Tuki Wasi NAMA
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Financing scheme

Contenido

This document is elaborated in the context of the ADMIRE project.

1. ICS potential in Peru

*This part aims at the definition of the **overall ICS potential** in the country, how was the issue of ICS approached historically in the country, what is the current status and what is the rationale of our proposal in comparison with previous approach (lending vs. grants).*

In Peru it is estimated[1] that around 1 million households still use the traditional open fire inside the house for cooking. This paper is a proposal of financing structure to install 1 million Improved Cooking Stoves ("ICS") instead, which has multiple benefits among which : reduction of wood consumption for fire leading to (i) reduction of CO2 emissions, (ii) reduction of environmental impact on deforestation; (iii) improved family health through reduction of fumes inside the house; (iv) financial savings for families.

There have been a number of attempts and pilots to install ICS in Peru, however the scale has remained limited due in particular to the lack of a structured financing scheme in place that tackles the scale of the issue the country. This paper aims at contributing to such a purpose:

1.1 Segmentation of population

A large part of the families that still use traditional cooking in Peru are located in rural (often remote) areas, which makes it challenging (and costly) for them to be reached. A significant portion of them is then located in in urban or peri-urban areas. There is an obvious correlation between the use of traditional cooking stoves and the level of wealth, the population that we target here being in the poorest of Peru. Therefore, the purchase of an ICS at an estimated price of 200 USD can be considered as challenging for the size of the investment. Whilst a large portion of those simply cannot afford to buy an ICS, we believe another part can afford to pay for part or all of the cost of the ICS, either directly, either with financing mechanism that we will detail further down (grants, Payment In Kind, Result Base Financing, Microfinance). We consider the 1 million households can be segmented as follows:

- Segment 1 (50%): This segments includes the poorest population, the one that cannot afford to pay 200 USD for the ICS. If we wish to reach this population, we will to need to structure a grant system. In practice those typically can partially pay for the ICS (with a mixture of payment in cash and payment in kind material, working hours etc).
- Segment 2 (40%): This segment includes those who have regular earnings, which constitute debt payment capacity. We propose to reach them through microfinance loans: there are not as poor as Segment 1, as such have capacity to repay a microfinance loan that finances the full amount of the ICS upfront without the need of any grant or subsidy. From a MicroFinance Institution ("MFI") perspective, this segment is made of existing MFI clients or potential clients. As they usually have little savings to spend we need to offer a system to finance the stove upfront (MFI loan) as well as an incentive for them to make the investment (for example additional features to the ICS, to be developed at a later stage)
- Segment 3 (10%): Finally, a portion of the population can pay for their ICS from their earnings or savings, hence have no need for a microfinance loan nor grants of subsidies. They might need for an incentive to use their savings for an ICS rather than for another investment.

[1] Internal Document by MINEM, Ministry of Energy and Mining to which Microsol had access. Not published yet.

The proposed split of 50%/40%/10% is indicative at this stage

Client segmentation	Segment 1	Segment 2	Segment 3	Total
Estimated share	50%	40%	10%	100%
Number of households	500,000	400,000	100,000	1,000,000
Price of ICS (USD)	200	200	200	200
Total value (SD)	100,000,000	80,000,000	20,000,000	200,000,000

1.2 Microfinance Approach - Preliminary considerations (Segment 2):

The cost of ICS is relatively low (200 USD) compared to usual loan sizes: Microfinance Institutions ("MFI") usually target loans over 300 dollars to be profitable, especially in the targeted rural areas where costs are higher (MFI typically start with smaller loans around 150 USD and grow with time with those clients who pay well).

The segmentation will be detailed further at a later stage. Additional aspect to take into consideration are the spread of the targeted population in Peru´s regions and whether of not it matches with MFIs presence as well as with the presence of operator. MFIs are usually located at reasonable distance from large cities and beyond 2 hours from the closest city, clients are considered very costly to reach. . . While the network of MFI promoters and operators is expected to be used to promote the ICS, a significant portion of the 1 million potential clients might be out of reach of MFIs due to geographic location and should thus be served as segment 1. Thus, another segmentation criteria could be to segment the population according to areas where MFIs are active or not, or the distance to the closest large city (inside city, less than an hour, 1-2 hours, 2-3 hours, more than 3 hours). This possibility will depend on availability of data.

Note that we initially identified a separate Segment 4 of those families who have capacity to partially pay for an ICS through a microfinance loan. We explored the possibility to finance ICS through a mix of grant and MFI loan, however this does not appear viable. From an MFI perspective it is not attractive to lend amounts smaller than 150 USD. As such those are included in Segment 1 in this paper.

2. The underlying economics of an ICS for households

*This part aims at describing the **underlying economics** of an ICS – define the impact in numbers on 1 household, what are the financial benefits (if any), what is the economics of a typical household and how is it going to be affected by an ICS.*

Installing an ICS generates an upfront investment, i.e. an initial outflow from the family budget which can take various forms (cash, grant, monthly debt repayments etc.). On the other hand, once in use the ICS allows various savings on an ongoing basis in additional to the improved overall family wellbeing. The two key improvements are lower wood consumption and improved health with fewer fumes inside the house.

2.1 Reduction in wood consumption

We consider two types of households, (i) those that collect wood, for which the savings will be a reduction of time spent collecting wood; and (ii) those that buy wood, for which there will be a direct savings in purchase of wood.

At this stage, we assume those people belonging to segment 2 are the ones that buy wood for their stove, as they are financially less poor and can afford to buy instead of lengthy collection of wood. In our proposed financing mechanism using MFI loans, the reduction of wood consumption and consecutive

reduction in wood spending can be used directly to reduce the monthly payment. These savings in buying wood can contribute to the monthly debt service and can partially finance the interest. A loan of USD 200 at 3% monthly interest rate involves monthly interest payment of USD 6 (assuming the capital repayment is made completely after one year). We consider that such an amount is largely covered by wood savings since our information[2] shows that wood spending savings can be up to 12 USD per month.

2.2 Savings in health costs

Households generate savings in health thanks to reduced exposure to fumes inside the house. Those savings include reduction in doctor bills, medicines, and reductions in days off work for being sick (or to stay at home with sick children). Those are difficult to quantify, not all families would spend on doctor visit and medicine, or only one of the two. Some would compensate lost working hours with more working hours the following days (hence not necessarily a straight finance loss). Not for all families would this be a direct financial gain, however overall it will be an improvement in wellbeing and will generally improve family finances as well.

In a few occasions, the use of improved cookstoves avoids death – 1,500 annually in Peru according to the WHO (World Health Organization). There is consistent evidence that exposure to household air pollution can lead to acute lower respiratory infections in children under five, and ischemic heart disease, stroke, chronic obstructive pulmonary disease and lung cancer in adults.

We consider that health savings can further contribute in paying for the investment in the ICS since our information[3] shows that wood spending savings can be up to 18 USD per month.

Thus, those people who do not pay for the fuel are corresponding to Segment 1 and those who do not pay for the fuel are corresponding to Segment 2.

3. Borrower profile/credit risk of ICS households

This part aims at describing the experience in lending to ICS clients in the country, expected defaults, typical interest rates, do these households even qualify as borrowers? Are there any similar lending products available to these kind of clients (e.g. consumer lending for home appliances? – what are the typical terms?) Do they typically have bank accounts? – to be provided by partner microfinance FIs.

In this section, we will focus on those households who do have capacity for debt repayments (Segment 2) in order to analyze the best of introducing microfinance as a way of financing the installation of ICS.

3.1 Previous experiences (Workshop February 2017)

There have been a number of projects for the installation of various green technologies in Peru but with very limited scale. In February 2018, Microsol organized a workshop with a number of public and private players in universal energy access and microfinance in rural area. Be it in a context of a pilot project or in a more developed way, various financing mechanisms have been used.

The following Case Studies were presented, analyzed and discussed:

- Case Study 1: EnDev presented Two projects were presented, (i) first a pilot project for the installation of solar water heaters combining Result Based Financing and microfinance which was

[2] Information collected in the framework of the Qori Q'oncha programme runed by Microsol over the whole Peruvian territory since 2008.
[3] Idem.

implemented in collaboration with Caja Arequipa) and (ii) second the certification of biomass based improved cookstoves in view of future production and distribution.

- Case Study 2: Fondesurco presented a project where they installed solar-based water heaters, improved oven and cookstoves through microfinance loans
- Case Study 3: Caritas Cusco presented a project where they encouraged the development of a microfinance product offer for microfinance institutions to support the local distribution of improved cookstoves.
- Case Study 4: Acciona Microenergía implemented a model where they distribute energy produced through solar panels at a fixed monthly fee wich can be considered as a subsidized pay-for-use mechanism as the production of energy is subsidized to allow for a low monthly fee for poor end-users.
- Case Study 5: Tecnosol acts in Nicaragua as a distributor and installer of various energy technologies. It built partnerships with microfinance institutions to allow its end clients to purchase the proposed technologies.

We used the analisis of those case studies and the outcomes of the discussions that took place during the workshop to build the proposed scheme.

3.2 Description of MFI clients

A microfinance loan is not appropriate for all. As explained above, segments 1 and 3 do not qualify as borrowers as for Segment 1, the poorest who do not have sufficient payment capacity as such the MFI will not be accepted by IMF due to higher risks and for Segment 3, people do not have the need for a loan to finance the ICS (they could be potential clients for other purposes, or maybe are already clients for larger amounts). In addition, are conceptually[4] excluded here those clients who could have payment capacity but are not in an area were an MFI is active (or wishes to be active) since they do not qualify as potential borrowers. As explained previously, those households that would have the financial capacity to repay an MFI loan but live in remote villages that are two far from the city will not be attractive to MFIs.

3.3 What makes Segment 2 attractive to MFIs ?

Clients from segment 2 are attractive to be reached through MFIs. 200 USD is the low end of MFI loans, especially in the countryside. Due to high costs to reach clients in the countryside, the minimum tends to be even higher (USD 300+). There are 2 scenarios: (i) as a stand-alone loan for new clients, 200 USD would be a minimum, with the hope for the MFI to increase over time once the client has proven its financial discipline by repaying on time; (ii) 200 USD is considered as an add-on for those clients who already have a business loan. This is the perfect situation from the MFI perspective, as it increases its lending (by 200 USD) to a client it knows and to whom it already lends to.

3.4 Type of Microfinance Institution targeted

We will select a number of MFI to work with, considering that those who would be willing to collaborate typically will have one or more of the following characteristics:

- Active in the rural area
- Willing to lend small amounts
- Have social and/or environment impact as key in their mission

[4] We do not have the corresponding map at hand but consider that the 40% portion corresponding to Segment 2 takes this particularity into account.

- Have the capacity to deploy loans for such a project

Traditionally, those MFIs that still reach the poorest (i.e. our target population) are NGOs since they are the type of organizations that keep a strong focus on social impact[5]. Those larger regulated microfinance institutions tend to be managed as pure financial institutions (as a matter of fact there were largely bought by private banks). Whilst they might be less interested due to size of loans and costly access to rural areas, they could be interested due to their need to increase the lending portfolio.

3.5 Key metrics of the proposed microfinance loan

MFIs usually have loan products available for house improvement (typically in addition to productive loan for the clients´ businesses). In these cases, we propose to maintain the MFI existing product for the purpose of the ICS, and only adapt it if needed. We would expect key loan metrics to match the MFI products and be in the range of:

Key metrics of MFI loan	Non seasonal income	Seasonal income	Comments
Maturity	1 year	1 year	Maturity would match existing products from MFI, it could be a little lower given the size
Interest rate	3% per month	3% per month	interest rate could be lower for existing clients and higher for new clients when MFIs designed an interest rate scale
Interest	Monthly	Monthly	N/A
Capital	Monthly	Quarterly / bullet	When household activity is from agriculture, revenues are seasonal, loan repayment can be structured to match income stream (annual harvest)
Average default	6%	6%	Typically lower for existing clients (e.g. 3%) and higher for new clients (e.g. 8-10%) – Default rate can be higher in rural areas, we should aim at reaching the MFI´s typical default rate

Note that for the purpose of this determining global financing requirements, it does not make a significant difference if repayments are monthly or bullet at the end of the 1 year maturity. In the model, we take the most prudent view.

4. Concessional Funding

This part discusses the need for concessional funding that is if concessional funding is needed a calculation of how much and justification of the reason needs to be presented.

At this stage we consider concessional funding will at least initially be needed for all segments, albeit in different ways and amounts. A higher level of concessional funding is required for segment 1 who do not have the capacity to pay for their ICS. Some concessional funding will also be required for other segments in order to trigger the market: as it is a relatively new product, some operators, MFIs and end-clients will need some financial / technical / in-kind assistance to decide on investing on this project. Whilst they have the capacity to pay for an ICS, some families might have other investments they need to make, and will therefore need to be convinced thanks to specific training and financial help. The detailed content of such training can be designed at a later stage once discussions have taken place with various market players.

[5] MFIs with more commercial approaches tend to reduce such profiles in their portfolio are they are driven by other objectives.

Concessional funding will have th following uses:

4.1 Finance technical assistance "Capacity Building" *(all segments)*

Concessional funding will finance capacity building, which includes Technical Assistance for Operators (those who will distribute and install the ICS), and MFIs and any player in the project. This includes helping structure the project, then the product, then support distribution and monitoring of ICS installation. This Capacity Building goes across three segments of population.

4.2 Grant / Subsidies *(segment 1)*:

In the case of Segment 1, concessional funding will be required to finance the cost of the ICS, as the households are unable to generate sufficient income to pay for this.

In order improve the efficiency of the grant, we propose 3 routes that will allow some leverage of the grant:

4.2.1 *Match PIK*

We propose to condition subsidies to Payment In Kind ("PIK") by end-clients, which has proven to be effective in the past. Typically, households can offer materials for the ICS, or working hours, which reduces the cost of ICS. For the purpose of modeling, we would include within PIK those household who can make a modest cash contribution to the ICS cost.

4.2.2 *Result Based Financing*

There is a possibility to articulate the programme with a Results Based Financing mechanism in the form of carbon emission reduction certification and sales. Microsol has extensive experience in setting up such mechanisms where an RBF provider buys reduction of CO2 emissions either upfront or on delivery. This mechanism can be articulated with the Operator, allowing to reduce further the upfront cost of each ICS, reducing the need of grant per ICS – at this stage we have not yet included the impact of RBF in the overall calculations, therefore they constitute an upside to be calculated at a later stage[6].

4.2.3 Differentiating ICS costs

At a later stage and together with operators who will install ICSs, we propose to explore the availability of cheaper ICS for segment 1 (or higher cost ICSs for Segment 2 and 3 depending on the exact situation of stove costs at the moment of starting the project[7]). That would allow a reduction of the cost of ICSs financed through plain grants/subsidies. In addition, that would allow a differentiation between various types of ICS and give incentive to other segments to purchase their ICS: it could become an issue if the same ICS is being installed in exchange of 50% PIK to a segment a household and with a loan of 100% of the cost to a segment 2 household in the same community. On the contrary, a household with higher income would be willing to purchase the better ICS, which means a better well-being for the family and might mean a sign of social status within the community.

[6] At a later stage other options can be envisaged for the best use of this financing. A few example which we have not selected at this stage include inter alia contribute to maintenance cost, repay repay part of MFI capital, reduce the MFI loan interest rate to end clients, collected and fund future grants, finance additional features to ICS to make more attractive, pay a distribution fee to the MFI.

[7] The 200 USD hypothesis is considered conservative since lower costs stoves are already available at the moment but not widely disseminated. In the context of microfinance loans to be created, one way of opening the market can be rather to increase the cost than to decrease it so it can match with MFIs loan size requirements. It should be considered that the main reason for developing low costs stoves and in particular stoves with high in-kind contribution potential was first sustainability and second the use of subsidies. In the context of using a loan the logic is modified significantly.

Note that in the model developed below we have not included yet the additional benefit of (4.2.1) and (4.2.2), which can significantly reduce the need for a grant and improve the leverage.

4.3 Dedicated loan to MFI (DFI):

We consider the possibility of a a dedicated loan typically from Development Finance Institutions ("DFI") to MFI which will be specifically set aside for the purpose of ICS lending. The DFI will lend an amount to the MFI, with specific conditions attached to the loan, including an attractive rate as an incentive to lend for ICS distribution and a conditional leverage.

As far as the interest rate is concerned, we believe an attractive rate for MFIs could be 8%. The currency of those loans will need to be determined as USD loans require a costly coverage for foreign exchange movements (if the concessional loan is in USD, the MFI will lend in PEN and will receive payments in PEN that will have to be changed into USD). This cost depends on market conditions and can add up to 2-4% to the nominal rate.

As far as the conditional leverage is concerned, we believe the DFI loan can be structured with conditions that the MFI lends its own funds together with lending the DFI loan. As a first step, the FDI can finance 50% of the new loans (the balance being financed by the MFI own funds) and then reduce this portion over time. In Peru, the microfinance market is relatively mature. Some MFIs are cash rich and might be willing to increase their lending portfolio size without the need for external financing. On a combined basis, we suggest that the FDI could finance 50% of the funding requirements of the MFIs in the first 3 years, then reducing to 25% year 4-6 and 0% in the last 4 years.

4.4 Guarantee Facility (Segment 2)

We propose a guarantee facility to be provided together with the DFI loan to the MFI. This will create a strong incentive for the MFI to lend for this product, as it will effectively reduce its losses whilst earning the interest income, and boosting their profitability.

Leverage: A Guarantee Facility is an efficient use of grants, as it allows leveraging the guarantee line and increasing external funding. For example a USD 1m guarantee covering 5% of losses generates lending from third-party MFIs of USD 20m.

Structure of guarantee facility: The guarantee facility needs to be carefully designed in order to incentivize MFIs to work on ICS whilst maintaining a rigorous risk discipline. We will ultimately rely on the MFI's risk assessment to disburse loans for ICS. For example, if the guarantee fully protects the MFI for the first % of bad debt, the MFI could be tempted to lend to risker clients with the view that their loss will be absorbed by the guarantee at no cost for the MFI. In other words the guarantee facility will be used to grow their portfolios a subsidy to the MFI to capture new clients. Therefore it is important the MFI shares losses with the guarantee. We propose the guarantee is structured so that losses are shared 50/50 between the guarantee line and the MFI up to the standard MFI default rate.

Size of guarantee facility: Default rates in MFIs amongst NGOs and Cajas Rurales are typically around 5% to 8% in Peru. We suggest to consider a 10% default rate, which is not unreasonable given we will endeavor to reach (i) the poorest; (ii) clients in the rural area and possibly (iii) new clients. All three client categories typically have higher default rates (new clients have typically higher default rate than existing clients with a good credit history). As a result, we propose a guarantee facility of 5% split 50/50 with the MFI: the guarantee facility will absorb half of the first 10% bad debt, giving a strong incentive to the MFI.

5. Proposed Financing Structure

This part aims at describing the proposed framework including all the stakeholders and their role/contribution.

a. Combined Financing Scheme

We assume the cost of an ICS is USD 200. We propose to address each segment of the market through a specific financing scheme. We will use the segmentation explained above:

Segment 1 (grants): These will be served through grants. We estimate that the clients can in average finance half of the ICS cost, especially with payments in kind (material, working hours etc). This reduces the grant financing requirement by half, i.e. the client contributes USD 100 in kind and the grand finances USD 100 if the total cost of USD 200 of the ICS. As already mentioned, installing simpler (cheaper) ICS for those households could reduce further the grant requirement. For example a simpler 150 USD ICS could be financed with USD 100 PIK, which would only leave a need for USD 50 that is half of the amounf of the grant needed in the first scenario.

Segment 2 (microfinance loan): Those will be served through MFIs, which will offer a USD200 loan, with a maturity of 1 year and monthly interest rate of 3%. We propose a guarantee line of 5% that would cover up to 5% of loan losses with a 50/50 up to 10% default. The MFI would take the hit above 10%, which is above market default rates. Up to 10%, the guarantee facility would cover half of the losses. As an incentive to the MFI to participate in the project, we will offer a dedicated loan to the MFI, to be deployed for ICSs together with the MFI own funds.

Segment 3 (self-paid): Those households can pay fully for their ICS. As such the only cost not bore by the clients will be the capacity building (shared with other segments).

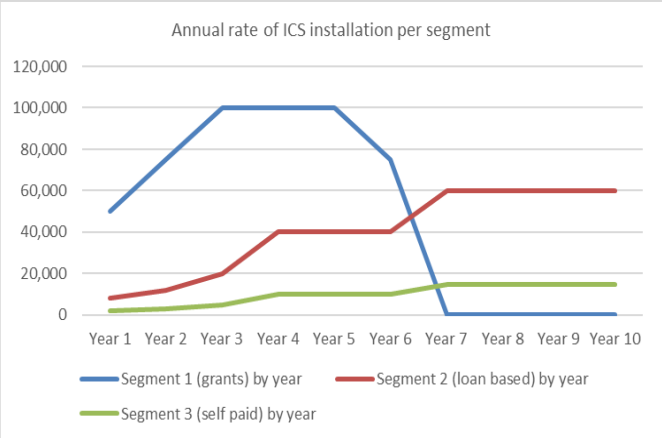
b. 10-year implementation profile

We propose a 10 year implementation in three steps for the installation of 1 million ICS in Peru. We assume Segment 2 (MFI loans) and 3 (self-paid) will be served in parallel at a similar rate – this reflects that they are probably located in the same communities, as such MFI promotors with operators will distribute to both segment 2 and 3 at the same time.

Step 1: In the first three years, ICS will mostly be installed for Segment 1 through grants. We believe it will take time to articulate the financing scheme and involve MFIs into the project, hence a more most rate of installation for segment 2 through MFI loans.

Step 2: In years 4 to 6, the grant-financed ICSs will continue and increase in number for Segment 1 as a large number of households remain unaddressed. The installation of ICSs for segment 2 through microfinance will accelerate substantially while the requirement for DFI money will reduce as MFIs will have the experience of the first three years to gain trust in the project and will thus increase their portion of overall loans disbursed.

Step 3: Finally, in the last 4 years there will be no more installation of ICS for Segment 1 (at this stage it will have been addressed fully). The number of ICS installed through MFI loans will remain high without the need for DFI.



c. MFI Model

For the purpose of the MFI loans, we build a simplified model to illustrate the installation of 400,000 stoves over 10 years following the 10-year profile explained above. The purpose of this model is to determine the size of the Guarantee Line and DFI Loan to MFIs for Segment 2. We assume a USD 200 price of ICS with 2% annual inflation.

Leverage of fund repayment: Importantly we need to model the leverage of funds through loan repayment year after year, as MFI loans to the end clients are short term (1 year). When the MFI lends USD 200 to a client for an ICS, this client pays interest on a monthly basis. The client will repay the loan after one year, at which time the MFI will be in a position to lend again the same USD 200 to another client. The same USD 200 will have been lent to 2 different clients, financing the installation of 2 ICS. This is assuming the DFI loan represents 50% of MFI contribution, USD100 of concessional FI loan will finance 2 ICS of USD 200 (or a total of USD 400). In a conservative approach, we assume the loans disbursed in one year are only repaid at the end of the following year. This approach is very conservative and assumes long delays and repayment so that funds can be lent again after 2 years instead of one.

In as scenario where 4000,000 ICS are installed at a total cost of approx. USD 9m, MFIs only need funding of USD 31.5m that can be lent several times over the 10 year period. The DFI loan to the MFI will be USD 3.35m in the first 3 years (50% of net funding requirement) and USD 4.5m after 6 years (25% of the funding requirement).

Below is a summary of the model output for 400,000 ICS.

Table: Summary of model output for 400,000 ICS.

Segment 2 (loan based) by step	Year 1-3	Year 4-6	Year 7-10	Total
# of stove installed (average)	13,333	40,000	60,000	**40000***
Cumulative # of ICS installed	40,000	120,000	240,000	**400,000**
Gross loans disbursment to consumers	8,209,600	25,981,768	55,699,200	**89,890,568**
Debt oustanding (after losses)	3,953,520	8,391,014	13,624,055	**13,624,055**
MFI annual Financing need	2,229,867	3,879,156	3,287,108	**1362406***
MFI net Financing requirement (after repayments)	6,689,600	11,637,467	13,148,434	**31,475,501**
DFI Loan	3,344,800	4,581,767	0	**7,926,567**

** 10 year average*

d. Total Concessional Financing requirements

We built a simplified macro model for the installation of 1m stoves over 10 years following the three-step profile described above. We used an approach that includes a model for each segment to determine the size of Concessional Finance required. Here is a summary table of the corresponding global model.

Global business proposal	Segment 1 (grants)			Segment 2 (MFI loans)			Segment 3 (Self-paid)			Total	
Users		50%	500,000		40%	400,000		10%	100,000	**100%**	**1,000,000**
Price of stove			200			200			200		**200**
Total Investment after inflation			105,542,015			89,890,568			22,472,642		**217,905,225**
Paid by the client	in kind	50%	52,771,008	loan	95%	85,396,040	cash	100%	22,472,642		**160,639,689**
Grant	grant	50%	52,771,008								**52,771,008**
Capacity Building			10,000,000			8,000,000			2,000,000		**20,000,000**
Guarantee Facility				guarant	5%	4,494,528					**4,494,528**
DFI loan to MFI (max need)						4581767*					**4,581,767**
TOTAL Facility required			**62,771,008**			**17,076,295**			**2,000,000**		**81,847,303**
# ICS per 100 USD concessional funding			0.80			2.34			5.00		**1.22**
Leverage of concessional funding			1.68			5.26			11.24		**2.66**

** 50% of financing requirementin year 3, 25% in year 6*

On a combined basis, the installation of 1m ICS at a total cost of USD 238m (after inflation and USD 20m Capacity Building) requires a total concessional funding of USD 82m (guarantee Facility + grant + Capacity Building + DFI Loan to MFI). This proposal generates a leverage of 2.7 (i.e. each dollar concessional funding generates and additional USD 1.7 of self-paid contribution). In other words, each USD 100 of concessional funding generates funds for the installation of 1.22 ICS priced at USD200.

We believe fine-tuning the structure in the next stage can further improve the leverage through improved mechanism or less conservative assumptions supported by deeper analysis (a few examples were mentioned throughout the presentation above).

In particular we recommend fine-tuning the proposed segmentation (50%/40%/10%) at the next stage.

6. Co-Benefits of the installation of ICS

This part aims at presenting the Co-benefits that is to quantify GHG impact, other co-benefits (health, time) – ideally in numbers.

Assuming a CO2 reduction of 2.5 tons equivalent per annum and per ICS, the installation of 1m ICS reaches annual savings of 2.5mt of CO2 in years 10 onwards.

Global business proposal	Grant based			Loan based			Self Paid			Total	
Users		50%	500,000		40%	400,000		10%	100,000	**100%**	**1,000,000**
CO2 annual ton reduction			**1,250,000**			**1,000,000**			**250,000**		**2,500,000**

Other co-benefits are an improvement of family health where the house becomes fume-free. This has an obvious impact on family well-being, as well as financial impact. The financial impact includes savings in medicine, doctor appointment, and days of inability to work for parents due to illness (or due to the need to stay home with sick children).

7. Other considerations

This part aims at "highlighting and quantifying other related investment opportunities such as small solar home systems, clean water, access to finance in general (target households aren't likely clients of any bank/no bank account), micro-insurance, mobile banking etc. –> ICS project could serve as a vehicle for FIs to enter into all these new opportunities, thus indirectly making ICS project more attractive. Additionally, some FIs often have non-financial targets as well (e.g. reduction of poverty, climate...) so these points could help to catch their interest.

In addition to improved health, savings of wood consumption, savings in health costs and helping fight deforestation, the ICS project can combine other benefits:

- Financial inclusion through microfinance loans: be it with new clients and existing clients, microfinance loans contribute to building financial inclusion of the poorest.
- Other technologies: The ICS can be the first step before adding other technologies, such as solar water heaters or other green technologies. It could be explored to combine ICS with other technologies (for example an improved ICS that also offers an oven), or other technologies. Either using a larger microfinance loan to pay for the improved technology. Or alternatively once the ICS loan is repaid, the repayment capacity of those households can be redirected to other home improvement technologies.

8. Appendix: Combined model overview:

Below key assumptions and key metrics of our model:

Production and distribution costs (USD)	200
Operational margin	0%
Selling price (USD)	200
Inflation rate goal	2%
Size of individual loan (USD)	200
Monthly interest rate	3%
Repayment period (months)	12
Bad debt (net of Guarantee facility)	5%
Annual CO2 emission reduction per stove	2.5

Segment 1 (grants) by year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
# of stove installed	50,000	75,000	100,000	100,000	100,000	75,000	0	0	0	0
Cumulative # of ICS installed	50,000	125,000	225,000	325,000	425,000	500,000	500,000	500,000	500,000	500,000
Price of ICS	200	204	208	212	216	221	225	230	234	239
Annual investment (after inflation)	10,000,000	15,300,000	20,808,000	21,224,160	21,648,643	16,561,212	0	0	0	0
Cumulative Gross investment (aft inflation)	10,000,000	25,300,000	46,108,000	67,332,160	88,980,803	105,542,015	105,542,015	105,542,015	105,542,015	105,542,015

Segment 2 (loan based) by year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
# of stove installed	8,000	12,000	20,000	40,000	40,000	40,000	60,000	60,000	60,000	60,000
Cumulative # of ICS installed	8,000	20,000	40,000	80,000	120,000	160,000	220,000	280,000	340,000	400,000
Price of ICS	200	204	208	212	216	221	225	230	234	239
Gross loans disbursment to consumers	1,600,000	2,448,000	4,161,600	8,489,664	8,659,457	8,832,646	13,513,949	13,784,228	14,059,913	14,341,111
Cumulative Gross investment (aft inflation)	1,600,000	4,048,000	8,209,600	16,699,264	25,358,721	34,191,368	47,705,317	61,489,545	75,549,457	89,890,568
Capital repayment received	0	1,520,000	2,325,600	3,953,520	8,065,181	8,226,484	8,391,014	12,838,252	13,095,017	13,356,917
Interest payments received	205,200	428,868	709,541	1,387,686	1,720,303	1,754,709	2,367,525	2,738,399	2,793,167	2,849,030
Total debt instalment received	205,200	1,948,868	3,035,141	5,341,206	9,785,484	9,981,194	10,758,539	15,576,651	15,888,184	16,205,947
Debt oustanding (after losses)	1,520,000	2,325,600	3,953,520	8,065,181	8,226,484	8,391,014	12,838,252	13,095,017	13,356,917	13,624,055
Annual net interest (after losses)	136,000	329,040	538,805	1,036,238	1,377,872	1,405,430	1,816,434	2,193,314	2,237,180	2,281,924
Cumulative net interest (after losses)	136,000	465,040	1,003,845	2,040,083	3,417,956	4,823,386	6,639,819	8,833,133	11,070,313	13,352,237
MFI annual Financing need	1,600,000	2,448,000	2,641,600	6,164,064	4,705,937	767,466	5,287,465	5,393,214	1,221,661	1,246,094
MFI net Financing requirement (after repayn	1,600,000	4,048,000	6,689,600	12,853,664	17,559,601	18,327,067	23,614,532	29,007,745	30,229,406	31,475,501
Annual CO2 reduction (tons)	0	20,000	50,000	100,000	200,000	300,000	400,000	550,000	700,000	850,000
Cumulative CO2 reduction	0	20,000	70,000	170,000	370,000	670,000	1,070,000	1,620,000	2,320,000	3,170,000

Segment 3 (self paid) by year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
# of stove installed	2,000	3,000	5,000	10,000	10,000	10,000	15,000	15,000	15,000	15,000
Cumulative # of ICS installed	2,000	5,000	10,000	20,000	30,000	40,000	55,000	70,000	85,000	100,000
Price of ICS	200	204	208	212	216	221	225	230	234	239
Annual investment (after inflation)	400,000	612,000	1,040,400	2,122,416	2,164,864	2,208,162	3,378,487	3,446,057	3,514,978	3,585,278
Cumulative Gross investment (aft inflation)	400,000	1,012,000	2,052,400	4,174,816	6,339,680	8,547,842	11,926,329	15,372,386	18,887,364	22,472,642