local content rules to be pursued through the Government Procurement Agreement, sustainability standards for energy products via the International Energy Charter, and the need to avoid the creation of new property rights to fossil resources (Kraemer 2016, 24; 25-26).

Conclusion

Germany's G20 presidency comes at a pivotal time of changing economics in energy technologies, which is accelerating the overdue shift away from fossil and nuclear energy toward renewable energies and storage in smart-energy systems. This shift will help provide access to modern energy services to populations in areas that are not being served at present. The geopolitical consequences of the shift are beginning to be understood, but the second- and third-level effects on economic development, capital formation and deployment, growth (as measured in GDP), trade, employment and tax revenue have not yet been studied in sufficient detail.

With its roots in economic and financial crisis management, and still reacting more to emergencies than anticipating and facilitating developments, the G20 needs to reconfigure its internal structure and operations. Integrating climate and energy into the finance track would provide a focus on internal cohesion (within the Sherpa track and between the Sherpa and finance tracks) as well as on long-term crisis prevention.

The leaders' meeting under the German presidency could thus shift the G20 from crisis response to crisis prevention, and begin to focus on the future rather than on the past.

Acronyms

BETD	Berlin Energy Transition Dialogue
G20	Group of Twenty
EELP	Energy Efficiency Leading Programme
EMWG	Energy Management Working Group
ESWG	Energy Sustainability Working Group
IRENA	International Renewable Energy Agency
JODI	Joint Organisations Data Initiative
SDGs	Sustainable Development Goals
SEAD	Super-Efficient Equipment and Appliances Deployment
WTO	World Trade Organization

6 See G20 Leaders (2013, paragraph 97).

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Through its research, collaboration and publications, the Global Economy Program informs decision makers, fosters dialogue and debate on policy-relevant ideas and strengthens multilateral responses to the most pressing international governance issues.

About the Author

R. Andreas Kraemer is a senior fellow at CIGI and the Institute for Advanced Sustainability Studies (IASS) Potsdam, founder of Ecologic Institute and initiator of a Canadian-German Energy Think Tank Group. He researches the role of think tanks in global policy coordination, with a focus on energy, climate and sustainability.

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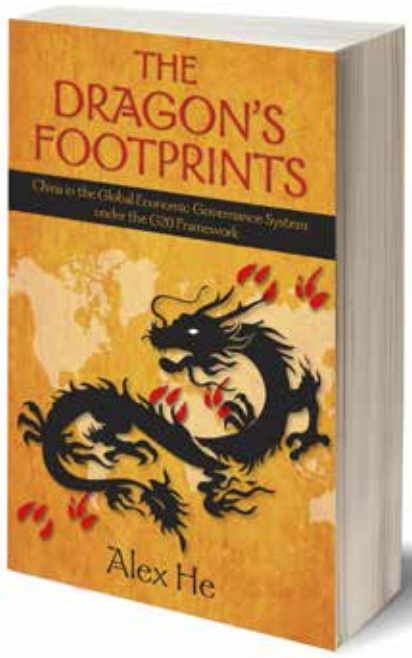

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China in the Global Economic Governance System under the G20 Framework

By Alex He

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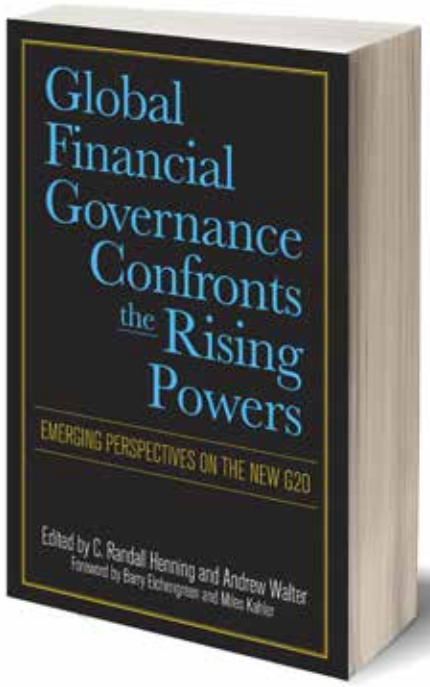

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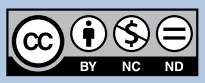

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