DIW BERLIN

177

Politikberatung kompakt

Deutsches Institut für Wirtschaftsforschung 2022

How to Design EU-Level Contingency Plans for Gas Shortages? Evidence from Behavioural Economics, Policy Research and Past Experience

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IMPRESSUM

DIW Berlin, 2022

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ISBN 978-3-946417-68-2
ISSN 1614-6921

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DIW Berlin: Politikberatung kompakt 177

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How to design EU-level contingency plans for gas shortages? Evidence from behavioural economics, policy research and past experience

Final report

Berlin, 19. April 2022

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Excellent research support from Frederik Lettow is gratefully acknowledged.

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Summary

Following Russia's invasion of Ukraine, the risk of a prolonged physical supply shortage of natural gas is higher than ever before. While European Union (EU) institutions and member states are discussing the possibility of imposing an embargo or a gradual phase out in this sector, an abrupt shortage may result from a political decision on the supplier's side. This event would be beyond EU control and requires appropriate contingency plans. However, the EU does not have adequate procedures for managing long-term supply interruptions. High gas prices alone will not be able to deliver the necessary level of savings, and they will also create unfair distribution of reserves.

EU's preparedness and resilience rests on its ability to adjust gas demand quickly, efficiently and in a fair manner. With gas rationing as the measure of last resort, we propose to develop non-price-based mechanisms, as well as coordinated and voluntary efforts for gas saving on a European level. To increase resilience and unlock gas saving potential across sectors, the following steps are recommended:

- European institutions and governments should immediately agree on an EU level gas saving target with a clear definition of the contribution expected from each member state. This will allow to reduce imports and support storage refill.

- Building on the initial saving arrangements and experience with their implementation, the EU should be prepared to scale up the gas savings targets for the case of supply interruptions. This may include more far-reaching non-price mechanisms, potent enough to avoid the need for rationing.

- To prepare for the case of rationing as a measure of last resort should savings targets and storage refill levels not be met, there is a need of multi-stakeholder advance planning and consultations.

This process needs to be launched immediately, and must be based on broad stakeholder participation, to safeguard legitimacy of demand adjustment as well as fair burden sharing. In this policy brief, we outline the way such a process could unfold, and show the potential of non-price mechanisms to trigger savings, using historical examples from other sectors. We also argue for the need to create a special Taskforce at EU level to coordinate the planning and implementation of contingency plans.

1 Introduction

In the event of a large-scale and extended supply interruption, gas consumption in the EU will have to be reduced significantly. A prolonged halt of supplies would result not only in a renewed price hike, but also in physical shortages of gas. To ensure that demand reduction can be achieved in a fair and effective manner, we propose a three-stage approach:

1. European institutions and governments should immediately agree on an EU-level gas saving target with a clear definition of the contribution expected from each member state. This will guide implementation of non-price mechanisms for gas saving by national and local authorities, with the objective to deliver 5-10% of savings to reduce imports and support storage refill.

2. Building on the initial saving arrangements and experience with their implementation, the EU should be prepared to scale up the gas savings targets for the case of supply interruptions. This may include more far-reaching non-price mechanisms, potent enough to avoid the need for rationing.

3. To prepare for the case of rationing as a measure of last resort should savings targets and storage refill levels not be met, there is a need of multi-stakeholder advance planning and consultations.

Communication and stakeholder participation is key across all stages. In the following we will outline how historical precedents of responses to similar emergencies can guide the EU in its efforts to prepare for a supply cut.

2 Why is coordination of gas saving necessary at EU scale?

Increasing gas prices alone is unlikely to unlock sufficient gas savings at the necessary scale for two reasons. *First*, consumers, especially households, are exposed to wholesale price changes only with certain delays, due to tariff structures and billing periods. Also, despite efforts to save gas, mainly through efficiency improvements of technologies and buildings, many consumers are historically not focused on gas savings and may thus not have the necessary information or skills on how to effectively reduce gas demand.

Second, extremely high prices would create economic hardship for many households and some businesses. Lump sum transfers to households are proposed in countries like Germany to address such costs without distorting the market. They can partially address this impact, while retaining price incentives for gas savings. However, gas demand varies widely, for example because buildings dependent on the thermal insulation require between 30 and more than 200 kWh per square meter for heating. Lump sum transfers alone cannot provide a fair and essential compensation for many households – especially in face of a high price increase – for price

induced increases of heating costs (Neuhoff et al. 2022). Coupled with a serious macroeconomic risk against the backdrop of an already unstable economic environment, governments are likely to enact measures to directly mitigate the price impact even at the cost of foregoing incentives for gas savings.

Despite these limitations of relying on price incentives to face gas shortages, a rationing of gas demand should only be a measure of last resort. Yet, preparedness is key should rationing become necessary. The security of supply regulation provides the framework for such rationing, it has however been largely designed with short-run shortages in mind (ENTSO-G. 2021) and is likely focused primarily on intermitting supply to industry. However, the implications of such longer-term shutdowns of gas-dependent industries for the broader economy need to be considered for a scenario of an extended supply interruption, but also other response options may be possible in the case of longer interruptions.

While generally applicable, it is important to recall that existing contingency plans have been designed with a view to extreme weather events, e.g. a cold spell, or for the event of short-term interruptions. In terms of gas demand, the first customers to be typically rationed are therefore industrial consumers. However, if the gas supply for energy intensive basic material production (e.g. chemicals, steel, aluminum) and agriculture (fertilizers) would be interrupted for months, not days, it could create a supply shortage for downstream manufacturing industries. This could be of particular concern in the current situation as Russia and Ukraine both have 'specialized' their industry on energy intensive commodities and are among the largest exporters of, for example, steel, fertilizers and aluminum. Supply cuts targeting production of, for example, fertilizers may in the current shortage of wheat triggered by the Ukraine-Russia war be less appropriate. A prolonged interruption of production in these sectors risk ripple effects on the production and upward price pressure for downstream sectors.

This calls for a contingency plan for prolonged shortages that unlocks gas savings among wider categories of households, businesses and industry. If more actors contribute to savings, lower gas cuts are required from industry. As it is socially, technically and politically difficult to ration gas for example to households, this however also implies that these savings need to be delivered by alternatives to rationing. For this, a range of measures needs to be prepared that can be mobilized should the worst case of prolonged gas shortages occur. Such measures would include setting of clear expectations of gas savings to be contributed by all gas users, by behavioral adjustments on the part of firms and households, and programs to provide feedback to individuals and communities on the goal attainment. Should these fail to achieve the necessary gas savings, more top-down measures would become necessary. Moreover, given the intertwined nature of

the EU energy market, the potential gas-shortage requires a response at EU scale, as already visible in the REpowerEU communication (European Commission 2022). How could this be achieved?

3 The EU needs to define a target for gas savings

Mobilization of energy saving can use information, campaigns, nudging, new norms on appropriate and inappropriate energy usage behavior and investments that can be realized in the short-term. However, clear objectives are key to facilitate voluntary mobilization for gas saving. Both governance research on steering behavior with goals and targets (Kanie and Biermann 2017; Morseletto et al. 2017), evidence from economic research on behavioral change and norm setting (Farrow et al. 2017), and on contribution of individuals to commons (Ostrom 2000), as well as historical evidence on voluntary resource saving campaigns provide useful lessons in this context.

For example, the experience of Cape Town during the water shortage between 2015 and 2018 suggests that citizens and businesses can be motivated to contribute to savings. While citizens initially failed to respond to the saving requests, they eventually did when urgency and targets were clearly specified and communicated. Public authorities declared a "Day Zero" at which water storages would run empty and piped water supply would need to be cut off. The daily, real-time communication of the exact number of days left was the key to incentivize additional savings so as to increase the likelihood that water in the reservoirs would suffice throughout the summer (Parks et al. 2019; Ziervogel 2019).

This mechanism of triggering mobilization has worked in other contexts as well. As the experience of Japan shows in the aftermath of the 2011 tsunami and the shutdown of nuclear power plants, citizens can be motivated to change their usage behavior in times of crisis, provided clear savings targets are set, even if they are voluntary. Significant electricity savings were achieved through non-price policies, as prices remained almost unchanged at first. Attention towards the crisis was high and consumers had a strong moral motivation to engage in conservation efforts in order to reduce the shortage (Kimura and Nishio 2016). In this context, even voluntary targets set by the government and requests from utility providers were drivers of motivation to achieve savings. This 'governance by targets' approach is also used in climate policy (von Lüpke and Neuhoff 2019), formulating targets at EU level and clearly specifying the contribution required from each member state. Arguably, however, shorter time horizons induced by energy scarcity require a quicker response.

The European gas equivalent to the Cape Town water depletion day would be the "storage days". That way, one could quantify the objective of gas savings in terms of (i) filling gas storage by end of summer (ii) retaining gas storage levels within historic boundaries during winter. The advantage of such a framing obviously lies in the fact that both the goal and the targets are tangible, and easy to grasp. Part of the communication effort would also involve clearly informing the general public that otherwise mandatory rationing would apply as an alternative, and to show the implications. That way, targets can function as tools for nudging towards increased gas savings.[1]

4 Participation of local communities in identifying objectives, designing and implementing campaigns

The definition of targets for gas saving requires a participatory approach, so as to account for local vulnerabilities, which may not be visible from Brussels or even member state capitals. Moreover, ensuring the success of savings campaigns requires to go beyond goal setting. This means engaging key stakeholders in the design of such campaigns and their implementation. Such a participatory governance process is not new to the EU. In fact, it can draw on the already existing experience of 'just transition' governance across the EU (Atteridge and Strambo 2020), and could involve roundtables at the EU and national levels, bringing together stakeholders including trade unions, consumer protection organizations, environmental groups and relevant civil society organizations (Szulecki 2018; Szulecki et al. 2020; Mc Lean 2022). Wherever possible, existing structures including also corporatist fora and the governance mechanisms under European Union's and the respective national security of supply (SoS) regulation should be used to facilitate an encompassing consultation process so as to identify saving opportunities but also challenges, profiting from interactions across energy systems or supply chains.

Clearly, relying on savings programs is strongly desirable over top-down rationing. Research suggests, also in the context of disaster management, that it is crucial that stakeholders are involved (Grote and Gbikpi 2002; Tierney 2012). While this consultation process will require time and resources, the ownership it creates in saving campaigns should increase involvement and policy effectiveness, and it is likely to increase their legitimacy thus reducing the risk of protest

[1] Communication of progress and goal attainment is important, and Norway's recent water shortages in hydroelectric plant reservoirs can be used as an example – with daily newspapers and websites publishing daily water levels in reservoirs (storages), as well as current spot prices and the price for every water kettle boiled. Such translation of general goals into tangible household energy services (e.g. how much each additional degree Celsius costs/saves) can be applied in the gas sector.

and a political backlash as the burden of supply reductions gains weight (Coenen et al. 1998; Zakhour 2020; Landemore, 2020).

5 How to distribute the objective of gas savings?

Distributing saving targets is a thorny issue as it is about allocating efforts and potential economic costs. Yet, the EU has ample experiences of distributing both resources and tasks among its member states. For example, the EU-level 2020 target for renewable energy deployment has been distributed in 2008 to the member states. For this, the European Commission proposed an allocation mechanism reflecting pre-existing renewable capacity, available wind- and solar sites, and GDP per capita. With some refinement in negotiations in the Council, this approach was then accepted. In a similar manner, an allocation key could be designed to share gas saving needs across EU member states based on factors like the type of gas usage, climatic conditions, and demand per head of households using gas for heating. It may also be considered to specify the savings per usage category (e.g. buildings, industry, commerce and power) so as to allow for better comparability and therefore sense of fairness and justice.

The allocation mechanism has in 2008 been facilitated by a parallel, EU-level redistribution of revenues from the EU Emission Trading System (EU ETS). This allowed to primarily focus the definition of the renewable targets to renewable resources available in member states, while using the revenue allocation from EU ETS to address equity concerns. EU level co-funding of programs for gas savings which would – like all EU funds – be financed by a larger share by richer member states could be considered to replicate such a scheme. The advantage in this context would be a ready-made mechanism that proved effective. The key to success lies in creating a sense of fairness and solidarity. This will require rich member states to carry more of the financial burdens and provide transfers for poorer member states.

Recent proposals of the EU commission for gas storage requirements for all member states could also serve as a template for an envisaged gas savings mechanism. These proposals also include cost sharing arrangements to ensure that member states without sufficient storage on their territory will contribute to the costs incurred by other member states to achieve the joint EU objective.

6 What can member states do to achieve the gas savings?

With a clearly defined objective for gas savings – relative to historic baselines and according to main gas usage categories – national governments will need to devise plans how to deliver these

with national policies or, respectively, how to allocate targets for sub-national and sector-level implementation. Figure 1 illustrates at the example of Germany the current usage patterns of gas for different activities and sectors and thus allows to identify specific gas saving potentials.

With direct and CHP-based heating of residential and commercial buildings constituting more than half of gas demand, they also need to be part of a savings strategy. This emphasizes the need for dedicated government programs to unlock the savings, as these customers are protected from curtailment. Every 1C reduction of room temperature translates to more than 5% reduction in gas heating demand. Government programs for rapid increase in building insulation, optimization of heating systems and heat pumps can also contribute to gas savings. Substitution of heating medium and low-temperature heat provision from gas to electricity could also deliver savings in the chemicals sector.

Further gas savings are possible in the power sector – either by extending life time of coal power stations or by use of oil-based reserve generators. Acceleration of wind and solar power deployment could further reduce gas-based power generation, although the impact is moderated as gas is already less frequently operated during periods of high solar power generation. In the German case, the extension of life time of the two remaining nuclear reactors is being discussed, but restarting new fuel cycles, maintenance, and regulatory procedures would be costly - not to talk about the politics.

Finally, industrial gas demand is highly concentrated in the chemicals and steel sector. Gas savings would therefore be possible by reducing production of for example Ammoniac (Fertilizers), DRI-based steel, or Aluminum (saving gas both directly and gas for electricity production). These savings can be realized with incentives from high gas prices, government programs tendering for gas savings, or mandatory curtailment. Whatever the instrument – it will be important that the ad-hoc interruptions do not destroy production capacities, that economic viability of producers is not put at risk through extended interruptions, and that impact on supply chains is carefully monitored to avoid large spill-over effects to agricultural (e.g. fertilizers), construction (steel) or manufacturing (chemicals and aluminum).

The example thus illustrates the savings potentials – and the need to realize these potentials not primarily through curtailment of industrial load, but through measures that allow for gas savings across all users.

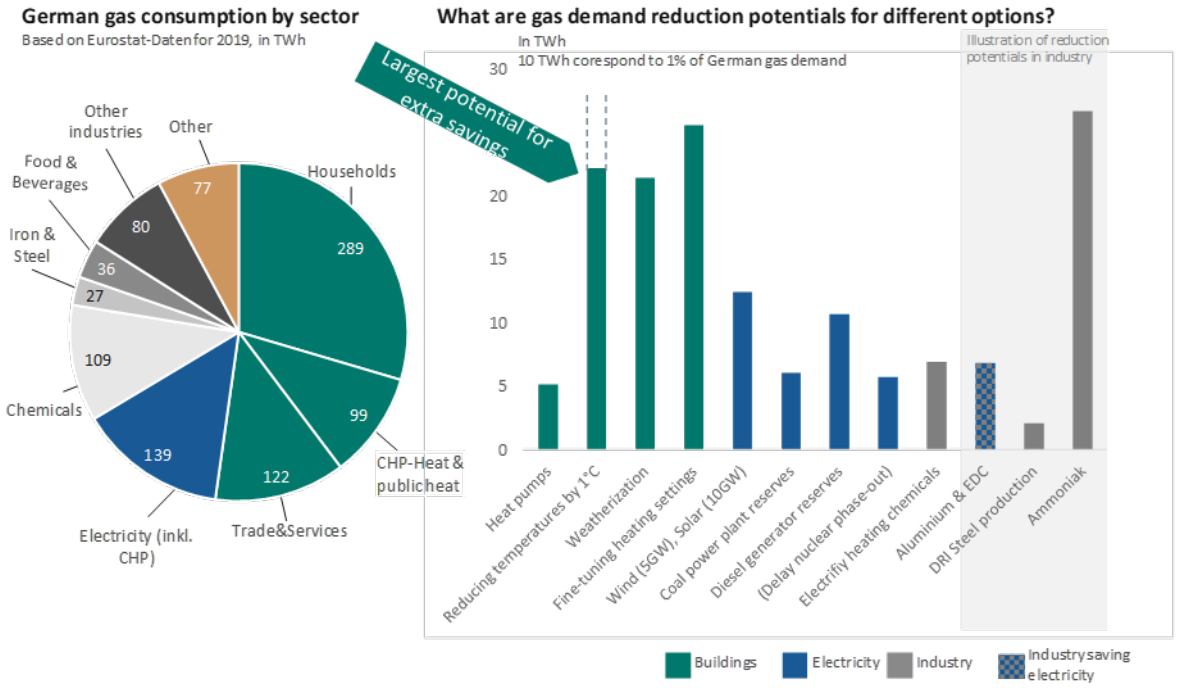

Figure 1: Gas consumption in Germany and illustrative gas saving potentials (DIW Berlin calculations)

Evidence on goal-based policy adoption suggests that it is essential to pay close attention to the process for achieving these savings (Bandara et al. 2004). A way to do this is to monitor and report publicly at least on a weekly basis so as to allow for refinements of the strategy. Corrections for weather conditions and holidays should be applied in a standardized format across the EU so as to allow for good comparability and facilitate mutual learning. The corresponding data is available, but would need to be processed and prepared accordingly.

To efficiently allocate gas savings, member states can build on experience with electricity demand response programs (Stede 2016). For example, countries like Germany have implemented tenders to realize (peak) demand reductions for short periods of time in the power sector (50hertz et. al 2020). Such a tender could also be designed for gas saving options in industry to cover the cost of production interruption to save gas.

7 What does past experience tell us about resource scarcity and emergency governance?

International experiences and best practices provide lessons on how, combined with other measures, non-price mechanisms can motivate consumers to achieve significant savings.

First, information on how to save energy has been proven key. For example, information campaigns and calls for voluntary action were used in the United States during World War II to reduce the use of cars in order to save fuel and rubber. Apart from public administration, utilities and gas distribution companies, volunteers could also play an important role. Existing NGOs, environmental groups, churches and civil society organizations could be called upon to mobilize volunteers. These could be trained through online tutorials about best practices in household gas saving. They could share their knowledge in "doorstep" campaigns providing advice based on household's specific situation.

Second, industrial firms have a crucial contribution to make. Guideposts could be used where firms pledge a certain reduction in gas use as their contribution to the EU-wide gas saving effort. Similar to announcements of climate neutrality objectives by firms or food waste reduction goals in the retail sector, such guidepost could be advertised publicly to create a marketing incentive.

Third, communication and targeted information campaigns could play an important role. They were for example key to achieve the required savings in water usage in Cape Town. This experience suggests that it is first important to clearly explain the severity of the situation and objectives, so that citizens understand the importance of achieving savings (Ziervogel 2019).[2] The ability of non-price factors and policies such as information campaigns to induce behavioral change is also confirmed by experiences with energy shortages in e.g. California and Brazil (Reiss and White 2008; Gerard 2013).

Fourth, communication needs to be constructive, i.e. provide concrete information on how individuals can achieve the savings. An important element in Cape Town consisted in the fact that information campaigns were successful in changing the social norm on what is considered appropriate and inappropriate usage within the community (Parks et al. 2019). In addition, the experience shows that nudging approaches can be effective in achieving savings, in particular for groups that are less responsive to prices and other information campaigns (Brick and Visser 2017; EfD Initiative 2019). In the case of Japan, information campaigns on how individuals can save electricity were important after the Fukushima disaster.

Further, experiences with water shortages also show that engagement with stakeholders is important to meet the required savings. In Cape Town, private actors such as retailers and shopping centers became an important amplifier of the message to increase efforts to save water and schools were engaged to spread the message into communities (Visser et al. 2021). During the drought in South-East Australia between 1997 and 2009, commercial and industrial users were

[2] For a review of international experiences, also see Moglia et al. (2018).

given assistance in developing conservation plans and when the crisis intensified were required to set conservation targets and report on them publicly (Grant et al. 2013).

Finally, additional non-price measures can play a role. For example, during the drought in Cape Town, a range of demand-side policies achieved a reduction of per capita consumption of 50% towards the end of the crisis compared to pre-drought levels (Ziervogel 2019). Together with steep increases in the block tariff structure[3], a scenario analysis provided the basis for detailed plans that imposed step-wise restrictions depending on the severity of the situation. Restrictions were imposed on activities for which water can be used, banning e.g. car washes and watering, but also on per capita usage (e.g. 50 liter/day at the end), and violation of restrictions were fined significantly (Parks et al. 2019). In addition, short-term investments in water meters and management devices were increased. The rollout of such devices was targeted at excessive users, for which installation was mandatory, but also incentivized for poorer households that received water debt reliefs if they agreed to the installation.[4]

8 We need a Taskforce to prepare for a mandatory rationing scheme

While every effort should be made to rely on voluntary saving schemes based on clearly defined EU-wide and national targets, mandatory rationing plans must be prepared now to meet the requirements of a prolonged supply interruption should they become necessary as a measure of last resort. The European Commission should initiate a procedure, e.g. in the form of a delegated act (similar to the recent 'taxonomy') combining early consultations with member state governments with a taskforce created at the EU level that would include representatives of trade unions, gas providers, businesses, consumer protection organizations and environmental groups as well as experts on the gas market and planning processes from economics and engineering. This taskforce would be charged with developing a proposal for EU-wide gas rationing to be presented to the European Commission.

For a rationing plan to work effectively the backing of all stakeholders is needed, and this requires a democratic and participatory process to achieve buy-in and broad social acceptance. A fair process will take some time. Such a taskforce therefore needs to be created urgently to ensure that a viable plan is in place should the worst-case scenario occur. The task force would

[3] Over the span of the drought, tariffs were increased by at least 400% for all user groups (lowest block) and by over 2500% for the most excessive users (Köhlin et al. 2018).

[4] Similar restrictions were imposed during droughts in Melbourne (1997-2009), although per capita restrictions remained voluntary, and in California (2013-2016), where utilities were responsible for meeting specific savings and implementing individual restrictions (see e.g., Parks et al. 2019, Grant et al. 2013, Palazzo et al. 2017).

need to identify which industries are particularly significant and need to be prioritized in gas rationing to ensure continued operation. This is to some extent in analogy with the COVID-19 induced shutdowns. But the key question is currently which categories of European industries need to keep running to reduce the impact of gas rationing on overall output. The experience of the pandemic could serve as a relevant reference point in this context.

9 The EU needs to act now

Policy responses in anticipation of a likely gas crisis need to center on nudging, stakeholder ownershipf and clear savings targets, and they need to be taken at the European Union-level. In conjunction with non-price measures, these are central to achieve significant savings, in the range of 5-10% in the short to medium term. In a second stage, mandatory savings measures may come in. There are historical precedents of economy-wide saving programs which can be used to guide the EU in its efforts to prepare itself for possible prolonged gas supply interruptions.

It is imperative that the process be launched quickly, and through participatory tools which the European Commission as well as national governments already have. The initial response to the COVID-19 pandemic in 2020 has shown that extraordinary governance measures can be implemented quickly and effectively but making them sustainable over time requires societal acceptance that can be secured through broad consultations.

Such a mechanism should be initiated now, prior to any potential interruption of physical supplies, so as to gain experience and – by realizing some gas savings – accelerate the speed at which storage can be refilled. Reducing current scarcity and increasing confidence among market participants that EU and member states will be able to reduce gas demand, such measures can also help reduce gas price levels.

Additional incentives can and should be provided to complement such efforts. For both households and firms, investment measures to realize gas saving in the short-term could be rewarded with tax breaks, low interest rate loans and transfers for poorer households. The ‘carrot’ of rewards for successful saving can be combined with the ‘stick’ of mandatory rationing should the voluntary campaign fail.

Finally, defining targets and implementing them through effective and participatory schemes is only one side of the challenge. The other is to deal with the impact of a shortage of a fuel of intersectoral relevance and of critical importance for the European economy. Contingency plans for rationing and a participatory process of preparing for those is important. However, increasing the level of preparedness both in the public sector, the business sector and among citizens

will make the effort more manageable, and the current geopolitical situation, as well as the recent experience of COVID-19 pandemic, can help generate support for extraordinary governance solutions.

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