ISSUE BRIEF

BRIDGING POLICY AND INNOVATION:
Using regulatory sandbox to drive new mobility innovations
Abstract
Mobility is transcending the traditional notion of traveling, hurtling towards automation, IoT and MaaS among other things. Technologies and business models are constantly evolving to keep pace with changing preferences and solutions. However, the pertinent question is whether the current regulatory framework provides an enabling environment for these innovations and technologies to create impact at scale. Accessibility, diversity, inclusion and transparency are not fully enabled under the current regulatory approach. Enter regulatory sandboxing! A regulatory sandbox provides a framework to live test innovation concepts in a controlled regulatory environment. Sandbox allows regulators to work with innovators in mitigating risks of implementing a new solution, and develop data-driven, evidence-based policies for new technologies. This Issue Brief presents the framework of a regulatory sandbox, its advantages, evaluating its success and analyses the use of regulatory sandbox for mobility innovations. As Indian cities arrive at the cusp of a mobility revolution, regulatory sandboxing could potentially determine the way forward in enabling innovation.

Introduction
The world is in the midst of a rapid technological evolution disrupting and redefining the way we live. The change is primarily driven by advances in artificial intelligence, robotics, the internet of things (IoT) and computing at an unprecedented scale and pace. Closer home in India, the past decade saw startups - powered by India’s greatest asset, i.e. human capital - catapulting the country to a leading global hub of innovation, securing India’s ambition as outlined in its national strategy, “Decade of Innovation (2010-2020)”. While India’s talent is comparable to global standards, its full potential can be realised only through the creation of enabling ecosystems especially from a policy and regulatory perspective. The current approach to policymaking, involving any new technology or revenue model, is reactive, coming under the government’s focus only when it reaches a certain threshold of users and revenue. This leads to a trust deficit between policymakers and businesses, creating high regulatory risks for firms and a situation of perpetual catch-up for governments.

Mobility as a sector is witnessing a technological transformation. Low-emission vehicles powered by batteries or alternative fuels, self-driving cars, air taxis, drones, etc. are shaping the future of mobility and cities. Such innovations generally operate in a regulatory grey area where rules are seldom clearly defined. For instance, air taxis, a reality in the near future, are being developed worldwide. However, regulations surrounding their operations are opaque and require careful assessments. In India, mobility policies favour the electrification of all modes of people and goods movement, while restricting shared mobility such as bike taxi operations. On-demand bus services are often penalised for operating “illegally”, since it is the state that operates public transit. This differentiated approach is due to the limited availability of information and evidence on the potential economic and social impact of new business models or innovations.

An efficient and robust innovative ecosystem is necessary to harness new mobility services, capable of providing a more accessible and inclusive transport system. India’s potential to emerge as a global leader in mobility necessitates the enablement of innovations through favourable policies, within a fixed time-frame. Governments, hence, need to act swiftly with intent, mitigate the risks involved, and measure impact of a new
solution, thereby presenting opportunities for policymakers to work in tandem with technology and create an innovation-friendly environment.

Enter, regulatory sandbox! Regulatory sandbox is a tool globally adopted by regulators to work with innovators to evaluate and develop evidence-based policy\(^2\). It is through this anchor that this issue brief presents the framework of a regulatory sandbox, its advantages, and evaluates its success. Further, we explore the possibility of using a regulatory sandbox for innovations to solve urban mobility issues.

### What is a regulatory sandbox?

Regulatory sandboxes are created for limited periods to live test models in a controlled environment\(^7\). The leeway it provides helps innovators to experiment even when the innovations may not conform to the existing legal framework. More importantly, it allows regulators to discover the contours of future legislation, fostering similar innovation in the said domain\(^8\).

Several countries have adopted sandboxing to achieve the twin objectives of nurturing innovation and safeguarding consumer interest\(^9\). The empirical data acquired from real-time testing helps regulators make sound policy decisions. Its ‘learn by doing’ approach allows for piloting new technologies that face regulatory barriers, as innovators and regulators work towards a favourable regulatory ecosystem\(^10,11\).

### Regulatory Sandbox Framework

<table>
<thead>
<tr>
<th>Process</th>
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<tbody>
<tr>
<td>● <strong>Eligibility</strong>: Criteria for participation broadly covers genuineness of innovation, direct benefits to consumers, no risk to the sector and testing readiness of the product.</td>
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<td>● <strong>Application</strong>: Firms apply to the regulatory body describing their business model for approval.</td>
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<tr>
<td>● <strong>Authorisation</strong>: The authorisation is granted after laying out the business plan and the relaxations with which the products can be tested.</td>
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<tr>
<td>● <strong>Testing</strong>: Firms identify their customer base to live test their product. A significant degree of freedom is allowed in designing and amending test plans during the course of testing.</td>
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<tr>
<td>● <strong>Exit</strong>: At the end of the test period, firms need to transition out of the sandbox. The test results determine whether the product is authorised for service at scale.</td>
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<table>
<thead>
<tr>
<th>Stakeholders</th>
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<tr>
<td>● <strong>Core Stakeholders</strong>: Government, Regulatory Authorities, Businesses</td>
<td></td>
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<tr>
<td>● <strong>Others</strong>: Consumers, Civil Society, Market Forces</td>
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<th>Time Frame</th>
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<tr>
<td>● The duration depends on a case to case basis, generally lasting between 3 and 12 months, with provisions for extensions.</td>
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<tr>
<th>Post-sandboxing</th>
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<tbody>
<tr>
<td>● Regulators either recommend the product to operate at scale if it meets all the legal and regulatory requirements or declare that the operator is not to be recommended to proceed for licensing.</td>
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<th>Impact</th>
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<tr>
<td>● Provides regulatory exemptions</td>
<td></td>
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<tr>
<td>● Reduces uncertainties and risks, catalysing innovation</td>
<td></td>
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<tr>
<td>● A continuous feedback loop helps fine-tune business model and develop enabling policies</td>
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### Application
- Business models & innovations falling outside the purview of existing law
- Products with substantial customer benefit

### Advantages

Regulatory uncertainty hinders investment. Sandboxes encourage positive dialogue between regulators and innovators on emerging technologies, spurring innovation and investment that benefit all stakeholders alike.

<table>
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<th>Table 2: Regulatory Sandboxing Advantages</th>
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<tbody>
<tr>
<td>Live Testing</td>
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<tr>
<td>Cohesive Environment</td>
</tr>
<tr>
<td>Risk mitigation</td>
</tr>
<tr>
<td>Foster innovation and attract investment</td>
</tr>
<tr>
<td>Continuous Development</td>
</tr>
<tr>
<td>Aids policy making</td>
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</table>

The potential benefits of the regulatory sandbox has prompted several countries to adopt this approach, sending a signal to the market that governments want to promote and attract innovation and top talent from across the globe.

### Areas of application

Traditionally, regulatory sandboxes were developed for fintech services. However, other sectors like energy, urban development and telecom too are leveraging sandboxing to usher in innovations. Indeed, sandbox applications range from testing of digital payments, and enhancing grid management and energy storage, to deploying smart city and smart mobility technologies in a controlled fashion, among others, as illustrated in Table 3.

### Does the regulatory sandbox approach work?

Policymakers are increasingly focusing on regulating the digital economy driven by innovation and data. Its large-scale impact in sectors such as mobility, healthcare, defence, space, etc., necessitates government intervention. The sandbox approach adopts a touch of openness by regulatory authorities reducing the uncertainty that is atypical to tech-oriented sectors. When this is complimented with transparency and dialogue with market actors, regulatory sandboxes become even more effective. This allows regulators and innovators to share information keeping each other in the loop. An ecosystem of building trust between...
innovators and regulators and increasing regulatory certainty is thus established, making the regulatory sandbox approach a viable tool.

South Korea’s Financial Services Commission (FSC) is a case in point. The FSC sandbox has attracted over US$111 million in investments for start-ups and expanded the country’s blockchain technologies and fintech services since its inception in 2019\[^{21}\]. Colombia too introduced a sandbox in financial services for promoting innovation and technological transformation in the financial, securities and insurance market. Four projects are now successfully operating at scale\[^{22}\].

Sandboxing experiments are unique to each country, and the frameworks are difficult to replicate elsewhere. They are useful when used and set up appropriately within the local context. A simple approach factoring market reception and resources, can contribute to the success and overall impact of a sandbox\[^{22}\]. Although many sandboxes have achieved some degree of success, others have faced bottlenecks failing to attract firms to participate. The most common determining factors are presented below.

- **Multiple regulators** with overlapping jurisdiction requires meticulous coordination\[^{24}\]. When multiple sandboxes are applied appropriately with coordination, they have shown promise of creating an enabling environment for innovators. Hong Kong, for instance, has three regulators each having a sandbox - interlinked with the other two - to provide a single point of entry for testing cross-sector fintech products\[^{22}\]. In such cases the lead authority tests the product in its sandbox while coordinating and communicating the results to the other regulators\[^{22}\]. Hong Kong has enforced an MoU among these different regulators making coordination and communication of results accessible and efficient\[^{24}\].

- **Feasibility assessments**: Information on the legality, resources and vitality of data of the market ecosystem, help in assessing the need for a regulatory sandbox. The Australian Securities and Investment Commission (ASIC)’s regulatory sandbox saw limited participation due to its restrictive parameters\[^{22}\]. The ASIC took measures to reform the sandbox by increasing the trial duration, provisioning for exemptions during trial and broadening the category of products and services. The assessment of the first regulatory sandbox helped ASIC to respond to market demands and also adapt to regulators changing needs\[^{24}\].

- **Resource-intensive**: Developing and operating a sandbox is expensive. The two common governance models, i.e. a dedicated unit or a hub and spoke model for a sandbox, vary in cost and efficiency\[^{24}\]. Governments must carefully evaluate both models. A recent survey by the World Bank estimates that running a regulatory sandbox could cost anywhere between US$25,000 - $1 million\[^{24}\]. The significant variance is dependent on the model adopted to run the sandbox.

- **Thematic sandboxes** are effective in encouraging particular technologies or products to enter the market. They provide impetus toward certain policy priorities. For example, the Reserve Bank of India (RBI) has a thematic approach to pursue specific policy objectives of mobile payments and contactless payment solutions while implementing a fintech sandboxes\[^{24}\].

- **Market forces** and the ecosystem must be conducive for implementing innovation at scale. For less mature markets, with only a few takers for a regulatory sandbox approach, other viable options such as a test-and-learn approach or innovation hubs can be explored\[^{24}\]. For example, the Philippines Central
Bank has adopted a *test and learn* approach to spur innovation within the financial sector\(^{(28)}\). The Central Bank permitted telecommunication firms to test new models of delivering financial services through non-bank entities that later were adopted and operated at scale\(^{(24)}\).

Indeed, a regulatory sandbox is established keeping several factors in mind with the market and regulators playing a crucial role in determining its types. However, the flexibility of regulatory sandboxes and their ease of application across sectors make them attractive to regulators.

### Table 3: Evidence of Regulatory Sandbox Success in Non-Mobility Industries

<table>
<thead>
<tr>
<th>Country</th>
<th>Regulator</th>
<th>Sector</th>
<th>Application</th>
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</table>
| Singapore       | Monetary Authority of Singapore (MAS)-Central bank | Capital market platform | • iSTOX, a capital market blockchain platform, tested its distributed ledger technology (DLT) to feature integrated issuance, custody and trading of digitised securities\(^{(29)}\).  
• Provides a flexible, inclusive and efficient platform benefitting both companies and investors\(^{(29)}\).  
• iSTOX has been permitted to begin operations at scale\(^{(29)}\). |
| Bahrain         | Central Bank of Bahrain (CBB)                     | Crypto trading and crowdfunding | • Startups and FinTech firms test crypto-assets, payments, remittance for both conventional and Sharia-compliant services.  
• Two FinTech companies, Tarabut and Rain, have been granted license to operate at scale\(^{(30)}\). |
| UK              | Office of gas and Electricity Market              | Power sector            | • Test peer-to-peer local energy trading platform that allows residents to source their energy from local renewables and trade it with their neighbours using blockchain technologies\(^{(41)}\). |
| Sierra Leone    | Bank of Sierra Leone (BSL)-Central Bank           | Banking                 | • BSL initiated a regulatory sandbox to encourage, cultivate, and promote financial innovation\(^{(31)}\).  
• Services tested include mobile payments, a mobile money cash transfer application for agriculturists, a financial literacy mobile application, and an electronic money transfer platform\(^{(31)}\). |
| Germany         | Federal Ministry of Economic affairs and Energy    | Energy                  | • “Smart Energy Showcases- Digital Agenda for energy transition” (SINTEG) program to test for a secure, efficient and environmentally compatible energy supply\(^{(13)}\). |
| Columbia        | Ministry of Information Technologies and Communication | Telecom              | • Testing of equipment, spectrum allocations, network and systems to adopt 5G technology\(^{(15)}\).  
• Colombia is exploring more flexible allocation of spectrum, such as shared use and the secondary market\(^{(16)}\). |
| South Korea     | Ministry of Land, Infrastructure, and Transport   | Urban Development       | • Using sandboxes in the areas of personal data usage, private network and land use for its smart city project\(^{(14)}\).  
• Testing includes allowing developers to enter private contracts for the land sale to companies. |
The various models of sandboxes existing in highly regulated sectors such as finance, banking, and power hold enormous benefits for consumers. These "safe spaces" to test technology through a sandbox have caught the attention of other sectors, especially the mobility industry, where major transformation and innovation is expected to take place in the coming decade.

<table>
<thead>
<tr>
<th>Country</th>
<th>Regulator</th>
<th>Sector</th>
<th>Service/ Model</th>
</tr>
</thead>
</table>
| Korea       | Ministry of Land, Infrastructure, and Transport   | Ride-hailing               | In Korea ride-hailing services can only be offered by licensed taxi. Reservation platforms can test ride-hailing using Regulatory Sandbox to provide<sup>32</sup>  
|             |                                                   |                            | - Flexible rating systems for reserved taxis  
|             |                                                   |                            | - Late-night taxi-sharing service  
|             |                                                   |                            | - Predetermined fare  
|             |                                                   |                            | - Easy access without denying rides |
| Japan       | Ministry of Economics, Trade and Investment       | E-bike                     | - Japanese traffic laws are unclear where and how hybrid bikes should operate in its different modes.  
|             |                                                   |                            | - Through regulatory sandboxing, Glafit, an e-bike manufacturer, demonstrated where e-bikes could operate in multiple settings while the government and company collect and use data to create new regulations<sup>33</sup>. |
| Germany     | Federal Ministry of Economics and Technology      | Hamburg Electric Autonomous Transportation | - Testing the viability of fully automated buses being integrated into road traffic<sup>34</sup>. |
| Singapore   | Land Transport Authority                         | Autonomous mobility        | - A test area has been assigned where firms can test Autonomous Vehicles (AVs)<sup>27</sup>. |

The commercialisation of any innovation is highly dependent on scale and time to market. Regulatory sandbox in mobility innovations is witnessing fruitful results en route to embracing new-age technologies. As countries globally are enabling their innovators to build for the world through a sandbox, it is time for India to adopt a similar approach to achieve the vision of global leadership in the mobility industry.

**Regulatory sandbox to promote mobility innovations in India**

To appreciate the need for a regulatory sandbox approach for mobility innovations, the Indian context must be studied. Indian cities rank amongst the worst in terms of traffic congestion. Mumbai, Bengaluru and Delhi feature in the top 10 of the most congested cities in the world<sup>35</sup>. City congestion is not only environmentally hazardous but also economically regressive, costing cities like Delhi an estimated US$9.6 bn<sup>37</sup>. Adding to this burgeoning burden, by 2030, India will house 600mn people in its urban centres putting immense pressure on city infrastructure and further aggravate mobility problems<sup>36</sup>. Further, issues of road safety, rising number of private vehicles, lack of a robust mass transit system across cities need to be urgently addressed.
At the same time, growing economic prosperities are making consumers demand better mobility services. As the mobility sector is set to grow exponentially in the coming decade (see table 5), new technologies will also see a surge. These emerging technologies have the potential to unlock economic opportunities and set new cultural phenomena that shape and redefine the new world order. The preference for electric vehicles over ICE is a case in point. Taking a cue from countries like South Korea and Japan, India stands to gain from adopting the regulatory sandbox approach to test and drive mobility innovations. While the Government has put in place a regulatory sandbox for fintech services, the Karnataka government has taken the lead in setting up a sector agnostic regulatory sandbox allowing startups from any field to apply for testing their innovations - a model to be replicated by other states in the adoption of new technologies and fostering innovation.

**Potential Areas of Application**

India is poised for a transformation in the mobility sector, and new technologies and business models must harness the opportunities created through a regulatory sandbox. A few avenues having the potential to act as a gateway to the future of India's mobility are listed below.

- **Micro-mobility & non-motorised transport (NMT):** Micro-mobility and NMT have the potential to address India’s first mile- last mile conundrum. However, the policies surrounding micro-mobility limit its usage. A pilot project through a regulatory sandbox- focusing on space, right of way, size, speed etc.- can better help identify the benefits and challenges of micro-mobility and NMT, and help governments formulate better policies surrounding micro-mobility and NMT.

- **Mobility as a Service (MaaS):** MaaS shifts transportation solutions to an on-demand service and onto a single platform. It offers a personalised and streamlined mode of transport while addressing first and last mile connectivity issues. However, the challenges of users' perspectives, business model, enabling policy, and the complexity of integrating the various modes of mobility services require careful assessment and piloting, which a regulatory sandbox can address.

- **Road safety:** Road safety is of paramount concern when it comes to mobility. The advent of technology innovation to improve road safety such as smart traffic control, connected vehicles etc. can transform road space into a safe and risk-free environment. Such technologies can be live-tested to unleash their potential benefits and conform to regulations through a sandbox, before operating at scale.

### Table 5: Market Potential from key market clusters in India (value in USD billion)

<table>
<thead>
<tr>
<th>Clusters</th>
<th>2018</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional carsharing</td>
<td>0.069</td>
<td>0.592</td>
</tr>
<tr>
<td>P2P carsharing</td>
<td>0.007</td>
<td>0.298</td>
</tr>
<tr>
<td>Corporate sharing</td>
<td>0.00</td>
<td>0.172</td>
</tr>
<tr>
<td>Dynamic shuttle</td>
<td>1.32</td>
<td>23.626</td>
</tr>
<tr>
<td>MaaS</td>
<td>0.00</td>
<td>3.356</td>
</tr>
<tr>
<td>Taxi Service</td>
<td>15.39</td>
<td>61.66</td>
</tr>
</tbody>
</table>

[1] Source: OLI MOBILITY INSTITUTE
- **Smart bus systems**: Optimising bus systems by improving the service rendered to a population largely dependent on mass transit is essential. A smart bus system can help manage resources, maintenance and transport information, and optimise routes. A regulatory sandbox allows testing smart bus systems to implement efficient public bus service at scale instead of policy experiments with limited success such as the Bus Rapid Transit System (BRTS) in New Delhi.

- **Micro transit**: Micro transit services help expand the reach of public transit in cities. The absence of a comprehensive policy, differing regulatory approaches at the State level, and lack of infrastructure make it excruciatingly difficult for these micro transit models like mini buses to transition into successful ventures at scale. On-demand, technology enabled micro transit systems are yet to be widely legally accepted. A regulatory sandbox approach can effect a change in policy outlook.

- **Vehicle sharing**: Currently, India’s regulatory framework does not permit sharing and renting of private vehicles. The peer-to-peer (P2P) vehicle sharing and rental segments can enable millions of Indian citizens to access a vehicle anytime on an as-needed basis. This also creates earning opportunities for vehicle owners. Testing the regulatory compliance through a sandbox can unlock the potential benefits of vehicle sharing.

- **Air Taxis**: An air taxi service could be offered on-demand with a network of landing or take-off hubs across a city. With many business centres on the rise, air taxis could be the solution to bridge time and space. A regulatory sandbox offers a platform to test air taxi services, ensure safety, and evaluate the policies surrounding urban aerial mobility.

- **Drone delivery**: Drone services are multi-faceted, from the ability to connect remote areas to delivery of critical military or medical supplies and transporting life-saving organs. Testing these services through a sandbox can help the government better utilise drone services and understand the need for revising existing rules on commercial drone aviation.

- **Autonomous Vehicles**: Fully automated vehicles may not be viable on Indian roads, however, other use cases such as automated bus corridors can be tested through a sandbox for smart transit systems. Autonomous vehicles also have the potential to bridge the accessibility gap and give persons with disabilities a personalised mode of transport. Such innovative solutions must be tested in the background of the benefits they offer.

Mobility innovations operate in regulatory grey areas but have substantial benefits to offer. These emerging technologies can benefit from a regulatory sandbox and be adopted with caution satisfying the legislative requirements.

**Conclusion**

Regulatory sandbox encourages the concept of ‘learn by doing’, enabling regulators to get valuable information to make policy changes while assessing potential benefits. Since the focus is on outcomes rather than the process, it allows innovators and regulators to look beyond policy roadblocks and unlock benefits on a larger scale. Firms are given a free hand to experiment during the live testing phase and bring out the best version of the product through a feedback loop. Regulatory sandboxes have gone past the traditional usage in fintech.
services. Sectors like energy, telecom, urban development etc have adopted the sandbox approach to foster and inculcate an ecosystem of innovation to find new solutions to the growing needs of consumers.

Citizens are on the lookout for more services and choices on how they travel, work and live. The mobility sector with its slew of innovations offers scalable solutions. This intersection of opportunity and expectation, however, has varying degrees of uncertainty. As disruptive technologies pose certain threats, it is critical to engage with all stakeholders to ensure that emerging mobility technologies and services are in adherence to the law and in public interest. Regulators through a sandbox can mitigate these risks by crafting policies, establishing protocols, in collaboration with companies, to create new mobility innovations, thereby acting as catalysts to shape the future mobility ecosystem.

For India, the growth of the mobility sector is key to her ambition towards a US$5 trillion economy. Access to affordable, safe and sustainable mobility will help unlock new economic and employment opportunities. Governments need to embrace newer technologies and business models at a rapid pace to enable blitzscaling and capturing world market share for local companies. The regulatory sandbox is a tool that will help bridge the gap between innovation, policy and time to market, thereby driving an entire new mobility ecosystem that can be built in India, for the world.

Endnotes


15. Defelipe, S. (2020, August 26). This is how Colombia's path is going in the 5G era. https://impactotic.co/en/chipset-this-is-the-way-of-colombia-in-the-5g-era/


41. UCL Energy Institute. (n.d.). *France and UK are well-positioned to learn from each other on self-consumption and peer-to-peer energy trading*. [https://www.ucl.ac.uk/grand-challenges/sites/grand-challenges/files/181101_ucl-sorbonne_p2p_energy_policy_briefing_uk_version.pdf](https://www.ucl.ac.uk/grand-challenges/sites/grand-challenges/files/181101_ucl-sorbonne_p2p_energy_policy_briefing_uk_version.pdf)

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