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LEARNING NOTE

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GREEN CITIES, INFRASTRUCTURE AND ENERGY PROGRAMME (GCIEP)

The role of regulatory sandboxes in renewable energy delivery: Learning from GCIEP's support to Egypt

During 2024 and 2025, GCIEP worked with the Government of Egypt to increase the country's renewable energy generation and energy security by enhancing the enabling environment for investment in the sector. GCIEP supported the national energy regulator, EgyptERA, in scenario modelling to optimise wheeling services and inform policy and regulations. Additionally, it developed an ***Energy Regulatory Sandbox Guidebook***, enabling EgyptERA to pilot and test potential innovations in a controlled regulatory environment.

A regulatory sandbox offers a controlled environment where emerging innovations, such as dynamic tariffs and local energy sharing, can be tested as a trial runs in a live, pilot context. Rather than implementing new policies and regulations across an entire energy system, innovators – such as energy companies, technology developers or start-ups – submit applications to the regulator proposing to trial their new technology, business model or service with real customers for a defined period.

If approved, participants receive temporary regulatory exemptions or modified compliance requirements that would otherwise prevent the trial, whilst the regulator maintains close oversight through regular reporting, monitoring visits and established key performance indicators to track technical performance, consumer impacts, grid stability and market effects. By enabling these real-world trials, the sandbox generates robust evidence on how new solutions perform under actual conditions with real consumers and market participants, allowing informed adjustments to be made before beneficial innovations reach the marketplace at scale. *See Figure 1 for summary of sandbox design overleaf.*

Figure 1: Sandbox design.

Design Element	Description	Design Choices (examples)
Eligibility	Defines who can participate in the sandbox. Eligibility should be articulated clearly to ensure a level playing field across all market participants.	• Open to incumbents only • Open to newcomers only • Open to nonfinancial services providers (e.g., technology providers, regtech)
Governance	Defines the internal operating structure of the sandbox, roles and responsibilites, and key operational processes.	• Specialized sandbox unit • Hub-and-spoke: a central point of contact coordinating sandbox inquiries with other units of the regulator
Timing	Includes: • Duration of the admission window • Duration of the test	• Periodic admission (cohort-based) • Permanent admission window (on-tap) • Testing period range from 3 to 36 months
Test restrictions	Limits to the scope, scale, and/or conduct of the sandbox test to minimize potential harm.	• Number of clients • Number of transactions • Volume of transactions • Geographical limits • Consumer protection safeguards • Minimum AML/CFT requirements
Exit	Includes: • Individual test outcomes (graduation, terminated test, etc.) • Incorporation of insights and lessons learned into the broader regulatory agenda	• For test outcomes see Section IV • KPIs in terms of the absolute output (number of graduated firms) • KPIs in terms of a regulatory change promoted

BARRIERS TO SUCCESFUL IMPLEMENTAION

The absence of a legal foundation

Deficiency of Resources and Expertise

Requested derogations exceed the authority of implementing entities

Participation Contraints in Sandbox Programs

Source: GCIEP

The concept has been successfully applied by the **UK's energy regulator Ofgem**, which has extensive experience in deploying sandboxes to test energy innovations. Since launching its regulatory sandbox service in February 2017, Ofgem has granted multiple sandboxes enabling trials of diverse innovations including local energy trading platforms, community energy models combining solar generation with battery storage, peer-to-peer electricity trading systems, and prosumer-to-grid energy sharing marketplaces. These trials have provided valuable evidence on how innovations function in practice and have informed Ofgem's broader regulatory policy development, such as its Future Retail Market Design project. The insights generated through these sandbox trials have demonstrated the practical viability of concepts that might otherwise have faced regulatory barriers, whilst simultaneously identifying rules that inadvertently pose barriers to innovation. *See Figure 2 for summary for Ofgem's activities:*

Figure 2: Ofgem's experience with regulatory sandboxes.

Project/Company	Year Granted	Innovation Type	Key Features
Green Energy Networks, SmartKlub & SIG (Cannock Chase)	2018	Community solar with battery storage and local energy trading via ESCO	Automated time-of-use tariff selection; residential flexibility services to grid
Green Energy Networks, SmartKlub & SIG (Trent Basin)	2018	Community solar and battery with peer-to-peer trading and flexibility services	Virtual Power Plant integration; community ESCO billing
Verv & British Gas (Banister House)	2018	Peer-to-peer electricity trading platform using distributed ledger technology	Blockchain-based trading; direct solar benefit for residents
BP & Tonik Energy	2018	Digital marketplace for prosumers to sell excess electricity (simulated trial)	Platform-based supply-demand matching; up to 250 customers
F&S Energy	2021	Energy innovation trial	Trial support provided
UK Power Networks	2021	Network innovation trial	Network services trial
Emergent Energy Systems Ltd	2022	Smart local energy solution	Local energy system development

Source: Ofgem

Tailored specifically to Egypt's energy sector context, the guidebook developed by GCIEP for EgyptERA provides policymakers, regulators and industry innovators with a practical, step-by-step framework for designing, implementing and managing regulatory sandboxes. It equips EgyptERA with the capability to test new energy solutions, regulatory approaches and market mechanisms before broader implementation across the national grid, covering all relevant processes from application and pilot testing to scaling successful projects for broader market adoption.

Drawing on international best practices and lessons learned from pioneering countries like the United Kingdom, the guidebook positions EgyptERA to conduct trials of renewable energy integration techniques, electric vehicle charging infrastructure, energy storage technologies, demand-side management solutions and smart grid digitalization. This approach ensures that regulatory development is grounded in practical evidence rather than theoretical assumptions, allowing EgyptERA to refine frameworks before full-scale deployment whilst maintaining regulatory oversight and market stability.

Learning points

Our experience in developing the regulatory sandbox guide for ERA has resulted in some important learning points:

- **A regulatory sandbox offers a smart, low-risk way to test new energy solutions without disrupting the current system:** Any country or sub-national region experiencing a clean energy transition would require solutions for integrating new services, technologies and products without affecting the default operational circumstances of the energy system. The regulatory sandbox is an effective means to achieve this.
- **The close collaboration with the national regulator created a unique opportunity for mutual learning:** It helped to realise the current regulatory priorities and challenges, allowing the guidebook to be designed with specific focus areas that respond directly to EgyptERA's requirements.
- **The sandbox guidance was designed to be practical and well-suited to the regulator's resources and capacity:** Open discussions with EgyptERA about the sandbox's foundational and operational steps allowed the design to remain ambitious but realistic ensuring that it's administratively and technically feasible for EgyptERA to action.

Recommended resources:

The following resources are recommended on this topic:

- OECD, 2025, Regulatory Sandbox Toolkit: A Comprehensive Guide for Regulators to Establish and Manage Regulatory Sandboxes Effectively
- World Bank, 2020, How to Build a Regulatory Sandbox: A Practical Guide for Policy-makers.

GCIEP is a demand-driven initiative focused on sustainable green cities and climate-resilient infrastructure in lower-income countries. As the flagship programme of the UK's Centre of Expertise for Green Cities, Infrastructure and Energy, GCIEP supports the UK Government's mission to accelerate investment in, and delivery of, infrastructure and urban development that is responsible, reliable, inclusive, low-carbon and climate-resilient.

A significant proportion of GCIEP's work is carried out in seven priority countries: Ethiopia, Ghana, Indonesia, Philippines, Mozambique, Vietnam and Zambia, where a Deep Offer programme provides long-term, systemic interventions focused on transformative change and infrastructure financing.

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