IRENA coalition FOR ACTION

COMMUNITY ENERGY TOOLKIT

BEST PRACTICES FOR BROADENING THE OWNERSHIP OF RENEWABLES

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About the Coalition

The IRENA Coalition for Action brings together leading renewable energy players from around the world with the common goal of advancing the uptake of renewable energy. The Coalition facilitates global dialogues between non-governmental and governmental stakeholders to develop actions to increase the share of renewables in the global energy mix and accelerate the global energy transition.

About this paper

This white paper has been developed jointly by members of the Coalition's Working Group on Community Energy. Using a case study approach, this white paper by the Coalition for Action highlights different ways communities actively participate in energy decision-making around the world and harness renewable energy's potential to deliver economic, social and environmental benefits for a just transition.

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This report was edited by Stefanie Durbin and designed by Myrto Petrou.

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FIGURES, TABLES AND BOXES

ABBREVIATIONS

3NE	Three Nations Energy
AMADER	Agency for the Development of Domestic Energy and Rural Electrification
ARENH	Regulated Access to Historic Nuclear Electricity (Accès Régulé à l'Electricité Nucléaire Historique)
AUD	Australian dollar
CAD	Canadian dollar
CORENA	Citizens Own Renewable Energy Network Australia
e-car	Electric car
ECHO	Energy Consortium of Hakone Odawara
EDF	Électricité de France
EU	European Union
EUR	Euro
EV	Electric vehicle
FIT	Feed-in tariff
GHG	Greenhouse gas
GWh	Gigawatt-hour
ICE	Indigenous Clean Energy
ISEP	Institute for Sustainable Energy Policies
JPY	Japanese yen
km	Kilometre
kVA	kilovolt-ampere
kW	Kilowatt
kWh	Kilowatt- hour
kWp	Kilowatt-peak
METI	Ministry of Economy, Trade and Industry
MW	Megawatt
MWh	Megawatt- hour
MWp	Megawatt-peak
NGN	Nigerian naira

NGO	Non-governmental organisation
PV	Photovoltaic
SCIC	Société coopérative d'intérêt collectif
TANESCO	Tanzania Electric Supply Company
tCO_2	Tonne carbon dioxide
UrStrom	UrStrom Citizen Energy Co-operative Mainz eG
USADF	United States African Development Foundation
USD	United States dollar
VLS	Village Lighting Scheme
W	Watt

01 INTRODUCTION

Despite record installations in renewable energy, the world is not on track to deliver on the energy transition required to limit the global temperature rise to 1.5°C. To accelerate the transition to renewables and ensure it is just and fair, new approaches involving a wider variety of actors are needed.

Community energy – the economic and operational participation and ownership by citizens or members of a defined community in a renewable energy project – can be a crucial enabler of a just and inclusive energy transition (IRENA Coalition for Action, 2018). Not only can community energy create local socio-economic value, it also allows communities to achieve greater autonomy through direct control over financial and energy resources on the road to energy democracy. This helps foster more positive attitudes towards renewables and raise citizen support and participation for the energy transition (IRENA Coalition for Action, 2020).

A range of approaches to community energy development can be found around the world. Examples include energy access initiatives harnessing renewable energy production to spur local economic development; community-led projects supplying renewable energy to the grid and providing energy services; and partnerships between communities and traditional energy actors, such as local authorities, utilities and private sector developers.

Such diversity reflects the different local contexts within which community energy initiatives are deployed, making it challenging to identify one set of best practices. Consequently, the dissemination of case studies illustrating best practices in community energy remains essential. Knowledge exchange can enable a community to learn from other communities that have developed similar initiatives or identify potential partnerships with experienced third parties committed to working with communities to create shared value through renewables.

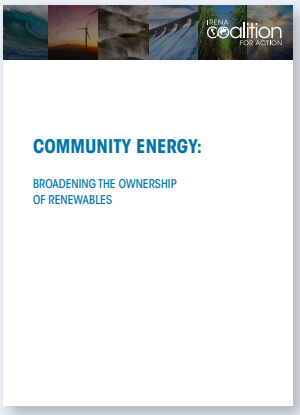
Using a case study approach, this white paper by the Coalition for Action highlights different ways communities can actively participate in energy decision-making. The following chapter identifies seven dimensions and key questions that a community could consider when developing a renewable energy initiative. Chapter 3 provides key takeaways for communities inspired by 11 case studies on community energy initiatives around the world. The case studies, which feature interviews with key stakeholders, make up Chapter 4. Finally, additional resources for communities can be found in the annex.

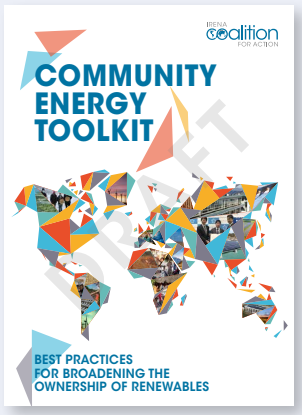
Box 1 IRENA Coalition for Action Community Energy Working Group

Established in 2017, the IRENA Coalition for Action Community Energy Working Group has produced a series of white papers and analyses documenting case studies and best practices for broadening the ownership of renewables through community energy.

The Working Group's first white paper introduces the concept of community energy, discusses its benefits and highlights implementation challenges. The second white paper showcases policy measures and financing mechanisms reflecting best practices in community energy and offers recommendations to governments and financial institutions on how to accelerate its development. This third white paper complements the previous two papers by exploring community energy from the on-the-ground perspective of communities developing their own renewable energy initiatives.

Coalition for Action white paper series – Broadening the ownership of renewables





AN ANALYTICAL FRAMEWORK FOR COMMUNITY ENERGY

02

Taking place on both large and small scales, a community energy initiative incorporates at least two of the following elements (IRENA Coalition for Action, 2018):

Figure 1. Elements of community energy initiative

To arrive at best practices for community energy, the Coalition for Action applied the above definition to identify and analyse over 50 renewable energy initiatives of interest. From these initiatives, the Group developed 11 case studies that collectively showcase seven common dimensions of community energy (Figure 2) that a community may wish to consider when developing a renewable energy initiative.

Figure 2. Dimensions of community energy

Location and policy environment

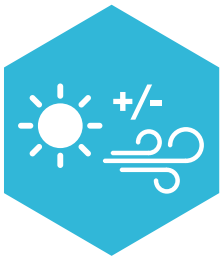
Location dictates the policy environment within which a community energy initiative is developed and implemented. Policy measures enabling community energy in a given jurisdiction may include regulatory measures promoting market entry for community energy projects, financial measures that support their funding, and administrative measures that help communities acquire the skills and knowledge they need to develop a renewable energy initiative (IRENA Coalition for Action, 2020).

COMMUNITY CHECKLIST

- ☐ **What regulatory requirements need to be met?** For example, a community wishing to build a renewable energy project must comply with requirements governing renewable energy project development. Communities establishing themselves as energy suppliers will need to navigate licensing and other regulatory procedures.
- ☐ **Are there government policies and programmes supporting community energy?** Communities may benefit from local, regional and national government policies and programmes (*e.g.* climate plans, funding support for community energy initiatives, gender action plans).
- ☐ **Are the communities receptive to renewable energy projects in their localities?** Communities with interest in and knowledge of sustainability and environment preservation gained can provide strong arguments for investing in community energy. By seeking community members' participation and engagement, communities can further facilitate buy-in for renewable energy projects.
- ☐ **Does the community prefer to be connected to the network or to operate independently?** Pending location, communities may have or not access to the grid. Some communities may also opt for decentralised community energy.

Technology

Community energy initiatives have made use of a range of renewable energy technologies. Although each technology has its own advantages and drawbacks, the choice of technology for a community energy initiative is ultimately driven by the local context. In addition to the existence or absence of policy supports for renewable energy technologies, other factors a community should consider include the purpose and scale of its initiative, renewable resource potential in the region, and availability of land for siting renewable energy projects, as well as accessibility to local parts and labour.



COMMUNITY CHECKLIST

- ☐ **What are the purpose and scale of the initiative?** For example, a community wishing to primarily produce energy to meet its own energy needs vs. a community wishing to become an independent power producer will likely pursue projects of different scales. Communities may also look at other purposes beyond generation and supply (*e.g.* distribution, heat, self-consumption, storage and transport).
- ☐ **What is the renewable resource potential in the area and where will the project be sited/installed?** The renewable resource potential (*i.e.* wind speed, solar radiation) and location will determine the technology options available to a community. For example, solar photovoltaic (PV) is often most suitable for urban applications because panels can be installed on the roofs of buildings.

- **Are local parts and labour easily accessible?** The availability of local parts and labour reduces challenges associated with operating and maintaining renewable energy installations.
- **Which renewable resource encourages the broadest participation?** Some technologies may be more accessible in terms of financing, operation and maintenance to a broad range of community members, including women and youth.
- **Does the community have the skill set to build, operate and maintain the technology?** Communities wishing to take an active role in the project's construction and operation/maintenance may want to assess the community's existing skill sets to determine whether an investment in training to build capacity is needed.

Ownership and governance

A community's ability to achieve majority or full ownership of a renewable energy initiative depends on its access to knowledge and resources – including land, labour and financial capital. Regardless of its ownership stake in the initiative, a community should strive to implement a governance framework that places community members at the centre of decision-making while enabling them to work with different partners, including local authorities, non-governmental organisations (NGOs), private sector entities and other communities.

COMMUNITY CHECKLIST

- **Who is the initiator of the project?** Is it an initiative from outside or from within the community? Are existing community organisations involved in setting up the project/community energy entity? Is it an entirely new organisation?
- **What is the desired level of ownership? What legal structures are available for setting up the initiative?** A community's desired level of local energy autonomy will influence its choice of ownership model. The types of legal structures available to a community will depend on the laws in its area.
- **Which responsibility does the community have and how is the initiative governed?** Next to defining clear responsibilities, community members also need to decide on the governance structure and decision-making processes (*e.g.* consensus-based decision making can facilitate buy-in from all community members).
- **Have processes been put in place to engage community members?** To secure buy-in from members, a community may need to explore different approaches to engagement based on members' interest, gender and level of involvement. These approaches may range from sharing information and consultation during the conceptualisation stage of the project to encouraging active participation such as collaboration and empowerment during the project's construction and operation. Sharing information on the project's performance and maintenance costs regularly and transparently will facilitate continued community engagement.

Financing

Financing and ownership of community energy are closely linked. In addition to contributions from community members, a community may fund its renewable energy initiative through a mix of grants, debt, and equity financing from external public and private sources (IRENA Coalition for Action, 2020). A community may also have access to alternative financing mechanisms, such as crowdfunding.

COMMUNITY CHECKLIST

- ☐ **What is the community's capacity to financially contribute to the initiative?** A community may make contributions in cash or in kind (*e.g.* voluntary labour, use of land, materials, donated services).
- ☐ **What external sources of financing are available to the community?** This can include, for example, government grants and loans, loans from financial institutions, and investments from third parties in some localities (*e.g.* financial schemes benefitting communities, specific programmes enabling women's participation, collaboration with private sector entities).

Socio-economic impacts

On top of expanding access to clean, affordable and reliable energy for communities, community energy initiatives can generate socio-economic benefits including local employment, skill building in the local population, positive health impacts and public well-being. To amplify these local benefits, energy production can also be directly and indirectly leveraged (*e.g.* through revenue generation by selling energy back to the grid) by a community to support economic activities making productive uses of renewable energy.

COMMUNITY CHECKLIST

- ☐ **How will the community benefit?** Before launching a community energy initiative, a community should have a clear understanding of the outcomes it wants to achieve through the initiative and which socio-economic benefits are most important to its members.
- ☐ **How will benefits be distributed to community members? Are costs and benefits equitably distributed?** For example, revenues earned on a community energy project can be distributed to community members based on ownership percentage, directed towards vulnerable persons (*e.g.* reductions on energy bills), or allocated – including with gender budgeting tools – to community projects benefitting all local residents. Benefits, such as creating local employment opportunities and providing education and technical training particularly to women and youth may also be considered.
- ☐ **Are there opportunities to make productive uses of renewable energy and/or initiate other sustainability projects?** Opportunities can target action across the spectrum, ranging from programmes targeting households (*e.g.* energy efficiency programmes) to decarbonisation through electrification in sectors such as transport (*e.g.* e-mobility), heating and cooling (*e.g.* replacing fossil fuels with heat pumps), and agriculture (*e.g.* renewable energy powered irrigation).

Cultural considerations

A community should consider integrating its cultural practices into the structure and governance of its renewable energy initiative to ensure key decisions made on the basis of the initiative are consistent with the community's core values and beliefs. Cross-cultural co-operation is becoming more commonplace in an increasingly interdependent world, creating greater potential for miscommunication to arise due to cultural differences. Partners need to be aware of cultural values, beliefs and practices that can influence a community's decision-making process.

COMMUNITY CHECKLIST

- ☐ **What are the community's core values and practices?** A strong awareness of core values and practices is especially important when adopting best practices from other community energy projects developed in different social, economic, environmental and institutional contexts.
- ☐ **What should the community look for in potential partners?** Partnerships will be more successful if partners understand a community's preferred decision-making approach and its core values and practices.

Gender considerations

Women continue to be under-represented in decision-making processes in many societies. A community can use its renewable energy initiative as a vehicle to challenge traditional perceptions of gender roles by placing women in leadership positions. Communities may also enable women to fully reap the socio-economic benefits of renewables by, for example, equipping them with skills needed for jobs in the renewable energy sector or providing them with opportunities to establish businesses that make productive uses of renewable energy.

COMMUNITY CHECKLIST

- ☐ **How will women's participation be encouraged and supported?** This could be achieved through mentoring opportunities, access to training, and skills development in technical and non-technical areas (*e.g.* training for students and business and leadership programmes).
- ☐ **Is there sufficient awareness of gender imbalances in the community and in the project and solutions to address these?** Gender equity targets, particularly for governing bodies of community energy projects, can enable women's participation.
- ☐ **Is enough attention being paid to women's roles in the project?** Highlighting female role models and showcasing women's contributions can help incentivise further participation by women in community energy projects.

By going through this checklist, a community can take the first steps towards identifying its needs and developing its vision in line with its core values, as well as taking into consideration the environment it is operating in. This allows the community to identify technology pathways (*e.g.* renewable energy, energy efficiency) through which it can take ownership of its energy future and determine the actions needed to maximise socio-economic value (*e.g.* job creation). Through dialogue with community members, governmental bodies and financial partners, a community can drive structural change from the bottom up and help accelerate the energy transition.

03 KEY TAKEAWAYS

Renewable energy communities are a powerful transition accelerator. To ensure a social, just and equitable energy transition, governments, financial institutions and other partners have a key role to play in facilitating community energy projects (IRENA Coalition for Action, 2020). Stable, predictable, non-discriminatory and conducive policy environments have been crucial in deploying community energy. Partners can also provide financial, technical and knowledge support to communities with limited experience setting up renewable energy initiatives.

The following takeaways may serve as inspiration for communities on how to set their renewable energy initiatives up for success:

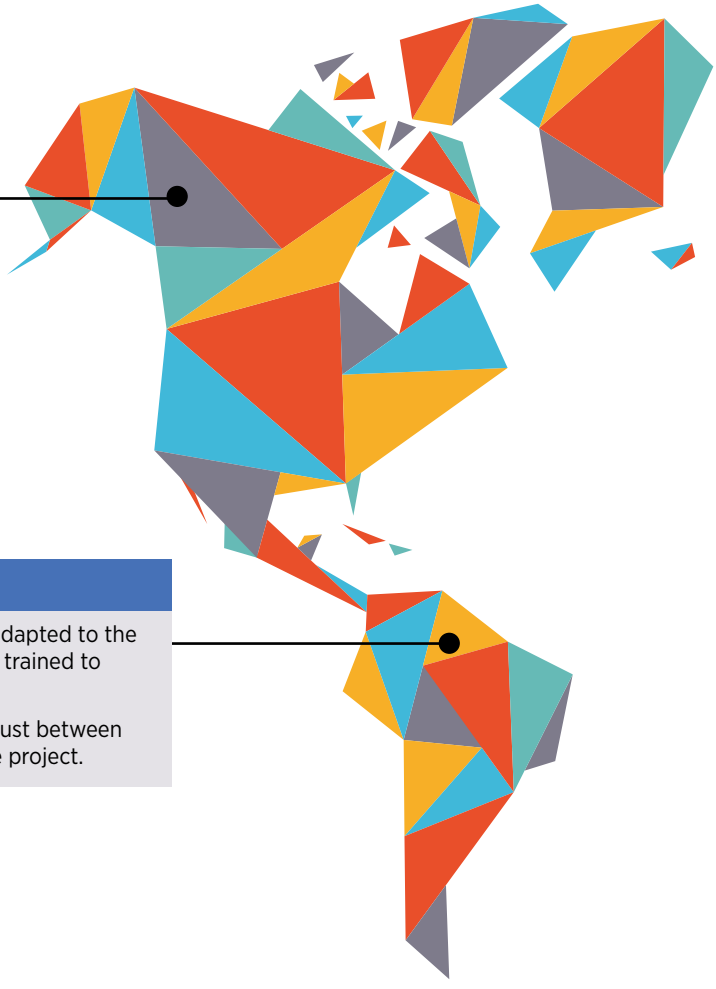
- **Communities should identify opportunities to make productive uses of renewable energy and amplify its benefits.** Mini-grids installed by Sosai Renewable Energies have not only provided households and businesses in two Nigerian villages with access to energy, but also enabled farmers to innovate in the types of produce they can preserve and sell at a premium rate. In Canada, Three Nations Energy (3NE) is building on the success of its first solar farm to invest in sustainability initiatives targeting food security and energy sovereignty. The case study of Citizens Own Renewable Energy Network Australia (CORENA), which has expanded beyond funding renewable energy and energy efficiency projects to fossil gas replacement and electric vehicle (EV) projects, also demonstrates benefit amplification. Likewise, in Germany, UrStrom Citizen Energy Co-operative Mainz eG (UrStrom) has begun implementing the use of renewables in decarbonising other end-use sectors, such as transport.
- **Communities should nurture dialogue among community members to foster a shared purpose and leverage knowledge and experience from the group to take their initiatives forward.** In many parts of Europe, the co-operative has emerged as a popular model for community energy ownership and management due to its emphasis on collective ownership and democratic decision-making. Citizen energy co-operatives UrStrom and Som Energia showcase, respectively, how members of a community can be a source of expertise and even launch their own complementary initiatives. The case study of Hakone Energy and Shonan Power also highlights how dialogue within a community can result in the development of new energy-related business opportunities and the creation of a shared vision for local renewable energy.
- **Communities should invest time in building capacity through technical training in renewables, developing an understanding of regulatory requirements and government policies, and acquiring the necessary financial know-how to develop business plans for their community energy initiatives.** This is best exemplified by the Benedictine Sisters of St Agnes in Tanzania, who not only took key decisions during the construction of the Tulila Hydroelectric Plant but also received training to become primarily responsible for the project's operations and maintenance.

- **Community energy can be a vehicle for gender and youth equity next to inclusiveness.** A community energy initiative can close gender gaps by establishing governance structures requiring equal representation from women in leadership positions and filling renewable energy-related jobs with female community members, as illustrated in the Tulila Hydroelectric Plant case study. By arming local women with transferrable skills and hiring them to manage offshoot businesses enabled through community energy, Sosai Renewable Energies underscores how partners can help support women. In addition, other typically under-represented social groups can become active community members by getting involved in community energy.
- **Many successful community energy initiatives are the product of partnerships.** Often, these communities made efforts over time to cultivate relationships with new partners and deepen relationships with existing partners. A network of local economic leaders played an instrumental role in founding Hotoku Energy and the Energy Consortium of Hakone Odawara (ECHO) in Japan. In the case of French energy supplier Enercoop, Belgian energy co-operative Ecopower and co-operative and ethical banks stepped in to provide a financial guarantee when traditional lenders were unwilling to do so.
- **When working with partner organisations, communities should help their partners develop an understanding of local contexts and their values and needs.** This understanding can support the implementation of decision-making processes compatible with a community's cultural values, as explored in the case studies on 3NE, Renew's Village Lighting Scheme (VLS) in Timor-Leste and Waterpower station Bëkyooköndë & Duwata in Suriname. The latter study highlights lessons learnt in this regard, showcasing the importance of integrating local practices into governance structures, adapting financial practices to local infrastructure challenges and considering the availability of local components for renewable energy solutions.
- **Communities can turn to other communities for inspiration and guidance.** Successful initiatives are often willing to share their knowledge and experience, as highlighted in CORENA's experience advising groups establishing their own revolving funds to support renewables. Communities can also partner more formally for mutually beneficial exchanges. In the AfrikaSTARK 1 initiative, German co-operative Energiegenossenschaft Starkenburg helped finance a solar water irrigation project in the Sikasso region of Mali. The exchange generated numerous socio-economic benefits for the Malian community and a concrete financial benefit for the co-operative.

04 CASE STUDIES

Serving as inspiration for citizens and communities, 11 community energy initiatives were selected by members of the Coalition for Action based on first-hand experience with the initiatives. The case studies presented here build on insights obtained through interviews with key stakeholders. Figure 3 below identifies the dimensions of focus for each case study.

Figure 3. Overview of case studies



3NE Solar Farm

Ownership and governance – 3NE is a partnership formed between three Nations for Indigenous owned and operated green energy solutions.

Socio-economic impact – Building on the success of its first solar farm, 3NE is developing other initiatives targeting energy sovereignty and food security.

Waterpower station Bëkyooköndë & Duwata

Technology – An innovative electrification solution was adapted to the specific needs of community. Community members were trained to operate and maintain the project.

Cultural/gender considerations – The project has built trust between the community and different stakeholders involved in the project.

Som Energia

Location/policy environment – Initiatives like Generation kWh highlight how Som Energia has overcome policy barriers by developing innovative ways for its members to finance renewable energy projects.

Ownership and governance – Spain's largest non-profit renewable energy co-operative, Som Energia now supplies 125 000 customers with renewable electricity.

Enercoop

Location/policy environment – Enercoop is France's largest 100% renewable energy supplier in a country that derives 10% of its electricity from renewable sources.

Ownership and governance – Enercoop's decentralised approach to organisation enables it to work on energy issues at a local level. It now has over 55 000 members in 11 co-operatives operating across France.

UrStrom

Location/policy environment – UrStrom is driving the local energy transition in Mainz, Germany through democratically planned and owned solar PV projects.

Socio-economic impact – Leading the transport revolution, UrStrom has launched an e-car service and helped establish national and European organisations focused on e-mobility.

Sosai Renewable Energies

Socio-economic impact – Solar PV mini-grids installed in two villages in northern Nigeria enabled solar dryers to be installed for local farmers to process their produce.

Cultural/gender considerations – Local women oversee the solar dryers, providing them with monthly income and the opportunity to gain transferable skills.

Hotoku Energy and Shonan Power

Ownership and governance – Following the establishment of the Energy Consortium of Hakone Odawara (ECHO), the ownership and management of energy supplier Shonan Power was transferred to local entities.

Financing – Equity financing from local businesses, a regional co-operative bank loan and mezzanine financing from citizens supported the installation of 1 MW of solar PV in Odawara City.

CORENA

Technology – The fund has expanded beyond supporting renewable energy and energy efficiency projects to fossil gas replacement and EV projects.

Financing – Donations from individuals and businesses finance a revolving fund offering interest-free loans to community organisations to reduce their greenhouse gas (GHG) emissions.

Village Lighting Scheme

Location/policy environment – Australian non-profit Renew collaborated with local organisations and the government of Timor-Leste to develop a community-managed energy programme.

Technology – Community members were nominated to serve as programme technicians and completed a nationally accredited solar PV certification course.

Financing – The programme has evolved into a rent-to-own solar model using a pay-as-you-go approach.

Tulila Hydroelectric Plant

Socio-economic impact – Electricity production from the Tulila Hydroelectric Plant provides households with access to lighting and water, supports essential medical services, and powers milling machines for processing food crops.

Cultural/gender considerations – The Benedictine Sisters of St Agnes developed, and now operate and manage, a hydropower project supplying 27 000 households with clean electricity.

AfrikaSTARK 1

Financing – A loan from German co-operative Energiegenossenschaft Starkenburg facilitated the installation of a solar irrigation project in the municipality of Blendio in southern Mali.

Socio-economic impact – Access to water has increased agricultural productivity and supported Blendio's response to COVID-19.

3NE Solar Farm: Reducing diesel reliance in Canada's remote communities

Aerial view of Three Nations Energy Solar Farm

KEY FEATURES

- **Dates of operation:** 2020 - present
- **Technology:** Solar PV
- **Capacity:** 2.35 MW
- **Financing:** Off-taker agreement with distribution utility, federal and provincial government grants (totalling CAD 7.8 million or USD 6.3 million)

Like many remote communities in Canada, the hamlet of Fort Chipewyan has historically relied on diesel to meet its electricity needs. Home to over 1 000 people, Fort Chipewyan is in the northeast corner of the province of Alberta, Canada. The hamlet lacks all-season road access and is only accessible by plane and boat in the summer and by plane and ice roads in the winter (Regional Municipality of Wood Buffalo, n.d.).

Many Fort Chipewyan residents identify as peoples from the Athabasca Chipewyan First Nation, Mikisew Cree First Nation or the Métis Nation. In 2018, the three groups founded Three Nations Energy (3NE), a vehicle for Indigenous ownership and operation of green energy solutions.

3NE began construction of its first renewable energy project in February 2020. The 2.35 megawatt (MW) solar farm is connected to a 1.5 MW battery energy storage system owned by distribution utility ATCO Electric. Electricity produced by the project will be purchased by ATCO Electric and distributed throughout Fort Chipewyan. The project also received grant funding from the government of Canada (CAD 4.5 million [Canadian dollars], or USD 3.6 million [United States dollars]) and the government of Alberta (CAD 3.3 million, or USD 2.6 million). Notably, the solar farm was the first project in Alberta to receive regulatory approval from the province's public utilities regulator as a "community generation unit" (Three Nations Energy, 2020). [1]

The combined solar-storage solution is expected to meet 25% of Fort Chipewyan's energy needs and reduce its annual diesel consumption by 800 000-900 000 litres. As of November 2020, the 3NE solar farm was the largest solar PV system in a remote Canadian community.

[1] Under Alberta's 2018 Small Scale Generation Regulation, to qualify as a community generating unit a project must incorporate a community benefits agreement or statement setting out how the project will confer social, environmental or economic benefits to a community group.

Interview with Calvin Waquan, Member, Mikisew Cree First Nation and Founding President and Director, 3NE

Q1. Why did your community want to get involved in renewable energy? How did you first get involved in the project?

My community relies on trucking in diesel over our winter ice road to meet our energy needs. We are feeling the effects of climate change – high snowpack in Alberta's Rocky Mountains means more melt and higher flow on river crossings in the Peace Athabasca Delta. On top of that, with warmer starts to winter and shorter windows for road access likely to be a common trend, we might not have a road one day.

I began my journey in renewable energy in 2018 when a member from our counterpart Nation, Athabasca Chipewyan, suggested I take part in the ICE 20/20 Catalysts programme.[2] Since completing the programme, I have become a coach/community mentor with the programme and now serve on ICE's advisory council. It has been an honour to give back to my community and to pass down knowledge to the next generation of energy champions.

Building capacity in the community as a leader is important and allows our Nation to move towards more traditional and sustainable living, in hopes of a climate-friendly future that benefits all. My conversations with the elders and youth centred around our traditional way of life living off the land and a future where we live in equilibrium between man's economics and our Mother's environment. In many ways, moving to community-owned clean energy solutions is a return to how we did things in the past, living in balance with our surroundings.

When the opportunity to get involved in the solar farm came along, Mikisew Cree had been independently looking at developing its own renewable energy project. After evaluating the project and securing provincial and federal government funding, it made good business and community sense to partner with ATCO, the Athabasca Chipewyan First Nation and the Fort Chipewyan Métis Association. The partnership is also a chance to build relationships among the three Nations.

Q2. Please describe the governance and decision-making processes established for the project. What are the communities' roles in making key decisions?

3NE was set up as an equal partnership. Each Nation owns one-third of the company and has two seats on the board of directors, while presidency is rotated.

We also chose to separate politics from business. Chiefs[3] and councillors do not have decision-making authority in 3NE matters. Directors are elected to the board based on the knowledge and experience they bring to the table and can be any appointed members from each Nation.

Board decisions are made by consensus, which is consistent with traditional Indigenous practices. There is no conflict as decisions are made with the collective group's best interests in mind. In the rare case where there is disagreement, we "agree to disagree" and move on.

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[2] 20/20 Catalysts is a pan-Canadian programme operated by the Indigenous Clean Energy (ICE) Social Enterprise (*https://indigenouscleanenergy.com/*) to build Indigenous capacity in clean energy development and help Indigenous communities maximise the social and economic benefits gained through clean energy initiatives.

[3] In many Indigenous cultures in Canada, chiefs are the leaders of bands, clans and/or First Nations. Chiefs – who may be elected or hereditary – hold high positions of authority in their communities, often serving as links between their people and municipal, provincial and federal governments. Métis people generally do not refer to their leaders as chiefs (Gadacz, 2018).

Q3. When you first got involved in the project, how did you expect your community to benefit? Has this changed over time, and if so, how?

When we (3NE) started working on the solar farm, we did not completely understand the project's full potential. Over time, we are seeing more and more opportunities that we did not realise were possible earlier on.

Because the procurement process for the solar farm was well managed and came in under budget, we were able to add generation capacity to the project (initially planned to be 2.2 MW) and invest in other sustainability initiatives targeting food security and energy sovereignty.

For example, we purchased a wood processor to convert wood salvaged from the solar farm site into stock and created a wood fuel business. We hold a forestry contract for a FireSmart programme (to thin out trees around our community to mitigate the risk of wildfire) and salvage what we can for future stock. This business is now in in full swing with staff employed from each Nation.

To lay the foundation for change in the next generation, we have also focused on improving energy literacy.

The three Nations are now piloting integrated solar packages with cabin owners in the Peace Athabasca Delta and Wood Buffalo National Park areas; any excess electricity produced that is not used to power the cabins will be stored in a battery bank. Cabin owners are trained to track data on fuel savings to build their capacity. It is amazing to witness an energy transition at home this quick and at this scale.

Finally, [non-Indigenous] residents of Fort Chipewyan will benefit from reduced GHG emissions and by taking part in the offshoot initiatives and programmes we have established.

Q4. What have been some of the major challenges of developing and operating the project?

Time and remoteness were the main challenges – the rest was fun. Community engagement and project planning take time to do well, and you must respect others to do it correctly. Our transportation and shipment season is also a factor, due to lack of road access outside the winter season.

Another challenge has been finding people with the right skill sets to work on our initiatives. We have allocated money in our budget for energy literacy as well as dedicated community positions for succession planning and training.

Q5. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted the project, and if so, how?

COVID-19 created some challenges during the solar farm construction process. However, we were able to mitigate the impacts of the pandemic by quarantining workers before they came to town and having them stay on-site. This was made easier by the fact that most of the construction workers were local (3NE had negotiated a 60% Indigenous content requirement for all phases of the project, where possible). Our partners – distribution utility ATCO and the construction company Clark Builders – were amazing to work with, and we are grateful for their dedication to our project.

Q6. What are some key lessons you would like to share?

Nations and leaders must invest time and effort to build capacity in yourselves, your staff and your community. Talk to people about energy issues in a way that relates to their interests, experience and level of understanding.

Do not push projects forward too quickly. Take time to appreciate the scenery on your journey, observe everything around you and celebrate your accomplishments.

Develop meaningful relationships with utilities, industry, government and other Nations who will help you build capacity, develop projects and assist you on the journey. Each interaction has helped Fort Chipewyan move forward in a positive way, and we are grateful for all the time and energy we shared with everyone along the way. If you do not build these relationships, you will not be able to get your project off the ground.

Governments have a duty to consult with Indigenous and First Peoples on energy and natural resources projects. By giving us an equal seat at the table, we can assist each other to achieve equity and true economic reconciliation on our shared lands.

Hiy Hiy and thank you.

Photo: 3NE

Drummers at 3NE Solar Launch

AfrikaSTARK 1: A Malian-German partnership for community solar-powered irrigation

System pumping water for agriculture, with the control unit powered by solar energy

KEY FEATURES

- **Dates of operation:** 2018 - present
- **Technology:** Solar PV
- **Project description:** Solar water irrigation system powered by solar PV mini-grid
- **Financing:** Contributions from community members in municipality of Blendio, loan from German citizen energy co-operative

Blendio is a rural municipality located in the Sikasso region of southern Mali. With a Sudano-Sahelian climate, the main economic activity in the area is agropastoral. While Blendio with its 6 000 inhabitants has basic infrastructure in place to support its economic and cultural activities, it has a growing need for access to a reliable energy source and clean water supply. The municipality's health centre and water supply system are powered by solar energy installations, but the energy produced by the installations is insufficient to cover residents' remaining energy needs.

To increase access to electricity in Blendio, a young Malian company active in rural electrification in Mali, ACCESS SA (ACCESS), installed a hybrid mini-grid system in 2018 in collaboration with the municipality of Blendio and the Malian government through the Agency for the Development of Domestic Energy and Rural Electrification (AMADER). The system consists of a 56 kilowatt-peak (kWp) solar PV system, 400 kilowatt- hours (kWh) of battery energy storage and an 85 kilovolt-ampere (kVA) back-up generator set. Electricity provided by the mini-grid system also facilitated the installation of a solar-powered water irrigation project to help local women carry out their main activity of vegetable gardening, which was hindered by the need to walk long distances to get water – particularly during the dry season, which lasts eight months. The water irrigation system is composed of a water drill hole of 80-metre depth equipped with an electric pump and a water tank of 25 cubic metres, 10 metres above the soil. Through the project, women have access to 30 to 45 cubic metres of water per day for their activities.

The project was put in place in close collaboration with the village of Blendio and its inhabitants. After Blendio helped secure access to a suitable land space, ACCESS conducted studies to determine the best site for water, installed a drilling system for a water well, created a gardening space and trained local women on growing vegetables using the new irrigation system. ACCESS employed villagers equally during

the project implementation. A local energy committee was established composed of representatives of youth, women, municipality, productive users, etc., to take basic decisions. The committee organises all the matters related to electricity supply in the village, facilitation of monthly fee collection and technical requests to ACCESS.

The irrigation project was financed through a EUR 10 000 (euros) or USD 12 000 loan from the citizen energy co-operative Energiegenossenschaft Starkenburg eG (Energiegenossenschaft Starkenburg), which had learnt about the work of ACCESS at a global conference on community energy. This money was utilised to cover part of the total project cost of EUR 21 000 (USD 24 000). The remaining amount was financed by ACCESS.

Interviews with Dr Ibrahim Togola, CEO, ACCESS and Micha Jost, Board Member, Energiegenossenschaft Starkenburg

Q1. Why did the village of Blendio want to get involved in renewable energy?

Dr Togola: The inhabitants of the village of Blendio wanted to get involved in renewable energy because in their village in particular (and in Mali in general), the electrification rate is very low.

The community of Blendio was happy about the arrival of electricity brought by ACCESS through the installation of the mini-grid in 2018. During one of our mission's surveys on the impact of access to electricity, concerns were raised by the local women's association about the lack of water and the difficulty of undertaking gardening during the dry season. Women would have to walk miles in order to get water.

Q2. How did Energiegenossenschaft Starkenburg first get involved in the solar irrigation project?

Mr Jost: We established contact with ACCESS in November 2018 at the 2nd World Community Power Conference in Bamako. At the conference, Ibrahim Togola presented on a mini-grid project in Bancoumana. The project made a big impression on us, and the idea arose that we could support a project with our co-operative's money. There was also the intention to start a kind of "model project", which could be followed by more and larger projects from other energy co-operatives.

Q3. Please describe the governance and decision-making processes established for the project. What were the communities' roles in making key decisions?

Mr Jost: After the project was discussed and approved by our board, AfrikaSTARK 1 was presented to our members. Each member of the co-operative has one vote, regardless of the amount of their financial participation. This means that basic democratic rules apply when it comes to co-determination.

Interest from our members in financially participating in AfrikaSTARK 1 was so high that we had to limit the number of participants because we had reached our target amount of EUR 10 000. In the end, 5 out of 20 interested members each contributed EUR 2 000 in debt financing.

Dr Togola: ACCESS has been working in the Sikasso region of southern Mali since 2009. The municipality of Blendio and the local leader of the village contacted ACCESS to come to work in their commune because they liked our approach, which is not purely commercial but integrates communal development with an energy committee composed of local representatives, with whom all the decisions are taken. Further, Blendio had an interest in linking sustainable energy with other development objectives, such as through the water irrigation programme that benefits women.

Q4. What benefits have been realised through the project to date?

Dr Togola: With the irrigation system, community members will be able to harvest without wondering whether the rainy season is going to be good or not. The irrigation system will permit better planning and certainty for harvesting vegetables and fruits, accelerating self-sufficiency and additional revenue streams. It will also prevent women of the village from walking long distances in search of water.

The AfrikaSTARK 1 project has been a success. Harvesting and economic activities in the village have increased and livelihoods improved. In the context of COVID-19, having access to water has also helped the population of Blendio adopt barrier measures (*e.g.* sanitation).

Mr Jost: We get a fixed interest rate on our loan. This gives us a concrete financial benefit from this project. The agreed interest rate is roughly comparable to projects in Germany.

Q5. What have been some of the major challenges of developing and operating the project?

Dr Togola: There were no major challenges to developing and operating the initiative. The community was fully onboard with the project and helped ACCESS's technicians operationalise the initiative.

Mr Jost: We had no influence on the implementation of the project. Due to the great distance between Mali and Germany, day-to-day involvement is challenging. We had no guarantees or sureties as there is no reliable legal framework in place. Basically, the entire initiative relied on the trust of the people involved. We therefore had to take the financial risk of our loan into account. Our members who took part in the project were aware of these risks but were motivated by the opportunity to help promote climate co-operation worldwide.

Q6. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted the project, and if so, how?

Dr Togola: The pandemic has not impacted the initiative so far. On the contrary, it has helped the population in Blendio fight the disease thanks to improved sanitation through access to water enabled by the irrigation project.

Mr Jost: The COVID-19 outbreak has so far had no influence on the project. However, direct personal exchange will continue to be challenging in the near term. We will have to improve virtual ways of making future projects happen and maintain relationships with existing ones.

Q7. What are some key lessons you would like to share?

Dr Togola: Renewable energy can help people living in rural areas to improve their living conditions. Thanks to solar energy, these populations have not only had access to electricity but also to water, which allows them to develop several income-generating activities for the well-being of the community.

Mr Jost: Projects can succeed under adverse conditions if the actors involved have a basis of trust. It is important that local companies carry out such projects. The projects have to be small and manageable and ultimately in the hands of the local people, if they are to be sustainable. We hope that with this little project we will inspire other co-operatives to take similar action.

CORENA: Harnessing revolving funds to finance climate action

A 100 kW solar installation for Tarremah Steiner School, Tasmania, Australia

KEY FEATURES

- **Dates of operation:** 2013 - present
- **Main activity:** Provider of interest-free loans to non-profit and community service entities
- **Technologies:** Solar PV, energy efficiency
- **Number of projects/capacity:** 44 (totalling 773 kW of installed solar PV capacity)
- **Financing:** Revolving fund furnished through donation-based crowdfunding

Citizens Own Renewable Energy Network Australia (CORENA) is a revolving fund established to provide interest-free loans to entities (generally non-profit organisations or other entities that provide a community service) to reduce their GHG emissions. Loans typically cover emission reduction measures related to renewable energy or energy efficiency installations. Recipients repay the loans from the savings they realise on power/fuel bills (CORENA, 2020).

CORENA is supported by donations from individuals anywhere in Australia, including its members and supporters. The revolving fund creates a multiplier effect, as a donation made to a specific project continues to revolve from project to project via loan repayments. As of September 2021, AUD 512 000 (Australian dollars; USD 383 000) donated to projects has enabled CORENA to give project loans totalling AUD 894 000 (USD 668 000). In eight years of operation, CORENA has funded 44 solar PV and energy efficiency projects located all over Australia, equating to 773 kilowatts (kW) and 2 441 megawatt- hours (MWh) in energy savings as of September 2021.

Interview with Margaret Hender, Founder and Chair of CORENA

Q1. Why did your community want to get involved in renewable energy? How did you first get involved in CORENA?

In CORENA's case, our "community" consists of members, supporters and donors scattered over all parts of Australia, connected by a common interest in achieving tangible and immediate reductions in GHG emissions in order to tackle the climate emergency. We are very conscious that many people, not just those who live in a community with a local renewable energy project, are empowered by being able to collectively achieve climate benefits, so we set up a system that is accessible to everyone in Australia.

I founded CORENA because I was feeling frustrated with the lack of action on climate and realised others felt the same way. While it's hard to envision one person making an impact, we could pool together our contributions to drive collective change. CORENA was set up to be donations-based due to the fewer legal complexities associated with setting up the fund, but my anecdotal observation is that many people interested in making contributions are not necessarily seeking a return on investment.

Q2. Please describe the governance and decision-making processes established for CORENA. What are members' roles in making key decisions?

CORENA is an incorporated non-profit association with tax-deductible donation status. It is administered by a volunteer committee and is ultimately governed by its constitution. Members and supporters provide feedback and suggest future projects, at times taking an active role in helping to develop projects in their local areas.

Donors have the option of making a general donation or contributing to a specific project. While most people are simply donating to reduce emissions, some people do donate to support a specific organisation. For example, we reached our funding target for a solar PV installation at a well-respected local non-profit in Canberra (Pegasus Riding for the Disabled) in just 11 days.

Q3. When you first got involved in CORENA, how did you expect your community to benefit? Has this changed over time, and if so, how?

We all benefit directly from the drop in GHG emissions as soon as a CORENA project is completed. In addition to seeing the impact of their donations increase over time through the revolving fund, members and supporters also benefit indirectly by popularising the notion that donations into a revolving fund can empower any community to reduce local emissions. One of our projects (Tarremah Steiner School) was initiated by students who wanted to increase energy literacy and inspire other schools to become zero-carbon. In eight years of operation, about half a dozen local groups have also approached CORENA seeking advice and assistance on how to develop their own revolving funds.

Organisations that receive a CORENA loan benefit in the short term by being able to demonstrate emissions reduction measures to their local community. After they have repaid their loans, they benefit from a significant drop in operating costs. This not only motivates these organisations to pursue more renewable energy solutions, but frees up extra funds to deliver services to their communities. On average, CORENA projects have repaid their loans in five years.

Q4. What have been some of the major challenges of establishing and operating CORENA?

The first major challenge was finding organisations that wished to take advantage of our interest-free loans. To them it seemed too good to be true that they could have a solar installation at no cost to themselves, so they tended to be a bit suspicious until we had proved the concept via a string of successful projects. Word of mouth within the community has spread over time, which has helped. We have also been profiled in guides published by the C4CE[4] and the state government of Victoria.

Human capital is another issue. An ongoing challenge is managing the workload associated with developing projects, matching projects with funding and doing administration tasks entirely by voluntary work. From time to time, new people become aware of our work and volunteer to help. However, recently a philanthropist wanting to support sustainable projects was searching the Internet and came across CORENA, was impressed, and offered to provide us with funding for staff to help expand our work.

For parts of Australia (*e.g.* Australian Capital Territory, South Australia, Tasmania) that are close to reaching 100% renewable electricity, we are also starting to fund other types of projects that generate emissions reductions, such as fossil gas replacement and electric vehicle projects. Right now, we are working on our first project to replace a local pool's gas heating system with heat pumps. The challenge with branching out is to make sure we continue to invest money wisely and maximise GHG emissions reductions per dollar of investment. After all, an electric vehicle costs the same regardless of whether you use it or not.

Q5. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted CORENA, and if so, how?

There has been little impact from COVID-19 on the administration of CORENA because we do almost everything online. Prior to COVID-19 we had in-person committee meetings in Adelaide, but now we meet via Zoom, which is actually much better. It means we can have committee members from all over the country instead of just local Adelaide people.

While COVID-19 has not had a major impact on donations, one of our current projects (City of Geelong Bowls Club) was temporarily put on hold due to government lockdown measures. Generally, the pandemic has placed additional pressures on many of the organisations we support. A few organisations have had to temporarily delay their loan repayments.

Q6. What are some key lessons you would like to share?

A key lesson has been that climate-motivated people are indeed willing to donate very generously towards practical projects that reduce GHG emissions. They also like knowing that the organisations that receive financial benefit via CORENA loans are "worthy causes" that provide other community benefits.

We have also learnt that an ongoing operation like ours, involving a stream of projects over many years, would benefit greatly from a business plan that ensures money is available to employ at least one staff member to co-ordinate volunteers. We have recently hired a part-time staff member to assist us with social media. In October 2021, CORENA also placed an advertisement to employ a COO (chief operating officer) and digital marketer using philanthropist funding.

[4] As of 2020, the Coalition for Community Energy (*https://c4ce.net.au/*) represented over 105 member groups active in Australia's community energy sector.

Enercoop: A journey to becoming France's largest co-operative renewable energy supplier

The head of the co-operative Enercoop Nord Est and a local wind power producer

General Assembly, Enercoop Bretagne, June 2019

KEY FEATURES

- **Dates of operation:** 2005 - present
- **Main activity:** Co-operative renewable energy supplier
- **Technologies:** Solar PV, hydropower, wind, biomass
- **Capacity:** Electricity purchased from 355 MW of renewable generation capacity
- **Financing:** Income from the sale of electricity

Launched in 2005 by French ecological and ethical business organisations, Enercoop is a co-operative supplier of 100% green electricity. At the beginning of 2021, the co-operative supplied 101 000 consumers, including individual and business clients as well as local authorities. As of April 2021, Enercoop had purchased renewable electricity from 354 independent local energy producers in France accounting for 355 MW of renewable generation capacity.

As a co-operative society of collective interest (société coopérative d'intérêt collectif, or SCIC), Enercoop is a limited profit company owned by over 55 000 members representing different stakeholders of the energy system. In addition to electricity producers and consumers, Enercoop counts among its members local public entities as well as key partners including other European renewable energy co-operatives, ethical businesses and financial operators.

The objective of Enercoop is not only to provide its clients with a 100% green electricity supply but also to directly support them in reducing their energy consumption. In addition to its green electricity supplier and aggregator activities, Enercoop has developed energy saving services and launched initiatives supporting decentralised energy production. By supporting the emergence of new local energy co-operatives since 2009, Enercoop is also fostering a network of co-operatives in which every citizen can invest and participate. While Enercoop started as one national co-operative, it has become a network of 11 local co-operatives that allows citizens to connect with the challenges of the energy transition on a regional level.

Interview with Maëlle Guillou, European Cooperation Manager, Enercoop

Q1. Why did your community want to get involved in renewable energy?

Enercoop was founded in 2005 by French environmental NGOs and social economy actors. At the time, the energy market in France was much different. Despite the liberalisation of the European Union's (EU's) electricity market (European Parliament, 1996), France was still entrenched in a very monopolistic and top-down energy system. Moreover, the French electricity mix was (and still is) overwhelmingly composed of nuclear power, set up and managed in an inherently centralised structure. In this context, a group of actors jumped on the opportunity of the electricity market's opening to competition to shape a new approach to energy. Our goal is to create a decentralised and 100% renewable energy model in which citizens not only take part in decision-making, but also own their co-operative supplier and actively take part in the energy transition. That is how Enercoop was born.

Q2. Please describe the governance and decision-making processes established for Enercoop. What are members' roles in making key decisions?

Enercoop was set up as a co-operative society of collective interest (SCIC). These are co-operative legal statutes specific to France that enable multi-stakeholder ownership and governance. Thus, Enercoop gathers among its members several categories of actors that all represent stakeholders involved in the activities of the co-operative. This includes consumers, employees, renewable energy producers, local communities and key partners. All members elect representatives during general assemblies (held once a year) who then form a board that discusses and decides on all strategic issues of the co-operative and appoints the general manager of Enercoop. With over 24 000 members, Enercoop is today the largest SCIC in France.

Another specificity of Enercoop is its ambition to decentralise its organisation as much as possible so as to deal with energy issues on a local level, with citizens at its core. Hence, since 2009, Enercoop has been fostering the emergence of new co-operatives on the regional level. Gradually, new energy co-operatives were created in a bottom-up approach to provide support for energy efficiency or energy production activities and, overall, to better tackle local energy matters together with local actors. This network has grown, and now Enercoop consists of 11 local co-operatives operating all over France.

Q3. How do members benefit from being part of Enercoop?

The direct benefit to the community and our members is to be involved in a more democratic process for strategic orientations of our co-operative. Members gain access to a 100% renewable energy supply through a co-operative and decentralised approach. Over time, Enercoop has also added to its activities other initiatives supporting a citizen-driven energy transition. These tasks include:

- developing new services to help our consumers reduce their energy use
- supporting the development of new citizen-led energy production projects
- contributing to the development of a solidarity fund to finance energy poverty alleviation projects
- engaging with our members to provide training, information sessions, beta-testing of new products and debates to include them in the daily life of their co-operative.

The growth of our model and our missions went hand in hand with the economic growth of our co-operative. When I started, we were just a small number of employees. Today we have 235 employees and 55 700 members in the whole Enercoop network, which allows us to diversify our activities and bring more benefits to our communities.

Q4. What have been some of the major challenges of establishing and operating Enercoop?

When Enercoop was founded, the first objective was to create a co-operative supplier to enable consumers to buy electricity from renewable sources through a co-operative approach. The founding members were driven by the firm belief that French consumers had to be provided with an alternative to the centralised historical monopoly of EDF,[5] in which citizens had no part in the decision-making process.

However, not only was setting up an energy supplier a difficult task, but setting up a renewable energy co-operative supplier was even more of a challenge. At the time, the regulatory context was a major obstacle to competing on the market and for Enercoop to secure its supply of renewable energy. Renewable energy producers had to sell their energy to EDF in order to have access to public support mechanisms. Therefore, only a few independent producers, convinced by the need for change in the market, joined the Enercoop project at first.

Soon enough, Enercoop had to bid to purchase energy produced by publicly owned hydropower installations. To do so, Enercoop needed guarantees from financial operators, who were sceptical of the young co-operative and therefore unwilling to provide the necessary guarantees. Enercoop was eventually able to secure a guarantee with the help of Belgian co-operative Ecopower, the ethical bank Triodos and the French bank Credit Coopératif. This support was a turning point in Enercoop's history. Since then, the regulatory context has also evolved in France, and Enercoop is now able to buy electricity directly from producers who still have access to public support mechanisms for renewable production.

Nowadays, the French energy landscape is quite different from 10 to 15 years ago, when Enercoop first started. Nevertheless, challenges still exist. One of the key issues Enercoop currently faces relates to the multiplicity of "green electricity" offers available for the consumers on the market, at a time when more and more consumers are subscribing to support the development of renewable energy. However, so-called "green" offers do not all contribute to the same level of this energy transition. Some other products on the market combine nuclear energy (from the Regulated Access to Historic Nuclear Electricity, or ARENH[6]) with guarantees of origin from renewable energy installations bought completely separately, which is an aberration in this regard. Enercoop advocates for an ambitious definition of green offers that are based on the joint purchase of electricity and guarantees of origin linked to the same installation.

Q5. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted Enercoop, and if so, how?

COVID-19 impacted the way we work and forced us to adapt a lot of our tools. For instance, most of our events, including our general assemblies, had to be held online. We thus decided to launch our own social media platform in order for our members to be able to receive information and exchange ideas more easily, despite being forced to stay at home.

Q6. What are some key lessons you would like to share?

One of the key lessons and underlying principles of Enercoop since its creation can probably be summarised in one word: co-operation. It might seem redundant for a co-operative to advocate for co-operation, but it has been both a leitmotif and a compass for us throughout the years. Stemming from the co-operation between different actors, built around the idea of multiple stakeholders co-operating for a citizen-led energy transition, and supported constantly by our co-operative partners in France and across Europe, Enercoop has achieved change while staying faithful to its core values. However, Enercoop's experience shows that co-operation cannot be imposed – it has to be nurtured and sustained inside and outside the organisation.

[5] Électricité de France (EDF) is France's largest utility and was 100% state-owned until 2005. As of December 2020, the French government held over 80% of total shares in the EDF Group (EDF, 2021).

[6] The Accès Régulé à l'Electricité Nucléaire Historique (ARENH) mechanism requires EDF to sell a certain volume of its nuclear electricity production to competitors on the French market at a regulated price.

Hotoku Energy and Shonan Power: An evolutionary community energy partnership in Japan

Local elementary school students visiting the community solar PV project in Odawara City

KEY EVENTS

- **December 2012:** Local economic leaders establish Hotoku Energy with the support of Odawara City
- **2014:** Hotoku Energy's first solar PV project (1 MW ground mounted and 3 public facilities' roof-top) is realised
- **2015:** Odawara City establishes its local energy plan with a long-term target of 50% renewable energy by 2050
- **Spring 2016:** Hotoku Energy and Shonan Power begin collaborating
- **Summer 2016:** Hotoku Energy, Shonan Power, Odawara Gas and Furukawa form Energy Consortium of Hakone Odawara (ECHO)
- **2017:** Shonan Power's ownership is transferred from ENERES to key stakeholders in Odawara
- **2019:** Odawara City, Shonan Power and REXEV launch EV car sharing scheme demonstration project

After the Great East Japan Earthquake and the Fukushima nuclear disaster on 11 March 2011, there was a surge of initiatives for community-based renewable energy development throughout Japan. Odawara City in Kanagawa Prefecture was among the first municipalities to initiate efforts in this space.

Following its successful application to a Ministry of Environment grant programme aimed at building local capacity for community energy (ISEP, 2014), Odawara City and key local economic leaders formulated plans to develop 1 MW of utility-scale and rooftop solar PV. To finance this project, the stakeholders established an energy company, Hotoku Energy, and raised JPY 34 million (Japanese yen) or USD 0.3 million in equity financing from 24 local companies. A loan from a Shinkin bank (JPY 254 million, USD 2.2 million) and mezzanine financing raised through a citizen fundraising scheme developed in collaboration with Japan Green Fund (JPY 100 million, USD 0.9 million) made up the balance.[7] This project was successfully realised in 2014. Since then, Hotoku Energy has developed further solar projects, operating a total of 2 354 kW (26 sites) as of 2021.

[7] A Shinkin bank is a type of co-operative regional financial institution in Japan typically serving small and medium enterprises and local residents, while Japan Green Fund is a funding company for community power projects established by the Institute for Sustainable Energy Policies (ISEP) and Hokkaido Green Fund. For more information on Japan Green Fund, see Furuya (2016).

Odawara City then set out to create an energy plan that specified short- and long-term targets for renewable energy production and consumption for the city. After a number of consultations with stakeholders, the Odawara City Energy Plan was established in October 2015 (Odawara City, 2015). As an extension of this process, in 2016 Hotoku Energy entered into a consortium agreement with local electricity retailer Shonan Power and gas retailers Odawara Gas and Furukawa. Under the Energy Consortium of Hakone Odawara (ECHO), Hotoku Energy sells locally produced solar power to Shonan Power. With support provided by Odawara Gas and Furukawa, Shonan Power supplies electricity to customers using as much locally produced renewable electricity as possible. The ratio of local renewable electricity reached around 23% in 2020.

Through the development of ECHO's business model, the majority owner of Shonan Power – energy services company ENERES – also came to the extraordinary decision to transfer most of its shares to consortium partners and other local entities (ENERES, 2017). ENERES' decision was made possible through the connections and interactions facilitated by key local business players, which resulted in the creation of a shared vision for local renewable energy production and consumption. Subsequently, Shonan Power has developed new retail electricity plans that contribute a percentage of consumers' electricity bills to support community activities. In addition, REXEV, a start-up founded by one of the board members of Shonan Power, launched an EV car sharing service in Odawara City.

Interview with Kazuya Yamaguchi, Director, Energy Policy Section, Environmental Department, Odawara City & Masahiko Shizawa, Executive Vice President and Representative Director, Hotoku Energy

Q1. How did Odawara City get involved in renewable energy?

Mr Yamaguchi: The Fukushima nuclear disaster affected local economic activities in Odawara, which is about 360 km away from the nuclear power plants. Rolling blackouts caused by the event and the detection of radioactive cesium in Ashigara tea produced in the region triggered action from local political leaders.

With the support of ISEP, the Odawara City government arranged a public event in July 2011. During the event, the idea to establish the city's own local energy company was born. At that time, there were few pioneer community power projects in Japan, so people had never imagined an electric company other than the utilities.

The city government and ISEP then jointly hosted public lectures on community-based renewable energy, and many local people showed interest in getting involved in the activities. From there, city staff identified potential leaders and co-ordinators for next steps.

Based on this initial process, Odawara City applied for a grant program by the Ministry of Environment, which supports communities to make business plans for community power. The work financed through this grant served as the foundation for Hotoku Energy[8] and everything that came afterwards.

[8] Hotoku Energy itself was named after a local 19th century agro-economic thinker, Sontoku Ninomiya, whose philosophy consists of four pillars: 1) Shisei (至誠) – a sincerity to put one's mind in a state of active engagement; 2) Kinrou (勤労) – the cultivation of local resources by local people; 3) Bundo (分度) – knowing the amount of resources that people need and making a life within means; and 4) Suijo (推穣) – leaving part of the harvest for neighbours and future generations, allowing local life and economy to be sustained.

Q2. How did the decision to form ECHO between Hotoku Energy, Shonan Power, Odawara Gas and Furukawa come about?

Mr Shizawa: After Japan's retail electricity market was fully liberalised in 2016, many new electricity suppliers started to offer different retail electricity options. Among them, Shonan Power supplied electricity to corporate and individual customers within Kanagawa Prefecture. The company has prioritised locally generated renewable energy and returned a portion of its profits to community activities, such as sports promotion.

It was a natural decision for Hotoku Energy to work with Shonan Power since both are community-based energy players. One of Hotoku Energy's board members facilitated the initial communication. At first, Shonan Power proposed buying locally produced solar power from Hotoku Energy, and that's what in fact happened. Building on this experience, Hotoku Energy then entered into a co-operation agreement with Matsuda Town, Shonan Power and ENERES (majority owner of Shonan Power at the time) to install a solar PV + battery project with the support of subsidies from METI (Ministry of Economy, Trade and Industry).

Around this time, Odawara Gas and Furukawa, which were historically hostile competitors, also went through leadership changes. The new CEOs of the two companies decided to work together to take charge of the local power and gas businesses.

Building on these conversations, local business leaders facilitated formal multi-stakeholder dialogue and collaboration. Many synergies were identified through this process. Shonan Power was facing difficulties because it did not have a system for marketing to a wide range of residential customers. On the other hand, Odawara Gas and Furukawa had been engaged in the local gas supply business, taking care of just such residential customers. All stakeholders also shared a common vision for community-based renewable energy production and consumption and started discussing how to translate their vision into a concrete business model. This is how ECHO was born.

Q3. How has Odawara City benefitted from ECHO?

Mr Yamaguchi: First of all, our community benefits from access to renewable energy. Under ECHO, Hotoku Energy sells its locally produced solar power to Shonan Power. Shonan Power supplies electricity to customers (residential, business and local government) using as much locally produced renewable electricity as possible.

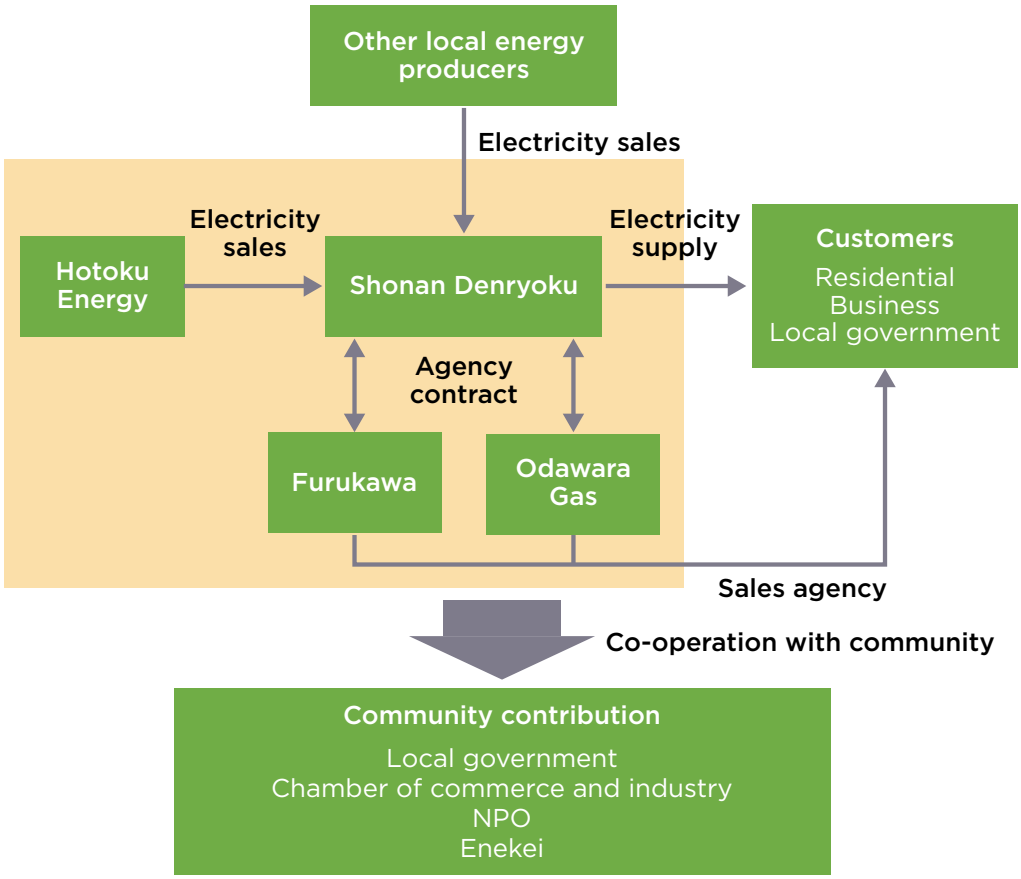
Secondly, Shonan Power offers retail electricity plans that allow customers to contribute 1% of their bills to support community initiatives, including revitalisation of local industries, environmental activities and disaster prevention efforts, culture and arts, and even the provision of meals for children in need. Some of the plans were developed in close communication between Odawara City and Shonan Power and are officially recognised as one of the concrete practices in realising a Regional Circular Symbiosis Zone[9].

Mr Shizawa: In January 2019, Shonan Power also teamed up with an e-mobility service start-up, REXEV, which was established by one of the board members of Shonan Power. With the support of a grant from the Ministry of Environment,[10] Odawara City now benefits from a demonstration project showcasing an EV car sharing service and the use of battery recharge/discharge remote control technology. The commercial service was launched in June 2020.

[9] Regional Circular Symbiosis Zone is a concept advocated by the Ministry of Environment in the 5th Basic Environment Plan i in Japan. The concept incorporates an integrated policy approach for a low-carbon society, resource circulation and living in harmony with nature (Odawara City, 2020).

[10] The Ministry of Environment called for proposals on a decarbonised community transportation model in terms of the Regional Circulation Symbiosis Zone. REXEV, Shonan Power and Odawara City jointly applied to the call for proposals, and their proposal was successfully adopted in September 2019.

Community Energy Partnership Hotoku Energy and Shonan Power



Source: Shonan Power

Q4. What were some of the major challenges faced by Odawara City in developing and implementing this initiative?

Mr Yamaguchi: While the city's energy plan set the basic direction, we still faced many challenges, such as limited renewable energy resources within the area (mostly only solar), a decreasing FIT (feed-in tariff) price and changing electricity market regulation.

Mr Shizawa: Shonan Power constantly seeks to develop appropriate measures in response to these challenges, taking into account strategic procurement and technological development to ensure an effective initiative. In the absence of similar nationwide examples, this often proves challenging.

Q5. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted the initiative, and if so, how?

Mr Shizawa: The 2020 EV car sharing service was launched in the midst of the declaration of a state of emergency due to COVID-19. As a result, it was not easy to increase the number of users rapidly. Nevertheless, we managed to exceed 1 000 users by early 2021.

Q6. What are some key lessons you would like to share?

Mr Yamaguchi: Decisive leadership and open communication were instrumental to the formation of Hotoku Energy and ECHO. When the Fukushima disaster happened, the mayor of Odawara City at the time, Kenichi Kato, acted quickly to start a dialogue with various parties interested in community-based renewable energy planning and development.

Support from local actors, particularly small and medium enterprises, who support community-based activities was also important. Hotoku Energy was financed through equity contributions from local companies who were persuaded to invest because of the community-based activities that would be undertaken through the new entity. Shortly after ECHO was formed, ENERES also transferred most of its ownership interest in Shonan Power to local entities once it realised community-oriented energy services can only be strengthened if local actors engage in the management of the company.

None of this would have been possible without the efforts of the CEOs of the consortium partners and other community leaders like the president of the Odawara Hakone Chamber of Commerce and Industry. Their willingness to facilitate discussions and collaborate allowed different actors to come together to work on projects, develop energy-related business experience, and create a shared vision for local renewable energy production and consumption.

Photos: Hotoku Energy

Solar PV installations from Hotoku Energy's first project

Som Energia: Transforming Spain's energy system through decentralised renewables

Photos: Som Energia

Community members next to ALCOLEA project

KEY FEATURES

- **Dates of operation:** 2010 - present
- **Main activity:** Citizen energy co-operative for construction of renewable energy projects and supply of renewable energy
- **Technologies:** Solar PV, biogas, hydropower
- **Number of projects/capacity:** 16 (totalling 14.1 MW of installed capacity)
- **Financing:** Member contributions

Founded in Girona, Catalonia in 2010, Som Energia is now Spain's largest non-profit renewable energy co-operative, supplying 133 000 customers with renewable electricity. Since its inception, the co-operative has grown to include over 75 000 members located throughout the country.

As of June 2021, Som Energia owned 14 solar PV power plants, one biogas power plant and one mini-hydraulic power plant reaching a combined 14.1 MW of generation capacity (making up 24.6 GWh of annual average production, which corresponds to approximately 5% of members' energy consumption). To meet the rest of its renewable electricity needs, the co operative procures electricity from the wholesale market through Guarantees of Origin (certificates attached to the production of renewable energy).[11]

Som Energia's projects are 100% funded by its members. As a consumer co operative, each member of Som Energia is required to make an initial contribution of EUR 100 (USD 120) and can make additional voluntary contributions. Voluntary contributions earn annual dividends at an interest rate agreed upon by the membership (set at 1% as of June 2021). Som Energia is also exploring the idea of offering shares through co operative and ethical banks. The co operative had a turnover of EUR 70 million (USD 80 million) in 2020.

[11] All EU member states must have a Guarantees of Origins scheme to ensure that energy generated from renewable sources can be tracked through the supply chain, from the generator to the end user.

In addition to investing in share capital, members have the option to purchase energy shares to offset their annual energy consumption through Som Energia's Generation kWh project.[12] Through Generation kWh, over 4 600 members have contributed EUR 4.5 million or USD 5.2 million in zero-interest loans to finance three solar PV power plants. After the Spanish government implemented changes to the regulatory framework favouring self-consumption, Som Energia also began building a community of prosumers by organising collective purchases of individual solar PV rooftop systems for its members. To date, it has organised 26 collective purchases, and 1 300 residential installations have been built. As of June 2021, Som Energia had more than 3 000 prosumers and expects to reach more than 4 500 by the end of 2021.

Interview with Nuri Palmada, Cooperative Board Member, Som Energia

Q1. Why did your community want to get involved in renewable energy? How did you first get involved in Som Energia?

At the time I got involved in Som Energia, I had been working in the renewable energy sector as an engineer for many years. My colleagues and I were in Germany visiting some energy co-operatives and were inspired to build something similar in Girona. We then got in touch with an entrepreneur who was interested in investing in renewables and helped make Som Energia a reality.

When Som Energia was started in 2010, it was also the beginning of the most important international campaigns against climate change, like 350.org and others. The majority of us involved in setting up the co operative were motivated by environmental concerns like climate change and nuclear energy. This was also around the time of the accident in Fukushima.

Another important reason was that in Spain, the existence of an energy oligopoly and its relationship with politics was too obvious. Even now, Spain's electricity sector is dominated by a small number of large companies.

Q2. Please describe the governance and decision-making processes established for Som Energia. What are members' roles in making key decisions?

The organisational structure of Som Energia runs from bottom to top and not the other way around.

As a co-operative, the Assembly is the most important decision-making body. Each member has one vote irrespective of how much they have contributed. All main decisions are taken in the Assembly, especially political decisions. The Assembly also votes for a board to represent its interests. The day-to-day operations are led by the management team and support staff, which has now grown to include 100 employees.

Som Energia operates as a decentralised model consisting of sections and local groups. Local groups act independently with the objective of attracting new members, organising information campaigns or other capacity-building activities. While local groups in Barcelona have emphasised member training, other groups have focused on expanding energy supply or creating links to other co-operatives outside of the energy sector.

Because the local groups constitute the co-operative, they are not expected to implement centrally decided rules. Sometimes, local groups form independent co operatives to advance their own causes. For example, one of our groups created a car sharing co operative, and now we collaborate with them.

[12] For more information on Generation kWh, visit *www.generationkwh.org*.

Q3. How do members benefit from being part of Som Energia?

Members expect to be able to consume renewable energy from Som Energia's own plants. This took some time to set up because first we had to become a supplier, with the technical and economic difficulties this involves. After Som Energia was established, one year passed before we could start supplying renewable electricity to members.

Som Energia now has several small renewable plants around Spain. We believe in a real distributed generation model, so we want people living in those places to benefit from the electricity we generate in their municipalities. By becoming members of Som Energia, people can help us create more local energy communities and co-operatives.

Spain is a very diverse territory. There are some regions with a strong co-operative culture and association culture while in other areas this is really a challenge. Local groups in those areas are doing really important and difficult work. They are slowly introducing this co operative culture in those areas.

In Som Energia, we promote gender equality. This is a transversal policy according to the formal commitment of the board of directors. Two of Som Energia's past four presidents are women.

Q4. What have been some of the major challenges of establishing and operating Som Energia?

Spain's regulatory framework for the energy sector currently does not facilitate co operatives and community energy projects. Right now, we are still waiting for the transposition of the Clean Energy Package[13] into national law, which may improve things in this regard.

We have been able to innovate in response to changes in government policy. For example, we developed Generation kWh as an alternative way to finance projects after the government stopped FITs in 2012. Recently, we have started moving beyond individual solar PV rooftop systems to options for collective self-consumption. Although it is possible to implement virtual net metering projects in Spain, there are major limitations on project size (maximum 100 kW) and who can participate (only customers living within 500 metres of a project are eligible).

The main difficulty is that many people still view renewables only from a cost standpoint and fail to value the many benefits they bring. Even now, renewable energy tenders are only for very big players because the objective is to procure renewables at the lowest cost. In many parts of Spain, there continues to be opposition to renewable energy projects due to nimbyism. This makes it challenging for us to expand beyond decentralised renewables and develop projects in regions where we have more members.[14] Right now, we meet approximately 5% of our electricity needs through our own projects.

Despite these challenges, Som Energia is showing that it is possible to do things another way, to put citizens in the centre of energy transitions. Som Energia's generation plants are 100% owned by our members, so they are sovereigns in terms of energy supply. This common good is not left in the hands of big funds and speculative capitalists.

[13] The European Commission's 2019 Clean Energy Package mandates EU member states to create an enabling legal framework to promote and facilitate the development of community energy. "Energy communities" are recognised in two EU legislative documents under the formal definitions of "citizen energy communities" (revised Internal Electricity Market Directive [EU] 2019/944) and "renewable energy communities" (revised Renewable Energy Directive [EU] 2018/2001). See IRENA Coalition for Action (2020).

[14] At the time of writing, approximately 70% of Som Energia's members are in Catalonia; however, most of the co-operative's renewable energy projects are located in the south of Spain.

Q5. COVID-19's impacts are being felt across the globe and in nearly every aspect of life. Has the pandemic impacted the initiative, and if so, how?

During the first months of the pandemic, fewer members joined. Now, the situation is not so bad. We are approaching pre-pandemic rates. But we are seeing more members who cannot afford to pay their electricity bills.

Q6. What are some key lessons you would like to share?

Firstly, policies should account for the differences between local energy and citizen energy. When talking about community energy, the Spanish government often focuses on local energy. However, Som Energia has members throughout Spain. Some countries have made this differentiation in their legislation.

Spain will have more renewable energy capacity than it needs. It is not a question of whether we move to renewables, but how to develop this resource responsibly in a way that supports communities and people. We risk a future that emulates the old fossil fuel model, with centralised projects owned by the same companies.

It is very difficult for NGOs, co-operatives, community energy, etc., to change the energy system. We can carry out projects like Som Energia but, in fact, projects like ours make a limited impact in the wider world, so efforts should be put into changing the global economic model.

Co operatives like Som Energia highlight the importance of social capital and show that the social economy is possible. We hope the upcoming changes to the community energy legislation will bring about more citizen energy co-operatives.

Collectively buying solar energy

Photos: Som Energia

Community members pointing to the rooftop installation

Fontivsolar project

Annual meeting of local groups

Sosai Renewable Energies: Empowering women through renewables in Nigeria

Sosai Renewable Energies Founder Habiba Ali demonstrates improved cookstoves to a community

KEY FEATURES

- **Dates of operation:** 2017 - present
- **Technologies:** Solar PV
- **Number of projects/capacity:** Two solar PV mini-grids (totalling 20 kW of installed capacity)
- **Financing:** Off-Grid Energy Challenge grant through the United States African Development Foundation (USADF), export credit insurance through the Dutch Good Growth Fund

Located in northwest Nigeria, Kaduna State is the country's fourth-largest state by land area and the third-largest state by population (National Population Commission of Nigeria, 2021; National Bureau of Statistics, 2021).

While Kaduna Electricity Distribution Company supplies households and businesses in the state with electricity, many rural communities are often left marginalised. With this in mind, in 2016 the United States African Development Foundation (USADF) launched the Off-Grid Energy Challenge, awarding grants to African enterprises providing off-grid solutions that deploy renewable resources, power local economic activities, and demonstrate a sustainable, scalable business model (USADF, 2021).

Sosai Renewable Energies, a renewable energy provider and consulting company, was awarded a USD 100 000 grant in 2016 for two community solar mini-grid projects in Kaduna State. It also received additional financing for the project through a USD 25 000 loan from the Dutch Good Growth Fund.

Two 10-kW mini-grids were installed in the Makarfi local government area, specifically the Baawa and Kadabo communities, in 2017. Today, the mini-grids supply 79 households and 12 businesses with energy. Energy from the mini-grids is sold to the communities through a pay-as-you-go model, at NGN 3 000 (Nigerian nairas) per month (USD 7) for households and NGN 6 000 per month (USD 15) for businesses. Local staff in the communities monitor the mini-grids and ensure that households and businesses are paying for the energy services on time.

Notably, the mini-grids have also had a positive impact on the women in the communities. Each community has one 18-metre solar tunnel dryer and one solar kiosk managed by local women. The women generate income through renting out the dryer to farmers, charging mobile phones and selling products through the kiosk. The solar dryers allow local farmers, many of whom are also women, to dry their produce quickly and efficiently. Further, reduced income dependency on men in the household has enabled these women to support their families while boosting their economic and social status.

Interview with Habiba Ali, Founder of Sosai Renewable Energies

Q1. Why did the communities want to get involved in renewable energy? How did Sosai Renewable Energies first get involved in the initiative?

When I started Sosai Renewable Energies, my goal was to increase the adoption of clean cookstoves and solar lamps within my community in northern Nigeria. The air pollution caused by inefficient cooking and lighting technologies and fuels was having harmful health effects, mostly felt by women and girls, who are primary users.

In 2013, while supporting the set up and implementation of the Clean Development Mechanism[15] on the project Improved Cookstoves across rural areas in Nigeria (UNFCCC, n.d.), we met the Kadabo community, who were interested in energy for lighting. Through discussions with the community, members expressed an interest not just in solar lamps for households, but also in a mini-grid that could power the whole community (Kadabo has roughly 250 households).

Shortly after this, the USADF call for applications was launched, which we applied for and won. We quickly realised that the funds made available through this were sufficient for installing a mini-grid in more than one community.

Using the networks we had developed as part of our cookstoves deployment, we identified Baawa as a potential area to set up a mini-grid. We discussed with the community the possibility of offering an electricity solution for everyone (as opposed to households buying their own solar lanterns). The Baawa community is a resettled community, pushed off its land due to frequent floods. They never thought that they could access electricity and expressed overwhelming interest in the opportunity to set up a mini-grid in their community.

Q2. Please describe the governance and decision-making processes established for the initiative. What are the communities' roles in making key decisions?

When the initiative first started, we (Sosai Renewable Energies) engaged elders, community leaders and youth leaders to better understand the communities' needs as well as get the necessary community buy-in to improve the odds of success of the initiative. These are the same groups that we engage with when there are any problems.

Both communities contributed the land for the mini-grids and volunteered their time to clear the land, make the local bricks needed for building and construct the battery room.

In addition to making their voices heard on the establishment of a mini-grid, the farmers in each community decided to introduce a solar-powered dryer to process their produce. The open-air drying method that they were using requires considerable time and effort, is weather dependent, and is prone to contamination from dust, dirt and insects. Additionally, prolonged exposure to ultraviolet radiation can negatively impact the quality of the products.

[15] Under the Clean Development Mechanism, countries with an emissions reduction commitment under the Kyoto Protocol can implement emissions reduction projects in developing countries (The Clean Development Mechanism, 2021).

Q3. How do community members benefit from the initiative?

The goal of this initiative, supported by the local government chairperson, was to improve the economic situation of communities and add value to community income.

Prior to the installation of the mini-grids in Baawa and Kadabo, there was no regular supply of electricity to these two communities. While we had initially set out to supply 25 houses within each community with energy, 79 households and 12 businesses across both communities are now receiving energy from the mini-grid. There is overwhelming energy demand.

Another benefit is job creation. We have local staff in the communities who monitor the mini-grids and ensure that households and businesses are paying for the energy services on time. We have trained these staff in record keeping and basic troubleshooting and provide them with a monthly base pay as well as a percentage of all funds collected from the payment of energy services.

Furthermore, these communities, which are dependent on farming peppers (Kadabo) and tomatoes (Baawa) for their income, were experiencing significant post-harvest losses. Drying produce on the roadside was leading to a 30% loss in goods, which is significant waste for valuable cash crops that are a major source of household income. Connecting the farmers to agricultural technologies critical to their productivity was a huge motivating factor.

Around 30 women farmers from both communities are now served by solar dryers each month. Several of these farmers have been able to move away from subsistence farming and towards scalable businesses. Furthermore, 12 women from across both communities oversee the dryers, which provides them with a regular monthly income. We have trained these women in dryer maintenance, bookkeeping and record keeping. We have also called in a food nutrition expert to train them in handling produce, drying produce, hygiene standards and packaging. All of these skills are transferable to other professional endeavours.

As a woman, I have a philosophy to support women in rural communities. The gender aspect of this initiative is quite significant, considering that purdah (a religious and social practice of female seclusion prevalent among some Muslim and Hindu communities) is commonly practiced among the more conservative communities in northern Nigeria.

Q4. What have been some of the major challenges of developing and operating the initiative?

Some of the challenges we have experienced in both communities include:

- Payment defaults from community members, which prevent us (Sosai Renewable Energies) from meeting our responsibilities in maintaining the mini-grids.
- Theft of energy services (bypassing of the meters) by some community members.
- Miscommunication among some community members who believe this is a government initiative and do not want to pay for energy provided.
- Lack of adequate skills and motivation within the community, which has prevented us from fully handing over the management of the mini-grids. We will continue managing the mini-grids, working together with the community to ensure continued supply of electricity.
- Conservative cultural beliefs with respect to gender, with some women disallowed from running the solar kiosks and instead having their brothers or sons take up this role.

We address these problems through engagement with the community elders and leaders, who communicate directly with community members and sensitise them on the operation of the mini-grid. We have also adjusted pricing models to ensure that we are efficiently catering to low-income community members.

Another issue is that with growing energy demand, the 10 kW mini-grids do not have the capacity to serve everyone in the communities. While both communities want to expand their mini-grids, funding continues to be a challenge.

Q5. What are some key lessons you would like to share?

Through this experience, we have developed a better understanding on how to run a mini-grid, including the technology and capacity needed.

It is also apparent that access to energy for lighting also promotes the adoption of household appliances, including refrigerators and televisions. With access to the solar power dryers, farmers have become innovative in what produce they can preserve and sell at a premium rate. They are also interested in scaling their businesses by introducing solar irrigation pumps and refrigerators. In the future, solar home kits can be added to better serve the growing needs of the communities.

Moving forward, we have plans to expand mini-grids and introduce mini-grids to new communities. We are motivated by the desire to light up our country.

Solar power dryers

Photos: Sosai Renewable Energy

Community members trying improved cookstoves

Tulila Hydroelectric Plant: Supplying reliable hydropower in rural Tanzania

Tulila Hydroelectric Plant

KEY FEATURES

- **Dates of operation:** 2016 - present
- **Technologies:** Hydropower
- **Number of projects/capacity:** 5 MW (with provision to expand to 7.5 MW)
- **Financing:** Bank loan, subordinated loans and equity, and a Green Generation Performance Grant (totalling USD 28.3 million)

The Tulila Hydroelectric Plant is a 5 MW run-of-the-river dam located on the Ruvuma River in Tanzania. Constructed between 2013 and 2016, the project provides electricity for rural areas and local activities via a mini-grid, with the aim of eventually connecting to the Tanzanian national grid to meet regional electricity needs and increase connectivity.

Tulila was initiated under Swiss entrepreneur Albert Koch's "Hydropower for Africa" initiative, which was founded in 2009 in collaboration with the Benedictine Sisters of St Agnes. The Sisters developed an interest in constructing and operating the project following their positive experience operating and managing another 400 kW hydroelectric plant, the Lupilo Power Station.

With support from the initiative, the Tulila Hydro-Electric Plant Company Limited was established to act as project owner and borrower. Through their previous experience, the Sisters had gained a strong reputation in hydroelectric project management, which helped them secure a bank loan to cover 65% of Tulila's project costs. Subordinated loans and equity contributed to 32% of total project costs, with the final 3% of expenses covered by a Green Generation Performance Grant through Tanzania's Rural Energy Agency (IHA, 2017a).

Since its construction, Tulila has helped reduce the Ruvuma region's dependence on diesel generators and provide the region with a reliable source of electricity, supplying energy to 27 000 households in the Mbinga and Songea districts (IHA, 2017b). The project also delivers important socio-economic benefits to local communities. A portion of the revenues earned by selling electricity to the national utility, Tanzania Electric Supply Company (TANESCO), supports the Sisters' services and charity work. Some of these essential services include delivering education for 2 000 pupils, nutrition and orphanage services, and operating the only health-care facility in the Chipole area.

Interview with Sister Yoela Luambano, Director of Tulila Hydroelectric Plant, Benedictine Sisters of St Agnes

Q1. Why did your community want to get involved in renewable energy? How did you first get involved in the project?

In our area there was a shortage of energy, and in rural areas there was no access to electricity. We were lucky to have a benefactor, Mr Robert Fuchs from Switzerland, start the Lupilo Power Station in 2000 in the Ruvuma River upstream. However, the size of this project (400 kW) does not meet all the energy demand in the area.

The project sponsor, Mr Albert Koch, recognised this problem. We sat down together and discussed possible solutions, resulting in a decision to start the Tulila hydroelectric project in 2010. The main goal was to provide electricity to local people in the villages and in a town called Songea who were using diesel generators. All the villages from Tulila to Songea are now getting electricity.

The government also helped support us by building a [transmission] line from the project to Songea to distribute electricity to people.

Q2. Please describe the governance and decision-making processes established for the project. What is your community's role in making key decisions?

After receiving financial support from Mr Koch to build the Tulila project, the convent was given responsibility to make key decisions. We identified a suitable site for the project and worked closely with the government throughout the process (*e.g.* to secure environmental approvals). Now we mainly operate the project ourselves with the support of local people who perform maintenance work and other tasks.

Q3. When you first got involved in the project, how did you expect your community to benefit? Has this changed over time, and if so, how?

The Lupilo Power Station produced enough electricity to support the convent, hospital, orphanage, schools and small activities near the plant, but not enough to supply all villagers.

The Tulila project is providing electricity over a distance of 100 km. This has had an impact in the region – if you go from Tulila to Songea, you can see small machines using electricity. Shops, schools, sewing and small milling machines are all using electricity from the Tulila project.

The project has had a positive impact on education. When there was no electricity, students could not learn in the evening due to lack of lighting. Now, they can learn in the evening at home or school.

Without electricity, we could not have a hospital because medicine needs to be stored in fridges. We needed enough power to operate around five or six fridges. The electricity produced by the Tulila project supports this load.

The project has also had many positive impacts on local women. Before, women had to go to the river or travel long distances to get water. Now, with electricity access, a lot of people can get water from a pump near their homes. In addition, the availability of medicines through a hospital dispensary has had a great impact on women and children's health. Women now also have easier access to milling machines for processing food crops. With electricity access, villages have purchased more machines.

In terms of local job development, there are two employees responsible for plant maintenance and operations. We have sent some sisters to school to get training on how to operate the plant. Seven sisters now operate the plant. We also have other sisters working in supporting administrative functions.

After we fully repay the bank loan taken out for the Tulila project, we will be able to use the income earned from selling electricity [now going towards loan repayment] to expand into other initiatives, such as maize processing to produce meal.

Q4. What have been some of the major challenges of developing and operating the project?

One challenge is transport. The plant is located in a remote area, so if any technical issues come up (*e.g.* the transmission line stops working), we have to use a private car to rush to town. We have written several letters to the government about the road to town, which is 100 km long and will require many hours to repair. For now, we can still manage maintenance ourselves. This issue also affects the sourcing of logs to construct the hydroelectric dam. Since our logs are not of good quality, we have to import timber from Songea.

Communication is also a big issue, although the situation has improved. Part of the problem was that we did not have reliable Internet access. Now we have some small devices with access (*e.g.* cell phones), although we are paying a lot of money for this. Internet access in our local area is still challenging.

Another problem is income. We want to connect the Tulila Hydroelectric Plant to the national grid and increase generation capacity by adding a 2.5 MW generating unit, but the revenues earned from selling electricity to the grid are not enough to cover loan repayments for the project and the cost of the new turbine. For now, we will focus on paying back the loan we took out for the project.

Q5. What are some key lessons you would like to share?

We have learnt a lot. Before we started the project, not everyone supported the fact that women could take action and organise something big like the Tulila Hydroelectric Plant. When we went to the government to explain our project, there was surprise.

We are trying to encourage our sisters to be self-sufficient. As we have seen, we now have seven sisters operating the plant themselves. So, a lesson we have learnt is that we can do everything we set our minds to. Another lesson learnt is that electricity is very, very key for everything. You can open schools, you can learn how to use machines, and there are many other things you cannot do without electricity. Electricity is essential in our life.

UrStrom eG: Leading Mainz's energy transition through citizen action

UrStrom celebrates the inauguration of a large solar PV plant in 2017

KEY EVENTS

- **Dates of operation:** 2010 - present
- **Main activities:** Citizen energy co-operative for construction of regional solar PV systems, supply of regionally produced green electricity, and operation of regional e-car sharing programme powered with 100% own green electricity
- **Technologies:** Solar PV
- **Number of projects/capacity:** 17 (totalling 1.1 MWp of installed capacity)
- **Financing:** Co-operative shares, loans from members

UrStrom Citizen Energy Co-operative Mainz eG (UrStrom) is the first citizen energy co-operative in Mainz, capital of the German federal state of Rhineland-Palatinate. Launched in 2010, the co-operative aims to contribute to the energy transition in the region through building a clean, democratic and decentralised energy supply. As such, it focuses on the construction of solar PV plants within a 100 kilometre (km) radius of Mainz.

As of 2021, UrStrom has grown to more than 470 members. The co-operative owns and operates 17 PV systems making up over 1.1 megawatts-peak (MWp) of installed capacity – enough to supply about 260 four-person households. The smallest system (installed on a private roof) generates an annual output of 7 MWh, while the biggest system (installed at a paper factory owned by an international company) produces 378 MWh per year. Together, these systems combine for over 1 gigawatt-hour (GWh) in annual average production to generate approximately 720 tonnes of carbon dioxide (tCO_2)/year in avoided emissions.

UrStrom has actively pursued the use of renewable energy in decarbonising other end-use sectors. In 2018, UrStrom pioneered a citizen-owned electric car (e-car) sharing project powered entirely by green energy. Eight e-cars have been made available to share at five locations across Mainz, and almost 260 customers have signed onto the project. In response to growing requests from citizens, UrStrom is about to establish neighbourhood e-car sharing locations. Based on this experience, the co-operative co-founded The Mobility Factory, the European platform for citizen-owned e-car sharing. UrStrom was also a founding member of a German umbrella co-operative for e-mobility, Vianova eG, in 2020. Beyond transport, the co-operative is now looking at how to support the resource-efficient use of land through agri-photovoltaics.

Interview with Annette Breuel, Editor and Head of Event Management, UrStrom

Q1. Why did your community want to get involved in renewable energy?

"And there is magic in every beginning…". This line of verse could be the headline of the founding story of UrStrom. In 2010, six of us from the same region met at an advanced training course, "Project Developer for Energy Co-operatives", with participants from all over Germany. All of us realised we had been independently pursuing the same idea for a long time: the grassroots energy turnaround. We shared a vision of climate protection, preservation of peace and the conservation of creation. Along with these goals, the participation of citizens had to be a priority.

This was at a time when the number of citizen co-operatives was growing rapidly in Germany – yet there was not a single one in Mainz. So we decided to start our pioneering work here. Our plan was to build PV plants, which produce 100% clean green electricity, within a radius of 100 km.

We launched UrStrom with nine founding members in September 2010. Our preamble stated: "By the production of renewable energy and the democratic structures of a co-operative, an environmentally friendly, socially just and at the same time economic energy supply shall be promoted. To this end, UrStrom offers opportunities for participation and involvement."

Q2. Please describe the governance and decision-making processes established for UrStrom. What are members' roles in making key decisions?

All members work on a voluntary basis. Our principle is a flat hierarchy, which allows free development of ideas and visions from each individual. The supporting pillars are the UrStrom meetings, which take place on a monthly basis and are attended by the management board and the supervisory board. Members who support UrStrom actively are also invited to participate with their corresponding topics. All important decisions are prepared, discussed and made at these meetings.

The annual general meeting is another significant element. Here, among other things, the supervisory board is elected, which controls the work of the management board. Each member has one vote, regardless of the number of co-operative shares he or she holds.

As our membership grew and we tackled more and more projects, we realised that the four members of the board of directors working in the fields of technology, energy operations, finance and marketing could no longer handle the tasks alone. So we looked for voluntary supporters among our members – and found them easily. For efficient internal structuring, we developed an organisational chart for the first time, with clearly defined areas of responsibility and competencies.

Q3. How do members benefit from being part of UrStrom?

Our mission is to be part of a community that wants to achieve an ecological as well as a social rethinking of its own and society's behaviour. Gender considerations have not been a main priority, but it is interesting to note that UrStrom was founded by two women and seven men. Today there are three women and six men on the management and supervisory boards. This gender ratio is also reflected in our membership: one-third are women. Among the actively supporting members, the proportion of women to men is one to five. Depending on the task at hand, each member is involved in numerous projects according to her or his knowledge and capacity.

Besides our pioneering work in solar PV, our co-operative is proud to be leading the transport revolution in Mainz. With our project UrStromMobil, we laid the foundation for a new way of mobility placed in the hands of citizens based on the principle of "sharing instead of owning". At the request of environmentally conscious citizens, we set up e-car sharing stations in their districts and provide them with cars powered by our 100% regionally produced green electricity. For some of the users, this offer was a reason to sell their own car, book UrStrom vehicles and switch to public transport or bicycles.

To create a feeling of togetherness, we founded the "UrStromClub" in 2011. We invite our members and interested guests to a monthly meeting in a separate, cosy room of a pub. Through our UrStromClub, we get to know each other personally, present planned projects and goals to the participants, and promote a lively exchange of ideas and discussions. Out of this circle, for example, 15 members have offered their assistance in areas such as IT, administration, data protection, project acquisition and PV monitoring.

In addition to the club, our annual event "UrStromUnterwegs" (UrStrom on the road) showcasing lighthouse projects of the energy transition serves as inspiration and is another means of engaging members.

Ninety percent of our members invest their money in their UrStrom co-operative for idealistic reasons, to promote renewable energy and to combat climate change. With the current sluggish climate and energy policy of the German government, we are convinced that change will only happen through civic engagement from the bottom up.

Q4. What have been some of the major challenges of establishing and operating UrStrom?

In 2010, we had no idea how much bureaucracy we would face. However, right from the beginning it was clear to us that our work – without any references – would be a struggle. Yet with the trust placed in UrStrom by the head of the Mainz Department of Environment, in 2011 we successfully co-operated with the city's waste disposal company to build and commission our first PV plant. With this plant, the company became one of the first in Germany to produce and consume its own renewable electricity.

One of the biggest challenges nowadays are the constant changes in the Renewable Energy Act (Erneuerbare-Energien-Gesetz) of the German government. These changes have always worked to the advantage of powerful big corporations and to the disadvantage of the citizen co-operatives. As a result, no two contracts are ever the same when it comes to building PV systems. This lack of predictability is nerve-wracking and wearing, particularly for a co-operative whose members work on a voluntary basis. It is thwarting civic commitment.

Tenders have also acted as a tool to favour big groups and hinder the democratisation of energy production. Their aim is to preserve structures of power, supported by government – despite the many advantages that a citizen-owned energy transition entails.

UrStrom has become a known and respected co-operative in Rhineland-Palatinate. In 2014, we co-founded the Bürgerwerke eG, today the largest co-operative association of citizen energy in Germany.[16] Through the Bürgerwerke we sell UrStromPur, the electricity from our plants, to our customers. However, bringing about political change for more PVs and e-car sharing continues to be a challenge for us. Through our contacts with the city's Department of Environment and the Ministry of Environment and Energy, we try to get government support for our vision and goals by written petitions and personal encounters.

[16] Bürgerwerke (*https://buergerwerke.de*) provides people all over Germany with renewable citizen electricity from solar PV plants, wind and hydropower as well as with sustainable biogas from organic residuals, produced in a sugar beet factory in eastern Germany.

Q5. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted UrStrom, and if so, how?

The pandemic has severely affected the supply of goods – mainly PV modules but also supplies for the transport market. This has caused prices to rise, which is an expensive affair for a small co-operative. By contrast, the number of customers in our electricity and gas sales businesses increased significantly.

We are feeling the effects of COVID-19 as well in our e-car sharing programme. We cannot organise large informational events for people interested in establishing new e-car sharing stations in their own neighbourhoods. So right now it is difficult for us to build "mobility communities". In addition, environmentally aware people currently have less need for mobility.

Corona measures have also impacted our UrStromClubs, as in-person group meetings were not allowed indoors or outdoors. In February 2021, we decided to have monthly virtual UrStromClubs. Although they have been well received by members and guests, the big disadvantage is that personal contact is missing.

Q6. What are some key lessons you would like to share?

We have initiated major projects in support of the regional energy and climate transition, and we have achieved a lot in the past ten years. Yet we could achieve even more if the government did not hinder our co-operative work. But even if the road remains rocky and is beset with more and more obstacles, we made the right decision in founding UrStrom. We have learnt a lot about creative ways to overcome political blockades, and we have won over many wonderful people for our co-operative.

The magic of the beginning and the motivation to continue despite resistance from political circles have left their marks on us. We need perseverance more than ever, and we must continue to push for the energy transition from the bottom. Only together, that's clear, are we strong.

Photo: UrStrom eG

UrStromMobil, a new way of mobility

Village Lighting Scheme: Rebuilding community self-sufficiency in Timor-Leste

Smiling woman switches on light

KEY EVENTS

- **Dates of operation:** 2007 - present
- **Technologies:** Solar PV
- **Number of projects/capacity:** 2 133 solar home systems (totalling 50 kW of installed capacity)
- **Financing:** Small grants from individuals and organisations (totalling USD 530 000)

Since 2010, the government of Timor-Leste has implemented impressive grid expansion, bringing the electrification rate from 24% at independence in 2002 to 86% in 2018 (World Bank, 2021). Timor-Leste is, however, very mountainous, and over 35 000 households will likely never be connected to the main grid. Those living off the electricity grid in Timor-Leste typically depend on candles and inefficient kerosene lamps after dark.

In 2003, a committed group of members from the Australian membership-based organisation Renew (formerly the Alternative Technology Association) started to install solar PV on critical infrastructure in Timor-Leste. After receiving requests for modern household lighting, Renew collaborated with local organisations and the government in 2007 to develop the Village Lighting Scheme (VLS).

The VLS is a community-managed energy programme administered at the village level. Households in the community commit to paying into a maintenance fund that is utilised to pay a local technician, buy spare parts and build capital for end-of-life component replacement. The community nominates candidates to receive technical training from a mobile training unit from a Timorese vocational college (the Centro Nacional de Emprego e Formação Profissional) and are then deployed to install 30 watt (W) solar systems in households.

After ten years of operation, the VLS had reached 2 133 households across seven districts of the country. Operational success, however, was highly dependent on communities placing trust in the energy committees established to oversee the programme. Renew also faced challenges growing the programme further unless it could identify a local entity to take ownership of the programme. Consequently, in 2018 Renew began to modify VLS to focus on a local, social enterprise-led model utilising household energy financing. This modification shows promise in creating the economies of scale required to support full-time technical employment and local enthusiasm to drive the programme forward.

Interview with Harry Andrews, Community Projects Manager, Renew, Australia

Q1. Why did the community want to get involved in renewable energy? How did Renew first get involved in the initiative?

During Indonesia's withdrawal from Timor-Leste in 1999, much of the country's infrastructure was damaged or destroyed. Renew (then the Alternative Technology Association) is a membership-based organisation focused on sustainability solutions for homes and communities. Some of its members wanted to contribute to rebuilding Timor-Leste. This led to Renew, in 2003, partnering with local organisations to install solar power on health clinics, schools, radio stations and police posts.

Over the years of implementing these projects, Renew and its partners received numerous requests from communities to help provide solar lighting, not only for community buildings but also to light their homes. These requests for assistance were often made through Australian-Timor-Leste Friendship groups (*i.e.* partnerships between Australian and Timor-Leste communities). On the recommendation of the Friends of Aileu,[17] in 2007 Renew answered these requests and began to frame its VLS through community consultation and trials in Besilau village of the Aileu Municipality.

Q2. Please describe the governance and decision-making processes established for the initiative. What are the communities' roles in making key decisions?

Renew established clear criteria for aiding communities. Firstly, Renew worked with the government of Timor-Leste to ensure that there were not imminent plans to extend the electricity grid to the community. Further, the whole community had to be willing to participate.

After a community has expressed interest, working closely with district and sub-district governments, one of Renew's local community engagement partners would visit the community to explain their commitments; have the community elect an "energy committee" consisting of a president, secretary and treasurer; nominate two to three candidates to receive technical training; and adopt a constitution. Renew encouraged 50:50 participation of men and women for these roles.

The energy committee then sought agreement from all households in the community to commit to paying USD 2 per month into a maintenance fund and to agree that this fund would pay for spare parts and remunerate technicians for undertaking maintenance and repairs. After installation of the solar systems, the community is responsible for managing monthly collections, operating the energy committee, and undertaking repairs and maintenance.

Q3. How do the communities benefit from the initiative?

The key benefit highlighted by the communities is safety. In the early stages of programme implementation, it quickly became apparent that there was a cultural tendency in Timor-Leste to leave lights on all night for safety reasons. As such, in the evolving design of the solar system, a low-wattage (1 W) outdoor light was added that automatically switches on when it is dark and operates all night. Further, household safety was improved as the solar lighting system reduces the need for candles and kerosene lanterns that pose burn and fire risks. The lighting systems have also enabled communities to undertake night-time economic activities, generating additional income by repairing fishing nets and weaving fabric at night.

[17] Established in 2000, Friends of Aileu is the friendship relationship between Moreland City Council and Hume City Council, along with their communities, and the Timor-Leste municipality of Aileu and its people (Moreland City Council, n.d.).

Additionally, we worked closely with a Timorese vocational college to develop a solar PV certification course with funding support from the Australian Government. Community members nominated to become technicians through the VLS completed a training course based on this programme, which has also been accredited by the national government.

Q4. What have been some of the major challenges of developing and implementing the initiative?

As much as possible, Renew's focus under the VLS was to build community self-sufficiency. Renew worked to establish linkages between the community and technical support partners in the capital city of Dili. And, in later years, Renew hired a Timorese community engagement officer to visit the communities to conduct monitoring and help resolve administrative issues. Nevertheless, we faced some challenges.

One major challenge has been communities' lack of willingness to continue to deposit money into the maintenance fund after the first 12-24 months following installation. The solar systems used proved to be very resilient, and there were few failures over their first four to five years of operation. In many communities, once the maintenance fund grew to more than USD 2 000 there was a tendency for people to stop contributing.

Anecdotal reports indicate that there was both a reluctance for money to be sitting idle and a lack of trust in the energy committee to manage significant funds. In some communities, money intended for maintenance had been misappropriated by the committee for other purposes. Interestingly, the energy committees in more remote communities tended to operate for longer, with greater transparency and trust (possibly due to stronger community cohesion) than those communities closer to administrative centres.

Another persistent challenge was maintaining technical skills at the village level. In the first years after installation there were typically few technical issues. As such, there was insufficient work in the first years to maintain skills. Technicians tended to lose their skills or moved on to focus on other income-generating activities.

To address these challenges, in 2018 the VLS evolved into a rent-to-own solar model using a pay-as-you-go approach. Currently, mobile payment technologies are not prevalent in Timor-Leste, which means payment must be collected by going to individual community members. While the lack of mobile payment technologies may seem like an obstacle, it has actually resulted in zero default rates as personal relationships are maintained with customers. This will present challenges at scale – but in the absence of mobile money, it has to be managed.

This change also enabled a local social enterprise to take ownership of the programme and hire full-time technical staff. Because each technician covers a larger geographic area, skill retention due to lack of work is not an issue. Instead of continuing with the energy committee approach, the enterprise is also working with existing leadership structures, which may help improve community buy-in. While it is too early to tell if this evolution will be sustainable over the long term, the initial signs are promising.

Q5. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted the initiative, and if so, how?

COVID-19 created significant uncertainty for Renew. In 2020, a decision was made that the organisation needed to focus on its core activities of helping Australians live more sustainably.

Renew's exit from Timor-Leste was phased in over a transition period (ending in December 2021). During the transition, Renew continued to work closely with the local social enterprise running the VLS and linked it with funders who are interested in continuing to support the programme. The social enterprise is amazingly capable, and I am confident that the programme will continue.

Q6. What are some key lessons you would like to share?

Heightened transparency is required around money collection and safe keeping for initiatives like VLS. This is particularly the case in places where communities have no access to formal banking. Before Renew made the difficult decision to end its engagement in Timor-Leste, it explored the potential of transferring the maintenance fund into a Village Saving and Loan model. This model is like a local savings club, where community members agree to deposit a settled amount each month into a locked box. Members of the community can request to borrow money from the club at an agreed interest rate. This approach would allow the growing fund to have a productive use in the community, reduce the risk of unauthorised loans and increase transparency.

Further, when deploying renewable energy solutions it is important to consider the local availability of components. The solar system utilised for VLS was chosen for the ease of finding spare parts (*e.g.* a standard-sized lead acid battery used in security systems and screw-in LED globes). In reality, finding quality components in the districts was impossible and was even challenging in the country's capital city.

Lastly, the traditions and cultural values of beneficiary communities should be integrated into governance and decision-making structures. While Renew had developed the energy committee construct in consultation with local leaders, it later received feedback that the construct is fundamentally based on Western concepts inconsistent with traditional Timorese leadership structures and decision-making processes, which are consensus-based.

Three men lift a solar PV panel

Waterpower station Bëkyookóndë & Duwata:
Enabling energy access in Suriname

Suriname hinterland village and local Oryon Watermill hydropower installation

KEY EVENTS

- **Project stage:** In construction (commercial operation date planned in 2021)
- **Technologies:** Hydropower
- **Capacity:** 50 kW
- **Financing:** EUR 200 000 (USD 233 000) by the Netherlands Enterprise Agency and EUR 300 000 (USD 349 000) by the technology developer

Located deep in the Suriname jungle at the Upper Suriname River, the community of the two villages Bëkyookóndë and Duwata has historically relied on a small diesel generator with an unsteady resupply of fuel. The over 2 000 inhabitants had therefore only very irregular access to electricity.

The community forms part of the Saamaka tribal culture, with 37 500 people living overall in the Upper Suriname River Basin region. The people are direct descendants of colonial slaves who fled the plantations in the 1750s and achieved peace with the Dutch in 1760 (Kemper, 2014).

In 2016, the Community Entrance Hinterland NV (Intermediary), together with the two small and mid-size enterprises Deepwater Energy BV and Hipersense Smart Grid, started work on a 50 kW hydropower station at the Bakaaboto-Rapid to provide a continuous supply of energy to the villages of Duwata and Bëkyookóndë. The project, scheduled to be operational by the end of 2021, was partially funded by Deepwater Energy BV and the governmental Netherlands Enterprise Agency. Currently, the community is considering how to sustainably take full control of the hydropower plant and how to further improve the local grid.

Interview with Walther Sanné, Community Entrance Hinterland (CEH) NV & Dolf Pasman, CEO, Deepwater Energy BV

Q1. Why did your community want to get involved in renewable energy? How did you first get involved in the project?

Mr Sanné: We had already built a primary school and a health clinic for this region. Furthermore, telecommunication network infrastructure for 67 villages and other infrastructure projects are being constructed in the Upper Suriname hinterland region. However, the lack of electricity limits those projects and prevents the production of anything which needs electricity. Therefore, prosperity and well-being in our region can only be increased with a supply of electricity. We therefore actively searched for electrification solutions. In that process, we learnt about modular built hydropower plants and Oryon Watermill's technologies via our network and got in touch with Deepwater Energy BV. The first time I called their CEO, Dolf, I said to him: "I have waited many years for you". Soon after, we teamed up to receive the installation permits at the hinterland location. Originally, we discussed this installation with the Suriname government, who also have a keen interest in further deploying renewable energy. The government was helpful in terms of issuing permits and visas; however, it could not finance the project because it is focused on larger-scale projects, and processes take time.

Q2. Please describe the governance and decision-making processes established for the project. What is your community's role in making key decisions?

Mr Sanné: My elders sent me, as the next generation, to school to be able to continue developing the area further than they could in the past. Now, as the chairman of the region, I have worked on a variety of development projects. All decisions in the hinterland are done together with the community, which includes 67 villages. The Brokopondo Reservoir provides as much electricity as possible for the capital city of Paramaribo, but not for the remote villages who had to hand in their original villages and residential areas. Our development work is based on our passion for the area.

Q3. When you first got involved in the project, how did you expect your community to benefit? Has this changed over time, and if so, how?

Mr Sanné: Originally, five diesel generators were donated to the villages, but replenishing the fuel is problematic. Our community has a lot of water, rapids and falls to generate hydroelectricity, and that's why we kept hoping for years to get a project to produce electricity from the water. With that, we also hoped to show the world our independence as a community. The project started around early 2016, and Oryon Watermill brought in funding from the Dutch government right away. Community Entrance Hinterland also provided by default a helping hand: land, local resources and workforce. My expectations and those of the community remained the same throughout the project.

Q4. What were some of the major challenges of developing the project?

Mr Pasman: The main difficulties are related to logistics and timing, trying to bring the technology from the Netherlands into the Surinamese jungle. Three years ago there was too much rain, and the water level prevented civil works, resulting in a full year of delay. All the civil works are done by local people who are highly motivated by the project. This will also in the long run allow them to run operations and maintenance, including repairs. Especially in the beginning of the project we spent a lot of time on education and training. All delays hit the people working on the project especially hard as they were so much looking forward to having electricity available.

Q5. COVID-19's impacts are being felt in nearly every aspect of life. Has the pandemic impacted the project, and if so, how?

Mr Pasman: Due to COVID-19 it was and still is very difficult to travel to Suriname. One silver lining is the increased number of vaccinations in Suriname. Some people in the hinterland are doubtful about the vaccination as they also have less connection to the population-dense coastal area, but every week more people understand the need to get vaccinated. In 2020, the local work in Suriname was stopped and only some preparatory work in the Netherlands could be performed. The same situation reduces the amount of travelling possible for obtaining further investments in the project.

Q6. What are some key lessons you would like to share?

Mr Sanné: Something to take into consideration in an international project like this are cultural differences. The local people often have a different understanding of certain aspects than providers of public or private funding. It is important to present yourself and your needs to them in an understandable way. It would be much easier for future projects if funders were willing to better understand our culture and the local community.

Mr Pasman: In the beginning, when we looked for investments, the only questions were about LCOE [levelised cost of energy], efficiency and return of investments. If you bring electricity to a place without infrastructure, there is no way of selling the electricity so there is no clear business case, and the conversation needs to shift to social impact instead of economics. The next time I would not try to go through all the NGOs, governments and financial institutes but do it directly with the community and work closely locally, thus enabling better communication and fast decision making. The most important part is to have trust between each other. Grants and public funding have strict restrictions on their reporting that are often not compatible with the utilisation of local resources (man-hours, local building materials, etc.).

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ANNEX: RESOURCES FOR COMMUNITIES

A number of organisations have developed resources to guide communities in implementing their own community energy initiatives.

International

- **Arctic Council,** *Arctic sustainable energy futures toolkit* (in English), https://arctic-council.org/en/projects/arctic-sustainable-energy-futures-toolkit/
- **DECIDE, a Horizon 2020 project,** *Resources for energy communities (regulation, guidelines for collective action)* (in English) https://decide4energy.eu/resources
- **Energy Cities,** *How Local Authorities can encourage citizen participation in energy transitions,* (in English), https://energy-cities.eu/wp-content/uploads/2020/05/HafRobison_LAs-and-citizen-participation_published.pdf
- **IRENA,** *Global Atlas for Renewable Energy* (in English), https://www.irena.org/globalatlas
- **IRENA,** *Policy guidelines tool for cities* (in English), https://survey.eu.qualtrics.com/jfe/form/SV_cAtzHKitZHV5bJr
- **RESCoop.eu, Friends of the Earth and Energy Cities** *Community energy: A practical guide to reclaiming power* (in English and several other languages including French and Spanish), www.rescoop.eu/toolbox/community-energy-a-practical-guide-to-reclaiming-power
- **RESCoop.eu,** *A number of resources including stakeholder engagement guide, financing guide, and strategic planning* (in English and several other languages including French and Spanish), https://www.rescoop.eu/toolbox/
- **The European Community Power Coalition,** *Resources (papers, briefings, practical tips)* (in English) https://communitypowercoalition.eu/resources/
- **We the Power,** *Documentary film about community energy and an online guide on how and where to engage in it* (in English and several other languages including French and Spanish), https://eu.patagonia.com/de/en/wethepower/
- **WWEA,** Women for the Energy Transformation (in English), A project aimed at improving gender imbalances in community energy, https://wwindea.org/women/

National

- **Energy Transition Now Network, Netzwerk Energiewende jetzt e.V., Germany,** *Practical platform with business cases for energy cooperatives* (in German), www.energiegenossenschaften-gruenden.de/praxisplattform.html
- **German Citizen Energy Alliance, Bündnis Bürgerenergie BBEn e.V., Germany,** *Become active in energy communities: Interactive map for action* (in German), www.buendnis-buergerenergie.de/karte
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