

Smart Meters Rollout in Jordan: Opportunities, Challenges, and Recommendations

POLICY PAPER



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EDAMA Association

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1. Executive Summary

The increasing economic challenges, growing population, and rising living standards have made energy security a top priority for governments across the world. For a country like Jordan that suffers from the scarcity of natural resources amid regional instability and conflicts, energy security becomes increasingly challenging.

Securing sustainable energy supply and ensuring optimum utilization of natural resources are among the main challenges addressed in the Energy Sector Strategy (ESS) for 2020–2030. In fact, the ESS aims to increase the contribution of local energy sources to electricity generation to become 48.5% in 2030 as opposed to 15% in 2019. The main local contributors are renewable energy sources and oil shales, and their contribution is expected to reach 31% and 15% respectively by 2030.

Given the increasing domestic demand for energy at a steady pace, the Kingdom imports around 89% of its energy supply (MEMR, 2021), prompting the goal of providing reliable and affordable electricity from locally available resources such as renewable energy sources. Since energy security has social, political, economic, and environmental implications, the energy consumption patterns need to be addressed while taking into account price distortions and socio-economic implications.

Jordan suffers from a costly energy bill, especially after the Gulf War (2003), making energy costs account for around 20% of Jordan's GDP. During the Arab Uprisings, the Egyptian–Jordanian gas pipeline was sabotaged and subject to explosions more than 10 times, causing interruptions to the natural gas flow that supplies more than 80% of the electricity thermal power plants, eventually leading to economic losses worth more than USD 7 billion. NEPCO is also still suffering from the repercussions of this huge loss and the resulting debt.

Because of the costly energy bill, the Jordanian government had to lift the fuel subsidy and raise fuel and electricity prices, but prompting the government, at the same time, to find alternative local energy sources such as solar and wind energy. In 2012, the government enacted the Renewable Energy Law, which increased the deployment of renewable energy (RE) in electricity generation, eventually reaching 20% in 2021.

As a result, the main problem is the high cost of electricity bill in Jordan with a fixed tariff (not linked to the time of use). This urges the need to adopt a dynamic tariff that would transform electricity consumption, leading to reduced demand in peak times, better management of distribution networks, and cutting operational costs.

A full transition towards smart meters in Jordan is a key pillar to achieve a compatible smart grid system, which is the best-recommended solution to sustain energy security in Jordan. It will also foster and flatten the electricity load curve, which will impact the economy mainly by reducing the cost of power generation.

Smart meters would potentially bring about several benefits to consumers, most importantly reducing the electricity bill due to less consumption that is stimulated by improved monitoring of usage. In addition to the efficiency of this system and the enhanced provision of information to consumers, it will also reduce the operational running costs borne by electricity distribution companies such as eliminating the need for site visits to read meters.

This policy paper aims to answer an overarching research question, which is: how can the transition into smart meters in Jordan contribute to achieving the following: economic wellbeing and development; reducing electricity costs; adopting a dynamic electricity tariff system; deploying smart grids; increasing the share of renewable energy in electricity generation; managing the

electricity distribution networks more effectively; and ensuring sustainable energy security. Accordingly, the paper will focus on identifying the main challenges, opportunities, and recommendations of this transition.

Until date, much of the debate about the rollout progress has focused on technical issues, albeit there are several socio-economic issues that could potentially either help or hinder the rollout. To accelerate the deployment of smart meters, it is vital to place greater attention to these aspects. This paper, therefore, is highlighting the main opportunities, challenges, and recommendations of the smart meters transition in Jordan, while consideration the following key areas:

1. Proposed tariff for the rollout of smart meters
2. Promoting energy saving with the use of smart meters
3. Economic development, cost-effectiveness, and the lifecycle of smart meters

2. International Best Practices

Over the last two decades, many countries have installed millions of electricity smart meters to improve the efficiency, reliability, and quality of services in the electric power industry. Compared with traditional meters, smart meters measure consumers' electricity usage at five or 15-minute intervals and communicate this usage and other data automatically to the utility. Both electricity consumers and electric utilities can benefit from smart meters, as they provide more information to manage electricity consumption, improve power outage detection and restoration, enhance opportunities for additional value-added services such as billing options and time-of-use rates, decrease the utility's costs, and enable the use of distributed energy resources like solar energy and storage (KAPSARC, 2021). Figure 1) below shows the smart meter rollout period for selected utilities, states, and countries. As evident in this figure, the targets set for smart meter installations were achieved over the course of four years or more in most cases.

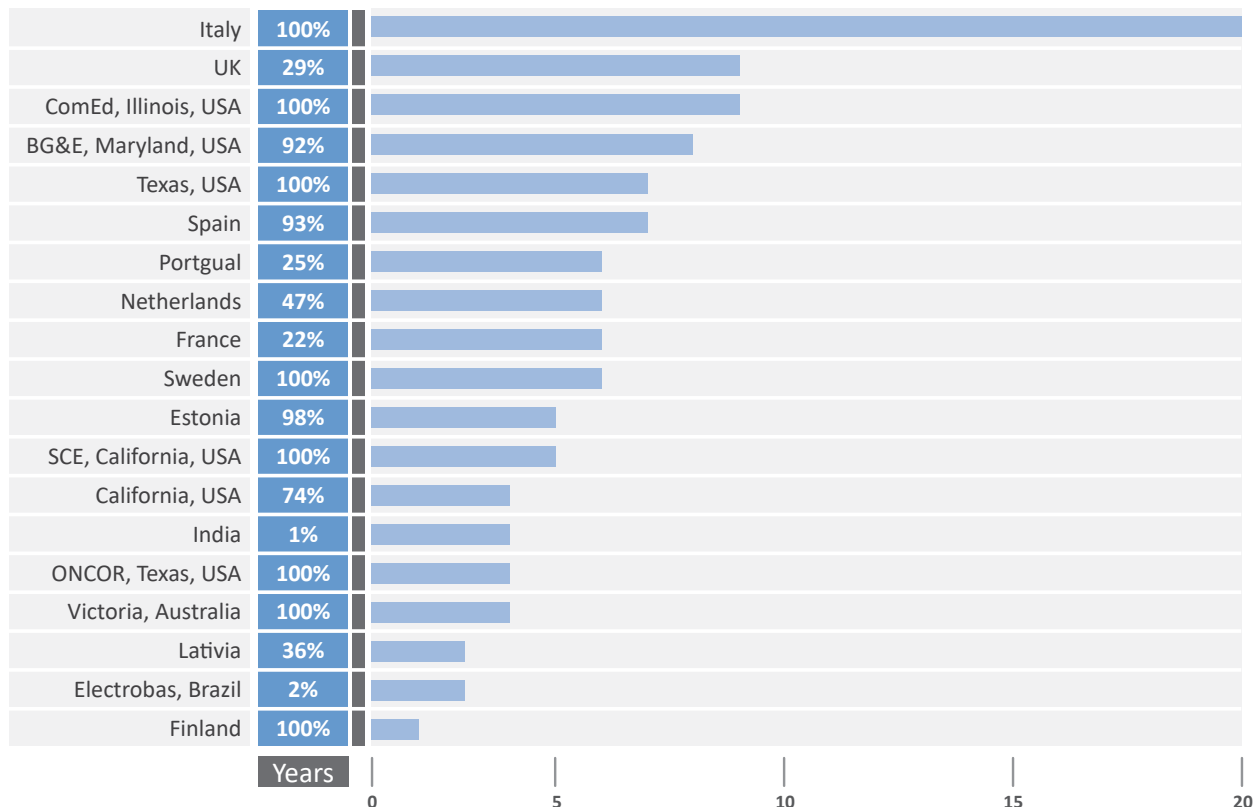


Figure 1: Smart meter rollout period

2.1 USA Experience¹

It was more than a decade ago when the USA began the deployment of smart meters. Today, the cooperation is ongoing between electricity and technology companies, seeking to make the best use of smart meters and their data and capabilities to yield numerous benefits to customers. Throughout 2020, several electric companies utilized smart meter data to provide personalized insights and tips to customers in order to support energy management during the COVID-19 pandemic.

Since 2011, the installations of smart meter have shown rapid growth. As indicated in Figure 2), electric companies installed 99 million and 107 million smart meters by the end of 2019 and 2020 respectively, covering 75% of the US households. 115 million smart meters are expected to be reached by the end of 2021.

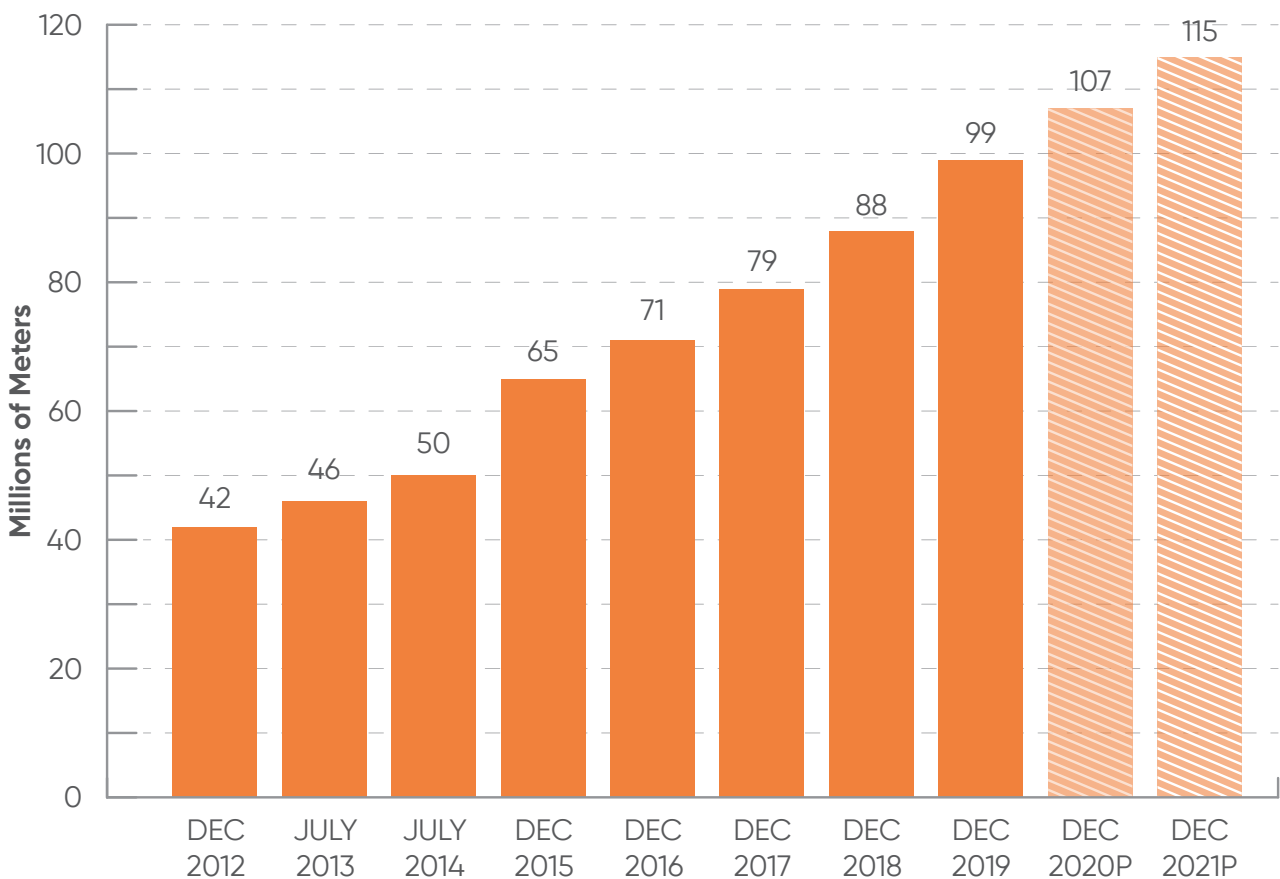


Figure 2: U.S. Smart Meter installations reach 107 Million in 2020 and are projected to reach 115 Million in 2021²

In several electric companies across the US, smart meter data are used to monitor the condition of the grid, ensure rapid restoration in the event of power outages, integrate distributed energy resources (DERs), and provide efficient energy services and solutions to customers.

As of the end of 2020, preliminary data show that carbon emissions from the US power sector were 40% below the 2005 levels, marking the lowest rate in more than four decades. Amid this transition to a future characterized by clean energy, smart meters have become a key technology that electric companies deploy to make customers part of energy management. By applying

demand response programs, customers are encouraged to change their electricity consumption patterns to avoid peak demand times. The growing utilization of devices like smart thermostats that can be connected to houses and buildings also provides an opportunity to customers to save energy and money while reducing carbon emissions.

Not only did 58 investor-owned electric companies fully install smart meters, but they are also making huge investments to enhance the energy grid. Out of a forecasted total investment worth \$139.8 billion, electric companies are forecasted to have invested more than \$41.8 billion in the distribution system alone in 2020.

With the ongoing repercussions of COVID-19, residential customers are spending more time at home and thus using more electricity to work and learn from home. During this pandemic, electric companies have supported their customers by offering innovative customer assistance and bill relief programs along with flexible customer payment plans, providing proactive communications to engage customers in energy management and helping the acceleration of granting energy assistance funds.

2.2 The Australia Experience

Although the Australian market was slower to adopt this technology, it is now driving a change and pushing for a growing trend of deploying smart metering solutions, as more homes are now adopting solar and other renewable energy solutions. Meanwhile, the New Zealand market has achieved around 90% smart meter adoption. Such a scale up of deploying smart meter services has led to improving the market competition and yielding economic benefits to both consumers and retailers.

Led by a utility services company based in Australia and New Zealand, the smart meter transition has offered innovative metering and data solutions to maximize new digital and energy services. The company noted that solar energy or other behind-the-meter services were the driver for almost two-thirds of their new smart meter installations in 2020. Other drivers included new or renovated homes, commercial premises connected to electricity grids, the replacement of old and broken meters, or simply responding to the requests of customers to switch to smart meters via electricity retailers.

The estimates of the Australian government suggest that one in four Australian homes now have solar PV installed, marking an installation rate 10 times faster than the global average. Installations in January 2021, for example, marked a 23% increase compared to the same month in 2020.

2.3 Saudi Arabia Experience

In 2020, Saudi Arabia's Smart Metering Project (SMP) started with a target of installing 10 million smart meters. Despite the challenges posed by the COVID-19 pandemic, the Saudi Electricity Company (SEC) was successfully able to replace 10 million analogue meters with smart meters in less than three years. Out of the 10 million units installed in Saudi Arabia, around 4 million were produced locally as part of the country's efforts to minimize reliance on importing technological devices. The figure below shows the number of smart meters installed in a single day in selected utilities and countries, suggesting that deployment targets were met within four years or more in most cases.

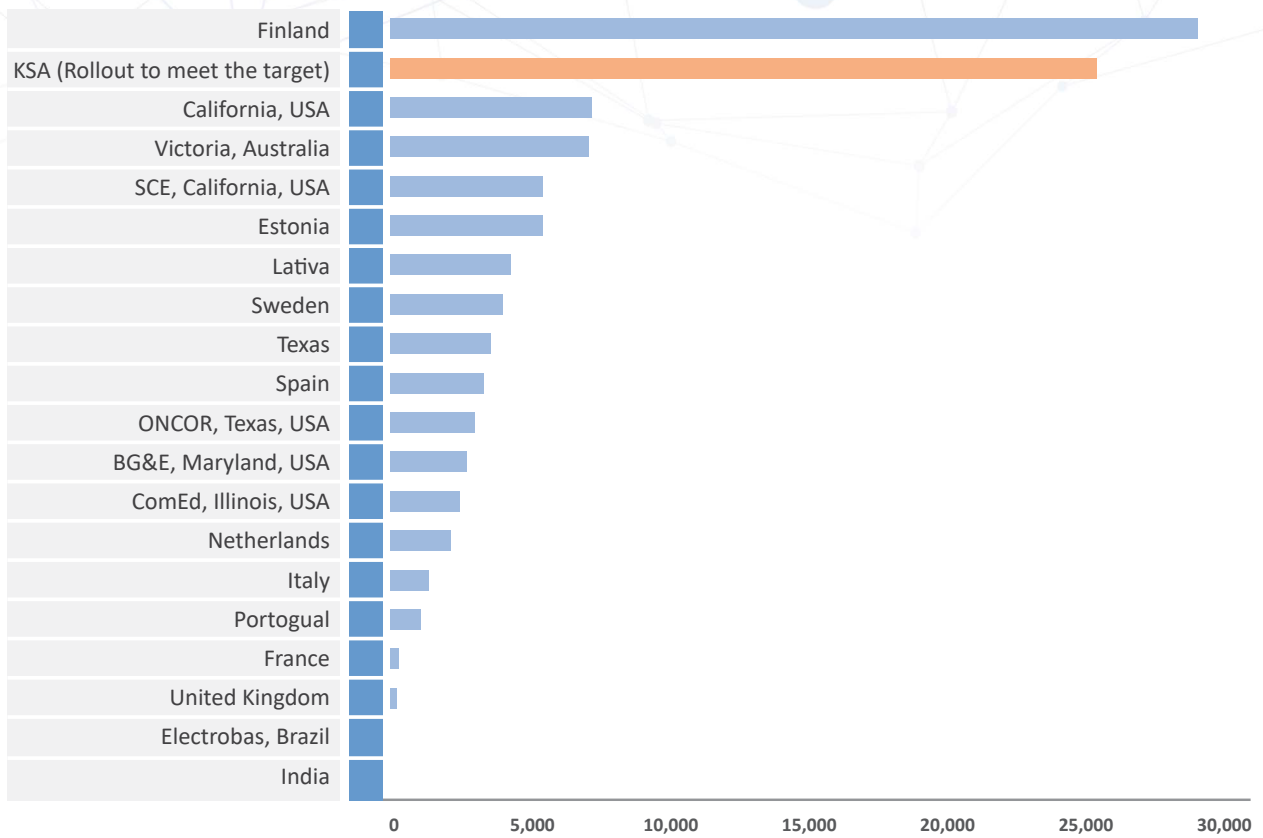


Figure 3: Smart meter rollout per day 1

In Figure 3, the blue bars represent the average of smart meter rollout per day when normalized with the customer base of around 10 million in Saudi Arabia.

The main challenges affecting the implementation of Saudi Arabia's Smart Metering Project were logistical, mainly related to delivering smart meters. In Finland, for example, the installation of solar panels was more challenging than in Australia and California, so the country had to install around 25,000 meters of panels per day to achieve its goal. Meanwhile, SEC exerted incredible efforts to install all the 10 million smart meters in a record time, eventually becoming the world's fastest growing smart metering project.

The Saudi Vision 2030 aims to build a smart nation by equipping citizens and businesses with the necessary technological infrastructure to support continuous operations. This renders SEC's efforts a very promising step in this direction.

3. SWOT Analysis & Smart Meters Current Status in the Jordanian Electricity Sector

Jordan Energy Sector Strategy (ESS) action plan for 2020–2030 aims to shift gradually from conventional metering to smart metering until a 100% transition is achieved by 2022. This transition towards smart metering still needs funding and technical studies to address its impact on operators, distribution companies, and end-user prices, in addition to investigating the expected impact on the load profile and grid flexibility.

The current deployment of smart meters in the Jordanian market stands at about 10%, which is much less than the 1st year target in the ESS. The Samra Electric Power Company (SEPCO), the power generation company, is fully deploying smart meters in its power plants with a total of 22 smart meters that are supplied, installed, and calibrated by NEPCO.

NEPCO, the only company operating in the electric power transmission sector in Jordan, has fully changed its meters into smart meters in 2015 with a total of 800 smart meters connected to the feeders and adapters, noting that their infrastructure can cover up to 5000 meters.

The Jordan Electric Power Company (JEPCO), one of the electricity distribution companies in Jordan, has launched a pilot phase for upgrading conventional meters to smart ones and developing the infrastructure. Out of the company's 1,487,111 total number of meters, 73,215 meters became smart by 2020, marking around 5% for smart meter deployment in JEPCO (JEPCO, 2020). By the end of 2021, JEPCO installed a total of 130,000 smart meters and it is expected to reach 210,000 smart meters by 2022.

In Irbid District Electricity Company (IDECO), the deployment of smart meters project was based on extensive tests and gained experience. IDECO has tested different small projects to identify the suitable communication method to ensure a successful connection between the meter and IDECO servers, including the general packet radio service (GPRS), the programmable logic controller (PLC), the radio frequency (RF), and mesh networks.

In the third quarter of 2021, the total number of meters in IDECO amounted to 600,000, of which 55,322 are smart meters, meaning that the deployment of smart meters at IDECO stands at 9.22%. By the end of 2021, a total of (68,865) smart meters are installed, and it is expected to deploy new 35,000 smart meters in 2022. However, given the huge growth of the smart meters project in terms of meters quantity and IT development, this caused some load on IDECO's IT resource, i.e., hardware and the workforce. Therefore, they decided to migrate their systems to local cloud services, and they are currently in the process of rebuilding their systems on Orange Cloud as part of the preparations for this big move.

During 2020, the Electricity Distribution Company (EDCO) has been supplying single-phase and three-phase smart meters, which are connected by (GPRS) communication method with the remote reading and control system offered by Huawei & Hexing. In the third quarter of 2021, EDCO had a total number of 265,000 meters, of which 48,000 meters were smart, meaning that the deployment of smart meters in EDCO has reached 18.1%. EDCO is deploying 56,000 smart meters by the end of 2021 and it is expecting to have new 38,000 smart meters by 2022.

The increased deployment of distributed energy resources along with the widespread availability of smart meters have created a room for innovative business models. Following are the three suggested business models for the Jordanian case:

1. Metering Company (MC): It is a brand-new market player established to meet the needs of the metering services
2. Distribution Grid Company (DGC): It is an owner of smart meters that performs metering infrastructure control, in addition to providing metering services.
3. Energy as a Service (EaaS): This model performs the metering function in a liberalized market using existing agreement relations with the customer. In this case, a smart meter will not be part of the distribution grid.

A SWOT analysis has been carried out to define the strengths, weaknesses, opportunities, and threats for the suggested smart metering business models. The highest strength was assigned to the DGC model, as electricity distribution companies have an existing infrastructure compatible with the complete transition to smart meters, which will save time, money, and efforts. The MC model, however, has shown some weaknesses due to the time required to set up a private smart meter company, posing delay to the full transition to smart meters by the end of 2022. Meanwhile, the EaaS model holds opportunities to the IT market and paves the way for the Internet of Things (IoT) and Artificial Intelligence (AI). The main threat across all business models is the delay in transitioning to smart meters by the end of 2022, which will eventually affect economic growth in Jordan.

4. Smart Meters Rollout Challenges in Jordan

The challenges facing smart meters rollout in Jordan can be summarized in the following points:

01. Lacking the necessary legislation, policies, bylaws, and a comprehensive transition plan developed by the Ministry of Energy and Mineral Resources (MEMR) and the Energy and Minerals Regulatory Commission (EMRC), leading to low deployment of smart meters that fall behind the targeted percentage set out in the Energy Sector Strategy (ESS). Moreover, the distribution electricity companies took the responsibility of installing smart meters without legislation by the EMRC, leading to increased costs of installing smart meters.
02. Lacking the capital funds that distribution companies require for setting up smart meters, posing a challenge for completing the rollout in line with the Jordan's Energy Strategy 2020-2030.
03. The shortage of human resources in utilities to install smart meters for all customers, posing a challenge for the full deployment of smart meters in 2022 in line with the government's energy strategy.
04. Lack of trust of the private companies among customers, who believe the DGC would achieve better data security, which necessitates ensuring data privacy and security.
05. The high costs of taxes and customs as well as the procedures imposed on smart meter imports. Moreover, the high costs of the communication and data storage by the telecommunication companies, which hinder the speed of transitioning to smart metering.

06. The necessity of enhancing the operational, technical, and business capabilities of electricity distribution companies in Jordan in order to address the various challenges arising during the installation stages of smart metering systems.
07. The need for conducting further studies to address the impact of smart metering system on operators, distribution companies, and end-user prices, in addition to investigating the expected impact on the load profile and grid flexibility.
08. Lacking technical and evaluation studies that tackle the implementation of smart metering system in Jordan in particular and developing countries in general. Since smart meters are aimed at enabling a dynamic tariff that depends on the time of use, this tariff system would directly affect not only the end-user price, but also the economics of the energy market. It will also have social consequences on the consumption patterns, awareness, and further aspects of engagement with the billing system, but at the same time, smart metering will improve the infrastructure towards a smart grid.
09. Lack of public awareness of the smart meter transition and its benefits among the people in Jordan.

5. Business Model & Opportunities in Jordan

1. Smart metering is not the ultimate goal, but a tool for transitioning towards smart grids and dynamic tariffs (i.e., time-of-use tariff). The installation of smart meters has become a necessity to change the consumption behavior of electricity, improve grid management and security, encourage energy saving, manage and reduce the cost of electricity, control consumption and supply, facilitate the collection of bill fees, and integrate energy storage systems, not to mention the great impact this step will have on economic development.
2. In cooperation with the MEMR, electricity distribution companies, and NEPCO, the EMRC is working on the technical specifications and requirements of the smart meter transition in Jordan. This would lay a solid foundation aligned with the digital transformation in the energy sector.
3. Since GPS communication constitutes an additional cost that electricity distribution companies bear, two recommendations are suggested. The first is to combine all smart meters in a certain area in one programmable logic controller (PLC) then connect this PLC to GPS, while the second is to ensure that all smart meters support WIFI technology to combine each 25-30 meters as a cluster and connect them to GPS. This will eventually reduce the communication cost on electricity distribution companies, as they pay 0.17 JOD/month per meter.
4. It is necessary to form a committee comprising all stakeholders, including telecommunication companies, electricity companies, private sector companies, legislators and decision makers. This committee will be tasked with developing a comprehensive action plan to accelerate shifting to smart metering, eventually paving the way for innovation and digital transformation in the energy sector. Not only will this step benefit all parties and create investment opportunities in other areas such as smart grids and the liberalization of the energy market in Jordan, but it will also foster investments and competitiveness in the energy market.
5. In cooperation with the World Bank, MEMR is developing a roadmap for digital transformation in the energy sector, and smart meters constitute a cornerstone in this transformation.

6. There is a new prevailing opportunity for distribution companies arising from the contract concluded between JEPCO and a specialized European consulting firm. The contract entails conducting a review of the technical specifications and the delivery plan developed by JEPCO, seeking to leverage the expertise of electric companies in developed countries where similar projects have been implemented. Not only will this step maximize the return on investments intended for this purpose and ensure the adoption of international best practices in the areas of billing, but it will also improve network planning, enhance load management, help detect tampering cases, save costs, and reduce receivables.

7. Renewable energy sources can be better utilized and managed by identifying consumption patterns and increasing the share of renewable energy in electricity networks.

8. Load shifting constitutes a great opportunity to better adjust demand in line with generation. In other words, load shifting is a measure to adjust electrical load by shifting consumption from peak demand hours of the day to off-peak periods.

9. Smart meters that apply a dynamic tariff contribute to improving grid management and flexibility, while flexibility is mainly achieved through energy storage and demand response. Therefore, the integration of renewable energy can only take place by ensuring grid flexibility; this is, switching to a smart grid.

10. The deployment of smart meters reduces electrical losses, whether technical losses or illegal electricity extraction, eventually saving financial costs and yielding returns to both electricity companies and consumers.

11. Smart meter deployment will pave the way for the technology market, including Internet of Things (IoT) sensors, big data management, and embedded AI. This will help maintain the safety, resilience, and security of energy grids amid the ongoing growth of decentralized power generation, electrical vehicles (EVs), storage, and expanded customer participation options.

12. Local factories should be established for manufacturing smart meter devices in Jordan, which will be the first of their kind in the region, ultimately enabling regional export. Such factories will also foster a high level of competition, as each distribution company can customize its own smart meters at very high standards.

13. Smart meters deployment will pave the way for transitioning into renewable energy in Jordan, requiring the endorsement of policies and incentives in this phase. With the dynamic tariff, smart meters would positively contribute to increasing the share of renewable energy.

14. The installation of smart meters with dynamic tariff will also lead to energy cost savings, as consumption will be shifted to cheaper time-of-use tariff. Such a saving in generation cost can be accomplished through higher shares of renewable energy in the energy generation mix. Therefore, the reduction of peak load and the increased distributed generation driven by the installation and management of smart meters would lead to grid investment and cost savings.

15. It is necessary to consider the end-of-life management of older meters and in-home energy displays (IHDs), including finding means of repurposing and recycling these products at the end of their lifecycle instead of their disposal.

16. The Distribution Grid Companies (DGC) model is the best business model that fits the Jordanian market. Although this model is currently applied in the Jordanian market, the Energy as a Service (EaaS) business model is also needed, which might be combined with the DGC model as a hybrid model.

17. EaaS will assist in data monetization, forecasting, and trends since distribution companies lack the necessary expertise in this field. Hence, the need arises for adopting EaaS model in the concerned companies such as telecommunication companies.

18. Companies in the energy sector can use smart meter data along with underlying communication systems and technologies to:

- a. Provide customers with innovative services, electricity bill relief programs, and flexible customer payment plans;
- b. Effectively engage customers in programs to adjust their energy usage to meet clean energy goals;
- c. Enhance energy grid resiliency and operations during extreme weather conditions.


19. Smart meters data will enable IT and telecommunication companies to provide software application service for those who installed smart meters. Many services can be provided by smart meter software application, such as:

- a. Tracking Electricity Energy Usage: Customers can better track the whole-home electrical energy usage and detect energy spikes.
- b. Tracking Electricity Energy Budget: Enabling customers to keep tabs on their electrical energy spending by providing budget tracking.
- c. Switching to Smart Homes for Better Electrical Energy Management: More customers will be able connect smart devices like thermostats, smart plugs, and smart light bulbs.
- d. Engaging with the Electrical Energy Advisor: Customers can receive personalized advice to detect and avoid electrical energy waste through the Energy Advisor, especially for industries with costly energy bills and environmental concerns. In parallel with the Energy Advisory, smart meters will support time-efficient and cost-effective measures, leading to lower production costs;
- e. Spotting Power Saving Habits: Customers can track the habits and actions that drive electrical energy efficiency.

6. Recommendations

Based on the aforementioned, this paper recommends the following course of actions:

1. Involve energy sector stakeholders (e.g., ministries, electrical distribution companies, IT companies, end-user private sector stakeholders such as factories and businesses with high electricity consumption, decision makers, etc.) in setting future strategies. The significance of such a step stem from the high influence these stakeholders have on achieving the strategy targets across the following aspects:
 - Policies and legislation (ministries);
 - Social aspects and service provision capabilities (distribution companies and telecommunication companies);
 - Costs and funding (financing companies); and
 - Demand and consumption (industries and private sector stakeholders).
2. Review the national laws and regulations in order to apply smart metering transition and plan for further expansion.
3. Ensure that the specifications of smart meters set by the EMRC are compatible with the smart meters already installed by distribution companies and capable of adopting the dynamic tariff in the near future.
4. Help minimize the delay in implementing the full transition to smart meters as per the ESS targets by developing an action plan for smart meters transition in Jordan with new target year instead of 2022 year, as it is not possible to have a full transition to smart meters by 2022 in Jordan. The new targets shall take into account assessing the current infrastructure, examining the capability to shift into smart meters, and determining the team capacity in alignment with the action plan.
5. Develop a strategy for enacting policies for digital transformation in the field of electricity and other related fields. The strategy must include targeted stakeholders with the support of the Ministry of Energy and Mineral Resources (MEMR), Energy & Minerals Regulatory Commission (EMRC), the Ministry of Digital Economy and Entrepreneurship (MODEE), and the Ministry of Planning & International Cooperation (MoP).
6. Set a financial plan that allocates the costs of installing smart meters to the different parties involved in this transition (i.e., electrical distribution companies, telecommunication companies, and financing companies).
7. Conduct a preliminary cost-benefit analysis (CBA analysis) for the smart meters transition in Jordan, while considering the future development of the industry. Research centers and energy researchers and experts in Jordan can undertake this role.

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8. Leverage and scale up available opportunities to reduce time, efforts, and costs, such as adopting a meter data management (MDM) system for smart meters similar to the one already used by Irbid District Electricity Distribution Company (IDECO). This would ensure the alignment of smart meter operations with the various specifications.
 9. Facilitate partnerships between electricity distribution companies and telecommunication companies with respect to smart meter data storage and security to save operational and infrastructure costs. The Energy & Minerals Regulatory Commission (EMRC) shall facilitate such partnerships given its key role in regulating and enhancing the energy sector.
 10. Conduct further feasibility studies on smart meters to ensure infrastructure resilience, in addition to raising public awareness about the replacement of old meters with new smart meters by showing the additional features and the different billing system.
 11. Prepare a Code of Practice after the installation of smart metering to safeguard consumer rights when using smart meters. The "Smart Metering Installation Code of Practice" must stipulate that consumers are entitled to receive the highest standard of service from the smart meter installation stage until the usage stage. Distribution companies should also educate consumers about the way of using the new metering system to rationalize their energy consumption.
 12. Support electrical energy consumption analysis to increase costumers' awareness of their energy consumption, eventually encouraging the transition to smart meters among other customers. Following the installation of smart meters, it is recommended to collect and analyze data to help study consumer behaviors, consumption threshold, and usage trends.

Annex 1: SWOT Analysis

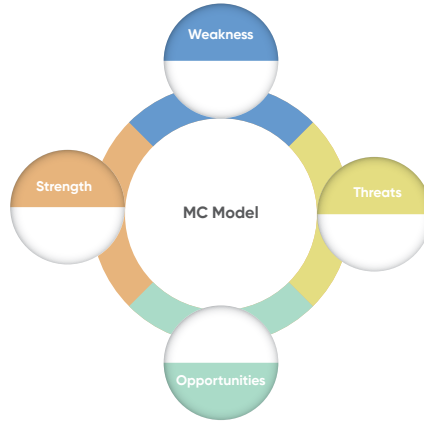
High cost of implementation.

A metering company is able to provide its services with a limited scope of work compared to other business models.

Founding a new firm, as well as contracts and other forms of relationships and trust with other players and customers, the model requires more time.

Establishing private companies for smart meters will create new job opportunities and drive the country's economic growth.

The existence of a smart metering company model as a private entity will create a competitive market in this field, which will reflect on the quality of the provided services for its customers.



Establishing a Smart metering company model, requires a lot of time due to its infrastructure requirements. Which would negatively affect the time of deploying smart meters in Jordan.

User's apprehension of their data security and confidentiality

It is most open to new technologies. It is not dependent on a certain data transmission method

Energy efficiency programs can be successfully promoted because such a model has no conflicts of interest to lower consumption.

The smart meters roll-out process has a more chaotic pattern and does not consider the future development and adopting new technologies, due to the lack of competitors

Electricity distribution companies have an infrastructure compatible with the complete transformation of smart meters, and this will save time, money, and effort.

The adoption of smart meters by electricity distribution companies will be in line with the future economic growth in Jordan.

No privacy or data security issues will be a raised.



Establishing a Smart metering company model, requires a lot of time due to its infrastructure requirements. Which would negatively affect the time of deploying smart meters in Jordan.

There will be privacy on Users' data so that the confidence between electricity distribution companies and the user will speed up the transition towards smart meters.

High cost of implementation.

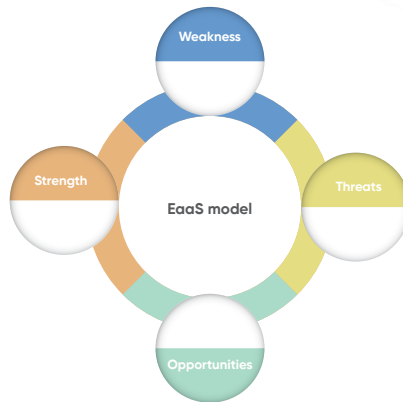
The lack of user awareness for the benefits of the energy services.

Founding a new firm, as well as contracts and other forms of relationships and trust with other players and customers, the model requires more time.

The adoption of smart meters by service providers will be in line with the future economic growth in Jordan.

The existence of energy as a service model will provide the customers with a variety of extra services, such as controlling home appliances, and recommendations for better consumption patterns.

create a competitive market in this field, which will reflect on the quality of the provided services for its customers.



User's apprehension of their data security and confidentiality.

Establishing a Smart metering company model, requires a lot of time due to its infrastructure requirements. Which would negatively affect the time of deploying smart meters in Jordan

Enhancing end users' energy efficiency.

It will Open the door for adopting new technologies and attract new business opportunities

Endnotes

- 1 KAPSARC (2021) 'Beyond Smart Meters'. Available at: <https://www.kapsarc.org/file-download.php?i=87318> (Accessed: October 23, 2021)
- 2 Edison Foundation (2021) 'Electric Company Smart Meter Deployments: Foundation for a Smart Grid (2021 Update)'. Available at: https://www.edisonfoundation.net/-/media/Files/IEI/publications/IEI_Smart_Meter_Report_April_2021.ashx (Accessed: October 23, 2021)

