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Looking into Passive Solar Houses (PSH)

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Suppressed Demand and the Carbon Markets: Does development have to become dirty before it qualifies to become clean? Looking into Passive Solar Houses (PSH)

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Abstract. Suppressed Demand refers to a situation where Minimum Services Levels (MSL) necessary for human development are unavailable to people or only available to an inadequate level. Numerous barriers, such as low income levels or lack of infrastructure and skills prevent access to MSLs, such as potable water, cooking energy, lighting and electrification. We investigate the concept of suppressed demand as it applies to Clean Development Mechanism (CDM) and market based incentives for GHG emission reductions. We argue that carbon markets have shown significant and catalytic potential for project development so far, but they have had limited impact on the poor, as the poorest tend to emit least. Including "suppressed demand" is in line with the objectives of the CDM and can go some way to re-balance the CDM as the development mechanism it was intended to be, and to make it relevant for the poor. Moreover, it is in fact necessary in terms of climate change limitation, as it is necessary to include low emissions areas into emission trading regimes and to incentivize lower emissions growth in poor regions. Through three case studies of CDM relevant development projects that deal with MSLs, we find that current CDM methods do not adequately address suppressed demand and that simple, transparent and common changes to assessment methods can have a significant impact on the leverage potential of these projects in the carbon market. Including "Suppressed Demand" in the CDM in the ways suggested can therefore facilitate project development in low emissions regions, by making it financially viable, and thereby avoid GHG emissions in the future.

Keywords. suppressed demand, Clean Development Mechanism (CDM), small scale, minimum services level, Millennium Development Goals (MDGs), passive solar houses.

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1 Introduction

Access to modern forms of energy and other basic services, such as potable water, sanitation and housing, is central to development and poverty alleviation. Lack of access to Minimum Service Levels (MSLs), particularly energy and water, is a serious barrier to economic and social development and the achievement of the Millennium Development Goals (The Secretary-General's Advisory Group on Energy and Climate Change, 2010).

Many still remain without services that are able to meet basic human needs. In large swathes of Least Developed Countries (LDCs) and poor regions of Middle Income Countries (MICs), the latent demand for MSLs is currently not being met.

Mitigation of GHG emissions and expansion of basic services are critical and immediate global imperatives. Poor and under developed regions tend to have low levels of per capita emissions. The latent demand that exists for basic services is "suppressed" due to barriers such as low income, weak infrastructure and inadequate access to technology. Many of today's low income societies have yet to reach level of economic development that is emissions intensive; they remain reliant on wood fuels, have no electricity and poor access to potable water, and they do not pollute significantly because in many cases they are too isolated or too poor. Pure mitigation instruments that focus only on trying to reduce emissions and not avoid emissions are therefore likely to have minimal impact and offer no incentives for alternative "cleaner" development pathways to the poorest.

2 Reaching the Minimum Service Levels without falling into carbon lock-in

With current trends, despite progress, population growth means that in 2030 the amount of people relying on traditional use of biomass for cooking will be the same as today (OCDE/I.E.A. 2011). In other words, our current actions in the provision of basic services such as energy are failing, both in terms of scale and pace. Moreover, there is a substantial inequality in access to services and the quality of services between rich and poor societies. The poorer three quarters of the world's population use only 10 per cent of global energy (OCDE/I.E.A. 2011). Globally, the IEA estimates that 20% of people live without access to electricity 40% are reliant on biomass for cooking, more than 1 billion people are without access to safe drinking water and 2.6 billion without basic sanitation (OCDE/I.E.A. 2011). Lack of access to modern forms of energy tends to go hand-in-hand with a lack of provision of clean water, sanitation and healthcare.

With income levels far below those of developed countries—and per capita emissions on average just one-sixth those of the industrialized world—developing countries will continue to increase their emissions as basic services are provided to the population (Chandler, Secrest et al. 2002). Given this context, addressing climate change in poor regions of developing countries needs different strategies to take into account their specificities that are linked to cultural habitudes and available resources.

The magnitude of the change required in the global systems can be expected to be very important. The immediate need is to secure affordable, clean and reliable MSLs at the household level. If current national and international development efforts eventually succeed in developing economies and LDCs, energy consumption and provision of basic services will have to increase substantially. If development goals are to be achieved, MSLs should be universally achieved[2].

Limiting the effects of climate change by fixing maximum temperature rise or GHG concentration will create a space, a "carbon-space" for GHG emissions in a sustainable development perspective (Opschoor 2009). LDCs and other poor countries require 'carbon space', to grow and overcome poverty. This is the case in Africa, where a growth in energy access for productive uses seems essential to break the vicious cycle of low incomes leading to poor access to energy services (Brew-Hammond 2010). Increasing the provision of MSLs in developing countries, particularly those at the lower end of the per capita income scale, requires a substantial part of this "carbon-space" both on a temporal scale and in terms of emissions.

On the other hand, according to Unruh's works, the development into an intensive carbon economy creates infrastructures, institutions and cultural practices. The system created is then dependent of the economic model and so, can be called, "carbon locked-in"; that in its turn inhibits the development of alternative sources of energy and delays the necessary switch to a decarbonized economy. For Unruh, developing countries has the chance to avoid the "carbon lock-in" and to leapfrog into a low carbon economy.

By creating an incentive to the wide implementation of these low-carbon technologies, Suppressed Demand methodologies could be a relevant mechanism to avoid a global "carbon lock-in" with disastrous consequences for humanity.

3 Carbon markets and the poor: a contradiction in terms?

The single Kyoto Protocol flexibility instrument that involves developing countries is the Clean Development Mechanism (CDM). It has the twin objectives of reducing emissions and contributing to sustainable development objectives. International carbon markets have a crucial role to play in financing projects and providing innovative technology and fostering access to clean and renewable energy. Offset markets through the Clean Development Mechanism have resulted in $27 billion in flows to developing countries in the past 9 years, catalyzing low carbon investments of over $100 billion (World Bank 2011). These flows and catalytic effects on technology and capability are essential for meeting the increasing energy demand and providing basic services (Arens, Burian et al. 2011). Even if the CDM is often framed

2 Such as the UN target to achieve universal access to modern energy services, and for a 40 per cent reduction in energy intensity by 2030, the Stockholm Statement (http://www.worldwaterweek.org/documents/WWW_PDF/2011/2011-Stockholm-Statement.pdf) and the Millennium Development Goal of reducing by half the proportion of the population without sustainable access to safe drinking water and basic sanitation.

as being directly and inherently linked with sustainable development, looking at the previous projects, the CDM and sustainable development are concepts that are not always woven together. According to the literature a number of CDM projects doesn't provide local sustainable development services (Nussbaumer 2009). The sustainable development dimension is not a requirement of the CDM; it should be seen as a main driver for developing country interest in participating in CDM projects (Gilaua, Buskirk et al. 2007).

Despite the CDM aims, the mechanism has demonstrated its irrelevance to billions of people that lack access to MSLs, especially the Least Developed Countries (LDCs). In fact, LDCs account for just 1.2% of all CDM projects[3] and just 0.5% of the Certified Emission Reduction (CER) volume issued (UNEP Risoe 2011).

In many Least Developed Countries (LDC) and Middle Income Countries (MIC), the low level of historic emissions leads to such insignificant creditable emission reductions that carbon finance revenue has a marginal or negligible impact. Moreover, assuming that a continued supply of low/poor quality services will continue throughout a crediting period does not align well with the development aims of CDM (CDM SSC Working Group 2010)[4]. The challenge is how to reform the CDM and other emerging mechanisms such as Nationally Appropriate Mitigation Actions (NAMA), to create much greater participation from a wider range of developing countries post-2012 that can transit them to a low carbon development path.

4 "Suppressed demand" within CDM

Unmet latent demand for basic services is termed "suppressed demand". Suppressed demand occurs where MSLs are unavailable or only available to an inadequate level. For example, households without electricity, those that are dependent on biomass for cooking or those who do not have access to adequate amounts of potable water.

Income poverty, lack of infrastructure such as roads or networks, high unit costs of energy and services and issues of physical access all suppress demand for services such as cooking energy, clean water or lighting. As these barriers are removed with economic development and technology levels i.e. people gain higher incomes and greater access to services (through government, private or other channels), people will certainly access higher level of service than they currently do.

Considering the concept of suppressed demand, alongside simplified and standardized approaches, to CDM projects is one curative measure to the failures and imbalances of the CDM. The concept of suppressed demand and avoided emissions has emerged in development and climate policy circles (Winkler and Thorne 2002). It is generally believed that by adequately addressing the issue of suppressed demand in the CDM and NAMA[5], can drive access to energy and other essential services while decarbonizing simultaneously. It is also thought to go some way to improving the regional distribution of the CDM and increase its relevance to the billions living in conditions of energy poverty and lacking basic services (Suppressed Demand Working Group).

Basic human needs in the context of the CDM relate mainly to energy services and other activities, which are relevant as CDM project types. Yet, there is no definitive of exhaustive list of basic services for human needs or agreement on the adequate quantity or quality of services to meet basic human needs. Article 25 of the UN declaration of Human rights states that "everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing …" Access to and delivery of basic needs services is therefore a condition in which the population can obtain water, food, shelter and health services <u>in adequate quantity and quality</u> to ensure survival and satisfy their right to "life with dignity". The UN also notes that "Energy services […] provide cross-cutting influences on both social and economic development, thereby influencing a nation's ability to achieving Millennium Development Goals (MDGs)".

The CDM interpret basic human needs as "services required to meet basic human needs for example, basic housing and basic energy services including lighting, cooking, and drinking water supply". In our analysis, basic services refer to: "Basic energy needs for clean cooking, treatment of drinking water supply and heating fuels, lighting, electricity (at home and in public services), motive power for productive uses, energy needs for cooling, information and communication".

Most current CDM project assumes that current emission levels as the baseline. This baseline is then compared with the project to quantify the emission reductions of the project. Setting project baselines in suppressed demand situations assume that poor regions will develop in the future. In doing so, GHG emissions will often increase, as technologies, fuels and practices are adopted. For example project dealing with families using wood fuel would assume that the families would migrate up the energy ladder to other more emissions intensive fuels as they became wealthier and had better access to fuels.

Within the project, although emissions in the region may level off or actually slightly increase relative to the previous scenario, the technology introduced by the CDM project may still result in emissions reductions relative to the baseline scenario. In other words, compared with the business-as-usual development path (without clean technologies), the technology introduced through the CDM may be cleaner. In this way **the CDM project would 'leap-frog' to cleaner technologies and avoid emissions, without the scenario first being dirty.**

3 At validation, Request Registration or Registered

4 The SSC WG notes that "particularly in the context of LDCs/SIDs and economically restricted regions of developing countries, over reliance on historical data results in very low emission baseline scenarios with consequent disregard for the latent demand for energy and other that exist...an assumption of continued supply of low/poor quality services throughout the 7 or 10 years of crediting period, as these countries/regions develop, may not align well with the development aims of CDM...such low baseline levels may result in such insignificant levels of emission reduction...that carbon credit revenue has a marginal or negligible impact."

5 NAMAs, Country targets/pledges, MRV, and other decarbonizing activities linked to energy access and basic services

5 METHODS

Our method consists in a desk review of the relevant UNFCCC decisions on the integration of suppressed demand on CDM methodologies (Item 3.1) and a case study on Passive Solar Houses located in a TehriGarhwal, in the Uttarakhand state in Northern India (Item 3.2). We used a step by step analysis in order to investigate the project eligibility to CDM methodologies and how suppressed demand is treated. Then we discussed the different approaches (considering or not the default values recommended by the Executive Board, as well as the minimum services level recommended by the World Health Organization – WHO) and suggests revisions to better include suppressed demand.

6 RESULTS OBTAINED

6.1 Integrating Suppressed demand in CDM projects

The modalities and procedures of the CDM state that "the baseline may include a scenario where future anthropogenic emissions are projected to rise above current levels". The CDM has also prepared guidelines, aiming to achieve consistency in the methods to address the situation of suppressed demand in CDM baseline and monitoring methodologies where future emissions by sources may rise above current level. These guidelines aim to "harmonize such approaches across CDM methodologies" and provide approaches that "can be used in baseline and monitoring methodologies to address situations of suppressed demand. They are applicable when a minimum service level, was unavailable to the end user of the service prior to the implementation of the project activity." (CDM Executive Board 2011)

In the CDM guidance (CDM Executive Board 2011), suppressed demand occurs when services for "Minimum Services", that are required to meet basic human needs, are inadequate. It defines the income effect, rebound effect and minimum services. Like this, the current CDM methodologies in rare cases do already account explicitly for suppressed demand. The guidance also suggests methodological approaches for two issues:

I. The identification of the **baseline technology/ measure** under a suppressed demand situation; and;

II. The identification of the **baseline service level** that should be used to calculate baseline emissions in a suppressed demand situation.

The CDM guidance aims to establish baseline fuels, technologies and the level of service for determining the Emissions Reductions of a project. In simplified terms, it puts forward a type of barrier analysis for alternative provisioning of service for the baseline. Each alternative (fuel or technology for example) is ranked in terms of the quality of service they provide.

However, according to our analysis, current interpretations are so far not field tested or proven to have an impact on project development and can provoke either over crediting or under crediting of a certain project activity. Moreover, there is no definitive of exhaustive list of basic services for human needs or agreement on the adequate quantity or quality of services. In many cases this will require political agreements on acceptable levels of service.

7 Case Study: Passive Solar Homes in Nothern India

7.1 Project description:

The project uses solar energy, harnessed through energy efficiency measures implemented in buildings. A combination of energy efficiency measures as: Improved Insulation (II) and one of the three passive solar technologies for solar gain: Trombe Wall (TW), Direct Gain (DG) or Attached Greenhouse (AGH), are installed.

The project is located in the high altitude desert of the Western Indian Himalayas. Winter temperatures in this area can be as low as -30°C, there is little precipitation and scarce vegetation. Villages are located between 2'700 and 4'600 meters above sea level and are often extremely geographically isolated. Due to the lack of natural resources and/or lack of financial means heating needs during the long winter period (from November to March) are high and indoor temperature fall well below basic minimums.

In this environment, households use substantially more energy than do people living in warmer climates or at lower altitudes. To reduce their fuel consumption and costs, often close the doors and windows. This exacerbates the amount of smoke in the house and exposes people to greater risks associated with indoor air pollution, such as respiratory diseases.

Over the course of 7 years the project will integrate energy efficiency measures in 250 households per year in 100 rural and remote villages.

Figure 1. Passive solar house owners from the TehriGarhwal in the Uttarakhand state in Northern India (2008)

7.2 Step 1: CDM Eligibility

The CDM used methodology **AMS I.E./Version 04**[6]**.** This category comprises activities to displace the use of non-renewable biomass by introducing renewable energy technologies. Examples of these technologies include but are not limited to biogas stoves, solar cookers and passive solar homes.

7.3 Step 2: How are Suppressed Demand Approaches Applied in the Methodology?

The barrier analysis focuses on one technology and one fuel rather than combinations, which is most likely to happen in the project context. It would also lead to the selection of wood as a baseline fuel as all fossil fuels face significant barriers, typically costs and import difficulties, within this region.

This current CDM methodology accounts of suppressed demand in terms of:

III. The type of fuel used in the baseline (baseline weighted emission factor);

IV. service level: actual increases in level of thermal comfort attained in the project i.e. using the project level of service in terms of thermally energy produced by the intervention as a baseline.

(I) Baseline Emission Factor

In AMS I.E, the CDM approach uses the same weighted emission factor from the other cases presented before that is for the substitution of non-renewable woody biomass by similar consumers, a value of 81.6 $tCO2/TJ$[7].

The fuel used pre-project can be assumed to be biomass as it represent 99% of the fuel used by households in the Uttarakhand (Saud, Singh et al. 2011). Because the poor people in rural areas lack access to electricity and modern fuels, they rely primarily on human and animal power for mechanical tasks, such as agricultural activities and transport, and on the direct combustion of biomass (wood, crop residues, dung) for activities that require heat. Biomass fuels are typically used for cooking (which dominates inanimate energy consumption in most warm regions), space heating, heating water for bathing, and meeting some industrial heating needs. According to the International Energy Agency almost 2.7 billion people relied on the traditional use of biomass for cooking in 2009. It concerned 51% of the developing countries population in 2009 and could decrease to 43% according to the I.E.A. New Policies Scenario in case of investments in biogas solutions, advanced cookstoves and LPG solutions (OCDE/I.E.A. 2011).

Space heating requires large amounts of fuel. The study made by GERES in the TehriGarhwal district (India) shows a marked increase in the use of biomass with increasing altitude, and fuel use was shown to be two to three times greater in winter than in summer (Biney 2007). The firewood consumption was reported at around 1.07 kg/person/day below 500 m altitude, rising by an additional fuel requirement of about 0.8 kg/person/day per 1,000 m, to reach 2.8 kg/person/day above 2,000 m.

According to the International Energy Agency "Current Policies" and "New Policies" scenarios fossil fuels would represent respectively 82% and 77% of the Indian total primary energy demand in 2035 (OCDE/I.E.A. 2011). Therefore the default (Tier 1) emissions factor (EF projected fossil fuel use) suggested by the UNFCCC looks realistic and balanced. However, it is important to stress that projections are always submitted to uncertainties, and that energy generation in remote areas differs from the national energy mix with for example high grid connection costs (OCDE/I.E.A. 2011).

In that line, many studies suggest that, at the national level (Tier 2), commercial energy of a higher efficiency such as LPG and Coal and electricity are steadily replacing the traditional energy resources being consumed in the rural sector. Sufficient data and analysis exists to develop a likely future energy mix.

However, looking at fuels is not enough. Using different fuels also means that different technologies will be used – comparatively more efficient electric heaters or LPG burners would be used. The Tier 3 emissions factor while similar would have radically different make up, 40% Coal, 20% electricity (grid connection - hydro sources) and 40% LPG. The Emissions factor would in this case be lower than both Tier 1 and Tier 2 emissions factors.

(II) Minimum Service Level

The methodology does incorporate desired service levels by allowing the quantity of thermal energy generated by the project to be applied to the baseline scenario; however, in the case of projects that do not generate energy, such as PSH projects, minimum service levels are not recognized. There is a large inconsistency in the methodology with regard to this type of project. In fact, in PSH projects, the minimum service level is the indoor temperature achieved, which is not easily convertible in emissions equivalent value considering the wide range of different buildings.

6 For more information please go to: http://cdm.unfccc.int/methodologies/DB/I1DGDUD1D5J0KMLSZFWMD3W9Z47OZZ/view.html consulted on 02/29/2012

7 "This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50% weight is assigned to coal as the alternative solid fossil fuel (96 tCO_2 /TJ) and a 25% weight is assigned to both liquid and gaseous fuels (71.5 tCO_2 /TJ for kerosene and 63.0 tCO_2 /TJ for Liquefied Petroleum Gas (LPG)." (AMS I.E v04)

Indoor thermal conditions are important for health and comfort, although individuals vary in their temperature requirements. The World Health Organization recommends a minimum indoor temperature for health of 18ºC, with up to 20-21ºC for more vulnerable groups, such as older people and young children (World Health Organization 1985). Conversely, Poor People's Energy Outlook suggests a minimum standard or 12°C (Practical Action 2010).

Considering this range, a Minimum Service Level of an average of between 12°C to 18°C indoor temperatures would be an ideal minimum level of service provided to households. However, in extreme conditions, where outdoor temperature could well reach -20°C this may not be achievable, even if substantial temperature differentials (between indoor and outdoor temperatures) are achieved; which does not mean that an increase in temperature won't increase the householder's comfort. PSH allows higher average indoor temperatures than traditional houses, reducing half to one third of the fuel use (Agniel, Dorjey et al. 2009). Most notably, the average indoor temperature in PSH houses is 20°C more than the outside temperature and is always above 5°C (Agniel, Dorjey et al. 2009).

There are two crucial factors that then become relevant: 1. The temperature difference between outdoors and indoors (pre-project); 2. The input energy required to generate the temperature difference. A simple comparison between pre-project and project fuel use can easily be drawn. The fuel difference between non-PSH households and PSH households can also be measured, even if it is still difficult to do so **in rural and mountains areas in winter**. However, the proposed methodological adjustments for suppressed demand from CDM does not account for suppressed demand on minimum service level of temperature comfort.

8 Discussion of the specific implications of the project

After analysis, the following propositions were considered to better adapt the methodology for Passive Solar Houses:
Table 1: Methodological revisions/considerations suggested: AMS I.E (V4)
According to the different propositions above we developed different CERs potential scenarios8 that are presented in table 2 below. **Table 2: Different scenarios with methodological revisions/considerations - AMS I.E –V4**

Under current CDM methods (A) the CER from the project are an average of 1.4 CER/unit/yr. Applying CDM guidance on suppressed demand to the project baseline (B), CER potential would be 1.6 CER/unit/yr. Applying the proposed suppressed demand approaches with project specific data in (C)

Applicability condition	To ensure the integrity of the approach, **only PSH technologies that can demonstrate to provide significant temperature difference (indoor and outdoor) in extreme environments. Defined as providing indoor temperature degrees higher than a comparative household (peers).** If project do not meet requirements, through a combination of interventions, projects should not be considered as CDM projects.
Service Level	**Option A: Minimum Level of Service (18⁰C)** in line with WHO recommendations and the number of days heating required when this temperature is reachable. **Option B:** When MSL cannot be reached; **Temperature differentials** and to factor in the number of heating days required per year with an optional default value.
Biomass Savings	Change specific to PSH, to reflect temperature differentials and to factor in the number of heating days required per year.
Emissions Factor	**Option A: Tier 1 default weighted average emissions factor 81.6 tCO2/TJ** **Option B: Tier 2 or Tier 3 calculated emissions factor (tC02e/TJ)** i.e. National or Regional specific default factor using a barrier analysis and/or of forecasting cooking energy mix in 2035 (or other agreed reference point) with comparative efficiencies for thermal devices. This fuel mix must be based on published and credible research or energy modeling and verified as being i) conservative and ii) credible.

Table 1. Methodological revisions/considerations suggested: AMS I.E (V4)

would increase the CER potential of the project. Compared to current CDM approaches (A) of 1.4 CER/unit/yr, new approaches (C[9]) and the difference in between would result in 2.4 CER/unit/yr on average – a 66% increase. Scenario (D), using tier 3 default value reduces the project potential to almost the same level than (A) with the current CDM methodology.

The case studies provide a new suggested methodology to explore potential approaches for accounting for suppressed demand. The case studies reveal that changes will potentially increase the CER issuance of the Passive Solar Home project considerably, from 1.4 CER/unit/year to 2.4 CER/unit/year.

Suppressed demand methods can maintain close environmental integrity by deriving Tier 2 - National

8 If you are searching for better understanding of the different scenarios please download the full study "**Suppressed Demand and the carbon markets**" at http://www.geres.eu/en/educational-guides

9 Considering: a local fuel emission factor; considering the energy required to heat households according to field measurements; minimum standard for heating for a certain amount of days. As well as excluding the fNRB.

Yr	Number of PSH operating	A = Current CDM	B = Current CDM meth with barrier analysis	C = Suggested new approach with specific values	D = Suggested new approach with default values
1	250	345	406	605	337
2	500	690	811	1’210	673
3	750	1’034	1’217	1’816	1’010
4	1’000	1’379	1’622	2’421	1’346
5	1’250	1’724	2’028	3’026	1’683
6	1’500	2’069	2’434	3’631	2’020
7	1’750	2’413	2’839	4’236	2’356
Total 7 years	1’750	9’653	11’357	16’946	9’425
Annual average		1’379	1’622	2’421	1’346
Average per Household/ year		1,4	1,6	2,4	1,3

Table 2. Different scenarios with methodological revisions/considerations - AMS I.E –V4

and Tier 3 - Local baselines. This, added to clear monitoring requirements, will allow ERs to be credible, transparently calculated and accurate. Quantification of the possible benefits, in terms of carbon financing potential requires more in depth analysis, but these finding suggest that the impacts would be considerable in encouraging project development in suppressed demand regions.

9 Conclusions

Emissions factors or projected fuel use is important to the viability of CDM projects. However, selecting or projecting ‘the expected fuel(s) to be used’ in the baseline can be challenging and be subjected to numerous nonlinear relationships. A particularly important factor is the price and availability fuels. However, there are other unpredictable factors such as local barriers to access to types of fuel and the costs of different technologies over time. The CDM currently approach proposes a “Tier 1” approach where globally applicable emissions factors for expected fossil fuel use is used. However, the CDM “Tier 1” default value does often not closely match field realities. Methodological options should allow project developers to develop location or technology specific values that reflect local contexts.

Secondly, the **CDM put forward a barrier analysis** approach to technology and fuel selection. This essentially ranks alternative fuels and technologies and eliminates those that face financial, infrastructure of skills barriers or low penetration rates. While simple and easy to use, it can too easily lead to singular outcomes of fuels and technologies, which is unrealistic and can lead to either over or under crediting depending on which fuel/technology is selected. It also does not allow for use of multiple of fuels, common in LDC’s. It is also difficult to assess penetration rates as data is often proprietary or unavailable. Moreover, looking at current barrier and penetration and does not assess potential changes in the future; however a survey could be included as part of the monitoring plan of the project to overcome this problem.

Add to that, the traditional view on fuel switching in the household sector of developing countries has been that households gradually ascend an “energy ladder”: there is a simple progression from relatively inefficient fuels and energy end-use equipment to more efficient fuels, electricity and equipment, with increasing income levels and urbanization. However, the switch from inefficient to more efficient fuels and equipment is not a linear or unidirectional process as suggested by the simple energy ladder theory. Households tend to use multiple fuels, which correspond to a vector of energy services. Complete switching, where one fuel totally substitutes for another, is rare. The reasons for multiple fuel use are varied and not dependent on economic factors alone, although the affordability or cost of the energy service also has an important bearing on the household’s choice. In some cases, households choose to use more than one fuel because they want to increase the security of supply. In other cases, the choice is dependent on cultural, social or taste preferences.

Basic human needs in the context of the CDM relate mainly to energy services. However, there is no definitive of exhaustive list of basic services for human needs or agreement on the adequate quantity or quality of services to meet basic human needs. Minimum Service Levels for some service exists and can be easily identified or adapted to local situations (as for example mountainous areas or drinking water requirements). However, even when internationally recognized MSL exist, such as WHO recommendation for indoor temperature of 18°C, these may not be expressed in energy units. Methodological facilitations must be made in order to convert MSLs into CDM relevant energy units and GHG emissions.

Recognition of suppressed demand would not only increase the potential of project in poor regions significantly but also provide clear and predictable carbon market incentives for projects working in poor, or poorly infrastructured, regions.

GERES, recommend further researches in order to address some of the barriers to the wide spread of Suspressed Demand methodologies. Research on Minimum Service Levels and their conversion into energy units has to be expanded; it represents a big brake to the development of innovative projects. There must be some works to elaborate more pragmatic methodologies in order to do not burden small-scale projects. Transaction costs remain very high, project developer as well as CDM Executive Board and voluntary standards should work to keep it minimum. These researches are necessary to make the carbon finance a leverage to sustainable development and do not replicate our carbon intensive development model.

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