

August 31, 2020



Outline of a Scale Project for a City

MILESTONE 1

Table of Contents

Acronyms	2
Introduction	3
Hogares Solares Financial Mechanism	4
Hogares Solares Projects in Mexico	7
Mexico City	7
Zapopan	7
Mexicali and Hermosillo	7
Outline of an Hogares Solares Project	9
Define the objective of the Project	9
Identify relevant stakeholders	9
Definition of the financial and operational structure	9
Choose the technology	10
Identify the users	10
Develop the Rules of Operations, Tender Documents and Legal Contracts	11
Develop a Communication Strategy	11

Table of Figures

Figure 1 Hogares Solares Funding Scheme	5
Figure 2 Stakeholders contributions to the Hogares Solares Financial Scheme	6
Figure 3 States in which ICM has designed or helped to design a Solar Homes Project	8

Acronyms

CFE	Mexican Federal Electricity Commission
CFE GPA	Environmental Protection Management of the Mexican Federal Electricity Commission
FIPATERM	Trust for Thermal Insulation
GIZ	German International Cooperation Agency
ICM	Iniciativa Climática de México

Introduction

This report corresponds to the output “Outline of a Scale Project for a City” for Milestone 1. The report consists of a description of the steps to design and develop an Hogares Solares Program in a city. The first part of the report, explains how the Hogares Solares Financial mechanism works and how it re-canalizes the subsidy to invest in clean energy. The second part of the document describes the context of Hogares Solares and the projects that ICM has designed and developed for different cities in Mexico. Finally, the document outlines the process it should follow to design and develop a Scale Project in a City.

Hogares Solares Financial Mechanism

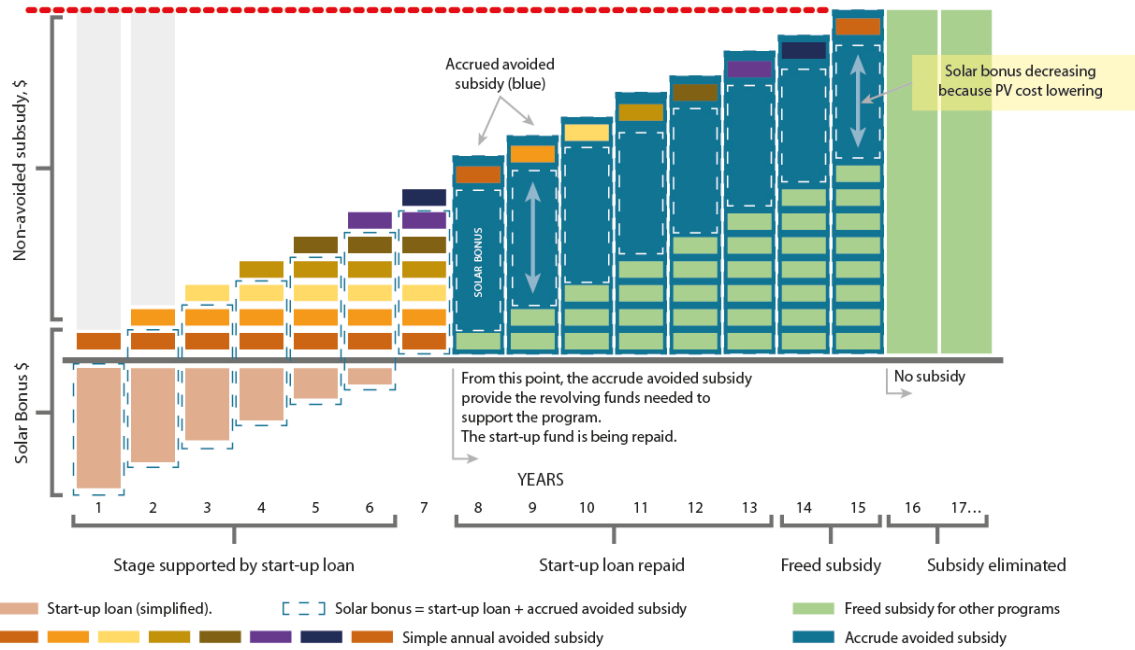
Hogares Solares is a business model and financial mechanism that promotes investment in PVDG leasing systems for users with subsidized electricity bill by capitalizing on the avoided subsidy, the sales of surplus solar electricity fed into the grid and of clean energy certificates. The PVDG systems of Hogares Solares produce enough capacity to cover the residential user current consumption, as well as to generate an additional volume to feed the grid.

One of the fundamental premises of the Program is that the user receives a discount on their electricity bill of 15 to 20% below their current payment.

To achieve a significant penetration of the Hogares Solares mechanism, the participation of the State, private sector and residential users is required. Residential users contribute, through a lease scheme, by covering part of the cost of the 'solar roof'. The program is designed to adjust to the payment capacity manifested in the average of each user's electricity bill. Additionally, the program is designed to be deployed gradually, allowing a high percentage of the resources contributed by the State to come from the subsidy avoided through a revolving mechanism.

The program requires a start-up fund that will cover the first year of operation exclusively. Then, to start the revolving mechanism mentioned above, the program needs recoverable start-up funds from year 2 of operation to year 6. During this period, each year, the start-up fund will decrease and the funds from the avoided subsidies will increase until fully covering the resources needed for the implementation of the solar roofs in year 7. From year 8 onwards, the amount of the avoided subsidies redirected to solar roofs starts to decrease and the remaining amount is freed, and after year 15 the avoided subsidy continues to be generated but it is no longer required to reinvest in solar roofs and can be used to satisfy other social needs. The illustration below shows in a simplified way the revolving mechanism assuming a constant implementation rate.

Figure 1 Hogares Solares Funding Scheme

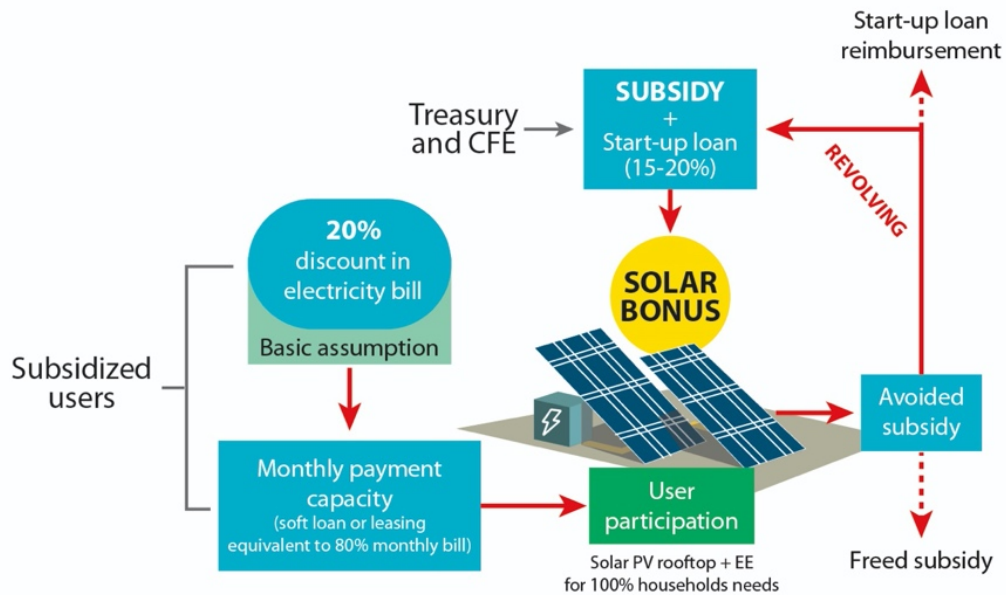


Source ICM

Depending on the official subsidy amount and the time when each solar roof is implemented, the individual user will pay between 30% and 40% of the total cost of their solar roof. The rest is covered by the State through the Program. One of the fundamental premises of the Program is that the user receives a discount on their electricity bill of 15 to 20% below their current payment. The users who participate in the program no longer pay for electricity but pay a fixed fee for the lease of their solar roofs. In the end, the State pays only part of the solar roof and not the total cost of it. The illustration below shows schematically the contributions of the State and the residential user¹

¹ The scheme may change if a Private Partner is included in the scheme instead of/or supplementary to the State.

Figure 2 Stakeholders contributions to the Hogares Solares Financial Scheme



Source ICM

The Hogares Solares Program represents a responsible strategy for the significant reduction of the electric subsidy expense, not only without increasing the electricity expense to the end user, but on the contrary, reducing it and benefiting users. It allows an attractive return on investment to the State, favors the solar distributed generation while allowing the incorporation of CFE to an innovative and sustainable business model.

Hogares Solares Projects in Mexico

The Hogares Solares Program has been developed for over four years. From 2014 to 2018, planning activities for the Hogares Solares Program consisted in the preparation of studies to mature the idea. In 2019, ICM is received support from UK PACT that provided resources and guidance for the design of the Pilot Project creating a ready to implement Pilot Project, and design and develop a scaled Hogares Solares Program. This program contributes to the mitigation of GHG emissions, to democratize the generation of electricity in Mexico and to increase the welfare of the benefited households and the State. The following are the programs that ICM has designed for different cities in Mexico.

ICM and its stakeholders has designed projects for Mexico City, Zapopan, Hermosillo and Mexicali

Mexico City

During 2019, ICM designed and developed a Pilot Project for Mexico City with the objective to prove the technical aspect of Hogares Solares, as the technology is still insipient in Mexico and there is still some pushback from some sectors. The technical aspect would be proved by demonstrating that a high penetration of solar systems in one circuit of the network, does not represent any tension to the network. The Mexico City Pilot Project, is going to be financed through a grant and will not implement the financial mechanism. The project was designed for households in the low-medium economic sector in Iztapalapa, a colony in Mexico, the households would benefit from a 20% of reduction in their bill and would only pay for maintenance of the systems, and after a period they would receive ownership of the systems.

Zapopan

Also in 2019, ICM handed IDOM the necessary tools to design a project and facilitated trainings and workshops so IDOM could design a project in Zapopan, a municipality in Jalisco. The Hogares Solares project in Zapopan had the specific objective to support the economic sector of Zapopan. On one hand, the project had technological specificities in their tender documents to nudge solar companies in Zapopan to professionalize themselves and seek proficiency in their installation practices to participate in the project. Additionally, the program has the incentive to benefit the households by reducing their electricity bill so increasing their welfare.

Mexicali and Hermosillo

Since 2019, the CFE GPA in collaboration with the FIPATERM began collaboration with ICM and GIZ about the potential development of a project of Hogares Solares where FIPATERM

could act as the central operating entity of the program and at the same time as an administration trust and a source of payment.

In the Project, the Trust Fund will be the owner of the systems and will develop a leasing scheme for the residential user. The scope of the program is to install around 14,000 PVDG Systems for residential users in different municipalities in the states of Baja California and Sonora where the expected summer temperatures will compromise the stability of the electricity supply to some cities. The project is in its design and planning phase, and will benefit from ICM's collaboration with Google to select the users of the Program using the solarization data. Furthermore, the project is being designed to be scaled up by support of the NAMA Facility, ICM and GIZ will be submitting the proposal this September, to cover more subsidized households paying Tariff 1 F, is the most subsidized and is applied in regions with 6-month average temperatures above 33 oC.

Figure 3 States in which ICM has designed or helped to design a Solar Homes Project



The projects mentioned above have been designed and planned or are in their designing and planning phase. Unfortunately, COVID 19 has delayed the implementation of the Zapopan and Mexico City project because of the economic stress and isolation brought by the health crisis.

Outline of an Hogares Solares Project

For the projects mentioned above, ICM observed the following outline to design and develop them.

1

Define the objective of the Project

Although all Hogares Solares Projects have the main purpose of redirecting and eventually eliminating the electricity subsidy, to finance renewable energy. Some projects, specially a Pilot Project, have another specific objective. The objective of the Project permeates into its structure and design and is a main component on how the Project develops. For example, in the Mexico City project, the objective was to prove the technical aspect of Hogares Solares, thus, all the systems were planned to be placed within one circuit of the network. It is very important to establish an objective of the Project that will then guide the rest of the design.

2

Identify relevant stakeholders

A second step, is to identify all relevant actors that will take part in the implementation of the project. The stakeholders, their characteristics, legal responsibilities and administrative capacity guide the operational and financial structure. The complexity of the Project, has shown us that the active participation and buy in of different levels and areas of the government and different type of actors is necessary for a successful implementation of the project. Besides the role the government plays within the operational and financial structure, its support is also important to communicate the Project through their official channels.

3

Definition of the financial and operational structure

Linked to the definition of the actors is the elaboration of the operational and financial scheme. The legal responsibilities an actor can accrue and their capacities will determine the role they play in the Hogares Solares Project. For the financial structure, there should be at least the following actors:

- Contributor of funds or lending entity -The actor that will either contribute funds as a grant or lend them to the main entity. There could be more than one actor. Lending entities can be banks, multilateral organizations or funds that have the capacity to lend the resources to the main entity.
- Main entity- The actor that will manage the project. The main entity can create a Trust (or it can be a Trust) to manage the project's payments. The main entity will be most likely part of the Government and it will be an important part to re-allocate

the subsidy into the project. The main entity will be the legal responsible of the project, and it can be the legal owner of the systems. All contracts with developers and users will be developed through the main entity (project can be through APP).

- Electricity Federal Commission- Although it may be possible to develop the project without the Electricity Federal Commission, its participation in the Project will ease the technical aspects of the project, enhance the communication aspect, can act as collector of quotas, and will make it possible to compute the freed subsidy. CFE can also act as the main entity.
- Developer- The actor that will installed the systems, they can also oversee operation and maintenance.
- User- The beneficiary of the Project.

For the operational structure, the actors mentioned above will have to conduct at least the following activities: development, acquisitions, installation, operation and maintenance.

4

Choose the technology

When developing the technical annex for the Project that will be used for the tender documents, ICM has defined the technical aspects of the systems by working with different developers to understand the market and evaluate that the technical capacities in Mexico and the PVDG market are adequate for the project we are developing. One characteristic that ICM has identified as important is to include in the tender documents is the criteria that the developer should have the due diligence of CSolar or at least comply with all the technical aspects that the CSolar due diligence process evaluates in a developer. CSolar is a strenuous due diligence process. Also, it is important to define all characteristics of the technology and its costs before the tender process in a way that if there is a technical problem, the developer can fix it and it won't reflect badly on the government.

5

Identify the users

The criteria to select the beneficiaries will derived from the objective of the project and the technology chosen. The criteria to choose potential users can be divide in two: characteristics of the dwelling, and the profile of the user.

The users' dwellings will have to comply with specific characteristics to install the system, including size, inclination, connectivity, among others. The Google API will make the pre-selection of the dwellings more efficient, as with the tool we can identify which structures comply with some of the technical physical aspects essential to be a user of Hogares Solares.

Once the users are selected, the Google API will also reduce costs of the design of the system as it will make more efficient the design of the array of solar panels.

The profile of the user is given by their quintile, electricity tariff, ownership of their house, neighborhood and other characteristics that the main entity has decided that the target beneficiary must have.

6

Develop the Rules of Operations, Tender Documents and Legal Contracts

The rules of operation will include all the specificities mentioned above: legal, financial and operational responsibilities of each actor; beneficiary profile and selection criteria; and technical specificities of the system.

The legal documents including contracts and public tender bases will be different for each project and will correspond to the legal framework under which the main entity and government actors involved operate. The legal documents are a cornerstone for the Project as establishing each rule of operation can shift the responsibilities from the Municipality to the developer. The final product must be one that won't assign a lot of risk to the government but will be interesting enough for the private party to participate in the bidding process.

7

Develop a Communication Strategy

There are four axes to develop a communication– asking what? (to identify key messages), how? (to identify channels of communication), to whom? (to identify the audiences) and when? (to identify the time when those messages need to be delivered to the audience). A communication strategy is key to assist in achieving the Projects objectives and successful implementation. A communication strategy also permits the creation of targeted material with the identity and logo of the Program for its easy recognition between participants.