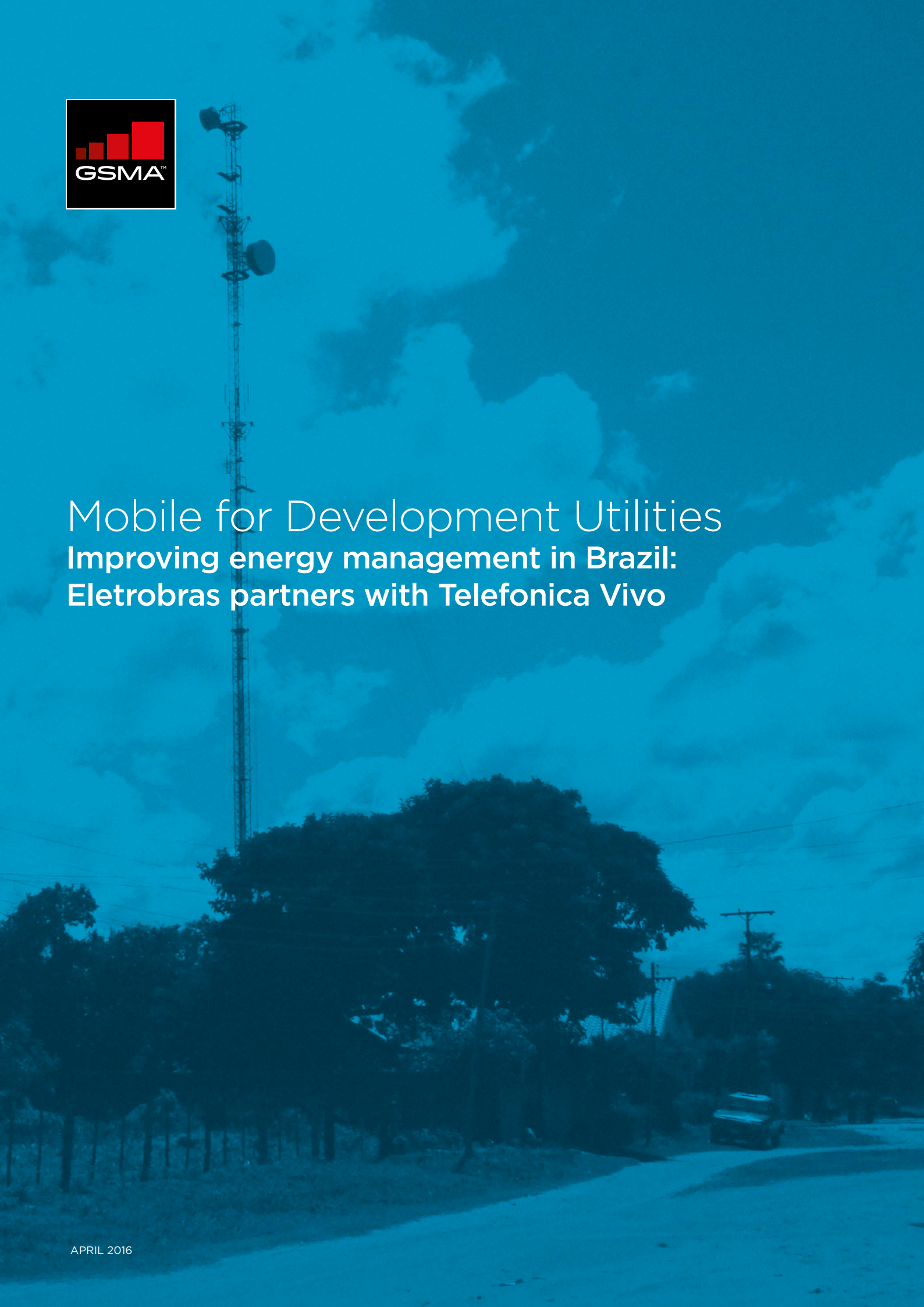


Mobile for Development Utilities

Improving energy management in Brazil: Eletrobras partners with Telefonica Vivo

APRIL 2016

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai and the Mobile 360 Series conferences.

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Mobile for Development Utilities

The Mobile for Development Utilities Programme promotes the use of mobile technology and infrastructure to improve or increase access to basic utility services for the underserved. Our programme focuses on any energy, water or sanitation services which include a mobile component such as mobile services (voice, data, SMS, USSD), mobile money, Machine to Machine (M2M) communication, or leverage a mobile operator's brand, marketing or infrastructure (distribution and agent networks, tower infrastructure). The Programme receives support from the UK Government.

The Innovation Fund

The Mobile for Development Utilities Innovation Fund was launched in June 2013 to test and scale the use of mobile to improve or increase access to energy, water and sanitation services. In two phases of funding, grants were competitively awarded to 34 organisations across Asia and Africa. Seed grants were awarded for early stage trials, Market Validation grants for scaling or replication of business models, and Utility Partnership grants to foster partnerships between utility companies and innovators.

The specific objective of the Innovation Fund is to extract insights from the trial and scaling of these innovative models to inform three key questions for growing the sector:

- How can mobile support utility services?
- For a mobile-enabled solution to be adopted at scale, what building blocks are needed?
- What are the social and commercial impacts of delivering community services to underserved mobile subscribers?

These insights, as well as grant-specific learning objectives, are included in individual case studies such as this one, as well as thematic reports that will be published throughout 2016.

This document is an output from a project co-funded by UK aid from the UK Government. The views expressed do not necessarily reflect the UK Government's official policies.

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1. Energy access in Brazil

Brazil is a champion when it comes to electrification in the region, with the government taking significant steps to reach universal access resulting in almost 99 per cent grid coverage across urban and rural areas[1], according to the International Energy Agency

The specific energy challenge that Brazil faces is ensuring that utilities' distribution networks are efficient, especially in the light of a growing energy demand. Disparities remain in the more rural North and Northeast regions of Brazil where utilities suffer from high non-technical losses of up to 20 per cent[2], mainly due to theft of electricity, vandalism and inefficient billing. In addition to these losses, infrastructure is often poorly maintained.

Conscious of these inefficiencies and the resulting revenue losses, distribution companies are adopting smart technologies to tackle the country's energy access challenges. This is the case of Eletrobras – Brazil's utility company and the biggest South American utility in terms of energy generation (38 per cent of Brazilian energy) and distribution (57 per cent of Brazilian grid)[3] – that in 2015 launched a tender to upgrade its infrastructure and roll-out smart metering technology.

2. Mobile for smart energy solutions

Smart solutions refers to a suite of information communication technologies which can be used to more rapidly and accurately send information between service providers, devices, and customers. It starts with the smart meter and extends to all the various enabling services that a smart meter offers, such as new channels for payment and customer engagement as well as remote monitoring and control of devices. This range of smart solutions can help improve energy access by addressing energy providers' main inefficiencies and losses.

In our report on mobile for smart energy solutions[4], we present the range of smart solutions for energy services that mobile technology and Mobile Network Operators (MNOs) can provide to tackle some of their main challenges and inefficiencies.

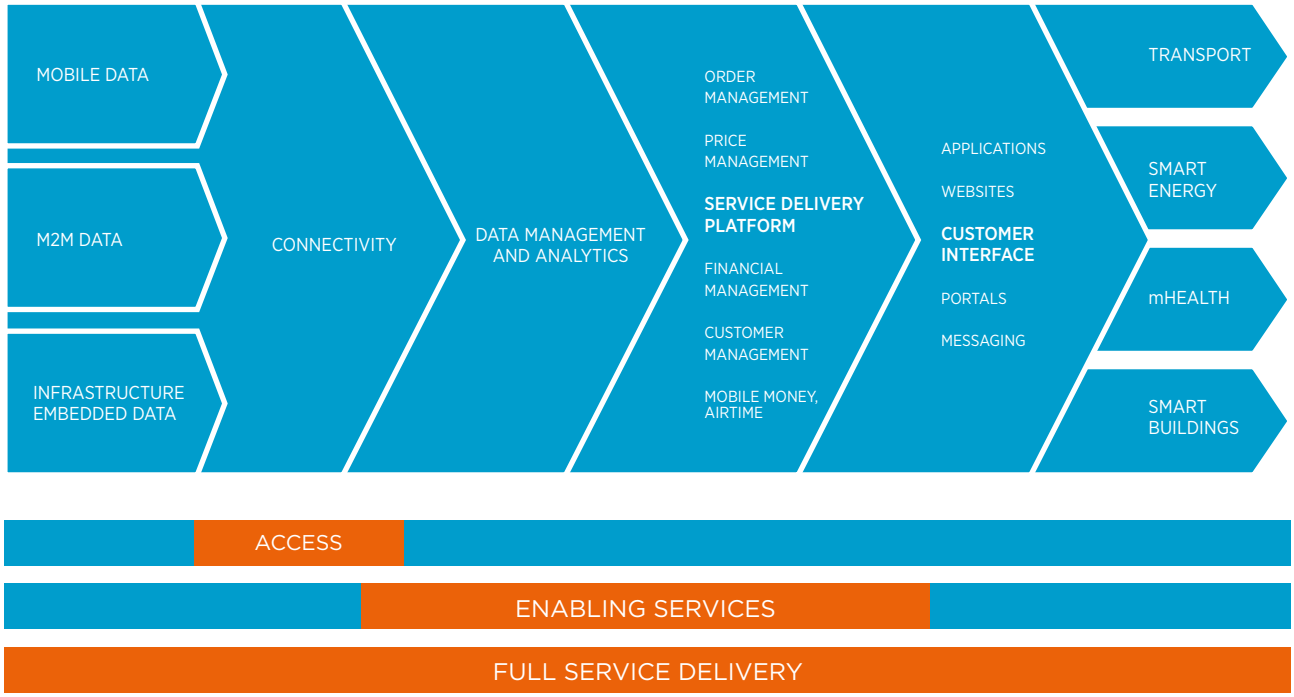
The four key services MNOs can offer to support smart solutions, include:

- Connectivity/managed connectivity - connecting infrastructure and individuals' handsets to central servers and databases;
- Data aggregation/analysis - providing data about the status of connected smart meters and smart grid assets; combining data from multiple sources to produce new insights;
- Service delivery - delivering real-time consumption information to people and machines that will enable them to adapt and respond to events; the use of mobile money to support pre- and post-payment; and
- Customer interface - providing customer support operations, such as call centers and web portals, as well as delivering messages to subscribers.

1. International Energy Agency, http://www.iea.org/countries/non-membercountries/brazil/
2. Brazil's Electricity regulator Aneel data
3. Telefonica, M2M case study, https://m2m.telefonica.com/sites/default/files/case-studies/eletrobras.pdf, 2015
4. GSMA Mobile for Development Utilities, Mobile for Smart Solutions, http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2014/11/MECs2014_PROOF008_Single.pdf, November 2014

FIGURE 1 Source: GSMA Mobile for Development Utilities Report 2014

MNO smart solution business offering



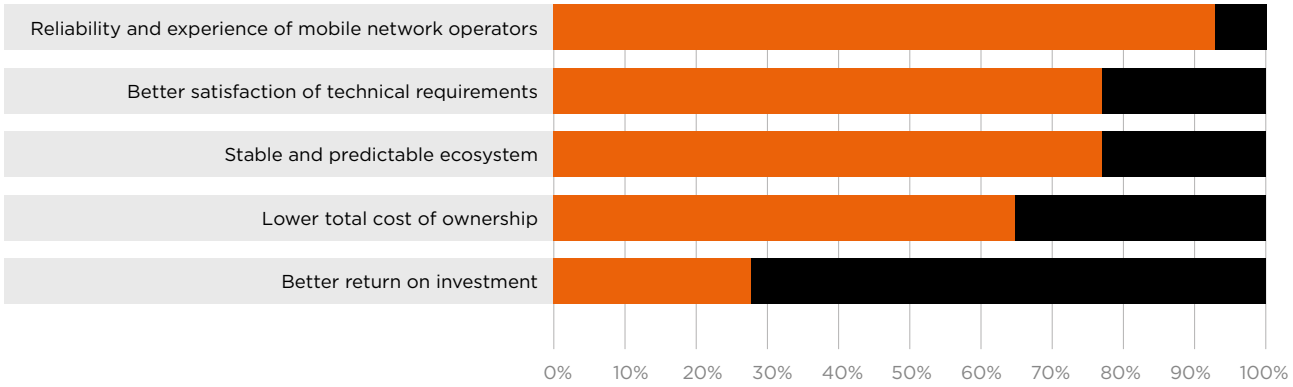
A GSMA-sponsored report by IDC Energy Insights 'Mobile Communications Powers Utilities' Adoption of the Internet of Things'[5], highlight some of the main benefits for utilities of leveraging partnerships with MNOs. Figure 2 shows the results of a survey of 43 utilities worldwide in the electricity, gas and water sectors.

5. GSMA – IDC Insights, Mobile Communication Powers Utilities' Adoption of the Internet of Things, http://www.gsma.com/connectedliving/wp-content/uploads/2015/11/cl_utilities_report_10_15-002.pdf, October 2015

FIGURE 2 Source: IDC Energy Insights, 2015

Mobile brings reliable partners, better technology and lower cost to utility IOT

WHAT ARE THE BENEFITS OF USING MOBILE-BASED PUBLIC COMMUNICATION FOR ANY DEPLOYED/PLANNED IOT SOLUTION?



The partnership between Eletrobras and Vivo presents a concrete example of the benefits that a utility can gain from using mobile technology.

3. The partnership between Vivo and Eletrobras

In 2012, Eletrobras launched the project Energia +, in partnership with the World Bank, to improve operational and financial performance of the six Northern states with the highest non-technical losses (10 per cent to 20 per cent[6]): Amazonas, Alagoas, Acre, Piauí, Rondônia and Roraima[7].

As part of the project, in 2014, Eletrobras contracted a consortium formed of Siemens, Itron and Telemont to manage their Advanced Metering Infrastructure bid, aimed at upgrading the network. The MNO Telefonica Vivo was selected out of a pool of tenders to provide machine-to-machine (M2M) cellular connectivity as well as the operation and maintenance management platform for Eletrobras' smart grid roll-out.

Cellular connectivity

Vivo is providing Eletrobras with an M2M cellular connectivity solution to enable remote transfer of data from the meter to the control centre and back to Eletrobras' subsidiaries – representing 20 per cent of the total smart meters rolled out. Vivo's 3G networks ensure a reliable, cost effective service for the utility that needs to make sure their system is running 24 hours a day, seven days a week.

Beside cellular connectivity, there are several other channels that are available for smart energy solutions, including GSM Network (3G, 4G Long-Term Evolution (LTE)), Radio Frequency (RF) Mesh networks and Ethernet (over Fiber Optic). The pros and cons of using one channel rather than another, e.g. GSM connectivity versus RF Mesh networks, vary as the table below highlights and is the decision of the distribution companies in Brazil.

6. Telefonica, M2M case study, https://m2m.telefonica.com/sites/default/files/case-studies/eletrobras.pdf, 2015
7. BN Americas, Telefonica Brasil tapped for eletrobras smart grid project, February 2015

TABLE 1 Source: Berg report, "Smart Meter in Europe", M2M Research Series 2013, www.berginsight.com

Communication channels for smart meters: pros and cons

Communication path	Description	Pros	Cons
Power-line Communication (wired)	Power-line Communication (PLC) requires a point-to-multipoint network, whereby a single transmitter is sending data to multiple receivers.	PLC is convenient as it uses existing AC power lines and is well adapted for areas where there is a high density of meters per power substation.	As PLC lines are not configured for the transmission of data, interference can occur.
GSM networks (wireless)	GSM networks use a point-to-point connection.	GSM is the most efficient technology for deployments in areas with low density of meters as there is no need for multipoint infrastructure. It is also a highly robust network (e.g. high interference management).	GSM communication remains more expensive than PLC or wireless mesh networks.
Radio frequencies (RF), including mesh networks (e.g. Zigbee, Z-wave), unlicensed spectrum solutions	Mesh networks require a point-to-multipoint connection: data must be aggregated at central points and redirected to a backhaul network - frequently mobile data network.	RF is highly robust as it can operate even if a node breaks down.	The usage of radio frequencies is limited as the frequencies are reserved for specific purposes and are not readily available in every market (mostly concentrated in the USA).

Although using GSM communication for remote reading of meters will be more expensive than manual reading by agents, utilities do take into account the benefits of using telemetry: providing real-time information and an accurate picture of customers' consumption as well as the health of the grid. Better management and operational performance will also reduce the risk of government fines that utilities face when their service goes down. The alternative, that some utilities in Brazil prefer, is to create their own private network instead of using the existing GSM network; this solution is necessarily more expensive and creates more complexity for the utility which is not used to managing these types of assets.

Current benefits for Eletrobras of this partnership:

Some of the main benefits for Eletrobras from their partnership with Vivo are[8]:

- Energy loss reduction: The project aims to achieve significant energy loss reduction and improve quality of service;
- Improved quality of service: Through better operational performance in the six distribution units; and
- Institutional strengthening: Contribute to strengthen the company's image.

8. Telefonica, M2M case study, https://m2m.telefonica.com/sites/default/files/case-studies/eletrobras.pdf, 2015

A broader offering: Managed services for energy utilities

As Figure 1 highlights, MNOs can provide a full suite of enabling services targeted for smart solutions that can be leveraged by electricity utilities. Data management, providing service delivery and customer relationship management platforms are some of the core competences of MNOs, beyond connectivity.

Further benefits for utilities

Mobile enabling services can tackle utilities' main inefficiencies, notably billing and collection of payments as well as improving communication between the utility and its customers.

Upgrading billing systems and improving revenue recovery

In Brazil, collection of energy consumption data is still manual – which is a cheap option given the inexpensive labour – and bills are sent via the post. In this context, distribution companies are reluctant to change and invest in more efficient, smart solutions. However, mobile services such as mobile payments or M2M technology, could help upgrade and optimize these inefficient and often inaccurate systems and in turn, improve revenue recovery.

Strengthening customer relationship management and encouraging better repayment rates

There is also a need to improve the relationship between the customer and the distribution company, which could be achieved through better information sharing and participation of the customer using mobile services as simple as SMS. While a simple service, better communication with the customer can strengthen the quality of the service, improve overall customer satisfaction and encourage customers to pay for their electricity bills.

4. Concluding remarks

While MNOs continue to focus on their core competency - connectivity - there is an opportunity to offer other enabling services, building on connectivity. MNOs, such as Vivo, can provide best in class services based on strong partnerships, deep expertise in data management and efficient service delivery, beyond providing its technology.

For more information on the Mobile for Development Utilities programme visit: www.gsma.com/mobilefordevelopment/utilities



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