Unlocking Demand for Residential Rooftop Solar in India

Learnings from Solarise Delhi Campaigns

Akash Som Gupta, Bhawna Tyagi, Neeraj Kuldeep, and Selna Saji

Report | April 2022

The Solarise Delhi campaigns targeted 28 residential colonies in South Delhi and East Delhi over three months - from November 2020 to January 2021.

Image: Akash Gupta/CEEW

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The **Council on Energy, Environment and Water** (CEEW) is one of Asia's leading not-for-profit policy research institutions. **The Council uses data, integrated analysis, and strategic outreach to explain — and change — the use, reuse, and misuse of resources**. The Council addresses pressing global challenges through an integrated and internationally focused approach. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with the wider public.

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The Council's major contributions include: The 584-page *National Water Resources Framework Study* for India's 12th Five Year Plan; the first independent evaluation of the *National Solar Mission*; India's first report on global governance, submitted to the National Security Adviser; irrigation reform for Bihar; the birth of the Clean Energy Access Network; work for the PMO on accelerated targets for renewables, power sector reforms, environmental clearances, *Swachh Bharat*; pathbreaking work for the Paris Agreement, the HFC deal, the aviation emissions agreement, and international climate technology cooperation; the concept and strategy for the International Solar Alliance (ISA); the Common Risk Mitigation Mechanism (CRMM); critical minerals for *Make in India*; modelling uncertainties across 200+ scenarios for India's low-carbon pathways; India's largest multidimensional energy access survey (ACCESS); climate geoengineering governance; circular economy of water and waste; and the flagship event, Energy Horizons. It recently published *Jobs, Growth and Sustainability: A New Social Contract for India's Recovery*.

The Council's current initiatives include: A go-to-market programme for decentralised renewable energy-powered livelihood appliances; examining country-wide residential energy consumption patterns; raising consumer engagement on power issues; piloting business models for solar rooftop adoption; developing a renewable energy project performance dashboard; green hydrogen for industry decarbonisation; state-level modelling for energy and climate policy; reallocating water for faster economic growth; **creating a democratic demand for clean air**; raising consumer awareness on sustainable cooling; and supporting India's electric vehicle and battery ambitions. It also analyses the energy transition in emerging economies, including Indonesia, South Africa, Sri Lanka and Vietnam.

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Akash's research is centred on assessing consumer perceptions about rooftop solar and developing strategies for improving bioenergy adoption in India. Before joining The Council, he worked with EcoSantulan, a Mumbai-based waste management start-up focused on providing composting and biogas solutions for urban applications. He holds a postgraduate degree in Sustainable Energy Engineering from KTH Royal Institute of Technology, Stockholm, and an undergraduate degree in Mechanical Engineering from Symbiosis Institute of Technology, Pune.

"Residential rooftop solar is essential for India to truly transition to clean energy democratically. Solarise Delhi campaigns have shown the potential of community-based demand aggregation campaigns in raising consumer awareness and motivating them to action."

Bhawna Tyagi
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Bhawna is a programme associate at The Council. Her work primarily focuses on accelerating rooftop solar adoption in India through research on consumer perception, undertaking techno-economic feasibility assessment, developing innovative business models, and supporting new policy and regulatory developments. She holds a post-graduate degree in economics from Ambedkar University, Delhi, and a graduate degree in economics (Hons) from the University of Delhi.

"Solarising residential households provides an opportunity to bring the energy transition closer to communities. Community-driven campaigns such as Solarise Delhi act as a lever to fully capitalise on this opportunity by educating, motivating and accelerating the consumer intention into installation."

Neeraj Kuldeep
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Neeraj Kuldeep has worked and published extensively on renewable energy markets. He is currently co-leading the renewable energy team at CEEW. His research at The Council revolves around solar and wind markets and the socio-economic benefits of renewables, including jobs and skilling in the renewable energy sector. Neeraj holds an undergraduate degree in energy science and engineering and an MTech in energy systems from the Indian Institute of Technology (IIT), Bombay.

"Rooftop solar, in a scattered fashion, has penetrated through the entire strata of residential households across whole India. However, growth remains sluggish. Solarise offers an effective demand aggregation tool to solar developers, states, discoms etc., for an accelerated rooftop solar adoption leading to widespread organic demand for RTS."

Selna Saji
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Formerly a programme associate at The Council, Selna Saji was keen on developing business models and tools that will facilitate the adoption of rooftop solar in India. Selna holds a dual post-graduate degree in management and engineering of environment and energy from Queen's University Belfast and Universidad Politécnica de Madrid.

"Low awareness about rooftop solar among households still remains as a challenge for scaling up the technology in India. Campaigns such as Solarise organised by the discoms with the support of RWAs can help in this regard. Additionally, households tend to trust the information via such community-driven campaigns more than the solar vendors themselves."

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We wish to acknowledge the efforts and contributions of several team members who helped design, execute, and manage the campaigns—Ellie O'Shaugnessy helped in transforming the Solarise Delhi campaigns to an online model and also developed the methodology for evaluating the impact of the campaigns; Almas Naseem and Rohan Barad created the look and design of the campaign and helped deliver memorable content to the consumers; Rishi Chandak and Syed Yasir Ahmad were crucial in liaising with the vendors and consumers and managed the lead tracking process; Ananya Dhanuka further helped to put together this report.

Utility-led, community-based Solarise campaigns offer tremendous potential for unlocking the latent demand in India's residential rooftop solar sector.

Image: Akash Gupta/CEEW

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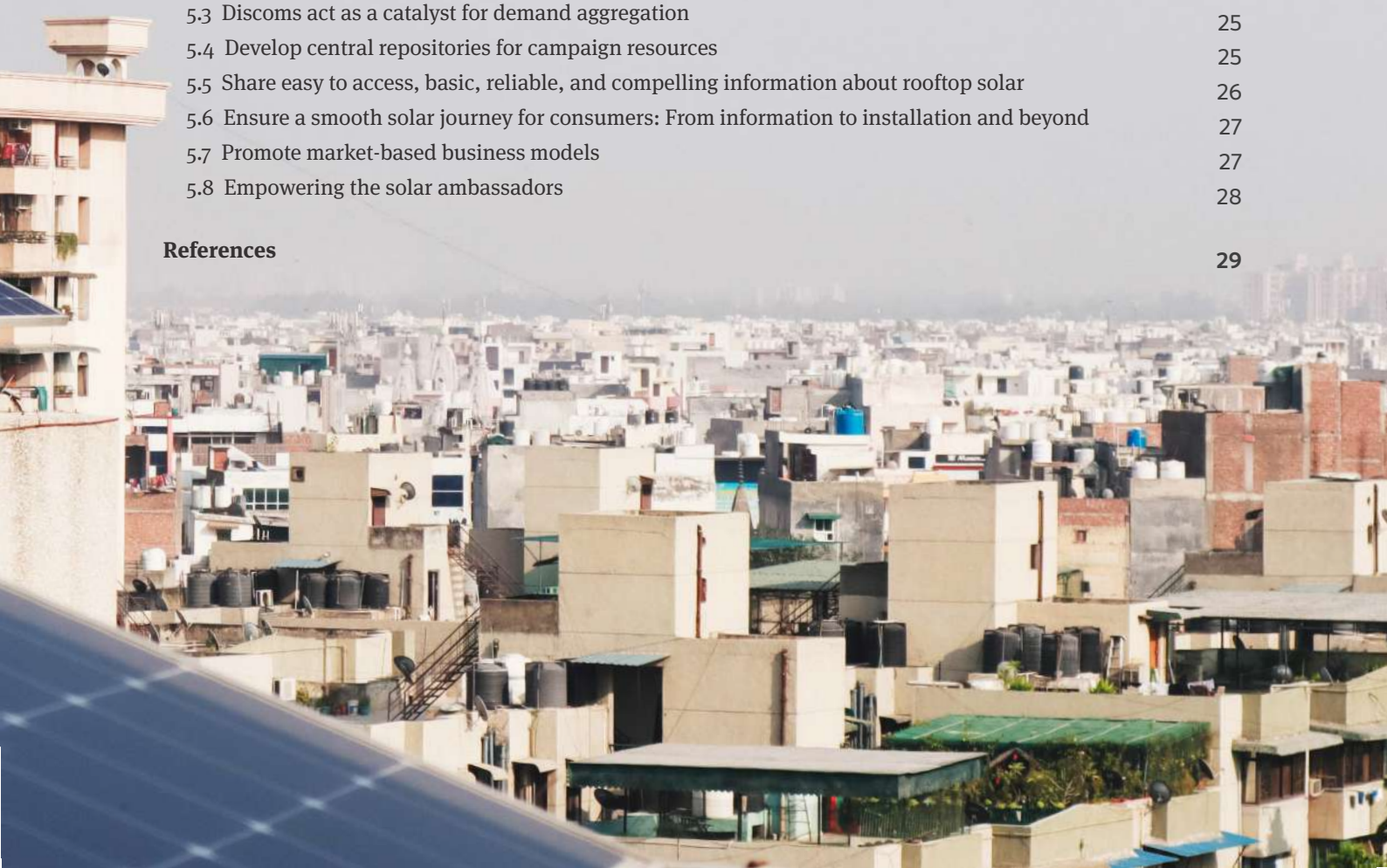


Acronyms

BRPL	BSES Rajdhani Power Limited
BYPL	BSES Yamuna Power Limited
CSO	Civil Society Organisations
COVID-19	Disease caused by the severe acute respiratory syndrome novel corona virus 2 (SARS Cov-2) infection
GW	Gigawatt
INR	Indian rupee
MNRE	Ministry of New and Renewable Energy
MW	Megawatt
NGO	Non-Governmental Organisation
NPO	Not-for-profit Organisations
PCRA	Petroleum Conservation Research Association
RACI	Responsible, Accountable, Consult, Inform
RTS	Rooftop Solar
RWA	Residents' Welfare Associations
USD	United States Dollar
UWP	Unified Web Portal

Proper maintenance of RTS plants is simple and can lead to greater benefits for the consumers.

Image: Akash Gupta/CEEW

Executive summary

With a technical potential of 210 GW in urban areas, residential rooftop solar (RTS) holds critical importance in achieving India's ambitious target of 500 GW of non-fossil fuel capacity by 2030. RTS also presents economic and environmental savings for consumers and electricity distribution companies (discoms). However, RTS deployment in general has remained poor – 6.4 GW of installed capacity against the total solar installed capacity of 49.34 GW. Several factors, such as high capital cost, lack of financing options, and insufficient levels of information dissemination limit adoption in the residential sector.

The Solarise campaigns have traditionally been community events with a high level of peer-to-peer influence between neighbours and community members

To accelerate residential RTS adoption in India, the U.S.–India Clean Energy Finance Task Force (Task Force), co-led by the U.S. Department of State and India's Ministry of New and Renewable Energy (MNRE), piloted the Solarise Delhi campaigns. These were modelled on the Solarise campaigns popularised in the United States but tailored to the local context. The Solarise campaign pilots were implemented by collaborating partners of the Task Force—the Council on Energy, Environment, and Water (CEEW), SmartPower Inc., and WeeGreen Inc.—along with the local discoms and Resident Welfare Associations (RWAs) to increase the adoption of RTS at the household level. Solarise campaigns, which proved to be high-impact local community campaigns in the United States, intend to increase the adoption of RTS in residential areas by leveraging community trust and through peer-to-peer influence.

Two discoms in Delhi—BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Power Limited (BYPL))[1] —proactively led the pilots of community-based Solarise campaigns. Three solar vendors were identified by the discoms for the campaign. The Solarise campaigns were conducted completely in a virtual mode due to the restrictions imposed by ongoing COVID-19 pandemic. Dedicated campaign websites developed using the WeeGreen platform facilitated consumer RTS purchases by providing access to solar vendors, campaign information and activities, and cost and technical know-how on rooftop solar. The pilot campaigns spanned a period of three months, from November 2020 to January 2021.

The **campaign activities educated consumers** about potential benefits of RTS, and demystified myths. Capitalising on the power of community trust, **local ambassadors motivated the community** members to adopt RTS by initiating dialogues and word-of-mouth recommendations. Finally, the availability of trusted solar vendors and end-to-end consumer support helped **activate** the consumers by providing a trustworthy and accessible opportunity to adopt RTS.

1. BRPL and BYPL identified Safdarjung in South Delhi and Karkardooma in East Delhi, respectively, as target neighbourhoods for the pilots because of favourable demographics in these neighbourhoods and availability of open roof spaces on houses. In total, both pilot campaigns targeted around 28 residential colonies with close to respectively 11,000 and 4,000 households in Safdarjung and Karkardooma. BYPL's pilot campaign offered both subsidised and non-subsidised systems, leaving the consumer to choose from either of the options, and BRPL's pilot campaign offered only non-subsidised systems.

A. Campaign performance

The scalability potential of the Solarise Delhi campaign pilots to larger areas within Delhi and other Indian cities was assessed. Thus, the key performance indicators captured the ability to aggregate demand using awareness and peer-to-peer influence tools. Some of the key performance indicators include:

- Extent of consumer engagement
- Potential for rooftop installations as indicated by the number of proposals (and the related RTS capacity) offered to consumers
- Changes in consumer awareness levels
- Perceptions about RTS

The campaigns engaged more than 400 consumers through virtual events and an additional 1,000 consumers through interaction with WeeGreen websites created for the Solarise Delhi campaigns. The two campaigns, spread across 12 weeks, elicited a total of 117 leads, primarily generated through WeeGreen websites, a hotline number, and social media. Of the total leads generated, partner vendors shared detailed proposals with **22 leads with a potential capacity of 140 kW**. This represents a 18.8 per cent lead-to-proposal conversion. Assuming a majority of proposals would have converted to contracts under non-COVID conditions, the results are comparable to the Solarise campaign results in the United States. The lead generation and conversion in Solarise Delhi entirely during the pandemic conditions are comparable to the number of leads and contracts signed in two pre-COVID Solarize campaigns in Rhode Island in the United States under optimal conditions during the summer of 2019, through Solarize Narragansett (108 leads, 16 contracts) and Solarize Jamestown (223 leads, 29 contracts).

The pandemic necessitated a sub-optimal operational mode for conducting the campaigns in two primary respects. First, the critical campaign element of peer-to-peer influence was greatly limited due to social distancing (a restriction to stop the spread of COVID-19), which significantly lowered the impacts of the campaigns. The U.S. experience shows, and the Indian experience re-affirms, that in-person interactions and word-of-mouth recommendations are critical elements of Solarise campaigns. Second, India's systemic lack of suitable financing options for residential consumers and the economic uncertainty arising from the COVID-19 pandemic contributed to consumer hesitancy or postponement of large purchases such as RTS. The availability of affordable financing was a key component of Solarise campaigns in the United States, turning consumer motivation into a successful RTS installation. However, financing options were very limited in the Solarise Delhi campaigns,

Key achievements of the campaign


Successful generation of 117 leads for rooftop evaluation through various activities


Proposals for 140 kW of rooftop solar capacity shared with 22 consumers


Reached 28 residential colonies with 15,000 households


Active engagement with 1,000 households on the WeeGreen platform


Engagement with consumers through 10 online events with different themes


Tested seven modes of communication

Source: Authors' analysis based on results from Solarise Delhi campaigns.

severely restricting the volume of installations.[2] Though the Solarise Delhi campaign yielded only one indirect RTS system,[3] the indicators suggest a high degree of latent demand and interest among India's price-conscious residential consumers as a result of the campaign.

B. Recommendations for policymakers

Utility-led, community-based Solarise campaigns offer tremendous potential for unlocking the latent demand in India's residential rooftop solar sector. However, this demand aggregation business model requires ecosystem support to convert consumer awareness and subsequent interest into on-the-ground installations. We offer the following recommendations in the fervent hope that they provide the necessary support to scale the Solarise model.

Table ES1 Making RTS more accessible for residential consumers can help unlock demand

Recommendations to accelerate adoption of RTS	Description	Key beneficiaries	Main actors	Envisioned impact
Provide access to affordable financing options	Innovative financing options such as dedicated solar loans, lines of credit, app-based non-bank financial companies, top-up on home loans, dedicated solar loan credit cards, and zero down payment loans can alleviate the initial burden of high capital cost for a large section of residential consumers. Through a suitable modification in the procurement guidelines, MNRE could require vendors seeking empanelment to offer innovative financing options for consumers. Discoms could credit vendors more favourably for empanelment if they offer accessible financing options to consumers.	Residential consumers	Central and state governments, discoms, financial institutions	Reduced financial burden on consumers, increasing their willingness to adopt RTS.
Create a central government push for rooftop solar	The central and state governments can show leadership and highlight RTS adoption as a national priority to meet sustainability targets through their communication channels. Discom-led activities for popularising RTS will secure further support and buy-in with a national media campaign push for residential RTS.	Campaign organisers, discoms, developers	MNRE, state nodal agencies	Encourage consumer alignment with national policy through national messaging on the potential benefits of RTS adoption.
Discoms act as a catalyst for demand aggregation	The local discoms should initiate the efforts to launch campaigns similar to Solarise and lend their name and credibility to these campaigns. The discom can convene, empower, and consult with motivated consumers who can further act as solar ambassadors in their communities. In geographies where discoms do not have the necessary resources, capable partners such as civil society organisations (CSOs) and non-governmental organisations (NGOs) can be identified to lead the campaigns with discom support.	Campaign organisers and partners, residential consumers, solar ambassadors	Discoms	Educate consumers about the potential benefits of RTS adoption to increase installations.

2. Only one partner vendor offered financing options in the form of a solar loan for non-subsidised RTS systems.
3. A community member received a proposal from the partner solar vendors through the campaign but eventually contracted a vendor outside the campaign to install his RTS system.

Recommendations to accelerate adoption of RTS	Description	Key beneficiaries	Main actors	Envisioned impact
Develop central repositories for campaign resources (for campaign organisers)	A central online repository of required campaign resources can become a supporting tool for future campaign organisers. Empowering campaign organisers with the knowledge and know-how on a national scale can help sustainably replicate and repeat the Solarise campaigns locally and cost-effectively.	Campaign organisers (discoms, developers, CSOs)	MNRE	Scale-up demand aggregation campaigns sustainably across the country to accelerate RTS deployment.
Share easy to access, basic, reliable, and compelling information about rooftop solar (for consumers)	Publicise existing unified web portals (UWPs) for RTS and make them user-friendly and accessible to consumers with basic, yet compelling information on RTS.	Residential consumers	Central and state governments, nodal agencies, discoms	Educating and busting the myths about RTS by providing access to reliable information and empower them to make informed decisions to adopt RTS.
Focus on a smooth solar journey for consumers	Discoms should use a beginning-to-end support mechanism as developed under Solarise through platforms such as WeeGreen. A simple and transparent application and tracking mechanism will help make RTS more accessible and attractive to consumers.	Residential consumers	Nodal agencies	Interested consumers complete their solar journey confidently, leading to purchases and testimonials to encourage other consumers to purchase RTS.
Promote market-based business models	Future campaign organisers such as discoms and not-for-profit organisations (NPOs) are encouraged to promote market-driven business models with incentives for stakeholders to increase RTS deployment. Campaign organisers should consider incorporating as a key feature an arrangement by which the vendors share a small part of their increased net revenues with the campaign runner. By incentivising the campaign runner, the vendors could lower their marketing and customer acquisition costs and also offer discounts to consumers that brings down the amount of financing needed by the consumers for installing the RTS system.	RWAs or campaign runners	Nodal agencies, discoms, vendors, NPOs	Motivated campaign runners encouraging consumers to purchase RTS.
Empower the solar ambassadors	Empower influencers to awaken consumer interest and aggregate demand from within the community. Discoms can create a programme for identifying and working closely with local champions from different communities to increase consumer awareness in their localities. Further, public figures who can potentially act as influencers at the national level to amplify consumer awareness of RTS should be identified.	Community solar ambassadors	Nodal agencies, discoms, campaign organisers, MNRE	Boost consumer adoption from within the community through word-of-mouth influence of trusted and reputable local actors on RTS purchasing decisions.

Source: Authors' analysis based on learnings from Solarise Delhi campaigns

By bundling together information in one place, providing compelling offers, and leveraging community trust, the Solarise pilot campaigns very effectively initiated conversations and elicited consumer interest in RTS in an innovative manner. The pilots demonstrated that virtual campaigns can play a key role in raising awareness and aggregating demand using social media, virtual meetings, community networks, and direct conversations. When implemented primarily as in-person campaigns, complemented by an online platform, these campaigns would be more effective in turning awareness and subsequent interest into on-the-ground installations for residential consumers. With committed stakeholders and a supportive ecosystem including financing options, Solarise campaigns (and campaigns of a similar nature) can become a powerful tool for increasing RTS adoption in the residential sector.

Demand aggregation refers to bundling a group of consumers from a defined geographical area interested in installing RTS and presenting them as an aggregated demand to solar developers.

Image: Akash Gupta/CEEW

1. Introduction

On 12 August 2021, India achieved a significant milestone of 100 GW of installed renewable energy capacity in its long journey towards tapping renewable energy for the country's growing energy needs. The share of RTS is minuscule and currently stands at 6.4 GW out of the overall installed solar power capacity of 43.94 GW (MNRE 2021). The growth rate of rooftop installation has been marginal over the years, with maximum installations registered in the commercial and industrial (C&I) sector (71.28%) (Bridge to India 2020a). The rooftop sector (RTS) in India, despite its poor uptake, has a tremendous technical potential of 210 GW in the urban areas (TERI 2014). Several factors have contributed to limit its growth. Limited consumer awareness and willingness to buy RTS hinders its adoption—only 4.7 per cent of households surveyed across the country expressed a willingness to buy RTS systems for their homes (Agrawal et al. 2021). Dutt (2020b) notes that residential RTS has not seen the expected adoption rates due to high capital cost, low savings for consumers, lack of financing options, and insufficient level of consumer awareness, among others. Moreover, certain risks perceived by vendors in the residential sector, such as payment non-compliance, high consumer acquisition costs, low profit margins, and distorted market prices, also contribute to RTS not gaining traction in the market (Dutt 2020a; Singh, Sinha, and Shrimali 2018).

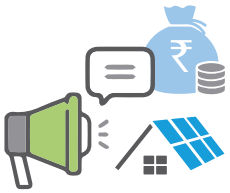
RTS adoption in the residential sector is limited by lack of affordable finance, low consumer awareness, and risks perceived by vendors such as non-payments and low profit margins

One of the critical factors impacting the adoption of RTS is the low electricity tariff in the residential sector, which varies from INR 2.5 to INR 4 per unit for a large section of consumers (Saji, Kuldeep, and Chawla 2019). Low electricity tariffs make RTS an expensive proposition for consumers, with a high upfront cost for its installation and long payback periods. Ironically, there is little realisation that RTS presents tremendous economic and environmental savings opportunities both for consumers and electricity distribution companies (discoms).

1.1 Need for rooftop solar demand aggregation for residential consumers

Acceleration of RTS deployment in the residential sector is essential to achieve India's renewed ambition of an installed capacity of 500 GW of renewables by 2030. Several studies point out that lack of actionable and objective information, limited awareness of the technology, social acceptance and peer effects, and scarcity of trustworthy solar installers can come together in multidimensional ways to pose barriers for consumer uptake of RTS (Devi, Narayan, and Mandal 2018; Saji, Kuldeep, and Chawla 2019; Wüstenhagen, Wolsink, and Bürer 2007; Aggarwal, Syed, and Garg 2019; Palm 2017; Dutt 2020a). Low consumer interest due to the abovementioned factors, combined with the risks perceived by vendors in the residential sector, leaves residential consumers with little room for adopting RTS.

Several international and national experiences show that RTS demand aggregation campaigns—utilising awareness building and peer-to-peer influence to purchase solar—are potent tools to promote the adoption of RTS (examples shown in Annexure 1). Demand aggregation refers to bundling a group of consumers from a defined geographical area interested in installing RTS and presenting them as an aggregated demand to solar developers or other demand aggregators such as discoms. (WRI 2021; GERMI 2020). This type of aggregation creates economies of scale by lowering the price for consumers who are offered better services and effectively reducing the consumer acquisition cost for solar developers.



When paired with adequate and affordable financial instruments, demand aggregation campaigns can assist low- and-middle-income consumers to make a transition to RTS

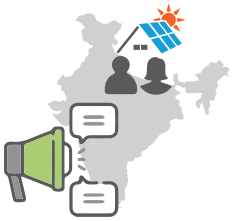
The Solarise campaign, elaborated in our report, differs from the demand aggregation campaigns tested in the past in India as it presents a market-based model that benefits all the stakeholders. The campaign consists of discom's demand aggregation in a targeted community for the selected vendors, enabling more efficient deployment of RTS in the community and lowering outreach costs for vendors. The consumers and solar installers achieve economic benefits, the governments realise their renewable energy goals, and most importantly, the campaign organisers are rewarded for their demand aggregation efforts. Vendors pay a campaign fee to the campaign organisers based on the total capacity installation achieved in the campaign. Further, drafting solar ambassadors from within the community builds deeper trust in the campaign. Research also shows that word-of-mouth recommendations and diffusion of awareness through local social networks play a crucial role in increasing RTS adoption (Palm 2017). When paired with adequate and affordable financial instruments, these campaigns can assist low- and-middle-income consumers to make a transition to RTS.

1.2 The Solarise campaign model in the United States

Recognising the success of demand aggregation campaigns in generating consumer adoption of solar, SmartPower, a non-profit organisation (NGO) in the United States, cemented the 'Solarise' campaign, a community-led strategically designed demand aggregation campaign approach for increasing RTS adoption. Over three years, this NGO has successfully achieved over USD 100 million worth of RTS installations (Evans 2020). The 'Solarise' campaigns leverage the prevalence of community trust and local social networks, combined with educational activities, vetted solar installers and equipment, and cost reduction gained from demand aggregation, to dramatically increase RTS adoption in the targeted communities.

An important feature of the Solarise model used in the state of Connecticut in the United States was to incorporate a market-based design in which solar installers financially support the campaign activities with a small payment per signed contract, in addition to support for the campaigns from the U.S. government. This strategic market-based approach leverages both operational and customer acquisition efficiencies gained by the solar installer to more than offset their cost of financial support; provides a 'ramp' for future support of the campaigns as government support is gradually reduced; and creates a replicable model for funding the campaign activities that can scale. Further, the vendors offer a tiered pricing to consumers through the campaign—essentially, the greater the collective demand for RTS that is aggregated, the lower the price for the RTS system. This incentivises community members to further nudge other community members to adopt RTS so as to increase aggregate demand and thereby get RTS installed at a lower price.

1.3 Solarise Delhi campaigns



Since Indian consumers approach new technologies very differently from American consumers, it was necessary to modify Solarise campaigns to suit the Indian context

Driven by India's previous experiences and those of the U.S.-based NGO SmartPower and WeeGreen (a software platform designed to help communities achieve their sustainability goals), the U.S.–India Clean Energy Finance Task Force (Task Force) pilot tested community-based campaigns such as Solarise in the Indian consumer market. Building trust through peer-to-peer 'word of mouth' and leveraging known and trusted consumer entities such as discoms and residents' welfare associations (RWAs) are the viable ways to provide information about RTS to the consumers. However, consumers in India approach new offerings and nascent technologies very differently from the American consumers, and therefore, it was crucial to modify the campaigns according to the Indian context.

Recognising the opportunity, BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Private Limited (BYPL)—the largest discoms in Delhi—launched the 'Solarise Delhi' pilots to test the designed campaign in their respective service areas. Under the Task Force, co-led by the U.S. Department of State and India's Ministry of New and Renewable Energy, the key objectives of the Solarise project were as follows:

1. Demonstrate the feasibility of discom-led community-based demand aggregation campaigns in India;
2. Assess the effectiveness of consumer awareness activities and peer-to-peer influence approaches to increase RTS deployment;
3. Draw insights from the pilot campaign implementation and recommend solutions to convert consumer awareness into actual installations.

The Solarise campaigns aimed to achieve these objectives through a comprehensive suite of features designed to provide a smooth experience for consumers all along their RTS journey. The campaigns were designed to help communities take the often-difficult decision of investing in renewable energy and move to a greener and more sustainable future. We present the performance of the campaign in this report, focusing on the key performance indicators, and then provide actionable recommendations based on the campaign teams' learnings and experiences in organising and implementing Solarise Delhi campaigns.

1.4 Research methods

The Solarise Delhi campaigns and the accompanying research were carried out using a combination of quantitative and qualitative methods. Since the primary intervention was an awareness and motivation campaign in targeted local communities, extensive stakeholder interactions were conducted in all phases of the project. We spoke to community leaders, early RTS adopters, local market associations, and business owners to obtain useful behavioural insights and views on RTS.

While designing the campaign, we consulted regularly with discom officials and members from SmartPower and WeeGreen to obtain key inputs on campaign planning, structure, and execution. We referred to campaign guidebooks of Solarise campaigns in the United States to understand the campaign's key features, while content from other awareness campaigns was

reviewed during the campaign design and content creation process. All campaign collaterals such as guidebooks, WeeGreen websites, WhatsApp messages, social media posts, and advertisements were developed by the campaign team and reviewed internally. The campaign management processes and protocols were developed and reviewed in collaboration with members from the U.S. teams.

A monitoring and evaluation plan was developed and implemented right from the planning stage to effectively measure campaign performance on key indicators. Data was regularly collected through WeeGreen website, Facebook pages, and Zoom webinars for online interactions between consumers and the campaign activities and events. A post-campaign feedback survey was rolled out to the 117 leads to collect data on campaign performance and consumer perception. The results from the survey have been reported in Chapter 3.

We discuss the campaign approach and design and list the key features and activities in the campaigns in Chapter 2. The performance of Solarise campaigns in Delhi and the United States is compared in Chapter 3. The insights and learnings from the implementation are explained in Chapter 4. The recommendations on how to scale up RTS adoption in India are offered in the final Chapter 5.

2. Solarise Delhi: a pioneering effort

Image: CEEW Solarise Delhi team

The Solarise Delhi campaigns were launched virtually on 1 November 2020 and rolled out over a period of 12 weeks (November 2020 to January 2021) with a host of engaging virtual activities supported by a comprehensive suite of informative content, digital tools, and robust consumer acquisition and handholding processes.

The COVID-19 pandemic necessitated a shift in the campaign from a primarily in-person format to virtual platforms while maintaining the sanctity of the campaign to achieve the intended objectives. This also resulted in overall cost reduction for the discoms in organising the campaigns.

WeeGreen: A powerful campaigning tool

The WeeGreen platform, central to the Solarise campaigns right from the beginning, assumed critical importance in the virtual plan. The platform was instrumental in providing a smooth and comprehensive suite of services to the consumers on a single platform such as information about rooftop solar, testimonials from rooftop solar owners, upcoming event details, recordings of past events, and avenues to sign-up for a rooftop site evaluation.

The platform is a template enabled to create campaign-specific pages, upload and change content quickly, and keep track of traffic and lead generation without the need for additional resources or time. Thus, it provided a simple, innovative, yet effective solution for the organisers.

Table 1 Key features and objectives of the campaigns

Campaign objectives	Key interventions and features
Easy access to actionable information on RTS	• WeeGreen platform • Series of webinars on different aspects of RTS
Leveraging community trust and peer-to-peer influence	• Solar ambassadors from within the community • Initiating dialogues through workshops, open house events, WhatsApp conversations • Worked closely with the RWAs to access the local social networks
Streamlining purchase experience	• Customer hotline for doubts/queries • Virtual demonstration events • Robust consumer interest management • Informational content on operation and maintenance
Create a compelling offer for consumers	• Limited-time discount offer for the campaign • On-boarding empanelled vendors as partners to provide quality and dependable services to consumers and instil confidence in the technology
Participation from trusted stakeholders	• Active participation from local discoms, state government, and trusted advisers such as SmartPower • Support from the U.S. and Indian governments
Market-based mechanism benefiting campaign organisers	• A discount of INR 1,000/kW given by vendors to consumers, which could be diverted to campaign organisers for their demand aggregation efforts

Source: Authors' analysis based on previous Solarise campaigns

Designing the Solarise campaigns

The most suitable neighbourhoods for carrying out the Solarise campaign require a high level of social interaction, individual houses with exclusive roof ownership, and families with medium-to-high purchasing power. Considering these factors, BRPL selected Safdarjung in South Delhi and BYPL selected Karkardooma in East Delhi as their target neighbourhoods for the Solarise campaigns. Overall, community leaders of 23 RWAs (covering close to 11,000 households) in Safdarjung and 7 RWAs (covering nearly 4,000 households) in Karkardooma expressed their approval to participate in the campaign. Therefore, the mentioned neighbourhoods were finalised as the target audience for the campaign pilots. Key elements for designing and managing the campaign are discussed below.

a. A comprehensive support system

The Solarise campaigns were a collaborative effort between key stakeholders in the RTS ecosystem—government, discoms, vendors, consumers, and civil society organisations (CSOs). The roles, responsibilities, and relationships between different stakeholders were defined using the RACI (Responsible, Accountable, Consult, Inform) framework. The detailed roles and responsibilities of each stakeholder are discussed in Annexure 2.

b. Benefits for all stakeholders

The Solarise campaign model offers a sustainable business model in which all stakeholders—the solar developers, financiers, homeowners, the campaign organisers, communities, and utilities—can share the benefits of the increased net revenues from installing RTS by first undertaking these campaigns to increase awareness and residents' adoption of RTS. Under the Solarise Delhi pilots, the RWAs, as campaign runners, were payable a sum from vendors based on the installed capacity within their locality. The fee was set at INR 1,000/kW of installed capacity.

The online model eliminated the need for on-ground resources and resulted in considerable cost savings. The costs for arranging events, consumables, and logistics were completely eliminated. A few posters were printed and put up in common areas in the targeted communities. This provided some on-ground presence. However, an on-ground campaign undertaken with adequate safety measures will still entail costs for the organisers. Such costs may be borne by the discom, if they are the main organisers, or other stakeholders such as RWAs, NGOs, and solar vendors, whoever leads the campaigns.

Figure 1 Compelling catchphrases were essential to capture consumer attention

Image: CEEW Solarise Delhi team

Source: Prepared by Solarise Delhi team for circulation among consumers on WhatsApp

c. Compelling and informative activities and events

Each activity was well designed and organised to provide maximum value to the consumers. CEEW, discoms, and solar vendors were available in most virtual activities to respond promptly to consumer queries. The activities were intended to educate the consumers about various benefits of RTS, motivate them to adopt the technology, and accelerate the adoption by providing a simple, accessible, and trusted platform. An example of a WhatsApp graphic for one such activity is shown in Figure 1.

Awareness activities were supported by the WeeGreen platform, which served as a single platform for all the campaign-related information, cost and technical know-how on RTS, solar vendor contact details, among others. The platform played a key role in organising and implementing the campaigns during the COVID-19 pandemic as restrictions were placed on outdoor activities. Detailed coverage of the events, including the content, is provided in Annexure 2.

d. Connecting effectively with the consumers

The Solarise campaigns recognised the value of community trust and leveraged it by engaging local ambassadors and RWAs to initiate dialogues about RTS organically. Since the campaigns were designed to be virtual, it was essential to engage with the communities regularly, update them on upcoming events and announcements, and get consistent feedback. In addition to circulating campaign information through WhatsApp, the content was also shared on the Solarise campaigns' social media pages to have broader outreach. Several channels of communications were used during the Solarise Delhi campaigns, as shown in Figure 2.

Figure 2 Mobilising different communication channels helped understand their effectiveness in capturing consumer interest

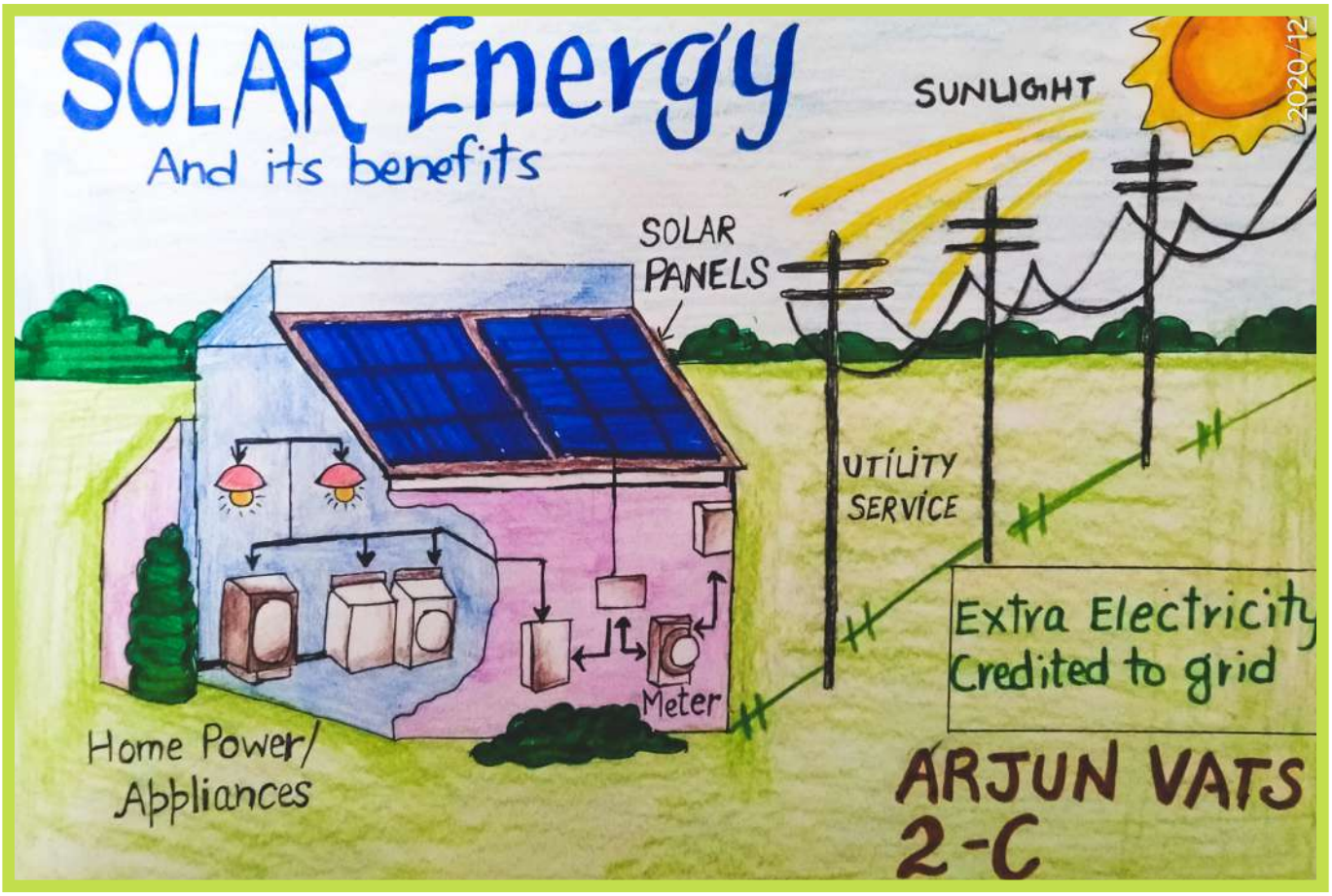
Source: Authors' representation of communication channels utilised during the campaigns

e. Trusted vendors selected for quality services

The Delhi discoms have meticulously empanelled RTS vendors to execute the MNRE Grid Connected Rooftop Solar Phase-II scheme. Motivated empanelled vendors who could deliver a quality consumer experience were selected by the discoms as partners in the campaigns through a rigorous, fair, and transparent process led by the discoms with support from CEEW. The process involved evaluation of selection parameters such as total installed capacity, experience in the residential RTS sector, consumer satisfaction, and value-added services offered. Based on the evaluation, three empanelled vendors were selected as campaign partners.

f. Lead management: capturing consumer interest

The campaigns were supported by a meticulous consumer acquisition process, which simplified the process of applying for RTS. This was carried out through an integrated system that collated lead generations through different platforms (WeeGreen, WhatsApp, hotline numbers) and the leads were shared with campaign vendors systematically and timely. Regular follow-ups on the progress of every lead ensured that consumers got the best vendor experience and had all their queries and doubts answered promptly. A detailed explanation of the lead management system is available in Annexure 2.



The solarise campaigns engaged with children in the target communities through workshops, live demonstrations, and youth competitions.

Image: CEEW Solarise Delhi Campaigns

3. Understanding campaign performance

The Solarise Delhi campaigns were designed to educate the consumers, motivate them, and accelerate their RTS adoption. The campaigns were implemented on a pilot scale to examine their scalability potential to other areas and states. Therefore, monitoring and evaluation of the campaigns were done through continuous monitoring of consumer engagement throughout the campaigns, social media statistics, feedback surveys, and semi-structured interviews with key stakeholders. The chapter discusses the campaign's overall impact in detail and delves deeper into the consumer perception about RTS and Solarise.

Despite the restrictions due to COVID-19, the Solarise campaigns were successful in engaging with consumers virtually. Over 1,400 consumers interacted directly through the campaign's communication channels

3.1 Consumer engagement during the campaigns

The performance of the campaigns was evaluated considering the limitations imposed due to social distancing as a safety measure in the times of COVID-19 and the lack of financing options highlighted above. Consumer engagement was measured through interactions and attendance during the campaign activities, visits to the WeeGreen websites, lead generation, and proposals shared. These indicators provided a clear understanding of the campaigns' impact at each stage of the consumers' solar journey—from attending the webinars to installing the systems.

a. Engagement through events and WeeGreen pages

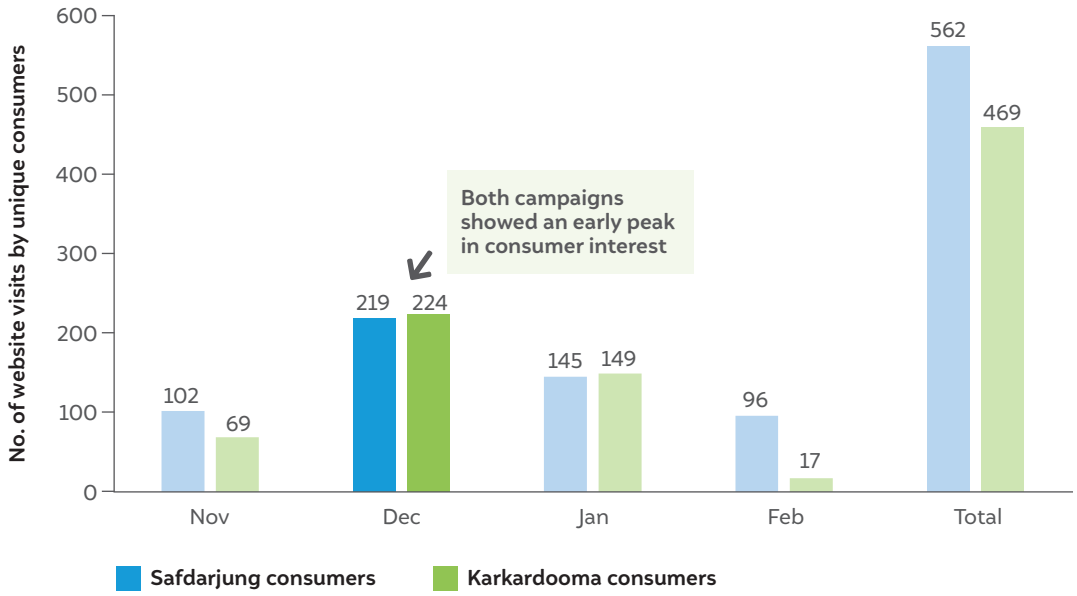
Across 10 virtual events, 403 consumers participated and interacted during the campaign activities. Male participation (63 per cent) was more than twice the female participation (30 per cent). The remaining 7 per cent of the participants were placed under the 'unknown gender' category.[4] Overall, the participation rate was high, but a drop in attendance was observed in the last few weeks of the campaigns. By contrast, U.S. Solarize campaigns typically presented a high participation at the beginning, slower in the middle, and high again at the end.

Over the three-month duration, 1,021 consumers visited the Solarise web pages—562 unique visitors for Solarise Safdarjung and 459 for Solarise Karkardooma. Both the websites witnessed the highest number of visitors in December 2020—the second month of the campaigns. The lowest visitor count was registered in February 2021—in the month right after the campaigns concluded.

4. The data has been compiled from the auto-generated Zoom meeting reports of each event held as part of the campaigns. The meeting reports capture the name of the attendee, but not the gender. Gender classification has been done based on traditional names for men and women in India. Some names of attendees were not easily discernible, had just acronyms, or had other identities (e.g. K's iPhone, AT, Galaxy Tab, etc.). These have been aggregated under the 'unknown gender' category. It should be noted that the classification has been done to the best of the team's knowledge and understanding of Indian names.

Figure 3 depicts a trajectory commonly seen in awareness campaigns, with an early peak in interest, which slowly tapers off towards the end. It is also worth noting that across both the websites, an average visitor spent 3–4 minutes on the website. However, much information was available in PDF documents, and we could not capture the overall time spent on these individual links.

Figure 3 Highest website impressions on WeeGreen during Solarise Safdarjung were in December 2020

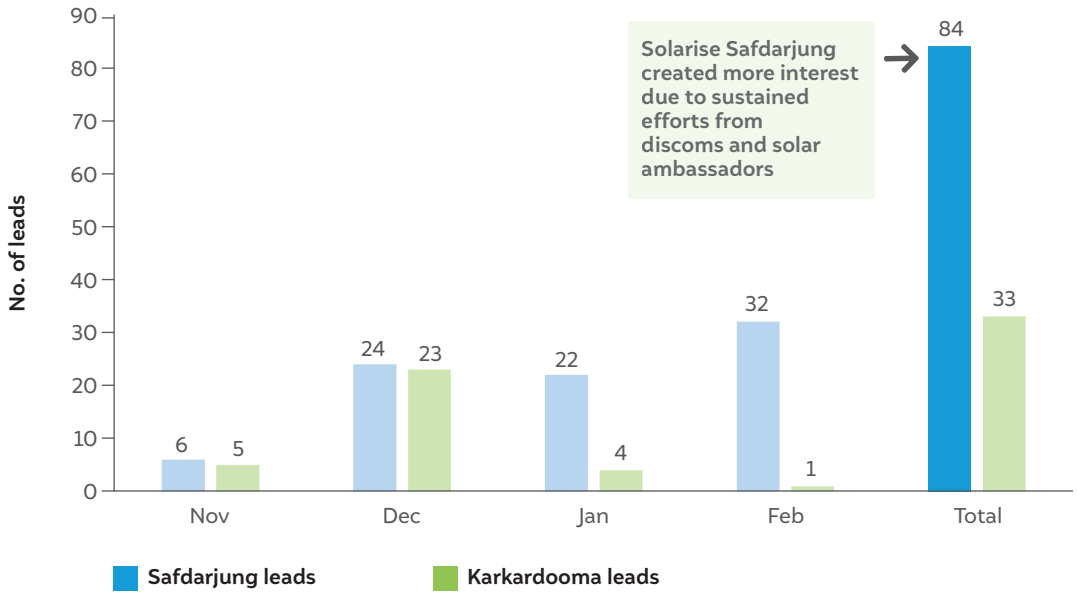


Source: Authors' analysis

b. Lead generation and conversion

The people signing up for evaluation were termed as leads and the lead count was registered throughout the duration of the campaigns. These leads were primarily generated through the WeeGreen websites, hotline numbers, or WhatsApp messages supplementing the avenues available to consumers.

Figure 4 Monthly leads generated increased over the months during Solarise Safdarjung



Source: Authors' analysis

The campaigns were able to generate a total of 117 leads from interested consumers over the three-month duration. Lead generation was maximum through WeeGreen websites for the campaigns, followed by hotline numbers for Safdarjung. Solarise Safdarjung continued to see higher leads throughout the campaign due to effective communication of the discom in January and February 2021. Figure 4 shows the spread of lead generation per month of the campaign.

The lack of affordable financing options and changes in financial priorities due to COVID-19 restricited the conversion from proposals to actual installations

c. Proposals initiated and proposed capacity

The generated leads were shared with vendors on a rolling basis. However, vendors observed that RTS was not feasible for many leads due to different reasons such as lack of appropriate roofs, insufficient space for a large system to realise any benefits, or additional time needed by the consumer to decide after understanding the initial financial outlay. These are also some of the major barriers cited in other secondary literature as well to adopting RTS in the residential sector (Bridge to India 2020b).

Despite these entry barriers, the partner vendors were still able to share detailed proposals with 22 leads. Sixteen proposals totalling 110 kW of proposed capacity were shared in Safdarjung, while six proposals totalling 30 kW capacity were shared in Karkardooma. With a total proposed capacity of 140 kW and an investment potential of approximately INR 4 million (INR 40 lakh), the campaigns generated significant interest in RTS from the targeted consumers.

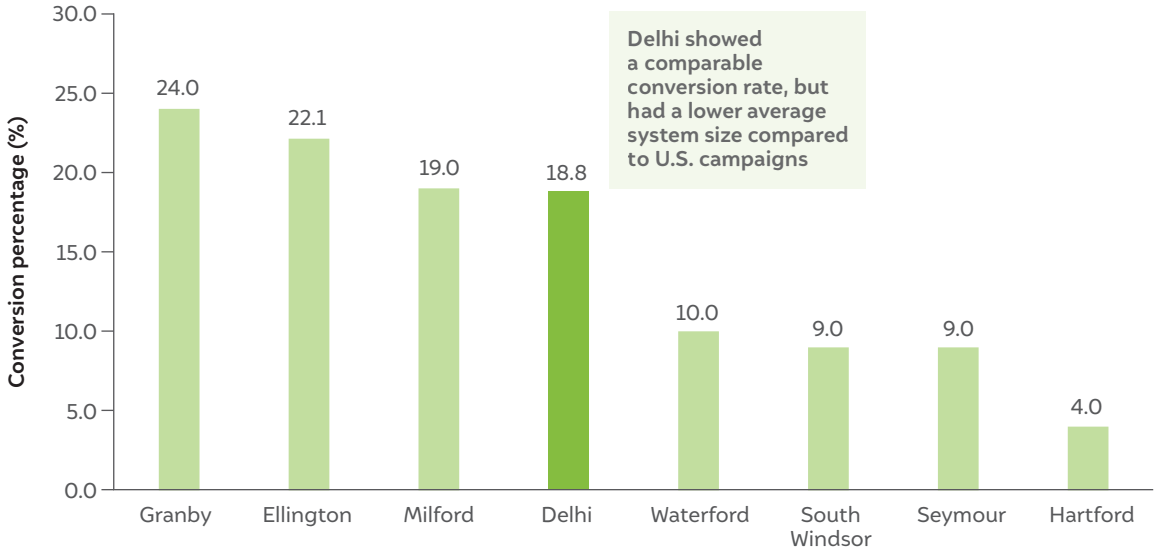
The Solarise Delhi results are comparable with the U.S. campaigns. Solarise Delhi generated 117 leads and 22 proposals were shared during the prevalence of COVID-19 in the country. The results are comparable to two pre-COVID Solarize campaigns organised in Rhode Island during the summer of 2019, that is, 'Solarize Narragansett' (108 leads, 16 contracts) and 'Solarize Jamestown' (223 leads, 29 contracts). Assuming a majority of the proposals would convert to contracts under non-COVID conditions,[5] Solarise Delhi also had comparable performance to Solarize Connecticut campaigns, as shown in Figure 5. At a conversion rate of 18.8 per cent,[6] the Delhi campaigns created considerable consumer interest.

However, the lack of financing options restricted the consumers' willingness to buy RTS. The role of financing options is evident from the data on Solarise Connecticut campaigns organised during spring and summer of 2017. Across seven campaigns, a total of 133 contracts were signed with more than 65 per cent of consumers opting to choose a financing option to fund their RTS purchase.

5. U.S. Solarize campaigns did not track proposals but only tracked (1) initial interest requests; (2) site visits (which indicates a roof eligible for solar and property ownership); (3) signed contracts, and (4) whether financing was used.

6. Conversion rate refers to the share of generated leads that got converted to actual installations.

Figure 5 Solarise Delhi achieved results comparable to Solarise Connecticut campaigns held in various towns

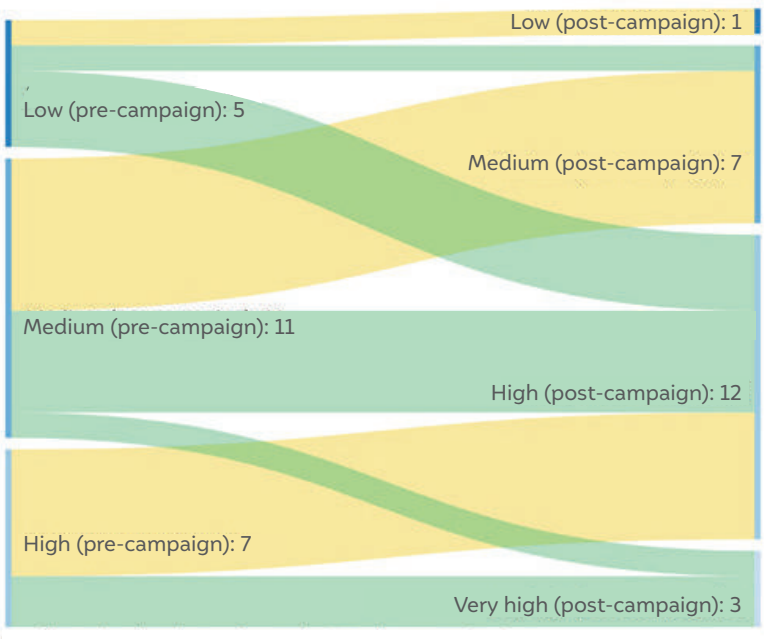


Source: Authors' analysis. Data on Solarise Connecticut campaigns shared by SmartPower team

3.2 Effect of the campaigns on consumer awareness and perceptions

A feedback survey was undertaken after the campaigns to capture consumer perspectives and perceptions. The consumers who had signed up for a rooftop evaluation ('leads') were approached for the survey. Forty-three per cent of respondents reported an increase in their awareness levels after interacting with the campaign (Figure 6). The survey findings indicate that even consumers with higher awareness levels also benefited from the campaigns.

Figure 6 Consumer awareness levels increased after the Solarise Delhi campaigns



Source: Authors' analysis based on responses to post-campaign feedback survey

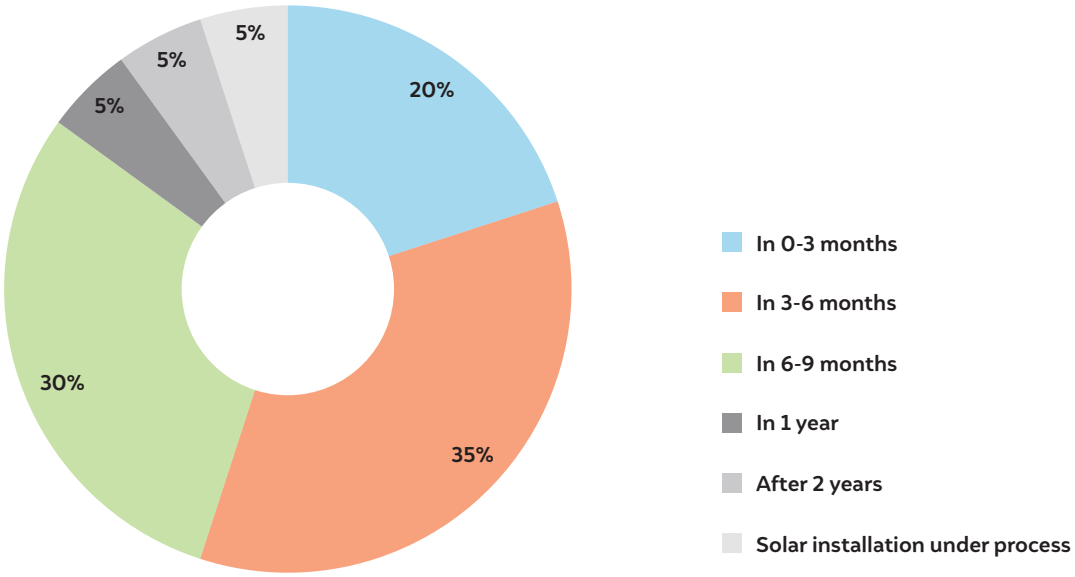
Notes:

- The numbers show the no.of respondents at each awareness level.
- Yellow flows show NO change in awareness level.

That the campaigns increased awareness was also supported by participants' response to timelines for buying RTS. Eighty-five per cent of respondents expressed interest in buying RTS within nine months of the survey, as shown in Figure 7. Thus, the campaigns educated and motivated the consumers to adopt RTS, with a potential persistence effect.

The favourable likelihood-to-buy scores may indicate potential installations; however, it is also important to address barriers to adoption for these consumers. Further insights from the feedback survey on campaign preferences are available in Annexure 3.

Figure 7 Most consumers expressed an interest in installing RTS systems within a year



Source: Authors' analysis based on responses to post-campaign feedback survey

3.3 Limitations of Solarise Delhi campaigns

a. COVID-19

The COVID-19 pandemic severely restricted the possibility of organising community-based events and altered the course of organising Solarise campaigns from physical, in-person events to a completely virtual operation. This shift impacted the campaigns' performance in several ways, as discussed below.

First, the true nature of **word-of-mouth recommendations was lost in virtual interactions**. People do not communicate freely as they would during in-person interactions. The possibility of chance encounters that happen in a community on a typical day became negligible due to restrictions on social gathering.

Second, **trust-building through technology demonstrations** was diminished as consumers could not experience a hands-on demonstration of an RTS installation. Consumers often find it hard to trust a new technology without in-person experience, especially for expensive products.

Third, **the on-ground presence of campaign organisers or activities** in the neighbourhood attracts consumers who feel more comfortable with in-person interactions. A kiosk in a community centre or park may attract more attention with minimum effort. On the other hand, participating in online webinars may pose a technological challenge and an extra effort for many consumers, particularly senior citizens, and may even become a reason for them to stay away.

Fourth, the **economic impact of the pandemic** forced consumers to re-evaluate their spending priorities and reduce their appetite for significant expenses. Consumers were unwilling to spend large sums during uncertain times, which in turn hampered their RTS investments, which is still a considerable expense for most Indian households.

Financial offerings by vendors to interested consumers was critical to the success of US Solarize campaigns

b. Financing options

The Solarise campaigns in the United States had partners or vendors offering easy-to-finance options to interested consumers. The Solarise Delhi campaigns did not provide such financing options to Delhi consumers due to lack of suitable financial products. While one partner vendor offered financing options, they were only available for non-subsidised systems sold at a premium, and the campaign did not give too much publicity this financing offer, which would have directed consumers to this sole vendor. However, none of the consumers availed the financing offered by this vendor. This could be attributed to several reasons such as financial difficulties due to lockdown and COVID-19, no financing options for subsidised systems, and the higher overall cost of non-subsidised systems compared to subsidised ones, among others.

c. Empanelled vendors

The Delhi discoms had empanelled vendors for residential RTS under the existing MNRE Grid Connected Rooftop Solar Scheme. The partner vendors for the campaign could thus be chosen only among the empanelled vendors. Further, the Ministry of New and Renewable Energy (MNRE) has set benchmark prices for RTS in India, below which the vendors could not quote prices. These two factors posed a limitation to offer tiered pricing to consumers in the campaign.

4. Learnings from the campaigns

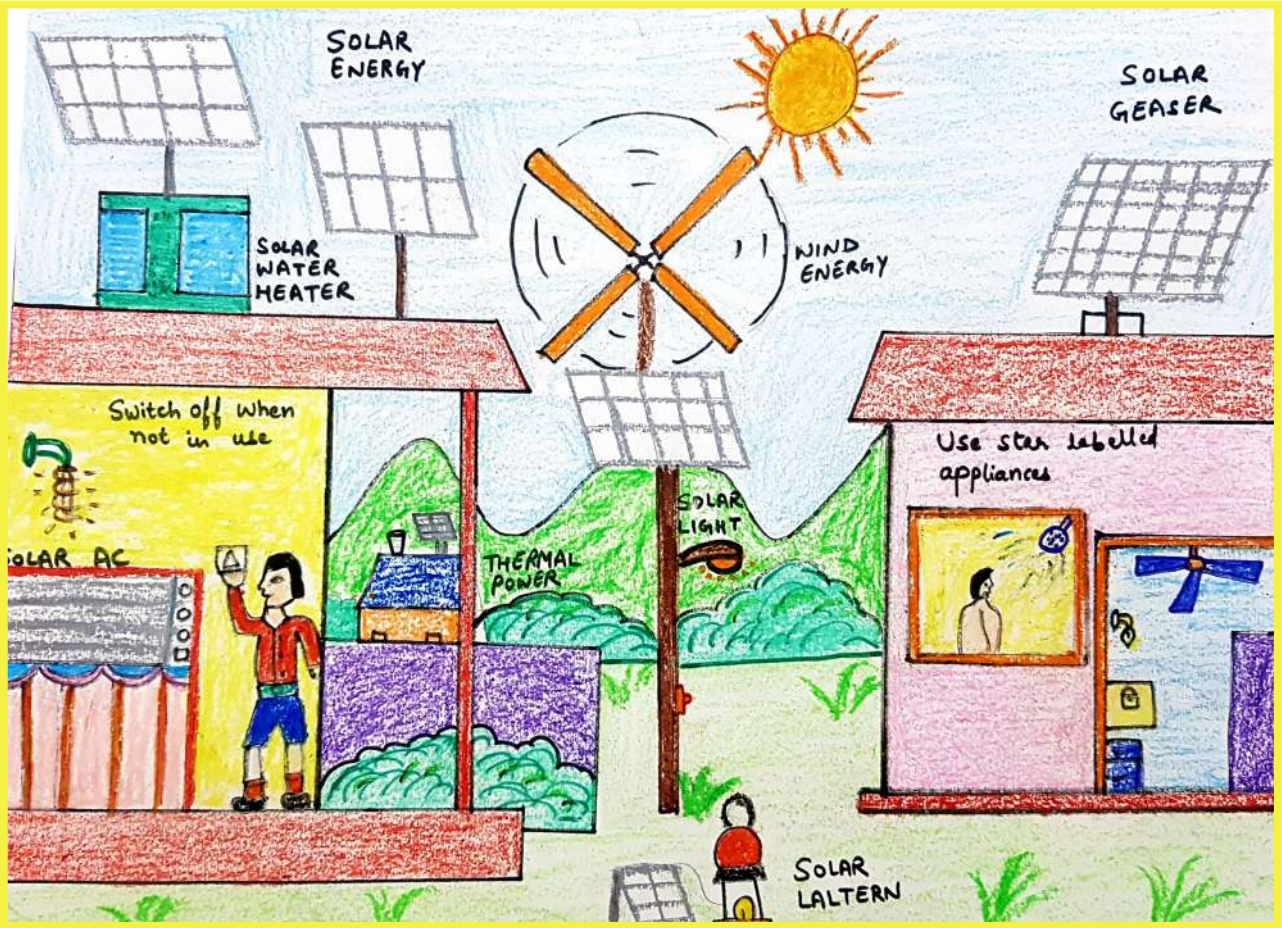


Image: CEEW Solarise Delhi Campaign

The Solarise campaign pilots turned out to be one of the first all-virtual consumer outreach campaigns for RTS in India. Rolling out the campaigns in the middle of the pandemic was also an unprecedented undertaking. The learnings from the past events and outreach efforts were incorporated into the campaigns in real time to continuously improve the quality of content provided and make the Solarise experience smooth and convincing for consumers.

Based on the campaigns' performance results discussed in the previous chapter, we distil valuable learnings to understand the efficacy of utility-led, community-driven Solarise campaigns in the larger Indian context. This chapter draws upon the learnings from the pilots on consumer needs, campaign limitations, and avenues for improvement. In addition, the key insights and learnings were further strengthened by detailed discussions with the stakeholders.

4.1 How did the Solarise campaigns bring value to Indian consumers?

The Solarise campaigns effectively educate consumers because they bring the concept of RTS directly to the consumers. By bundling together information in one place, providing compelling offers, and leveraging community trust, the Solarise pilots motivated community members to initiate conversations to create interest in RTS.

a. Assisted consumers in navigating their solar journey

While consumers reported some awareness about RTS before participating in the campaigns, the Solarise pilots further complemented their knowledge, addressed their doubts, and motivated them to start their solar journey by providing continuous support in the process. The feedback responses reaffirmed the findings as 95 per cent of respondents found the information shared during the campaigns helpful in learning about RTS. Additionally, around 43 per cent of the respondents reported improvement in their level of awareness.

The actionable information shared through the WeeGreen platform and the virtual activities addressed consumers' doubts and nudged them towards RTS adoption. A detailed information booklet (excerpt shown in Figure 8) helped consumers understand the basics of RTS in a lucid manner and contained detailed responses to all frequently asked questions.

b. Solarise removed common barriers to rooftop solar adoption

Consumers often cite insufficient information about RTS technology and the lack of a convenient point of contact as a barrier to adopting RTS systems. Solarise addressed these issues by bringing all the relevant information and stakeholders on one unified platform and customised it according to consumer requirements. Consumers could access information about RTS through the website by participating in campaign activities, dialling in dedicated call numbers, or by talking to a solar vendor.

Solarise provided an environment where the consumers were provided information and support throughout their solar journey—from understanding the basics to getting their net-metering applications processed. Further, facilitating dialogues between community members helped build greater trust in RTS.

c. Virtual-only campaigns were a stop gap approach for raising consumer awareness

Implementing Solarise campaigns through an all-virtual mode was the only safe pathway forward due to the COVID-19 pandemic. The pilot provided an opportunity to showcase that virtual Solarise campaigns are a viable method for aggregating demand using social media, virtual meetings, community networks, and direct conversations. The positive feedback from consumers and vendors and high participation rates further corroborated the findings. Despite the limited installations,[7] vendors highlighted the importance of systemically educating consumers about RTS as a key step towards higher adoption. Consumers were also receptive to the campaigns and suggested holding more such campaigns once the pandemic subsides. However, virtual campaigns should complement primarily in-person activities and interactions wherever safely possible to build deeper trust in the campaign and RTS technology.

7. A member from one of the target communities expressed interest in RTS installation. After getting a roof evaluation and a proposal, he ultimately installed an RTS system through a solar vendor outside the campaign.

Figure 8 Solarise provided information from the basics to installation to maintenance

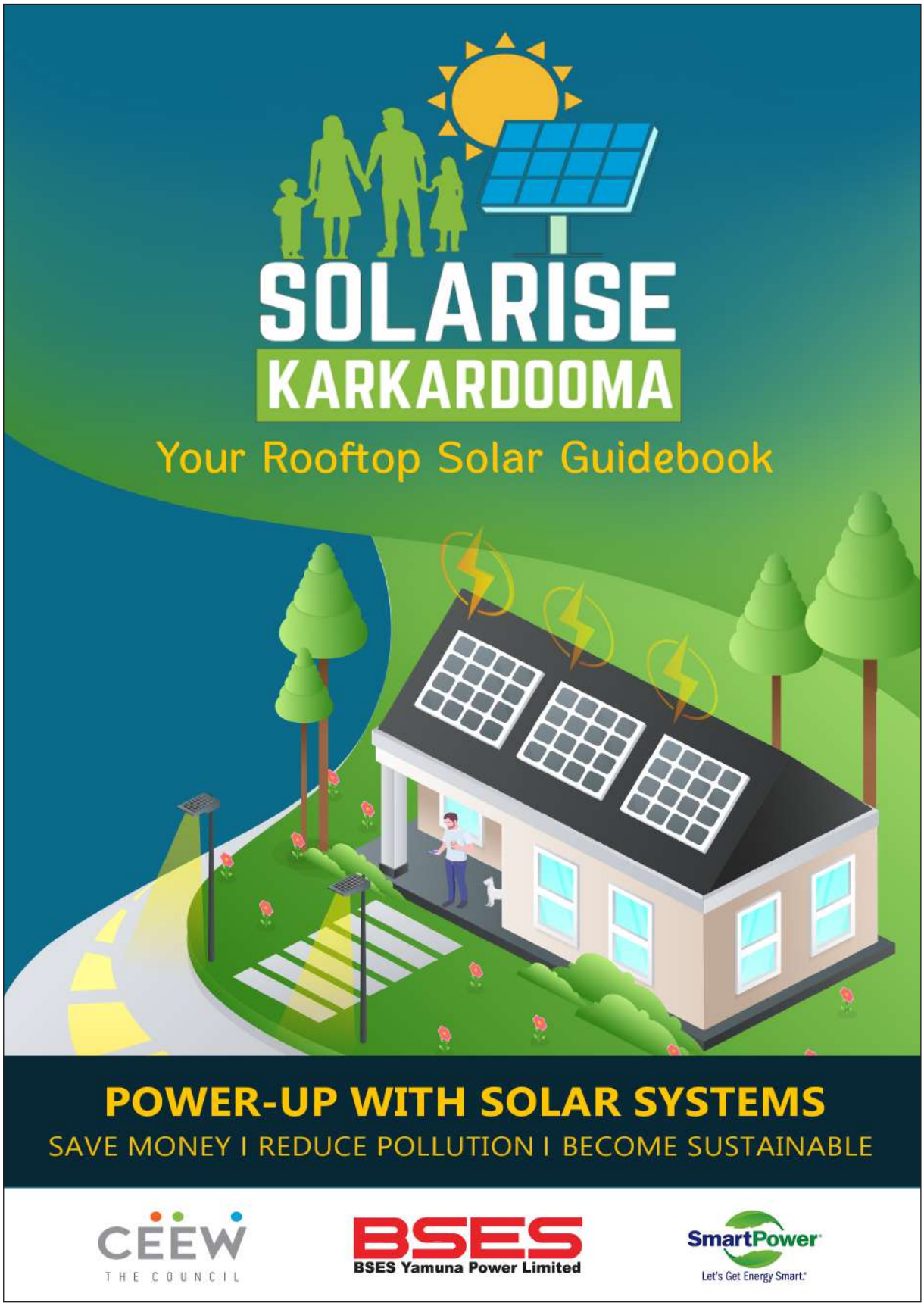


Image: CEEW Solarise Delhi team

Source: Cover of the RTS information booklet created by Solarise Delhi team.

d. Persistent awareness about rooftop solar in the communities

While the Solarise Delhi pilots did not create many avenues for in-person, community dialogues, all respondents to the feedback survey stated that they would be willing to talk to others about RTS. Approximately a third of the respondents had already spoken to someone about the campaigns and RTS, indicating a potential increase in community discussions as the restrictions begin to ease. Such social interactions have a strong trust factor and can assure consumers that RTS is a functional and reliable technology (Palm 2017). Research on the Solarise campaigns also suggests that word-of-mouth interactions lead to higher persistence of RTS awareness and interest in targeted communities after the campaigns conclude (CBEY 2018; Gillingham and Bollinger 2017). Such communities consistently lead in RTS deployments even years after the campaigns end—the awareness persists and creates a snowball effect of consumer interest in the technology.

4.2 Campaign limitations and scope for improvement

The Solarise pilots highlighted several avenues for improvement, which if strengthened, could provide more value to consumers.

a. Better vendor training

The vendors were primarily responsible for liaising with the consumers once they had registered their interest. However, several consumers mentioned in the feedback survey that some vendor representatives were unsure or unclear on several policy aspects and application processes. In future campaigns, the vendor representatives could be trained pre-launch and given the necessary information and tools to provide verified information to the consumers confidently. This will help build confidence and lead to a more active consumer interest in installing RTS.

b. Availability of financing options

The availability of financing options can be a decisive factor for many price-sensitive consumers looking to install RTS. A majority of consumers in U.S. Solarise campaigns such as Solarise Connecticut chose a financing option for their RTS purchase. The lack of suitable financing options in the Solarise Delhi campaigns restricted many potential consumers from making the purchase.[8] Future campaigns should aim to partner with reputable financial institutions and require service providers to offer compelling financial assistance options to consumers or make it mandatory for vendors to provide such financing options in order to participate in the campaign.

c. Timing the campaign

We organised the Solarise campaigns from November to January, that is, in the middle of the winter season. Vendors recognised that this time period might have impacted lead generation and conversion. Consumers were not too concerned about their electricity bills in this season and, therefore, did not seek avenues to save electricity costs. Thus, it becomes crucial to identify the seasonal variations in electricity consumption in the target communities and regions and plan the duration and timing of the campaign accordingly.

8. While one of the participating vendors offered financing, the campaign could not single out this vendor without disadvantaging the other participating vendors. Future campaigns could consider vendors offering financing requirements mandatory for their participation in the RTS campaigns.

d. Demand aggregation: a collective effort

Community groups have traditionally organised the Solarise campaigns with sponsorship and help from local or state energy agencies and civil society organisations. The Delhi discoms, CEEW, solar vendors, Task Force, and various other stakeholders brought together a varied set of experiences in the Solarise Delhi pilots. This diverse set of stakeholders was a requirement and a cause for the success of the campaigns.

This experience clearly shows that demand aggregation on a community or regional scale needs concerted efforts from multiple key stakeholders. While discoms or other NGOs can drive these campaigns, support from different national and state-level stakeholders can help in effectively implementing them.

Peer-to-peer influence in a community is a strong tool for building trust in RTS technology and motivating consumers to adopt it.

Images: Akash Som Gupta & Milan George Jacob/CEEW

5. Recommendations to scale up adoption of rooftop solar

RTS adoption in the residential sector remains a crucial link for India's transition to clean energy and a net-zero future. Community-driven demand aggregation campaigns offer tremendous potential for unlocking the latent demand in India's residential rooftop solar sector. However, there is still a need to convert consumer awareness and motivation to go solar into actual RTS purchases and installations. Based on the learnings from the Solarise Delhi and the U.S. Solarise campaigns, we offer the following recommendations to bridge the gap between consumer awareness and action and support consumers in navigating through their solar journey.

Consumer-centric policy interventions and services can help make RTS more accessible for the average Indian consumer

5.1 Provide access to affordable financing options

The availability of affordable financing, such as loans, can play a significant role in deploying RTS at greater scale through successful demand aggregation campaigns. For example, vendors in Solarise Connecticut in the United States offered multiple financing options to consumers. In seven out of eight campaigns, an overwhelming majority of consumers who installed RTS availed a financing option. Overall, 65 per cent of all installations in the eight campaigns were achieved by using debt or leasing financing.

In India, access to financing for RTS in the residential sector remains limited. Both vendors and financial institutions favour financing commercial and industrial (C&I) RTS projects over residential projects. This is mainly due to the perceived risks in the residential sector such as low payment security, smaller demand sizes, higher operational costs, and lower margins for vendors. Solarise campaigns can serve as an effective vehicle for discoms and vendors to aggregate demand in a cost-effective manner in a targeted community over a defined period, while reducing the vendor's consumer acquisition costs compared to one-off installations. This form of residential demand aggregation would have vendors more inclined to offer affordable financing options or pass on some of these benefits to the consumers in the form of price reduction.

Innovative financial instruments such as solar loans, app-based non-bank financial companies, top-up on home loans, designated solar loan credit cards, and zero down payment loans can alleviate the initial burden of high capital cost for a large section of Indian consumers. Banks and other financial institutions may also be directed to devise dedicated instruments for rooftop solar locally, with suitable mechanisms for evaluating the consumers' creditworthiness. These financial entities could provide a dedicated finance facility, similar

to a line of credit available to C&I consumers, for residential RTS adoption. This line of credit could be supported by a credit guarantee from a creditworthy state-owned financial institution to offset the risk of non-payment by resident consumers.

In addition, by adding a provision in the procurement guidelines, the MNRE could ask bidders seeking empanelment in the grid-connected rooftop scheme to offer innovative financing mechanisms to consumers. In their vendor selection criteria, discoms could rate bidders more favourably if they offer accessible financing options to consumers.

Figure 9 Access to affordable financing options is a key requisite

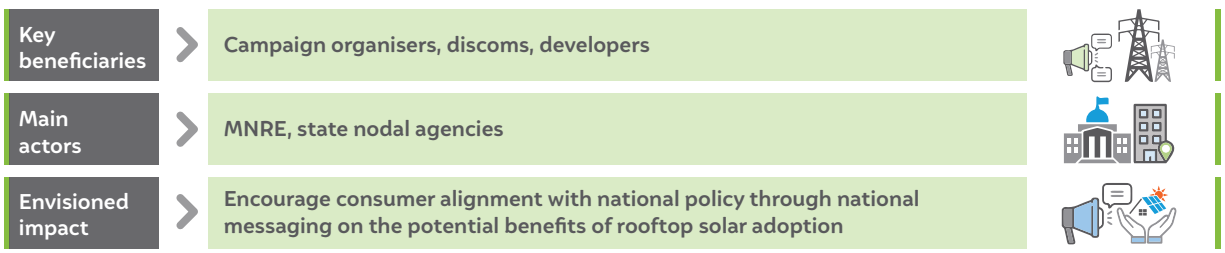
Source: Authors' analysis

5.2 Create a central government push for rooftop solar

The Indian government recently launched several campaigns to change consumer perception and encourage pro-environmental behaviour, such as *Swachh Bharat Abhiyan* (Clean India Initiative) and *Swachh Indhan, Behtar Jeevan* (Clean Fuel, Better Life). Consumers respond positively to the government's messages highlighting national priorities. To push the agenda of the clean energy transition, Grid-Connected Rooftop Solar Programme Phase-II identified consumer awareness as a key objective. The MNRE appointed discoms as the nodal agency for carrying out consumer awareness campaigns.

However, only a few discoms have carried out awareness campaigns to nudge the consumers to adopt RTS. The central and state governments can display leadership and initiative and highlight RTS adoption as a national priority to meet sustainability targets. Local discom activities for popularising RTS will gain further support and buy-in, if actively complemented by a national push for residential RTS. A large-scale awareness campaign from the government can increase consumer trust and encourage more proactive thinking about RTS. Similarly, the Petroleum Conservation Research Association (PCRA) annually organises a mass awareness campaign to change consumer behaviour and motivate them to use fuels consciously and transition to cleaner fuels. Similarly, the MNRE can coordinate with the discoms/states and organise regular local campaigns and online events in regional languages.

Figure 10 A national-level awareness campaign for RTS can re-ignite consumer interest



Source: Authors' analysis

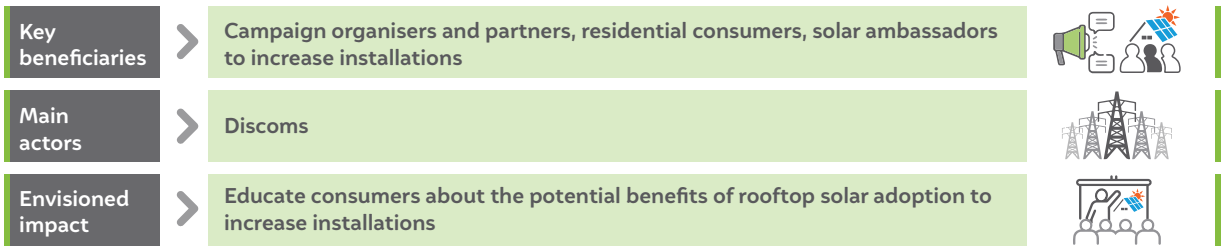
5.3 Discoms act as a catalyst for demand aggregation

The discoms are the key stakeholders in any demand aggregation campaign; they are trusted and recognised by the consumers as legitimate entities committed to serving them. This makes the discoms highly effective at convincing consumers and instilling a positive outlook about RTS. The Solarise Delhi experience suggests that discom communication channels are highly effective at garnering consumer interest. Discoms can use their extensive consumer outreach networks to share information about RTS regularly. Timing the communications can further increase consumer interest in RTS, especially during peak months of energy consumption.

It is thus important that local discoms lead the efforts to launch and implement awareness campaigns and lend their name and credibility to the campaigns by being at their forefront. The discoms can further delegate or partner with other experienced stakeholders such as NGOs, RWAs, and solar vendors for executing the campaign if the discoms are unable to lead the campaigns. The discoms can also increase their involvement with communities by establishing long-term 'solar ambassadors' programmes. The discom can convene, empower, and consult with motivated consumers who can further act as solar ambassadors in their communities.

In addition to discoms leading the way, a consortium of strong and trusted stakeholders will be critical to bring the support and experiences required to execute demand aggregation campaigns efficiently. In the Solarise Delhi pilots, stakeholders such as discoms, CEEW, solar vendors, and the Task Force brought together varied experiences, which contributed to the success of the campaigns.

Figure 11 Discoms can play a key role in aggregating consumer demand



Source: Authors' analysis

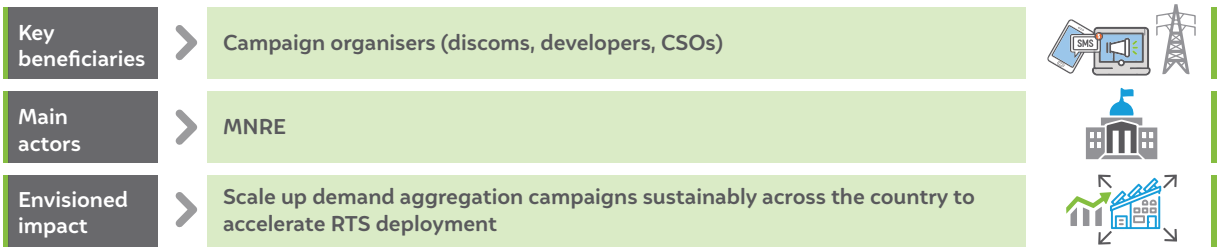
5.4 Develop central repositories for campaign resources

Community-based demand aggregation has proven to be highly effective, but organising them requires significant resources and efforts from key stakeholders. Access to the requisite knowledge and resources to plan and execute Solarise campaigns would help scale up demand aggregation campaigns sustainably across the country.

A central online repository of required campaign resources can become a supporting tool for future campaign organisers. This kind of repository could host several supporting tools such as guidebooks for campaign organisers, planning templates, design ideas, awareness content for consumers, monitoring and evaluation plans, and lists of local partners, including

civil society organisations (CSOs) who can become potential partners. It can also become a discussion platform for campaign organisers to share best practices and knowledge. Empowering campaign organisers with the knowledge and know-how on a national scale can help sustainably replicate and repeat the Solarise campaigns locally and cost-effectively. The existing unified web portals (UWPs) on rooftop solar could host these repositories along with other actionable information.

Figure 12 Resources for campaign organisers can facilitate expansion of demand aggregation campaigns



Source: Authors' analysis

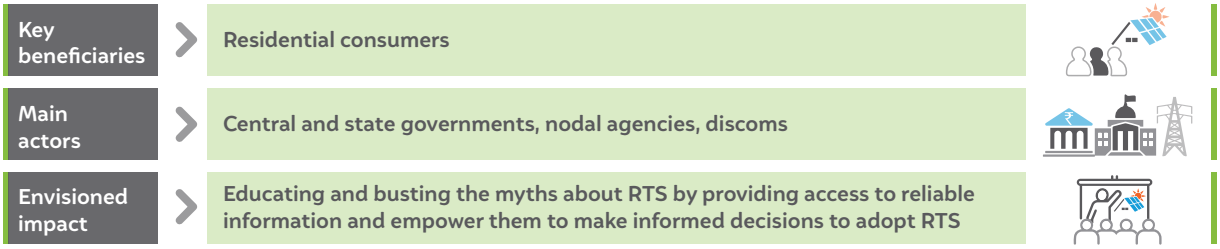
5.5 Share easy to access, basic, reliable, and compelling information about rooftop solar

The MNRE and state nodal agencies have developed dedicated UWPs for RTS adoption. However, the websites are not well-known by consumers and are also often difficult to navigate and use. Publicising the existing portals and making them user-friendly and accessible can provide consumers with a much needed and trustworthy source of information about RTS. Research shows that consumers are still becoming familiar with the technology and primarily seek information on the economic aspects of RTS. These portals could also be publicised widely during the consumer awareness campaign and act as a resource for consumers, similar to the repository for campaign organisers.

Discoms should regularly mention these websites in their consumer-centric communication and provide actionable, yet simple information through them. A template for the website design and relevant information may also be created to further assist the discoms in effectively designing such information resources.

In addition, similar resources could also be created locally for each Solarise campaign. The local discom/campaign organisers could create and maintain dedicated campaign webpages by integrating them with online platforms such as WeeGreen. Collating actionable information online can effectively raise consumer awareness, especially in light of unprecedented events such as the COVID-19 pandemic. Delhi discoms have already created such pages and benefited in terms of consumer participation. Other discoms could also prioritise creating similar resources.

Figure 13 Consumers still need access to basic information about RTS



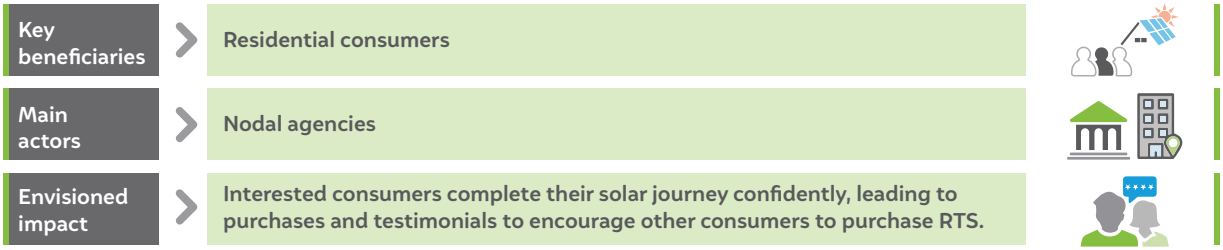
Source: Authors' analysis

5.6 Ensure a smooth solar journey for consumers: From information to installation and beyond

Consumers are still largely unaware of RTS and its benefits and need an impetus to accelerate their solar journey. There is also a lack of knowledge about owning and operating these systems. Providing piecemeal information is not an optimal approach. The Solarise Delhi campaigns focused on delivering a smooth experience for consumers, right from awareness to installation. The Solarise information booklet ensured that the consumers had actionable information needed to maintain their RTS systems effectively. The dedicated campaign support builds consumer confidence in the technology and the ecosystem.

Nodal agencies and discoms should create similar beginning-to-end support mechanisms through platforms such as WeeGreen. Consumers can better understand the technology, benefits, application process, and timelines before applying through such platforms. Further, the process of applying for a residential RTS system can be simplified with a transparent application and tracking mechanism. This will help make RTS more approachable and attractive to consumers. Dedicated solar helplines, standard procedures for operation and maintenance of RTS systems, and further information resources can also help consumers with the knowledge and support to own and maintain their RTS systems confidently. The existing UWPs can optimise their user experience and features to provide a smooth, simple, and transparent solar journey.

Figure 14 Adequate support and guidance for consumers must be provided throughout the solar journey



Source: Authors' analysis

5.7 Promote market-based business models

Market-based business models that transition the RTS segment away from subsidies are needed to accelerate the adoption of RTS by residential consumers in the long run. Such a model offers benefits to all the stakeholders.

The campaign promoted Solarise, a demand aggregation model that benefits all the stakeholders. The consumers and developers achieve economic benefits, the governments realise their renewable energy goals, and most importantly, the campaign organisers are rewarded for their demand aggregation efforts. Vendors usually pay a small fee to the campaign organisers based on the total installation size achieved in the campaign. The campaign was not able to fully capitalise on this key feature of the campaign. The fee would motivate the RWAs to actively participate and encourage the consumers to adopt RTS. Vendors can also save the advertisement or customer acquisition cost to promote the benefits of RTS, with the RWAs acting as campaign runner.

Future campaign organisers such as discoms and not-for-profit organisations (NPOs) should promote market-driven business models with incentives for the stakeholders. Campaign organisers should consider introducing the vendor fee as key feature of the campaign.

Figure 15 Market-based business models will reduce dependence on subsidies

Key beneficiaries	RWAs or campaign runners
Main actors	Nodal agencies, discoms, vendors, NPOs
Envisioned impact	Motivated campaign runners encouraging consumers to purchase RTS.

Source: Authors' analysis

5.8 Empower the solar ambassadors

The solar ambassadors are an integral part of any community-based demand aggregation campaign. They bring credibility and a sense of trust for consumers in the community. These motivated community members should be empowered to play a significant role as an influencer for eliciting consumer interest and aggregating demand from within the community. Ensuring that local solar ambassadors have modest financial resources to promote the campaigns is crucial to the success of the outreach efforts. Adopting the market-based approach of encouraging solar installers who financially benefit from the operational and customer acquisition efficiency of the demand aggregation to share a portion of their net increased revenue with campaign organisers and ambassadors is a scalable approach to providing the funds needed to run Solarise campaigns.

Finding community members who have already installed RTS can be even more beneficial as they can serve as examples of successful technology adopters. U.S. Solarise campaigns have witnessed significant installations around the home of solar ambassadors. In addition, the discoms can create a programme for identifying and working closely with local champions from different communities to increase consumer awareness in their localities. As evident from the U.S. Solarize campaigns, ambassadors who take up the role as part of a job (compared to volunteer work) are more dedicated to the cause and lead the conversations in their communities.

In addition, it will be critical to identify public figures who can serve as influencers at the national level to amplify consumer awareness about RTS. Similar strategies worked for several other campaigns, such as Amitabh Bachchan endorsing the Polio Eradication Campaign.

Figure 16 Solar ambassadors can bring credibility and familiarity to a campaign

Key beneficiaries	Community solar ambassadors
Main actors	Nodal agencies, discoms, campaign organisers, MNRE
Envisioned impact	Boost consumer adoption from within the community through word-of-mouth influence of trusted and reputable local actors on RTS purchasing decisions

Source: Authors' analysis

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The trust in a community is a powerful force and community-based demand aggregation campaigns can effectively leverage it to scale-up RTS adoption.

Images: Akash Som Gupta & Milan George Jacob/CEEW, and PV Diagnostics

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