

## Final report:

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# Energy inclusion as a driver of community-centered development

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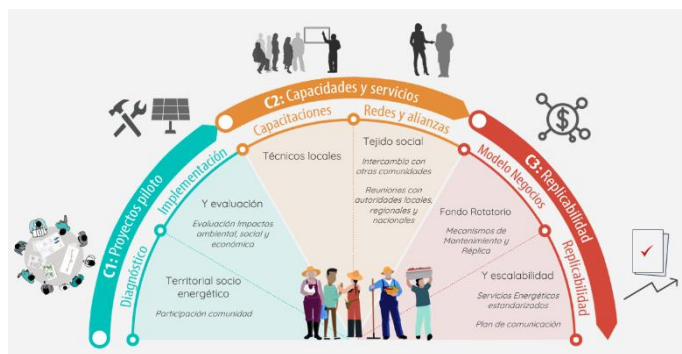
# 1. Summary

The Colombian municipalities of Natagaima and Coyaima, in southern Tolima, where the REPIC-funded pilot project was implemented, are located in the basins of the Magdalena and Saldaña rivers and close to the Tatacoa desert. They are vulnerable to climate change and armed conflict, also state services are not inclusive and deficient. This results in various problems and challenges for local communities and their development. In this context, the following needs were identified:

1. **Access to safe and affordable sources of energy** as the instability of electricity supply severely impairs the rural communities' agricultural processes requiring heat (e.g. incubators) & cold.
2. **Transition in the agricultural production from fossil fuels to renewables** as the use of fossil fuels (diesel) results in climatic damage & high production costs for farmers (e.g. water pumping).
3. **Knowledge, local capacities** and pilot experiences in the field of renewable energy in the agricultural sector, in order to enable replication of clean energy services as a driver for community-centered development and at the same time providing attractive job opportunities for young people.
4. Locally adapted **financial services and mechanisms** and **business models** to enable people to finance the maintenance and development of safe and clean energy solutions.

Based on the identified needs, a proposal was constructed and agreed upon in a participatory and articulated manner among local communities, civil society and engineering offices.

The project had **three main components**:



The first component is centered around the implementation of pilot projects based on technological solutions propelled by photovoltaic solar energy, each solution is closely linked with an economic strategy (incubation, fish farming etc).

The second component focused on generating local capacities for maintenance and replication, training people from the indigenous communities, as well as building networks and alliances with

governmental and non-governmental bodies, universities and other communities.

The third component was oriented towards facilitating the replicability of energy-based technological solutions. For this, the existing community owned "Fondo Rotatorio" was further developed and opened for energy-based projects. In addition, guidelines for potential applicants were developed.

The project was financed by Repic and Fastenaktion. EBP and Corpoema provided technical expertise. Grupo Semillas, thanks to its longstanding relations with local communities in Tolima, acted as the main driver of the project, working closely with the indigenous communities of Tamirco, Palma Alta and Ilarquito, as well as the steering board of the "Fondo Rotatorio". In addition, during the implementation stage, external contractors joined for the installation of the energy systems.

Fulfilling the proposed objectives, the following results were obtained:

- **5 types of solar photovoltaic systems installed, evaluated and in operation** (pumping, cooling, electric fences, egg incubation, production of concentrates), linked to productive projects like fish farming, chicken rearing, small scale farming and livestock management.
- **12 Community managers trained** in energy diagnostics, design, installation, maintenance and financial analysis of solar photovoltaic systems.
- The **South Tolima Fondo Rotatorio** established a credit line oriented towards financing different types of alternative community energy. **2 credits** have been **approved**: a solar photovoltaic system for refrigeration & oxygenation of a fishpond, as well as another credit for a solar dehydrator.
- **A well-documented pioneering experience of community-led local development, based on clean energy proposals**, which is considered as an important showcase by other organizations, universities, as well as national authorities, but not yet by local public institutions.
- **Linking the project results to the National Development Plan**, where, together with a broad alliance, concrete proposals for fostering community energy solutions were presented.

Grupo Semillas, acting as local anchor, will continue to (a) work with the communities to ensure the functioning of the pilot installations and promote local replication of the developed energy solutions and (b) engage with a broad alliance of civil society actors to exchange experiences, as well as to lobby the national government for fostering the legal and financial framework for community energy solutions.

## 2. Starting Point

### Departamento de Tolima

Hilarquito, Palma Alta y Tamirco



The project was developed with the farming and indigenous communities of Palma Alta, Ilarquito, and Tamirco belonging to the Pijao people, located in the municipalities of Natagaima and Coyaima, department of Tolima, in the region of the Upper Magdalena River, which have collective property title recognition in the form of resguardos. The number of inhabitants and area in hectares (hc) per community are: Palma Alta 41 family nuclei, 518 people - 435 hectare of land; Tamirco 45 family nuclei, 155 people - 230 hectare; Ilarquito 37 family nuclei, 184 people - 105 hectare.

According to the baseline survey carried out, infrastructure in the communities is in poor condition, for example unpaved, deficient access roads. The communities are connected to the electricity grid, which however is deficient with regular outages, they do not have aqueduct nor sewage systems. In terms of productive

activities, the main activities are crop cultivation, livestock production and the breeding of small animals.

## 3. Objectives

### General objective:

The main objective of the project is (a) to demonstrate that a community-centered development approach that uses energy as a driver of change improves the living conditions of farmers and indigenous communities in the short and long term and (b) to develop strategies for further dissemination.

### Specific objectives:

In order to achieve the general objective, the project established three specific objectives:

- 1) Installation of selected energy solutions in pilot communities responding to identified energy needs linked to productive processes.
- 2) Building of capacities for maintaining the energy solutions including self-organized finance mechanisms (for administering maintenance) and technical training.
- 3) Development of community driven energy services that can be offered to third communities including linkage to a community-owned micro-finance instrument (fondo rotatorio) allowing regional replication.

## 4. Project Review

### 4.1 Project Implementation

The focus of the project was energy as a driver of community-centered development, which established the communities of Tamirco, Ilarquito and Palma Alta as the main partners in the project, working closely with the project consortium (Grupo Semillas, Corpoema, EBP, Fastenaktion). For the implementation of the project, three interconnected components were defined and these in turn were divided into two sub-components (see also graphic 1 above):

#### 1. Pilot projects:

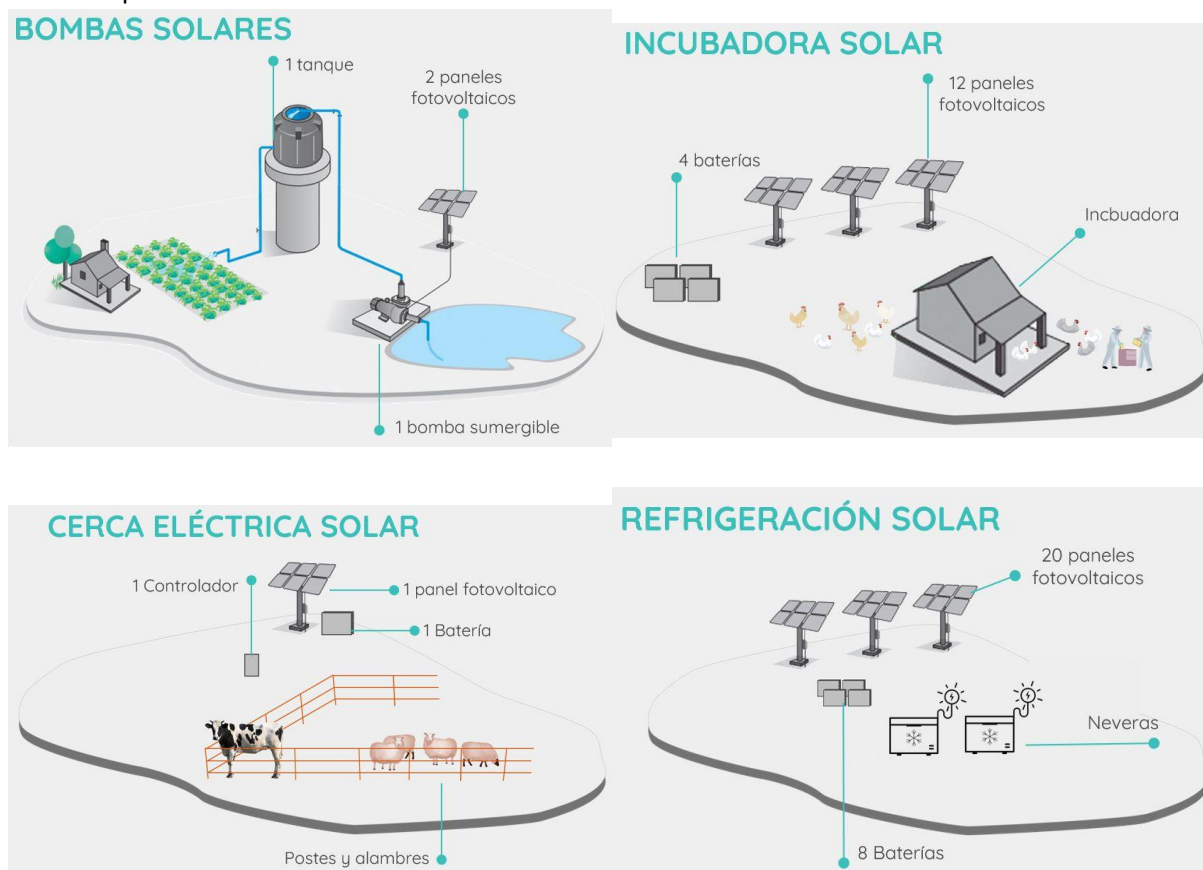
**Diagnosis:** The first step was dedicated to an energy diagnosis and a baseline survey in order to better understand the socio-economic realities of the communities, their organizational processes, the energy access situation faced by the beneficiary communities, as well as their productive projects. This allowed the identification of social, economic, environmental, technical and organizational strengths and weaknesses of the communities and established, among others, the high level of needs of the families in relation to energy services. Furthermore, it became evident that their standard of living is basic and covered with a moderate income generated by all the family members. Also, about 15% of all families had monthly debt services to pay.

**Implementation:** This phase focused on the installation of the energy systems. For this, a public bidding process was carried out, followed by the contracting of Sonnensol, a company that then developed (a) the detailed engineering of each system and (b) the designs and installation of the technologies provided for each of the communities, counting on technical advice from Corpoema and EBP. The systems installed were:



- Tamirco:** A solar water pumping system and a solar cooling system for the post-harvest management of fish and its refrigeration, a lighting system for the cleaning area and fish harvesting.
- Palma Alta:** A solar water pumping system for pumping and irrigation of paddocks for sheep production, an egg incubator for chicken rearing and a system for the production of organic food concentrates, the latter system is connected to the grid (On Grid).
- Ilarquito:** A solar water pumping system to feed an irrigation system and an electric fence system for grazing and management of small-scale agriculture.

Main components installed:



#### Technical details:

Community	Installed Solar Systems	Technical Details
<b>Tamirco</b>	Solar photovoltaic pumping system	Consisting of a PS2 1800 C-SJ5-8 centrifugal pump, PS 1800 controller, four (04) 330Wp Risen panels, 3E/1S clamper box, dps, dry sensor, full sensor, wiring, Alurack structure and grounding.
	Photovoltaic system with OFF GRID batteries to operate three (03) refrigerators.	Composed of a 3000Vac/48Vdc VICTRON inverter/charger, 20 Risen 330wp solar panels, VICTRON ENERGY 250/100 smart charge controller, 4E/ 2S clamper box, 8 Trojans 6v 435Ah battery banks, Alurack solar panel support, protections, wiring, piping and grounding system.
	Reflectors/Lighting with built-in solar system	Composed of 6 metal crossarms, 6 solar panels of 30 W, 6 solar reflectors of 400 W, shielding system with 2.4 meter rod and on/off control, installed on 6 poles.
<b>Palma Alta</b>	Networked system for food processing organic matter	Composed of 8 multicrystalline solar panels of 330W, four (04) APSystems micro inverters of 1kW, metallic cabinet to house dc components and board according to regulations for AC components, support for Alurack solar panels, protections, wiring, piping and grounding system.

	Photovoltaic system with OFF GRID batteries for the operation of an efficient egg incubator.	Composed of a 2000Vac/24 Vdc VICTRON inverter/charger, 9 Risen 330wp solar panels, VICTRON ENERGY 150/70 smart charge controller, 3E/ 1S clamper box, bank of 8 Trojans 6v 290Ah batteries, Alurack solar panel support, protections, wiring, piping and grounding system.
	Solar photovoltaic pumping system	Consisting of a PS2 150CBOOST pump, PS 150 controller, two (02) 330Wp Risen panels, 3E /1 S clamper box, dps, filter, wiring, Alurack structure and grounding.
Ilarquito	Electric fence system operating with photovoltaic solar energy	Weatherproof cabinet, 50 watt panel, 20 amp battery, 10 amp regulator, double shot blade, P.T. socket, 200km impeller, internal electrical installation of a lighting point.
	Solar photovoltaic pumping system	Consisting of a PS2 1800CSJ12-5 pump, PS2 controller, four (04) 330Wp Risen panels, 3E /1 S clamper box, dps, filter, wiring, Alurack structure and grounding.

The installation was performed by Sonnensol, a Colombian company that won the bidding. The installation process was overseen by a dedicated engineer of Corpoema, who was awarded the task of “interventoria”. This task included the control and approval of installation plans by Sonnensol, material control in the premises of Sonnensol and onsite, construction oversight, testing and approval of the final installations. The final report of the ‘interventoria’ is provided as an annex to this report.

Changes compared to initial planning were minor.

## 2. Capacities & alliances:

**Capacity development:** to guarantee the sustainability of the systems installed, replicate them and sustain the productive projects, a strategy was deployed to train ‘community energy managers’. The group consists of twelve people from each of the indigenous communities, including women, men, young people and adults. The training consisted of 200 hours of focused theoretical and practical training, including: energy diagnostics, system design, installation and maintenance, as well as financial analysis of solar photovoltaic systems. The participants also incorporated concepts of economic analysis and project viability and other relevant topics such as water management, gender and climate change. In May 20223, they received a certification as ‘community energy managers’ in alternative solar photovoltaic energy.

Along the same lines, the topic community energy was further developed and incorporated into the curriculum of the “Manuel Quintín Lame Territorial and Agroecological School”, which regularly organizes workshops for sharing and building knowledge of community leaders from all over the Department of Tolima.

Compared to initial planning, we identified a need for additional practical training. For this, Grupo Semillas purchased a dummy workbench that allowed hands-on practical training with solar panels. This strategy proved to be very successful (see learnings).

**Social relations and strategic alliances:** Establishing strategic alliances and integration with other indigenous communities and organizations was a permanent effort of the project, with the aim of promoting similar initiatives in other territories. For this, the project sought to establish a dialogue with Congressmen from Tolima, local mayors’ offices, other indigenous communities (also via the other activities carried out by Grupo Semillas in the region), as well as local and national civil society actors and academic institutions. For example, in August 2021, the project hosted an exchange on alternative energy, gathering representatives from five different civil society organizations (Grupo Semillas, Censat Agua Viva, Vicaria del Sur, Semillas de Agua y Atucsara). Along the same lines, the project participated in different regional and national energy fairs, such as in the 2<sup>nd</sup> international [exhibition](#) on “energy transition experiences” organized by CENSAT Colombia in 2021. The project was awarded first place by the jury. Or in the first fair of alternative energy “Expo energías Tolima 2022” - Gobernación del Tolima. The project also received different visits from organizations and academia interested in learning about the experience.

This work got a big boost from the change of government in Colombia in 2022. The new government is re-evaluating the country's mining-energy model and within the framework of a Just Energy Transition (TEJ) actively promotes alternatives. Through the project, Grupo Semillas managed to join a strong alliance of civil society organizations such as Censat Agua Viva, Fundaexpresion and Comunidades Seeta, working hand in hand to push for the recognition of community energy. As a result of this partnership, [proposals](#) for the inclusion of Community Energies in the National Development Plan (NDP) were presented to ministries and the Congress. The project participated and presented its experience in two national “public hearings” at the Congress, in [November](#) 2022 and [September](#) 2023.

Compared to initial planning it became clear that local authorities were not as receptive of information about community energy as expected. Therefore, the team adopted a strategy to work more closely with allies at national level. This change in strategy was facilitated by the change in national government.

### 3. Scaling up and replication:

**Community Fund “Focost”:** The Fondo Rotatorio “Focost” is a community-owned financial instrument for the social and economic development of small indigenous and peasant producers initiated in 2016. It has specific credit lines that support economic and productive initiatives of the communities with loans that have low interest rates. Focost is formed by six organizations, among them the Cooperative COOSAVIUNIDOS, which is the entity in charge of the administration of the economic resources. Focost promotes the following credit lines: The 1st is dedicated to Livestock; 2nd Agricultural; 3rd to Product Transformation and 4th to Technology and Education, which seeks to assist renewable energy projects. This last credit line was conceived and approved during the project time. Fastenaktion provided a specific seed-fund for this 4<sup>th</sup> credit line, which allows to test its viability without interfering with the previously existing three credit lines.

**Replication of community energy systems:** The replication of energy systems linked to productive projects is a continuous challenge because the installations have to be paid by the communities or families. Thus, economically viable scenarios must be available for the applicants, as financing is a deciding factor for such projects. In other words, when applying for loans to set up the installations, the profitability of the project must be guaranteed to be able to pay for it. As of end of June 2023, two replicas have already been processed through the fund, one for the improvement of a solar photovoltaic system and the other for a solar dehydrator. The process for applying at Focost is summarized in [this flyer](#), which is shared in the communities.

Compared to initial planning, it turned out to be a great challenge to identify economically viable renewable energy projects that can be funded through Focost. The reason is that inflation made technical equipment a costly investment, which often surpasses the level of investment a rural family in Tolima can handle, even with a specific credit line at hand. This shows the need to not only focus on self-managed financing vehicles but to combine these efforts with national and local lobby strategies so that state support schemes become available for family units and communities. Grupo Semillas is currently exploring such avenues.

**Communication:** Communication in this project was established as a tool for dialogue and learning and was strongly linked with the trainings and capacity building activities explained above. It ranged from learning materials, [flyers](#), [webinars](#), radio emissions to video clips ([1](#) and [2](#)). Finally, the project produced a publication with the [lessons learned](#), which will help drive the future work.

## 4.2 Achievement of objectives and results

*To what extent have the objectives been achieved and what results have been obtained?*

### General objective:

The general project objective was achieved since the living conditions of the families from the pilot communities were improved in the following ways:

- i) In Tamirco, the systems installed have improved the existing access to water for the chores of the headquarters and the improvement of aquaculture processes, which in turn means better economic income for the families and the community in general;
- ii) In Ilarquito, the systems installed allowed water to newly reach the headquarters and collective crop fields, via a newly installed tanks, increasing the areas cultivated and encouraging family planting;
- iii) In Palma Alta, the systems installed made it possible to create a new solar powered incubator facilitating chicken rearing and providing new income-generating opportunities.



- iv) In addition, the project allowed to train local energy managers and to test community owned financing vehicles for the further dissemination of productive projects coupled to renewable energies.

In this sense, the objective to demonstrate that energy can serve as community-owned driver for development is achieved. Furthermore, the foundation is built to further develop the experience.

In other words, the project is a pioneering experience of local development in Colombia, integrating the knowledge and experiences of diverse actors: indigenous authorities, engineers, community technicians, social science professionals and environmental experts.

### **Specific objectives:**

1. **Installation of selected energy solutions** in pilot communities responding to identified energy needs linked to productive processes.

This specific objective is achieved. 5 types of solar photovoltaic systems installed, evaluated and in operation (pumping, cooling, electric fences, egg incubation, production of concentrates, reflectors), linked to productive projects: fish farming, chicken rearing, small-scale agriculture and livestock management.

2. **Building of capacities** for maintaining the energy solutions including self-organized finance mechanisms (for administering maintenance) and technical training.

This specific objective is achieved. 12 Community managers were trained in energy diagnostics, design, installation, maintenance and financial analysis of solar PV systems. The technicians belong to the different pilot communities and support the communities in the maintenance of their energy systems.

3. Development of **community driven energy services** that can be offered to third communities including linkage to a community-owned micro-finance instrument (Fondo Rotatorio) allowing regional replication of the energy services.

This specific objective is mostly achieved. Through its 4<sup>th</sup> credit line, the Fondo Rotatorio Focost finances projects in technology and education oriented towards different types of alternative community energy. By the end of the project, it has approved 2 of the 3 planned credits for replications: a solar photovoltaic for refrigeration and oxygenation and a solar dehydrator. The gap is due to the difficulty explained above to identify productive projects linked to renewable energy systems that were financially viable for family units in rural Colombia.

### **4.3 Multiplication / Replication Preparation**

*What preparatory work was carried out for multiplication and propagation in the framework of the project?*

#### **Advocacy**

Ongoing efforts were made with local, departmental and even national institutions to ensure that elements in favor of community energy systems were included in plans and programs such as the National Development Plan of the new government. The goal is to inscribe the concept of “community energy” into the national transition plan and this way to improve the national legal framework in favor of community driven energy projects.

For this, the project established alliances with academic actors, decision-makers, public institutions and other civil society organizations through dialogue and exchanges in order to reach agreements and research that will allow to jointly advocate at different levels. In the same way, strategic alliances and integration with other communities, indigenous communities and organizations were established. In addition, the project participated in fairs, forums and exchanges, which were a permanent effort of the project to showcase the experiences made. With this, it intends to contribute to the development of similar initiatives in other territories.

#### **FOCOST Replicas**

At the same time, with the establishing of 4th credit line of the Fondo Rotatorio “Focost” on “technology and education”, the Focost incorporated the broad concept of alternative energy. Given the challenges

described above, the fund will need some further fine-tuning to become a local vehicle of replication. For example, in gaining more experience with other, less technology intensive and so less costly sources of renewable energy, making it possible for replicas to be financed by individuals or groups. These efforts are ongoing.

#### 4.4 Impact / Sustainability

<b>Ecological</b>	<b>Unit</b>	<b>Planned REPIC project</b>	<b>At the end of the REPIC project</b>
Installed renewable energy capacity	[kW]	16,86 kW	10,02 kW
Renewable energy produced	[kWh]/year	38'658 kWh/year	23'491 kWh/year
Amount of energy from fossil fuels saved	[kWh]/year	28'212 kWh/year	17'142 kWh/year
Greenhouse gas reduction	[t CO <sub>2</sub> - eq]/year	7.13t CO <sub>2</sub> eq/y	4.87t CO <sub>2</sub> eq/y
Freshly collected and separated waste	[t]	NA	NA
Freshly recycled waste	[t]	NA	NA
<b>Economic</b>			
Energy costs (LCOE)	[ct /kWh]	NA	NA
Third-party financing and investment	[CHF]	150.000 CHF	189.079 CHF
Local private income generated	[CHF]	29.154 CHF	Income: 12'597 CHF/year Gains: 8'553 CHF/year
<b>Social</b>			
Number of beneficiaries	[Number]	1070	1450 people
Number of new jobs	[Number]	10-15	15
Trained staff	[Number]	10-15	12 community energy managers
<b>Other indicators</b>			
Number of references of energy inclusion policy in regional development plans	[Unit] [Unit]	3 references	1 reference in local plan of Natagaima 1 reference in national plan Colombia
Number of local replications via the Revolving Fund	[Unit] [Unit]	3 replications	2 replications
Number of hours with access to clean energy (fences, cooling system, incubators)	[Unit] [Unit]	24h/day	24 h/day

Final designs of the energy systems showed that less capacity is needed to power the pilot installations. Therefore, energy produced as well as amount of saved fossil fuels and GHG emission reduction is also lower than expected. In terms of income generation, the numbers were revised based on the final applications and also taking into account that some changes will take more time to materialize (e.g. expansion of livestock management). Nonetheless, expected additionally generated income is important for communities, also when taking into account maintenance costs (gains). Furthermore, the number of jobs created, especially the number of trained staff (the community managers) turned out well. This human capital is an important basis for the sustainability of the pilot installations, but also the expansion and replication of the experience made.

The indicator on the inclusion of references in development plan is actually overachieved, even though only 2 references were set. However, the second reference is on national level in the national development plan, which is of much higher importance as it shapes policies of the current government.

## 5. Outlook / Further actions

### 5.1 Multiplication / Replication

*What are the next steps envisaged?*

- Consolidate the Fondo Rotatorio Focost as a local tool for disseminating community-based alternative energy projects and implementing strategies to reduce costs per installation.
- Develop new standardized services around the topic of “energy and water” as through El Niño water scarcity is likely to increase.
- Accompany the communities and energy managers that developed the pilot project to guarantee sustainability of the installations over time.
- Further deepen exchanges with national authorities to unblock financial flows for community-based alternative energy projects. For example, by working towards adjusting the modalities of the state-owned [Fenoge fund](#) to better accommodate community-based energy projects.

*What is being done to encourage multiplication/replication?*

- Further development and promotion of the 4<sup>th</sup> credit line of the Focost through which community-based alternative energy projects can be financed and supported, also developing new standardized services around the topic of energy & water.
- In addition, other renewable energy technologies and systems will be evaluated, tested and promoted, such as family-based biogas installations or energy efficient cookstoves.
- Promotion of community energy based on the existing pilot experience in Tolima, through participation in exchanges, forums, fairs, videos and articles published on social networks and websites of partner organizations.
- Together with allies, advocating with government bodies at local, regional and national levels to ensure that community energy is included in government plans and that the legal framework for community energy is improved at all levels.

*What obstacles need to be overcome for successful multiplication/replication?*

- The Colombian regulatory framework requires adjustments in policy and implementation mechanisms to be properly capable of supporting family or community level renewable energy projects (current regulations mainly addresses company stakeholders). This change can be addressed within the Just Energy Transition framework promoted by the current government.
- In a second step, such a revised and consolidated policy framework must not only be supported by the central government, but also at the regional and local level. It is important that local civil and environmental authorities incorporate community energy proposals in their reflections.
- Funding for this type of community energy projects is currently mostly available through international funding agencies. It is necessary to reform existing national funding mechanisms (such as Fenoge) and allocate national resources to them earmarked for community energy initiatives.

### 5.2 Impact / Sustainability

*What are the expected sustainable effects (environmental, socio-economic, CO<sub>2</sub> relevance, resource efficiency, etc.) during the multiplication phase, in the medium term?*

The sustainable effects of the project are still being consolidated, but can be seen in the following situations:

- 1) The socio-economic impact of the project is considerable. Through the pilot installations, the three indigenous communities expect to generate an additional income of 12'597 CHF and a net gain of 8'553 CHF per year, which they can invest into new production processes and infrastructure of the community.
- 2) In terms of the environment, the communities and the team of Grupo Semillas increased awareness for the importance of energy as a driver of development when coupled with productive processes. In this process, they realized that energy is especially powerful when coupled with water management practices. For example, fostering sustainable field irrigation and rational use of water resources. In this sense, the socio-economic impact was closely linked to improved environmental sustainability and resource efficiency.
- 3) To ensure proper maintenance of the installed energy systems, the three communities (Palma Alta, Hilarquito and Tamirco) discussed and developed agreements on how to make funds available

for this purpose. They decided to collect a percentage of the sales of their products to repair or buy equipment and pay for technical assistance if required. The maintenance is carried out by the community's energy managers, who act according to a detailed maintenance manual.

4) In general, the project's activities contribute in two ways to reducing CO2 emissions: First, the installed energy systems replace the use of diesel generators for water pumping. Second, the energy systems partially reduce the dependency on the national electricity grid. The Colombian electricity currently contains on average 24 percent of fossil fuels in its mix. Taken together, the pilot installations contribute to reducing 4.87t CO2 emissions per year and therefore to the health of the planet. This number is likely to increase with every replication.

## 6 Lessons learned / Conclusions

The Project has identified the following conclusions:

1. Energy has not only a technological, but also a socio-economic, environmental and cultural dimension. Therefore, it is essential to also consider the systemic and holistic perspective of any intervention. Every energy system needs to be adapted to these factors. Hence, well thought-through and locally adapted solutions are needed which should be intensively discussed with the communities. It is not possible to have a standard model, as that runs the risk of failing or not being sustainable over time.
2. A success factor is the selection of energy system proposals, which are linked to existing and running production processes (such as aquaculture, agriculture etc.) as this helps the community to more clearly formulate their needs, as well as to ensure durability and maintenance of the facilities.
3. It is important to ensure the inclusion of all stakeholders and full transparency throughout the implementation process to have commitment and legitimacy from all groups. For example, in this project, a "technical committee" was established to oversee the implementation work of the energy system. This committee included representatives from all pilot communities.
4. Capacity and knowledge management is key to ensure proper maintenance of installations and facilitate replication. In rural areas, training has to focus much more on practical aspects, virtual training does hardly work. Only with additional practical sessions that built on the intensive usage of a workbench for solar panels, the needed level of knowhow was attained.
5. The gender approach complements the mission and vision of the training by providing complementary perspectives. For this, gender balance was sought for the group of selected community energy managers.
6. The replication of solar-powered energy systems linked to productive projects is a continuous challenge because the replications need to be paid by the communities or families. However, solar-powered systems go hand in hand with substantial investments for technical equipment. Inflation made this a costly investment, easily surpassing the level of investment a rural family in Tolima can handle, even with a credit line offering good conditions. Thus, it turned out difficult to develop economically viable replication scenarios for solar panel systems that rely on batteries. Which means that each energy solution should be accompanied by a business model that provides financial sustainability in the short, medium and long term.
7. It is therefore important to develop co-financing alternatives to help build economically viable and thus replicable community energy projects.

## 7 References

### Project Videos

- EN: [Community Energy as a driver for development](#)
- ES: [La inclusión energética como motor de desarrollo centrado en la comunidad](#)
- ES: [https://youtu.be/d\\_mUfxpLndM?feature=shared](https://youtu.be/d_mUfxpLndM?feature=shared)

### Project presentations & videos in the web

Fastenaktion:

- [https://fastenaktion.ch/content/uploads/2021/07/FA\\_Perspektiven\\_0122\\_DE\\_Web.pdf](https://fastenaktion.ch/content/uploads/2021/07/FA_Perspektiven_0122_DE_Web.pdf)

Grupo Semillas:

- [https://web.facebook.com/GrupoSemillasColombia/posts/1157337127976652?\\_rdc=1&\\_rdr](https://web.facebook.com/GrupoSemillasColombia/posts/1157337127976652?_rdc=1&_rdr)

Corpoema:

- <https://www.facebook.com/Corpoema/videos/291823212005783>

EBP:

- <https://inclusionenergetica.com/tolima-colombia/>

REPIC :

- <https://www.repic.ch/fastenopfer-kolumbien/>

Radio Nacional de Colombia :

- [https://www.radionacional.co/noticias-colombia/energia-solar-mueve-emprendimientos-de-el-tolima?fbclid=IwAR1i1u5YxHA0F9Pa2n2soGAoefIES5O0fhueDFHB\\_Q39tZZWH\\_ZI9NMejjQ](https://www.radionacional.co/noticias-colombia/energia-solar-mueve-emprendimientos-de-el-tolima?fbclid=IwAR1i1u5YxHA0F9Pa2n2soGAoefIES5O0fhueDFHB_Q39tZZWH_ZI9NMejjQ)

## 8 Annex

### Main project publications:



Left to right: 1) [Flyer](#) on new energy services with Focost, 2) [Booklet](#) with main lessons learned, 3) [Flyer](#) on project experience.



## Participation in Events:

Intervention in Virtual Colloquium "Energy Poverty and Climate Change in the US-Mexico Border Region" - RedIEL, Programa de Inclusión energética and El Colegio de la Frontera Norte de México - COLEF

- <https://www.facebook.com/GrupoSemillasColombia/photos/a.164247637285611/1280765175633846>
- [https://www.facebook.com/watch/live/?ref=watch\\_permalink&v=780225382562112](https://www.facebook.com/watch/live/?ref=watch_permalink&v=780225382562112)

Participation in the "Virtual exhibition of community experiences of Just Energy Transition" - Censat

- <https://transicionenergeticajusta.org/la-inclusion-energetica-como-motor-del-desarrollo-centrado-en-las-comunidades-indigenas-del-sur-del-tolima/>
- <https://transiciones.info/la-inclusion-energetica-como-motor-del-desarrollo-centrado-en-la-comunidad/>
- [https://www.facebook.com/watch/live/?ref=watch\\_permalink&v=2069812186518865](https://www.facebook.com/watch/live/?ref=watch_permalink&v=2069812186518865)

Intervention in the "Public hearing on territorial experiences on community energy" - Fifth Commission of the House of Representatives. 10<sup>th</sup> of November 2022.

- <https://www.youtube.com/watch?v=m2EMBah6aDY>

Intervention in the Public hearing: "roadmap for a just energy transition in Colombia" - Fifth Commission of the House of Representatives. 18<sup>th</sup> of September 2023.

- <https://fb.watch/n8lo48ZL1G/?mibextid=Nif5oz>

Participation in the "Popular Dialogue Solidarity and Care Economy - Grupo Semillas".

- <https://www.facebook.com/reel/1551714478602481>
- <https://www.facebook.com/emicomunitaria.yumacu/posts/pfbid02rWkgeN2gLscWw7W8fn5YPTystzuvYhJBnpfiBKvBqcYLgz1KTKTCJjJ7Msjy9nvfl>

Intervention in the panel "Experiences on just transition and climate justice in Colombia, in the framework of the Meeting on Transitions and climate justice in Colombia, visions towards COP27" - Censat Agua Viva, Asociación Ambiente y Sociedad, Asociación Ecolectiva, Asociación Interamericana para la Defensa del Ambiente-AIDA Pacto X El Clima Climalab

- <https://fb.watch/lKBOIP7QoA/>
- <https://www.facebook.com/climalab/posts/pfbid04HeUG6BkJH6Te16rPWLYqzUEA12kYEFZB5dvWonAFzc4QXhsjZKCDEW9MsipRqbhl>

Participation in the first fair of alternative energies "Expo energías Tolima 2022" - Gobernación del Tolima

- <https://www.facebook.com/reel/1423774474770200>

Intervention in the webinar "Energy and agro-productive transitions, challenges in the government of change" - FENACOA

- <https://fb.watch/lKCK7VL8DT/>

Intervention in the environmental and citizenship training course "Just energy transition of the peoples and for the peoples" - Environmental Committee of Tolima.

- <https://www.facebook.com/photo/?fbid=628826435946152&set=a.625471302948332>
- <https://www.facebook.com/oficialcomiteambiental/videos/3726605697552516>

Intervention at the National Assembly on Solidarity, Popular and Community Economy

- <https://www.facebook.com/GrupoSemillasColombia/posts/pfbid0R1d9HXnovfYCnHyAXor918iuNnHK95Tc42R5HVmR1EGUgSyHhFnD1jcStq1Vt2CQI>
- <https://fb.watch/m7Ee7p-5py>

## Impressions:



Left: Pond in Hilarquito with water pump. Right: Solar panels in Tamirco for water pumping.



Left: A young woman in Palma Alta presents proposals to the community about the incubator's business model. Right: Incubator in action.



Left: Solar panels on the community center in Tamirco for powering the freezers. Right: frozen fish in Tamirco.



Left: Ice production in one of the Focost replications. Middle: Drying process in the solar dehydrator financed with the Focost. Right: Participants in the public hearing on community energy in Congress.