

Innovative Funding and Financing

Green and Circular Infrastructure Compendium





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1 Objectives

On the 7 April 2021, G20 Finance Ministers and Central Bank Governors reaffirmed the pivotal role of quality infrastructure in the G20 Action Plan for steering economic recovery post COVID-19. The G20 Infrastructure Working Group (IWG) has identified sustainable infrastructure as one of its priorities, and the green and circular economy as key topics under this priority. To support this agenda, the Global Infrastructure Hub (GI Hub) is developing two documents: the *Roadmap for Enabling Circular Economy Potential in Infrastructure* and a supporting compendium, presented here, illustrating innovative funding and financing solutions for green and circular Infrastructure.

The G20, under the Italian Presidency, is focusing on three broad, interconnected pillars of action: People, Planet, Prosperity. Infrastructure development is key in decoupling our economic activity from emissions and waste growth. A transition toward renewable energies, a green recovery, and more circular economic practices are all means of achieving important and tangible outcomes – especially carbon neutrality – under these priorities.

However, to realise a holistic transformation toward lower carbon and more circular economic practices at speed and at scale, we must rapidly change the way infrastructure is planned, constructed and operated.

Such a transformation carries technology risks and high up-front capital costs. Currently, the funding and financing of green and circular infrastructure continues to exhibit elements of market failure where the timing or distribution of benefits is not aligned with funders' objectives. Innovative funding and financing models are therefore critical to developing and expanding application of sustainable solutions, such as adopting alternative sources of energy, curbing excessive consumption, implementing greater efficiency in the built environment, and expanding existing recycling efforts.

This compendium presents global case studies of innovative funding and financing of green and circular infrastructure. The 20 infrastructure case studies selected have been shortlisted from a longlist of more than 60 identified examples based on several factors including their level of innovation, the impact of funding and financing and their applicability across jurisdictions. The case studies reveal important lessons, including how to make new infrastructure more circular and the role of infrastructure in supporting a lower-carbon and more circular economy.

2 Contribution to the IWG multi-year agenda

Under the Saudi Arabian G20 Presidency in 2020, the GI Hub developed the *Innovative Funding and Financing* tool (IFF Tool) to support and help further progress the *Roadmap to Infrastructure as an Asset Class*. The objective of the IFF Tool was to help governments understand available options, identify frictions in markets, and access solutions to improve the quality and quantity of projects attractive to private sector investors.

This compendium expands on the IFF Tool's case study library by showcasing how the green and circular economy agenda is being innovatively funded and financed in the context of infrastructure, in line with the direction and strategic focus for the Italian G20 Presidency. The case studies exemplify innovative use of revenue, risk management, and financing levers to fund and finance green and circular infrastructure projects across the globe.

2.1 What is 'green' and 'circular' in this context?

'Green' and circular economy are two broad topics that do not have universally accepted definitions in the world of infrastructure, and that often overlap. We have therefore used the phrase 'green and circular economy agenda' to encompass these two topics. We have not attempted to provide a definition of each, and instead this section provides an overview of the types of infrastructure which can be considered more 'green' and more 'circular'.



2.1.1 Circular economy infrastructure

The circular economy is centred around the 6R principles for circularity. The aim is to **refuse** (or significantly reduce) the amount of new materials entering the system. This is achieved by ‘closing the loop’ and maximising the amount of materials **recovered** and subsequently **reused, repaired and refurbished**, and **recycled**. **Residual** materials are those that can no longer be reused or recycled, and the available pathways are to extract the embedded energy (e.g. through waste-to-energy) or to safely dispose of these.

Within this 6R framework, infrastructure has a dual role to play. First, by increasing the ‘circularity of infrastructure’ (i.e. reducing the amount of new materials in infrastructure projects) in line with the 6R principles and second, by implementing ‘infrastructure for circularity’ (i.e. providing infrastructure that supports circular economy activity and the delivery of these 6R principles).

2.1.2 Green infrastructure

Green infrastructure is a broad agenda that covers anything from renewable energy to more efficient waste and energy infrastructure. Importantly, not all green infrastructure is circular. In fact, there are many examples where green infrastructure aimed at reducing greenhouse gas emissions is inherently linear. A notable example comes from the energy sector, where the development of renewable energy infrastructure is crucial to reducing greenhouse gas emissions and moving towards a lower-carbon economy, but where this green infrastructure (including solar, wind, and battery storage) is not necessarily circular – and governments and/or asset owners often do not have effective mechanisms or technologies to recover or reuse materials at the end of the life of this infrastructure.

2.2 Innovative funding and financing

There are a number of global case studies and case study reports that focus on innovative green and circular infrastructure and technologies. This report focuses on the innovative mechanisms that have been used to fund or finance green and circular infrastructure. The case studies in this compendium provide governments with a better understanding of those challenges and barriers in markets that can hamper the transition toward more green and circular infrastructure projects, which are attractive projects for private sector investors.

3 Methodology

For the development of this compendium, case study identification was undertaken through desktop research and stakeholder consultation. A preliminary list of more than 60 examples was identified.

To shortlist the examples to 20, case studies were ranked against the following criteria:

- Global **applicability** of the innovation
- Direct **benefits** of the innovation
- **Evidence** of causality between the proposed innovation and the green and/or circular outcome
- Level of **innovation**, using the IFF typology of frontier-traversing, frontier-extending, or frontier-breaking¹
- Potential **risks** of the innovation

Geographic location and IFF lever types (revenue, finance, risk management)² were also assessed to refine the shortlist.

¹ The typology is described at <https://www.github.org/innovative-funding-and-financing/>.

² The lever types are also described at <https://www.github.org/innovative-funding-and-financing/>.



4 Key characteristics of green and circular case studies

The case studies selected demonstrate that significant global innovation is underway in how we fund and finance green and circular infrastructure. Below are some common characteristics across the cases studies:

- **Government programs address technology risk by supporting demand and ‘industrialisation’.** Whether it is a public transport fleet, a social housing program, or a public school build, government programs shore up demand for investment and enable more viable scale to be achieved in emerging technology areas.
- **Coalitions of sponsors have been critical to frontier-extending’ programs and to driving collaboration across delivery agencies.** This is particularly true with respect to their role assisting developing economies to deploy green and circular infrastructure. Major programs that are proven in one country are ‘exported’ to other countries.
- **Long-term savings (avoided costs) can amortise high capital costs, proving suitable to private finance, where government can guarantee payments.** High capital costs of energy-saving technologies can be paid for by long-term cost savings or other benefits; however, key government and public funding supports continue to be required (e.g. subsidies and matched funding).
- **Incentives are aligned so that savings from improved performance are captured by the funder or financier.** Commercial lenders and other project developers will have the confidence and incentive to invest in green infrastructure despite high up-front costs if they can be assured (usually through the use of guarantees) that the resulting savings will cover initial costs and generate financial returns.
- **For first mover technologies, wholly or partially government-run lenders and investors have played a bigger role.** Many novel green and circular technologies have trouble attracting private investment due to various financial and operational risks. Partnerships between governments and the private sector are required to transfer and manage these risks, thereby helping catalyse investment from the private sector.
- **Circular infrastructure has gained more traction in the water and energy industries.** Circular infrastructure models have a difficult time competing for investment due to higher costs, risk of failure, and a lack of proven track record. Successful examples have mostly occurred where the circular models reduce impacts of high volume and frequency of a homogenous resource (e.g. water, and to a lesser degree energy). This is because of the relative simplicity of these sectors when compared to other circular infrastructure streams (e.g. construction) which rely on more partners and higher transactional costs, whilst having smaller markets for materials.

5 Conclusion and next steps

This compendium was developed to support the sustainable infrastructure priority of the G20 IWG and more specifically the *Roadmap for Enabling Circular Economy Potential in Infrastructure* developed by the GI Hub.

The compendium illustrates innovative mechanisms used to fund or finance green and circular infrastructure, through 20 curated case studies. Many use long-term savings (avoided costs) with government guarantees or incentives to amortise higher capital costs. The case studies in this compendium also provide governments with a better understanding of the challenges and barriers in markets that can hamper transition towards more circular and green infrastructure projects, which are attractive projects for private sector investors.

Across the case studies presented in this report, three lessons have emerged:

1. Because the green and circular economy agenda is evolving rapidly, government support during the incubation period of potential new solutions and technologies can be essential in mobilising private investment in the projects.
2. Funding and financing for many of these innovations – particularly those that are circular – can be structured using incentives linked to continued performance but also improvements over time.



3. Creating scale, for example through coalitions of sponsors or with government programs supporting demand and ‘industrialisation’ of new technology, has been critical in driving collaboration across delivery agencies and attracting private capital.

The case studies show that leveraging private sector capital to support green and circular infrastructure development is possible through funding and financing innovations – and this remains true for emerging technologies and economies. Sustainable infrastructure development can therefore also benefit the infrastructure as an asset class priority of the IWG.

The cases studies and key learnings in this draft were further refined through IWG member feedback and consultation with green and circular economy experts globally. The circular economy case studies will continue to support and benefit from the ongoing engagement under the *Roadmap for Enabling Circular Economy Potential in Infrastructure* work.

6 Summary of IFF green and circular case studies

Table 1 Summary of case studies

Green or circular?	Case study	Country	Innovation type	Lever type	Lever
Both	The Energiesprong model	Netherlands	Frontier-Breaking	Revenue	User Based
Green	Paris Schools Running Green	France	Frontier-Extending	Risk management	Performance Guarantee
Both	EuroPACE - Transitioning Energy Hungry Buildings	EU	Frontier-Breaking	Revenue	Tax Based
Green	Monetising Water Savings in Latin America	Mexico, Latin America	Frontier-Breaking	Financing	Government Debt
Both	GreenStreet Africa	Africa	Frontier-Extending	Financing	Listed Trust Investments
Green	ChargePoint as a service	USA	Frontier-Extending	Revenue	User Based
Both	Shenzhen e-Mobility System	China	Frontier-Traversing	Financing	Government Debt
Green	Volta Partnership model	USA	Frontier-Extending	Revenue	Ancillary Revenue
Circular	Water Energy Purchase Agreements (WEPA)	USA	Frontier-Breaking	Revenue	User Based
Green	ASEAN Catalytic Green Finance Facility (ACGF)	ASEAN	Frontier-Extending	Financing	MDB Debt Fund
Circular	Contractual Structuring for Road as a Service (RaaS)	Netherlands	Frontier-Breaking	Risk management	Performance Guarantee



Green	Climate Finance Accelerator	Nigeria	Frontier-Extending	Financing	Listed Securities
Circular	RaiseGreen – Crowd investing platform	USA	Frontier-Breaking	Financing	Asset Platform Investments
Green	Cape Town Green Bond	South Africa	Frontier-Extending	Financing	Government Bonds
Circular	Risk Mitigation for Geothermal Development in Indonesia	Indonesia	Frontier-Extending	Risk management	Hedging
Circular	Aguascalientes Water Fund	Mexico	Frontier-Extending	Financing	Direct Equity Operating
Circular	Auction-based pay-for-performance mechanism for greener housing	India	Frontier-Breaking	Financing	MDB/ECA/NDB Debt
Circular	JESSICA Urban Development Fund	EU	Frontier-Extending	Financing	Direct Equity Operating
Both	NAIF Conditional Loan for Kidston Pumped Hydro	Australia	Frontier-Traversing	Financing	Government Debt
Green	The Victorian Big Battery	Australia	Frontier-Traversing	Financing	MDB/ECA/NDB Debt



Appendix A - Green and circular case studies



Case study catalogue

The 20 case studies were identified across geographies and mapped according to the IFF typology, and explored across levers and innovation types, as shown across the following pages.





Country	Use Case	Description/Why is it innovative?	Lever type	Innovation type
1 China	Shenzhen e-Mobility System	<ul style="list-style-type: none"> Financial support from national subsidies and matched funding from the city government has enabled the initiative to grow enough to become self-supporting. Third-party financial institutions purchase and rent the e-buses to bus operating companies in Shenzhen. This lowers the up-front capital cost for operating companies. 		
2 Netherlands	Energiesprong	<ul style="list-style-type: none"> Tenants of the housing association will pay an up-front energy service plan that is equivalent to their previous energy supplier bill. These payments will then be used to partly fund the retrofits. The up-front costs of the retrofits are partly funded from the planned maintenance and repair budget of the next 30 years, along with expected energy cost savings. 		
3 France	Paris Schools Running Green	<ul style="list-style-type: none"> EPCs are an innovative form of contracting using a pay-for-performance mechanism in which the city government strikes an EPC agreement with an energy service company (ESCO), committing the ESCO to financing an energy-efficiency project with a performance guarantee. Allows governments and other building owners to repay their investments from realised energy savings over a set period of time. 		
4 Netherlands	Contractual Structuring for Road as a Service (RaaS)	<ul style="list-style-type: none"> Under a Circular Service Contract (CSC), the provincial government will maintain legal ownership of the road and the contractor will retain economic ownership of the road. Both parties enter into a contractual obligation for the specified use period of the road, and the contractor receives the residual value at the end of contract term. The road stays a fixed asset on the contractor's balance sheet while the government (province) pays a recurring quarterly fee for use of the road. 		
5 USA	Volta Partnership Model	<ul style="list-style-type: none"> Volta splits the cost of building the charger with the partner/commercial client and collects a recurring fee for the increased customer traffic to the locations where the chargers are installed. The advertising on the billboards will also generate significant revenue upfront, leading to a wider profit margin, and faster payback time per charger. 		
6 Nigeria	Climate Finance Accelerator (CFA)	<ul style="list-style-type: none"> New supply chain for climate finance which involves a 'transformation' phase where physical assets are turned into paper assets/term sheets that institutional investors from external markets would be willing (and permitted) to invest in. These highly rated paper assets such as green bonds are created via aggregation and de-risking of the physical assets that are deemed to be investment-ready. These paper assets are then distributed into mainstream institutional investment markets. 		

Green
 Circular

Revenue
 Risk Management
 Financing

Frontier Traversing
 Frontier Extending
 Frontier Breaking











Country	Use Case	Description/Why is it innovative?	Lever type	Innovation type
7 USA	RaiseGreen Crowdinvesting platform	<ul style="list-style-type: none"> Unlike other crowdfunding platforms, RaiseGreen is a 'crowd investing' platform that sells debt notes or equity stakes in green projects with a minimum investment determined by the originator. 		
8 Australia	NAIF Conditional Loan for Kidston Pumped Hydro	<ul style="list-style-type: none"> The Northern Australia Infrastructure Facility's (NAIFs) concessional loan is subject to a number of conditions precedent, including the finalisation of all other aspects of financing and agreements with construction contractors and operations and maintenance providers 		
9 Africa	GreenStreet Africa	<ul style="list-style-type: none"> GreenStreet Africa develops and aggregates portfolios of distributed solar projects at public health and education facilities for implementation by private IPPs or ESCOs, financed with local capital markets solutions. The innovation comes from the combination of a public-private partnership, portfolios bundling together individual projects, and guarantee-backed local-currency debt financing. 		
10 ASEAN	ASEAN Catalytic Green Finance Facility (ACGF)	<ul style="list-style-type: none"> The ACGF utilises equity provided by ASEAN member states into the AIF alongside support from ADB and other development partners. Leveraging facility helps governments use public and concessional funds better. Partnering with private investors on the Green Climate Fund to deliver a Green Recovery Program post-COVID-19. 		
11 Mexico	Monetising Water Savings (MWS) in Latin America	<ul style="list-style-type: none"> MWS is an initiative aiming to mobilise investment into sustainable agriculture and incentivise water conservation. MWS will provide loans on favourable terms to farmers to enable purchase of efficient irrigation systems and implement sustainable agriculture practices. Once operational, the MWS model will generate two revenue streams from producers and utilities, and a corporate partner committed to purchasing the agricultural products. Loan repayments are made through increased crop revenues, reduced costs, and improved access to markets. 		
12 South Africa	Cape Town Green Bond	<ul style="list-style-type: none"> This was the first green bond in South Africa and the only green bond in the country to meet CBI requirements and receive accreditation. It was also the first in the country to receive Moody's certification, with the agency rating the bond as GB1 (excellent). 		
<div> Green Circular </div> <div> Revenue Risk Management Financing </div> <div> Frontier Traversing Frontier Extending Frontier Breaking </div>				



Country	Use Case	Description/Why is it innovative?	Lever type	Innovation type
13 India	Auction-based pay-for-performance mechanism for greener housing	<ul style="list-style-type: none"> The World Bank developed the auction-based pay-for-performance mechanism to attract investment for projects aimed at reducing methane emissions. It provides price guarantees for future climate results which are determined by an auction. These price guarantees provide holders the right to sell future climate results to energy facilities at a predetermined price. Funds are only disbursed once the climate results have been independently verified 		
14 Australia	The Victorian Big Battery	<ul style="list-style-type: none"> Australia's green bank, the Clean Energy Finance Corporation (CEFC), committed AUD\$160m (USD\$125m) in senior debt financing in the designing, construction and operation process. 		
15 USA	Water Energy Purchase Agreements (WEPA)	<ul style="list-style-type: none"> Cambrian created WEPA® which is an accessible, service-based wastewater-to-resources solution. Cambrian maintains asset ownership, management and compliance cost of the wastewater plant. Cambrian only charges on a per-gallon basis when the system turned on and provides clean energy and water back to the facility at a lower utility rate. 		
16 Mexico	Aguascalientes Water Fund	<ul style="list-style-type: none"> AWF provides upfront financing to project implementers to enable the deployment large-scale sustainable agriculture projects using a landscape approach with rural farming communities. Unlike public schemes that are limited to 1-year duration, this fund provides a 6-year programme to build a long-term relationship with farmers and maximise impact. 		
17 EU	EuroPACE - Transitioning Energy Hungry Buildings	<ul style="list-style-type: none"> Euro Property Assessed Clean Energy (Euro PACE) is a scalable on-tax financing model to support the deployment of energy saving and generation technologies to European households and the EU's clean energy transition. Market-Based Approach: 100% financing through private and public capital to reduce reliance on grants and subsidies. 		
18 EU	JESSICA Urban Development Fund	<ul style="list-style-type: none"> Any return generate from a JESSICA funded project can be either retained by the UDFs or returned to Managing Authorities for reinvestment in new urban regeneration projects. As opposed to simple one-off grants, JESSICA utilises a series of locally controlled perpetually self-sustaining investment funds. The strategic rationale behind the program was to convert a grant mechanism (the ERDF) into a program participatory investing, lending and loan guarantee. 		
<div> Green Circular </div> <div> Revenue Risk Management Financing </div> <div> Frontier Traversing Frontier Extending Frontier Breaking </div>				



	Country	Use Case	Description/Why is it innovative?	Lever type	Innovation type
19	 Indonesia	Risk Mitigation for Geothermal Development in Indonesia	 <ul style="list-style-type: none"> A key innovation in the financing package is the use of convertible bonds (converting fixed-income debt security into equity shares) that will enable private sector geothermal sponsors to mitigate the exploration risk while providing an adequate upside in case of success. 		
20	 USA	ChargePoint as a Service	 <ul style="list-style-type: none"> ChargePoint retains asset ownership of the charging stations so they are able to significantly reduce the cost of entry for customers through monthly subscription pricing. ChargePoint uses annual OpEx funds to pay for charging infrastructure while conserving CapEx funds 		



Shenzhen e-Mobility System



CHINA

Innovation type

Frontier-Traversing

Lever type

Financing

Useful links

- [Shenzhen's New Energy Vehicles](#)
- [Electrification of Public Transport](#)

Context

From 2011 to 2020, Shenzhen wanted to reduce carbon emissions by 40–45%. To activate green public and private investments, the city leaders formulated several policies for New Energy Vehicles (NEV) and charging infrastructure promotion and application.

In 2017, Shenzhen became the first city in the world to electrify all public buses with a view to cutting emissions, reducing noise pollution and improving air quality. The initiative also helped to further develop electric mobility. The adoption of new service models incentivises manufacturers to design vehicle components so that they are maintained and kept in use, retaining value.

Problem

- Cities struggle with poor air quality - 20% of Shenzhen's air pollution is attributed to vehicle emissions.
- The local and national government wanted to explore possible developments to cut emissions, reduce noise pollution, and improve air quality – in addition to managing current overcapacity of electric power.
- Shifting to a 100% electric vehicle system requires large up-front capital investment.

Stakeholders involved

- Funders: *China Development Bank Leasing & China Construction Bank Financial Leasing*
- Commissioner: *National Government*
- Subsidiser: *Finance Commission of Shenzhen Municipality*

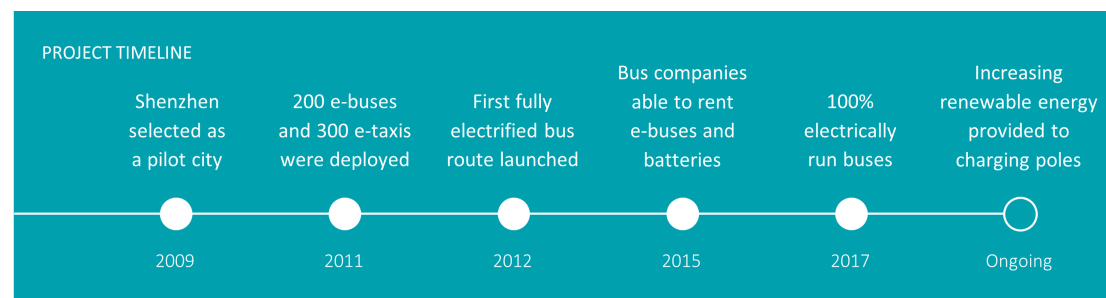
Innovation

- Financial support from national subsidies and matched funding from the city government has enabled the initiative to grow enough to become self-supporting.
- Third-party financial institutions purchase and rent the e-buses to bus operating companies in Shenzhen. This lowers the up-front capital cost for operating companies and since bus manufacturers retain responsibility for bus maintenance it incentivises circular design for reuse and durability.
- The project financing has also made use of, and benefited from using, cost-effective service models.



Results and impact

- **First to reach 100% e-buses:** In 2017 Shenzhen became the first city in the world to reach a goal of 100% electrically run buses.
- **Reduced pollution:** Combustion engine buses used to contribute to 20% of air pollution, but through the transition it is now estimated the city will see an annual reduction of 4.316 million tonnes of particulate matter. The average GHG emissions per e-bus kilometre is 40% less than a diesel vehicle, which, as of 2017, had reduced carbon emissions in the city by 0.63 million tonnes.
- **Reduced price of e-buses globally:** Prior to 2016, an e-bus was priced at approximately CNY¥1.8m (USD 290k). As a result of the program, pioneering improvements were supported to battery technology, contributing to the price competitiveness of e-buses.
- **Expanded operations globally:** The national piloting scheme has encouraged the development of the local electric vehicle industry, which is expanding to a global market. The largest Chinese electric vehicle producer, headquartered in Shenzhen, is now selling e-buses to 300 cities in Japan, Europe, the United States, and other countries globally.
- **Model being adapted to other mobility forms:** The lessons from the pilot are being extended to other mobility forms. Shenzhen now has electrified 16,000 buses and 23,000 taxis in the city.



Key lessons learnt

- **Policy and regulation provide a mandate for change:** A combination of national- and city-level policy measures have created the enabling conditions for an electric mobility system in the city to develop. This includes the national government's ambition to expand the electric vehicle sector, permitting Shenzhen to have bespoke trading and business rules to stimulate economic activity and innovation.
- **Enabling innovation through the use of new business models and financial support:** Financial support from national subsidies and matching funding from the city government has enabled the initiative to grow enough to become self-supporting.
- The provision of e-buses on a rental basis has also alleviated initial capital outlays, mitigated against potential ongoing financial risks for the bus companies, and supported the refurbishment and reuse of components and parts.
- **Incentivising the transition, by supporting both demand and investment:** Development of the broader electric vehicle industry has also been encouraged through the pilot. For example, incentives such as free licence plates for e-vehicle drivers and the removal of a passenger levy for fuel in e-taxis.



Energiesprong



NETHERLANDS

Innovation type

Frontier-Breaking

Lever type

Revenue

Useful links

- [Energiesprong website](#)

Context

Due to rising energy prices, the Dutch Government has placed emphasis on meeting national energy performance objectives through the reduction of fossil fuel consumption.

The Dutch Government is seeking innovative solutions to deliver more energy and cost-efficient buildings, as well as achieving Net Zero Energy buildings by 2020.

The retrofits include installation of rooftop solar panels and other insulation technologies.

Problem

- Buildings in the Netherlands account for approximately 35% of the country's total energy consumption.
- Most Dutch residential and non-residential buildings use natural gas and electricity, almost entirely sourced from fossil fuels, to fulfil their energy needs.
- An innovative approach was required to overcome the **cost, scale and speed** of rapidly retrofitting buildings across the Netherlands.
- Energy refurbishment was also considered too complex and costly for individual homeowners.

Stakeholders involved

- Commissioner: *Dutch Ministry of the Interior and Kingdom Relations (BZK)*
- Implementer: *Platform31*
- Private sector lead: *Energiesprong (private sector led from 2017)*
- Partially funder: *WSW Social Bank funding for Stroomversnelling (Rapids) deal*

Innovation

- Tenants of the housing association will pay an upfront energy service plan which is equivalent to their previous energy supplier bill. These payments are then used to partly fund the retrofits.
- The upfront costs of the retrofits are also partly funded from the planned maintenance and repairs budget for next 30 years, along with expected energy cost savings.
- The remaining amount is funded by financial arrangements organised by Energiesprong mainly from national funds and philanthropic funders.
- The risk of performance is transferred to Energiesprong.

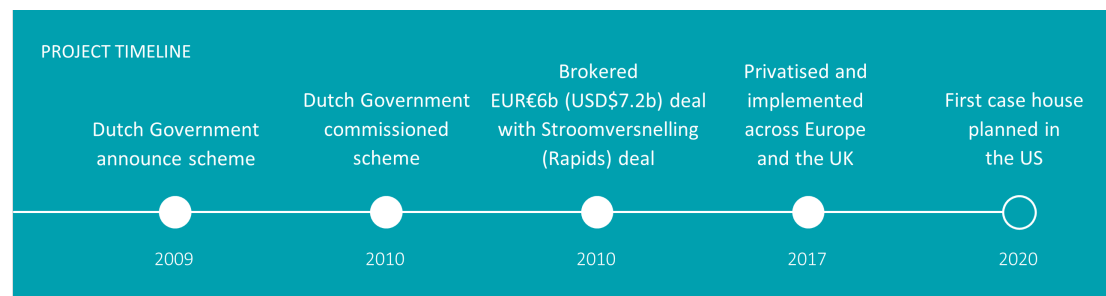


Results and impact

- **Successful pilot:** Energiesprong has successfully delivered Net Zero Emissions retrofits to over 113,000 Dutch homes.
- **Expanding globally:** A further 21,706 houses planned across the Netherlands, UK, France, Germany, Italy and the US. Achieving scale is a key barrier to green infrastructure. The larger the market, the greater the opportunity drive down costs of components, improve quality and ultimately drive the Net Zero Emissions in the built environment. Energiesprong has generated significant interest internationally, due to its success in the Netherlands, and its work to make Net Zero Emissions retrofits a market reality in other countries.

Energiesprong has managed to export its business model to international markets which is an important step to achieving green urban development at scale.

- **Energy savings** - successfully achieved an average total reduction in energy use of 150 kWh/m² and a 70% reduction in total household energy consumption, from almost 20,000 kWh to just over 6,000 kWh.
- **Reduced the cost of housing:** Achieving economies of scale through 3D technologies and pre-fabricated materials have enabled Energiesprong partnerships to lower the unit cost from EUR€130k (USD158k) to about EUR65k (USD79k).



Key lessons learnt

- **Providing financial security for the private owner:** Energiesprong uses an energy performance contract to guarantee the long-term energy saving performance of retrofits for a minimum of 30 years. This provides certainty for the private owner that the property will perform at the expected level.
- **Public housing programs provide demand certainty for the solution provider:** For the solution provider(s), there is a confirmed order pipeline with a minimum volume that justifies investment in innovation and solution development
- **Program required to achieve scale and drive industrialisation:** Market development teams work with regulators to achieve scale for the program, often involving thousands of retrofit deals simultaneously, and enabling suppliers to invest in quality components and reduce their costs.
- **Legislation needs to be amended** to allow a conversion of the monthly energy bill into a monthly energy service fee for the housing association.



Paris schools running green



FRANCE

Innovation type

Frontier-Extending

Lever type

Risk Management

Useful links

- [C40 Knowledge Hub case study](#)

Context

The City of Paris has used Energy Performance Contracts (EPCs) to refurbish 240 schools in two phases, with a third phase now underway. The refurbishments, tailored to each school, include window renovations and the installation of LED lighting, sensors, insulation and new boiler systems.

Phase 1 EPC for 20 years.

Phase 2 EPC for 15 years.

Phase 3 EPC for 6 years.

Problem

- The Parisian building sector accounts for 64% of the city's energy consumption. Schools are extremely energy intensive due to old infrastructure.
- The City of Paris's Climate Action Plan, therefore, aims to reduce the energy consumption of municipal buildings by 60% as part of an overall strategy to achieve carbon neutrality by 2050.
- The high initial upfront costs associated with the installation and retrofitting of energy saving infrastructure act as a deterrence to the uptake of such technologies.

Stakeholders involved

- Commissioner: *City of Paris*
- Contractor: *Nov'écoles (ESCO)*
- Financier: *European Investment Bank through the European Local Energy Assistance (ELENA) programme*

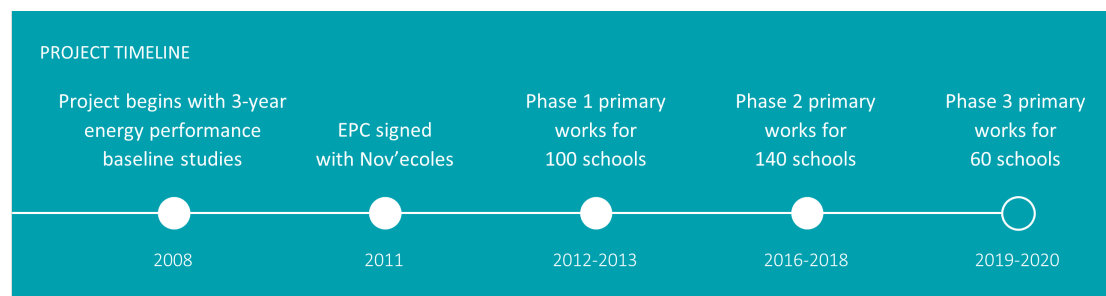
Innovation

- EPCs are an innovative form of contracting using a pay-for-performance mechanism in which the city government strikes an EPC agreement with an energy service company (ESCO), committing the ESCO to financing an energy-efficiency project with a performance guarantee.
- Allows governments and other building owners to repay their investments from realised energy savings over a set period of time.
- If the project underperforms and the agreed energy savings are not achieved, the ESCO pays the difference in cost borne by the government authority.
- This performance driven model is different to the price driven model seen in traditional contracting.



Results and impact

- **Successful financing:** The first phase of the project was largely financed through lenders. The European Local Energy Assistance (ELENA) programme, covered 90% of the costs of project preparation and follow-up. The EPC signed in 2011 with ESCO Nov'ecoles financing the upfront costs of the retrofit work - an investment of EUR28 million (USD43 million), which was paid when the works were completed and project performance verified.
- **Successful first and second phase:** The 100 schools in the first phase achieved a 33-38% reduction in energy consumption from 2004 levels, saving around 2,300 tCO₂ annually and exceeding the original 30% goal. The results of the second phase are still being calculated. A third phase is in progress and will involve another 40 schools to be upgraded.
- **A scaled program reduced costs:** The costs of subsequent projects in the second and third phases were typically lower as the City of Paris paid upfront costs of the refurbishments without borrowing or seeking external funding. Lessons learnt from the first and second phases have been applied to phase three which has reduced the cost and complexity of procurement.
- **Widespread applications:** Because of the programme's success, the City of Paris is now using EPCs to carry out energy efficiency refurbishments of its public swimming pools and is looking to extend the programme further.



Key lessons learnt

- **Innovative performance contracting:** The methodology of EPC differs from traditional contracting, which is invariably price-driven. Performance contracting is results-driven as the risks of underperformance are transferred to ESCOs.
- **Guaranteed performance:** The EPCs involved a guarantee by the ESCO that the savings will be achieved. As the ESCOs are to bear the financial consequences of underperformance, they are incentivised to deliver on the contractual energy saving guarantees. The ESCOs have the expertise and means to deliver on these guarantees as the onus of project design, feasibility studies, implementation of retrofits works, ongoing maintenance, and data monitoring resides with them.
- **Setting precise energy consumption baseline:** To accurately assess performance, it is imperative for ESCOs to conduct thorough baseline studies to collect good baseline data for later comparison. Feasibility studies are also crucial to establish which schools will actually benefit from the upgrades.
- **Funded by cash flow:** As the government is paying an ongoing performance fee over a long period of time rather than an upfront cost of upgrades, the EPC has allowed repayment of initial investment through cash flows from energy savings rather than initial capital expenditure. The project has become self-funded rather than debt-funded.



Contractual structuring for road as a service (RaaS)



NETHERLANDS

Innovation type

Frontier-Breaking

Lever type

Risk Management

Useful links

- [Launch road as a service](#)
- [Road as a Service Coalition](#)

Context

In the Netherlands, the regulatory requirement is that the surface layer of asphalt roads have a whole-of-life span of six years. Currently, 60% of rubble from broke-up old roads can be reused in the construction of new roads, however increasing that percentage of reuse is mostly improbable due to stability and safety concerns.

Dura Vermeer, a Dutch construction, infrastructure, and engineering business, has developed the technology to create top layer asphalt which can last up to 15 years (twice as long as current asphalt roads), but costs 10% more than regular asphalt roads.

Problem

- Dutch governmental budgeting structures have proved a barrier to investing in Dura Vermeer's proposition as local provincial governments will often opt for the least expensive option.
- Under a traditional finite-period construction and maintenance contract, a contractor has no incentive to make roads last as they will "sweat" the asset and do the bare minimum to meet handover requirements, meaning that a new contractor will have to bring the road back into shape.

Stakeholders involved

- Contractor: *Dura Vermeer*
- Client: *Overijssel Province*

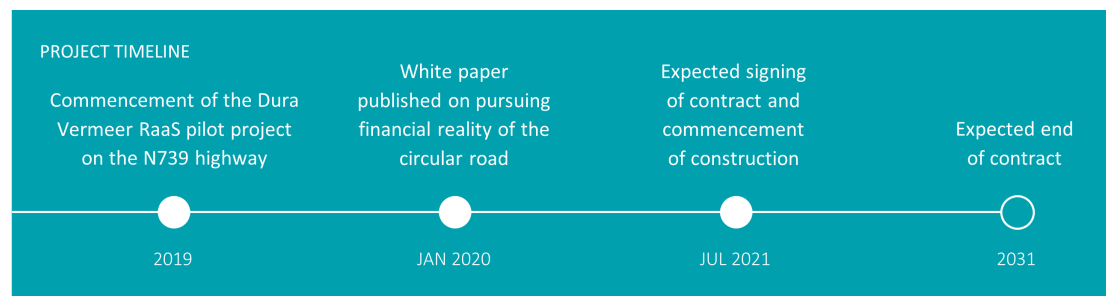
Innovation

- Under a Circular Service Contract (CSC), the provincial government will maintain legal ownership of the road and Dura Vermeer will retain economic ownership of the road while providing use of the road. Both parties enter into a contractual obligation for the specified use period of the road, and Dura Vermeer receives the residual value at the end of contract term.
- The road stays a fixed asset on their balance sheet while the government (province) pays a recurring quarterly fee for use of the road.
- Dura Vermeer is responsible for the construction, maintenance, and operation of the road, and will receive residual value payout, creating an incentive to construct the highest quality and most durable asphalt to minimise maintenance costs, and optimise residual value.



Results and impact

- **Discussions and negotiations between Overijssel Province authority and Dura Vermeer** regarding the scope of the functional requirements of the road are underway. They have been in the process of co-developing the road and requirements for the contract. The current presumption is that the contract will have a tenor of 10 years and a value of EUR5m (USD 6 million) (Dutch procurement law only allows direct awarding of contract without competition if the monetary value is below 5 million).
- **Forecasted reduction in road turnover and asphalt waste:** Due to the extended durability of the road beyond the standard six years, this avoids the unnecessary waste and costly disposal of non reusable rubble from broken-up roads. If the pilot is successful, the road will require less replacement, and less asphalt will need to be used over a long period of time. The reduction in road closures due to maintenance will also facilitate reduction in traffic.
- Rebel, a Dutch consultancy firm is preparing a memo on how to **determine the residual value of the road** with further review required from members of a Dutch bank, another accountancy firm, and an engineering firm. The preliminary judgement is that the residual value of the road will not only consist of the material value of the road but also the future value which will be a function of the avoided expenditure from public authority on additional maintenance after the contract period. This approach ensures public benefits as the road is always in a good condition.



Key lessons learnt

- **Creating financial incentive for circularity:** The contractual agreement should consider the distribution of risk vs reward to incentivise circularity. If at the end of the contract, economic ownership is transferred to the client (ex. Overijssel Province), it still appears on their balance sheet from the start as it would in a 'normal' sale. The alternative is to specify explicitly the ongoing nature of the agreement, which excludes a transfer. The ownership has implications for the reuse of the road and its materials at the end-of-life. The owner of the road and ultimate beneficiary of residual value payout is incentivised to optimize the durability of the road, its maintenance and (re) use of raw materials, with potential effects such as a longer lifespan, lower overall maintenance costs, leading to a higher residual value. These incentives ensure public benefits as the road is always in a good condition.
- **Combination of financing features:** Roads are traditionally procured on a project finance basis. Project financing/lending is based on long term contracted cash flows. On the other hand, corporate lending provides financing based on the balance sheet of a company. Because the contract foresees a residual value that Dura Vermeer owns, ownership could also be viewed as an asset that is relevant for the company's solvency. This is a theoretical shift to a combination of project financing and corporate lending as the road can be seen as asset to be held as secondary collateral, and the expected high residual value of the road improves the contractor's financial position.



Volta partnership model



USA

Innovation type

Frontier-Extending

Lever type

Revenue

Useful links

- [How Volta's EV strategy differs](#)

Context

Volta, a San-Francisco based EV charging company, partners with retailers, shopping malls, grocery chains, and others to place Volta's chargers in prime parking spots in front of their businesses.

The charging stations will also come with two billboard-sized screens for displaying advertising.

An initial 15 minutes of charging is free to customers.

California State Government supports the deployment of zero-emissions vehicles and fill gaps in the state's EV infrastructure.

Problem

- Significant upfront costs for the installation of EV charging infrastructure and the small revenue streams from consumer charging has lead to slow recoupment of the initial investments. This presents a large barrier to entry into the EV charging market.
- A lack of EV charging infrastructure is a factor in consumers not adopting electric vehicles.

Stakeholders involved

- Company: *Volta*
- Investors/Partners: *Various real estate and retail partners*
- Investor: *Sk Innovation (South Korea)*
- Investor: *Total SE (France)*
- Governing body: *California Public Utilities Commission (CPUC)*

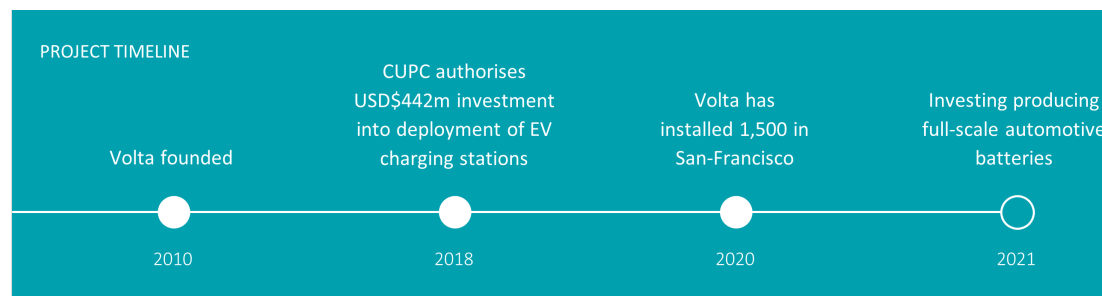
Innovation

- Volta splits the cost of building the charger with the partner/commercial client and collects a recurring fee for the increased customer traffic to the locations where the chargers are installed.
- The advertising on the billboards will also generate significant revenue upfront, leading to a wider profit margin, and faster payback time per charger.



Results and impact

- **Financing:** As of January 2021, Volta has raised over USD200 million in financing through a combination of partnerships and equity.
- **Macy's partnership:** In April of 2021, Volta expanded their existing partnership with Macy's to deliver 100 Volta charging stations at Macy's locations in addition to the existing 40. Since 2014, Macy's and Volta have powered more than 7.6 million miles with zero tailpipe emissions. The partnership has further offset an estimated 3.4 million pounds of CO2 emissions, delivered 2.2 million kWh and saved 305,100 gallons of gas through hundreds of thousands of charge sessions.
- **High utilisation:** Currently, there are 1714 Volta charging stations in 200 cities across 23 states in the USA. Volta stations are currently 80% utilised. On average, Volta charging stations host 10-12 charging sessions a day, whereas other pay-as-you-go charging stations attract one or two.
- **Projected returns:** The company expects to break even on an EBITDA basis in 2022 and turn a profit in 2023. Its 2025 forecasts are for USD252 million in EBITDA on USD826 million in revenue, with sales about doubling each year from 2020's USD25 million. Volta expects that by 2035, 37% of its revenue will come from advertising and sponsorships, and 7% from selling the data its network generates



Key lessons learnt

- **Government legislative support** is crucial for the uptake of EVs and supporting infrastructure. In 2018, the California Public Utilities Commission (CPUC) issued a proposed decision that would authorize Southern California Edison (SCE) to invest USD442 million to, among other things, deploy approximately 40,600 electric vehicle charge ports in its service area. The state's support for transportation electrification has created a favourable market environment and incentivises companies such as Volta to capitalise on this new emerging market opportunity.
- The **ownership model** of the charging station as well as the **alleviation of initial costs** (50% paid by partners) leads to faster cost recovery which creates incentive for Volta and other utility companies to invest in the installation of EV charging infrastructure.



Climate Finance Accelerator (CFA)



NIGERIA

Innovation type

Frontier-Extending

Lever type

Financing

Useful links

- [Climate Finance Accelerator Nigeria](#)

Context

CFA is a 4-year programme funded by the UK Department for Business, Energy & Industrial Strategy (BEIS).

Aims to identify and develop pipelines of bankable climate-related projects that can attract investment at scale from the private sector.

In 2017, Nigeria took part in the inaugural pilot CFA process. The CFA initiative has since been extended to Mexico, Colombia, Peru, South Africa & Turkey.

Problem

- In middle income countries, a large proportion of green projects need to be financed from private sources as government funding sources are constrained.
- Three key barriers to private investment include: lack of pipeline of investment-ready projects, projects are seen as “risky” investments, and regulatory obstacles.
- There is also a critical gap in skilled transaction intermediation, i.e. firms which can assist project and business promoters to bring together the different forms of financial and non-financial support that are often required to be combined to bring schemes to market.

Stakeholders involved

- Conceiver: Ian Callaghan Associates
- Funder: UK Government (BEIS)
- Neutral convener for the CFA process: Nigerian Economic Summit Group

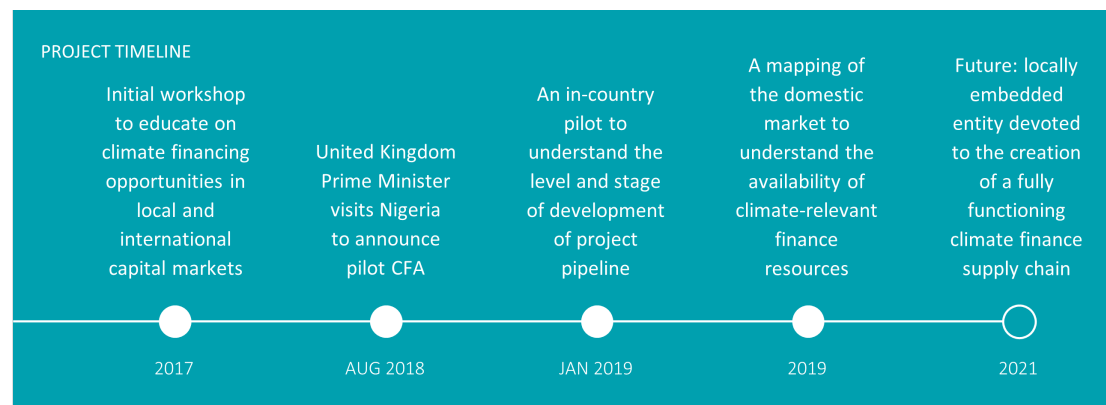
Innovation

- New supply chain for climate finance which involves a ‘transformation’ phase where physical assets are turned into paper assets/term sheets that institutional investors from external markets would be willing (and permitted) to invest in.
- These highly rated paper assets such as green bonds are created via aggregation and de-risking of the physical assets that are deemed to be investment-ready. These paper assets are then distributed into mainstream institutional investment markets.



Results and impact

- The pilot CFA initiative in Nigeria identified 15 projects worth approximately USD500 million for a range of sectors including emission reduction technologies, solar power, hydro, biogas, energy from waste, smart agriculture etc.
- To date, five projects seeking total investment of more than USD80 million have pre-qualified to receive guarantee instruments and are being considered further by potential investors.
- CFA facilitated engagement from various actors, namely the commercial banks in Nigeria and significantly improved dialogue between public and private sector actors, as well as their understanding of how to identify 'bankable' projects.
- CFA is able to mobilise investment from global institutions which deepens the pool of capital available for green projects specifically in development markets such as Nigeria.



Key lessons learnt

- The support of the Federal Governments of UK and Nigeria was an important precondition for the success of the CFA and must be maintained in the CFA Nigeria process going forward, in particular to help de-risk investments in SDG and NDC aligned projects.
- Establishing a relationship with all Ministries in Nigeria was key to the implementation of the CFA as well as with the private sector in the target country.
- Climate finance space lacked skilled intermediation. It was imperative for Nigeria to embed a neutral entity that could help financiers steer through the finance supply chain so that CFA could perform its function.



RaiseGreen – Crowd investing platform



USA

Innovation type

Frontier-Extending

Lever type

Financing

Useful links

- [Platform crowdfunds green projects](#)

Context

RaiseGreen is a new crowdfunding marketplace/platform for green projects. Individuals, startups, non-profits or even local governments looking to start their own green projects can utilise the platform to create and develop the project, set their own terms, and present their offering on RaiseGreen's platform for potential investors.

The platform offers a wide variety of replicable, templatised investment opportunities for solar power, affordable housing, EV charging stations, agriculture, water projects, and microgrids.

Problem

- Small projects that may have powerful local impacts especially for disadvantaged communities, face obstacles including high upfront capital costs, high interest rates on loans, and lack of verifiable impact certification.
- Financing challenges also mean scarce community ownership of projects and a lack of usable metrics that would make the projects logical for ESG portfolios.
- Originators also lack nuanced legal knowledge, industry connections, and access to resources that can help create and develop their concepts into viable projects.

Stakeholders involved

- Originators: Project Developers seeking capital (business owners, nonprofits, local governments, school districts etc.)
- Partner/Originator Engine developer: IBM
- Platform/intermediary/due diligence: RaiseGreen

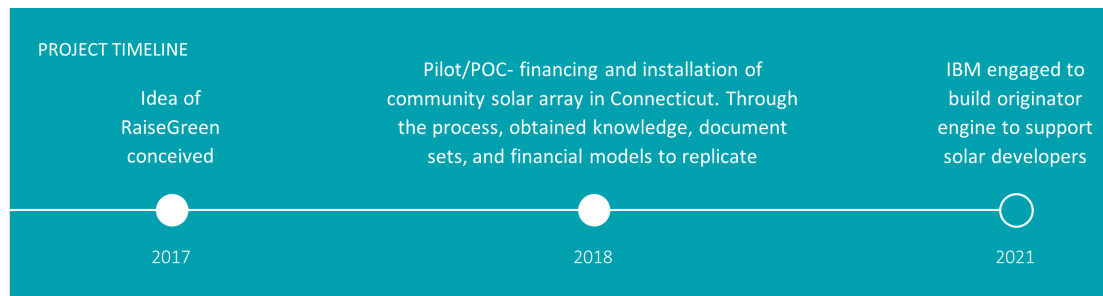
Innovation

- Unlike other crowdfunding platforms, RaiseGreen is a 'crowdinvesting' platform that sells debt notes or equity stakes in green projects with a minimum investment determined by the originator.
- A two-sided marketplace: one side for investors and the other for project creators, or "originators" which will roll out as the originator engine (saas tool), providing legal templates and financial modelling to determine returns.
- All project listed on the site, must go through an evaluation process which assesses the project's revenue, ambition, impact, social, and environmental metrics.



Results and impact

- By November 2020, RaiseGreen has worked with over 100 potential project developers. This process has **reduced barriers and complexity** by providing communities with tools they need to create, finance, build, and run their own green projects.
- The originator engine allows project developers to utilise existing document templates (ex. legal documents) and financial modelling used on previously successful projects. Through financial modelling, RaiseGreen has been able to assess the kinds of capital outlays projects would need for ongoing operations and maintenance. These processes have helped to **reduce the risk profile** of investments.
- This type of equity crowdfunding has created opportunities for a wider range of people to invest in green projects and initiatives - allowing ordinary people, retail, accredited, and institutions to invest in the same security at different elected amounts, creating **blended capital**.



Key lessons learnt

- Securities structuring** - The shorter maturity period (~1-2 years) of the development capital investments aligns with the operational needs of these small-scale projects. It offers flexibility to the investor, and allows them to see profits in a relatively short amount of time.
- Targeted financial incentives like **access to development capital** helps communities by lowering barriers to entry for new project developers, making the project creation phase more accessible and inclusive. Access to capital for underserved and disadvantaged populations increases the probability of projects being implemented for communities in need. Experts at the Department of Energy's Lawrence Berkeley National Laboratory found that these types of incentives can be catalytic to accelerating solar adoption and other green initiatives for the underserved.



NAIF conditional loan for Kidston Pumped Hydro



AUSTRALIA

Innovation type

Frontier-Traversing

Lever type

Financing

Useful links

- [Case study](#)

Context

The Kidston Pumped Storage Hydro project is the first pumped hydro energy storage scheme globally to be developed in an abandoned gold mine. The giant battery located in Kidston, Far-North Queensland will pump water uphill when energy is abundant during off peak periods and releasing it to create power in times of peak demand.

The Kidston project is supported by NAIF's 15-year concessional loan of AUD610m (USD475 million) - debt finance.

Genex will provide AUD120 million (USD93 million), including AUD25 million (USD19.5 million) investment by J-Power - equity finance.

Problem

- The remote location of the project leads to exponentially higher costs compared to a development closer to major urban centres due to:
 - Higher construction costs
 - Higher costs incurred in accommodating and fly-in fly-out workforce
 - The significant cost of the required transmission infrastructure

- Seeking financing and funding through private investment and capital raising for a project cost of approximately AUD610 million is extremely difficult.

Stakeholders involved

- Project undertaker: *Genex Power Limited*
- Funders: *Northern Australia Infrastructure Facility (NAIF) & Australian Renewable Energy Agency (ARENA)*
- Off-take buyer: *EnergyAustralia*
- Equity partner: *J-Power*
- Performance approver: *AEMO*

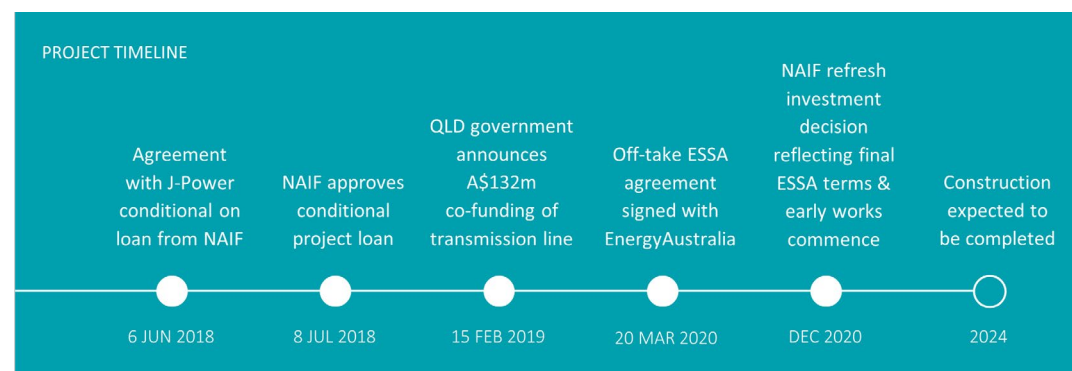
Innovation

- NAIFs concessional loan is subject to a number of conditions precedent including the finalisation of all other aspects of financing and agreements with construction contractors and operations and maintenance providers.



Results and impact

- NAIF's conditionally approved project loan catalysed interest in the project. It helped Genex secure other support for the project, including:
 - Off-take Energy Storage Services Agreement (ESSA) with EnergyAustralia which will guarantee 30 years of locked-in revenue which will enable Genex to provide returns to shareholders and repay the NAIF loan
 - An equity investment agreement with J-Power of Japan (which was simultaneously contingent on federal funding).
- The project is forecast to contribute AUD343 million (USD267 million) in net public benefit to the regional, state and national economy and community including AUD235 million (USD183 million) direct value add for Far North Queensland. Benefits include:
 - Wholesale market energy cost savings estimated at a present value of AUD500 million (USD389 million)
 - Wmission savings
 - Reliable, on demand electricity
- The project will provide 250MW of firm, dispatchable energy, improving renewable energy reliability while lowering transmission losses and electricity prices. The additional source of peak generation capacity will lead to lower average wholesale power prices which would flow to end users through the competitive retail power market. These outcomes will help increase market share of renewable generation.



Key lessons learnt

- The approval for a concessional loan was sufficient to overcome financing difficulties as a result of the remote location of the project, and helped with offtake coordination. The approval for the loan created confidence in the project which attracted investors and helped secure other financing and funding sources for ex. the J-Power equity investment.
- Potential precarious domino effects: EnergyAustralia's request to renegotiate the initial ESSA proposal could have had a negative domino effect, jeopardising finance arranged with NAIF, and as a direct result, putting J-Power's investment at risk, which caused Genex to halt securities trading. When NAIF extended its financing opportunity to June 2020, the funding stack was reassembled which led to EnergyAustralia's signing of the ESSA in March 2020.
- Like other NAIF projects, and other public programs provided like co-funding from the Queensland Government, subsidy support for the project was provided alongside other financing and funding mechanisms to shore up long term revenue.



GreenStreet Africa



AFRICA

Innovation type

Frontier-Extending

Lever type

Financing

Useful links

- [GreenStreet Africa overview](#)
- [Achieving clean energy access](#)

Context

Globally, Sub-Saharan Africa experiences one of largest energy access gaps.

Electricity reaches only about half of its people, while clean cooking only one-third; roughly 600 million people lack electricity and 890 million cook with traditional fuels.³

This has a disruptive impact on social infrastructure such as schools and hospitals which lack reliable electricity.

A clean energy revolution in sub-Saharan Africa is urgently needed to win the fight against energy poverty.

Problem

- Despite technology and market development, policies and patterns of finance and investment are off track.⁴
- Funding and financing to date has not recognised the transformative potential of solar off-grid and mini-grid solutions to deliver clean energy access, nor has it accounted for the significant social and economic benefits of electricity access (i.e. clean cooking).

- While grant funds exist for solar energy installation, many donor-funded systems fail because of a lack of funds for ongoing operations and maintenance.
- Additional barriers include high upfront cost, minimal investor engagement, and lack of interest from service providers.

Stakeholders involved

- *GreenMax Capital Advisors* established *GreenStreet Africa*
- Public-private partnerships at country level with local public agencies
- Projects tendered to service providers such as independent power producers (IPPs) or energy services company (ESCOs) for construction and operation

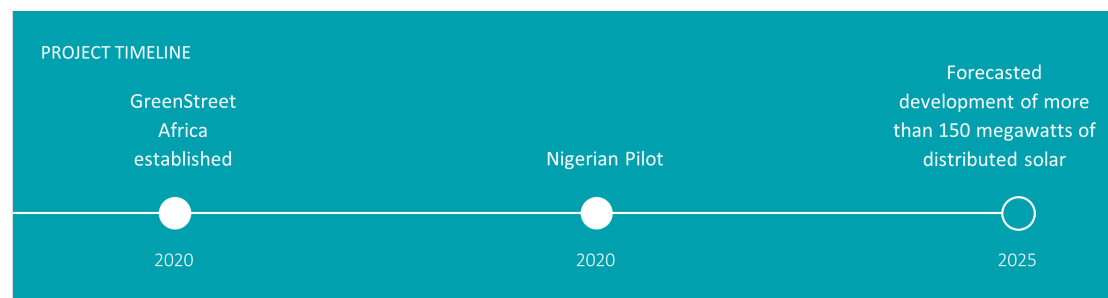
³ IEA (2018a) *World Energy Outlook 2018*. IEA, Paris

⁴ IEA (2018a) *World Energy Outlook 2018*. IEA, Paris



Innovation

- GreenStreet Africa develops and aggregates portfolios of distributed solar projects at public health and education facilities for implementation by private IPPs or ESCOs, financed with local capital markets solutions.
- The innovation comes from the combination of a public-private partnership, portfolios bundling together individual projects, and guarantee-backed local-currency debt financing. This is relatively unique in distributed solar development models for the public sector.
- To minimise risk to investors the debt is backed by a guarantee while the energy supply contractors are covered by third-party payment guarantees.
- The bundled approach creates portfolios large enough to appeal to institutional investors, while enabling the development of smaller projects to access affordable funding.



Results and impact

- **Nigerian Pilot:** Nigeria's Rural Electrification Fund as the public agency partner and InfraCredit as the local bond underwriter and guarantor. The pilot portfolio is supplying reliable solar energy and battery storage solutions for as many as six healthcare facilities. The facilities currently source electricity from diesel generators and unreliable grid connections.
- **Future potential:** Within 5 years of initial deployment, the Lab estimates that GreenStreet can drive the development of more than 150 megawatts of distributed solar. This would eliminate over 40,000 metric tons of CO2 emissions per year, while also reducing both local air pollution and high energy costs associated with diesel generators.

Key lessons learnt

- **Economies of scale:** Bringing project sourcing and development under the umbrella of an aggregated portfolio structure unlocks economies of scale, enabling faster development of solar distributed generation sited at public facilities. This approach creates portfolios large enough to appeal to institutional investors, enabling smaller projects to develop and gain critical access to affordable funding.



ASEAN Catalytic Green Finance Facility (ACGF)



COUNTRY

Innovation type

Frontier Traversing

Lever type

Financing

Useful links

- [ASEAN Catalytic Green Finance](#)

Context

The ACGF is an innovative finance facility dedicated to accelerating green infrastructure investment in Southeast Asia with over USD1.4 billion in loans from co-financing partners, under the ASEAN Infrastructure Fund (AIF). The ACGF's technical assistance supports governments to identify and prepare commercially viable green infrastructure projects while the ACGF loans are utilised to cover upfront capital investment costs.

This two-pronged approach 'de-risks' green infrastructure projects, making them more attractive to private capital investors.

Problem

- ADB has been urging Southeast Asian policymakers to implement green and innovative financing to fill the estimated USD3.1 trillion investment gap required for climate adjusted infrastructure in the region.
- This issue and gap were intensified after COVID-19, with estimated 3.8% economic contraction and substantial impact on employment.
- Green infrastructure has been deemed as a critical source to the region's economic recovery due to its scale and impact, which its importance of creating a de-risking and catalysing mechanism that can mobilise both public and private capital to support green infrastructure projects has been highlighted to the government.

Stakeholders involved

- Asian Development Bank (ADB)
- ASEAN Infrastructure Fund (AIF)
- 10 ASEAN member countries
- Co-Financing partners include ADB, Agence Française de Développement, AIF, the European Investment Bank, the European Union, KfW, and the Republic of Korea

Innovation

- Mobilising resources and building pipelines: The ACGF collaborates with governments and partners to originate and de-risk project opportunities, provide funding advice and technical assistance.
- Utilise equity provided by ASEAN member states into the AIF alongside support from ADB and other development partners. Leveraging facility helps governments use public and concessional funds better.
- The ACGF has also partnered with private investors on the Green Climate Fund to deliver the Green Recovery Program-post COVID-19.



Results and impact

- To date, the AIF has committed around USD500 million to nine projects, with a total portfolio size of approximately USD3 billion, across energy, urban, water and transport sectors. The Green Climate Fund (GCF) has allocated USD300 million to support the ACGF. ACGF has attracted more than USD1.4 billion in co-financing commitments.
- 20 finance ready green projects within 2 years:** 12 are in the early stages of development where ACGF resources are being used to validate project concepts and integrate innovative models. The other 6 are using funds to structure financing, develop climate baselines and build in approaches to mobilise private finance. The first project was first approved for financing in 2020.
- Demonstrable green impacts:** EDSA Greenways Project in the Philippines, Agricultural Value Chain Competitiveness and Safety Enhancement Project in Cambodia alongside two other green impact projects have the potential to reduce 73,000 tons of CO2 per year. These projects can further downstream 26.7m tons of carbon emissions as a result of critical policy reforms. Approximately USD278 million private capital has been catalysed, reflecting a sustainable financing practice. Over a 30-year period, the 20 projects to be financed through the facility are expected to reduce CO2 emissions by 119m tons.
- Creating knowledge platforms and products to build awareness:** Knowledge generation activities have been delivered through strategic partnerships with key global and regional actors on policy and knowledge, including the OECD, the Climate Bonds Initiative, and Infrastructure Asia.



Key lessons learnt

- Integrated “one-stop-shop” approach:** Providing green projects with structuring, financing and policy framework/implications support plays a pivotal role in developing and encouraging governments to utilise public finance more innovatively to bridge the financing gap for green infrastructure.



Monetising Water Savings (MWS) in Latin America



MEXICO

Innovation type

Frontier-Breaking

Lever type

Financing

Useful links

- [Monetising Water Savings](#)
- [Monetising Water Savings Instrument Analysis](#)

Context

In Guanajuato, Mexico agriculture accounts for about 84% of water rights. Significant growth in agricultural production and use of groundwater wells have led to a 2 metre annual decrease in groundwater levels. Improving agricultural irrigation practices has the potential to address agricultural water inefficiencies for water-stressed regions like Guanajuato. MWS is a collaborative approach to improve economic outcomes for farmers, create resilient supply chains, and increase water efficiency by using ‘pay for performance’ to accelerate sustainable agriculture practices in water-stressed regions.

Problem

- Globally, climate variability is having a significant impact on water availability. Unsustainable and inefficient use of water by agricultural producers increases the vulnerability of smallholder farmers in water-scarce regions and impacts water supply and food production.
- Like most of the country, Guanajuato practices flood irrigation which is the most cost effective but least efficient method of irrigation.
- Many small farmers in developing and emerging countries lack the resources, business models to participate in, and/or incentives to implement sustainable solutions.

Stakeholders involved

- Anchor corporate partner
- Water management experts and technical advisors
- Public sector partner (water utilities, state governments, water districts, municipalities)
- Civil society organisations (CSOs)
- Farmers
- Independent impact evaluator

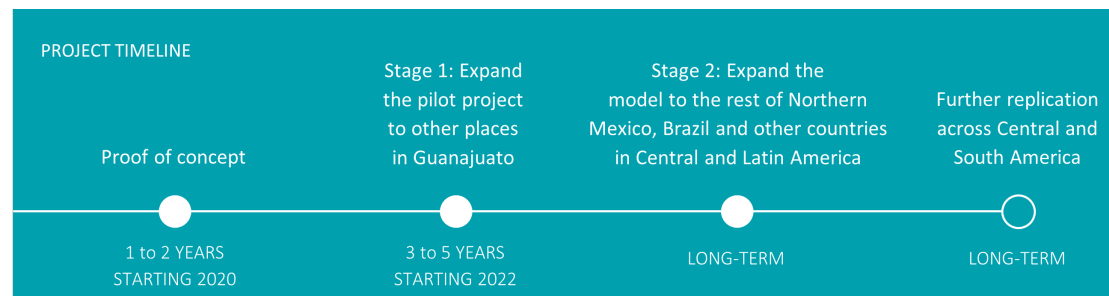
Innovation

- MWS is a collaborative initiative involving government, corporations, and agricultural producers to mobilise investment into sustainable agriculture and incentivise water conservation in water-scarce, agriculture-intense areas.
- MWS will provide loans on favourable terms to farmers to enable purchase of efficient irrigation systems and implement sustainable agriculture practices.
- Once operational the MWS model will generate two revenue streams from producers and utilities, and a corporate partner committed to purchasing the agricultural products.
- Loan repayments are made through increased crop revenues, reduced cost, and improved access to markets.



Results and impact

- **Improved water efficiency of grain producers in Guanajuato:** The pilot project focused on grain producers, targeting 4,000 farmers across an area of 20,000 hectares in Guanajuato (the second highest water-stressed region in Mexico).
- **Increased yield and reduced water consumption by farmers:** the MWS model is expected to result in a 30% increase in farmers' yields while reducing annual water consumption by 3,500 cubic metres per hectare (seven olympic-sized swimming pools of water each year).
- **Improved biodiversity and climate resilience:** MWS delivered a number of environmental benefits including improved biodiversity, increased resilience to climate events such as droughts, and contribution to long-term water security.
- **Technical assistance and training for farmers:** MWS also provided initial and ongoing technical assistance and training to farmers in order to reduce the risks associated with the operations and enhance that payment is consistent and reliable. Technical assistance include training on drip irrigation systems, adopting conservation practices, and continuous project financing support.



Key lessons learnt

- **Legal and administrative ambiguities in Mexico water governance:** The governance structure is complex with different regulatory bodies responsible for different administrative capacities (e.g. monitoring water usage, investing in solutions, etc). Navigating the system and coordinating stakeholders to acquire approvals was challenging, time consuming and importantly it required an understanding of the legal and administrative environment. Leveraging partnerships and relationships with organisations – for example FEMSA Foundation and WRI – who are experienced in working with the authorities was important in managing these relationships, navigating administrative systems and bureaucracy and identifying solutions.



Cape Town Green Bond



SOUTH AFRICA

Innovation type

Frontier-Extending

Lever type

Financing

Useful links

- [Cape Town addresses drought](#)
- [Cape Town first municipal green bond](#)

Context

In 2017, amid severe drought, the City of Cape Town, in South Africa was issued its first Green Bond, which was used to invest in projects aligned to city's sustainability goals to adapt to and mitigate climate change.

The ZAR1 billion Green Bond was used to fund and refinance a number of green projects in the city including procurement of electric buses; energy efficiency in buildings; water resilience initiatives; sanitation treatment; and the coastal structure protection and rehabilitation.

At the time, Cape Town had the only green bond in the country to be accredited by the Climate Bonds Initiative (CBI) and demonstrated market appetite for green and climate initiatives.

Problem

- Climate change is a global challenge that has had significant impact on the City of Cape Town, with the city experiencing an unprecedented water crisis after a period of severe drought between 2015-2017.
- In 2018, the rainfall deficit led to water supply in the city reaching critical levels and just narrowly avoiding running out of water.

- The drought impacted both the local and national economy, with the agricultural sector being the hardest hit and stressed the need for the city to respond to the impacts of climate change and build a water-resilient city.

Stakeholders involved

- Accreditation by CBI
- Bond issued by Rand Merchant Bank,
- Commissioned by City of Cape Town
- Facilitated by Cape Chamber of Commerce
- Financed by International investors

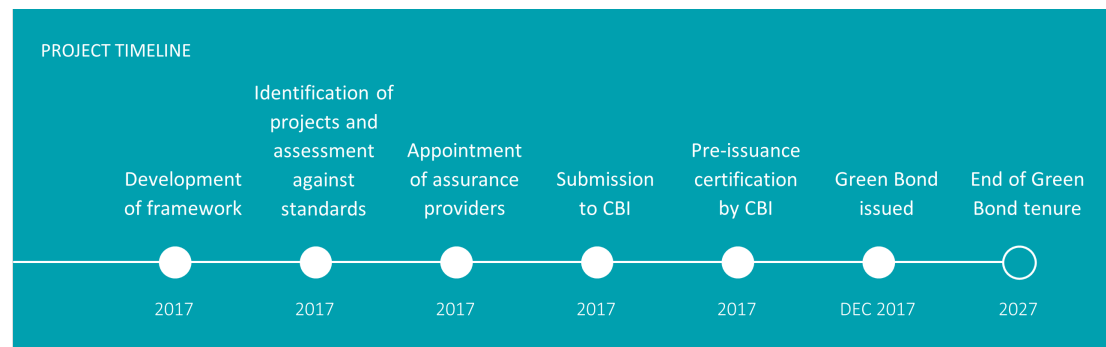
Innovation

- The Green Bond was first in South Africa and the only Green Bond in the country to meet CBI requirements and receive accreditation.
- The Green Bond was also the first in the country to receive Moody's certification, with the agency rating the bond as GB1 (excellent).



Results and impact

- **Building investor trust and confidence in climate-aligned investments:** The CBI accreditation, Moody's certification and GB1 rating, and the JSE listing were key to building market confidence and gaining investor support in green and climate bonds. The green bond underwent a comprehensive accreditation processes involving in-depth pre- and post-issuance assessment conducted by an independent verifier approved by the CBI. The City of Cape Town committed to continuous reporting to bondholder to inform them on the application of the proceeds. These initiatives provide investors with additional assurance regarding the ultimate use of the bond's proceeds.
- **Alignment to local plans and priorities:** the green bond supported the city's long-term strategy of adapting to climate change through investments in water management, sanitation treatment and energy-efficient transportation projects.
- **Supporting environmentally and socially responsible investment:** the JSE listing of the green bond through the exchange's green segment is expected to help investors meet increasing demand for socially responsible investment opportunities to address their ESG mandates. It also allows bond issuers to brand themselves as socially and environmentally responsible corporate citizens.



Key lessons learnt

- **Expected increase in green and climate bonds:** As corporate social responsibility initiatives garners more attention and support, issuers and investors are looking to invest in green / climate initiatives in order to improve their sustainability ratings.
- **Effective governance and leadership:** Issuance of green bonds present an opportunity for African cities to address the financing deficit. However effective governance, virtuous leadership and appropriate mechanisms that support and facilitate the issuance of green bonds in local markets is key to promoting investor trust and confidence. In addition, supporting global green bonds standards and principles, and adopting national green bonds standards and regulations can support future issuance of green bonds.
- **Regular reporting to ensure transparency and accountability:** effective reporting through annual reports detailing the projects and assets that have utilised the proceeds of the bond, and the expected green impacts of these projects is key to enabling the investors to effectively evaluate the green performance of the bond and avoid greenwashing. Climate Bonds Standards provides an effective certification scheme with clear, objective, sector-specific climate eligibility criteria for projects and assets.
- In South Africa, formal accreditation of green bonds is not the norm nor a listing requirement in the bond market. This is a shortcoming that could result in "green-washing" (false or misleading sustainability achievements).



Auction-based pay-for-performance mechanism for greener housing (conceptual model)



INDIA

Innovation type

Frontier-Breaking

Lever type

Financing

Useful links

- [Study on Using the Climate Auction Model](#)

Context

The Indian government has committed to reducing the emissions intensity of its GDP by up to 25% by 2030. Buildings are identified in its nationally determined contributions (NDC) as one of the key levers to achieve this goal.

The World Bank identified India as a prospective case study to carry out a quantitative assessment of the potential impact of the mechanism due to its complex housing market, economic conditions and Federal structure.

An economic cost-benefit analysis was conducted using the Excellence in Design for Greater Efficiencies (EDGE) green building software and cash flow modelling to assess the potential impact of a USD50m auction on the Indian market.

Problem

- Despite the NDC identifying buildings as a key to reducing the emissions in India, there is a lack of national policies to incentivise green new builds.
- More than 50% of urban infrastructure needed in India until 2030 including housing, energy, transport, water, and waste disposal are not yet built.

Stakeholders involved

- World Bank / Multilateral Development Banks (MDBs)
- Ministry of Housing
- Bureau of Energy Efficiency

Innovation

- The World Bank developed the auction-based pay-for-performance mechanism to attract investment for projects aimed at reducing methane emissions.
- This auction platform provides the minimum price private firms need to invest in emission reductions while maximising the impact of public funds and the volume of climate benefits for each dollar.
- It provides price guarantees for future climate results which are determined by an auction. These price guarantees provide holders the right, but not the obligation, to sell future climate results to energy facilities at a predetermined price.
- Funds are only disbursed once the climate results have been independently verified and there is a shared risk shared between the public and private sector for green investments



Results and impact

- India has no national policy that incentivises the development of new green buildings. As a result, the study assessed the potential impact of a USD50m auction budget to close the unfunded cost premium and found that such an incentive could lead to:
 - Construction of 1.7 to 2.9 million m² of green building space,
 - Avoided carbon emissions ranging from 1.4 to 2.3 MtCO₂
 - Energy savings ranging from 1,400 to 2,100 GWh,
 - Water savings ranging from 56 to 146 billion litres, and
 - Lowering of the energy bills for 100,000 to 410,000 people.
- The analysis also confirms that carbon and energy, savings on a per capita basis increase by income level:** Assuming an auction of USD50m, the carbon savings (in million tonnes of CO₂) for the low-income segment would be USD24 and USD37 for the high-income segment (based on the passive scenario).
- Lower income segments are the best target for the auction mechanism.** A USD50m auction would also create greater or equivalent total savings in the economy of the target country, largely benefitting the poorest citizens in the lower income segments. However, there is a trade-off between people supported and carbon saved, with low income supporting more people but lower middle income saving more carbon.



Key lessons learnt

- Consumers in India are reluctant to pay extra for green buildings despite the associated household energy cost savings:** Evidence indicated that greener buildings can reduce energy costs of low-income households by up to USD200 per year (5% of their total yearly spending on all goods and services). However consumers are reluctant to pay a premium for green buildings due to lack of trust in the purported bill savings of greener buildings. The proposed auction mechanism should also involve awareness raising initiatives to increase understanding of the financial benefits associated with green buildings among consumers, particularly in the lower income segments.
- Funder priorities and housing markets will influence the selection of income segment and eligibility criteria:** The choice of income segment to target, and how this influences the eligibility criteria, will depend on priorities of the funders of the auction mechanism and the characteristics of the housing market of the country in which it is implemented.



The Victorian Big Battery



AUSTRALIA

Innovation type

Frontier Traversing

Lever type

Financing

Useful links

- [Victorian Big Battery](#)

Context

The 300MV Victorian Big Battery is currently to be Australia's largest lithium-ion battery which assists in providing critical grid support services, reducing wholesale power costs for consumers and assisting in the transition to renewable energy in Victoria, Australia.

It utilises the System Integrity Protection Scheme (SIPS) which increases import capacity to Victoria by up to 250 MW, reducing the likelihood of unserved energy (USE) from high impact, low probability (HILP) events during summer periods.

Problem

- High reliance on concentrated, increasingly unreliable thermal generation
- Increased reliance on variable renewable energy that may be delayed or underperforming
- Delay to commissioning of Victoria to New South Wales Interconnector West and continued interconnector outages
- Weather events and high temperatures
- The culmination of these issues mean HILP events are increasingly likely to occur, presenting a significant reliability risk for Victoria

Stakeholders involved

- Victorian Government (Initiated the SIPS procurement process)
- Australian Energy Market Operator (AEMO, Manages the National Electricity Market, the Wholesale Electricity Market and the Victorian gas transmission network)
- Clean Energy Finance Corporation (Project funder)
- Neon Australia (Grid service provider)
- Tesla (Battery service provider)

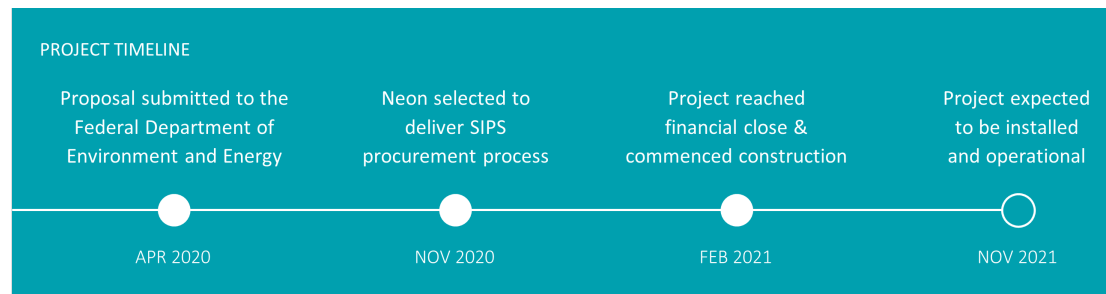
Innovation

- Australia's green bank, the Clean Energy Finance Corporation (CEFC), committed AUD160 million (USD125 million) in senior debt financing in the designing, construction and operation process.
- This investment has been delivered as CEFC's strategic focus on energy storage as a priority technology under the new [Technology Investment Roadmap](#).
- Amidst the growing attention for completed projects, the Victoria Big Battery was the only greenfield utility renewable project to reach financial close that was financed by the government body so far in 2021.



Results and impact

- **Consumer benefits:** The SIPS will provide significant benefits on high USE day (a HILP) event equivalent to AUD 220.4m over the 11 financial years, where AUD 201.9m is passed on the Victorian consumers through avoided USE and electricity price savings. It is assumed that the wholesale price benefits flow directly through to retail prices, with the full impact of these being received by consumers. This reflects a benefit to cost ratio of 2.4.
- **Market benefits:** The remaining AUD 18.5M of benefits go to generators and other participants within the Victorian electricity market through dispatch and demand side participation (DSP) benefits. DSP benefits refers to reductions in the volume of DSP called up to relieve supply/demand conditions during trading intervals in the NEM. This translates to savings in payments to DSP providers
- **Unquantified benefits:** These include the positive impact on Victoria's sustainability and ESG credentials and wider impact and interaction with the National Electricity Market (NEM).



Key lessons learnt

- **Government investment into private sector projects:** Government is taking an increasing role in financing Australia's renewable transition. Together with private sector project proponents, investors and financiers, and government agencies such as the Australian Renewable Energy Agency (ARENA) and CEFC have developed a strong investment pipeline across a broad range of technologies that are reducing Australia's emissions.
- **Debt and equity rather than simple grants:** CEFE does not provide typical grants, but rather invests both equity and debt to deliver a positive return for taxpayers across the portfolio. As a specialist investor on behalf of all Australians, with the support of the Australian Government, this approach focuses on projects with positive risk based financial return that are commercial and reflect CEFC's investment requirements.



Water Energy Purchase Agreements (WEPA): Rombauer Vineyards



USA

Innovation type

Frontier-Breaking

Lever type

Revenue

Useful links

- [Cambrian Innovation WEPA services](#)
- [Cambrian wastewater treatment as a service](#)
- [Case study](#)

Context

Cambrian Innovation developed the WEPA® to enable food and beverage manufacturers across the United States to implement their solutions to remove wastewater costs, reduce environmental impact, and alleviate capped production at no upfront cost or operational risk.

Wineries in Nappa Valley, including Rombauer Vineyards, produced high-strength wastewater (diluted wine) through standard rinsing and cleaning processes putting pressure on traditional municipal treatment plants.

In 2018, Rombauer Vineyards was the first replaced existing ineffective treatment system with an EcoVolt® Solution from Cambrian Innovation.

Problem

- In 2009, Rombauer Vineyards installed an aerobic wastewater treatment system to manage high-strength wastewater stream. However, by 2017, this system was unable to accommodate the high-volume particular during harvest season at the winery.
- The capacity limitation forced the winery to hold and haul excess wastewater to the East Bay Municipal Utility District which had high financial, operational, and environmental costs for Rombauer Vineyards.

Stakeholders involved

- Wastewater treatment service user: Rombauer Vineyards
- Wastewater treatment service provider: Cambrian Innovations
- Local municipality: East Bay Municipal Utility District (EBMUD)

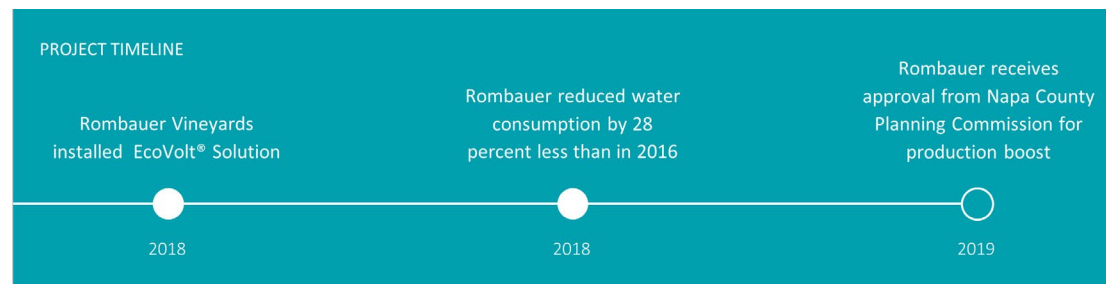
Innovation

- Cambrian created WEPA® which is an accessible, service-based wastewater-to- resources solution. Cambrian maintains asset ownership, management and compliance cost of the wastewater plant. Benefits include:
 - Removing an upfront capital investment to allow cost savings from treatment solution while freeing up capital for other investments focused on business growth.
 - Securing long-term, predictable, fixed costs, to reduce vulnerability to utility market volatility such as price escalation.
 - Divesting operational and compliance risk to safeguard long-term operational security while ensuring internal resources are focused core business functions.
- Cambrian only charges on a per-gallon basis when the system turned on and provides clean energy and water back to the facility at a lower utility rate.



Results and impact

- **EcoVolt Solution enabled Rombauer to economically manage its wastewater:** The two-step process removed 99% of the Biochemical Oxygen Demand (BOD) in the winery's wastewater. This resulted in highly-treated effluent which reduced the environmental impact and cost of discharge to the local municipality.
- **The wastewater treatment solution treats 100% of the winery's wastewater** and allows for expansion through the addition of more EcoVolt modules to accommodate any increases in wine production.
- **The EcoVolt Solution supported Rombauer Vineyards to realise key environmental and operational goals:** By eliminating the need for trucking and the burden of treatment on public infrastructure, Rombauer was able to reduce its carbon footprint by 4,150 metric tons of CO2 offset annually with uninterrupted sewer discharge compliance and significant savings.



Key lessons learnt

- **Adopting the “everything-as-a-service” (XaaS) model** and replicating across industries to the infrastructure-as-a-service approach in water and wastewater enabled Cambrian to standardise its disruptive approach to wastewater infrastructure and provide a creative financing platform that increase the financial viability of sustainable waste-to-resources projects.



Aguascalientes Water Fund



MEXICO

Innovation type

Frontier-Extending

Lever type

Financing

Useful links

- [Municipality led circular economy case studies](#)
- [Water challenges for resilient cities](#)

Context

Due to decreasing aquifer water level (280 million m3 per year), Veolia Water Technologies (Veolia) partnered with The Nature Conservancy (TNC) and local municipality to propose the establishment of a water fund to finance changes to local water-catchment and uses.

As a result, Livelihoods Funds created a project to support vulnerable farmers in Aguascalientes to invest in drip irrigation equipment to enhance farm resilience.

Changing to a drip irrigation system showed a 50% - 70% decrease in water consumption by farmers. If the 5,000 local family farmers in the water catchment area adopted this system through the new fund, this results in approximately 65% reduction of the annual aquifer deficit.

Problem

- Aguascalientes is a semi-arid state experiencing a decreasing trend in the aquifer (mostly due to intensive agriculture and population growth), which poses a significant challenge for the future of the city.
- Reducing water levels has forced Veolia to source water from deeper underground each year. However this has adverse impacts on the water quality and the environment.

Stakeholders involved

- Veolia Water Technologies (Veolia)
- Danone Waters
- The Nature Conservancy (TNC)
- Livelihoods Funds for Family Farming (L3F)
- Local municipality and State Government
- FIRA (Mexican agency for Rural Development)
- SEDRAE (Agricultural Authority of the State of Aguascalientes)

Innovation

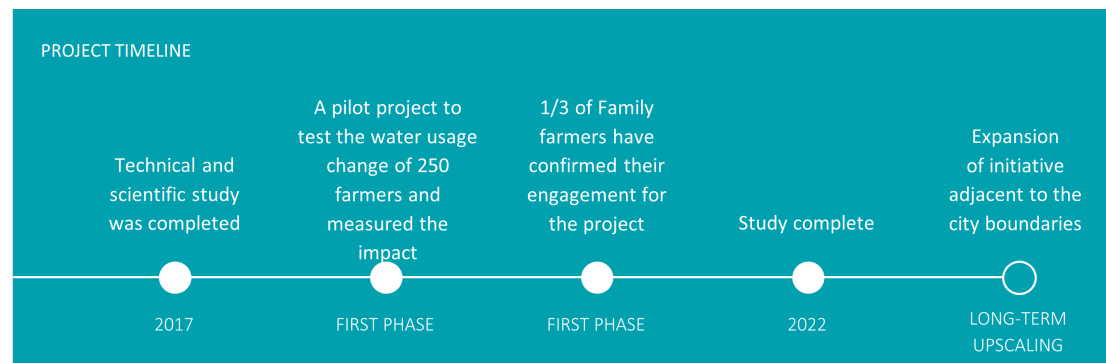
- L3F provides upfront financing to project implementers to enable the deployment large-scale sustainable agriculture projects using a landscape approach with rural farming communities.
- In Aguascalientes, the Livelihoods 3F linked farmers to public authorities to provide the required information and financing to access drip irrigation in order to reduce water consumption
- The project also included a 2.5 year training program to maximise the social, economic and environmental benefits of the system.
- Unlike public schemes that are limited to 1-year duration, this fund provides a 6-year programme to build a long-term relationship with farmers and maximise impact.



Results and impact

Project achievement to date include:

- In 2017, Veolia in partnership with TNC conducted a technical and scientific study to develop a better understanding of the water situation in Aguascalientes and identify actions to be undertaken to address concerns.
- At the commencement of the project, about a third of Family farmers in Aguascalientes confirmed engagement in the project.
- Veolia and TNC are also collaborating with the City and the State to develop a single structure to address and manage concerns related to the aquifer level.
- Family Farmers involved in the project are provided with training, equipment and technical assistance: The project involves a 2.5 year training program that includes classroom and in-field training to enhance the fertility soil using conservation agriculture techniques and weekly on-farm visit from a project coordinator during the first year. Farmers will also be trained on farm management such as accounting, investments to increase revenues on the long-term, etc. In addition the project also drives awareness among farmers on the importance of growing less water-intensive crops and practising crop diversification to improve the farm resilience.



Key lessons learnt

- Establishing a project involving public, private, NGO entities was challenging and securing blended finance through private-public funders for the farmers has been fundamental to success.



EuroPACE – Transitioning Energy Hungry Buildings



EU

Innovation type

Frontier-Breaking

Lever type

Revenue

Useful links

- <https://www.europace2020.eu/>

Context

Euro Property Assessed Clean Energy (EuroPACE) is a scalable on-tax financing model to support the deployment of energy saving and generation technologies to European households and the EU's clean energy transition.

The scheme is inspired by the successful US PACE scheme that was introduced in 2008, which resulted in over USD4.7 billion in funded projects, over 200,000 homes over the past four years.

Private capital is deployed as upfront financing to homeowners which is repaid through an additional special "assessment" payment on its property tax bill for a specified term.

Problem

- Energy efficiency investment are not attractive as it comes with high transaction costs as projects are small and relatively long payback period.
- Lack of technical and legal standardisation of projects prevents securitisation of energy efficiency assets (loans or equity).

Stakeholders involved

- EU
- Global New Energy Finance (Netherlands)
- Center of Scoail and Economic Research (Poland)
- Joule Assets Europe (Italy)
- Climate Bonds Initiative (UK)
- Ajuntament d'Olot, Energy Agency of Extremadura, Ente Vasco, Up Social (Spain)

Innovation

- **Market-Based Approach:** 100% financing through private and public capital to reduce reliance on grants and subsidies.
- **De-Risking Energy Efficiency investment:** The long-term repayment obligation (up to 25 years) is attached to the property not the owner. Remaining debt is transferred to new owner upon sales.
- **One-stop shop home renovation process:** Providing all technical advice, support, training, verification and financing services.
- **Standardisation:** Projects can be aggregated and securitised as green bonds.



Results and impact

- By 2025, EuroPACE is expected to deliver the three following impacts.
- **Social impact:** EuroPACE contributes to community regeneration by making homes and apartments buildings more livable, attractive and through engaging with local stakeholders. EuroPACE has the potential to bring retrofit and improve over 300,000 homes and benefit Europeans that are in energy poverty (approx. 50-125 million people) by lowering their energy bills.
- **Environmental impact:** EuroPACE can reduce the energy consumption of residential buildings by improving insulation, heating and cooling equipment and more. By 2025, the project intends to save 3.5M MWh/year which is equivalent to more 1.8M tons of CO2 savings.
- **Economics Impact:** EuroPACE can help revitalise local economies through an injection of €5BN capital in local economies and the creation of over 45,000 jobs across the EU27. Every €1 m investment is expected to generate 18 jobs (direct and indirect) in Spain.



Key lessons learnt

- Collaborating with multiple homeowners via utilising a standardised solution is effective in reducing costs rather than targeting individual homeowners.
- The economics of EuroPACE is best suited for countries that experience energy bill hikes in the winter (northern European countries) and low energy bills (Mediterranean countries).
- As EuroPACE relies on homeowners who are able to secure finance on favourable terms, this program may not be applicable for social housings which have access to cheap funding.



JESSICA Urban Development Funds – Public-private investment funds for providing financial support



EU

Innovation type

Frontier-Extending

Lever type

Financing

Useful links

- [JESSICA](#)

Context

Joint European Support for Sustainable Investment in City Areas (JESSICA) is a partnership between the Council of European Development Bank (CEDB) and the European Investment Fund, which has provided EUR2.1b (USD2.5b) in co-investment in circular economy projects since 2015.

The EU JESSICA Urban Development Funds (UDF) contain financial contributions from EU member states, cities, and other public and/or private sources.

These are invested in the form of equity, loans, and guarantees for projects that support sustainable urban development and regeneration in cities.

Problem

- Traditional grants, such as those provided through the European Union's European Regional Development Fund (ERDF), have several limitations such as time constraints and annual spend requirements.
- The importance and need for project financing rather than simple gap funding grants is not highlighted enough.
- Projects with limited commercial viability must rely nearly entirely on grants, reflecting lack of financing flexibility.

Stakeholders involved

- European Commission (Initiated program)
- European Investment Bank (EIB, Co-partner)
- Council of Europe Development Bank (CEDB, Co-partner)

Innovation

- **Recycling of funds:** Any return generated from a JESSICA funded project can be either retained by the UDFs or returned to Managing Authorities for reinvestment in new urban regeneration projects.
- As opposed to simple one-off grants, JESSICA utilises **a series of locally controlled, perpetually self-sustaining investment funds**. The strategic rationale behind the program was to convert a grant mechanism (the ERDF) into a program participatory investing, lending, and loan guarantee.



Results and impact

- JESSICA delivers value not only to the EIB and ERDF but also to the citizens of the EU. Through JESSICA, the EIB was able to extend the value of the ERDF program far beyond its scheduled decommissioning in 2015. In addition, by providing a form of evergreen mezzanine risk capital, JESSICA is enabling local authorities to progress economic development goals that would have otherwise stalled during the economic downturn.
- In London, the city co-funded the Tate Modern's extension via the London Energy Efficiency Fund, a subset of the JESSICA London Green Fund, made up of funding from the European Regional Development Fund, London Development Agency, and London Waste and Recycling Board. The extension was designed for energy efficiency, using 54% less energy and generating 44% less carbon than regulations demanded. The design included natural air circulation, daylight, and the use of building materials that can store heat naturally.



Key lessons learnt

- Public-private partnerships**, especially collaborative investment funds, allow to share, reduce, and mitigate associated risks of costly projects.
- Financially supporting **"sub-commercial" projects**, those who are unable to obtain commercial financing and raise private development financing, is pivotal to lessen the reliance on "grand handouts". JESSICA's investments in these projects could therefore generate a return, at least enough to preserve the investment capital employed.



Risk mitigation for geothermal development in Indonesia



INDONESIA

Innovation type

Frontier-Extending

Lever type

Risk Management

Useful links

- [Funding for geothermal development in indonesia](#)

Context

The Indonesian Government aims to expand its geothermal energy sector to reduce greenhouse gas emissions.

The Green Climate Fund (GCF) and Clean Technology Fund (CTF) are offering USD127.5m in financing, consisting of a senior concessional loan for public sector projects, a reimbursable grant for private sector projects, and a grant for technical assistance. World Bank will also provide USD100 million loan to scale up investments in geothermal energy in Indonesia.

Problem

- The availability of geothermal resources is uncertain and requires high early-stage exploration costs to ascertain. The high risk of unsuccessful exploration makes the activity unattractive to private investment.
- In Indonesia, there is limited availability of suitable financing instruments and options that adequately address geothermal resource confirmation risks.

Stakeholders involved

- Government of Indonesia
- Green Climate Fund (GCF)
- World Bank
- Private Sector Developers

Innovation

- A key innovation in GCF and CTF's financing package is the use of convertible bonds (converting fixed-income debt security into equity shares) that will enable private sector geothermal sponsors to mitigate the exploration risk while providing an adequate upside in case of success.
- The project also aims at de-risking the early-stage exploration through the use of private insurance company's insurance capabilities to cover part of the cost in case of unsuccessful exploration.



Results and impact

- At its twenty first meeting in Bahrain, the GCF Board approved the first tranche of USD100 million out of the USD 185 million requested from GCF to finance public and private sector geothermal development in Indonesia. The first tranche of the GCF multi-year support facility will mobilise USD410 million with contributions from the World Bank.
- The Government of Indonesia and private sector developers are expected to achieve 600 MW to 900 MW of additional geothermal capacity. The full project facility will mobilise USD 760 million to support exploration and resource confirmation for 1GW to 1.5 GW of geothermal energy. This translates to 187-281 million tons of CO2 mitigated over the lifetime of the generating assets.



Key lessons learnt

- Government bodies and international institutions need to provide the right calibration of financing packages to mitigate the risks of geothermal energy investment:
 - Convertible bonds facilities are able to hedge against risks of non-discovery, due to their nonrecourse features that provide an adequate premium in case of success; and
 - The insurance would cover GCF's nonrecourse loan to the project company for part of the exploration cost, and the insurance (purchased using CTF convertible grant) will cover the resource risk for that GCF loan. Through this structure, private developers appropriately mitigate the exploration risk. If result of exploration is positive and project developers decide to move forward to investment phase, project developer will repay funds from CTF. To the extent the exploration risk insurance product is unfeasible, there may be a possibility to use it as concessional or subordinated debt for exploration/development stage.
- Other forms of incentives that can be provided include increasing data quality through exploration drilling conducted by the government. With this, the risk of exploration will be reduced, because business actors already have an overview of the potential resources in the Geothermal Working Areas being offered.



ChargePoint as a Service (CPaaS)



USA

Innovation type

Frontier-Extending

Lever type

Revenue

Useful links

- [ChargePoint CPaaS](#)
- [Customer story Georgia Power](#)

Context

ChargePoint as a Service installs electric vehicle (EV) chargers for no upfront cost in return for a fixed term subscription

CPaaS reduces overhead costs and offer predictable operational expenses

CPaaS also proactively monitors stations to identify and fix technical issues remotely and enables businesses to track performance and utilization.

Georgia Power (a utilities company in Georgia) and Pivotal Atlanta, an automotive company has partnered with ChargePoint to install EV chargers in a major travel corridor.

Problem

- For fleet managers, investment in EV charging stations avoided due to huge investment demand, concerns about under-utilisation, management, and pricing.
- The state of Georgia is a region that has historically lacked mandates and incentive programs in transportation electrification which has caused the region to fall behind in EV uptake in comparison to other states in the US.

Stakeholders involved

- ChargePoint
- Clients

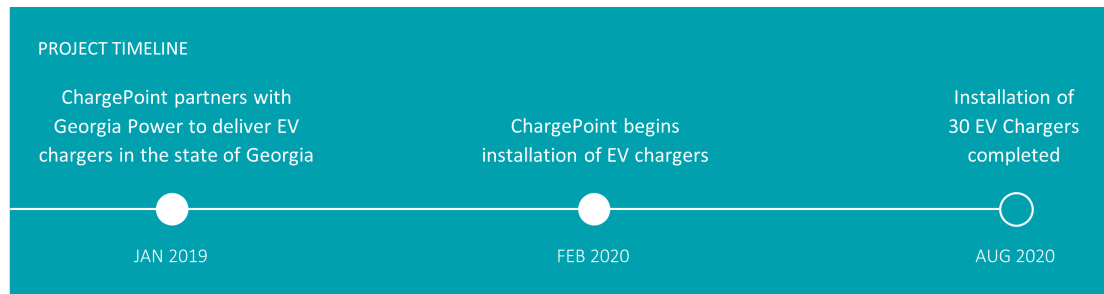
Innovation

- ChargePoint retains asset ownership of the charging stations so they are able to significantly reduce the cost of entry for customers through monthly subscription pricing.
- ChargePoint uses annual OpEx funds to pay for charging infrastructure while conserving CapEx funds.



Results and impact

- By August 2020, through the Pivot Atlanta project with Georgia Power and Pivot, ChargePoint has installed ten DC fast and 20 Level 2 fleet EV chargers at the 25-acre Pivot Atlanta facility located in a former “EV charging desert” between downtown and Hartsfield-Jackson Atlanta International Airport. The installations aim to support fleet electrification, including the powering of Lyft Express Drive program which is currently operated out of Pivot Atlanta.
- The charging stations installed utilise a time-of-use charge rate to provide low cost fueling during off-peak hours. In addition, ChargePoint’s vertically integrated cloud network services allow Pivot to monitor and collect comprehensive **data on charging sessions and station usage** to gain insight into charging patterns and requirements of local users. The charging installations will function as a learning opportunity to support the transition of fleets to zero-emission electric vehicles.
- Future scalability:** Capacity has also been built into Georgia Power’s electric design for the anticipated EV expansion in the coming years. This includes the installation of DC Fast Chargers that can be combined to provide 125kW high-output charging for the larger batteries of the future.



Key lessons learnt

- In underserved EV markets and jurisdictions that lack favourable government incentives, business models such as ChargePoint are able to fill the gap, offering free installation of EV charging stations to be paid off from monthly subscription fees thereafter.
- Scalability:** ChargePoint planned to initially focus on training their installers. But to ensure future scalability of training in terms of reaching a larger number of audiences, a mobile-friendly training model was deployed. This platform allowed installers to train anywhere and anytime on-the-go while out in the field. A Salesforce integration was also utilised to train and track audiences/installers. Automated certifications and reminders were also used to keep their partners’ training up to date.

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