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GLOBAL GOVERNANCE 2022
ABOUT THE REPORT

This report was produced within the framework of the Global Governance 2022 program, organized by the Global Public Policy Institute in Berlin, in collaboration with partner institutions in the United States (The Brookings Institution and Princeton University), China (Tsinghua University and Fudan University), and Germany (Hertie School of Governance).

GG2022 brought together 24 young professionals from the US, China and Germany for three meetings, one each in Berlin (26-30 August 2012), Beijing (7-11 January 2013) and Washington, DC (5-9 May 2013). During these meetings, the GG2022 fellows jointly discussed challenges of global governance in the year 2022 and beyond, with a particular focus on three areas: cyber security, energy security, and development.

This report summarizes the work of the GG2022 working group on global development governance. To explore possible futures in global development, the working group used a scenario planning methodology with techniques developed extensively in the field of future studies. The diverse nationalities, backgrounds, and expertise of working group members contributed crucial assets for devising national strategies and solutions.

During the three sessions, the working group also met with leading academic experts and policymakers in the field of international development from all three countries. We are grateful to all these experts for their valuable input:

Julius Agbor (The Brookings Institution), Nancy Birdsall (Center for Global Development), Deborah Bräutigam (Johns Hopkins University), Kate Campana (Speak Up Africa), Carolyn Campbell (Emerging Capital Partners), Matthew Ferchen (Carnegie-Tsinghua Center for Global Policy), He Wenping (China Academy of Social Sciences), Ingrid Hoven (Executive Director for Germany at the World Bank), Jin Ling (China Institute of International Studies), Inge Kaul (Hertie School of Governance), Mao Xiaojing (Chinese Academy of International Trade and Economic Cooperation), Sara Minard (Columbia University), Shantanu Mitra (Department for International Development), Célestin Monga (World Bank), Guy Pfeffermann (Global Business School Network), Lant Pritchett (Harvard Kennedy School), Ebrahim Rasool (Ambassador of South Africa to the United States), Jürgen Zattler (Federal Ministry for Economic Cooperation and Development, Germany).

We would like to thank the organizers and funders of the GG2022 program and everyone else who contributed to making the program possible, most especially Joel Sandhu and Johannes Gabriel. We are also grateful to Alex Fragstein for the design work and Oliver Read for editing.

Disclaimer: The views expressed in this report do not necessarily represent the views of, and should not be attributed to, any author in his individual capacity nor to their respective employers.
Major technological, economic and political shifts are remaking the global energy market. Emerging economies have become top energy consumers. Technological breakthroughs have fueled the rise of new energy producers. And energy regimes such as the Organization of the Petroleum Exporting Countries (OPEC) are under increasing pressure to reform. Uncertainty remains. Turmoil in the Middle East remains a trigger for concerns over supply. Fallout from the financial crisis remains a core concern for both developed and developing countries. Carbon emissions are increasing faster than expected. Further, while clean technologies have become more affordable, structural limitations, including the continuation of financial subsidies and poor systems integration, undermine their take-up.

In the face of these challenges, the current state of global energy governance is in remission. International dialogue on energy is limited. International climate policy has lost momentum. Energy markets on the whole remain as volatile and unpredictable as ever.

Structured scenario planning has become commonplace among private and public sector organizations alike. The methodology and development of scenarios is designed to facilitate strategic long-term planning in the face of this uncertain future.

The GG2022 energy group has used scenario planning methodology to create two distinct scenarios for the energy world in 2022. In both scenarios, we identify unconventional fossil fuels as a primary factor that will significantly impact global energy markets and change not only the size, structure and membership of existing energy institutions, but also their relevance and influence. Though major uncertainties concerning the size of the reserves of unconventional resources and the environmental impact of the methods used to extract them still exist today, the political and economic momentum that their extraction has generated fundamentally reshapes global energy markets. As a result, their exploration, extraction and production emerge as fundamental issues in global energy governance.

Will existing power structures ignore, integrate, or defend against unconventional resources? Will the new unconventional sources be made available to the global market or will their supply remain limited to producing countries? What will be the effect on countries without domestic supplies? What room does global energy governance have to shape these new rules of the game on energy trade and what will be the implications on the climate change framework? How should the energy governance institutions adapt to this changing environment?

We investigate these questions in two scenarios for the year 2022, one with a fragmented world, another with an integrated world. Both scenarios share important key assumptions – the emergence of new energy consumer- and supplier-countries and the availability of unconventional fossil fuel sources (see Figure on page 3).
Scenario 1

Within the “Fragmented World” scenario, countries focus on controlling energy assets rather than trading energy on a global market. Regional trading blocs emerge based on longer-term supply agreements. Resource conflicts surface over disputed resource-rich territories. While global climate change negotiations are moribund, some of the regional energy partnerships lead to substantial investments in clean technology.

Scenario 2

By contrast, in the “International Market Integration” scenario, countries demonstrate growing confidence in the global energy market. New producer countries generate a “supply cushion” that reverses long-held assumptions about strategies for securing energy supplies, gradually enticing entrants into the global energy market. In turn, new consuming countries also source from the global market. Regional investment treaties provide standardization of norms through which international investment and trading rules are improved. Closer cooperation in energy trade spills over to other energy governance areas and creates a platform for climate leadership and regional climate agreements.

TWO POSSIBLE WORLDS IN 2022

- **FRAGMENTED WORLD**
  - Focus on controlling energy assets
  - Regional alliances
  - Resource conflict

- **INTERNATIONAL MARKET INTEGRATION**
  - New suppliers
  - New consumers
  - Growth in market participation
  - Global integration through bilateral investment treaties
  - Enhanced collaboration/competition

PROMPTS MAJOR SHIFT IN GEOPOLITICS OF ENERGY – BUT IN WHICH DIRECTION?
By examining these contrasting visions for the next 10 years, the GG2022 energy group was able to identify lead strategies – that is, policy options that are suitable for both of these different scenarios. Each lead strategy addresses one or more of the following four goals: (1) energy affordability, (2) energy availability, (3) energy accessibility, (4) energy sustainability. The resulting policy options are:

**Scale up energy transport.** This includes liquefied natural gas (LNG) import/export terminals, pipelines, and electricity grids. This option also involves a clear regulatory framework, concessional finance, and long-term off-take contracts in order to improve investor security for the needed infrastructure investments. Procedures for determining infrastructure investments will need to be streamlined in order to get the necessary infrastructure in place, but those procedures must also allot time to engage affected communities and other stakeholders.

**Bolster energy-related legal and trade instruments.** This includes standardized investment treaties that provide fair and equitable treatment, protection from expropriation, and mechanisms for dispute resolution. These investment treaties should have application at multiple legislative levels and work to normalize best practices and market frameworks for energy trade.

**Implement energy knowledge-sharing and capacity-building mechanisms for emerging economies and developing countries.** This includes agreements and institutions to collect data and disseminate best practices on energy technologies and environmental protection. Such mechanisms must involve multiple stakeholders in information exchange in order to encourage countries to meet their growing energy needs in a secure and sustainable way.

**Accelerate clean-technology development and penetration through bilateral and regional institutions.** While non-state actors are increasingly forming alliances to reduce carbon emissions, states must work to keep climate change on the policy agenda. In emerging bilateral and regional energy treaties, regional climate agreements could be inserted as well. This will continue the effort to mitigate climate change, even if a global climate policy agreement cannot be reached.

**More closely incorporate emerging economies in existing international energy institutions.** It is likely that, absent major changes, global governance of energy will continue to be relatively weak and decentralized. Nevertheless, modest changes are feasible in the near future in order to facilitate dialogue on energy technology and trade. The International Energy Agency (IEA) could extend formal membership to countries such as China and India, while the G20 could provide greater leadership and coordination among and between developed and emerging economies.
Global energy governance institutions encompass a broad set of issues – often regionally focused – ranging from trade, investment and intellectual property regulations to emissions and supply targets and limitations. They provide forums for exchanging knowledge and technology, and they facilitate pledges to reduce carbon emissions. The current governance framework includes energy consumer and producer organizations, the United Nations efforts on climate change mitigation, and a multitude of bilateral and regional agreements regulating energy trade and investments.

The current governance structure faces challenges. Newly emerging consumer nations are not consistently included. Climate negotiations are stagnating. Energy trade and investment treaties are primarily bilateral, not global.

Moreover, no single, strong international body coordinates energy governance. In the past, the Group of Eight (G8) or the Group of Twenty (G20) major economies have spearheaded initiatives to improve energy efficiency, but neither has delivered a comprehensive vision for global energy governance. The United Nations Framework Convention on Climate Change (UNFCCC) provides a forum for negotiating treaties to set limits on greenhouse gas emissions, but it has not as of yet elicited binding commitments from major emitters, nor has it produced a post-Kyoto treaty.

The International Energy Agency (IEA) is an important organization of energy-consuming countries within the membership of the Organization for Economic Co-operation and Development (OECD). Its members coordinate their emergency oil supply reserves, and the secretariat provides a forum for market and technology data exchange through expert networks and reports. Yet the IEA does not include emerging economies such as India and China. In addition, although it generally advocates open energy markets, the agency lacks the mechanisms and mandate to facilitate legal frameworks for energy trade.

OPEC, a self-selected group of producer countries, coordinates oil supply volumes and prices of major oil producers. But with the potential emergence of further major energy exporters, the organization’s capability to continue to exercise its market power is in question.

The International Energy Forum (IEF) has emerged as an organization in which consumer and producer countries join a dialogue about stabilizing energy markets and improving transparency in energy markets. The IEF’s Joint Oil Data Initiative is an example of such data sharing, but overall the IEF’s reach has been limited. Energy trade and investment is also regulated by many bilateral or regional agreements, such as the Energy Charter Treaty. The Energy Charter Treaty aims to improve investor security among producer, transit and consumer countries in Eastern Europe, but recently its implementation and geographical expansion have stagnated.

In sum, global energy governance is disjointed and in flux. As a result, the GG2022 energy group sees a larger role for nation-states, the private sector, and civil society than it does for formal international organizations. These visions are captured in two scenarios – Fragmented World and International Market Integration – whose storylines are presented next.
Scenario 1: Fragmented World

Today, in 2022, the world is sorted into regional blocs that aid countries in satiating their energy needs in their respective “neighborhoods.” Worldwide industrialization has continued, bringing greater levels of development but also greater demands for energy. Enormous new consuming countries in Asia now hold sway, fueling a competitive scramble with Japan and long-industrialized European countries. At the same time, breakthroughs in unconventional fossil fuels enable a few countries in the Americas to greatly increase their energy production and challenge the production dominance of Middle Eastern countries. In pursuit of energy security, many governments are bypassing international energy markets to instead seek longer-term supplies within their immediate regions. Cross-regional institutions such as OPEC, the International Energy Agency, and the World Trade Organization gradually devolve. Meanwhile, although countries have formally abandoned global climate change negotiations, some of the regional energy partnerships have led to substantial investments in cleaner-technology projects that make moderate headway in reducing worldwide carbon emissions.

Picture of the Future: The Rise of Regional Energy Arrangements

HISTORY OF THE FUTURE: FRAGMENTED WORLD

> PHASE 1
New suppliers and new consumers shake up global energy system.

<table>
<thead>
<tr>
<th>TODAY</th>
<th>Big developing countries such as China and India ramp up their demand for energy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>US and other non-OPEC countries emerge as major suppliers of unconventional fossil fuels, such as shale gas and tar sands.</td>
</tr>
<tr>
<td></td>
<td>Energy infrastructure lags behind new energy supplies, making it difficult to get new supplies to global markets. Countries begin turning to regional partnerships instead.</td>
</tr>
<tr>
<td></td>
<td>Countries fail to reach a post-Kyoto Protocol commitment on carbon emissions. UNFCCC becomes even more marginalized.</td>
</tr>
</tbody>
</table>

> PHASE 2
Regional partnerships proliferate and resource conflicts loom.

| 2016   | Hillary Clinton runs for US presidency on a pro-manufacturing platform, vowing to protect domestic industry. |
|        | Following heavy lobbying by the US and Canadian petrochemical industries, and citing national security, Congress bans US exports of LNG outside North America. |
| 2018   | East African and Australian natural gas supplies come online. Supply off-takers such as South Korea partner with Asian producers in pursuit of energy security. |
|        | Increasingly left out of the new energy order, Russia tries to claim energy resources in the Arctic region, and this sets off an international backlash. |

> PHASE 3
Opportunities for investments in cleaner energy.

| 2020   | OPEC’s influence takes a huge hit as Saudi Arabia and China announce a bilateral agreement on energy supplies. Without the support of its biggest member state, the group begins unraveling. |
|        | With Russia and OPEC losing power as energy suppliers, Japan and the European Union consider other options and sign an agreement to invest jointly in clean-energy technology. |
| 2022   |                                                                                             |
Phase 1: A Shake-Up by New Consumers and Suppliers

Between 2014 and 2016, emerging economies shook up the global energy system. As part of their long-term development plans, the governments of China and India ramped up energy investments, gaining control over energy assets in Sub-Saharan Africa and in several former Soviet republics in Central Asia. Meanwhile, long-time consumers such as Japan continued to demand substantial amounts of energy imports. Fearful that more and more energy assets were “spoken for,” Japan and other industrialized countries accelerated their efforts to obtain reliable access to energy assets that could meet their needs well into the future.

Non-Middle Eastern producers also transformed the global energy system in this period. Since at least the 1980s, OPEC had struggled to moderate oil supplies in order to prop up oil prices. Further challenges were posed by the fact that non-OPEC countries – particularly the United States and Canada – would become the key near-term beneficiaries of a boom in unconventional fossil fuel supplies, such as shale gas and tar sands. By 2015 the United States, long a net-importer of energy supplies, was poised to become a net-exporter. This reduced US demand for OPEC oil and also held the promise of substantial non-oil energy supplies in the future.

However, due to infrastructure limitations, the United States by 2016 proved able to export regionally but not globally. Congressional paralysis and the absence of clear policy framework limited needed investment in exportation infrastructure. Investment in the increasingly integrated North American grid system ensured greater cross broader collaboration and integration in North America energy markets. But growing integration of the regional energy markets was not the game changer that was foreseen. Countries in other parts of the world too began to turn away from global energy markets in favor of regional partnerships.

Growing regional partnerships and alliances undermined the modest international momentum that had remained for forging new carbon-emissions commitments to replace the Kyoto Protocol.

After all, many countries anticipated that in the near future the most promising energy sources would continue to be fossil fuels, even if in unconventional forms such as shale gas or tar sands. Moreover, regional – rather than global – partnerships appeared to be the cooperative form of the immediate future, partly because infrastructure investment could not keep pace with emerging energy sources.

As a result, governments became even more reluctant to tie their hands through a global climate agreement. Countries were unable to agree on any new comprehensive commitments. Thus, the already languishing global climate change negotiations came to a standstill, and the United Nations Framework Convention on Climate Change became even more marginalized.
The movement toward regional energy partnerships took another turn in 2017, when the US government finally made a clear choice to keep the country’s burgeoning unconventional gas supplies out of global markets. For several years, the US and Canadian industrial lobbies had called for a ban on natural gas exports outside of the Western hemisphere in the hopes of not forestalling a lasting economic recovery, still on the minds of many policymakers. They found an ally in Hillary Clinton, the frontrunner for the 2016 US presidential election. Citing national security considerations, Clinton emphasized a pro-manufacturing campaign platform and vowed that, if elected, she would protect domestic companies, especially manufacturing jobs. Joined by a new Democratic majority in Congress, in mid-2017 President Clinton signed into law a bill prohibiting US natural gas exports beyond the Americas.

This assuaged the demands of powerful interest groups in the United States and Canada and set off even more regional energy partnerships in other parts of the globe. Around the world, the extraction of unconventional energy from shale gas had been accelerating – but as in the Americas, distribution of those extracted resources remained a challenge, because new gas distribution networks needed to be built and existing distribution networks needed to be refitted. This proved to be more feasible on a regional basis than on a global basis. Infrastructure limitations led shale gas extractors to serve regional rather than global customers.

The world’s previously dominant natural gas producers, especially Russia, lost some of their former power-projection capabilities. For years, several parts of Europe depended on Russian gas supplies – a situation that fueled robust revenue for Russian suppliers. But the development of shale gas reserves in Poland provided additional regional options, allowing Germany and other European countries to decrease their reliance on Russian supplies. Toward the end of the decade, the relationship between Russia and northern Europe underwent another strain: In 2019 the Russian navy sent five ships to the Arctic Circle to begin extracting energy resources in disputed areas. This prompted a backlash from the European Union, backed by Canada, China, and the United States. Although Russia eventually backed down, the specter of resource conflicts in the Arctic and elsewhere remained. This further solidified state inclinations to pursue “secure” energy supplies by satiating their energy needs regionally rather than in global markets.

Phase 3: Opportunities for Investments in Cleaner Energy

By 2020 the dynamics and regionalism surrounding influential new consumers and producers of energy upended other elements of the previous energy order: OPEC and the International Energy Agency. Throughout OPEC’s history, Saudi Arabia had been pivotal. It strived to settle squabbles among member-states, and it overlooked member-states’ occasional over-production vis-à-vis quotas. But playing this pivotal role became more difficult and costly over time. The Arab Spring uprisings had shaken Middle Eastern and North African states, exposing vulnerabilities within their governments and economies. Moreover, the shale gas boom had spurred interest in non-oil energy sources in countries outside of OPEC’s membership. In a surprise move, Saudi Arabia withdrew from the organization in 2020. Abandoned by this key member-state, OPEC began formally unraveling.

The International Energy Agency also faltered, although for different reasons. Since its creation in the 1970s, the IEA had provided an institutional
framework for major energy-consuming countries, sometimes counterbalancing OPEC’s. As an off-shoot of the OECD, the IEA had always drawn its membership from “rich” democracies. This posed little problem when the universe of major energy-consuming countries coincided closely with the universe of rich democracies – but the rise of China and India complicated the situation. In 2020, the IEA’s existing membership agreed to change the organization’s membership criteria, permitting non-democracies or less-developed states to join. But both China and India declined to pursue membership under the new rules. This, coupled with OPEC’s unraveling later that year, meant that the IEA could no longer claim to be representing major energy-consuming countries or to be counteracting a powerful cartel of energy-producing countries. International energy governance – which had never been as intricate as governance of other issues at the global level – was splintering by 2021.

Around the world, governments intensified their use of regional multi-year agreements instead of international spot-markets for their energy needs. This was part of a self-reinforcing cycle. Infrastructure investments and improvements (especially for gas supplies) were made on the basis of shorter-term regional agreements, not with the goal of getting new supplies on global markets. But because new supplies were not reaching global markets anyway, countries faced no incentive to discontinue their investments in the infrastructure necessary for their regional agreements. In other words, the lack of a comprehensive worldwide infrastructure fueled countries’ emphasis on regionalism, and that emphasis on regionalism impeded investments in a comprehensive worldwide infrastructure. As result, the world became marked by a proliferation of regional energy agreements and a power vacuum left by previously central actors, such as Russia, OPEC, and the IEA.

This fragmentation, however, proved to be beneficial for reducing carbon emissions. Mid-decade, the global negotiations centered on the UNFCCC and the Kyoto Protocol had died out. But increased supplies of natural gas (especially within particular regions) enabled countries to replace some of their coal consumption with cleaner burning natural gas, particularly for electricity generation. This produced a modest decrease in carbon emissions within particular regions, such as North America. Although in itself this did not drastically reduce global emissions, it did make the US and Canadian governments more willing to make more substantial formal commitments to climate change mitigation.

Meanwhile, countries that were unable or unwilling to fully and directly capitalize on the boom in shale gas and other unconventional fossil fuels faced incentives to pursue renewable energy research more vigorously. No substantial shale gas reserves were uncovered in Japan, but Japan’s energy needs remained high. Greater shale gas deposits were found in Western Europe, but several countries joined France in banning extraction. Then, in late 2021, Japan and the European Union announced that they would sign an agreement to invest jointly in clean energy technology, particularly wind power. In an ironic turn, the 2022 world of fragmented energy governance promises greater reductions in carbon emissions than the UNFCCC-led climate talks ever had.
**Scenario 2: International Market Integration**


Today, in 2022, nation states demonstrate growing confidence in the global energy market. New producer countries generate a “supply cushion” that reverses long-held assumptions about strategies for securing energy, gradually enticing entrants into the global energy market, now flush with cheaper oil and gas. As a critical mass of producers and consumers start to source more from the global market, major new consuming countries pivot: Increasingly, they source from the global market, which they find offers more secure sources of supply with greater flexibility.

**History of the Future: International Market Integration**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TODAY</td>
<td>The US exports natural gas. Obama nicknamed “Oil President.”</td>
</tr>
<tr>
<td>1</td>
<td>2014</td>
<td>Sudden natural gas $ drop.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>China’s Xi Jinping institutionalizes carbon tax, gets nickname “Green President.”</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>US-China Energy Dialogue leads to BIT, which articulates tech transfer guidelines and energy innovation sharing regime.</td>
</tr>
<tr>
<td>1</td>
<td>2016</td>
<td>EU-Russia “Cold War” as long term gas supply contracts renegotiated.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>BRICS sign historic energy innovation accord, dubbed a “strategic commercial alliance” (SINOPEC, SASOL &amp; Petrobras).</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>SOE partnership props up international energy market as accord sells back into market in attempt to limit influence of speculators.</td>
</tr>
<tr>
<td>2</td>
<td>2018</td>
<td>Intense competition in new frontiers (Africa).</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>OPEC begins to loose control of its members as African states leave on mass.</td>
</tr>
<tr>
<td>3</td>
<td>2019</td>
<td>Coal to Gas Summit in Beijing. US-China lead global shift from coal to gas, set targets in commercial contracts for CO₂ reductions.</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>WTO and G20 emerge as new CO₂ reduction target forums, displace UNFCC as central decision making body.</td>
</tr>
<tr>
<td>3</td>
<td>2020</td>
<td>Vancouver Summit on international energy market codifying “rules of the road” for short term energy contracts.</td>
</tr>
<tr>
<td>3</td>
<td>2022</td>
<td></td>
</tr>
</tbody>
</table>
Phase 1: New Suppliers Disrupt Old Energy Security Paradigm

The rise of new supplier countries (such as the US) and additional consuming countries from the developing world brought about a paradigm shift in global energy markets. The growth in demand from populous emerging consumers such as China and India proved to be relatively predictable. More impactful was the less obvious influence of rapidly growing energy supplies from unconventional fossil fuel sources in the United States, Africa, and Latin America. Earlier than anticipated, the production of unconventional fossil fuels became more energy efficient and substantially less environmentally damaging. Shale gas companies, for instance, developed new extraction methods that use very little water, greatly reducing extraction costs and groundwater contamination concerns.

Substantial investment in renewable energy sources continued, but with an emphasis on “game changer” technologies. For example, improving battery technology became a major focus for Western countries, where consumption of petroleum is focused on the transport sector. Not wanting to cede ground to China on green technology, the US announced a 10-year “man on the moon” initiative to develop the world’s first long-lasting battery, and the government began the initiative with a major investment in the Bell Labs Battery Extension Facility. Although such investments did not completely appease civil society groups pushing for a “greener future,” they did indicate progress in that direction.

In the near term, however, renewable energy was unable to displace fossil fuels. In addition to investments in battery research, countries around the world made strides in solar and wind energy production, leading to substantial price drops in photovoltaic and other technologies. But lack of usage and absence of distribution mechanisms remained major impediments to rapid wide-scale adoption of solar and wind technology. Instead, progress came in the form of shifts from higher emitting fossil fuels such as coal to instead lower-emitting fossil fuels such as natural gas.

By 2015, Africa emerged as the newest hotspot for fossil fuel exploration. That year the continent accounted for eight of the 10 largest hydrocarbon finds in gas and oil. This sparked a new competitive frontier between major state owned enterprises (eg, China National Offshore Oil Corporation, Sinopec, Petronas, Petrobras) and traditional private powerhouses (eg, Exxon and Total). The battle played out in the global energy market, where both groups preferred to sell energy supplies back into the global market. With the extension of the West African Transform Margin up the coast of West Africa, and the announcement that East African reserves had secured off-take contracts in India, South Korea, and Japan, Africa ascended in the new global energy world.

The US also rose as a key new energy pole in this period. In his second presidential term, Obama continued to express concern about climate change and catastrophic events, but he did not spearhead comprehensive policies to deal with these concerns. In fact, he advanced America’s renaissance in fossil fuel extraction. Major catastrophes in deep water offshore drilling and nuclear generation proved less influential as policy fore-runners. President Obama eliminated the moratorium and announced an expansive domestic drilling agenda. Then, in the run-up to the 2016 presidential elections, candidate Hillary Clinton went even further: Backed by a strong domestic lobby and looking to head off Republican challengers, Clinton embraced the campaign slogan “Frack Baby Frack.”
Phase 2: US/China “Breakthrough”
Sets Scene for Global Integration

Now a decade after the start of the shale boom, and frustrated by lack of innovation within its state-owned energy enterprises, China looked to outside sources for expertise in deep water drilling and fracking, but an absence of intellectual property protection deterred potential investors. The 2014 Joint China-US Economic Dialogue placed energy and intellectual property protection atop its agenda; the summit ended with agreement on establishing an “energy dialogue.”

The US natural gas industry, seeking financing and suffering from bottoming out prices of natural gas at home, lobbied congress for the creation of a bilateral energy investment treaty (BIET) with China. The BIET seemingly aligned both countries’ interests: China had the need and finance while US companies had the technology and need. The BIET was hailed as a major strategic breakthrough and set the stage for China to acquire major Canadian and US oil services companies. China further incentivized the development of the domestic shale gas industry by removing legal impediments (for example, through unbundling shale from oil/gas classification and allowing foreign and private bidders into increasingly frequent bidding rounds). The development of shale gas in China, however, was not fully exploited as full-scale investment remained repressed by lingering concerns about off-taker and intellectual property protection regulations and infrastructure requirements in the area of exploration and extraction. While this delayed “game changer” for Chinese energy, it nevertheless provides a “proof of concept” for some wild cat investors.

On the back of major losses on Keystone, environmentalists saw the BIET as potentially advancing their own goals of reducing global carbon emissions. Environmentalists began a concerted campaign to advance natural gas export to China. China, seeing the added benefit of lower emissions and lower natural gas prices, revisited its long-term supply contracts with Indonesian coal, lowering its supplier contracts down to 70% from its 2010 level. The switch towards increased natural gas consumption decelerated China’s coal consumption growth.

South Africa, hosting China and Brazil for the 6th Annual BRICS Forum in 2015, proposed a strategic trilateral technology transfer alliance focused on sharing gas-to-liquids and deep-water-drilling technologies with Brazil. Looking to build on Exxon’s seismic data, SAPetro, South Africa’s national petroleum company, was especially eager to learn from Petrobras, which saw value and access to cheap capital from China. Meanwhile, China was the major driver of a Sasol-SINOPEC partnership, which saw synergies in its own coal and gas sectors. The partnerships allowed all three countries to pursue joint projects in new frontier markets, especially Africa, but instead of securing these assets for national consumption, the trio decided that it was in their better interest to sell the resources back into the global market.

Phase 3: As Old Alliances Realign, Global Market Matures

The new alliances between new consumers and new producers shook up old alliances. The Iranian regime was in serious turmoil as gas revenues dipped below breakeven targets, and off-taker contracts became more competitive. Sanctions on the regime started to bite, as China appeared less dependent on maintaining a resource relationship with the regime, agreeing to take a tougher stance and consenting to limited sanctions.

Internally, OPEC started to unravel in 2019. As Iraq and US oil came online, spare capacity reached 9 billion barrels by 2020, an increase of 400% in five years, reducing price setting power of the alliance.
With the world entering the third decade of the 21st century, it has done so with the foundations of an integrated international energy market in place. Standards and commercial arrangements have been increasingly conducted via a global market and managed by a new set of actors. Looking for a new role after Doha’s failure, the WTO has taken the lead in managing the new framework while the G20 remains the central forum for agenda setting. Both China and the US have approached climate negotiations differently, now that attaining carbon reduction targets appears less of a cost and an integrated market facilitates more open dialogue and commercial cooperation. Having substantially reduced its CO₂ emissions by managing a strategic shift from coal to natural gas, Chinese policymakers play a more active role in climate negotiations. Seeing an interest in spurring a global shift from coal to gas to ensure an export market for its surplus supplies, the US no longer slow peddles carbon targets and promotes gas as an effective bridge fuel, to the consternation of some activists.

Elsewhere, in India, a reinvigorated public debate about energy and development has been sparked by chronic massive rolling blackouts, which grip the political class and threaten disorder. China, where pollution continues unabated, sees its own interests in driving the dialogue to satisfy domestic concerns. Domestic forces have therefore gradually shifted global dialogue and promoted a generalized shift in climate negotiations. Political leaders in emerging countries have started to embrace new language to discuss climate change – from “burden sharing” and “load shedding” to “opportunity sharing.”

The green shoots of a bottom-up patchwork agreement on carbon reduction targets look obtainable by 2030 as major consumers and suppliers increasingly explore new political space for a global climate change treaty.

**Phase 4: Bottom-Up Global Climate Consensus**

With the world entering the third decade of the 21st century, it has done so with the foundations of an integrated international energy market in place. Standards and commercial arrangements have been increasingly conducted via a global market and managed by a new set of actors. Looking for a new role after Doha’s failure, the WTO has taken the lead in managing the new framework while the G20 remains the central forum for agenda setting.

As OPEC and other old alliances devolved, new institutions filled the gap. The G20 and the World Trade Organization emerged as central forums for energy. The G20 Summit in Vancouver in 2020, labelled the “Integrated Energy Market Summit,” looked to formalize the rules of the road for an integrated global energy market. Building off of a “spaghetti-bowl” of pre-existing arrangements, the summit served as the starting point, ushering in a new era of energy collaboration and cooperation, in stark contrast to the cartel and price fixing of past energy eras. New rules of the game – including data sharing, emergency reserves, burden sharing on shipping route security, spare capacity and investment rules – were enshrined in a compact between major producers and consumers.

Frustrated by what they perceived as a “founder collusion” between Venezuela and Saudi Arabia, African states (Libya, Nigeria, Algeria and Angola) left the cartel en masse and started participating more actively in global energy markets.

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Neither scenario – Fragmented World or International Market Integration – is inherently better than the other. While they have unique aspects, they also share features, such as the availability of new energy sources, the shifting of geopolitical alliances, a drop in fossil fuel prices, and an erosion of the market power of some traditional producers. Both scenarios contain positive and negative aspects – and together the two scenarios illuminate a variety of potential opportunities and potential threats that could arise in the coming years. These opportunities and threats are summarized in table 1.

In the Fragmented World scenario, characterized by new suppliers becoming available and secured from discovering particularly unconventional fossil fuels in the Americas, the global energy market is enriched with diversified sources; these sources are beyond traditional Middle Eastern and some African countries, which appear to form an evolving landscape of emerging players at a lower fossil fuel price. Relying on the rise of domestic production and exports to the international market, new suppliers are forming their own regional alliances based on common interests in claiming new leadership in the international economy of fossil fuels, while former producers lose battlefields in the shift of geopolitical power. And that new alliance is confronted with the responsibility to address greenhouse gas emissions and tackle global climate change through regional collaborative actions after global consensus fails to happen.

In the International Market Integration scenario, the availability of supply is secured by a more flushed and flexible global energy market with conventional fossil fuels at a lower price. As means to facilitate and stimulate fluidity of market access to new supply, bilateral trade and investment agreements are prioritized, which ultimately promotes the integration of the international market. Former producers, particularly those in currently existing alliances such as OPEC and the IEA, are also losing in the shift of power due to a leadership vacuum and political conflict.
Both scenarios are impacted by common themes, and the resulting opportunities and threats focus on three strategic implications: energy availability, affordability, and accessibility. Paying attention to these three strategic implications helps to identify ways to offset risks and leverage benefits in each scenario.

In the next 10 years, the availability of energy largely depends on the realization of projected expansion of conventional and unconventional energy production. To mitigate perceived investment risks, the United States needs to provide regulatory certainty to foster investment in extraction and in the transportation of unconventional sources. It also needs to tighten its regulatory environment in order to prevent drilling-related accidents from potentially halting fracking activities. China, on the other hand, would need to solve technological and environmental challenges on fracking for its own particular case as this technology is geographically specific.

The prospect of the affordability of energy has different implications globally. The US needs to loosen its current export restrictions. The price reduction also depends on whether other countries holding large shale gas reserves, such as China and EU states, can reproduce the US success in shale gas development. Current US crude oil suppliers, such as Saudi Arabia, Canada and Mexico, would need to seek alternative markets. Middle Eastern countries and Russia need to seriously consider diversifying their economy. At the same time, a more integrated energy market needs to be formed to provide the needed transparency and stability, thus further reducing the price volatility in the world’s energy market.

In the Fragmented World, a country’s access to energy supplies will hinge to a large extent on its own geographic location, economic or political powers, and resource endowments. Any country that is disadvantaged in this regard will need to consider risk-mitigation strategies to prevent shortages in energy supplies – for instance, by shifting their domestic energy mix toward a higher share of renewables. In the International Market Integration scenario, to prevent crowding out of renewables due to increased reliance on natural gas energy supply, countries such as the US also need to develop relevant policies. The accessibility of traditional and newly added sources also depends on the availability of transporting infrastructure.
POLICY OPTIONS

Based on the strategic implications of a Fragmented World and an International Market Integration world, the GG2022 group has derived robust strategic options to provide a secure, affordable and sustainable energy supply irrespective of the alternative future environments. Each of the policy options addresses one or a combination of the strategic implications. The policy will aim to make energy more affordable, available, accessible, sustainable, or a combination of the above.

Policy Option: Scaling-Up Energy Transport Infrastructure

› Ensure regulatory certainty on energy exports
› Provide concessional finance and long-term off-take contracts
› Speed up permitting procedures for infrastructure and engage affected stakeholders

Policy Implications

The need for scaling-up energy transport infrastructure to make available energy more accessible. In the Fragmented World, energy trade occurs mostly on a regional basis, while in the International Market Integration scenario, energy trade occurs globally as a more integrated energy market emerges. In both scenarios, the potential for new unconventional energy sources to reshape energy trade strongly depends on the availability of sufficient transport infrastructure to connect markets. The current transport infrastructure is insufficient to deal with the energy trade potential, but major regulatory investment and technological barriers hinder the scale-up of this need. Regional energy trade as predominantly occurring under the Fragmented World relies strongly on an extension of oil and gas pipelines as well as, to a lesser extent, electricity grid interconnections. In International Market Integration, there is greater potential for global energy trade driven by regional price differences. In this scenario, global energy trade relies on the extension of liquefied natural gas (LNG) import- and export-facilities in key supply and demand countries.

Policy Instruments

Remove regulatory, investment and technological barriers for energy transport infrastructure. Regulatory uncertainty today prevents the required investments from flowing to energy transport infrastructure. Uncertainty remains regarding the size of global unconventional fossil fuel reserves, regarding many developing countries’ capability to exploit them in the short-term as well as regarding environmental regulation and export legislation. The uncertainty revolving around a potential bill banning the US LNG export is an example of delayed investments in LNG export terminals. These regulatory uncertainties drive up financing costs for investors. On the national level, countries need to provide a reliable long-term regulatory framework for LNG exports. On the international level they need to agree on common codes and standards for energy transport (eg, network codes...
for electricity) and provide bilateral investment treaties to ensure investor security. Concessional finance and state guarantees from the government side and long-term off-take agreements from the energy consumers all help to reduce investor risk. Permitting procedures need to speed up, and ensuring effective stakeholder consultation and offering affected communities equity stakes in energy transport infrastructure projects will help to reduce local opposition to the projects.

Policy Option: Energy-Related Legal and Trade Mechanisms

- Aligned bilateral investment treaties standardizing energy trade
- Common/harmonized international trade codes for energy technology
- Legal reciprocity and intellectual property protection agreements

**Policy Implications**

**The need for additional investment in the energy sector to make energy more affordable and accessible.** Both scenarios suggest the need for additional investment in the energy sector. In the Fragmented World scenario, consuming countries fear unstable supply from traditional energy producers, and therefore some opt to install more renewable-energy capacity within their own territories. For developed and emerging countries, this means additional commitment of public and private investment towards renewable energy technology development. For the least developed countries, this may indicate additional need for aid and foreign investment to provide required liquidity. In the International Market Integration world, with the continued reliance on fossil fuels and the switch towards reserves that are more difficult to reach (e.g., deep sea drilling or oil shale), additional investments are needed for both upstream and downstream infrastructure development.

In both scenarios, there is a threat of under-investment due to economic uncertainty and the difficulties associated with risk assessment and decisionmaking on large energy projects. In addition, there is little framework for governing foreign direct investment in the energy sector. This leads to alternative structures, such as bilateral investment treaties (in International Market Integration) or regional arrangements (in Fragmented World) to define investment conditions and settle disputes.

**Policy Instruments**

**Use bilateral investment treaties to create energy related multilateral investment and trade framework.** Bilateral investment treaties (BITs) refer to an agreement that sets the investment conditions for private investors from one state in another state. It usually contains line items that define fair and equitable treatment, protection from expropriation, and provides mechanisms for dispute resolution. In the face of a lacking global governance structure on foreign direct investment, BITs have provided the needed guarantee of dispute settlement and risk amelioration. Private investors can seek arbitration from international dispute resolution institutions without the need to involve diplomatic protection from the home state. At the same time, due to the increasing uniformity of these BITs in terms of language and format, a common standard is forming for foreign direct investment.
With this in mind, we see the potential for BITs – signed between one major energy consuming or producing country with their partners – to expand into a multilateral investment framework that eventually harmonizes international investment in the energy sector in the next 10 years. There have been attempts in the past to form such multilateral international standards for energy related foreign investment from a top-down approach, such as the European Energy Charter Treaty. Although their influence on providing better investment governance remains to be seen, such efforts indicate the demand and experimentation of providing more transparent, common and stable legal platforms in the energy sector for foreign investment. At the same time, we realize the difficulties of negotiating and forming a multilateral investment standard among many national players. We argue that starting such efforts on a bilateral level and expanding the legal web from there may increase the likelihood of forming a widely accepted investment governance structure within the global energy sector.

## Policy Option: Environmental Regulation and Standards

- Sharing information, knowledge and consensus building
- Collaborating with international industrial association
- Integrate BRICS countries into the system
- Studies on international environmental impact

### Policy Implications

**The need for cross-border regulation and standardization to make energy use more accessible and sustainable.** Energy extraction, production, and use create myriad negative environmental externalities. To mitigate many of these concerns, it is crucial to establish environmental standards and oversight. The options remain focused on environmental externalities that could result from extraction or emissions. That calls for information and knowledge sharing as well as consensus building between major energy players through collaboration with international governing institutions, particularly with emerging economies under consideration.

### Policy Instruments

**Sharing information, knowledge and consensus building.** To assess the environmental impact of unconventional energy extraction, international standards should be jointly developed by countries with unconventional sources, industry representatives and civil society.

To reduce emissions from their energy usage, energy extraction industries should develop a knowledge and data sharing system in terms of environmental impact mitigation and pollution/emission control. They could join an existing data platform such as that of the International Steel Association.

Just as industry should develop mechanisms for measuring emissions, so should emerging and developed countries. Baseline standards for emissions and data accounting mechanisms should be developed and followed. Transparency, accountability and trust are critical in addressing the
ballooning amount of carbon in the atmosphere. Additionally, in raising awareness about the severity of climate change by the public exchange of data, nation states, industry and NGOs could build consensus towards an emissions reduction agreement.

To share knowledge regarding proper solutions on mitigating environmental impacts from energy extraction and emissions from energy usage, environmental impact studies could be developed between multiple nation states or industries. These studies could raise awareness and provide solutions to many environmental concerns related to energy production and consumption.

Policy Option: Climate Policy and Clean Technology

› Accelerate technology penetration and technology development
› Mitigation of climate change
› Mini-lateral climate agreements

Policy Implications

The need for climate action and technology cooperation in order to make energy more sustainable and available. Unconventional fuels play a large role in both scenarios, suggesting that support for clean technologies will continue to be necessary in order to ensure their commercial viability. Traditional mechanisms such as the UNFCCC breakdown in both scenarios, but addressing climate change is still an imperative. In the Fragmented World emissions are tackled modestly in the form of mini-lateral agreements between countries as part of off-taker agreements. In the International Market Integration scenario, a mechanism develops for tackling climate change via the markets.

Policy Instruments

Accelerate technology penetration and technology development. National governments should play the major role in technology penetration and technology development. Governments should substantially increase spending for global energy research, development, demonstration and deployment (RDD&D). Because of time lags between technology research and economically profitable mass production, sufficient amounts of investment is the prerequisite for effective clean technology promotion. There is a strong view among scholars and analysts that governments should focus on critical and prioritized areas of green technology. Therefore, governments should facilitate the emergence of “disruptive” technologies, investing more in cross-cutting areas such as materials and nanotechnology. Technology penetration systems should be encouraged as well.

Mitigation measures for climate change. Effective implementations of mitigation measures from different actors are seriously needed. Policymakers around the world should consider the broad, long-term consequences of the climate change
mitigation policies they choose due to the difficult nature to change them when the policies are widely accepted. Many problems are cross-regional, necessitating international measures to mitigate or adapt to climate change. The business community and its regulators should incorporate climate risk mitigation into their plans and business models for economic development. The local citizens should be encouraged to show their concerns on climate mitigation in public and participate in activities to promote green societies.

**Policy Option: Improve Institutions for Global Energy Governance**

- The G20 should provide leadership in coordinating energy institutions and integrate energy markets.
- The IEA should include emerging economies and increase dialogue with non-members.

**Policy Implications**

The need to bolster existing international governing institutions in order to make energy more affordable, available, accessible, and sustainable. In the presented scenarios, the potential for immediate multilateral governance on energy is limited as the interests of major actors are too diverse. Instead, there are bilateral and regional agreements that can gradually evolve into a more multilateral framework governing energy. Global energy governance institutions can thereby facilitate dialogue and provide best practices on trade and investment frameworks, improve transparency on energy trade, provide forums for countries to coordinate their carbon reduction pledges and promote technology-transfer to developing countries.

**Policy Instruments**

Include emerging economies in energy institutions and facilitate further dialogue. The G20 countries should further coordinate the tasks of energy governance institutions and promote energy market integration, delivering a comprehensive vision for energy governance. The International Energy Agency, which so far does not include major consumers such as India and China, should open up its membership to non-OECD consumer countries. It should also deepen its dialogue on emergency reserves and response measures with other countries. The IEA should further strengthen its clean and conventional technology dialogue and provide guidance on energy trade and investment treaties. OPEC, currently still coordinating the oil supply volumes and prices of major oil producers, will lose capability to continue to exercise its market power through the emergence of new producers. It will need to present itself as a reliable energy supplier, for example through furthering data sharing and confidence-building measures in the International Energy Forum. The Energy Charter Treaty, currently tasked with providing investor security in Eastern Europe, could be extended in geographical and
sector scope and serve as a forum to standardize investment treaties. Finally, while in our scenarios there is little initial progress on a global climate regime, the United Nations Framework Convention on Climate Change could still provide monitoring and mechanisms for countries that agree on bilateral or regional carbon reduction targets.
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Iris Ferguson is a consultant and associate for the White House Office of Advance. She previously worked as a special assistant in the Office of the Under Secretary at the US Department of Commerce’s International Trade Administration (ITA) where she worked to prioritize ITA’s initiatives by targeting international markets and sectors with high export growth potential. Prior to Commerce, she worked as an assistant to the chief counsel on the Senate Foreign Relations Committee for former Senator Joseph Biden, focusing on treaties, nominations and European affairs. In addition, she spent a summer with the Department of State’s Mission to the European Union in Brussels, focusing on political-military affairs. Iris holds a bachelor’s in international relations and anthropology from the University of Arkansas and a master’s in international economics and energy policy from the School of Advanced International Studies at Johns Hopkins University.

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Yuge Ma is a DPhil candidate with the Environmental Change Institute (ECI) at the University of Oxford. She was a Ford Scholar at The Brookings Institution (2011-2012). Her research focuses on comparing the energy policies of India and China, and the impact of international politics on domestic energy efficiency policies. In India, she conducted extensive field research on household energy consumption in more than 10 states across the country. With colleagues in Oxford, she is currently organizing a multi-disciplinary workshop called Juxtapose: Comparing Contemporary China and India. The seminar brings together international scholars and practitioners to discuss comparative projects about these two emerging powers, their challenges and opportunities. Topics of discussion range from environment, energy, foreign policy, global governance and technology to culture and society. Apart from her academic work, Yuge is an active journalist and writer who has published articles about China’s energy policy, foreign strategy, Indian democracy, healthcare, development and American think tanks – and their implications for China. Her articles are published on broadly-read newspapers and magazines such as People’s Daily, China Comment, China Energy, China Economic Herald and Globe. Her book ‘Grow Up in India: contemporary India from a Chinese perspective’ is published by Lijiang Publishing House of China in May 2013. She has served as a consultant for the India Initiative of Panasonic’s Overseas R&D Center, and she has been a presenter and journalist on Tsinghua TV and CCTV. Yuge graduated from Tsinghua University with a double BA in building efficiency technology and law. She spent one year as a graduate student of regional development at the Jawaharlal Nehru University in New Delhi.

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Fabian Wigand is a strategy analyst at the Desert Energy Industrial Initiative (Dii), an international initiative of firms and research institutes that aims to create a market for renewable energy from deserts. He works on market, financing and regulatory issues for pilot projects and the long-term implementation strategy. Besides his work, Fabian is a member of the Think Tank 30 of the German Club of Rome and is engaged in seminars by the Foundation of German Business. Prior to working at Dii, Fabian conducted research on global management practices for a joint project of the London School of Economics and Political Science and Stanford University. He was a student assistant at the European Utility Management program at Jacobs University, and he interned in the global energy governance program at the Global Public Policy Institute. Fabian holds a bachelor’s in international politics and history from Jacobs University and a master’s in international political economy from the LSE.
APPENDIX: SCENARIO PLANNING METHODOLOGY

The methodology underlying this report is structured scenario-planning. Having become commonplace among private and public sector organizations alike, this methodology is designed to facilitate strategic long-term planning in the face of an uncertain future. A “scenario” is a possible and internally consistent trajectory of the future. To develop scenarios, the GG2022 energy group performed four major steps. First, we collected and investigated variables that are likely to influence the future of global energy governance. Second, we undertook a factor-system analysis in order to distill the most crucial factors. Third, drawing on this analysis, we constructed three main scenarios. Fourth, and finally, we derived key strategic implications and policy options.

Environment and Factor Analysis

We tabulated the most salient technological, social, economic, and geopolitical developments that influence global energy governance. These included, among other things, trends related to new energy consumers and producer nations, climate change policies and trade dynamics. From the list of approximately 40 factors, we identified 14 that stand out in both their potential impact and the level of uncertainty. We subsequently defined at least two possible outcomes for each crucial variable to complete our factor analysis.

Factor System Analysis and Scenario Construction

To observe cross-impact and interaction effects, we rated cross impacts between all crucial factor outcomes and created a matrix of rules on how these factors and their respective outcomes are interrelated (see Table 3: Cross-Impact Matrix Excerpt). We utilized a computer program (ScenarioWizard) to run a cross-impact balance analysis to separate the plausible and consistent sets of factor outcomes from the inconsistent ones. Then we selected two abstract scenario frameworks (see Table 4: Scenario Frameworks). We named our scenarios “Fragmented World” and “International Market Integration.” This does not mean that all factors radically differ in the two scenarios. For example, in both scenarios we envision abundant unconventional fossil fuel sources. But many factors, such as the existence of global energy markets, are represented only in one scenario. Our scenarios represent two different directions on a continuum of possible futures.

Having defined two plausible and selective future states of energy governance, we employed a driver-driven analysis to learn more about the forces that primarily influence developments. We then created corresponding histories for our pictures of the future by engaging in a collective writing process. We relied on intra-group discussions as well as ex-
changes with experts in the field. We also modeled several development paths for each scenario, and engaged in multiple rounds of editing, harmonizing, and re-editing. Recognizing that the future rarely proceeds linearly, we incorporated turning points within each scenario.

### Strategic Implications

#### Framework

After they had been outlined and illustrated, the two scenarios “Fragmented World” and “International Market Integration” underwent extensive robustness checks through expert reviews. We first accounted for factors and consequences that are “positive” (opportunities) or “negative” (threats) in influencing energy governance. Next, we derived strategic options to mitigate threats while utilizing opportunities for each scenario. Third, we determined the strategic fit between both strategy sets and developed a robust lead strategy, including all options that proved to be consistent for both scenarios. We then defined the key stakeholders in energy governance and accounted for their perspectives and strategic interest in a subsequent decomposition process. By taking into account the broad range of – at times incompatible – interests among stakeholders, and by identifying strategic options shared among governments, international organizations, NGOs, and multinationals, we were able to both refine our lead strategy and derive concrete policy options. This multi-stage process left us with a set of robust strategic options that would be appropriate across scenarios.

As outlined above, we used several techniques ranging from computerized uncertainty-impact and cross-impact analyses to qualitative content analysis and expert surveys to make our scenarios robust. In doing so, we profited from many resources.

› The interaction of group members who draw on a variety of backgrounds ranging from academia, NGOs, business and public affairs. Scenario planning is a holistic approach and requires diversity to tap into several reservoirs of knowledge.

› The expertise of our invited panelists and discussants. They made us aware of points of contention that we overlooked or interaction effects that we had neglected and thus not only provided tacit knowledge but also ample feedback into our descriptors and scenarios.

› A rigorous and demanding review process, including internal supervision and the aforementioned external experts.

This structured scenario approach made it possible for our group to lastly derive targeted and practical options for courses of action in global energy governance.