T20
SAUDI ARABIA 2020
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POLICY BRIEF

PROMOTING ENERGY MARKET STABILITY IN A TRANSITIONING WORLD

Task Force 10

SUSTAINABLE ENERGY, WATER, AND FOOD SYSTEMS

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موجز السياسة

تعزيز استقرار سوق الطاقة في عالم متغير

فريق العمل العاشر

نُظم الطاقة المستدامة والمياه والغذاء

المؤلفون

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ABSTRACT

Stability in international energy markets is critical for promoting adequate investment in infrastructure so that economic activity can be sustained, in order to provide pathways for growth and improvement in welfare. In light of recent global events and the varied sources of market instability that have been presented historically, as well as various commercial and government goals that drive lower carbon intensity in the energy value chain, it is important to consider energy market stability in the broader context of energy transitions. The preservation, expansion, and in some cases, establishment of institutions that promote energy market stability are important for future economic well-being. We propose that the Group of 20 (G20) take steps to preserve and promote energy market depth through infrastructure resilience and institutional fortitude.

يعد الاستقرار في أسواق الطاقة الدولية أمرًا بالغ الأهمية من أجل تعزيز الاستثمار الكافي في البنية التحتية واستدامة النشاط الاقتصادي بهدف توفير آفاق أوسع للازدهار وتحسين الرفاهية. في خضم الأحداث العالمية الأخيرة وانعدام استقرار السوق بشكل غير معهود، والمساعي الحكومية والتجارية التي تهدف إلى الحد من ارتفاع نسبة كثافة الكربون في سلسلة القيمة المتعلقة بالطاقة؛ من المهم مراعاة استقرار سوق الطاقة في السياق الأوسع لعمليات التحول في قطاع الطاقة. يُعد الحفاظ على المؤسسات التي تعزز استقرار سوق الطاقة وتوسيعها وإنشاءها، في بعض الحالات، عوامل رئيسية لتحقيق الرفاهية الاقتصادية في المستقبل. نقترح في هذا الموجز أن تتخذ مجموعة العشرين (G٢٠) خطوات إيجابية للحفاظ على عمق سوق الطاقة وتعزيزها من خلال مرونة البنية التحتية والثبات المؤسسي.

CHALLENGE

The G20 Osaka Leader's Declaration (2019) acknowledged the role of all energy sources and technologies in the energy mix and different possible national paths to achieve cleaner energy systems. Various parts of the world have already started their energy transitions. However, the pace of change varies across regions because of different economic circumstances, policy support, and capital wherewithal. Various long-term institutional projections have shown that fossil fuels will represent a substantial portion of the global energy mix for decades to come. Hence, the long-term goal of mitigating greenhouse gas emissions must be achieved while preserving the stability of energy markets, both of which are critical for sustainable economic advancement.

Energy security lies at the core of any desire to promote energy market stability. Energy security refers to the notion that economic dislocations are associated with unexpected disruptions in energy supply or sudden changes in energy prices and should thus be avoided. Diversification of supply is a means of reducing the probability and hence expected cost of disruptions. It refers to the ability to draw upon multiple sources for a single fuel or to substitute among different types of energy resources. For example, any temporary market shortage, perhaps because of a weather-driven increase in demand or disruption in supply deliverability, can be overcome if there is an easily accessible alternative source of the same fuel. This, in turn, can mitigate the risk associated with uncertainty in demand and/or supply.

Occasionally, energy prices will experience periods of low volatility interspersed with periods of high volatility. The periods of high volatility are associated with negative macroeconomic consequences. Furthermore, increased uncertainty associated with high volatility has been linked to changes in firm behavior, which translates to reduced investment, increased unemployment, and lower output (see Dixit and Pindyck [1994]).

As a key driver of economic growth, energy market stability is relevant for the G20. Past G20 leaders have declaratively stated thus:

- "Increase energy market transparency and market stability by publishing complete, accurate, and timely data on oil production, consumption, refining and stock levels" (G20 2009, USA)

- "We recognize that excessive price volatility in energy commodities is also an important source of economic instability... G20 members will remain vigilant of the evolution of oil prices and will stand ready to carry out additional actions as needed, including the commitment by producing countries to continue to ensure an appropriate level of supply consistent with demand. We welcome Saudi Arabia's readiness to mobilize, as necessary, existing spare capacity to ensure adequate supply." (G20 2012, Mexico)

- "... the importance of global energy security as one of the guiding principles for the transformation of energy systems, including resilience, safety and development of infrastructure and undisrupted flow of energy from various sources, suppliers, and routes" (G20 2019, Japan).

The economic calamity wrought by the COVID-19 pandemic highlights the importance of infrastructure and energy market institutions that preserve flexibility for market participants. The global crude oil and petroleum product market benefits from unique infrastructure and institutions such as strategic petroleum reserves, spare production capacity, commercial stocks, and deep markets that allow significant commodity trade. Market depth increases when more potential trade becomes possible, which can be facilitated by both spatial trade between participants and movement in and out of inventories. In regional contexts where market depth is compromised, market volatility increases. A striking illustration is the recent plunge in the prices of the front-month futures WTI contract into negative territory. This occurred because contract positions had to be unwound in the face of dramatically diminished capability to take physical delivery of crude oil at Cushing (Medlock 2020). Symptomatic of a severely constrained market, price volatility was in excess of 15 standard deviations of long-run volatility, a level that had never been previously witnessed.

The recent episode of collapse and increased volatility in oil prices has the potential to harm economies and societies worldwide, both in the short and long term, with consequences that include:

- Additional fiscal stress on oil-dependent economies due to a significant decline in their oil export revenues at a time when governments need to direct financial resources to strengthen health systems and to deal with the consequences of the COVID-19 crisis (see for instance the communique [OPEC n.d.a] from the African Petroleum Producers' Organization and the joint statement [OPEC n.d.b] of the IEA Executive Director and OPEC Secretary General).

- The disruption of business plans and postponement of investments at a global scale: A reduction in the current investment in the oil sector can be a precursor for future market imbalances, especially if future supplies are compromised as demand recovers, resulting in oil price spikes and market instability that can adversely impact the global economy.

- Job losses and company bankruptcies in the oil and gas industry and in other sectors through economic linkages, which results in the impoverishment of workers and communities.

In the course of the unprecedented collapse of demand that accompanied the COVID-19 pandemic, the G20 has become a centerpiece for the discussion on oil market stability, with dialogues centered on ensuring market balance. An Extraordinary G20 Energy Ministers' Virtual Meeting was held on April 10, 2020, to address energy market stability. It had been preceded the day before by an Extraordinary OPEC and non-OPEC Ministerial Meeting that laid the foundation for collective action to rebalance the oil market. The G20 acknowledged that maintaining the stability of oil markets throughout the crisis and during recovery is vital. It also recognized producers' commitments to stabilize energy markets.

In the longer term, beyond the demand collapse associated with the COVID-19 pandemic, the oil market, like other energy markets, is being reshaped by major transformations. Aside from environmentally-motivated transitions in the energy complex, the COVID-19 pandemic has generated significant uncertainty around the future demand for oil and other forms of energy, as the future of transportation, work-life circumstances, and freight movements are all being questioned.

PROPOSALS

The current challenge is to ensure that both infrastructure and institutional fortitude and market stability continue and expand into the future, despite the uncertainty surrounding the future of global energy markets. It is timely to offer recommendations on how to ensure the stability of energy markets, for the joint benefit of both producing and consuming countries.

Proposal 1: The G20 should preserve institutional mechanisms that minimize market volatility (such as spare production capacity and government inventories), while taking steps that encourage building storage capacity for commercial inventories and finding ways to protect the sanctity of international trade.

Rationale

Economic theory (Jacks 2007; Kawai 1983) and commercial observation (Medlock 2007) reveal the importance of intertemporal and regional trade in mitigating price volatility. Theory suggests that as the quantity of possible trade increases, price volatility should decrease. This is because the arbitrage opportunities that are presented when prices fluctuate will be captured, as indicated by a more elastic supply deliverability curve (see appendix). When storage capacity is added, or greater connectivity to a heterogenous set of suppliers is expanded (through pipelines and/or ports, for example), there is a shift in the market conditions that is discoverable through transparent pricing. Therefore, the number of opportunities for trade will also grow. This is evident across markets for different commodities and within the market for a single commodity, where physical connectivity grows over time.

Discussions around market stability often revolve around either the level or volatility of price. Neither of these metrics is sufficient. Rather, unexpected changes in the supply-demand balance (and hence price) ultimately generate broader economic difficulties. Regular variations in price are not disruptive if there are means to mitigate risks through well-functioning markets. Studies have shown that unexpected changes in price have a much larger negative impact (e.g., Lee et al. 1995). Thus, it is critical to focus on mitigating the costs associated with sudden, unexpected shifts in the market, instead of simply focusing on volatility.

When commodities are more fungible, through either inventory management or regional/global connectivity, there is a lower price volatility and a reduced propensity for unexpected, one-time shifts in pricing (see appendix).

In the case of oil, producer states have been the principal agents in managing spare capacity that can be utilized for short-term market rebalancing. Pierru, Smith, and Zamrik (2018) showed that OPEC has substantially mitigated oil price volatility by managing its spare capacity, which can be seen as a public good that benefits the global economy. Pierru, Smith, and Almutairi (2020) found that OPEC's attempt to stabilize oil prices has produced an expected annual increment in the global GDP equivalent of around USD 175 billion in 2015 prices, which is around 0.2% of the world's GDP.

Suggestions pertaining to the means of implementation

1. The G20 should hold regular dialogues among its members to review market performance across established and emerging energy commodity value chains. Such action will allow the regular review of new market stresses by drawing upon how markets reacted to previous ones. This will also allow the cross-commodity evaluation of drivers of short-run market instability, so that appropriate institutional frameworks and infrastructure investments are implemented. A shared understanding and recognition of existing institutional mechanisms contributing to energy market stability is a critical enabler of international collaboration.
2. The G20 should create a working group on energy market stability with a mandate to propose mechanisms and policies that can potentially be activated during global emergencies (such as the current massive shock to oil demand). This working group can improve global preparedness for future crises, reinforce the reactivity of energy markets, and enhance international collaboration.

Proposal 2: The G20 should promote cooperation between existing market institutions and leverage dialogue between consumers and producers to promote more transparent markets and freer trade.

Rationale

It is critical to ensure that anti-globalization sentiments and trade disputes that are growing increasingly pervasive do not drive reductions in market fungibility through the erection of trade barriers. To protect their domestic energy industries during the crisis, governments may be tempted to impose tariffs on certain energy trade flows. Certain special interests may seem well-served by such policies, but a preponderance of research generally indicates that fewer barriers to trade promote more rapid economic growth and improvements in welfare (e.g., Andersen and Babula 2008; Idris et al. 2016; Alam and Sumon 2020).

All countries may agree on the benefits of market stability. However, consumer countries may be tempted to ask for active market intervention when prices spike, and may advocate free market-driven rebalancing when prices plummet. Similarly, producer countries may advocate for higher prices through market intervention, especially when prices are low. This misalignment of incentives complicates the discourse between consumer and producer states, and reinforces the need for dialogue.

Suggestions on the means of implementation

As with Proposal 1, holding dialogues among G20 members that engage both producers and consumers is recommended. This should be done on a regular basis, and must include scholarly engagement on the subject of international trade in energy commodities and energy market stability. A model for such engagement is the LNG Producer-Consumer Dialogues, which is hosted annually by Japan's Ministry of Economy, Trade and Industry. Through a robust dialogue, lessons from established markets with well-developed supply chains and consumer bases can be shared with policymakers and market participants involved in emerging energy commodity supply chains.

The G20 dialogue with existing international energy market organizations can be reinforced. In the oil market, the recent recognition by the G20 energy ministers of the producers' commitment to stabilize energy markets, supports this approach. One possibility in this context is to facilitate dialogue on market stability through expanding the mandate of the International Energy Forum (IEF).

Proposal 3: Develop a long-term approach to market stability, for instance, by enhancing cooperation among all existing energy institutions and leveraging the circular carbon economy framework to reduce uncertainty in energy transition.

Rationale

The goal of enhancing energy market stability can be achieved by addressing short-term market fluctuations and the potential costs they carry by establishing institutional frameworks that persist both in times of extreme stress and calm. Rigidity in policy, regulation, and institutions will invariably result in market inflexibility. This, in turn, will manifest in periods of extreme volatility. Hence, institutional flexibility is critical to achieving the long-term goal of energy market stability.

Suggestions on the means of implementation

The G20 should encourage member countries to actively assess—in a collective manner—existing institutions in the established energy commodity markets and how they mitigate uncertainty. These lessons can be used to establish appropriate institutions for emerging energy commodity markets associated with energy transition. This can be implemented by a standing G20 committee and coordinated with other multinational organizations such as the IEA, OPEC, IRENA, IEF, etc.

To secure the investment flows required for an efficient and equitable energy transition, the G20 should create a working group on the potential benefits that a circular carbon economy framework could generate for both energy producers and consumers while meeting climate targets.

Disclaimer

This policy brief was developed and written by the authors and has undergone a peer review process. The views and opinions expressed in this policy brief are those of the authors and do not necessarily reflect the official policy or position of the authors' organizations or the T20 Secretariat.

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APPENDIX

Trade, Inventories, and Price Variability

We can leverage economic theory to conceptualize the role of inventories and trade in minimizing price variability. To begin with, let there be two markets – a "stock" market and a "flow" market – in which price is simultaneously determined. In the stock market, inventories are valued against the demand for future supply. This provides a vehicle through which expected future and current prices are linked. In markets with actively traded futures, the "stock" market provides a link between the spot price and prices along the forward curve. Thus, expectations can influence price by altering the demand for inventories.

The "flow" market represents the current delivered supply and end-use demand. Thus, it is simply the market clearing price that arises as a result of contemporaneous trade in the physical commodity. The flow market is, therefore, the standard partial equilibrium representation of market supply and demand when a product cannot be stored.

To understand how this fits together, consider Figure 1. The level of inventory in the stock market is fixed at any point in time and is denoted as I. The demand for inventory is given as D, and is downward sloping to reflect the notion that as spot price P declines, the profitability of holding inventories to be sold in some later period rises, which is the classic "buy low, sell high" notion.

The demand and supply curves in the flow market in Figure 1 are denoted as d and s, respectively. Inventories either expand or shrink based on the position of the demand curve in the flow market relative to a given production schedule, denoted by q. To illustrate this, let demand in the "flow" market change throughout the year, moving from high to low demand periods. Thus, for a given production schedule, there will be periods where demand is greater than production capability and periods where demand is below production capability. In the absence of the ability to augment production with movements in and out of inventory, price would increase to P'_H when demand increases to d_H. However, inventories provide the ability to augment production when demand increases, and thus dampen upward price movement. When price rises, inventory is drawn down so that $I \rightarrow I'$, and production in the flow market is augmented by the withdrawal of inventory. Accordingly, when inventory is available, supply to the flow market is given as $s = q + \Delta I$ where ΔI is the change in inventory. As we can use inventory to enhance production in the flow market, the supply curve is more elastic, and price only rises to P_H. By analogy, when demand falls, price will also fall. If storage capability exists, it will encourage injections into inventory, thus taking production out of the flow market. As a result, price does not decline to the extent it would have had there been no storage capability. If the initial level of inventory is

reduced, then $s \rightarrow q$, meaning that price will rise more for a given increase in demand. Within the limit, where inventory is non-existent, then $s=q$ and far larger price swings will result from low to high demand periods. Generally, storage acts to buffer price movements in response to stimuli for demand and supply, precisely because it is an arbitrage mechanism that facilitates intertemporal trade.

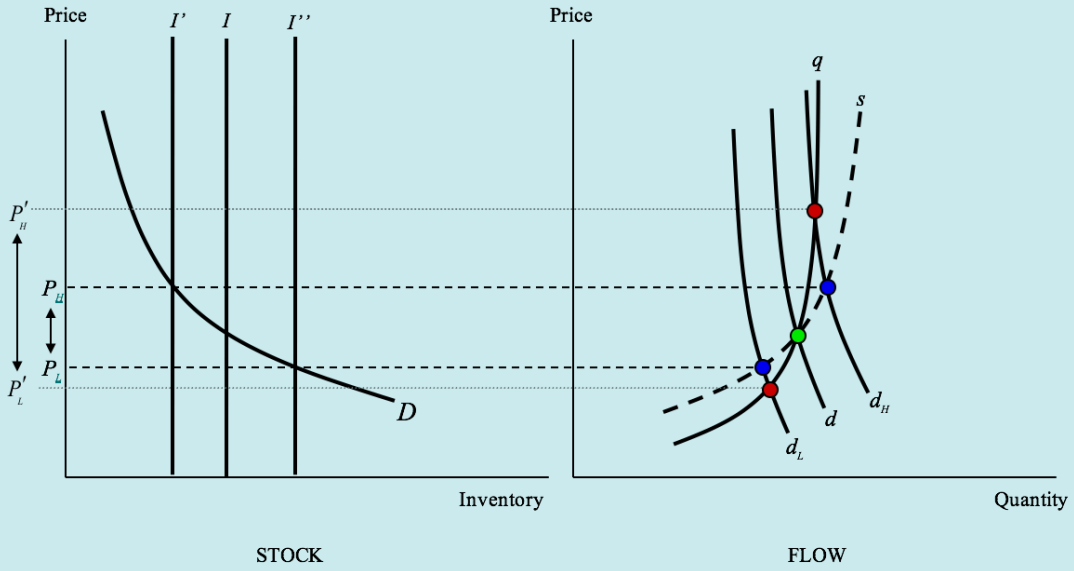

Figure 1. **Impact of inventory on market equilibrium**

As storage capacity increases, the possible size of injections and withdrawals rise, thus flattening the supply curve in the flow market. However, this does not necessarily mean that a larger storage capacity is desirable. A flatter supply curve will render movements in price smaller. This, in turn, would at some point render additional storage capacity commercially unviable.[1] It is also important to note that if flows in and out of inventory are not responsive to price signals in reliable and transparent ways, the incentive to invest in inventory capacity will be distorted. In sum, efficient investment guidance is best informed by clear and transparent price signals that are not encumbered by non-commercial interventions.

1. This follows because the incentive to store is related to the profitability of buying when price is low and selling when price is high. As price variation is reduced, the incentive to develop and utilize storage is diminished. This point is often raised with regard to government stockpiles being a disincentive for commercial stocks.

Spatial trade is another arbitrage mechanism that allows commodity movement in response to shifts in regional price differences, as opposed to intertemporal price differences. As spatial trade increases, price variability is reduced. This also reduces the incentive for holding inventories. However, if the cost of regional trade rises, the incentive for holding inventories also rises. Thus, there will be regional differences that dictate preferences for the relative size of inventory holdings and trade. However, price must be transparent and discoverable to inform an economically efficient outcome that achieves an optimal reduction in price variability.

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