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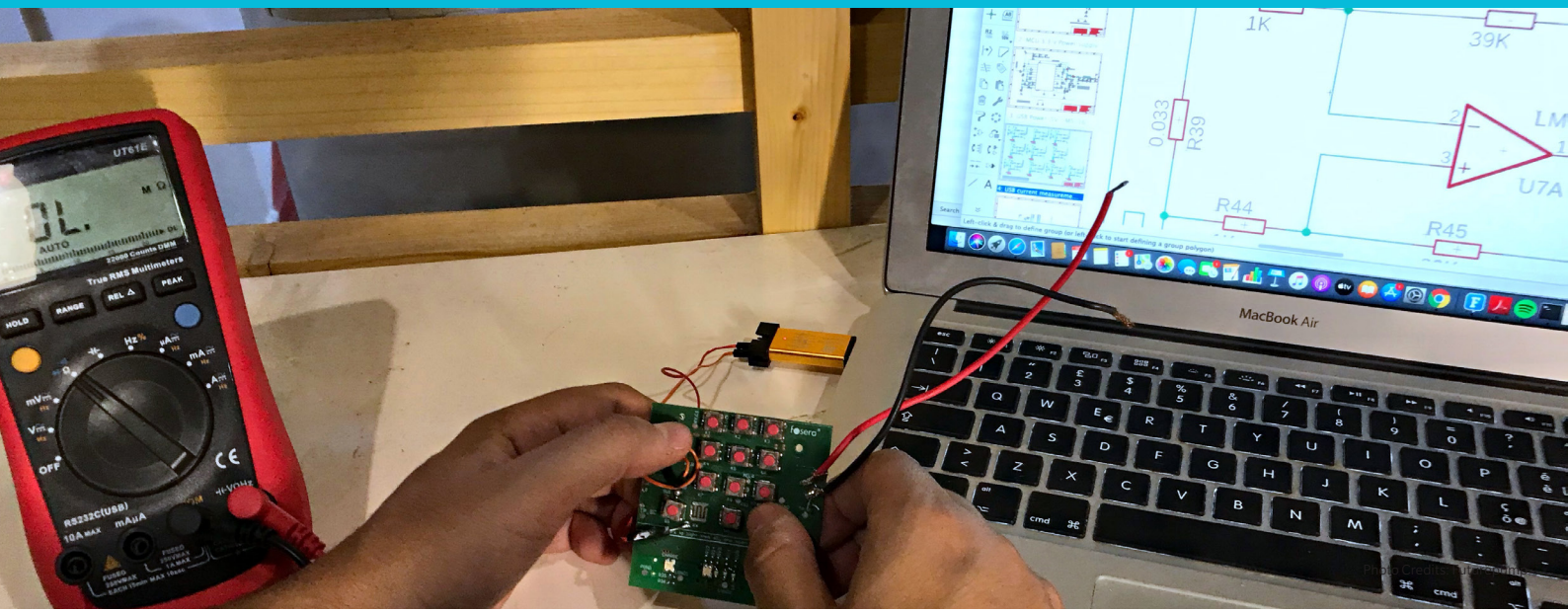
EFFICIENCY FOR ACCESS RESEARCH AND DEVELOPMENT FUND: INNOVATOR SERIES

OPENPAYGO LINK: A MILESTONE TOWARDS OFF-GRID APPLIANCE MARKET GROWTH



HOW STANDARDISATION CAN HELP ACCELERATE GROWTH IN THE OFF-GRID APPLIANCE MARKET

As the off-grid solar market has grown, customised pay-as-you-go (PAYGo) solutions have become the norm. These are often sold as bundles, including solar panels, lighting, batteries and other add-on appliances. These appliances do not currently have a common mechanism to communicate with solar home systems.

For consumers, this means that they are locked into buying their solar home systems and appliances from the same company. In addition, the lack of compatibility between systems restricts their ability to buy or sell appliances.

For manufacturers, this means that they need to adapt their appliances to use different communication protocols from different hardware providers, incurring significant upfront research and development costs. These costs will be passed onto the end-consumer.

In addition, non-interoperable appliances affect the creation of a market for secondhand appliances. This could produce a similar situation to that in the European Union where incompatible AC phone adaptors have contributed to the creation of 51,000 tonnes of electric waste.

In the long term, non-interoperable systems can restrict the growth of the off-grid appliance market, affecting the energy access sector's efforts to achieve Sustainable Development Goal (SDG) 7 of ensuring universal access to affordable, reliable and modern energy services by 2030.

DID YOU KNOW?

50 million tonnes of electronic waste are generated each year

ENHANCING CONSUMERS' FREEDOM OF CHOICE AND OPPORTUNITIES FOR COMPANIES

Standardising appliance communication protocols can not only help improve consumer choice, but also accelerate the growth of the off-grid appliance market. Standardisation can help consumers by allowing them to choose freely between competing products, which will help increase appliance sales. Greater standardisation can also help companies differentiate their products based on their internal financial and customer relationship management solutions, which can help result in improved upgrades, enhanced repairability and overall customer service.

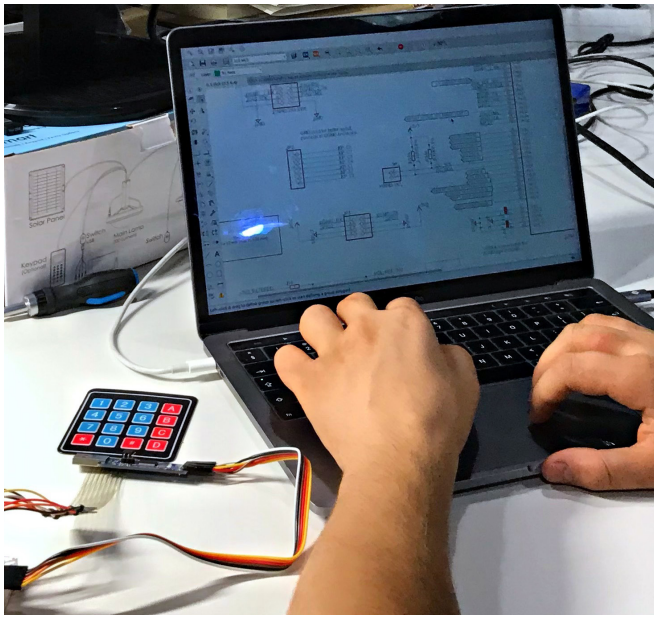
Interoperable appliances also offer numerous opportunities for solar home system manufacturers. Standardising how appliances communicate and interact with solar home systems could help reduce costs and improve the quality of appliances. It could also help build capacity for suppliers and provide a shorter time to market for new appliances. Distributors would also have a wider choice of appliances, helping to increase quality. Furthermore, creating interoperable appliances could help improve supply chain efficiency through the unbundling of systems and locally sourcing solutions.

However, compatibility and interoperability have not traditionally been priorities for appliance manufacturers. For solar home system and mini-grid companies, commoditisation of the off-grid market is associated with business risks, such as losing customers or not being able to honour warranty or quality of service (read more here).

MORE ON INTEROPERABILITY :

Efficiency for Access Compatibility and interoperability technology roadmap

https://www.gogla.org/about-us/blogs/connectors-the-low-hanging-fruit-for-interoperability



The Efficiency for Access Off-Grid Compatibility and Interoperability Technology Roadmap identifies priority areas that the Efficiency for Access Research and Development Fund aims to address. The roadmap identified the development of an interoperable PAYGo protocol as a critical step in developing an open and efficient, off-grid appliance market.

OPENPAYGO LINK: AN OPEN-SOURCE, STANDARDISED COMMUNICATION PROTOCOL FOR PAYGO APPLIANCES

Since 2014, Solaris Offgrid has worked to foster inclusive business models such as PAYGo that help empower the world's poorest and most underserved communities. The company supports entrepreneurs and organisations through its Software as a Service (SaaS) solutions and product development services.

The Efficiency for Access Research and Development Fund supported Solaris Offgrid to develop OpenPAYGO Link, a standardised communication protocol for PAYGo appliances. This is a free and secure, open-source technology that aims to provide the industry with a standardised ecosystem, helping to enable integration of PAYGo into a wider range of appliances.

OpenPAYGO Link enables the automatic activation and deactivation of PAYGo devices, verification of electrical compatibility to avoid damaging appliances, and provides custom data reporting. The technology guarantees the secure activation and deactivation of appliances based on the PAYGo status of the solar home system. It enables appliances to be purchased and paid for separately as well as easily integrated into the solar home system.

Once adopted, OpenPAYGO Link will provide a wider range of appliances for PAYGo distributors to select from and a larger market for appliance manufacturers to engage with. End-users will also have a greater choice of products in a more open and competitive market.

OPENPAYGO LINK:

To download OpenPAYGO Link, click here

To download OpenPAYGO Link via GitHub, click here

Solaris Offgrid first engaged in detailed dialogue with several appliance and solar home system manufacturers, which informed the design and development of the OpenPAYGO Link solution. Each prototype iteration was tested with manufacturers whose feedback helped to improve the technology. This iterative design process led to a well-tested and reliable solution, which is comprehensively documented online at https://www.paygops.com/openpaygolink.

SOLARIS OFFGRID:

"The grant from the Efficiency for Access Research and Development Fund was critical in helping Solaris Offgrid develop OpenPAYGO Link. This open source product offers manufacturers an inexpensive, robust, and easily adoptable technology, which will help their Paygo system and appliances to communicate with each other. We believe that this innovation will ultimately help end users in low to middle income countries access a greater range of products and services without compromising on affordability"

- Benjamin David, Chief Technology Officer and Co-Founder, Solaris Offgrid

POSITIVE ENGAGEMENT FROM INDUSTRY PLAYERS

Over 20 manufacturers engaged with the project, with more than half being inbound requests. Unsolicited requests included those from large manufacturers, such as BBOXX, ENGIE Mobisol, Fenix International and Azuri Technologies, who each downloaded the system and provided feedback. Due to the high level of engagement, Solaris Offgrid was able to develop a feature-rich system that is compatible with many manufacturing use cases.

Off-grid system manufacturer, Fosera Solarsystems, chose to use Open PAYGO Link to manage the communication between its solar home system and refrigerators. The company stated that Open PAYGO Link will save appliance manufacturers an estimated 80 engineering man days that would have been required to develop their own in-house solutions.

WHAT DID WE LEARN?

PAYGo software providers need to work together

Collaboration is needed between software companies, as it avoids duplication of efforts and accelerates progress towards a standard for off-grid appliance communication. During the project, Solaris Offgrid collaborated with Angaza, a last-mile software developer, which offers Nexus Channel Core, an open and interoperable technology for communication between off-grid energy devices.

Solaris Offgrid had originally planned to use its own application layer in its protocol, but decided to use the Nexus Channel Core upon hearing the product's announcement. The Nexus Channel Core was more resource-intensive than Solaris Offgrid had initially anticipated, which required increased system optimisation for it to run on systems that matched the original target cost. This setback demonstrates the need for collaboration from the outset, so that providers, distributors and manufacturers can either make or pre-empt alterations or additions, avoiding difficulties further down the line. Collaboration can also help foster greater innovation, as companies can share resources, ideas and time.

There is significant market demand for interoperable solutions

Solaris Offgrid was surprised to see high demand from large-scale solar home system manufacturers, ten of whom reached out to Solaris Offgrid independently. Overall, Solaris Offgrid estimates that the manufacturers who directly engaged with and expressed interest in the technology represent more than half of product sales on the market. This clearly highlights that there is an appetite for collaboration and interoperability from manufacturers, a barrier that Solaris Offgrid had anticipated.

OpenPAYGO Link saves on research and development costs

The collaboration with Fosera established that using OpenPAYGO Link can help reduce engineering time for appliance manufacturers, and lower research and development costs.

It is estimated that a manufacturer who uses the final version of OpenPAYGO Link can save over 120 engineering days required to develop its own hardware and software communication protocol. If the solution is widely adopted in the industry, appliance manufacturers could save even more time as they would only need to implement OpenPAYGO Link, rather than a communication protocol for each solar home system they work with.

The OpenPAYGO Link could eventually lead to a direct reduction in retail product costs. If Solaris Offgrid's solution were implemented in around 25 appliances or solar home system, it would lead to an estimated US$1.5 million saving for the industry, solely through savings of R&D costs. This figure could be doubled with savings linked with the consequent interoperability between solar home system and appliances.

COLLABORATION: THE SOLUTION TO INTEROPERABILITY?

The combination of Solaris Offgrid's OpenPAYGO Link and Angaza's Nexus Channel Core promises to be a viable solution for the industry, and key to ensuring full interoperability for solar home systems and appliances. It forms part of the full stack interoperability initiative that GOGLA is leading, which will ensure that compliant solar home systems and appliances are compatible. Within this initiative, Solaris Offgrid's OpenPAYGO Link provides the foundation for open-source communication between solar home systems and appliances.

It is now important to ensure that the solution is widely adopted throughout the industry to secure interoperability between systems and appliances. Early adoption can also help ensure lower design and development costs.

Solaris OffGrid will accompany the deployment of the solution by fixing issues reported during implementation. It will also promote the solution and provide consultancy services to manufacturers seeking to adopt the technology. Eventually, the company hopes to encourage the creation of a consortium of software providers and manufacturers to help maintain OpenPAYGO Link, which would help ensure the system's longevity.

Widespread adoption of open-source solutions such as OpenPAYGO Link can benefit a range of stakeholders from consumers to appliance manufacturers to solar home system manufacturers and distributors. More importantly, it can help ensure that consumers can freely choose between appliances available on the market. This is a crucial part of the international community's efforts to unlock universal access to clean, modern and reliable energy services.

GET IN TOUCH:

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