

Proposal for the Nueva Venecia Renewable Energy CSOP in the lagoon Ciénaga Grande

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I. Executive Summary

Nueva Venecia located in the coastal lagoon Ciénaga Grande consisting of approximately 460 households with about 2,500 inhabitants is one of the most isolated and poorest communities in Columbia. The community is one of the populations that had been severely affected by the armed conflict in Colombia¹, which amongst others generates inequality and displacement. The settlement has a precarious connection to the electricity grid providing public buildings and a part of the residential buildings with access to electricity. Apart from technical problems that impair stable electricity supply from the mainland one of the central problems in the past has been that the local population simply has not been able to afford electricity and thus was reluctant to pay their energy bills. Therefore, this project proposal other than a classical Consumer Stock Ownership Plan (CSOP) foresees two inclusive alternatives, dubbed “Assisted CSOP” here.

A classical CSOP can buy into an existing or invest in a new renewable energy (RE) plant, typically with co-investors like the municipality and local SMEs. In particular, citizens with low income – who as a rule do not dispose of savings necessary for conventional investment schemes – are enabled to repay their share of the acquisition loan from the future earnings of the investment: A fiduciary entity set up under this concept, e.g., by the local community, managed by an independent trustee is authorized to borrow funds for the acquisition of shares in the RE plant on behalf of the energy consumers. The shares acquired by the trust are allocated among the CSOP consumer-beneficiaries in proportion to their respective energy purchases. Revenues from savings resulting from lower energy bills or from the sale of the energy produced are used to repay the acquisition loan assumed by the CSOP trust. Once the debt is amortized this revenue is distributed to the consumer-beneficiaries.

Unlike as in a regular CSOP in the case of an “Assisted CSOP” a) the RE installation may be donated and/or b) the acquisition of the equity share by the consumer-beneficiaries can be additionally facilitated by a matching contribution. As a result the joining consumers need an even smaller initial contribution to participate and do not have to wait for the amortisation of the investment before they benefit from revenues which can also be in kind, that is in the form of energy. Both elements are of importance with regard to particularly vulnerable groups as the local population of Nueva Venecia.

1. Expertise

KIE Team: Jens Lowitzsch, Riccardo Novo; VIADRINA network: Luis Ramirez Camargo, Ankit Kumar;

UTADEO Team: Isaac Dyner, Jorge Herrera, Grace Quiceno, student work group.

2. Project Phases (Inception period prior to Implementation -> 2022-2023)

2.1. Spatial Planning / Engineering -> ca. 2 months (UTADEO)

2.2. Actor Analysis (Oct./Nov./Dec.) -> ca. 3 months (KIE / UTADEO)

2.3. Feasibility Study -> ca. 3months (KIE / UTADEO)

3. Budget overview (yet to be drafted) 3.1. Personnel / 3.2. Travel cost / 3.3. Equipment

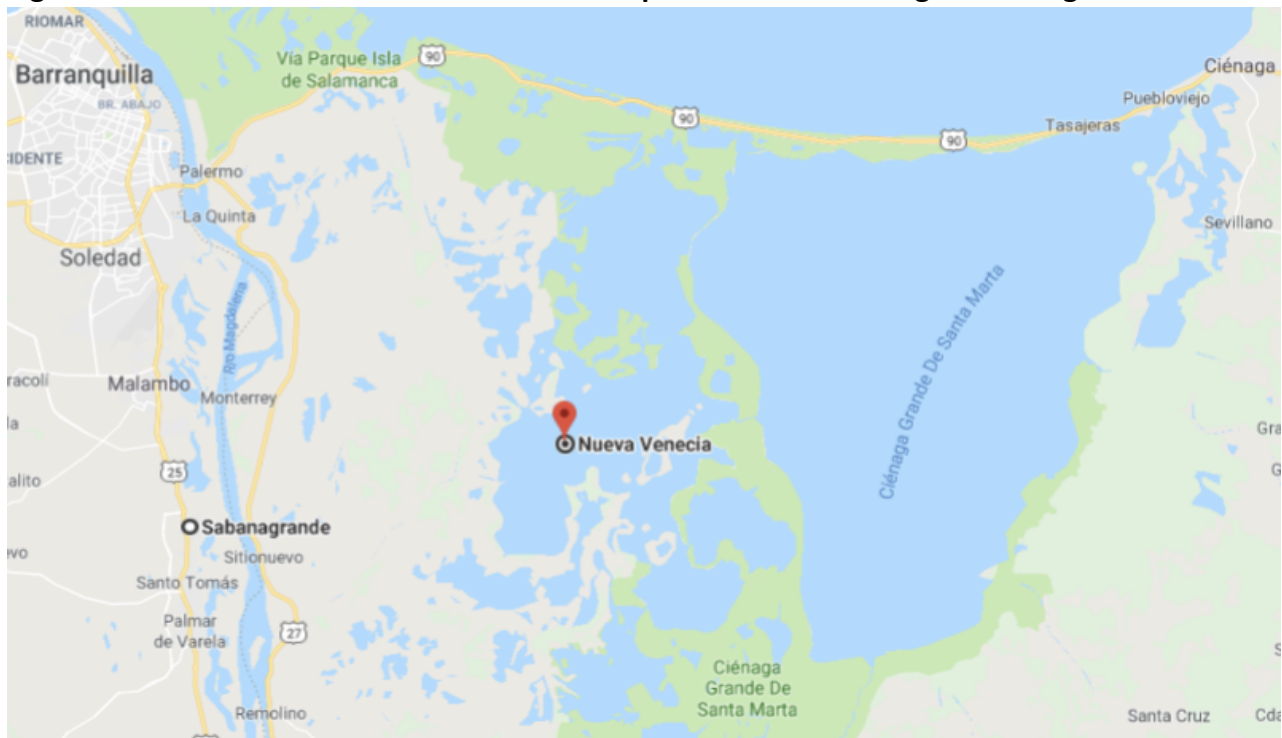
¹ On November 22, 2006, boats with 70 paramilitaries from the Northern Block left Caño Clarín, a channel that connects the Ciénaga Grande and the Caribbean Sea, on their way to Nueva Venecia. On the route, they killed about 15 fishermen who were working in the Ciénaga Grande in the early morning hours. Once they arrived in Nueva Venecia, the paramilitaries ransacked the houses, forced the population to meet in the church and selected 17 fishermen, who were shot on the spot.

II. Case study

1. Background and Geography

Nueva Venecia, located in the south-western part of the coastal lagoon Ciénaga Grande (26,810 hectar) of Santa Marta in the Department of Magdalena, is one of Colombia's largest palafitic communities with approximately 380 homes, 460 families and 2,500 inhabitants.

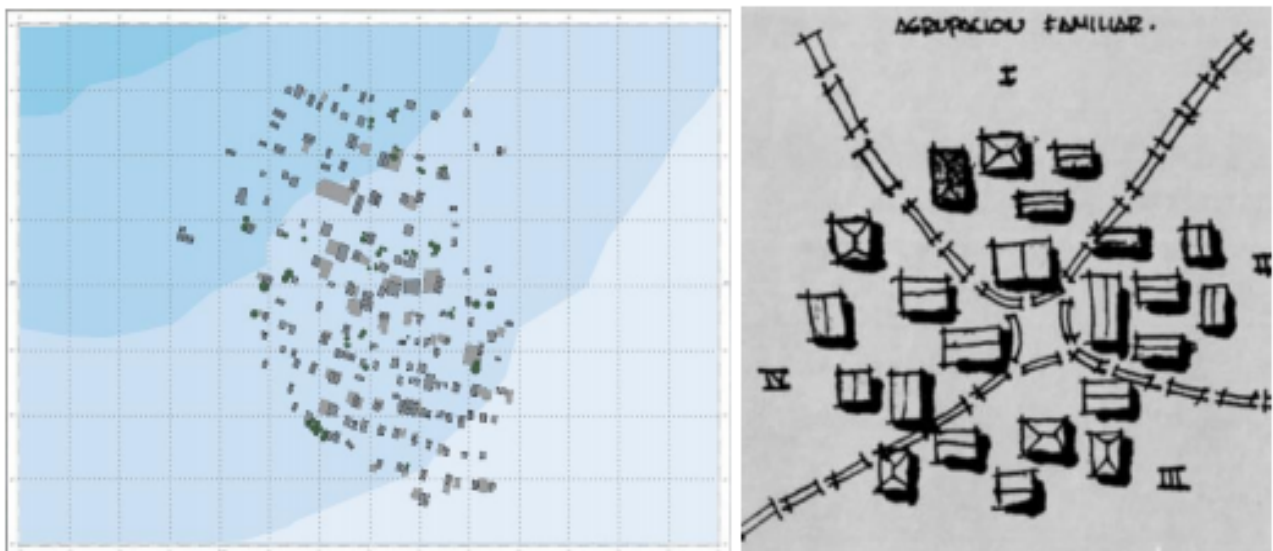
Figure 1 – Nueva Venecia in the south-western part of the coastal lagoon Ciénaga Grande



Source: Googlemaps.com

Nueva Venecia was founded in 1847 by emigrants fleeing economic conflicts and power struggles that plagued Magdalena at the time; the dwellings covering a water surface of around 1,3 km² as of August 2019 were initially erected on two large islets, which, however, due to erosion and rising water levels over time have shrunken.

Figure 2 – Grouping and pattern of the buildings of the settlement “Nueva Venecia”



Source: Pineda V., A. 2018

The infrastructure of the settlement is limited by its specific topography and the corresponding environmental determinants of the lagoon. As a result, Nueva Venecia lacks a modern public infrastructure accustomed to the standards of the XXIst century unable to deliver public services such as drinking water, sewage, waste, gas and telephone among others (Pineda A., 2018). As public transport does not exist canoes are the means of transport which the local population generously provide for each other. The local economy is mainly based on fishing for tarpon, goats and mullets, which are then sold to merchants from Sitionuevo and Barranquilla. A few shops, including a small ice cream and a fried food joint, a hotel and a canoe shipyard exist.

2. Municipality and communal facilities in 2019

The communal facilities are the church, the school and the police station embodying a notion of centrality and dividing the settlement into two zones called Barrio arriba (uptown) and Barrio abajo (downtown).

Figure 3 – Areal view of the centre of the dwelling “Nueva Venecia”



Source: Googlemaps.com

The specific geography of a palafitic dwelling far from the mainland make it difficult to supply its citizens with basic goods and services of community life such as transportation, housing, food, security, electricity, aqueduct, education and the like rendering basic needs a luxury. Such, for example the stores of Nueva Venecia to be reached by canoe are supplied from mainland cities such as Santa Marta creating additional costs to small businesses and as a result increasing prices.

With education being fundamental pillar for personal and social development, the scarcity of this service is reflected in the way people live: As opportunities for progress are few, if not almost nil, most of the local population are exclusively producing what they need from day to day. Living in a subsistence economy they rely entirely on natural resources to provide for basic needs, that is, on fishing for trout and other marine animals; due to a lack of arable land or other appropriate surfaces the community agriculture is not possible.

3. Environmental situation and Ecosystem

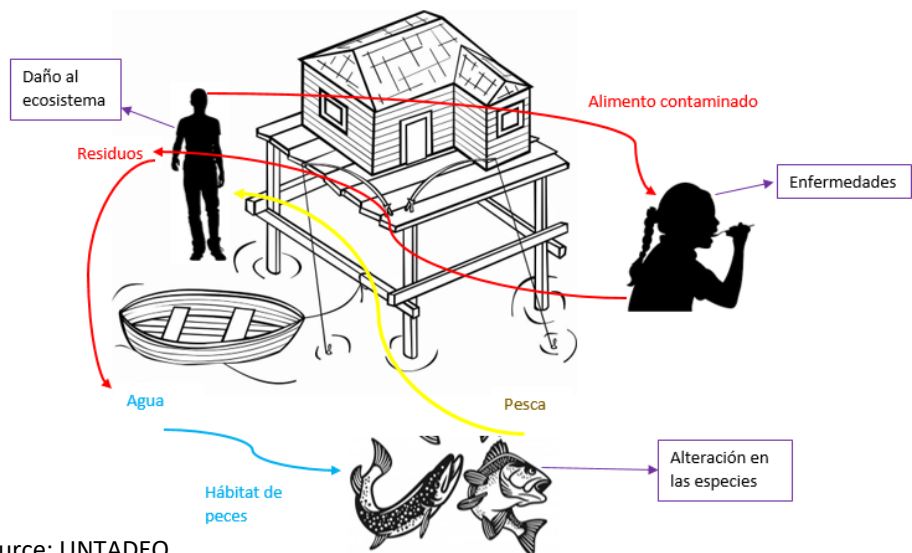
The Ciénaga Grande (large swamp) is an open system in which changes driven by environmental factors quickly manifest, an example of this is the difference in precipitation throughout the year (“el niño” phenomena and its opposite phase “la niña”). While the shortage of water comes along with the phenomenon of “el niño” restricting the precious resource, the increase in water levels is linked to the phenomenon of “la niña”, clearly showing the vulnerability of Nueva Venecia to the climatic factors presented in the territory. The lagoon complex is of great ecological and economic importance, as wetlands and mangrove forests allow the reproduction of fish, crustaceans and mollusks and serve as a refuge for migratory and native birds that in turn are predators of species considered as pests. The most important services the ecosystem of the lagoon renders in the area thus are:

- Provisioning: Shelter, water, food from fishing;
- Regulation: Climate regulation, nutrient regulation, biological control;
- Sustainability: transformation and degradation of waste;
- Culture: Open spaces for spiritual enrichment.

Throughout the years, the marsh in which the community in question is located has been characterized by its capacity to regulate both biological and anthropogenic processes. However, the diversion of rivers and the almost total closure of the pipes that connect the Magdalena River with the large marsh have made ecosystem services increasingly scarce and of lower quality.

As of 2019 the area is in a worrying environmental state, with the increasing impacts triggered by a growing population not having been evaluated. Amongst these impacts is water pollution due to sewage being discarded directly into the surface water due to the lack of an aqueduct and sewage system in the area; similarly a large share of ordinary waste ends up in spaces not suitable for disposal. These problems are exacerbated by the isolation of the population leaving them unprepared for the arrival of non-natural external entities to the ecosystem damaging its normal cycle. This impacts above all on the economic source of the area, that is, fishing which is also used for self-consumption depleting the ecosystem as production capacity is exceeded. The interrelatedness of these problems are illustrated in Figure 4.

Figure 4 – Interrelatedness of human presence in the ecosystem



Source: UNTADEO

4. Focus – Bringing Renewable Energy to Nueva Venecia

Electricaribe S.A. founded in 1998 as a public service company is the local distribution system operator in the region responsible for connecting the communities of the Colombian Caribbean to the public grid. Since 2009 the private company Gas Natural Fenosa holds 85% of the shares of Electricaribe with the remaining 15% in the ownership of the Columbian State. Following financial distress, technical problems and corruption investigations the government intervened in November 2016 putting the firm under receivership and ordering the liquidation of its gas branch in March 2017.

4.1 Access to Electricity / Energy

The settlement has limited and precarious access to electricity from Sabanagrande by a ca. 17km underwater cable. On the mainland the connection with approximately 20 posts originates in Cardona further to Casanta until it reaches the submarine connection point. Due to a lack of professional maintenance and proper security and infrastructure conditions the connection is precarious: energy access is periodically interrupted for 5 to 6 days in most cases due to natural causes such as winds and gales they generate. One of the reasons is that Electricaribe has not been supervising the maintenance crews of the transformer properly leaving the responsibility entirely to the mayor.

Currently there is only one transformer in Nueva Venecia that was installed around 2 months ago (previously there were two transformers but these were badly damaged as the entire electrical system in the area is in precarious conditions). The only interconnection from the distribution transformer that exists is a bridge connecting the church with the school, the police station and the Colombian Red Cross medical center, the only buildings in the area having continuous electricity and street lighting.

Furthermore, about 10 of the houses have electricity access albeit precarious and often improvised. However, as the local population is too poor to pay for electricity consumed and electricity theft occurred creating problems with the physical infrastructure as a result of the manipulations of the connection lines.

4.2 Potential for photovoltaic installations

The school was built in 1927 with its original roof made of sand and cement; today it carries a solid tin roof with a surface of approximately 80 square meters. The church dates from 1938 and was subsequently reconstructed in 1968 with a solid roof construction and a surface of about 120 square meters. The police station was built in the 1990ies with a tin roof of about 50 square meters; the medical centre appears to have similar features.

An inspection of the statics of the roofs by qualified engineers is pending; at first glance the roofs of the church, the medical centre, the police post and the school and possibly a limited number of the private dwellings seem resistant enough to carry PV panels.

5. Ancillary sustainability measures to improve the ecosystem

Use of refuse: Converting waste into compost in the context of a waste management concept can provide an additional economic source of income of in addition to fishing. Such measures are directly complementary to the mid term aim of supporting sustainable tourism in this area sur-

Figure 5 – Circular waste management



Source: UNTAEDO



rounded by a natural reserve. Although touristic projects in the region have received public support they have not achieved the sustainability goals for the local communities often leaving the impact that inhabitants and visitors have on the area aside. A circular and sustainable waste management can improve both the quality of the ecosystem as habitat as well as its attractiveness for tourists.

At the same time renewable energy production in the planned photovoltaic installations needs to be carefully calibrated to local energy consumption, waste management and the potential sale of excess production to avoid rebound effects and oversizing of the technical infrastructure. To evaluate the amount of electricity required for housing a consumption study following the model currently used in Medellin by Empresas Públicas de Medellín (EPM) is planned. This assessment should include both energy possibly needed for compostation as well as the potential for producing energy from biomass. With the aim to prevent overconsumption the study should define the cap for the base load offered to residents under the CSOP; of course households would be permitted to purchase energy in excess of the daily supply if necessary at a preferential tariff and paid by means of prepaid cards or the like.

The overall aim is to achieve equilibrium between ecologic, residential and economic requirements of the community and its habitat while at the same time making Nueva Venecia not only a destination for sustainable tourism but also ensuring the friendly coexistence of all living organisms in healthy conditions necessary for its population.

V. Financing consumer (co-)ownership in PV installations through a CSOP

Apart from technical problems that impair stable electricity supply to Nueva Venecia from the mainland one of the central problems in the past has been that the local population simply has not been able to afford electricity and thus was reluctant to pay their energy bills. Therefore, this project proposal other than a classical Consumer Stock Ownership Plan (CSOP) foresees two inclusive alternatives, dubbed “Assisted CSOP” here. However, all options suggested below involve scalable investments, that is, PV installations that – other than exclusively for self-consumption – are large enough to permit sale of excess production to local businesses and/or to the grid. All of them involve – subject to availability – to a different degree co-financing by a bank loan and regional / national / international development programs.

1. Classic (fully fledged CSOP / largest installation)

Co-investors -> Local population, municipality and small/micro enterprises

Main aim -> Commercially oriented project (with potential to develop regional industries)

Technical requirements -> Large roof surfaces; complementary RES; smart metering

2. Inclusive (delayed amortisation / medium sized installation)

Co-investors -> each 33%: Local population, municipality and local micro businesses

Main aim -> excess production sold in two tier structure (i) commercial: municipality & small businesses supplying financing; (ii) self-sufficiency: households supply rooftops; investment leveraged;

Level (i) -> Electricity cost savings cover maintenance & sale to grid cover consumer supply & repayment of bank loan; *benefit* = municipality + co-investors receive electricity & dividends

Level (ii) -> Consumer co-ownership in escrow fund; *benefit* = energy for auto-consumption with cap; no dividends but appreciation of shares over 20years = installation lifetime (cashless transaction)

Technical requirements -> Medium roof surfaces; low-cost mono-directional meters

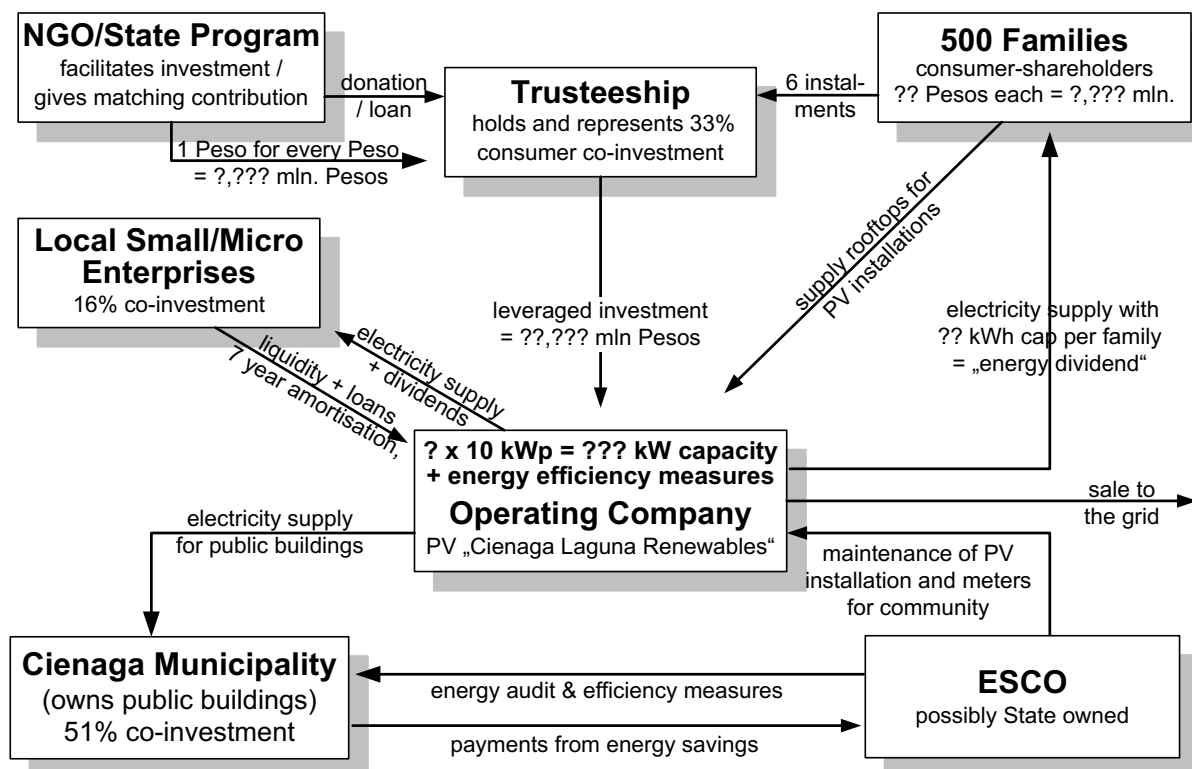
3. Assisted (no financing necessary / but maintenance costs / small-medium installation)

Co-investors -> Installation donated (NGO/state agency/twinning); local population & municipality;

Main aim -> Temporary ownership in escrow fund; cashless transactions, no dividends; electricity cost savings for public buildings cover maintenance; sale of excess production possible;

Technical requirements -> Small roof surfaces; low-cost mono-directional meters.

Figure 6 – Overview of the financing structure of the Nueva Venecia “Assisted CSOP”



Source: KIE.

V. Empowering the Cienaga Renewable CSOP participants

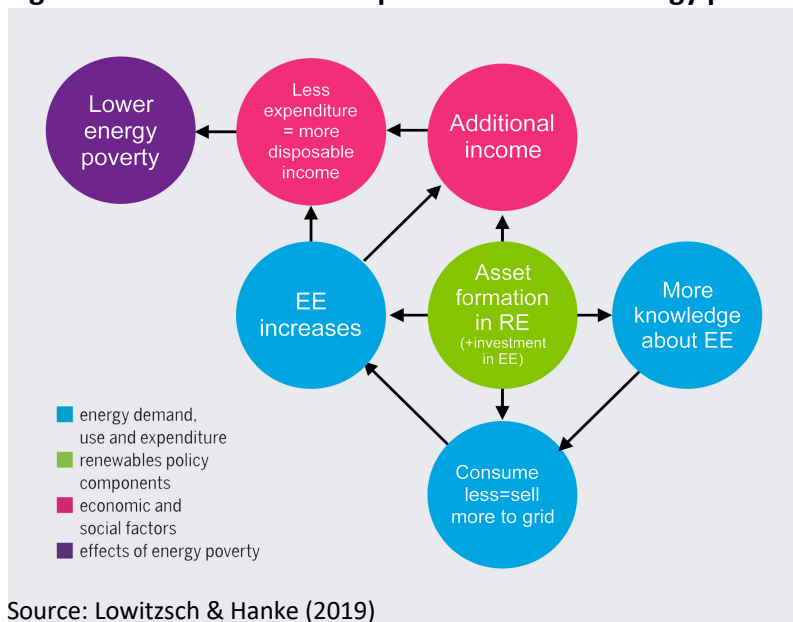
Since RE generation decreases fuel use, and – now that renewables have reached grid parity – comes at a lower cost, thus reducing payments for energy use, it has a potentially positive impact

on disposable household income.² Furthermore, as a form of asset formation, acquiring RE ownership has additional beneficial dynamics with respect to alleviating energy poverty at the household level. If consumers become prosumers³ of RE, that is, when they produce part of the energy they consume, their overall expenditure for energy is not only reduced but at the same time they gain a second source of income from the sale of excess production to the grid.

1. Complementarity between investments in RE and in energy efficiency

The mentioned cumulative effects on disposable household income further rise when prosumership is coupled with measures to increase EE. Investing in RE while at the same time reducing consumption by improving EE reduces in turn the amortisation period of the investment. Consumers use less money to buy energy while selling a larger share of the production to the grid. Ownership in RE thus is a secondary incentive mechanism to consume less energy and to apply additional EE measures. As a result, energy poverty is decreased not only through lower energy supply costs but through lower demand and increased EE in general. Figure 7 summarises these aspects of asset formation in RE coupled with EE investments as a means to alleviate energy poverty.

Figure 7 – How co-ownership in RE alleviates energy poverty



2. Distributing the benefits to local CSOP participants

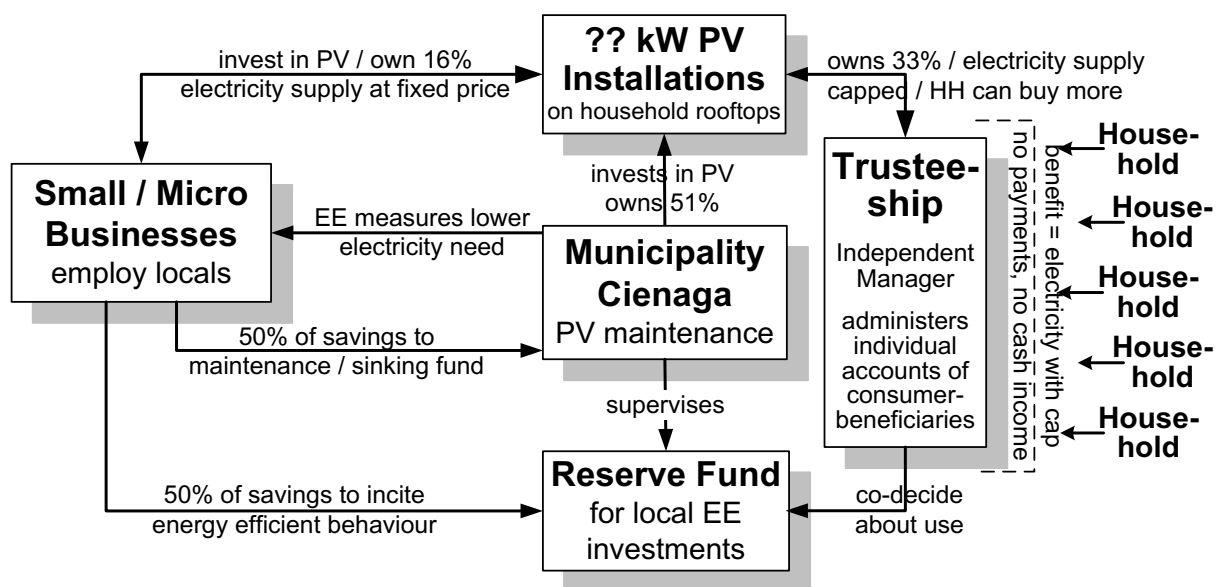
An Assisted CSOP differs to some extent from the classic CSOP inasmuch as creating a source of income for its participants is not its primary purpose. The Assisted CSOP is envisioned as a low threshold participatory instrument to empower vulnerable consumers that even in a conventional CSOP would not have been able to participate. The sense of ownership and both the benefits as well as the responsibility associated therewith are key for behavioural changes with regard to energy efficiency but also with regard to inclusion and the experience of becoming actively involved in the energy transition. Thus, social, communal and environmental protection policies are affected at the same time. To this end the Assisted CSOP not only grants plan participants an ownership stake in the RE installation that supplies the infrastructure where they live with energy but enables them to participate in decision-making processes about saving energy on the one hand and on the use of the benefits on the other.

² See also Lowitzsch, J. & Hanke, F. (2019). *Consumer (Co-)Ownership in Renewables, Energy Efficiency and the Fight Against Energy Poverty – a Dilemma of Energy Transitions*. RELP 9, Vol. 4 pp. 5–21

³ As early as 1972 Marshall McLuhan and Barrington Nevitt suggested in their book *Take Today*, (p. 4) that technological progress would transform the consumer into a producer of electricity. The artificial word stemming from the Latin was probably first introduced by Alvin Toffler in his book *The Third Wave* (1980).

However, given the small amount of monies invested an Assisted CSOP offers only modest monetary returns. Furthermore, due to structural underconsumption among the population of Nueva Venecia the savings from reduced electricity consumption are expected to be marginal if not nil. Thus any possible “dividend payments” would remain marginal and unnecessarily increase the administrative burden and transaction costs. Much more important than monetary returns is access and affordability of energy, that is factual supply of electricity to the impoverished population of Nueva Venecia. Therefore, as a main benefit for participants the Assisted CSOP in this case foresees – PV production permitting – a capped daily amount of electricity for each household. Additionally, the plan foresees a Special Fund for participants set up by the municipality or the trusteeship and designated to cover expenses to increase energy efficiency and to expand electricity / energy infrastructure for the settlement.

Figure 8 – Distributing benefits through a Special Fund in a Assisted CSOP



Source: Own elaboration.

This fund is administered for the benefit of the plan participants by the person running the Trusteeship; it is overseen by the municipality as formal owner of at least 51% of the PV installation and thus as the entity entitled to decide about the use of the revenues (see overview in Figure 8). The fund is fed by 50 per cent of the saved expenses for electricity while the remaining 50 per cent are earmarked for the sinking fund and possible spending for maintenance or further energy efficiency measures. In term of bookkeeping this solution provides a maximum of flexibility, as it should not be difficult for the municipal administration to justify such reserves for contingencies or other accruals while permitting spending them for social and infrastructure purposes.

References

- Pineda V., A. 2018. Investigación de Nueva Venecia, Ciénaga Grande de Santa Marta. Bogotá – Colombia. Pontificia Universidad Javeriana.
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