BIOGAS USAGE & FUNCTIONALITY

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FCN was formed to share the experiential learning of ADATS and the Coolie Sangha, especially regarding the development and implementation of climate projects. This document goes beyond that rather didactic objective. It is for our own reflection and learning as secondary stakeholders or project delivery personnel.

1. Our 1st Biogas CDM project

From the mid '90s to 2005, a decade long discussion on Greenhouse Gases, climate change and the business opportunity created for thousands rural women to provide a vital environmental service preceded ADATS embarking on the world's first CDM project to build 5,500 Biogas units in Chickballapur district, the home turf of ADATS where we have lived and worked for the past 45 years.

4,465 *(81%)* of these first Biogas units were built for active Coolie Sangha members in 339 functioning villages CSUs. The remaining 1,043 *(19%)* were built for non-CSU members. As a result, there was a terrific enthusiasm propelled by several factors.

1) The first being an excitement to participate in a massive collective action being undertaken at such a big scale.
2) The second was the convenience provided to poor people by the possibility of smoke-free kitchens on par with the handful of middle class/big peasant homes with LPG cylinders in towns and a few villages.
3) Thirdly, a quasi-cerebral understanding of the science behind climate change, even without a total acceptance of the seeming illogic behind it.
4) And fourthly, a grudging belief in our assertion that they would, in some distant future, earn carbon revenue through the selling of what they, quite frankly, saw as "hot air".

In 2005, a French carbon investor bought 136,871 tonnes, in advance, for € 1.1 million. This was the capex used to build, repair, and maintain the 5,500 Biogas units. After receiving 1,01,848 tonnes *(75%)* of the contracted volume, having tripled their investment through the resale of these carbon credits in Annex-1 countries, the carbon investor decided to gift the remaining reductions to End User women. The seven-year ERPA we had signed was thereby cleared by 2011, two years in advance.

1.1. Performance

From 2011 to date, all the 90,905 tonnes issued by the UNFCCC/GS have been sold for ₹ 6.23 crore. This entire carbon revenue has been given to End User women, in proportion to their usage days, as business earnings for having provided a vital environmental service.

Oddly enough, for the first 5 years *(2006 to 2010)* functionality remained at a steady 100%. It then stayed at over 90% for the next 5 years *(2011 to 2015)*; After that, it dropped to 85% in 2016, and thereafter plummeted to 43% in the next 7 years *(2017 to 2022)*.

Cumulative functionality, calculated from 2006 till today, has dropped to only 80% due to the weightage of earlier Biogas functionality.

Month	Within the month Functionality	Cumulative Functionality
Jan-06	100%	100%
Jan-07	100%	100%
Jan-08	100%	100%
Jan-09	100%	100%
Jan-10	100%	100%
Jan-11	98%	100%
Jan-12	96%	99%
Jan-13	94%	98%
Jan-14	91%	98%
Jan-15	92%	97%
Jan-16	85%	96%
Jan-17	61%	93%
Jan-18	68%	91%
Jan-19	51%	88%
Jan-20	54%	86%
Jan-21	54%	83%
Jan-22	53%	81%
Oct-22	43%	80%

Culled from the month-wise Functionality Report generated by *InfoNeeds* Biogas monitoring solution

We found this puzzling since all the expectations with which End User women had embarked on this project were fully satisfied. And yet, Biogas usage dropped after 11 years, despite the debt being cleared and their having received substantial carbon revenue. We needed to figure this out. This was one of the reasons for me to write the paper titled *"A Critique of Climate Projects"* in March 2021. Please see https://fairclimate.com/Library/Docs/6/210318%20Critique%20of%20Climate%20Projects.pdf

2. The 2nd Biogas CDM project

In 2010 we started implementing one more Biogas project in 633 villages of Chickballapur district. The Coolie Sangha sold 233,827 CERs in advance, before starting the project, for € 2,975,371 to a Dutch carbon investor who "forward purchased" these credits even before they were generated. This was the capex that End User women used to build 11,715 Biogas, repair and maintain them for 9 years. 2,763 *(24%)* of these second lot of Biogas units were built for active Coolie Sangha members. The remaining 8,953 *(76%)* were built for non-CSU members.

We cannot claim that this project was committed to the same objectives as the first one, 5 years back. While one-quarter of the End Users (Coolie Sangha members) were propelled by the very same compulsions, the remaining three-quarter would only have seen the 2nd objective of convenience. While they would have heard about the possibility of earning carbon revenue, we doubt if they would have truly believed.

This begs the question of why we encouraged the Coolie Sangha to invest their Sangha Funds, develop, register, and implement this project.

- Firstly was the pressure from thousands of Coolie Sangha members who had not received Biogas units in the 1st project.
- Second was our enthusiasm to promote community owned and managed climate projects that would promote climate integrity as well as give rural women a chance to provide a vital environmental service and transform themselves into "businesswomen". Unlike the 1st project, the Coolie Sangha itself was the project proponent (owner) of this one.

- And thirdly because the viability of climate projects demands large numbers.

2.1. Performance

For just 2 years *(2010 & 2011)* functionality was steady at 100%. It then stayed at over 90% for the next 5 years *(2012 to 2016)*; After that, from 2017 till today, it suddenly started fluctuating between 42% and 61%, averaging at 54.5%. Cumulative functionality, calculated for the past 14 years from 2010 to date has dropped to 72%.

It looks like it is merely a desire to clear their ERPA and get out of debt. In spite of poor performance when compared to the 1st project, this ERPA will be completed by December 2022, after which 100% of the carbon revenue will go to End User women who continue to use thier Biogas units.

Month	Within the month Functionality	Cumulative Functionality
Feb-10	100%	100%
Jan-11	100%	100%
Jan-12	99%	98%
Jan-13	99%	98%
Jan-14	96%	98%
Jan-15	95%	96%
Jan-16	90%	95%
Jan-17	47%	90%
Jan-18	59%	84%
Jan-19	58%	80%
Jan-20	61%	78%
Jan-21	56%	76%
Jan-22	56%	74%
Oct-22	42%	72%

Culled from the month-wise Functionality Report generated by *InfoNeeds* Biogas monitoring solution

3. Functionality

Functionality is a measure of usage. It is a unit to gauge the performance of energy climate projects. It tells us how many days the Biogas unit or improved Woodstove has been used, and thereby calculates the number of days they used renewable sources. It is expressed in percent terms – the higher the number, better the usage.

- Within-month Functionality tells us how many days the Biogas unit worked in any given month. This number shows the *satisfaction level* of End User women – i.e. the number of days in each month when they were able to avoid collecting firewood, using traditional cookstoves or other fossil fuels.
- Cumulative Functionality tells us how many days the Biogas Unit worked from the day it was commissioned till date. It reflects the *economic efficacy* of the climate project in terms of Emission Reductions generated.

4. Repair & maintenance

Repair & maintenance is a vital part of any “aftersales” service. However, it’s a little overrated. It is not the be all and the end all. If the product is no longer attractive, offering to keep it in good repair will be of little help.

Attributing functionality solely to timely and efficient aftersales would be a narrow technocratic reading, without a grasp of nuanced factors that lead to a holistic response. In spite of 63% of problems being fixed, so many End User women still stopped using their Biogas units.

In the earlier quoted paper, we explored other dynamics. These current reflections, *largely for internal rectification*, is to flesh out those global observations in our specific experiential context.

Biogas units have experienced 21 different kinds of problems – 12 Major and 9 Minor issues.

- Major problems are those that make the Biogas unit unusable and force the End User woman to resort to some other non-renewable source of fuel. For the number of these downtime days, there will be no Emission Reductions generated.
- Minor problems do not make the unit inoperable but inconvenience the woman by not working optimally. Nevertheless, she does not have to scrounge for firewood or use any other fuel.

Of a total of 29,985 problems faced by End Users in both our Biogas CDM projects in the past 18 years, 22,888 have been major problems, and 7,097 were minor in nature, causing inconvenience but not any loss of carbon credits/revenue.

PROBLEM	1st Project		2nd Project		FOUND	FIXED	
	Found	Fixed	Found	Fixed			
MAJOR PROBLEMS							
Abandoned Unit	509	219	1,341	202			
Demolished	1,454	80	2,035	44			
Sold Cattle	634	229	1,563	486			
No Gobar	673	383	1,255	932			
Empty and Replaster Dome	1,462	1,246	3,766	3,003			
Gobar Dried	1,161	844	4,008	2,812			
Gobar Too Watery	38	29	358	311			
Kitchen not Used	590	405	621	336			
Rainwater in Dome	31	14	145	104			
Repair Outlet Tank	46	32	251	187			
Repair Stove - 2 Burners	127	123	743	718			
Replace Stove	10	8	67	60	22,888	12,807	*56%*
MINOR PROBLEMS							
Change Nozzle	51	51	551	539			
Drain Water in Gas Pipe	7	2	168	157			
Minor Repairs	681	535	1,830	1,591			
Nozzle Blocked	29	27	240	227			
Repair Inlet Tank	103	30	172	112			
Repair Stove - 1 Burner	61	56	385	377			
Repair/Replace Gas Pipe	452	349	1,564	1,444			
Replace Gate Valve	137	99	546	504			
Replace Knob	8	8	112	109	7,097	6,217	*88%*
TOTAL	8,264	4,769	21,721	14,255	29,985	19,024	*63%*

6,217 *(88%)* of minor problems have been solved and even 12,807 *(56%)* of major ones have been fixed to date – including some seemingly insurmountable ones like Abandoned Units and Demolished.

Major problems were fixed by our Field Staff, and minor ones largely by village volunteers and End Users themselves, with just tools and spares supplied by the project. Field Staff honed their skills to fix problems and accelerate gobar digestion. Village volunteers innovated many a creative home remedy like bandaging a torn gas pipe with plastic paper, especially during the COVID-19 years.

5. Convenience & the LPG trap

In 2016, the Indian government launched the *Ujjwala* scheme targeted to give free and subsidised LPG stoves and cylinders to 8 crore families. Statistically, families with LPG increased from 62% of the population in 2016 to 99.8% in 2021, suggesting that LPG is no longer a luxury in India.

However, in 2021-22, 0.9 crore beneficiaries "dropped out" and did not take refill gas cylinders. And over one 1 crore got their refills only once. As on today, beneficiaries have already availed 14.17 crore free refills under the scheme.

Despite this, LPG has been a major reason for End User women "abandoning" their Biogas units and allowing them to get into disrepair, tempted by the convenience.

In 2006 and 2010, when we initiated our two Biogas CDM projects, Biogas was a far superior technology to cooking with firewood and kerosene. 6-10 years later, LPG proved to be far more convenient. No more the need to rear cattle, collect and mix cow dung every morning, protect the digester domes from pesky children, feeder pipes being bitten by nasty monkeys and squirrels.

LPG won the convenience argument hands down. However, for many there was a huge price to pay.

6. Disempowerment of Women

Immediately after the *Ujjwala* scheme was initiated, LPG became a status symbol, especially for male heads of households in every rural home. It was a shame to *not* have a cylinder and gas stove in their kitchen, when practically everyone had one. But then came the cost factor. It started with a free domestic cylinder, followed by about ₹ 600 for a refill, peaked to ₹ 1,100, and today hovers around ₹ 900.

A tragically pathetic but typical conversation in practically every single household runs as follows, with very little variance:

> *"The cylinder is over. We need to get a refill."*
>
> *"Hmmm…"*
>
> *The next day, "Did you not hear me? The cylinder is over."*
>
> *"Yes, I know. You already told me."*
>
> *3-4 days later, "We just have to get a refill cylinder!"*
>
> *"STOP PESTERING ME! You think that money grows on trees? How did you manage this last week? Continue like that till I have the money!"*
>
> *After yet another week, "Did you get the money for a refill cylinder?"*
>
> *"ENOUGH! I can't take this any longer. I knew that this Biogas from the Coolie Sangha would spoil you completely! You don't know how to cook like you used to? Like your mother did? Like her mother before that? One more word out of you and I'll throw you out and marry someone younger, unspoilt, and more hardworking than you!"*

The above is not an odd or isolated narrative. It has happened to every single poor End User woman who foolishly got tempted to abandon her Biogas, allowed her husband sell off the cow and calf, and switched to the LPG trap. In the meanwhile, the gobar has got hard due to disuse, the digester dome has dried up and developed hairline cracks, and she is back to collecting firewood (and anything else that burns) since she cannot go a single day without cooking; it is a never ending and compulsory chore.

A change of heart occurs after some weeks, perhaps due to her continuous sulk, maybe because of some windfall income, and the refill cylinder magically appears, tied to the back of a borrowed motorcycle, with a sheepish apology, "You shouldn't have pestered me like that. You know that I didn't then have the money."

End User woman after woman relate the same story of how they go for weeks and sometimes months between two cylinders. So much so that most of them whose Biogas units are beyond repair have majorly shifted back to scrounging for firewood and managing with just 2-3 LPG cylinders a year.

7. Upward Mobility

Not all abandonment of Biogas and switching to LPG can be attributed to this morbid gender trap. Upward mobility and economic improvement can be attributed, in no small measure, to the success of the Coolie Sangha itself.

- With the breaking of feudal ties, caste and sex barriers, a tremendous social capital has been unleashed to establish a person status and individuality in small and poor peasants.
- The empowerment of women within their families has very few NGO/CBO initiated parallels, and this has contributed tremendously to the performance of all their endeavours, including climate projects.
  We have elaborated on this in our April 2018 paper *"Engendering Climate Projects"* at https://fairclimate.com/Library/Docs/6/Engendering%20Climate%20Projects.pdf
- 60,148 acres of scattered holdings have been made cultivable through 22 years of DLDP works followed by MG-NREGA works, lifting the status of small and poor peasants from servitude to cultivators.
- Decentralised village level credit structures have given out ₹ 19.8 crore worth of interest-free loans for a horde of reasons, without any security, with a repayment rate of 81.6%.
- 69,892 children have been supported to go to school, with a perfect sex ratio in high school classes. 41,972 *(60%)* have completed 10 years of schooling and college, and 9,213 (13%) are still in school. The remaining 27% unfortunately dropped out.
- Life skill training for 1,658 youth and their placement in city jobs, propelled thousands more with peer support.

All these and many more have all contributed to increased family incomes through farming, increased wages, timely and leakage-free delivery of State entitlements, enterprises undertaken outside traditional caste-class ascribed occupations, as well as regular remittances from children.

City jobbed sons and daughters, more liberal and gender sensitive than their fathers, visit their native villages once every few months on an own or borrowed motorcycle. They regularly pick up an LPG cylinder on their way home to their mothers.

We suspect that much of the "Abandonments" were through conscious choice. So too a chunk of the "Demolitions", though some would have been through boundary disputes with neighbours or to find space to build the aggressively promoted bathrooms/toilets under the central government's *Swatch Bharath* scheme.

The "No Gobar" would have occurred through distress sale and loss of cattle, though all "Sold Cattle" may not be so.

8. Data

For four and a half decades, right from the very beginning, senior leadership at ADATS has had a penchant for Data. Perhaps that is why we invited professional management consultants to always accompany us, stringently adopted LFA and laboriously searched for "soft indicators" as MoV's, regularly got external evaluators to offer highly critical "third opinions", etc.

We encouraged our inhouse IT team to "look over the shoulders of project delivery personnel" and develop monitoring solutions for not just every project and programme, but also to measure the so-called "intangibles" in the development processes – satisfaction, empowerment, socio-political presence, *et al*. We are firm believers in the axiom *"What cannot be measured cannot be managed"*.

Over the years we have come to understand that there are three requisites for good data. It must be collected on time, honestly, and even then, accept an accuracy of only about 85%.

This is a challenge because, quite honestly, we cannot claim that it is a shared value by all our Field Staff, who are drawn from the rank and file of village Coolie Sangha Units. They are aware of and reservedly tolerate our obsession, but do not quite share the same concern. For them, anecdotal observations through everyday village visits suffice.

This contributes to less than acceptable data accuracy. COVID-19 years accentuated the challenge. In order to address this deficiency, the FCN Tech Team occasionally conducts "truthing surveys" by a dispassionate team who independently visit every single Biogas unit and monitor their current status in the *InfoNeeds* solution. Even this was not possible during the pandemic.

9. Staff

9.1. 1st Project

Every single Rupee of the ₹ 6,19,33,692 (€ 1.1 million) received from the French carbon investor went to build and repair the 5,500 Biogas units. Even biennial verification costs – monitoring reports, DOE fees, issuance fees, etc. – were paid for by the investor. As such, there were no exclusive staff for this project. Our "overheads" were zero, save the cost of one truck for hauling material and a driver's salary.

Longstanding ADATS Field Workers took a call that building and repairing Biogas units was just one more item in their comprehensive list of services provided to Coolie Sangha families. They quickly picked up *Maistry*[1] skills to study diagrams and measurements, oversee masons, source material like bricks, sand, cement, and hardware.

As a result, it was *development workers*, intimately connected to the villages/families, and innately committed to socio-political and gender objectives, who oversaw the technical project. This has had its reflection in Results.

9.2. 2nd Project

As earlier stated, this 2nd project was taken up for rather more lofty technical reasons to assist women adapt to, and also mitigate climate change. Thereby its financials were accordingly planned on the lines of a conventional service delivery project with separate staff, overheads, *et al*.

With more than three-quarter the Biogas units built for non-Coolie Sangha members in non-CSU villages, connections were neither longstanding nor intimate. Despite several training sessions on climate science, and the offset mechanism which provided a business opportunity for rural women, there wasn't any innate commitment to objectives.

[1] construction supervisor

In fact, several newly appointed "Biogas Case Workers" couldn't come out of their *Maistry* mindset and had to be relieved after construction was over. ADATS Field Staff had to take additional responsibilities to monitor, repair, meet ERPA commitments/generate carbon revenue.

Once again, all this is reflected in Results, with the rapid fall in functionality.

10. The Pandemic

Living through frequent lockdowns entailed assisting helpless migrants arriving at the state border to cross over and walk on towards home, training over a thousand village volunteers on COVID protocols, equipping them with digital thermometers, oximeters, and 1st & 2nd line medication, monitoring every suspect case they found, ensuring that not a single patient needed hospitalisation, confirming that every single eligible adult got vaccinated, and keeping morale high with a constant flow of authentic information on COVID-19.

Alongside, we had to make sure that the "super spreaders", children, were kept occupied and didn't miss out on their 3 R's. In practically every Coolie Sangha village, our Balakendra Teachers and government schoolteachers (who were all on paid leave) held daylong clandestine classes under the trees and in verandas, maintaining COVID protocols of masks, sanitizers and physical distance.

All this lasted more than a year from early 2020 to mid 2021, when Biogas monitoring, repair and maintenance was a challenge.

- Repairing was a problem with Field Staff, masons, and stove mechanics not able to personally visit the villages. There was a limit to the quality of advice they could give over WhatsApp video calls.
- Hardware shops were all shut for more than a year. Even when they eventually opened, there were no stocks due to worker and supply chain disruptions at the manufacture level.
- Thousands of small repairs were ingeniously carried out by End User families and village volunteers with locally available scraps and pieces. Not all these have been recorded in our monitoring solution in spite of *InfoNeeds* solutions moving to the cloud, accessible by smartphones.
- Added to this, women were stopped from venturing out to collect firewood during the frequent lockdowns, and by overzealous vigilante in between.
- Rural bus services were stopped for nearly 2 years. There was a fuel shortage, and private motorcycles could not ply freely, which meant that LPG refills could not reach the villages. The only uninterrupted transportation was milk collection, twice a day, and police/health workers making their rounds.
- Even biennial verifications were a challenge till the UNFCCC and Gold Standard quickly adapted protocols to allow video surveys of stratified samples.

  The FCN Tech Team, headed by our CDM Specialist, had to use statistical tools to make conservative adjustments to recorded usage and functionality, and also apply "stacking" [2] algorithms approved by the DOE's.

In spite of this, we saw a small spike in functionality because, for a while, Biogas was the only available fuel in villages. Perhaps because its value, beyond mere convenience, was recognised during hard times. After it was all over, we have hundreds of anecdotal reports of Biogas being shared by neighbours when there was no other cooking fuel – i.e. an informal rise in End Users without an increase in the number of units. And of course, monitoring was not at all rigorous.

[2] The practice of households using multiple technologies to cook their meals, e.g. Biogas + LPG + kerosene

11. Poverty

Continuous drought and famine broke the backs of the poorest. Many families sold their cattle, migrated in search of work, and abandoned their Biogas units. As earlier mentioned, the "No Gobar" could have been through distress sale and loss of cattle.

The selection of End Users has also to be faulted. While the poorest of the poor are the unquestioned primary stakeholders of grassroots NGOs, we failed to look into their capacity to maintain Biogas. The poorest were not able to keep their cattle during years of drought and fodder scarcity. We overlooked their vulnerability to migrate in search of work during lean years.

12. Who Retained Functionality?

Let me briefly recap what we have said in our *"Critique of Climate Projects"* paper on the ones who succeeded.

12.1. The Matter of Fact

Families whose primary occupation is cultivation simply find the Biogas useful. Cooking and cleaning is easier and faster. They find slurry far more sensible than paying hard cash to buy chemical fertilizers. They have draught animals for agricultural operations that tractors cannot perform, and also have milch animals.

They are relatively large families with a strong woman presence. They range from upper caste farmers to Dalits and Adivasis. The poorer ones own more or less contiguous holdings and have common lands close by.

12.2. The Climate Conscious

Diehard Coolie Sangha Members, largely women cadre, have a strong take on nature, environment and the ecology, and a simplified understanding of climate science. They genuinely believe that they should not release smoke and poisons into the atmosphere. Their grit increases usage by everyone in their sphere of influence – be it a single village or the entire Gram Panchayat.

They just knew that ADATS would eventually get their GHG reductions certified and bring carbon revenue to them. Simply because that is what we had said we would do. There is a palpable pride when, after each verification, CERs are issued. The fact that some get more and others less due to differences in usage just doesn't matter.

12.3. The Twice Shy

Those who switched to LPG, abandoned their Biogas units, and later repented did not *all* stay quiet. It was not just inflation, rising cylinder prices and reduced subsidies that hit them hard. Women experienced a sudden loss of control. They became totally dependent on menfolk to not just shell out money to refill cylinders and physically transport them from towns to village homes, but also to take that decision.

Not needing cow dung as a cooking fuel had tempted these families to sell off their cattle in hard times, making even a little milk for children or a cup of *chai* a commodity to be bought. End User women who managed to hold on to cows and somehow refurbish their Biogas units swear to never again make the same mistake.

This year, after the pandemic and Lockdown, there are more and more women in this category of the born again. Once bitten, twice shy!

12.4. Carbon Revenue

Substantial amounts earned by End User women who were still using their Biogas units after clearing cleared their ERPA's were received with pride and joy. But contrary to expectations, we have not found the actual receipt of carbon revenue, through 4 tranches, to push up functionality.

Financial Year	Villages	End Users	Carbon Revenue
2018-19	277	2,470	83,37,289
2019-20	290	2,635	2,06,23,648
2020-21	289	2,626	1,99,31,470
2021-22	211	882	1,13,40,548
			₹ 6,02,32,955[3]

Except perhaps for half of it, the ₹ 3.13 crore tranche given out during COVID-19 pandemic. That received accolade! Everyone spoke of how welcome it was during the hard days of the lockdowns, and how they had shared their revenue even with other non-Biogas women.

It appears that the Diehards who saw themselves as "businesswomen" from the very start continued to hold onto that identity through the years; with very few converts joining their ranks as the years rolled by.

Perhaps they need to receive a few more tranches before we can definitely conclude on this observation. And it will be interesting to see how End Users of the 2nd project will view themselves once carbon revenue flows into their bank accounts in early 2023.

13. Reflections on Impact

From a project perspective, there is very little to write home. A gradual drop of about 5-10% every five years would perhaps have been acceptable. Not these steep and sudden drops in usage and functionality. Yet, having witnessed the Coolie Sangha weather so many triumphant highs and agonising lows over the past four and half decades, makes me seek deeper impacts of both CDM projects, beyond their dismal technical performance.

13.1. Acumen of the Rural Poor

The rural poor, popularly perceived as lacking in skills and ability, made a startling demonstration of their collective capacity. They proved their ability to actualise on their social capital to not just invest an impressive investments of ₹ 25,55,69,247 (€ 4,075,371), clear the entire debt, and also make a 24% profit of ₹ 6,23,17,592 with far more to come in over the next 5-9 years.

	Capex	Carbon Revenue	
1st Project	6,19,33,692	6,23,17,592	*101%*
2nd Project	19,36,35,555	-	*0%*
TOTAL	25,55,69,247	6,23,17,592	*24%*

Returns are an astounding 101% if we consider only the 1st project since post-ERPA carbon credits have not yet been sold in the 2nd project.

[3] 97% of ₹ 6.23 crore carbon revenue; remaining 3% went to meet DOE, UNFCCC, and GS issuance fees.

On the one hand, the sheer gumption with which the poorest of the poor in village society incurred such humungous debts, offering no security or guarantees, save their collective determination. On the other, the risk that investors took, albeit reposing trust in guidance and support given by an assetless NGO with zero credit rating and no business experience. Gumption matched with gamble pioneered an audacious attempt to define the contours of a new age business model that effectively addressed the climate change challenge.

End Users and staff acted responsibly to meet business commitments, investors reaped more than expected dividends, and women will continue to receive substantial carbon revenue for the life of their Biogas units.

13.2. Decentralised Business Units

With this impressive experience in their resume the Coolie Sangha can pitch for community owned and managed decentralised business units set up in collaboration with far sighted and climate conscious corporate bodies. They have proved their capacity to analyse the current political economy and develop an economic philosophy to address multiple malaises unleashed by centralised concentration of capital in the extractive economy.

Such DBU's, planned and designed in an environmentally sustainable and commercially viable manner, can provide products and services to an immediate vicinity.

13.3. Shattering Gender Rote Roles

The biggest impact is the shattering of ascribed roles that had supposedly been written in stone.

Even with an abysmally low functionality of 42%, we cannot gloss over the fact that more than 7,000 End User women are still using their Biogas units after 12-16 years. Their steadfast refusal to avoid non-renewables is not only a clever and sensible economic choice. It is far more than a conscious demonstration of climate integrity. It is a determination to exercise personal choice and make their own decisions. The opportunity to become businesswomen offering vital environmental services to society at large fundamentally transformed their identity from household chattels to standing out as individuals.

These are women who did not view the CDM projects as yet another prefabricated "scheme" offered by outsiders. When the opportunity was presented to them, *en masse*, to fundamentally alter their status within households, the ultimate bastion of patriarchy, they glimpsed what the future held and grabbed it with both hands.

In meeting after meeting, large and small, across five taluks, we hear them speak. They have made radical personal lifestyle choices and undertaken a range of activities that defy ordained gender rote roles way more than they used to, a decade back, with Mahila Meeting support.

Middle aged women run individual and collective businesses, catering to far flung markets well beyond the confines of their villages, incur bank loans on their own, take control of family enterprises, assign domestic responsibilities to menfolk, permitting no backtalk or argument, etc. Anecdotal observations, not necessarily supported with data, reveal an unbelievable change in mindset.

Spread over so many villages, they will exercise what we have described in our April 2018 paper *"Engendering Climate Projects"* as the magnetic pull to bring stragglers to face their own cognitive dissonance and "come out". This will not have any "project implication"; they will not get back lost Biogas units; they may not even be End Users.

It can be argued that the Coolie Sangha *per se*, especially the Mahila Meetings, had already done this to a large extent well before the CDM projects. But the massive scale and glaring visibility, with thousands of still functioning Biogas units dotting the countryside challenging, as it were, the

senselessness behind non-renewables, caught everyone's attention. The protagonists behind this informed and critical questioning were End User women. At long last, after decades of localised empowerment struggles, they occupied centre stage in the global arena.

14. Blazing the Trail

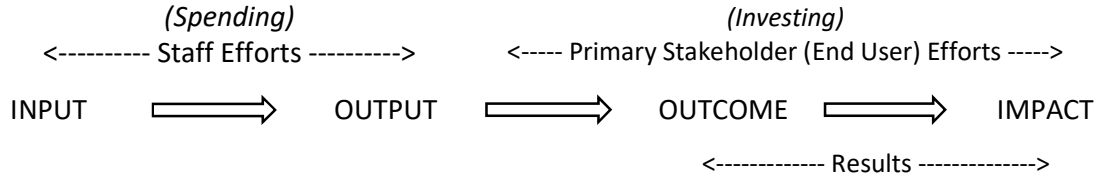
14.1. Demonstrating Results

ADATS has given lead to the Fair Climate Network since 2007 with a commitment to share our experiential learning with other grassroots NGOs/CBOs. This learning is derived, to a large part, from the efforts of the Coolie Sangha.

Biogas End User women have demonstrated that when a business model is adopted, abandoning the charity project approach that treats primary stakeholders as "beneficiaries", serious Outcomes are obtained. The new age business model goes beyond the management fad that claims to give primacy to "customers". Here, primary stakeholders are given their rightful place as "owners and managers" of enterprises and this is what elevates these Outcomes to Impact.

14.2. Grassroots Development NGOs

Many donor-driven rural development NGOs view their role as the delivery of predetermined Outputs through the honest and efficient implementation of Inputs. They concern themselves with "spending" State, CSR or foreign funds as opposed to "investing" in Results. Very little can be derived by charity works designed to provide do-good feelings and photo ops to give publicity to givers and doers.



The vision with which they may have embarked on their journeys quickly disseminates. They stop providing analytical leadership to primary stakeholders and rapidly fall into the institutional threshold of "managers" catering to compulsions to meet inflated overheads and keeping their organisations afloat.

Others may have started with less lofty ambitions to merely fill gaps in service delivery to the best of their ability, scrambling for resources from wherever it is available.

And then there are those established NGOs who, through demonstrated credibility and longstanding staying power, are able to navigate their funding partners to recognise the value in seeing beyond mere Outputs. They start to reflect, although in a rather perfunctory manner, on limited Outcomes that follow

Were they to recognise the need to create Impact, they must realise these are obtained by primary stakeholders themselves, and not by project delivery personnel. Impact cannot be attributed to just any single Outcome by a sole actor. They are the cumulative Effects of multiple Outcomes of different interventions by different actors – civil society, State, and others. But it is only the primary stakeholders themselves who can garner all these to their benefit.

In the addendum to this paper, we have given a brief resume of 3 of 16 Biogas CDM projects that have tried to emulate, in part, our approach. Their ERPA commitments are on the verge of completion. Should they choose to, they are now poised to take efforts to new heights.

15. In Conclusion

For the fourth time we repeat that *this paper is for our internal reflection*. No critical appraisal of development efforts is good for marketing. That needs feel-good stories that have happy endings with nothing beyond. Real life struggle, on the other hand, is a continuing saga from one achievement to another, with many a pitfall in between.

Many a time we have been tempted to conclude that Biogas is perhaps not the technology of choice in semi-arid drought prone regions like ours. We have asked ourselves if we have perhaps not been brave (a polite euphemism for foolish or stupid) in undertaking CDM projects that take away the initiative from our hands and places the onus on primary stakeholders. The overt dependence on End User behaviour has been nerve wracking. Oftentimes we have wavered between the perhaps, probably, and maybe not. But now, on clear reflection, we have no regrets. Were we to do it all over again, we definitely would!

November 2022

16. Addendum:
Functionality in 3 other Biogas CDM projects

The Fair Climate Network has facilitated the development and registration of 13 Biogas CDM projects.

- 6 were nonstarters for want of forward purchase ERPA's.
- 1 faced starting problems and was abandoned after building only 300 units.
- 1 project claims to have built 5,000 units, but we have no reliable monitoring data to contribute to this study on functionality.
- 5 projects being properly implemented and have constructed a total of 26,497 Biogas units.
  - ✓ Two of them are our own in Chickballapur district of Karnataka
  - ✓ FCN itself is the carbon investor in three more, having bought 2,34,090 CERs in advance, before starting the project, for ₹ 27.35 crore.
    Two of these are implemented by local grassroots NGOs, and the third directly by FCN.

Let me briefly comment on functionality and usage in these 3 projects, where ERPA's will be completed by 2023.

16.1. Chittoor, A.P.

In 227 extremely backward villages in the Eastern Ghats, CROSS built 3,812 Biogas units for as many End User women from 2014 to 2018. But only 3,096 were "commissioned" – i.e. their usage started being counted for Emission Reductions.

This is a biomass rich region with forest cover close to the villages. Most families keep at least 1-2 scrawny cows and a few goats. Yet, there is abject poverty and migration in search of labour. End Users say they cannot afford LPG, but still use 1-2 cylinders a year since this is linked to other government benefits like subsidised rations, etc.

Functionality stayed at 100% till 2015 and then very gradually went down to 87% by 2022, in spite of 1,113 unresolved problems as of today: 446 irreparable, 617 major and 50 minor problems. The reason for a relatively high functionality after 9 years in spite of so many irreparable and major problems is because of the difference between "built" and "Commissioned". It reflects a strict and stringent monitoring with these 720 not being counted for Emission Reduction.

16.2. Anantapur, A.P.

In 227 villages in the perennially drought prone Rayalaseema region, FCN directly built 3,356 Biogas units for as many End User women from 2014 to 2016. There is hardly any biomass in the district and families use just about anything that burnt, including discarded plastics, cardboards, etc., as cooking fuel.

Functionality stayed at 100% till 2016 and then went down to only 91% by 2022 thanks to immediate repair and maintenance by an exclusive and dedicated climate team. They have found innovative ways to use kitchen runoff, cattle urine, and all other "waste" water to mix the gobar and feed the domes during drought and even normal summer months.

Many families use just 1-2 cylinders a year, *"We go for MG-NREGA or other coolie works early in the morning after cooking the afternoon meal on our Biogas stove. When we come back at 2-3 pm, we use LPG to quickly heat up the cold food."*

In order to prepare End User women to receive post-ERPA carbon revenue, a concerted effort is being in the past one year, through monthly village meetings, to explain the business logic of climate projects, open and verify bank accounts, etc.

There are 399 unresolved problems as of today: 309 irreparable, 69 major and 21 minor problems.

16.3. Haldwani, Uttarakhand

In 134 villages located on the fertile plains amidst dense forests just below the Himalayas, SUVIDHA built 2,821 Biogas units for as many End User women from 2016 to 2018.

Functionality stayed at 100% till 2018 and then went down to 95% by 2022. Usage is very high because a majority of families live in farmhouses on their own fields. They fully and immediately use the runoff slurry from their Biogas units. Small holders find this especially useful for growing organic chemical-free vegetables.

Another consideration is Human-animal conflict since they all live close to the jungle. Leopards prey on cattle left out for grazing. Small animals like snakes, scorpions and the like are a danger for humans who venture out. Forest guards harass single women who go out to collect firewood. Biogas is no panacea, but it definitely reduces risks and dangers.

End Users are unabashed about LPG usage which is comparatively higher at 5-6 cylinders per year. The FCN Tech Team therefore deducts quite a bit of the monitored reduction values as “leakage”.

There are 264 unresolved problems as of today: 31 irreparable, 223 major and 10 minor problems.