

## Emissions Mitigation as a National Security Investment

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Veröffentlichungsversion / Published Version

Stellungnahme / comment

### Empfohlene Zitierung / Suggested Citation:

Bosch, T., Campbell, L., & Vinke, K. (2023). *Emissions Mitigation as a National Security Investment*. (DGAP Policy Brief, 22). Berlin: Forschungsinstitut der Deutschen Gesellschaft für Auswärtige Politik e.V.. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-88202-1>

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# DGAP POLICY BRIEF

ACTION GROUP

ZEITEN  
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## Emissions Mitigation as a National Security Investment



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Germany's first National Security Strategy identifies sustainability as a pillar of peace and stability. However, in navigating the recent energy crisis resulting from Russia's invasion of Ukraine, the government has prioritized short-term crisis management over long-term climate goals. If the *Zeitenwende* is to be a larger policy shift, Chancellor Olaf Scholz needs to drive the cabinet to re-prioritize rapid decarbonization to meet climate obligations. Fostering independence from fossil-fuel autocracies and averting the disintegration of the multilateral efforts to protect the global commons lay the basis for freedom and security.

- In line with the National Security Strategy's stress on a preventive approach, rapid emissions reductions are crucial for maintaining the country's economic resilience and credibility as a leader on climate action.
- Increasing ecosystem collapse and life-threatening extreme events will move multilateral and plurilateral climate action and the race to lead in green technologies center stage in geopolitics.
- The green transition necessitates the engagement of not just the state but of all stakeholders, including business and individuals. The responses to the COVID-19 pandemic and the energy crisis provide valuable lessons for the required shift.
- European offshore wind and circular economy projects would have climate mitigation effects and provide opportunities to bolster Germany's geopolitical position and economic outlook.

### The Geopolitics of the *Zeitenwende* in the Energy Crisis

Russia's role as the dominant oil and natural gas supplier for Germany placed energy policy at the heart of the *Zeitenwende*. While many actors had already raised concerns about these import dependencies, the full-scale invasion of Ukraine in February 2022 forced an acute realization of the depth of Germany's vulnerability.<sup>1</sup> The situation was aggravated by the destruction of the Nord Stream pipelines. In his February 2022 *Zeitenwende* speech, Chancellor Olaf Scholz stated that a responsible and farsighted energy policy would improve energy security.<sup>2</sup> This is to be realized by scaling up the deployment of renewables to increase autonomy of supply and by diversifying energy imports.

Germany subsequently leased floating liquefied natural gas (LNG) import capacity off its coast, with these becoming operational within months. It facilitated this through a quick legislative process and a mobilization of funding.<sup>3</sup> According to Scholz, this "new German speed" should be a blueprint for economic transformation as a whole.<sup>4</sup> At the same time, energy companies sought LNG imports on the global market to supply to Germany. The quantities secured thus far are significant, although individual contracts account only for a small share of the current level of LNG demand.<sup>5</sup> These steps, along with changes in consumer

behavior, helped avoid the more severe predicted impacts of the energy crisis over the past year.

The government describes natural gas as a short-to-medium-term bridging technology while Germany scales up renewables and decarbonizes industrial activity. However, the concern is that it will be used for longer than needed and that LNG infrastructure and contracts may lock natural gas into the energy mix. For instance, the country's import capacity may exceed demand from 2030.<sup>6</sup> Company contracts for LNG imports stretch over a period of 15 years.<sup>7</sup> In 2022 the EU imported 60 percent more LNG than in 2021, and two-thirds of this new supply came from the United States.<sup>8</sup> While the transatlantic alliance is crucial, new asymmetrical energy relations could leave Europe vulnerable if American policy changes.

These developments are part of an international trend of expansion of gas investments that undermines declared ambitions to fulfill the goals of the Paris Climate Agreement. It is estimated that if all the LNG infrastructure planned globally was realized, the capacity in 2030 would amount to 235 percent compared to 2022 levels. Internationally, this would imply a surplus of 1.9 gigatons of carbon dioxide equivalent compared to capacities compatible with net-zero scenarios by mid-century.<sup>9</sup>

- 1 Russia supplied 55 percent of Germany's natural gas needs in 2021. See Bundesministerium für Wirtschaft und Klimaschutz (Federal Ministry of Economy and Climate Protection), "FAQ-Liste LNG-Terminal in Deutschland," March 6, 2022: [https://www.bmwk.de/Redaktion/DE/Downloads/F/faq-liste-lng-terminal-in-deutschland.pdf?\\_\\_blob=publicationFile&v=8](https://www.bmwk.de/Redaktion/DE/Downloads/F/faq-liste-lng-terminal-in-deutschland.pdf?__blob=publicationFile&v=8) (accessed June 12, 2023).
- 2 The Federal Government, "Policy statement by Olaf Scholz, Chancellor of the Federal Republic of Germany and Member of the German Bundestag, 27 February 2022 in Berlin," February 22, 2022: <https://www.bundesregierung.de/breg-en/news/policy-statement-by-olaf-scholz-chancellor-of-the-federal-republic-of-germany-and-member-of-the-german-bundestag-27-february-2022-in-berlin-2008378> (accessed June 12, 2023).
- 3 Edward Donnelly, "Was hinter dem globalen LNG-Boom steckt," Klimareporter, May 2, 2023: <https://www.klimareporter.de/finanzen-wirtschaft/was-hinter-dem-globalen-lng-boom-steckt> (accessed June 27, 2023).
- 4 The Federal Government, "Federal Chancellor Scholz addresses the World Economic Forum: It is now crystal-clear that the future belongs solely to renewables," January 18, 2023: <https://www.bundesregierung.de/breg-en/search/scholz-wef-2023-2158700> (accessed June 12, 2023).
- 5 In the fall of 2022, the German government engaged diplomatically to facilitate a deal for LNG deliveries from Qatar. The agreement was enabled by German Minister of Economy Robert Habeck and concluded between a subsidiary of the US company ConocoPhillips and state-owned QatarEnergy. Starting from 2026, the 15-year supply contract secures a maximum quantity of 2 million tons LNG annually (equivalent to 2.7 billion cubic meters (bcm)) to be delivered by ship to the new German LNG terminal in Brunsbüttel. To put the quantities of 2.7bcm in context, Germany's total demand in 2021 was 90.5 bcm. At the end of 2022, the German energy utility RWE also secured a 15-year contract with the US company Sempra Infrastructure, for a volume of 2.25 million tons of LNG annually. See Kathrin Witsch and Klaus Stratmann, "Deutschlands Gas-Deal mit Katar deckt nur Bruchteil des LNG-Bedarfs ab," Handelsblatt, November 29, 2022: <https://www.conocophillips.com/news-media/story/conocophillips-and-qatarenergy-agree-to-provide-reliable-lng-supply-to-germany> (accessed July 7, 2023); "RWE schließt LNG-Vertrag mit US-Unternehmen," Tagesschau, December 28, 2022: <https://www.tagesschau.de/wirtschaft/lng-fluessigerdgas-rwe-usa-101.html> (accessed June 27, 2023).
- 6 Loyle Campbell and Leonie Oechtering, "The German Greens' Identity Crisis," IP Quarterly, May 2, 2023: <https://ip-quarterly.com/en/german-greens-identity-crisis> (accessed June 12, 2023). Concerns about a potential oversupply of LNG are nourished by long-term project planning, such as additional terminals on the island of Rügen. See "Bundestag stimmt für Bau von LNG-Terminals auf Rügen", Zeit Online, July 7, 2023: <https://www.zeit.de/wirtschaft/2023-07/fluessigerdgas-lng-terminal-ruegen-mukran-bundestag-zustimmung> (accessed July 10, 2023).
- 7 RWE schließt LNG-Vertrag mit US-Unternehmen," Tagesschau, December 28, 2022: <https://www.tagesschau.de/wirtschaft/lng-fluessigerdgas-rwe-usa-101.html> <https://www.tagesschau.de/wirtschaft/lng-fluessigerdgas-rwe-usa-101.html> (accessed June 27, 2023). International Energy Agency, "How to avoid gas shortages in the European Union in 2023," December 2022: <https://iea.blob.core.windows.net/assets/96ce64c5-1061-4e0c-998d-fd679990653b/HowtoAvoidGasShortagesintheEuropeanUnionin2023.pdf> (accessed July 7, 2023).
- 8 International Energy Agency, "How to avoid gas shortages in the European Union in 2023," December 2022: <https://iea.blob.core.windows.net/assets/96ce64c5-1061-4e0c-998d-fd679990653b/HowtoAvoidGasShortagesintheEuropeanUnionin2023.pdf> (accessed July 7, 2023).
- 9 Climate Action Tracker, "Massive gas expansion risks overtaking positive climate policies," November 10, 2022: <https://climateactiontracker.org/publications/massive-gas-expansion-risks-overtaking-positive-climate-policies> (last accessed June 12, 2023).

Germany also increased the use of emissions-intensive coal power to make up for near-term supply shortages. In 2022, the share of coal in the electricity mix increased by 8.4 percent, up to about one-third of it, compared to the previous year.<sup>10</sup> Besides putting emissions reduction targets at risk, Germany's different measures also create a foreign policy dilemma for it. The country's continued use of coal and other fossil fuels significantly weakens its legitimacy when calling on other countries to phase out fossil fuels.

Beyond the phasing out of fossil fuels, other areas of the domestic energy transition are also lagging. For example, the buildup of renewable energies and the electrification of key sectors, particularly the buildings and industry sector, are not proceeding fast enough to meet Germany's national net-zero goals set for 2045.<sup>11</sup>

While new warming records are set, with undeniable human security implications, all factors point to the conclusion that policy changes are too slow and incremental to avoid catastrophic climate impacts.<sup>12</sup>

Germany's nationally incoherent governance of the commons also creates a foreign policy dilemma: The continued use of coal and other fossil fuels significantly weakens its legitimacy when calling on other countries to phase out fossil fuels.

Thus, the *Zeitenwende* currently focuses on managing immediate geopolitical risks and does not fully address longer-term climate considerations and the diplomatic setbacks that affect relations with governments in developing countries on which Germany depends for resource imports for the green transition. As Germany, Europe's largest emitter of greenhouse gases (GHG), has prioritized its energy supply and maintaining the status quo over its commitments to lower the burden it puts on impoverished communities at the forefront of the climate crisis. While this "Germany-first" policy may be deemed acceptable in an acute crisis, the contractual and in-

frastructural path dependencies hastily created are harming international climate cooperation. In particular, countries marked by severe energy poverty may become more reluctant to adjust their development pathway to meet climate targets.

The need to diversify and avoid dependencies is Germany's guiding principle for action. This can also be observed in other policy fields, such as the supply of critical raw materials or the production and import of high-tech products. Renewable energy and industrial transformation toward climate neutrality are instrumental for the country's energy security and independence, for strengthening its geopolitical resilience, and for reducing emissions. However, an approach that reconciles short-term geopolitical considerations with long-term climate goals has been hard to realize in the face of the energy crisis.

### Addressing the Planetary Crisis

A larger policy shift in the wake of the release of Germany's National Security Strategy in June 2023 should take geopolitical and climate risks alike into account to be decisive. Scientific evidence shows increasing climatic threats to human wellbeing, prosperity, and security. The Intergovernmental Panel on Climate Change (IPCC) has assessed with high confidence that already today "(s)ome tropical, coastal, polar and mountain ecosystems have reached hard adaptation limits."<sup>13</sup> Global risks are becoming more acute as tipping points near, potentially leading to rapid and increasingly irreversible changes.<sup>14</sup> Certain natural systems such as the Greenland ice sheet may be reaching their tipping point already below 2°C global warming, condemning future generations to experience several meters of sea-level rise.<sup>15</sup> Climate change and other anthropogenic pressures thus put at risk the relative earth system stability that has been the basis for human development and prosperity over the past 12,000 years. A recent assessment quantifies the earth system boundaries with regard to climate and air pollution, fertilizers, biodiversity, and freshwater, and concludes that multiple boundaries have

10 DESTATIS Statistisches Bundesamt, "Stromerzeugung 2022: Ein Drittel aus Kohle, ein Viertel aus Windkraft," Pressemitteilung Nr. 090, March 9, 2023: [https://www.destatis.de/DE/Presse/Pressemitteilungen/2023/03/PD23\\_090\\_43312.html](https://www.destatis.de/DE/Presse/Pressemitteilungen/2023/03/PD23_090_43312.html) (accessed June 29, 2023).

11 The Transformation Tracker, a tool of the Copernicus Project Ariadne, provides a structured assessment of the state of Germany's energy transition in various categories. See Transformation Tracker, Ariadne-Projekt: <https://tracker.ariadneprojekt.de> (accessed June 29, 2023).

12 ClimateReanalyzer.org, Climate Change Institute, University of Maine, "Daily 2-meter Air Temperature," last updated July 8, 2023: [https://climatreanalyzer.org/clim/t2\\_daily](https://climatreanalyzer.org/clim/t2_daily) (accessed July 10, 2023).

13 Intergovernmental Panel on Climate Change, "Climate Change 2023. Synthesis Report. Summary for Policymakers," March 2023, para. A.3.5: [https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC\\_AR6\\_SYR\\_SPM.pdf](https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf) (accessed June 12, 2023).

14 Timothy M. Lenton et al., "Climate tipping points – too risky to bet against," *Nature* 575, November 28, 2019, pp. 592–595: <https://www.nature.com/articles/d41586-019-03595-0> (accessed July 6, 2022).

15 David I. Armstrong McKay et al., "Exceeding 1.5°C global warming may trigger multiple climate tipping points," *Science* 377, Issue 6611, September 9, 2022: <https://www.science.org/doi/10.1126/science.abn7950> (accessed June 12, 2023).

been crossed.<sup>16</sup> This means that humanity's life-support systems are in danger. Vulnerable populations (especially in the Global South) are already acutely affected by climate impacts and biodiversity decrease, endangering human security, and leading to losses and damages.<sup>17</sup> Impacts in Europe are also increasingly putting at risk the population's security and health. For instance, a recent study estimates that more than 61,000 heat-related deaths occurred in Europe during the summer of 2022.<sup>18</sup>

## Existing governance structures provide a framework for swift emissions mitigation

These recent risk assessments reaffirm the importance of the targets of the 2015 Paris Agreement, which obliges states to limit global warming to well below 2°C, and ideally to below 1.5°C. Existing governance structures provide a framework for swift emissions mitigation by Germany. First, the EU Green Deal legislation sets clear steps that member states should take to reduce emissions. Second, Germany is legally obliged to swiftly phase out fossil fuels. The Federal Climate Protection Law of 2019 originally mandated annual emissions reductions and monitoring until 2030. It became more stringent after the Federal Constitutional Court ruled in 2021 that it was partially unconstitutional. The court found that the law's medium-term targets were in-

sufficient and shifted the burden of climate mitigation to the future, thus infringing on the freedom of future generations.<sup>19</sup> The revised law from 2021 targets emissions reductions of 65 percent by 2030 and 88 percent by 2040 compared to 1990 levels, and net-zero emissions by 2045.

Germany's track record on emissions mitigation undermines the credibility of these targets. It only achieved its target for 2020 due to the economic fallout of the COVID-19 pandemic,<sup>20</sup> and the subsequent 2021 target was missed again. The Federal Environment Agency projects that Germany is set to miss its long-term mitigation targets.<sup>21</sup>

Delivering on emission reductions is not just a legal obligation; it also serves Germany's foreign policy interests. First, continued and accelerated domestic emissions mitigation is a prerequisite for the country to be able to promote climate protection internationally. Germany's decision to prolong and expand its fossil fuel use because of the energy crisis may have weakened its long-term credibility and challenged its often-claimed role as a leader on the energy transition.

Second, climate change should be seen as a cross-cutting risk factor that increasingly affects security policy, geopolitics, and economic security. According to the IPCC, "Roughly half of the world's population currently experience severe water scarcity for at least part of the year due to a combination of climatic and non-climatic drivers."<sup>22</sup> Food insecurity is also exacerbated by climate impacts in many regions, including Europe, and is identified as a field of action in Germany's National Security Strategy. Climate-related changes in weather patterns amplify the risk of heat and drought conditions that may lead to crop failures in major breadbasket regions.<sup>23</sup> Such events will increasingly occur simultaneously

16 Johan Rockström et al., "Safe and just Earth system boundaries," *Nature*, May 31, 2023: <https://www.nature.com/articles/s41586-023-06083-8> (accessed June 29, 2023).

17 For a closer examination of these security dimensions of climate change under the terms "planetary security" and "climate impacts," see Tim Bosch and Kira Vinke, "Integrating Climate in Germany's National Security Strategy," DGAP Policy Brief No. 27/2022, September 2022, pp. 2-4: [https://dgap.org/system/files/article\\_pdfs/DGAP-Policy-Brief-2022-27-EN\\_3.pdf](https://dgap.org/system/files/article_pdfs/DGAP-Policy-Brief-2022-27-EN_3.pdf) (accessed June 27, 2023).

18 Joan Ballester et al., "Heat-related mortality in Europe during the summer of 2022," *Nature Medicine*, July 10, 2023: <https://www.nature.com/articles/s41591-023-02419-z> (accessed July 11, 2023).

19 Dana Schirwon, "The German Federal Constitutional Court's Revolutionary Climate Ruling," DGAP Online Commentary, April 20, 2022: <https://dgap.org/en/research/publications/german-federal-constitutional-courts-revolutionary-climate-ruling> (accessed June 12, 2023).

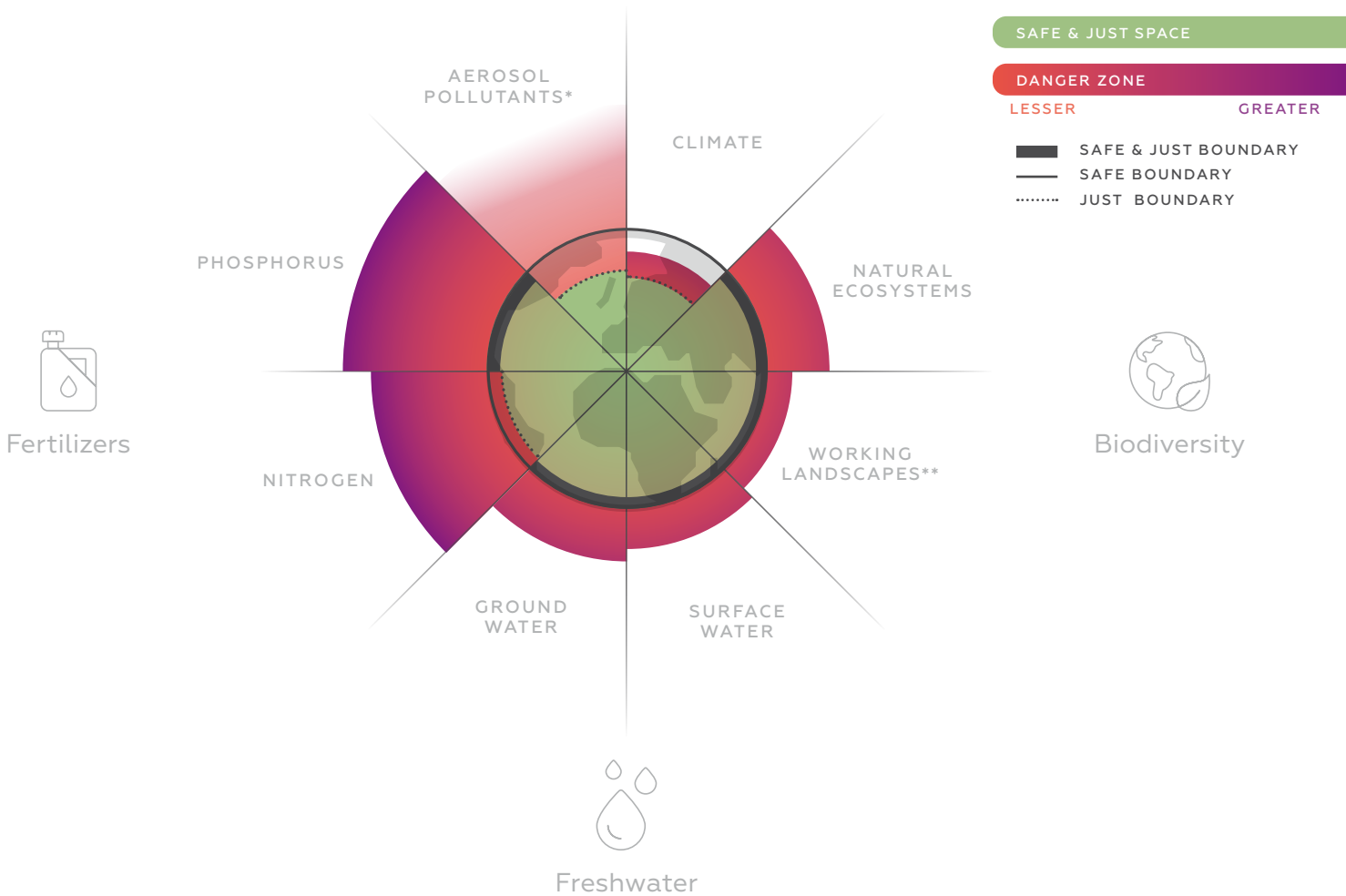
20 Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz, "Treibhausgasemissionen sinken 2020 um 8,7 Prozent," March 16, 2021: <https://www.bmu.de/pressemitteilung/treibhausgasemissionen-sinken-2020-um-87-prozent> (accessed June 12, 2023).

21 Umweltbundesamt, "Projektionsberichte (integrierte Energie- und THG-Projektionen)," December 22, 2022: <https://www.umweltbundesamt.de/themen/klima-energie/klimaschutz-energiepolitik-in-deutschland/szenarien-fuer-die-klimaschutz-energiepolitik/integrierte-energie-treibhausgasprojektionen#Berichterstattung> (accessed June 12, 2023).

22 Intergovernmental Panel on Climate Change, "Climate Change 2023. Synthesis Report. Summary for Policymakers," March 2023, para. A.2.4: [https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC\\_AR6\\_SYR\\_SPM.pdf](https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf) (accessed June 12, 2023).

23 See also Kai Kornhuber et al., "Amplified Rossby waves enhance risk of concurrent heatwaves in major breadbasket regions," *Nature Climate Change* 10, December 9, 2019, pp. 48-53: <https://www.nature.com/articles/s41558-019-0637-z> (accessed June 12, 2023).

Figure 1 – Humanity’s Most Pressing Common Security Risk – Surpassing of Earth System Boundaries



This graph shows parts of the Earth System that are vital for the resilience and stability of our planet as well as the life of humans that depend on it (Rockström et al. 2022, 102). Building on prior work (see Steffen et al. 2015), scientists identified boundaries to these systems, the transgression of which would put the planet’s resilience at risk and expose humans to significant harm. The framework distinguishes between “safe” and “just” boundaries. “Safe” boundaries pertain to the preservation of the functioning of the Earth System and the extent to which it supports the survival of humans and other living organisms. “Just” boundaries consider the circumstances required to avert significant harm to people. The justice assessment includes considerations of 1) interspecies justice and Earth System stability, 2) intergenerational justice, and 3) intragenerational justice (Rockström et al. 2022, 103). While in most cases the safe and just boundaries are aligned, justice considerations put additional constraints on the climate and aerosol pollutants dimensions. Overall, seven out of the eight Earth System boundaries have been transgressed (Ibid.).

\*The just boundary has been breached in many places locally, but is still to be assessed at the global level | \*\* Urban, forest, and agricultural areas | Sources: Global Commons Alliance, “Safe and Just Earth System Boundaries published in Nature,” May 31, 2023: <https://globalcommonsalliance.org/news/earth-commission/safe-and-just-earth-system-boundaries-published-in-nature/> (accessed July 11, 2023); Will Steffen et.al. “Planetary boundaries: Guiding human development on a changing planet.” Science 347, Issue 6223, January 15, 2015: <https://www.science.org/doi/10.1126/science.1259855> (accessed July 10, 2023). Johan Rockström et al., “Safe and just Earth system boundaries,” Nature, May 31, 2023: <https://www.nature.com/articles/s41586-023-06083-8> (accessed June 29, 2023).

with geopolitical crises. Global food supply shortages caused by the war in Ukraine – an important producer for countries beyond Europe – demonstrates the danger of climatic and non-climatic crises intersecting. Climate-induced extreme conditions pose severe risks to supply chains and have the potential to undermine infrastructure, including those installations that are critical for the green transition.<sup>24</sup>

In this context, national and international efforts to avert accelerated climate change should be seen as an investment with benefits across multiple sectors. Germany's National Security Strategy is broadly in line with this conception as it reiterates the role of international processes as well as European and national climate and environmental goals for the protection of climate, biodiversity, and ecosystems.<sup>25</sup> It states that, "For action by the Federal Government, prevention is of overriding importance, since early action saves lives."<sup>26</sup> To substantiate this, concrete instruments and measures toward emissions reductions must be developed and implemented.

## NEW PARADIGMS AND SCALING UP POLICIES

Germany needs to implement immediate drastic emission reductions to achieve its targets. A comparison of past and required future mitigation pathways illustrates the scale of the challenge. Germany's GHG emissions need to drop by more than 40 percent between 2022 and 2030 but, to put this in context, they decreased by about 20 percent in the previous eight-year period between 2013 and 2021.<sup>27</sup> This shows that incremental corrections will be woefully insufficient. A deeper shift is required, guided by the paradigm of "integrated security,"<sup>28</sup> which requires concrete policies that align even more closely with long-term climate considerations. Fortunately, democracies, in contrast to autocracies, are able to learn from past mistakes and neither the modus operandi of managing the climate crisis nor the political instruments to

do so are fixed.<sup>29</sup> Three larger societal shifts will need to be realized to deliver on ambitious climate targets:

First, recognizing the disruptive implications of the *Zeitenwende* requires learning from the past and rethinking how Germany approaches the climate emergency. The COVID-19 pandemic and the energy crisis demonstrated that countries are able to make quick, transformative responses to emergencies in terms of technological innovation, speed of policy implementation, as well as societal and behavioral change. A mix of regulatory measures and responsible behavioral change helped avoid the worst impacts of COVID-19 in Germany. Similarly, when the energy crisis hit last winter, Germans quickly saved relatively large quantities of natural gas.<sup>30</sup> That significant shift in consumer usage provides lessons in crisis management.

Second, a holistic approach requires the engagement of not only the state but also of the private sector and individuals in climate action. The energy crisis has confirmed the role of the state in balancing conflicting interests while keeping decarbonization on track. However, in the medium and long term, all stakeholders need to take ownership of the challenge and do their share. Understanding climate protection as a societal goal requires civic engagement and sociocultural change that cannot be mandated from above. While a majority in Germany recognizes the need for a decarbonized economy, businesses and consumers are calling for widespread state support to alleviate financial burdens in the face of high energy prices. Though such support is required in the short term, smart policy measures should instead target the most economically vulnerable. At the same time, long-term regulatory frameworks need to avoid path dependencies that may lock in emissions-intensive production or consumption.

Third, policymakers will need to communicate that rapid emissions reductions are unavoidable. Determining a pathway to climate neutrality by mid-

24 Corey Lesk and Kai Kornhuber, "An effective clean energy transition must anticipate growing climate disruptions," *Environmental Research: Climate* 1, July 7, 2022: <https://iopscience.iop.org/article/10.1088/2752-5295/ac76db> (accessed June 12, 2023).

25 The Federal Government, "Robust. Resilient. Sustainable. Integrated Security for Germany. National Security Strategy," June 2023, p. 64: <https://www.nationalesicherheitsstrategie.de/National-Security-Strategy-EN.pdf> (accessed June 14, 2023).

26 Ibid. The National Security Strategy also establishes "the primacy of preventing crises" as a central element of Germany's foreign policy. Ibid., p. 40.

27 Umweltbundesamt, "Emissionsentwicklung," April 11, 2023: <https://www.umweltbundesamt.de/daten/klima/treibhausgas-emissionen-in-deutschland#emissionsentwicklung> (accessed June 12, 2023).

28 The concept of "integrated security" is at the heart of the National Security Strategy. See The Federal Government, "Robust. Resilient. Sustainable. Integrated Security for Germany. National Security Strategy," June 2023: <https://www.nationalesicherheitsstrategie.de/National-Security-Strategy-EN.pdf> (accessed June 14, 2023).

29 Peter R. Neumann, *Die neue Weltordnung: Wie sich der Westen selbst zerstört* (Berlin, 2022).

30 Oliver Ruhnau, Clemens Stiewe, Jarusch Muessel, and Lion Hirth, "Natural gas savings in Germany during the 2022 energy crisis," *Nature Energy*, May 4, 2023: <https://www.nature.com/articles/s41560-023-01260-5> (accessed June 12, 2023).

century is difficult but feasible and economically opportune. However, this requires transparent communication about long-term security versus short- and medium-term costs. Disruptive change needs to be managed while highlighting that long-term climate risks outweigh the risks faced during the transition. Delaying decarbonization may inflate the costs of inaction, divert investments, and increase the difficulty in adapting the economy at a later stage.

Competing policy priorities and parallel investment needs in various sectors (for example, climate, social security, and defense) may make it difficult to allocate sufficient resources in all policy areas that are decisive for the integrated security approach stipulated in the National Security Strategy.<sup>31</sup> What is more, the government is bound by the legally set national debt ceiling while the National Security Strategy reiterates the centrality of balanced budgets.<sup>32</sup> This raises doubts as to whether Germany's climate ambition will be bolstered by appropriate measures, considering its climate finance need is not being met currently. A study commissioned by Germany's investment and development bank KfW estimates that the private and public finance need for Germany's domestic climate neutrality is about €5 trillion.<sup>33</sup> Calculated over the period until 2045 (the date set for domestic climate neutrality), this amounts to roughly 5 percent of gross domestic product (GDP) annually.<sup>34</sup> While most of the spending is to be covered by the private sector, the total public funding need is estimated to be about €484 billion until 2045, or €19 billion annually. This is equivalent to about 0.5 percent of current GDP. Last year, the government announced a Climate and Transformation Fund to be distributed between 2023 and 2026.<sup>35</sup> It remains to

be seen whether this will unlock appropriate private funding for the green transition.

The finance gap at the global level is also significant. One assessment found that a net-zero transition by 2050 would require an average annual global spending of \$9.2 trillion – about 60 percent more than current levels.<sup>36</sup> While investment needs are uneven, spending would have to happen predominantly in the coming decade.<sup>37</sup> The International Energy Agency estimates that a net-zero scenario necessitates public and private investment in clean energy worth about 4 percent of global GDP until 2030 – about twice the share mobilized in 2017–2021.<sup>38</sup> Germany's National Security Strategy acknowledges that "(i)nvestment on a massive scale is required globally to fund effort to accomplish an ecological transformation and to make the necessary adaptations to the climate crisis."<sup>39</sup> While the recent announcement by the government that Germany will bolster the Green Climate Fund reinforces its position as a leader in international climate finance,<sup>40</sup> it is crucial to accompany this with diplomatic efforts to convince its partners in the EU and the G7 to follow suit.

## INCREASING AUTONOMY THROUGH OFFSHORE WIND AND CIRCULARITY

Delivering on climate-mitigation targets requires a socioeconomic transition that is unprecedented in scale.<sup>41</sup> Beyond adequate finance, the swift implementation of concrete projects is essential to achieve this. Two sectors are discussed below as examples with considerable potential for scaling up climate ac-

31 The Federal Government, "Robust. Resilient. Sustainable. Integrated Security for Germany. National Security Strategy," June 2023: <https://www.nationalesicherheitsstrategie.de/National-Security-Strategy-EN.pdf> (accessed June 14, 2023).

32 Ibid., pp. 53–54.

33 Stephan Brand and Daniel Römer, "Öffentliche Investitionsbedarfe zur Erreichung der Klimaneutralität in Deutschland," KfW Research Nr. 395, July 19, 2022: <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-2022/Fokus-Nr.-395-Juli-2022-Oeffentliche-Investitionsbedarfe.pdf> (accessed June 14, 2023).

34 Taking 2022 GDP as a baseline. Statista, "Bruttoinlandsprodukt (BIP) in Deutschland von 1991 bis 2022," June 6, 2023: <https://de.statista.com/statistik/daten/studie/1251/umfrage/entwicklung-des-bruttoinlandsprodukts-seit-dem-jahr-1991> (accessed June 29, 2023).

35 Federal Ministry for Economic Affairs and Climate Action, "177.5 billion Euros for climate action, energy security and help with energy costs," July 2022: <https://www.bmwk.de/Redaktion/EN/Pressemitteilungen/2022/07/20220727-177.5-billion-Euros-for-climate-action-energy-security-and-help-with-energy-costs.html#:~:text=For%20the%20years%20from%202023,amounts%20to%20€35.4%20billion> (accessed June 14, 2023).

36 Mekala Krishnan et al., "The net-zero transition: What it would cost, what it could bring," McKinsey & Company, January 25, 2022: <https://www.mckinsey.com/capabilities/sustainability/our-insights/the-net-zero-challenge-accelerating-decarbonization-worldwide> (accessed June 14, 2023).

37 Ibid.

38 International Energy Agency, "World Energy Outlook 2022," November 2022, p. 122: <https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf> (accessed June 14, 2023).

39 The Federal Government, "Robust. Resilient. Sustainable. Integrated Security for Germany. National Security Strategy," June 2023, p. 64: <https://www.nationalesicherheitsstrategie.de/National-Security-Strategy-EN.pdf> (accessed June 14, 2023).

40 Julian Wettengel, "Chancellor Scholz pledges 2 billion euros for Green Climate Fund," Clean Energy Wire, May 4, 2023: <https://www.cleanenergywire.org/news/chancellor-scholz-pledges-2-billion-euros-green-climate-fund> (accessed June 14, 2023).

41 Intergovernmental Panel on Climate Change, "Climate Change 2023. Synthesis Report. Summary for Policymakers," March 2023, para. C.3.1: [https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC\\_AR6\\_SYR\\_SPM.pdf](https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf) (accessed June 12, 2023).



tion and for increased European regional integration and security. By 2050, a carbon-neutral and circular Germany could consume 50 percent less primary natural resources than in 2018<sup>42</sup> while having up to 70 gigawatts (GW) of offshore wind capacity providing 280 terawatt-hours of power annually<sup>43</sup> – over half of current demand.<sup>44</sup> These initiatives do not offer silver bullets for climate protection, nor are they without caveats and practical challenges. But they combine emissions mitigation, geopolitical security, and economic resilience. Local renewables and resource efficiency greatly enhance Germany's energy security by improving self-sufficiency and reducing dependency. These two areas also support green industry in the Baltic and North Seas region, which is central to hedging against future dependencies.

## Circularity is pivotal for a smart climate and energy policy

### Circular Economy Enhancing Energy Security

Circularity is pivotal for a smart climate and energy policy. Studies suggest that demand-side circularity could reduce the EU's GHGs emissions by 650 million tons of carbon dioxide equivalent by 2040,<sup>45</sup> and account for a 56 percent reduction in its industrial emissions by 2050.<sup>46</sup> Improving product lifetime and efficiency will dramatically reduce demand for energy and resource imports while higher rates of reutilization and recycling function as a domestic resource.

By reducing the share of imports, German and European energy systems, and supply chains more broadly, will be more resilient to external shocks and less susceptible to foreign manipulation. The National Security Strategy considers circularity a key component of supply-chain resilience – particularly for critical raw materials.<sup>47</sup>

Self-sustaining systems also foster local employment. The European Commission estimates that implementing the EU's Circular Economy Action Plan would create 700,000 jobs in Europe by 2030.<sup>48</sup> Many of these jobs would be resilient to outsourcing because they would be directly linked to local waste management. Such dynamics are especially true when it comes to the recycling of offshore turbine blades because their size makes moving them costly. Local recycling can establish resilient, sustainable supply chains by creating demand for and supply of recycled material. By 2040, Europe could supply up to 70 percent of its steel needs as well as half of its aluminum and plastic needs through circular sources.<sup>49</sup> Such outcomes can be achieved especially if standards favoring recycled content are used to reinforce the production of green technologies within Europe. However, the goal of circularity does not warrant an exclusive industrial policy, as it is in the interest of Europe and of Germany to incentivize circular production in non-EU countries too.

Breaking the cyclical consumption-driven energy system also improves resource efficiency. Fossils, in contrast to fossils-based systems are limited by the existence and accessibility of extractable resources that are ultimately consumed when burned. The benefit of adopting a circular approach to a system based on renewables is that the same minerals and materials can be used repeatedly if they are recycled. Although recovery rates are not perfect, they

42 Acatech – Deutsche Akademie der Technikwissenschaften, "Circular Economy Initiative Deutschland," <https://www.acatech.de/projekt/circular-economy-initiative-deutschland> (accessed June 14, 2023).

43 Agora Energiewende, Agora Verkehrswende, Technical University of Denmark and Max-Planck-Institute for Biogeochemistry, "Making the Most of Offshore Wind: Re-Evaluating the Potential of Offshore Wind in the German North Sea," March 2020: [https://www.agora-energiewende.de/fileadmin/Projekte/2019/Offshore\\_Potentials/176\\_A-EW\\_A-VW\\_Offshore-Potentials\\_Publication\\_WEB.pdf](https://www.agora-energiewende.de/fileadmin/Projekte/2019/Offshore_Potentials/176_A-EW_A-VW_Offshore-Potentials_Publication_WEB.pdf) (accessed June 14, 2023)

44 Bundesverband der Energie- und Wasserwirtschaft e.V., "Die Energieversorgung 2022 – aktualisierter Jahresbericht," <https://www.bdew.de/service/publikationen/jahresbericht-energieversorgung> (accessed June 14, 2023).

45 Summa Equity, "Investing in a circular and waste-free Europe," April 2023: <https://cms.summaequity.com/assets/Reports/PDF/230417-Investing-in-a-circular-and-waste-free-Europe.pdf> (accessed June 14, 2023).

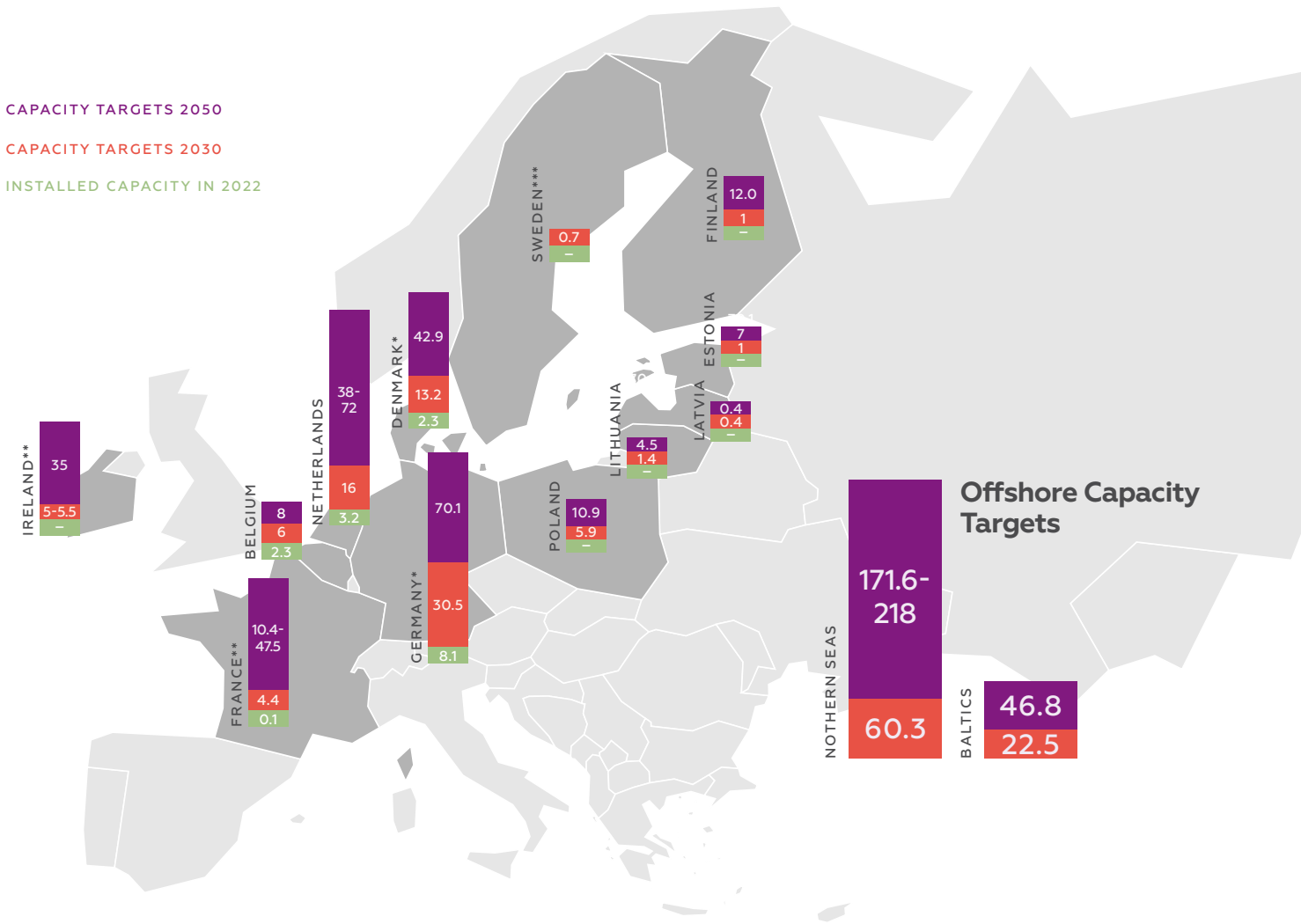
46 Material Economics, "The Circular Economy – a Powerful Force for Climate Mitigation," 2018: <https://materialeconomics.com/publications/the-circular-economy-a-powerful-force-for-climate-mitigation-1> (accessed June 14, 2023).

47 The Federal Government, "Robust. Resilient. Sustainable. Integrated Security for Germany. National Security Strategy," June 2023, pp. 54–56: <https://www.nationalesicherheitsstrategie.de/National-Security-Strategy-EN.pdf> (accessed June 14, 2023).

48 European Commission, "Impacts of circular economy policies on the labour market. Final report and annexes," Publications Office of the European Union, 2018: <https://op.europa.eu/en/publication-detail/-/publication/fc373862-704d-11e8-9483-01aa75ed71a1/language-en> (accessed June 14, 2023).

49 Summa Equity, "Investing in a circular and waste-free Europe," April 2023: <https://cms.summaequity.com/assets/Reports/PDF/230417-Investing-in-a-circular-and-waste-free-Europe.pdf> (accessed June 14, 2023).

**Figure 2 – Installed Offshore Wind Capacity and Non-binding Targets Registered under TEN-E Regulation for Select EU Countries (in GW)**



\*Includes capacity in North Sea and Baltic Sea  
 \*\* Includes capacity in North Sea, Atlantic, and South and West offshore area  
 \*\*\* Sweden has considerable national targets not subject to TEN-E

Sources: 2022 installed capacity figures are from Energy-Charts.info. <https://www.energy-charts.info/?l=en&c=DE>. National and regional 2030 and 2050 capacity targets are from the regional agreements pursuant to the Trans-European Networks for Energy (TEN-E) regulation as of 19 January 2023. Regional agreements can be accessed here: [https://energy.ec.europa.eu/news/member-states-agree-new-ambition-expanding-offshore-renewable-energy-2023-01-19\\_en](https://energy.ec.europa.eu/news/member-states-agree-new-ambition-expanding-offshore-renewable-energy-2023-01-19_en).

are rapidly improving, which will eventually reduce the necessity for new material inputs. While transitioning toward this will generate waste initially, the long-term environmental impacts will be much less severe than under current pathways. Ultimately, the shift toward circularity will contribute to a more sustainable and resource-efficient energy sector.

**Leveraging the Geopolitical and Climate Benefits of Offshore Wind in the Baltic and North Seas**

While the energy transition requires various technologies, offshore wind could be the cornerstone of a future European security order that integrates climate protection and greater energy independence. EU-wide cooperation on such transforma-

tive projects can reinforce the continent's leadership on climate and strengthen the identity of a solidary Europe facing the climate and energy crises in unity.

Offshore wind is a key element in the transition because it has significant mitigation potential. European leaders recognize this, as demonstrated by the North Sea Wind Summit and the Baltic Wind Forum held in April and May 2023 respectively.<sup>50</sup> Earlier this year, EU countries also announced nonbinding offshore wind capacity targets pursuant to the revised regulation on trans-European energy networks.<sup>51</sup> While agreements pursuant to the regulation exist for various sea regions, Germany is a riparian state to the Baltic and North Seas – which are highly relevant because they have optimal wind conditions.<sup>52</sup> The targets demonstrate the potential to scale up, as the 2050 targets of 171.6–218 GW in the North Sea and 46.8 GW in the Baltic Sea dwarf the 14.6 GW of capacity in the EU at the end of 2021.<sup>53</sup>

Germany needs a proactive energy diplomacy with its Baltic partners to accelerate this level of offshore wind investment. Closer cooperation with Poland could be particularly impactful as it could ease the country's transition from a coal-dependent energy system. The National Security Strategy does not explicitly identify Poland as a strategic and close partner, while it highlights German–Franco relations and the transatlantic alliance with the United States. This is a shortcoming because in a strategic document the government should have looked beyond the currently difficult relations with the government in Warsaw to stress the geopolitical relevance of Poland as a partner. Conversely, Germany must keep in mind that political changes in even a close ally can lead to challenging policy shifts, as was the case with the United States during the Trump administration in 2017–2021 whose actions strained the transatlantic relationship and caused setbacks in US climate action. Adopting a more regional approach in which Germany builds stronger engagement with Poland as well as Estonia, Latvia, and Lithuania could enhance its energy security.

Scaling up regional investments in offshore wind will also strengthen European energy security. By establishing a regional green energy supply, countries reduce dependence on fossil-fuel imports and increase their self-sufficiency. This is particularly crucial for Estonia, Latvia, and Lithuania as it will help them gain independence over their power systems as they decouple from the Russian grid. Diversification of the energy mix in the Baltic Sea countries and the interconnections between them will enhance the trans-European power grid's resilience to disruptions. The electricity produced could be consumed directly or transformed into outputs like green hydrogen. This added flexibility can help balance the European grid.

*It is crucial  
to manage  
coastal regions  
with offshore  
infrastructure  
carefully*

Deploying offshore may be a cornerstone of European green industrial policy. The transit and installation of wind turbines requires specialized port infrastructure. Generally, the closer a port and manufacturing capacity is to the point of installation the better. This fosters the development of local and regional supply chains, especially for major components. Moreover, installing turbines necessitates a large workforce, potentially creating local jobs. European industry is also still a leader in offshore wind and investing in this field can strengthen this position. Additionally, the construction of towers and foundations requires substantial volumes of steel and cement, offering oppor-

50 For a recent indication of the political willingness to leverage offshore wind potential in the North and Baltic Seas, see Council of Baltic Sea States, "Berlin Declaration on Baltic Offshore Wind by CBSS Foreign Ministers," May 9, 2023: [https://cbss.org/wp-content/uploads/2023/05/230509\\_berlin-declaration-on-baltic-offshore-wind-by-cbss-foreign-ministers\\_final\\_consented.pdf](https://cbss.org/wp-content/uploads/2023/05/230509_berlin-declaration-on-baltic-offshore-wind-by-cbss-foreign-ministers_final_consented.pdf) (accessed June 30, 2023), and Alexander de Croo et al., "The North Sea can be the world's biggest power plant," Politico, April 23, 2023: <https://www.politico.eu/article/north-sea-global-power-plant-clean-energy-renewable-green-deal-climate-crisis> (accessed June 30, 2023).

51 European Commission, "Member States agree new ambition for expanding offshore renewable energy," January 19, 2023: [https://energy.ec.europa.eu/news/member-states-agree-new-ambition-expanding-offshore-renewable-energy-2023-01-19\\_en](https://energy.ec.europa.eu/news/member-states-agree-new-ambition-expanding-offshore-renewable-energy-2023-01-19_en) (accessed June 30, 2023).

52 High speeds are one of the reasons why offshore wind is particularly viable in the North Sea. Both regions have high average wind speeds, ranging from 9.5 meters per second (m/s) in the Baltic Sea to over 10.5 m/s in the North Sea. Both seas are also relatively shallow, and thus less materials are required to install the turbine structures on the sea floor.

53 European Commission, "Offshore renewable energy": [https://energy.ec.europa.eu/topics/renewable-energy/offshore-renewable-energy\\_en](https://energy.ec.europa.eu/topics/renewable-energy/offshore-renewable-energy_en) (accessed June 14, 2023).

tunities for the EU to integrate green sourcing criteria for construction material into the supply chain.

However, several remaining challenges require political attention. A major one is the issue of scale and cross-border cooperation. Offshore wind projects are very large both in terms of the machinery deployed and the physical space they occupy. Smaller countries might struggle to realize economies of scale unless bigger ones like Germany leverage the size of their energy demand. Larger offshore projects in European waters also implies significant cross-border infrastructure, which increases the bureaucratic complexity for issuing permits.<sup>54</sup> This means integrated security will require Germany to play a very active role in supporting broader energy initiatives through cooperation with the EU or other regional forums.

Another challenge lies in connecting offshore wind to power grids. Although there are already numerous interconnections, they fall far short of the capacity required to distribute the amount of power that would be generated by this scale of offshore wind. Projections estimate that Europe will nearly double the number of interconnectors it had in 2022 by 2030.<sup>55</sup> But this will likely be insufficient and additional sea and land cables must be constructed to enable dynamic power flows.

Furthermore, it is crucial to manage coastal regions with offshore infrastructure carefully. Coastal zones are heavily utilized by the military, commercial shipping, and fishing industries, and they may be affected by offshore wind development. Balancing the interests and needs of these stakeholders is essential to ensure that all remain supportive of the rapid deployment of offshore energy infrastructure.

## RECOMMENDATIONS

Germany's National Security Strategy identifies the risks associated with climate change and biodiversity loss. It rightly stresses the importance of a preventive approach. This, however, has also brought to

light the sorely lacking speed and scale of the transition to a green and circular economy. Mechanisms that balance short-term crisis management and economic interests with long-term catastrophe prevention need to be at the heart of national security considerations. Implementing this will require bold action on all levels of governance.

To promote a **whole-of society approach** to climate action, Germany's policymakers should:

- **Raise society's awareness of the necessity of prevention and emphasize the economic and geo-strategic benefits of early decarbonization.** Better and continuous communication about the cost of inaction and related climate security risks is needed to justify more difficult measures. This must include evidence-based communication regarding technologies with high globally externalized costs that, if internalized, would no longer constitute a competitive advantage (for example, fossil-fuel-based production and consumption). As during the COVID-19 pandemic, highlighting the necessity of individual action and broader policy change are key.

With a view to **deliver on the Paris Agreement**:

- Promote phase-out dates for all fossil fuels in the EU. While emissions in the EU and Germany have declined since the 1990s, projections indicate that EU countries will miss their 2030 targets with current measures.<sup>56</sup> To remedy this, **phasing out commitments for coal, oil, and natural gas as well as building up targets for renewables and storage infrastructure** need to be quickly implemented at the **EU level**.
- Establish a national Natural Gas Phase-out Commission to design plans with a group of representatives of industry, academia, politics, and civil society. Through its coal commission Germany successfully kickstarted its phase-out from coal power and could use this instrument to formulate an exit strategy from natural gas.<sup>57</sup> A natural gas exit commission would need to **develop sector specific targets** for the reduction of natural gas use.

54 Although not the focus of this paper, it is worth noting that the EU is advancing various measures to accelerate the permitting process for renewable projects across the bloc. See European Commission, "Enabling framework for renewables": [https://energy.ec.europa.eu/topics/renewable-energy/enabling-framework-renewables\\_en](https://energy.ec.europa.eu/topics/renewable-energy/enabling-framework-renewables_en) (accessed July 7, 2023).

55 Susan Hansen, "The Growing Strategic Importance of Interconnectors: a Look at the North Sea Region," Rabobank Research, June 8, 2023: <https://www.rabobank.com/knowledge/d011369901-the-growing-strategic-importance-of-interconnectors-a-look-at-the-north-sea-region> (accessed June 14, 2023).

56 Climate Analytics, "What is the European Union's pathway to limit global warming to 1.5°C?": <http://1p5ndc-pathways.climateanalytics.org/countries/european-union> (accessed June 7, 2023).

57 Kommission für Wachstum, Strukturwandel und Beschäftigung (Commission for Growth, Structural Change and Employment), "Abschlussbericht" (Final Report), January 2019: [https://www.bmwk.de/Redaktion/DE/Downloads/A/abschlussbericht-kommission-wachstum-strukturwandel-und-beschaeftigung.pdf?\\_\\_blob=publicationFile](https://www.bmwk.de/Redaktion/DE/Downloads/A/abschlussbericht-kommission-wachstum-strukturwandel-und-beschaeftigung.pdf?__blob=publicationFile) (accessed July 10, 2023).

Such targets should consider where economically and technically viable low carbon alternatives exist. This includes the currently discussed heating sector where electric heat pumps or geothermal district heating are competitive substitutes. Here Germany could already learn from Denmark's example of phasing out natural gas in heating by 2030 through various supports including a disconnection scheme.<sup>58</sup>

To integrate a **circular approach**, Germany should:

- **Advance a pan-European market for the supply and demand of recycled raw materials** – positioning itself as an intermediary where necessary to ensure a balanced development of both segments of the market. This could require a mix of financial incentives and regulations.
- **Take stock of existing initiatives, policies, and practices** promoting circular supply chains at national, sub-national, and regional levels. Germany should pay special attention to **highlight opportunities to integrate partners from the Global South into circular green supply chains**. This could be realized through targeted bilateral engagements like Germany's energy partnerships or broader regional structures such as the ASEAN-German Energy Program.

**Offshore wind** will be crucial for decarbonization, strengthening energy security in Europe, and contributing to a green industrial policy. To maximize these outcomes Germany should:

- Recognize that regional decarbonization enhances German climate security and apply the “new German speed” mentality to accelerate regional energy projects. This could be operationalized by proactively engaging stakeholders throughout the project cycle about project needs and constraints. Particular attention should be given to actors based outside of Germany. Upon identifying bottlenecks, Germany can then offer logistical support to project developers or the respective permit-issuing authority to move projects along faster.
- **Take steps to stabilize market conditions for large offshore wind projects**. This can be done through a variety of mechanisms, including the leveraging of

public finance to help de-risk investments to control capital costs.

- **Integrate circularity into the offshore wind supply chain** where possible, focusing on improving recycling and repurposing rates for wind turbines and using recycled or green materials in project construction.
- **Promote subnational initiatives for coastal cities in the region to coordinate and share best practices on how to expand a regional supply chain** necessary to reach offshore wind deployment targets and strengthen onshore green economic development. For example, such an initiative could be anchored in the European league of Hanseatic cities. Drawing from the strong historical identity of the trade partnership and port cities' potential for innovation, a Hanseatic Renewables Alliance could strengthen momentum on the national level.

<sup>58</sup> International Energy Agency, “Funding to promote green heating and phasing down the use of natural gas,” April 25, 2023: <https://www.iea.org/policies/16391-funding-to-promote-green-heating-and-phasing-down-the-use-of-natural-gas> (accessed June 30, 2023).



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*DGAP receives funding from the German Federal Foreign Office based on a resolution of the German Bundestag.*

**Publisher**

Deutsche Gesellschaft für  
Auswärtige Politik e.V.

ISSN 2198-5936

**Editing** Nick Bouchet

**Layout** Lara Bühner

**Design Concept** WeDo

**Author picture(s)** © DGAP



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The project “Action Group Zeitenwende” cultivates the comprehensive yet coherent approach that Germany needs to better define, express, and pursue its own interests as well as the goals and values it shares with its partners. It helps build a Germany that is ready, willing, and able to act.

“Action Group Zeitenwende” is funded by Stiftung Mercator.

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