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ANNEXURES

- **Annexure 1-** National Strategy for Implementing NAMAs in India: A Proposal

 - **Annexure 2-NAMA Ideas**
 - Methodology for identifying NAMA Ideas
 - NAMA Idea 1: Big-Push Fund to transform brick sector
 - NAMA Idea 2: Energy efficient housing for poor in Rural India
 - NAMA Idea 3: Trading Mechanism for Efficient Buildings in Residential Sector
 - NAMA Idea 4: Traffic congestion management in Indian cities
 - NAMA Idea 5: Fuel Efficiency Standards, Labels and Incentives for Private Transport in India

 - **Annexure 3-**Nationally Appropriate Mitigation Actions: Overview of Policy and Action
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ANNEXURES

Annexure 1- National Strategy for Implementing NAMAs in India: A Proposal

A National Strategy for NAMAs in India: context and relevance

At COP19 in Warsaw, all Parties have been asked to intensify domestic preparations for their intended nationally determined contributions (INDCs) and communicate them by first quarter of 2015. These INDCs put forward by the Parties are likely to form the basis of the post-2020 climate agreement. INDC has been interpreted in different ways by Parties. While some look at it as essentially mitigation contributions, some consider it to be a mix of adaptation, mitigation, finance & technology contributions. There is, however, general agreement that INDCs are an amalgamation of all bottom-up efforts likely to determine the contours of international regime that can achieve the 2°C goal, agreed by all Parties.

As India will be preparing to implement its INDC, the role of nationally appropriate mitigation actions (NAMAs) is likely to be crucial. For it will not only assess the mitigation potential of programs and policies but also the level of its capability to undertake mitigation actions and the level of support required. As yet, India has not proposed any NAMAs in the NAMA registry for recognition or for support. Arguably because even NAMAs listed for recognition has an additional burden of MRVing and India is not in the favour of any MRV unless actions are adequately supported. Surprising however is the fact that there has been no submission from India so far for supported NAMAs. Perhaps clarity on several issues such as available support, conditions of support, MRV requirements, domestic technical expertise and institutional set-up would help India in formulating its NAMAs. Apart from NAMA registry, other support mechanisms like the Green Climate Fund (GCF) are evolving under the UNFCCC. Domestic institutional preparation would enhance the readiness in developing countries like India to absorb the funds and other support. An institutional strategy for NAMAs is thus imperative for India.

Beyond the NAMA registry and other support mechanisms under the UNFCCC, a number of initiatives by developed countries have been announced to support NAMAs in developing countries outside of the UNFCCC. Such unilateral decisions outside the UNFCCC by developed countries not only undermine multilateral negotiations but may also infringe upon the sovereignty and collective negotiating strength of developing countries.¹ Hence, it is in the interest of developing countries like India to come up with their domestic institutional responses outside the UNFCCC to protect and re-enforce their negotiating positions and interests under the UNFCCC.

The Clean Development Mechanism (CDM) offers an existing example of a support mechanism, which was well received by developing countries. India benefitted from its first movers advantage to make a CDM strategy² and is one of the leading host country Parties in terms of number of CDM projects. The response to the CDM among the Indian private sector shows that additional finance to meet the 'incremental costs' can trigger economic dynamism towards sustainable development practices and mitigation actions. Access to the support outside UNFCCC for NAMAs may re-open opportunities that have been closed by the evident death of the CDM.

Also, in an online survey conducted by TERI, most of the respondents from developing countries highlighted 'guidance from national government' as one of the important issues in implementing and designing NAMAs. Suggesting that national-level institutional strategy is required in developing

¹ Shrivastava, M.K. and Upadhyaya, P. (2014), "Whither multilateralism? Implications of bilateral NAMA finance for development and sovereignty concerns of developing countries" in Jooste, M, Tyler, E, Coetzee, K, Boyd, A and Bouille, M. (Eds). Proceedings of the Forum on Development and Mitigation, Cape Town 2014. Cape Town: Energy Research Centre, University of Cape Town, pp. 65-77.

² For details see: <http://www.teriin.org/nss/fullreport.pdf>

countries to steer discussions and provide guidance at national level. Given that only ‘NAMA approvers’ will be able to approve all NAMAs for their country before they are recorded in the registry, this is the first step at national level as other readiness or preparatory activities continue³. In a nutshell, a national institutional strategy on NAMAs is required as:

1. In Warsaw (COP19), it was decided that all Parties should initiate or intensify domestic preparations for their intended nationally determined contributions and communicate them by the first quarter of 2015. In this context, India will also have to submit their intended nationally determined contributions by the first quarter of 2015. It is critical therefore to undertake a thorough analysis of options before deciding on the nature, scope and type of the intended contribution of India. The role of nationally appropriate mitigation actions (NAMAs) is likely to be crucial. A continued discourse and knowledge sharing is imperative for India to put forward the information on its INDC.
2. There are new mechanisms, processes shaping up in the international climate regime which focuses on transformation, mitigation, climate finance, and other bilateral channels. Given the CDM experience of India, India is in a position to get benefited from the evolving mechanisms such as GCF and NAMA registry. A strategy document will facilitate the understanding of key stakeholders on how to proceed with regard to NAMAs as in case of CDM, where initial studies on preparing strategy document were undertaken.

Objectives of the National Strategy on NAMAs

NAMAs are highly sensitive to political choices. These choices relate not only to issues pertaining to international support and cooperation but also to national development strategies and priorities. In this context, a NAMA strategy should be aimed at achieving broadly two objectives.

1. **National level guidance:** A national NAMA strategy could provide a push to bottom-up preparatory activities and provide much required guidance to the stakeholders in developing countries. The guidance is also required to steer large programmes or policies, in the context of larger sustainable development goals, which can be taken up for implementation. As UNFCCC requires the ‘NAMA approvers’ to approve all NAMAs for their country before they are recorded in the registry, a domestic guiding framework and institutional arrangement is indispensable with an objective to identify and design NAMAs at various scales and comply with the MRV requisites with due political sensitivity. Thus the national strategy will outline how India should approach NAMAs, which will in turn enhance India’s readiness to implement and benefit from NAMAs. Over time, this paper can also provide foundation and guidance for creating an institutional structure for facilitating NAMA implementation in India.
2. **Safeguard national interest:** The stated purpose of supporting NAMAs in smaller countries by developed countries through bilateral arrangements is to demonstrate how a mechanism like NAMAs should be implemented as well as to have a control over the utilization of the financial resources they provide to developing countries.⁴ This evidently is an attempt to not only influence the evolving global institutions on NAMAs but also to have much larger say in

³ Pahuja N & Agarwal S, 2013, In Annual NAMA Status Report, 2013. Accessed at: http://ccap.org/assets/Mitigation_Momentum_Annual_Status_Report_2013.pdf

⁴ NAMA Facility representative, at SBSTA technical briefing, 11 November 2013, Warsaw

the development priorities of developing countries. Hence, one major role of the NAMA strategy would be to offer a counter institutional response to balance the initiatives of developed countries. Second, it is likely that financial and technical resources for implementing any potential NAMAs will be mobilized from multiple sources (multilateral funds and banks, bilateral support, private investment, government support) and in multiple forms (grant, loan, equity, technical input etc.). Accordingly the accountability and MRV requirements would also vary. A NAMA strategy should be able to provide a framework and institutional arrangement that could manage and balance the multiplicity of MRV requirements with due political sensitivity. Moreover, with multiple forms of support from different sources the question of ‘what counts as climate finance?’ becomes important. A NAMA strategy should also be able to maintain a national registry recording the climate and non-climate receipts of resources.

3. **Role of different actors:** The fact that NAMAs can take many forms further adds to the complexity of choice. They could be a project, a program, a policy or a regulation or a combination of two or more types. They may also vary in terms of geographical as well as economic scale ranging from city level interventions to national level strategies, sectoral interventions to economy wide initiatives.⁵ This multiplicity of types of NAMAs requires a system of coordination among different stakeholders and government units aimed at aligning national developmental and diplomatic priorities with any potential NAMAs.

Approach for preparation of India’s NAMA Strategy

While there is a need to prepare the national strategy for NAMAs, our approach is mindful of the existing and the likely challenges in this regard. This section outlines some of the challenges in preparing the national strategy and also suggests the approach to deal with these challenges.

1. **Harmonisation of international NAMA landscape and domestic processes:** The NAMA landscape internationally is complex. The NAMAs being planned or implemented vary in scale, type and scope. Further the support, related requirements of MRV and other design aspects are quite different from each other. The selection criterion of different stakeholder is different. Domestically, there is no nodal agency identified yet. This adds to the complexity as coordination among various government agencies, and regulators, financing agency, ministries becomes difficult. Synergies between international requirements and national institutional arrangements are extremely important. *We provide a synthesis the international NAMA landscape in order to inform the domestic process with an aim to facilitate greater preparedness for implementing NAMAs.*
2. **Modalities of the nodal agency:** Well defined roles and responsibilities among different agencies involved in the governance of NAMAs will hold the key for successful international cooperation and domestic action to lower emissions. While there is general agreement that an coordinating nodal agency is required, a larger discussion on the modalities and operating guidelines is required for the nodal agency. For instance, how will the nodal agency interact with other line ministries or government departments and the private sector? Further, it is

⁵ Pahuja N, 2013, at SBSTA technical briefing, 12 November 2013, Warsaw, Accessed at: <http://unfccc.int/focus/mitigation/items/7934.php>

not clear who will bear the cost of maintaining such an institutional arrangement and whether an approval fee could be levied on projects? *We provide a platform for discussions and deliberations on these and more questions in order to formalise the institutional arrangement in the National Strategy.*

3. **Clarity on role of private sector:** There is lack of clarity internationally, as well as domestically, on what would be the role of private sector. For instance, Whether NAMAs governed and implemented solely by private sector could be an option? If so, what could be the minimum criteria for private sector participation in terms of scale and/or scalability? Otherwise, what could enable public-private-partnerships in implementing NAMAs and the role of private sector therein. *We involve private sector in discussions as part of the steering committee and various roundtables to account for their views in the National Strategy.*

As part of the approach for preparation of India's National Strategy on NAMAS, we identify list of relevant stakeholders and aim to enhance the understanding of the stakeholders on the emerging international NAMA landscape. Further, we provide a platform for informed dialogue among the government, private sector and civil society towards 'nationally determined contributions' helping the national preparations to be scientific, transparent and acceptable. A concrete list of sectoral mitigation actions along with their mitigation benefits is also deliberated upon. As part of the approach we engage with different stakeholders in one-one interactions, roundtable meetings and focused group discussions to add to the literature review and expert judgement while formulating the National Strategy.

Key stakeholder involvement in the preparation of India's NAMA strategy

Key stakeholders of a national institutional strategy for implementing NAMAs include all entities crucial in formulating and designing NAMAs for India and all entities involved in implementation of identified NAMAs. Most importantly, Ministry of Environment and Forests have been identified as 'NAMA approver' in the NAMA registry and is the key stakeholder of the national strategy. Along with MoEF, various line ministries and departments such as Bureau of Energy Efficiency who are likely to formulate sector specific actions that can be taken up as NAMAs are important. It is important to note that much of the funding requirement such as that of the NAMA facility insists in the participation or buy-in from the government of host country proposing NAMAs. Since mitigation actions are also to be reported in biennial update reports, India's NATCOM Cell is an important stakeholder. Other implementing entities like the State and local governments, Regulatory agencies, Planning commission, are also relevant given that the NAMAs could be designed and implemented at any scale. Private sector and Financial institutions were key stakeholders in the uptake of CDM projects in India. Therefore, they remain an important stakeholder for the NAMA strategy. Most importantly, NAMA strategy is relevant for the individuals and communities affected/benefitted by implementation of NAMAs.

This proposed strategy builds on inputs provided by the stakeholders identified above.

Elements of the Proposed National Strategy on NAMAs

An effective NAMA Strategy on NAMAs should identify the nodal agency for NAMAs along with highlighting the modalities and guidelines of its operations including on how it will interact with other relevant stakeholders including international stakeholders. Further, it should throw light on the governance aspect of NAMAs. In doing so, it should be able to inform about three fundamental questions.

1. Identifying NAMAs

Identifying Nodal Agency: The first and most crucial step is to identify a nodal agency to coordinate the process of undertaking NAMAs. The prerequisites of the nodal agencies include: its understanding and linkage with the international NAMA landscape and its connect with the domestic stakeholders and processes. Ministry of Environment and Forest, has experience of being the designated nodal authority for CDM projects and has been the nodal agency for most of the communication with UNFCCC. In this light, it is most situated for being a nodal agency. However, in the recent past new entrants like the climate change finance cell of the Ministry of Finance has played a role in international negotiations. Similarly, the planning commission is more situated to align the NAMAs with the five year plans and India's development priorities. Some line ministries/departments like the BEE are quite relevant for the concerned sector. This presents few options to exert the choice in identification of Nodal Agency.

NAMA Identification and Approval Procedure: Thereafter, a NAMA identification approval procedure with a Nodal Agency as the coordinating entity has to be worked out which would address queries such as to what will be the relationship between Nodal Agency and various line ministries? Which actions can be undertaken as NAMAs? Who could propose such actions i.e. who could be potential actors and NAMA implementers? Whether the identification is top-down assessment from line ministries or bottom-up willingness of private sector to pitch in? Where to propose such actions, online platform or mutual discussion? Whether a formal inventory of NAMAs in a national registry would help in scrutinising the required resources for implementation of proposed activity? Which actions could open the planning process vulnerable to international intervention? How to coordinate with the MoEF's NATCOM cell who are also involved in preparing BURs?

Beyond plans and policies, scope for innovations: While there is some agreement in aligning mitigation actions with the development priorities, it is not clear if some innovative ideas could be pilot tested using NAMA support and later scaled up as part of the planning process. So a pertinent question that the nodal agency needs to address is how to deal with innovation? Should the actions be identified in the planning process or should the approved projects be included in the plan document?

2. Designing NAMAs

Identification of managing entity and liaison with implementing partners: After identification of the NAMAs, an important step would be to determine the scale of activity. Depending on the scale, a governance mechanism for a particular NAMA could be put in place. For instance, who would be the managing entity and implementing partners? What will be role of each and how will benefits be shared amongst each? The experience from PoA projects suggest that the process of liaison with all partners/entities and agreement in terms can consume a lot of time. Perhaps a top down sectoral road map could be useful. The learnings from the Bachat Lamp Yojna, registered PoA could be incorporated in the road map. Or perhaps the entities (government or private) approach the nodal agency with a planned NAMAs in a bottom up manner.

MRV of benefits: It is generally agreed that mitigation actions should only be labelled as NAMAs on provision of international support. This will require certain MRV conditions from the support providers. It will also be in national interest to be mindful of the international support coming to the country. An important question relevant to design and in such complex situation involving variety of partners is how international support is received and disbursed? The design should focus on the specific aspects of MRV of international support, GHG impacts and non GHG impacts. A MRV system

should be built on the existing procedures and reporting requirements across different departments. Whether creating baselines is required for support?

Low hanging fruits or well thought innovations: While CDM projects focused on the low hanging fruits and accrued benefits from the same. The National Strategy could design whether the international support is useful for implementation of low hanging mitigation opportunities? Or it should be used to catalyse innovative mitigation actions.

3. Implementing NAMAs

Governing the NAMA design: The key challenge is to identify whether the actions are being implemented the way they were planned or whether the support is being disbursed as planned. The modalities of the design should be formulated in such a manner that this information could be easily captured and readily available. How does it relate with the MRV requirements? Who should be responsible for what function? And if a third party review is required?

Scaling up actions- innovative support mechanisms: The NAMA support could provide seed funding for mitigation actions, which could be used in experimenting with different models of scalability. These models could thereafter be used to scale up mitigation actions on a larger scale.

Feedback into the system: Learnings from other developing countries could provide useful insights to improve on the existing system. The NAMA strategy should provide for feedback mechanism to incorporate good practices from round the world.

The Proposed Strategy in the context of INDCs

The Paris Agreement has established a bottom-up regime with provisions for ensuring transparency in tracking progress towards the achievement of the 2°C goal pursuant to 1.5°C ambition. How (intended) nationally determined contributions are implemented and their progress is tracked by countries will be foundational in ensuring a comprehensive global response to climate change. Representatives from Indian government, industry, think tanks and media came together on 14th March 2016 to discuss various issues around the theme “*Paris Agreement and India’s INDC: Enhancing Preparedness for Implementation and Tracking of Mitigation Actions, Plans and Policies*”. A summary and way forward as emerged from the discussions is presented below along with a synoptic overview of an institutional architecture to implement (nationally appropriate) mitigation actions with a view to implement India’s INDC.

The Guiding Frame

The broad contours of India’s strategy for implementing INDCs in a transparent and comprehensive manner were spelled out by Mr. Susheel Kumar (Special Secretary, MOEFCC), Mr. Upendra Tripathi (Secretary, MNRE), Mr. Ashok Chawla (Chairman, TERI) and Dr. Ajay Mathur (Director General, TERI). Underlining that India’s INDC is very ambitious; the strategy outlined can be summarized as following directive principles:

1. Inviolable imperatives of inclusive growth and sustainable development goals.
2. Active and fair participation of different stakeholders (ministries, state governments, industry, think tanks, NGOs, media)
3. Enhanced knowledge and scientific research about scope of and challenges in mitigation and adaptation
4. Readiness to access finance from various sources, particularly the Green Climate Fund
5. No replication of the development model and life style of the West and China.

The subsequent discussions explored the question whether at the national level India should follow a bottom-up or a top-down or a mixed approach to successfully implement her INDCs while respecting these normative boundaries.

An Integrated Institutional Approach

The discussions began with an implicit recognition that the entry point perhaps will have to be a *centralized institutional mechanism* that will not only bring together different actors from multiple levels of governance but also provide *guidance* on various responsibilities including *development of methodologies* and *data collection*. Figure 1 provides a synoptic overview of this integrated institutional approach.

(A) Initiate from top but not top-down

The layered arguments from different stakeholder perspectives further elaborated that this *centralized institutional mechanism* should not be based on a top-down approach rather it should evolve into a *flat institutional arrangement* wherein it increasingly incorporates more actors through a simultaneous process of *assigning responsibilities* and *building required capacities*. The 'flat' character also includes increased *norm synchronization* (particularly between GHG norms and environmental norms); *target synchronization across sectors* (so that interdependencies among sectors are better reflected); and *policy synchronization* (among ministries and departments to enhance accountability and balance trade-offs between multiple-objectives).

(B) Sequential but not hierarchical

Many were of the opinion that decision making should be based on the knowledge and capability space and take into account the *sequential impacts* of any proposed actions. For example, interventions in power sector and coal mining need to be thought through together. Similarly the oil and gas sector should be considered along the automobile sector. Accordingly, cost calculations to assess viability should be based on assessment of co-benefits. A structured approach to assess trade-offs will be required to facilitate this.

(C) From planning to regulation mode

The private sector will have to play a critical role. Instead of centralized planning strong signals to private sector through *stable regulation* are therefore important. These should be designed in consultation with private sector keeping in mind how and what different sectors can contribute towards achievement of INDC targets.

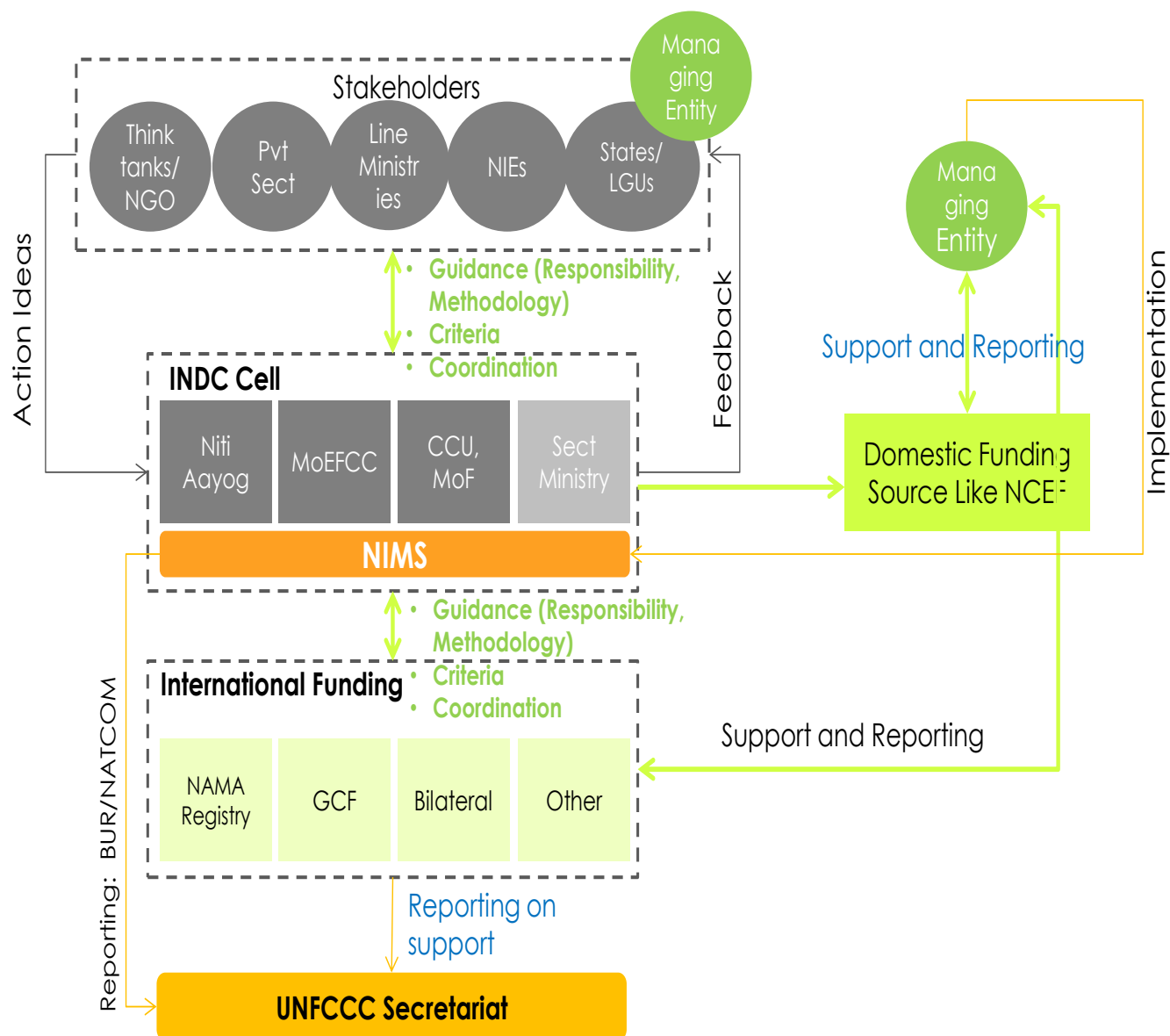
(D) Decentralization of implementation

Role of more than one actor was discussed in implementing INDCs, perhaps as managing entities of a range of actions. For example breaking down INDCs into district/city level interventions, particularly those related to land use pattern. Role of district collector and city commissioner would also be important for data collection and reporting. A need to introduce mechanisms so that individuals can integrate climate concerns into their choices.

(E) TIER 3 data management

At present only 12 % of GHG emissions in the BURs and NATCOMs are calculated based on Tier-3 assessment. For greater transparency government target is to cover 80% of GHG emissions at Tier-3 level. Significant efforts and support will be needed for the institutions participating in BUR and NATCOM preparation as well as setting up an online seamless data management platform with clearly spelled out responsibilities of different actors.

Figure 1: A synoptic institutional architecture for transparent implementation of INDCs



Annexure 2- NAMA Ideas for India

Methodology for Identifying NAMA Ideas for India

Identification of NAMA Ideas

In our approach towards identifying NAMA ideas for India we built upon the understanding that in the end a NAMA is an action, scrutinized in the context of national interest and circumstances, that directly or indirectly lead to reduction or avoidance of GHG emissions. Hence, we followed a two-step approach.

First step is to list all the actions which may lead to reduction or avoidance of GHG emissions. Here, the action is used to mean a policy, a project or a program. In order to develop an informed list of such candidate NAMA ideas for further scrutiny, we reviewed the 12th Five Year Plan of the Government of India as well as the Report of the Expert Committee on Low Carbon Pathways set up by the erstwhile Planning Commission of India. We restricted our review to the three sectors which define the scope of this study: SMEs (small and medium enterprises), buildings and transport. Few ideas from the available literature in these sectors were also included. In order to bring in lessons from the international experience, we also reviewed the international NAMA Pipeline and mapped if the listed actions are similar. The reference to international experience was made only with a view of learning lessons from prior experience and did not in any way influence the second step of NAMA identification. A list of 19 ideas was thus generated.

The second step for identifying NAMA Ideas was to subject the listed candidate NAMAs to selection criteria to assess their national appropriateness. We used the approach provided by Shrivastava et al (2014)⁶, “The TERI NAMA Approach” for NAMAs. Since the TERI approach recommends an iterative application of the “deliberation matrix” assessing positive and negative impacts of NAMA ideas against a broad set of desirable outcome clusters defining national appropriateness, at the initial stage the TERI Approach was applied by the project team to scrutinize the list of ideas prepared at the first stage. Upon this scrutiny 5 NAMA ideas out of the initial 19 ideas were taken up for further detailed consideration. This two stage scrutiny of ideas is summarised in Table A.1.

Development of NAMA Ideas

The selected 5 NAMA ideas, listed below, were then further explored and developed in a three stage process. At the first stage a simple ideas statement was articulated. At the second stage this simple idea statement was further examined and elaborated along the “deliberation matrix” of the TERI NAMA Approach. These elaborated ideas were presented in a stakeholder-cum-expert workshop held on 27 August 2015 at Seminar Hall, TERI. The ideas were subsequently refined taking into account the inputs provided by the participants in the workshop. The selected ideas include:

A. Small and Medium Enterprises

1. Fund to modernize brick sector

B. Transport Sector

2. Mandatory vehicular emission standards
3. Congestion tax

C. Buildings Sector

4. Energy efficiency in housing schemes for poor
5. Trading scheme for residential buildings to promote energy efficiency and renewable energy

⁶ Shrivastava, M.K., Pahuja, N., Tewari, R., Pandey, N. and Agarwal, S. (2013), Nationally Appropriate Mitigation Actions: An Approach to Design, Label and Monitor, TERI Policy Brief, TERI, New Delhi.

Table A.1: Candidate NAMA Ideas and initial scrutiny for appropriateness in SME, Buildings and Transport Sector in India

Sector	Reference in LCC / Planning Commission	no. of NAMA projects/ concepts) / Countries	TERI-NAMA Deliberation Matrix
1 Transport Sector			
1.1 Mandatory alternative fuel	Y	2 Chile, Indonesia (Transport Policy)	Deliberation needed
1.2 City wide electric vehicle	Y	3 Ethiopia (Inter-urban electric Rail NAMA), China (Electromobility), South Africa (TRANSfer project)	Deliberation needed
1.3 Efficiency Standards and labels	Y	3 South Africa (Transport refrigeration), Colombia (TRANSfer project), Thailand	OK
1.4 Dedicated Freight corridors	Y	2 Mexico (Mexican-German NAMA Project), Ethiopia (50% road cargo replaced in 8 routes),	OK
1.5 Congestion tax	Y	N N	Deliberation needed
1.6 Model Shift	Y	1 India (Project by UNEP- low carbon mobility plans for upto 4 cities)	OK
1.7 Transport Demand Management	N	5 Chile, China (TDM in Beijing), Indonesia (Transport Policy), Colombia (Transit oriented development), Indonesia (create sustainable urban transport fund for TDM)	Deliberation needed

1.8	Improved Road pavement	N	1	Serbia,	No
2 Buildings Sector					
2.1	Building codes	Y	4	Pakistan (EE lighting in residential, commercial, industrial buildings), [Indonesia, Philippines] (IKI Project for NAMAs in Buildings), Thailand (National Energy Efficiency Plans), Serbia	Mandatory Building codes for govt. / commercial buildings
2.2	creditable ESCerts	Y	1	[Indonesia, Philippines] (IKI Project for NAMAs in Buildings)	creditable ESCerts for large buildings (target)/ Householdes with diff. electricity pricing
2.3	Financial Incentives/Tariff systems	Y	4	[Indonesia, Philippines] (IKI Project for NAMAs in Buildings), Pakistan (Revolving Fund), Thailand (NEEP-tariff systems), Serbia (metering and billing),	No
2.4	Construction/Retrofit/low carbon technology	N	8	[Indonesia, Philippines] (IKI Project for NAMAs in Buildings), Mexico (Mexican-German NAMA programme - Construction/refurbishment), Uruguay (Sustainable New housing programme), Serbia (expansion of district heating system), Serbia (Installation of solar hot water systems), Serbia (Refurbishment of schools), Serbia (improvement of old residential buildings), Mexico (upscaling energy efficiency housing)	Efficient Housing for poor/MIG/ or Schools/hospitals in rural areas

3 SMEs Sector					
3.1	Labelling	Y	2	Thailand (NEEP), Jordan (benchmarking industries for GHG reduction)	No
3.2	Recovery and conservation techs	Y	1	[Mexico, South Africa, Thailand (Refrigeration and foam sector)]	Deliberation needed
3.3	Raw Material Enhancement	Y	1	Mexico (use of clinker substitutes in cement production)	Deliberation needed
3.4	Efficient Mother technologies	Y	N		OK
3.5	Upgradation Fund	N	1	Chile (Pre-investment grants and funds to support provision of loans)	OK (Brick sector)
3.6	Alternative fuel	Y	2	Mexico (Replacement of fossil fuels with alternative fuels (generated from the recycling of tires, municipal solid waste, sewage sludge, and biomass) in cement production); Chile (decentralized renewable systems in SMEs)	No
3.7	Technology shift - Energy Efficiency	Y	2	Costa-Rica (Low carbon coffee production and processing practices) , Mexico (Mexican-German NAMA Programme in SME)	OK but deliberation needed

NAMA Idea 1: Big-Push Fund to Transform Brick Sector

Why brick sector?

An estimated number of more than 60,000 FCBTK and 150,000 clamp units are involved in producing more than 220 bn bricks every year in India. These are highly energy intensive units consuming on average 18 tonnes of coal per 100,000 bricks causing CO₂, SPM and black carbon (BC) emissions. They are also the source of serious health issues, particularly for the 12 million (approx.) workers they employ. In addition, the brick sector impacts the quality of top soil, hence agricultural productivity. Given that the construction sector is expected to grow rapidly in coming decades, brick sector will also grow. Accordingly, its contribution to GHG, SPM, and BC emissions, deteriorating health of the workforce, impact of top soil and demand for coal consumption will also rise. Hence, the brick sector not only offers a potential avenue for mitigating CO₂ emissions but also needs technological interventions from the point of view of public health, occupational hazards, soil conservation, and energy security.

Modernization of the brick sector has been a long standing policy objective with little success due to, primarily, financial, technical and institutional limitations. Although, the years of efforts have generated some technical capacity to assist the units improve their efficiency, it is not enough to address the challenges due to the large number of units operating in India. These challenges are made more difficult to overcome due to limited availability of financial and institutional resources. Hence, a supported NAMA to transform brick sector addressing financial and institutional barriers to capitalize on existing technical capacities and experience is very much in line with broader national development policy objectives as well as global imperatives of mitigation and sustainable development.

Options for improving efficiency in brick sector

There are two different sets of interventions that can improve the efficiency of the brick sector: (1) design of the kilns, and (2) mechanization of brick making.

Kiln Design Options

The available literature suggests that in comparison to the dominant Clamps and FCBTK designs the alternative options of Zig-Zag fired kilns and vertical shaft brick kiln (VSBK) are the most viable technological interventions in the brick sector. Table 1 presents a comparison of performance of these four kiln designs in terms of specific energy consumption, GHG emissions and air quality impact. In addition, the Zig-Zag fired kilns and VSBK also improve the percentage of quality brick production upto 90% compared to less than 60% in FCBTK. In addition to health benefits from improved ambient air quality, the alternative designs also reduce the heat exposure of the workers. Other options, such as 'tunnel' are not considered viable options due to excessive capital cost and the fact that there is no domestic technical capacity to implement it.

Table 1: Comparison of various kiln designs

Type of Kiln	Production capacity (Lakh bricks/ year)	Primary Energy (MJ/kg brick)	GHG Emissions (kg CO2e/kg brick)	Air Quality (SPM + PM2.5 g/kg brick)
FCBTK	20-100	1.1-1.75	0.1179	1.04
DDK/Clamp	0.5-10	1.2-4.5	0.2877	2.53
Zig Zag fired	30-50	0.8-1.1	0.1048	0.39
VSBK	5-40	0.54-1.1	0.072	0.2

Source: compilation from various sources.

Mechanization of brick making

In addition to change in kiln design, it is suggested that change in brick type from solid to hollow or perforated can not only further reduce the demand for coal but also reduce the demand for clay hence reducing the negative impact on soil quality. This would require mechanization of the brick making as well as more skilled workers. However, the mechanization of brick making is hindered by the lack of suppliers of necessary machine tools. In addition, mechanization will lead to job losses in the sector.

Challenges in the brick sector

- 1. Access to financing:** The capital investment for modernization of brick making package ranges from Rs 1-20 million, depending upon the size of existing unit as well as the package. The majority of brick makers have little or no access to bank credit.
- 2. Lack of availability of off-the-shelf technology packages and technology providers:** Standard technology packages are not available. The know-how of the zig-zag firing is limited to a handful of brick makers. For VSBK technology there is only one active technology provider. The manufacturing of machinery for brick making is concentrated in a few small-scale enterprises. Recently some European brick-making machinery manufacturers have entered the market and are involved in field trials on India-specific technology packages.
- 3. Lack of availability of trained manpower:** Operation of any new technology requires trained manpower, which is in short supply. The VSBK monitored during the study was operating at 50% of its rated capacity, mainly because of a worker shortage. Similarly, the poor operation of the zig-zag forced draft kiln can be attributed to absence of trained manpower for its operation. Currently, there is no system in place to train manpower for the brick industry.
- 4. Limited or no access to grid-electricity:** Semi-mechanization of the brick production process requires electricity. Most of the existing brick kilns either do not have access to grid electricity or are located on rural electricity feeders, which are prone to power outages and poor power quality. This is a significant barrier in adopting new technologies. Adopting new technologies requires investments in captive power generation facilities by brick makers.
- 5. Low profit margins for machine-moulded bricks:** Machine-moulded bricks have a higher production cost and face stiff competition from lower-priced manually produced bricks.

6. **Land ownership:** The majority (>90%) of brick kilns in the Indo-Gangetic plains are located on leased land. This is expected to be a large barrier in making investments in the construction of new facilities and machinery. A shift to new technologies would require investment in land or renegotiating lease agreements. Due to the high price of land around cities, brick enterprises are likely to relocate further from towns and cities.

Assessment of Options against TERI's NAMA Approach

Options 1: Zig-Zag Firing Technology

Outcome Cluster	Positive aspects	Negative aspect
Political acceptability of International support	High: Many multilateral and bilateral agencies e.g. GEF, SDC, WB have supported modernization efforts in the Indian brick sector.	
Transformation Potential	Moderate: <ul style="list-style-type: none"> • Moderate efficiency improvement and % of quality product. There are better options such as VSBK. • Only 30% kilns i.e. existing FCBTKs can be easily retrofitted with Zig-Zag. 	
Social and local acceptability	High: <ul style="list-style-type: none"> • Better health conditions, • Can be retrofitted in existing units 	
Environmental Impacts	Moderate: Still emits BC, SPM, CO, CO ₂	
Cost implications	Moderate: <ul style="list-style-type: none"> • Although the cost of retrofitting in one unit is in the low and can be recovered in less than 2 years, cost of transforming the whole sector adds up to be very high, even for the multilateral funding agencies. • If implemented, the credit-worthiness of manufacturers will improve enabling them to adopt more efficiency measures. • The avoided expenditure on health are significant 	Moderate: Despite the short recovery period, brick manufacturers are hesitant to invest due to poor access to credit.
Institutional feasibility	High: In line with government policy and there are already proven examples	
Domestic resource component	High: Not dependent on imports	
Reduction in undesirable impacts	High: There are no undesirable impacts of implementing Zig-Zag Firing method.	

Option 2: VSBK Technology

Outcome Cluster	Positive aspects	Negative aspects
Political acceptability of International support	High: Many multilateral and bilateral agencies e.g. GEF, SDC, WB have supported modernization efforts in the Indian brick sector.	
Transformation Potential	High: <ul style="list-style-type: none"> Higher efficiency improvement % of quality product Large number of clamp units can be replaced Needs skilled workers Improved credit-rating of brick-makers 	Low: <ul style="list-style-type: none"> Production capacity of one unit is lower than FCBTK
Social and local acceptability	High: <ul style="list-style-type: none"> Better health conditions due to improve air quality Reduces the thermal stress and consequent risk of eye and skin diseases and dehydration among workers. 	Moderate: <ul style="list-style-type: none"> The workers loading bricks can develop respiratory tract infections. Needs new construction, may require break in production for some time New construction may also need new lease agreements with the land owners
Environmental Impacts	High: almost nil BC, CO, and lesser SPM (upto 85%) and CO ₂ (upto 45%) emissions	
Cost effectiveness	Low: Costs 2-3 times more than ZigZag,	High: Long pay-back period, the issue of lease agreement may further add to the cost
Institutional feasibility	High: In line with government policy and there are already proven examples.	
Domestic resource component	High: Not dependent on imports	
Reduction in undesirable impacts	High: There are no undesirable impacts of implementing VSBK.	

Option 3: Mechanization of the brick making process

Outcome cluster	Positive aspects	Negative aspect
Political acceptability of International support	High: Many multilateral and bilateral agencies e.g. GEF, SDC, WB have supported modernization efforts in the Indian brick sector. Would be in line with 'make-in India' campaign.	
Transformation Potential	High: Builds new manufacturing base	Low: Will create additional demand for electricity.
Social and local acceptability	Moderate: Will create and protect jobs Soil conservation	Moderate: <ul style="list-style-type: none"> • General unacceptability of regulation • Difficult to ensure that all laid off workers get job in new industry
Environmental Impacts	High: less demand for top soil and coal	Low: <ul style="list-style-type: none"> • New manufacturing may add to standard environmental impacts but it is expected that those will be within permissible limits.
Cost implications	Low: At present there does not exist any significant manufacturing base to provide machines at scale. Establishing new industry would require significant government efforts.	High: <ul style="list-style-type: none"> • It is difficult to estimate cost of establishing new manufacturing units along with training of targeted workers • Energy consumption of new manufacturing units
Institutional feasibility	Moderate: Capacity to regulate SMEs is increasing already;	Moderate: New manufacturing units with specific purpose and reason will require new sets of institutional arrangement for regulation
Domestic resource component	Moderate: As such not dependent on imported material.	Low: So far only a European company has set up manufacturing units to supply machines for mechanization. Mechanization in the beginning may need some reliance on international expertise.
Reduction in undesirable impacts	Moderate: Overall no serious predictable undesirable impacts of mechanization except for potential job losses	Moderate: Difficult to predict the impact on cost of product's price and actual job losses

Key deliberation points

Scope of NAMA:

From environmental benefits point of view combining better firing practices, kiln design and brick design (hollow) is the best option. Benefits include not only reduced emissions of GHGs and SPMs (including black carbon) but also reduction in impacts on soil health, improved quality of bricks, local environment and health of workers.

- a. However, mechanization results in less number of persons employed. Brick sector employs more than 12 million people. Mechanization would mean large scale laying-off of workforce which is not socially and politically viable/ acceptable. Hence, alternative employment generation has to be an integral part of the NAMA in brick sector.
- b. As of now, there is no sizeable supply of machine tools and skilled work-force to enable the mechanization process. Hence, NAMA should include establishing a machine tool industry along with skill development of the work force. A plan to absorb the laid-off workers due to mechanization in this new machine tool industry can mitigate the negative social impact of mechanization, while enabling further efficiency measures in the brick sector.

Zig-Zag Firing or VSBK?

While VSBK is certainly a better technological options its implementation is costly and relatively difficult than Zig-Zag. The fact that Zig-Zag firing can be easily retrofitted in the existing FCBTKs, which are significant in number (approx. 60,000 units) offers a quicker option. Shifting from Clamps to Zig-Zag or VSBK , on the other hand, are almost similar in difficulty, only cost varies. Hence, it makes more sense to change Clamps to VSBK for higher environmental and social benefits. Hence, a combination of both technologies seems more realistic to begin with.

Financing mechanism

Access to finance is a critical barrier hindering adoption of either zig-zag or VSBK technologies despite their pay-back period being 2-4 years. The prospects of long term savings should encourage the manufacturers to enter into a contract with government if transition is fully financed with low transaction cost and repayment of loan only after the savings begin to materialize.

- a. Mobilizing necessary technical support for technological transition constitutes a significant part of the transactions cost. Hence, financing proposal from the government should be accompanied by the technical assistance. This has been the case with earlier examples.
 - b. However, available technical capacity is not enough to launch a full-fledged sector wide transition program. Hence, a cyclical assistance program is ideal aiming hands on training for new personnel, spiralling into a larger pool of experts over a period of time.
 - c. Financing mechanism should, therefore, also provide cyclical assistance with a provision of increasing the financial resources available to support by utilizing increasing pool of experts. Hence, the recovery of financial support should be more than 100% of initial support provided to manufacturers.
-

The NAMA Proposal: Big-Push Fund

Objective: The proposed NAMA for transforming brick sector will set-up a “big-push” fund with an objective of (1) Transforming all the FCBTK to Zig-Zag Firing Klines and all the clamps to VSBK by 2030, and (2) Promoting mechanization for transition from solid-bricks to hollow bricks by establishing machine tool industry to facilitate mechanization. In the aggregate it can improve efficiency of the sector to the range of 50%.

Set up the Fund: The “Big Push Fund” will be set up from contributions from the Green Climate Fund (80% of total) and other development agencies (national, multilateral and bilateral), totalling approx. USD 700 million to facilitate technology transformation and MRV of the brick sector in India. Given the significant social benefits, in addition to the mitigation benefits, grant contributions are preferred. In case it is in the form of loan, further conditions should be devised such that the primary purpose of the Fund, i.e. to transform the brick sector in India is not compromised.

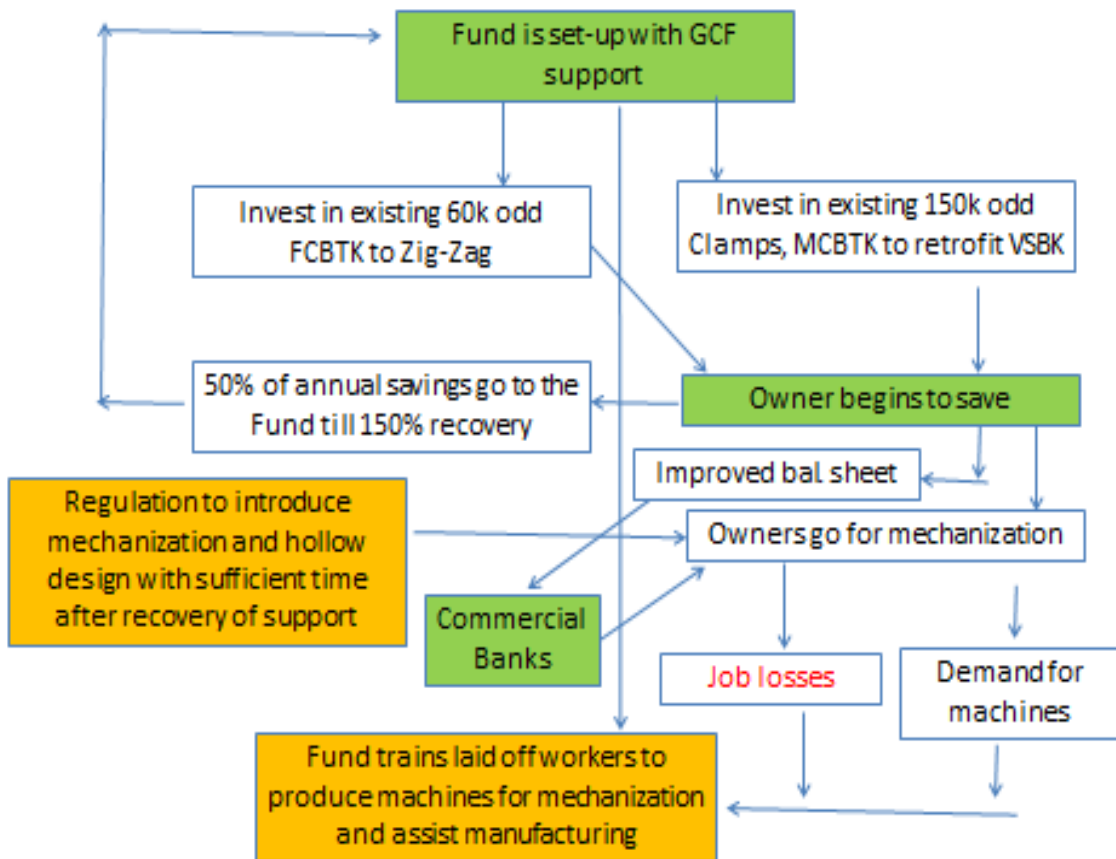
Fund utilization- stage 1: This fund will invest in technology retrofitting of the existing FCBTK to Zig-Zag firing technology and recollect 50% of the resulting savings for 3 years or till the value of initial investment at current market price is recovered (whichever is most). This recollected money will be used to finance retrofitting other units.

Fund utilization- stage 2: After the units receiving support from the Fund, repay the support to the Fund and begin to save, they are subjected to stricter standards and regulations for mandatory implementation of mechanization of production process. To facilitate the mechanization process, the Fund will support establishing the manufacturing base to produce necessary machine tools. Those workers, who will lose jobs due to mechanization will be trained and employed in this machine tool industry.

Proposed key actors:

- a) MoEF & CC: Nodal ministry for regulating NAMAs in India
 - b) The Bureau of Energy Efficiency: To supervise the operation of the Fund and establish institutional and capacity building arrangements for MRV.
 - c) Association of Brick Manufacturers: To facilitate awareness program among the brick producers, assist the BEE in developing the MRV framework.
 - d) Financial Institutions and Agencies: To enhance effectiveness of the Fund, particularly at the stage-2 by providing finance for machine tool industry.
 - e) Research Institutes: To impart their experience and technical knowledge to the brick producers and assist them in transition.
 - f) Individual brick producers and entrepreneurs
-

Figure B.1: Schematic representation of the Big-Push Fund



NAMA Idea 2: Energy efficient housing for poor in Rural India

Why Housing for Poor?

Buildings are considered key to a sustainable future because their design, construction, operation, and the activities in buildings are significant contributors to energy-related sustainability challenges. Reducing energy demand in buildings can therefore play one of the most important roles in solving these challenges. Statistics suggest that globally, the buildings sector and people's activities in buildings are responsible for approximately 31% of global final energy demand, approximately one-third of energy-related CO₂ emissions, approximately two-thirds of halocarbon, and approximately 25–33% of black carbon emissions⁷. In India, residential sector consumes 21% of the total electricity generated which will increase to a much higher percentage given the Government's target for housing for all. Currently there are estimated shortages of 18.78 million residential units in urban areas and 43.67 million units in rural areas (National Housing Bank, 2012). With the mission target to build about 4.2 Crore houses by 2022 in rural India and nearly 2 Crore houses in urban India, the energy use intensity of the residential buildings is expected to grow exponentially by 2022 because of the increase in air-conditioned area, more access to electricity, and the increase in ownership and usage of appliances by the tenants in this sector (CEA, 2014). In this context, the proposed National Gramin Awas Mission (GRAM) of the rural development ministry, which is likely to replace the Indira Awas Yojana, could become the guiding scheme for constructing houses in rural areas.

Energy efficiency initiative in buildings in India will result in benefits with values ranging in the billions of dollars annually, such as health improvement-related productivity gains and cost savings. Moreover, India loses 15 lakh houses to disaster every year wherein the energy efficient design construction will feature disaster resistant characteristics which will prevent recurrent repairs and constructions. There is a clear need for developing and popularizing appropriate technology through a network of institutions, which could result in low-cost, environment- friendly, energy efficient and disaster-resistant houses as per local cultural preferences. While construction of toilets is mandatorily aligned with the Swachh Bharat Mission of the Government of India, energy efficiency provisions in the rural housing construction is not yet mandatory. This can therefore be incorporated into a NAMA activity for India to maximizing its potential to achieve its GHG mitigation goals.

Challenges for Energy Efficiency in Housing for Poor

- 1) **Unavailability of cost-effective eco-friendly technologies:** Building materials account for about 60% of basic inputs in any housing programme and their costs can go as much as 75% of the cost of a house for low-income groups. There is a growing concern that persisting shortage of cost-effective building materials for the vast majority of population is a serious impediment to improving the housing conditions of the people.
- 2) **Lack of Training and capacity:** Even with the newer technologies for energy efficient buildings, the adoption of these in housing for poor was hampered by the general lack of understanding on part of beneficiaries due to ignorance and illiteracy.
- 3) **Access to finance:** Since energy efficient homes are much more expensive than conventional homes, access to financing for implementation of energy efficient housing for poor is a challenge.

⁷ Ürge-Vorsatz, D.; Eyre, N.; Graham, P.; Harvey, D.; Hertwich, E.; Jiang, Y.; Kornevall, C.; Majumdar, M.; McMahon, J.E.; Mirasgedis, S.; et al. Chapter 10—Energy End-Use: Building. In *Global Energy Assessment—Toward a Sustainable Future*; Cambridge University Press: Cambridge, UK, 2012; pp. 649–760.

Proposed NAMA:

Energy efficient housing for poor in Rural India: Including a mandatory component of energy efficiency in Housing for All Mission of the government for poor in rural as well as urban areas conditional upon international support to meet the additional cost.

Objective

The primary purpose of this NAMA is to build Low cost energy efficient, disaster resistant homes for poor in Rural India aligned to the National Housing Mission of the Government of India.

Proposed Mitigation Action

With the primary motivation to include all rural families, the government of India under its National Grameen Awaas Mission (GRAM) envisages to build pucca disaster resistant homes for all (to build nearly 60 lakh houses annually till 2022). Unit area for each household will increase from 20 sq meters in earlier schemes (Indira Awas Yojana) to 30 sq meters in GRAM with mandatory inclusion of toilets, water and electricity facility. While IAY doesn't address energy efficient or disaster resistance in building designs, GRAM is expected to target only disaster resistance construction in homes. Energy efficiency which is a significant design factor is left out of the housing priority list of the government. Therefore within the proposed NAMA, the government of India will be targeting policies towards energy efficient homes for poor, which in addition is also low cost and disaster resistant.

Approach

Energy consumption in buildings is dependent on variables such as outdoor climate, building construction and materials, operational modes (for example, naturally ventilated or air-conditioned), occupancy hours, and home appliances. The Energy efficient Housing NAMA for Rural India will take a holistic view of buildings ('whole house approach'). The focus is not on applying individual energy efficiency measures or using renewable energy in residential buildings, but on a building's overall energy performance.

Under the earlier schemes for housing for rural poor, communities have been involved in construction of houses, which are often inadequate, vulnerable and inefficient. As per the IAY guidelines, the houses are to be constructed by the beneficiaries including decisions on the type of house to be constructed and the selection of construction material. There is no mandatory specification of material or houses and this does not encourage any sort of linkage between the technology developers and technology users i.e. the IAY beneficiaries. Secure housing built by formal state and market actors is deeply insufficient in number in rural India and almost entirely unaffordable for those who need it the most. Within the NAMA, through public-private-community partnership, the government must aid private penetration in the affordable energy efficient housing sector in this area. This is because most often private players do not enter the market unaided for below Rs. 5 Lakh unit cost construction. In case of rural housing 95% of the market share is for these kind of housing needs. Private developers have a role to play in affordable housing, but the limits of the market must be recognized clearly so that policy can regulate and direct the market effectively. The government can easily create such a market through the instrument of "Public Procurement"

which has been practically overlooked over the years⁸. This creation of demand through public procurement will push enterprises into taking up ventures in low-cost energy efficient innovative building materials, which in turn will push the R&D institutes to be more innovative. This will further lead to increased R&D investment and mobilization of resource, including Foreign Direct Investment (FDI). The developed products will be pulled, in turn, through the public procurement system⁹.

In phase 1 of the NAMA, government will establish clear guidelines for energy efficient housing for poor in consultation with the Bureau of Energy Efficiency as well as the research agencies in rural housing. This will help government identify clear strategy for its public procurement procedure. In phase 2, implementation will take place.

GHG Reduction Potential

As per the estimates of GBPN 2014, the number of rural households with ACs will rise considerably in future. A scenario analysis, commissioned by Global Buildings Performance Network (GBPN) and produced by the Centre for Climate Change and Sustainable Energy Policy (3CSEP) of the Central European University (CEU), estimates that India could easily experience an increase in building energy consumption and CO₂ emissions of around 700% by 2050, compared to 2005 levels. With 30% reduction in energy demand for energy efficient construction in buildings, the GHG emissions in future for this sector can be drastically reduced.

Estimates for emission reduction can be drawn using the assumptions for the total number of new constructions for rural poor at 60 lakh per annum till 2022 for 30 sq meter space each where 1 BHK – nearly 30 sq m has a base case Primary Energy Demand of 30KWh/Sq m/annum. Within the NAMA we develop an effective mechanism for providing appropriate technology based shelter particularly to the vulnerable group and economically weaker section (R.K.Garg, 2008) to reduce the the level of EPI to further increase energy efficiency.

Key actors

Ministry of Rural Development, Bureau of Energy Efficiency (BEE), Housing and Urban Development Corporation Limited (HUDCO), Research Agencies in Rural Housing (Central Building Research Institute, National Institute of Rural development, Advanced Materials and Processes Research Institute (AMPRI), National Building Construction Corporation Limited (NBCCL), Building Materials and Technology Promotion Council (BMTPC), TERI, CEPT); National Building organization, Indian Institutes of Architects); private housing associations.

Small and medium-sized enterprises in the housing construction sector, local masons in construction, financial institutions particularly Housing banks in terms of lending for NAMA will be important actors within the NAMA programme.

⁸ <http://www.nistads.res.in/indiasnt2008/t6rural/t6rur6.htm>

⁹ Report of the Working Group on Rural Housing for the 11th Five Year Plan, Available at: http://planningcommission.nic.in/aboutus/committee/wrkgrp11/wg11_rdhou.doc

Assessment of the Proposal against TERI's NAMA Approach

	Positive	Negative
Political Acceptability of International dimensions	High: Similar NAMA in Mexico, Additional cost, Grounded in national priorities,	Moderate: MRV conditions
Transformation of economy	High: Avoid lock-in, demand for high efficiency products, and awareness	
Cost-effectiveness /Implication	Low: Reduced energy bill for poor, long term savings for government	High: High upfront investment, long payback period
Social and Local Acceptability	High: Employment, equity, welfare, disaster resilient homes,	
Environmental Impacts	Moderate: Sustenance emissions	High: Demand for construction material
Institutional feasibility	High: in line with government policy	Moderate: MRV challenges
Domestic Resource Usage	High: No need for imports	
Reduction in undesirable impacts	High: Prevent lock-in of energy inefficiency in new houses.	

Key deliberation points

Political acceptability of international support: The NAMA falls in line with the National Mission on Housing as well as fulfills the criteria within the another national flagship mission on Swatch Bharat which together entail high political acceptability by the national government. Domestic funds could be used to set up initial preparatory phase of the NAMA in phase 1 while NAMA could seek international funding from GCF for its implementation phase to meet the incremental costs.

Transformation of the economy: The proposed scheme if upscaled to the total target for 4.2 crore housing requirement for the rural poor, could lead to significant reduction in energy consumption and emissions in the buildings sector. The proposed NAMA will also help in bringing change in lifestyles of rural poor. Estimates show that as per the expenditure share of the rural poor, it is seen that nearly half of the income of the rural poor is spent on meeting their energy needs. Ironically, energy efficient housing for the poor remains last on priority of the government. The proposed NAMA will therefore aid in transformation and upliftment of this section of the society through this intervention.

Social and local acceptability: The proposed NAMA will very finely address the concerns of equitable income share in the society as the poor will now be able to save more with more efficient housing.

- The local acceptability of the proposed NAMA will be extremely high as it will also impact adequate skills among the local dweller while they are involved in the construction of the energy efficient homes. Since earlier, developers were concentrating mainly on the high income group segment, in rural areas constructions mainly occurred through self-construction in which case rural masons lacked capacities to build houses in an energy efficient design.
- However adequate incentives will have to be provided to the private players to create a demand pull for them to enter this market.
- Since people are used to getting free housing under various government / aid schemes they therefore may lack the willingness to pay for developer-built energy efficient housing.

Environmental consequences: The GHG reduction potential of the proposed NAMA will be extremely high as emission from this sector is expected to increase 700 times on account of new construction of buildings, a major portion of which will be in rural India. Apart from impacts on GHG emissions, other environmental benefits such as improved health, disaster resistant homes are also envisaged.

Cost-effectiveness: Energy efficient houses are nearly 15% more expensive upfront than traditional houses due to materials etc., financing for which is a critical barrier in implementation of energy efficient housing NAMA in rural India. Taking cost assumption from the Ministry of Rural Development, an energy efficient house in rural India will cost nearly Rs. 90,000 more expensive than traditionally built houses¹⁰ (approx).

Unit assistance by the government for construction purposes will need to be revised likewise. Assuming that 20 per cent of households living in such houses can provide resources to build a house and the remaining 80 per cent of the families may not be able to provide for construction of a house from their resources. Then at-least 3.20 crore households would require assistance from the

¹⁰ Cost can increase with increase in prices of materials and wages

Government to house themselves (Estimates as per assumptions used in government documents). There will be an added burden on the government to finance these energy efficient housing. However, energy savings and reduced operating costs of the buildings would make the action cost-effective in medium to long-term for individual building owners (or inhabitants). This needs to be incorporated in the entire NAMA mechanism as a financial leveraging arm for future projects. And at the Centre, since the government will bear the upfront cost of investing in efficient homes, adequate financial mechanism will need to be created for the same.

Institutional feasibility: Institutional capacity for energy efficient homes already exists in India with BEE, TERI, IGBC and ESCOs having already implementing projects in this sector, barring targeting the Rural Housing Sector particularly. Institutional framework for residential construction already exists in line of the proposed National Housing Scheme of the government of India.

The proposed NAMA would therefore only require streamlining and incentivizing the rural housing (construction) sector towards energy efficient practices. Since, private sector developers are particularly reluctant to enter this market, institutional capacity and feasibility structure needs to be further operationalized in this sphere.

Domestic resource use: The proposed NAMA would be able to implement activities within the programme with the help of already existing domestic resources and technical know-how which only needs to be upscaled to the rural housing sector.

Reduction in undesirable impacts: The proposed action will help reduce the emissions lock-in in the housing sector which will witness large-scale boom in the coming years.

NAMA Idea 3: **Trading Mechanism for Efficient Buildings in Residential Sector**

Why Residential Sector?

In the ongoing international climate deliberations Nationally Appropriate Mitigation Actions (NAMAs) are being presented as one of the most effective tools for developing countries to shape and stimulate their emission reductions approaches while contributing to transition towards low carbon development pathways. The following note proposes an ETS in the residential buildings sector in Delhi, India as a model NAMA in the buildings sector.

It is extensively recognized that buildings account for significant global greenhouse gas (GHG) emissions, and also that they present enormous potential for rapid, deep and cost-effective mitigation. Improved energy efficiency and resource optimization in buildings also result in multiple add-on benefits for the stakeholders. Policy makers and technology providers around the world acknowledge the scale and size of this abatement opportunity.

According to IPCC AR 5 (2010 data), the building sector alone accounts for 32 % of total global final energy use and 19 % of energy-related GHG emissions including electricity-related emissions. Further, the sector contributes around one-third of the global black carbon emissions, and an eighth to a third of F-gases. Furthermore, with significant construction in progress especially in the developing world, and improving lifestyles (adequate housing, access to energy, increasing buying capacities, etc.) of people, the emissions are estimated to double or even triple by the middle of this century. However, there are strong scientific evidences to suggest that this upward trend of GHG emissions could be moderated or even reversed if the currently available (also newly developed), demonstrated and cost-effective technological solutions combined with behavioural changes are adopted on a wider scale globally. In fact, co-benefits such as reduced air pollution and health benefits thereof, improved living environments, energy security, reduced need for expenditures on health and energy generation, creation of green jobs, enhanced value of building stock and unlocking of the potential of innovation in the sector far exceed the monetizable energy and climate benefits. Further, long lifetimes of buildings and retrofits pose great risks of 'lock-in' of energy use patterns for decades and thus loss of opportunity. But challenges such as lack of awareness and information, lack of technical and servicing capacity, limited access to financing (especially in developing world), split incentives, absence of supporting policy framework, etc. result in limited adoption of the cost-effective technological solutions by the market forces and the general public.

**Proposed NAMA:
Trading Mechanism for Efficient Buildings in Residential Sector**

Objective

The primary purpose of this NAMA shall be to promote and incentivize energy efficiency and use of renewable energy in residential buildings to reduce GHG emissions from the sector. The DDA Efficient Building Scheme (DDA EBS) shall essentially be an offsets trading mechanism in residential buildings of DDA and would recognize both energy efficiency improvements (GHG emissions reduced) and avoided emissions.

Approach

‘Regulations plus markets approach’: The proposed NAMA shall be a combination of ‘regulations plus markets approach’ as the buildings/building groups/associations could trade the energy savings achieved over and above the levels mandated by the regulator. An ‘only regulations’ approach is most effective in new or to-be-built buildings but not in the existing building stock. Thus, integration of policy and market instruments shall enhance the scope and results of the initiative.

The scheme shall include both reduced emissions (especially relevant in case of retrofits for the buildings sector) and avoided emissions (more applicable to new buildings stock). The regulator of the mechanism shall define an aggressive abatement trajectory for different building classes over time but not the means to achieve the goal. Therefore, the implementers of the initiative shall be unrestricted in terms of technology/construction practice choices they make (depending on factors like effectiveness of the technology, investments required, age/state/type of building/s, feasibility of retrofitting, etc.) to adhere to the stipulated levels of energy efficiency or GHG emissions.

The mechanism shall employ a ‘Carrot and Stick’ approach. Tradable certificates/etc. (needs to be defined further) and reduced operating costs of buildings would incentivize better performances. A system of penalties/etc. for inaction/non-conformance with the mandated goal shall be instituted. The trading scheme could potentially be linked to existing/proposed ETS in the region (e.g. PAT) and fungibility of trading units could be ensured.

Key Actors (illustration for Delhi)

As a proposition, the primary actors of the initiative (to begin with) shall be the Delhi Development Authority (DDA), Bureau of Energy Efficiency (BEE), Energy Efficiency Services Limited (EESL), Resident Welfare Associations (RWAs), tenants, landlords, etc.

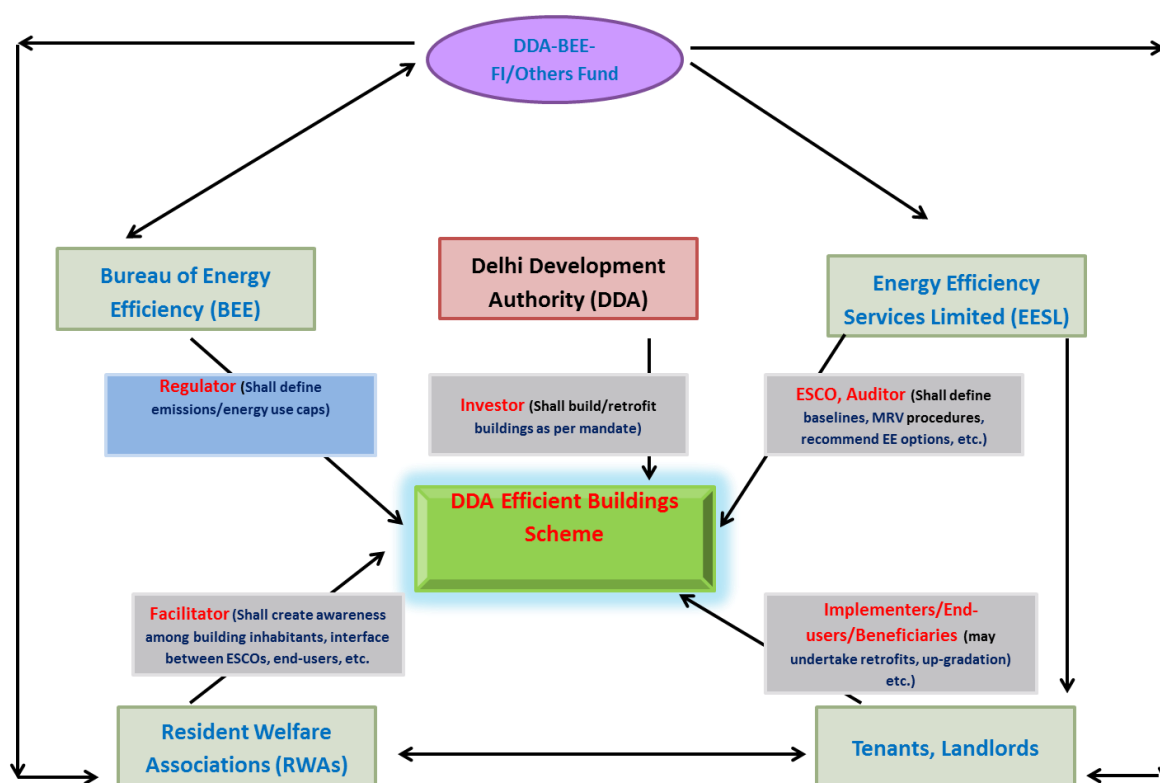
DDA, BEE, and EESL as partners shall be the key institutional authorities of the scheme. BEE shall be the key ‘Regulator’ in the partnership – shall define mandates for emissions cap (or trajectory or threshold emissions) different for different classes of buildings. The BEE shall also recognize and suggest latest/most efficient/most suitable state of the art technologies/standards for the achievement of energy efficiency and renewable energy in different types of buildings but shall not mandate or impose any of these choices on the stakeholders.

DDA shall be the key investor and implementer in the partnership - shall invest in property improvements which in turn shall increase the value of the buildings, lower the operating costs and increase profits and provide employment opportunities for local architects/builders, HVAC and construction businesses, etc.

EESL shall be the ESCO in the partnership. It shall (in collaboration with BEE) conduct detailed energy audits of sample buildings to understand energy usage patterns, annual energy costs, and options to reduce those costs. EESL shall also classify buildings based on energy usage patterns/age/etc. Scientific and clear categorization of buildings (e.g. new/existing/etc.) would ensure fair comparability of costs and benefits.

Resident Welfare Associations (RWAs), tenants and landlords would be both the actual implementers and beneficiaries of the scheme. They would have a key role in the monitoring and reporting of the program and consequently data management for the definition of dynamic baselines for the buildings sector.

Illustration of the Trading Mechanism



The Process to design the trading mechanism

In the preparatory or pre-implementation phase, as the first step, energy audits and categorization of buildings shall be undertaken by EESL and BEE to define the baselines and key building classes. Thereafter, DDA (in consultation with experts) shall initiate construction of energy efficient buildings (new projects) or configure retrofits in existing building stock. DDA-BEE with support from government or in collaboration with financial institutions could establish a rebate fund for upto say x% of the cost of installing recommended energy improvements.

During the implementation phase, each year a building owner shall calculate the total GHG emissions for its building including both onsite fuel consumption and emissions from purchased electricity through utility or fuel bills. The total emissions derived thereof shall to be divided by net lettable area (NLA) to derive 'Emissions Intensity' (in tonnes of GHGs per square metre (tCO₂e/m²)). Definition of emissions intensity shall help in addressing perverse incentives for large, inefficient buildings. The emissions intensity figures shall be compared to the mandated/ predetermined

emissions cap (or threshold) to calculate the reductions or excess emissions vis-à-vis the cap. Based on this rewards/penalties shall be allocated or acquitted respectively. The rewards shall constitute deemed tradable energy savings/emissions reductions credits/certificates.

In the trading phase, the overachievers (over and above the mandated levels) shall trade the credits and the under performers could offset their emissions by buying of credits to avoid penalties, etc. In the long-term, the scheme could serve as a pilot program for anticipated larger, better funded energy conservation programs by enhancing its scope from just DDA buildings to others and also by linking with other local trading mechanisms.

Assessment of the Idea against TERI-NAMA Approach

	Positive Impacts	Negative Impacts
Political Acceptability of International dimensions	NA	NA
Transformation of economy	High: This will induce change in consumption pattern at the household level and will promote market for energy efficient appliances and probably home-based renewable energy systems.	
Cost-effectiveness /Implication	High: Both government and households are likely to save on energy bills over time.	Moderate: High upfront costs for government for MRV and households for energy efficient appliances and lighting
Social and Local Acceptability	Low: Few job creation and immediate savings.	High: Too many stakeholders will lead to high transaction costs. In cases of rented houses there is likely to be the challenge of Principal-Agent Dilemma.
Environmental Impacts	High: Lower GHG emissions from household consumption of power (indirect effect)	
Institutional feasibility	Moderate: Institutional processes to monitor household power consumption is already in place.	High: Enforcement due to too many stakeholders will be difficult. Measurement of reduced or avoided power consumption would be difficult across different categories of houses and households.
Domestic Resource Usage	NA	
Reduction in undesirable impacts	No undesirable impact	

Key Deliberation Points

1. **Political acceptability of international support:** The scheme would essentially use domestic funds but could seek international support in terms of latest building technologies and know how. Lessons in the context of scheme design and MRV procedures could also be drawn from the currently operating certificates/trading schemes in the buildings sector elsewhere in the world.
 2. **Transformation of the economy:** The proposed scheme if successful and upscaled could lead to significant reduction in energy consumption and emissions in the fast growing buildings sector. It would offset grid sourced fossil fuel based energy which could be channelized for other economy sectors. The initiative would unlock innovation in the building sector, stimulate economic activity and result in new skills and employment opportunities. As the net effect, buildings that are better positioned for adapting to the impacts of climate change would be delivered.
 3. **Social and local acceptability:** The scheme could potentially face challenges associated with 'split incentives' or the 'principal-agent-dilemma'. The entity responsible for developing the building (in most likelihood) is not the owner (landlord) or the tenant. And hence there is no financial incentive for the developer to invest in energy efficiency and little incentive for the owner (if he is not a resident of the building). This is one of the major bottlenecks in the way of uptake of emissions reduction initiatives in the buildings sector. Another factor impacting the local acceptability of the mechanism would be high transaction costs associated with technology installation or retrofitting and limited availability of funds. Moreover, there is little awareness among the consumers to influence choice between initial cost and long-term gains. Finding adequate number of buyers for houses at comparatively enhanced costs (owing to EE/RE installations) would be yet another challenge. To address some of these issues, BEE/EESL could run awareness programs and promote energy labelling of buildings on a wider scale.
 4. **Environmental consequences:** The proposed scheme would score high on this criterion. Over and above the reduced GHG emissions, co-benefits such as reduced air pollution and health benefits thereof and improved living environments and energy security would be the key spin-offs of the initiative.
 5. **Cost-effectiveness:** Although initially, the initiative would require massive investments for technology adoption and building of necessary institutional set-up, the long-term gains both monetizable and non-monetizable would be immense. Energy savings and reduced operating costs of the buildings would make the action cost-effective in medium to long-term for individual building owners (or inhabitants). And on a larger scale, financial savings by reduced investments on energy generation and health and creation of green jobs, enhanced value of building stock and unlocking of the potential of innovation in the sector would far exceed the monetizable energy and climate benefits.
-

To enhance the financial feasibility and cost-effectiveness of the initiative, DDA-BEE-some FI could form a fund for supporting developers/owners. Conformance with the mandates would be a prerequisite for subsidies and financial incentives from the fund. Furthermore, fungibility between existing/proposed mechanisms e.g. with PAT could be created to mitigate some of the financial risks and attract more participants.

6. **Institutional feasibility:** The primary regulatory and implementing institutions proposed for the initiative – BEE and EESL are quite proficient and mature entities with prior experience of having implemented similar initiatives (e.g. PAT, energy efficient street lighting programs, etc.). Nevertheless, lack of data and awareness about data management practices amongst the stakeholders would be a primary challenge for the auditors/architects/engineers/etc. Determination of baselines and consequent MRV procedures would be quite cumbersome in the initial phases especially in light of the complicated methodologies applicable to the buildings sector. Adoption of technologies for retrofits in old buildings stock and thereafter creating comparability between the old and the new buildings would be another area of concern for the implementers. As discussed above, the ‘principal-agent-dilemma’ dissuades landlords to invest in energy efficiency measures (if they are not using the same building). To address this, amendments/improvisations in rent acts/agreements needs to be made to create incentives for landlords. Building owners/developers could be rewarded up front for energy efficient design and technologies through ‘deemed’ savings and tax rebates. Renting out buildings that do not meet the minimum requirements as defined could be made illegal. Further, to make the process more credible and effective, developers or building owners could enter into Engineering Performance Construction contracts (EPC) with ESCOs. The ESCO shall evaluate potential energy saving opportunities, make recommendations, carry out design work and implement the selected energy efficiency upgrade works, which will deliver energy cost savings and in return the building owner shall make periodic repayments over the term of the EPC to cover the ESCO’s costs. The ESCO shall guarantee the energy savings to be realised to cover the cost of the project and be win-win for all actors.
 7. **Domestic resource use:** As illustrated above, this would be primarily a domestically driven NAMA with the key institutional, technical, financial and man-power resources to be sourced locally. However, there is potential and scope for replicating building technologies and practices which have been successful elsewhere and suit the Indian conditions. Thus, technological and know-how exchanges could be undertaken with foreign agencies having expertise in the area. Also, linkages with global trading schemes is a possibility though a distant one in light of the current market situations.
 8. **Reduction in undesirable impacts:** The proposed initiative will not only reduce energy consumption and GHG emissions by buildings but would also create better living environments and improved health conditions through reduced air pollution levels. Some of the other indirect but positive effects include enhanced energy security, creation of green jobs, enhanced R&D in the buildings sector, etc. In addition, making buildings more energy efficient and climate friendly would also mitigate the risks associated with the ‘locking-in’ of wasteful energy use patterns for decades and thus loss of opportunity.
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NAMA Idea 4: Traffic Congestion Management in Indian Cities

Why Congestion Management?

Transport sector is a key contributor to global GHG emissions. According to IPCC Fifth Assessment Report the sector accounted for 7.0 GtCO₂eq of direct GHG emissions and was responsible for approximately 23 % of total energy-related CO₂ emissions in 2010. In India alone, transport sector emissions in 2007 were estimated to be 142.04 MtCO₂eq accounting for approximately 13% of total energy related CO₂ emissions of which majority of emissions were from road transport. Given that India is witnessing rapid economic growth with increasing urbanisation rates, emissions from the sector are likely to grow at a faster rate. It is therefore important that India's development trajectory avoids huge investments to be locked-in carbon intensive infrastructure.

Congestion pricing is one of the most commonly adopted measures worldwide. It has proved to be one of the most effective measures to control congestion in a few urban cities in the world. A congestion price is a charge imposed on the commuters for entering a crowded zone during peak hours of traffic. Commuters who are affected by the congestion pricing scheme, switch to public transport and other different modes. This leads to a substantial reduction in the traffic congestion during the peak hours and also in the level of emission of major greenhouse gases. This is evidenced by the review of literature of congestion tax in various metro cities around the globe. In this paper we have conducted a literature review of implementation of congestion charge in the developed nations such as Singapore, Stockholm, London and Hong Kong. We, then, have discussed the congestion problem in India with special focus on the National Capital, New Delhi and whether congestion pricing can be implemented or not. In the table below experience with congestion management from select countries is summarized.

Table E.1 Summary: Impact of Congestion Tax

S. no	Country and policy description	Impact	Revenue generated and use
1	Singapore		
	Area Licensing System- flat rate charged for unlimited entries into Singapore's Central Area	<ul style="list-style-type: none"> • 44% reduction in traffic • Travel speed increased from 11mph to 21 mph • 20% increase in bus ridership 	
	Electronic Road Pricing- electronic toll collection system	<ul style="list-style-type: none"> • Further 15% reduction in traffic • 65% commuters use public transport 	<ul style="list-style-type: none"> • 50 million USD generated • Revenue generated used in infrastructure development, maintenance of roads and public transportation

2	London		
	Virtual license with digital camera enforcement-overhead cameras recognize license plates	<ul style="list-style-type: none"> • Reduction in congestion by 20-30 per cent • 6 per cent rise in bus ridership • 12% increase in cycling • Some road space now dedicated to public transit. • Substantial fall in PM level and and Carbon Dioxide levels fell 15-20 per cent. • Increase in employment within the charging zone 	<ul style="list-style-type: none"> • £112 million revenue generated. • Revenue used for bus improvements and other transit facilities. • Additional revenues also spent for road safety.
3	Stockholm		
	Time-differentiated cordon toll	<ul style="list-style-type: none"> • Shorter travel time valued at 600 million SEK annually • Increased road safety valued at SEK 90 million • CO2 emissions were reduced by 15 per cent with reductions in Nitrogen oxides (NOx) and PM10 as well. 	<ul style="list-style-type: none"> • 730 million kr net revenue generated • Revenue used to make upfront investment in buses, transit and park-and-ride lots • \$200 million US in system operations
4	Hong Kong		
	Electronic Road Pricing-electronic toll collection system	<ul style="list-style-type: none"> • Aggregate benefits derived amounted to HK \$1.25 billion. • Net economic benefit from journey time saving and lower operating vehicle cost was about HK \$2 billion/year. • reduced vehicle emissions and reduced exposure to traffic noise inside the charging zone 	<ul style="list-style-type: none"> • gross revenue of HK \$0.4 to HK \$1.3 generated. • Revenue generated was utilized for transport infrastructure investment.

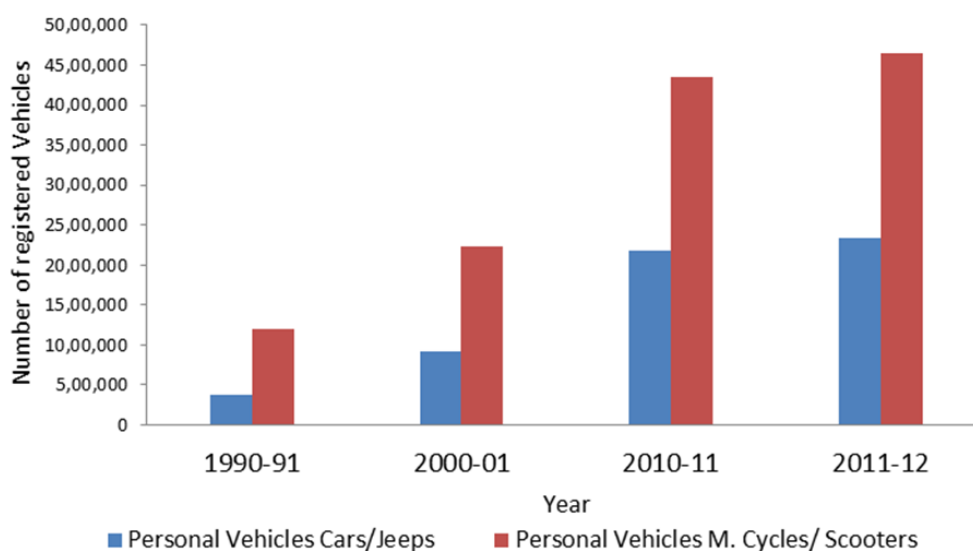
The case of Delhi

According to a recent study¹¹, GHG emissions of Delhi were about 38,633.2 Gg in 2007 of which 32% were from the road transport. The GHG impact of the proposed mitigation action has not been quantified yet.

¹¹ T.V. Ramachandra et al, 2015, GHG footprint of major cities in India, Renewable and Sustainable Energy Reviews 44 (2015) 473–495

According to census, Delhi's population grew by 22% between 2001 and 2011. The phenomenal growth in population has also put pressure on its transportation network, which is predominantly road based with 1284 km of road per 100 sq.km. The total road length (km. lane) has also increased twofold times in last decade, was 28508 km in 2001 and 31373 km in 2009. Not only this, there has been a parallel growth in registered vehicle on roads of Delhi (Figure E.1). However, the registered vehicles and increase in daily work trips are soon catching up with the huge road network. So much so that congestion is now recognised as a problem in Delhi with average vehicular speed being only 15 km/h in 2007. Increasing congestion has led to negative externalities such as wastages of fuel use, increased air pollution, increase in motorist/passenger stress and loss of productive time. It is crucial to intervene in the sector in order to provide a congestion free productive environment to the residents. Delhi Master Plan 2021 and Climate Change Agenda for Delhi calls for encouraging public modes of transport infrastructure. And a high powered committee chaired by Secretary Urban Development was also constituted to prepare a detailed action plan on how to decongest Delhi.

Figure E.1 Growth trends in registered motor vehicles



Source: Transport Department, GNCT of Delhi

Climate Change Agenda for Delhi 20 calls for discouraging the use of private vehicles by increasing tax on private cars to contribute to Transport Development Fund. A further congestion pricing instrument could be used to top up resources in the fund which could be used to build infrastructure that encourages use of NMV modes of transport such as having bicycle tracks throughout the city. The Delhi government has already taken few measures in order to cut down congestion levels. Some of them include completion of metro project in the adjoining cities of Gurgaon, Noida and Ghaziabad, adopting Intelligent Transport System (ITS) and the launch of Delhi Integrated Multi-Modal Transit System Ltd. (DIMTS). Expected benefits of congestion pricing are listed in Table E.2.

Table E.2. Expected Benefits of Congestion Pricing in Delhi

Sl No.	Benefits	Comments
1	Congestion reduction	Increases vehicular speed and reduce peak-period demand.
2	Road & parking savings	Reduces total vehicle travel and avoids the need to add capacity.
3	Transport choice	Increases motorists' choice and improves travel alternatives.
4	Road safety	Reduces crashes.
5	Environmental Protection	Reduces vehicle travel and reduces emissions.
6	Efficient land use	Increases the mobility

Source: Paper no. 552 Determination of congestion in central business district of New Delhi-A case study (Aditi Singh & P.K. Sarkar)

BARRIERS TO THE ADOPTION OF CONGESTION TAX

INEFFICIENT PUBLIC TRANSPORT

The public transport in Delhi needs further improvement. The metro rail does not cater to the needs of all the commuters as it still has poor connectivity in a few areas. There must be great accessibility to the public transit system if a congestion tax is to be levied such that commuters have reliable alternatives to travel. One factor behind the success of a congestion pricing scheme in the developed nations was an efficient public transport system which enabled the commuters to switch to public modes of travel.

CORRUPTION

The most challenging element in the development of the country's infrastructure is corruption. The revenue from taxes is generated for the purpose of infrastructural development and improvement. However, this revenue is hardly utilized for the purpose in question. The revenue is immorally used by the authorities for the fulfillment of their personal ventures. The problem of corruption in India has been there since long and it has a strong grip over the overall functioning of the political and economic system. The revenue from congestion tax, hence, is likely to be seized by the bureaucrats.

LACK OF USE OF TECHNOLOGY

Use of technology to control traffic is also negligible. Urban cities worldwide for e.g.: London, Stockholm, Singapore, etc. have adopted advanced technology to improve and manage the flow of traffic in an organized manner. India lags behind in introducing technology into its system. There's a great need of replacing the traditional method of managing traffic as it is inefficient and ineffective. The city lacks technical expertise to implement an automatic system to charge and collect the congestion fees.

LACK OF ROAD SAFETY

Traffic safety is another cause of concern which leads to further congestion on roads. Mishaps and accidents cause loss of lives and create inconvenience for other people commuting. In India, people,

especially youngsters, are ignorant to the traffic rules which are a major cause on accidents. There's a need to educate the individuals and create awareness regarding traffic rules.

SYMBOL OF STATUS

It is next to impossible to reduce the number of vehicles on roads as the ownership of cars. It, more than a mode of convenience, has become a status symbol. One family, today, owns more than one vehicle which further aggravates the problem of congestion on roads.

POOR ACCESS TO NON-MOTORISED TRANSPORT

The non-motorised mode of transportation is still poorly developed in the city. The availability is restricted only to very few areas in Delhi. Walking cannot provide to be a radical solution if traveling over larger distances. Also, commuting via bicycles on is not suggestive on Indian roads due to the improper infrastructure of the country. In order to make cycling a viable option, there needs to be separate lane for the purpose as adopted in various other nations such as U.S., U.K., South Africa, Europe, etc.

POOR URBAN PLANNING AND INFRASTRUCUTRE

For the efficiency of the public transport system, well planned roads and developed infrastructure are extremely crucial. The state of roads and flyovers is poor in Delhi. Also, there is great need to widen the roads and construct more flyovers. The 3-lane Rao Tula Ram Marg flyover in Delhi is one of the biggest examples of poor planning of roads and flyovers. It started off as a single lane flyover but later on was converted into a 3-lane which created major problems for the commuters traveling to and fro everyday on that route. Due to this major faulty planning the congestion in that area has further worsened. Another major example is the wrongly planned BRT corridor between the 5.8km stretch running from Ambedkar Nagar to Moolchand. It has created nuisances for the commuters traveling everyday over this route. This BRT pilot project was constructed on one of the narrowest roads and, hence, it turned out to be a failure. Construction of no more BRTs was proposed after this. Construction of more BRTs is required such that the traffic on the roads is well organized and creates less trouble for two and three wheelers. However, there is huge debate over whether the BRTs should further be constructed at all or totally be scrapped. Cities with success stories of congestion tax had well planned roads and freeways. Therefore, better urban planning is pre-requisite for the successful implementation of a congestion tax.

LACK OF ROAD SAFETY

Road fatalities have gradually increased over the past few years in Delhi. It is, therefore, essential to spread awareness regarding road rules to promote the safety of the commuters. People also need to develop road sense in order to prevent road rage cases.

UNWILLINGNESS TO PAY

People, generally, assume that traveling is free and no tax should as such be associated with the same. Due to this fact, there might be great resistance from the public to implement a congestion pricing scheme. This is major barrier to the adoption of such a policy.

Proposed NAMA: Traffic congestion management in Indian cities (illustration for Delhi)

In order to limit emissions from the sector Avoid-Shift-Improve (A-S-I) approach has been advocated. Further, the policies thrust upon the role of urban planning and development with better land use planning and infrastructure for increasing non-motorised modes. This will promote the use of public modes of transport along with the use of regulatory instruments such as delineating low emission zones, better emissions norms and traffic management. Economic instruments like the vehicle taxes, parking pricing, fuel taxes, and congestion taxes could be used to discourage private vehicle on roads. The funds so generated could be put back in the system to improvise on infrastructure for public modes of transport and/or technology improvisation. According to IPCC AR5, such policies and actions can provide co-benefits including improved access and mobility, better health and safety, greater energy security, and cost and time savings.

To implement the action, congested travel routes need to delineated and travel patterns need to be observed over a period of time. Different forms of congestion management could be used in the delineated area. For example, depending on the road structure a separate lane could be kept for high occupancy vehicles and emergency vehicles such as ambulance with no congestion tax. For rest of the lanes a congestion tax could be charged in peak hours which could be collected through a toll booth or special permits. The existing ITS could be used to implement such congestion pricing instrument. A study¹² has been conducted for the business area in Delhi in this regard.

The proposed NAMA will consist three phases.

Phase I: In phase I, assessment of feasibility and design aspects of congestion tax will be undertaken and accordingly a model for implementing congestion tax in Delhi will be developed. This will include, at the least, consideration on the following aspects:

- **Congested travel routes** need to delineated and travel patterns need to be observed over a period of time
- **Pricing issue:** differentiated tax as separate/no for high occupancy vehicles and emergency vehicles such as ambulance
- Congestion tax could be charged in **peak hours** collected through a toll booth or special permits
- ITS/DIMTS could coordinate such congestion pricing instrument

Phase II: In its phase II this tax model be implemented on a pilot basis. This can be a domestic NAMA supported by domestic resources.

Phase III: In the Phase III it will develop a supporting alternate public mode of transportation to meet the commutation needs of the citizen. We also propose to set up a Transport Development Fund from the collection of taxes to support creation of alternate transport infrastructure such as for non-motorized vehicles. This phase is recommended to be a supported NAMA, requiring significant international support.

¹² A. Singh & P.K. Sarkar, Paper no. 552 Determination of congestion in central business district of New Delhi-A case study, accessed at <
<http://www.irc.org.in/ENU/knowledge/archive/Technical%20Papers%20for%20Irc%20Journals/Determination%20of%20Congestion%20Cost%20in%20Central%20Business%20District%20of%20New%20Delhi%20-%20A%20Case%20Study.pdf> >

Assessment of the Idea against TERI-NAMA Approach

	Positive Impacts	Negative Impacts
Political Acceptability of International dimensions	High. International support (technology and finance) : may not be required for phase I&II; MRV requirements: ITS role enhanced	Medium. May not be willing to share live data on traffic flow in real time basis
Transformation of economy	High. Induce behavioural change ; discourages use of private vehicles.; greater energy security; productive time savings	
Cost-effectiveness /Implication	High. Using existing infrastructure; innovation in domestic source of fund; funds so generated could be used to promote NMV ; savings in productive time loss due to congestion	High. Additional burden to provide alternate modes of public transport
Social and Local Acceptability	Medium. improved access and mobility, better health and safety; promotes equitable access to affordable public means of transport in phase III	Medium. Shifts the burden to middle class; concerns of willingness to pay ; absence of reliable alternate public mode of transport
Environmental Impacts	High. Lowers air pollution,	Medium: Actual impact difficult to measure
Institutional feasibility	Medium. Past experience with DND, Gurgaon toll with PPP mode to collect toll charge; fund was already proposed as part of the Delhi climate change agenda proposed action talks of further strengthening it; ITS for MRV exists and its role can be enhanced	Medium: Social acceptance could impose challenge in phase I & II; therefore parallel and rapid progress on phase III required
Domestic Resource Usage	Difficult to determine ex-ante.	
Reduction in undesirable impacts	High. Encourages greater use of public transport as an alternate to private vehicles ; new finance for non-motorized modes ; reduces undesirable impacts of traffic congestion, air pollution etc.	

Key Deliberation Points

1. **Political acceptability of international support:** The two most important aspects are the international support (technology and finance) and MRV requirements. ITS could be modified to be used for MRV requirements. Domestic funds could be used to delineate the areas and modify the existing infrastructure. International support may not be required.
 2. **Transformation of the economy:** The proposed NAMA may help in bringing behavioural change and also change in lifestyles. The funds so generated could be used to promote NMV thus sending clear message that government is keen to discourage use of private vehicles.
 3. **Social and local acceptability:** There are concerns of equitable access to affordable public means of transport which could be address by implementing the proposed action as it would alleviate economic and social inequalities. However, there may be concerns of willingness to pay from the users of private vehicles unless a reliable alternate public mode of transport is available for them to switch.
 4. **Environmental consequences:** Apart from impacts on GHG emissions, other environmental benefits such as low air pollutants and co-benefits such as impacts on health are envisaged.
 5. **Cost-effectiveness:** The proposed action can raise finances and could be looked as an innovative mechanism to tap resources for investments in infrastructure for NMVs.
 6. **Institutional feasibility:** This needs to be evaluated further, but there have been past experience with DND, Gurgaon toll where PPP mode was used to collect toll charge. The fund was already proposed as part of the Delhi climate change agenda and the proposed action talks of further strengthening the fund collection.
 7. **Reduction in undesirable impacts:** The proposed action will encourage greater use of public transport as an alternate to private vehicles and more investments for non-motorized modes by the funds so generated. Thereby undesirable impacts of traffic congestion, air pollution etc. can be reduced.
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NAMA Idea 5:

Fuel Efficiency Standards, Labels and Incentives for Private Transport in India

Why Fuel Efficiency, Labels and Incentives together?

The private transport sector in India has witnessed significant growth over the last decade with increasing per capita incomes. This has resulted in increased consumption of petroleum products such as gasoline and diesel, while simultaneously adding to the carbon emissions due to fuel combustion. The last decade alone has resulted in tripling of fuel consumption in the Indian car fleet whose numbers have grown from 18 lakh sales per year in 2010-11 to 25 lakh sales per year in 2014-15¹³.

In the Indian automobile sector, sales are concentrated only in a few vehicle models. About 16 models account for about 80% of the total sales. These models tend to have small engine sizes and about 30% of these engines are powered with less than 1 L displacement and 90% of these vehicles are powered by engines under 1.5 L displacement¹⁴. Hence, due to the small average engine size, the Indian automobile sector's fuel economy stands at a better baseline as compared to USA and western European countries and with increasing growth in the sector, and there is a wider scope for improvement in mileage.

The issue however began being reflected in policy only as late as August 2010, when the Prime Minister's Office had passed a directive asking for fuel efficiency standards to be issued by the Ministry of Power under the Energy Conservation Act, 2001 and implemented by the Ministry of Road Transport and Highways. However, it may be noted that of the more than 80 car models plying on Indian roads at present, only 8 comply with these standards. The norms, if implemented will result in a saving of about 20 million tons of fuel by 2025, as per BEE estimates. This would have important consequences for oil import as India imports around 80% of its oil requirement. The subsequent carbon dioxide emissions savings are projected to come down from 142 g/km in 2010-11 to 129.8 g/km by 2021-22 and 113 g/km from 2022 onwards¹⁵.

Thus, with proactive participation of the auto manufacturers and political will of the regulating agency viz. BEE, fuel efficiency in the automobile sector and the associated targets, standards, incentives and policies required for its accelerated implementation lends itself as a suitable candidate for the development of a partly supported Nationally Appropriate Mitigation Action (NAMA) proposal for India.

Policy Instruments already in place

Sector wide CAFÉ Targets

Mandatory Corporate Average Fuel Consumption (CAFC or CAFÉ) standards for the entire automobile industry were notified by the Ministry of Power under the Energy Conservation Act in 2013 and will be implemented by Ministry of Road Transport and Highways. This will stipulate targets for fleet-wide emission reductions in two phases from a baseline of 141 g/km in 2010-11 to 129.8 g/km by 2021-22 in phase 1 and 113 g/km from 2022 onwards in phase 2. The norms will

¹³ SIAM, 2015

¹⁴ SIAM, 2015

¹⁵ BEE (2011) Consultation Paper on Passenger Car Fuel Economy Labeling and Standards Framework. Govt. of India.

cover all auto fuels including petrol, diesel and gas. The standards will stipulate the consumption of fuel on the basis of total vehicles manufactured.

BEE Star Label Scheme

The BEE star labeling provides consumers with information about the fuel consumption of a particular model, and also, through a star rating (on a scale of one to five) provides information on the relative fuel consumption of the model compared to other models in the same weight class. The labeling started as a voluntary scheme in 2013 and has been made mandatory since 2014.

Fiscal Incentives for Fuel Efficient Vehicles

The government also provides fiscal incentives which are linked to the fuel economy of the vehicles. An excise duty is levied by the Ministry of Finance at the rate of 8% for vehicles with efficiency of above 90% of the average, while those that do not fall under this bracket are subject to 24% excise duty.¹⁶

Penalties for Non-Compliance

BEE is empowered under the Energy Conservation Act, 2001 to levy penalties for those cars which fail to comply with the norms. The penalties would serve as a deterrent to auto manufacturers and act as a driver for the sector to produce fuel efficient vehicles.

Options and Challenges

Parameters	Phase 1	Phase 2
Target	129.8 g/km from 2016-17 to 2021-22	113 g/km from 2021-22 onwards
Options	Can be met with fine-tuning and optimization of current designs	Requires redesigning and retooling with additional features to improve tyre efficiency, aerodynamic designs, engine technology improvements
Willingness	Starting of Phase 1 already delayed by a year. Willingness not high.	Willingness unpredictable. Not expected to be high due to large investments in technology and design features which will affect car price and sales.
Challenges	<ul style="list-style-type: none"> - Sector already under pressure due to declining sales (first sales drop in 10 years). - Higher fuel costs and high interest rates for 	<ul style="list-style-type: none"> - Adoption of Phase 2 standards will require additional investments in technology which would increase car prices to the tune of Rs. 80000 to 1 lakh as per SIAM estimates. - Weak penal provisions create perverse incentive structures to adopt Phase 2

¹⁶ Central Board of Excise and Customs, 2015

	<p>loans deterring car buyers further leading to reduced sales.</p> <p>- Would increase production costs.</p> <p>-72 out 80 models do not comply with the standards (weak baseline compliance).</p>	<p>standards. Penalties for non-compliance could be much lower than additional cost of shifting to new production lines to meet the stricter emission norms.</p>
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Status in Other Countries

Country	CAFÉ Targets (2010) g/km	CAFÉ Targets (2020) g/km
EU	145	95
USA	187	121
China	179	117
Japan	130	125

Options for India and Challenges

- EU has an average weight of car fleet of 1300 kg and is pushing for a 3.4% per year reduction in CAFÉ emission norms. India with an average fleet weight of 1050 kg stands at a better baseline and yet has proposed only a relatively marginal improvement in CAFÉ standards at 1.6% per year. Keeping this in mind, even a modest improvement of 2-2.5% per year will result in a CAFÉ standard of 107 to 98 g/km by 2022.
- However with phase 2 targets already set at 113 g/km from 2021-22 onwards, the additional reduction of 8 to 15 g/km may be achieved through international support of climate finance agencies through mechanisms such as GCF.
- EU had adopted regulations to achieve reductions in CO₂ of upto a difference of 10 g CO₂/km through implementation of a) Use of biofuels, b) Gear shifting reminders, c) Efficient Air Conditioners, d) Low Rolling Resistance tyres, e) Limit curve for light commercial vehicles. While some of these measures are being taken seriously by the auto sector such as low rolling resistance tyres and engine technology improvements, there is scope for the penetration of other low hanging fruits. For e.g. India already has a biofuel policy in place but it does not extend to private transport vehicles. Mandating use of biodiesel (with a fixed % of biomass in diesel) for cars could be considered to reduce average emissions. In addition, use of energy efficient air conditioners in vehicles may be proposed with targets based on vehicle models.

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- Further, there are no incentives provided to car models with lower average fleet weights. The BEE consultation paper takes yearly increase of average fleet-wide weights as a given. Since CAFÉ standards is directly proportional to the fleet-average weight, incentives to reduce fleet weight through greater production of smaller- sized vehicles or through incorporation of light-weight vehicles using advanced aerodynamic features will greatly enhance fuel economy.
 - Barriers to the adoption of the above measures are mostly in the realm of cost. A careful analysis of the extent to which refitting as well as introduction of well-established technologies could enhance fuel economy as against the more advanced technological and design features must be carried out. This would provide insights on additional costs required to adopt global best practices which would take the fleet-wide CAFÉ emissions beyond the stipulated target of 113 g/km for phase 2. Thus, the international climate finance support through NAMA could be sought for taking the CAFÉ standards from the phase 2 target of 113 g/km closer to the theoretical maximum based on global best practices.

Proposed NAMA: Fuel Efficiency Standards, Labels and Incentives for Private Transport

In the first phase, mileage norms are expected to be at or above 18.2 km/l by 2016-17. In the second phase, mileage is expected to be at or above 22 km/ltr by 2022. The BEE star labeling system started as a voluntary scheme in 2013 before it was made mandatory in 2014. Thus with both the emission targets viz. CAFÉ standards and BEE star labeling being made mandatory for the automobile sector, the policy NAMA may begin in immediately and extend till 2022 until the targets for Phase 2 is achieved.

- **Higher target is technologically feasible:** EU with heavier vehicles (1300kg) compared to India (1050kg) has a target of 95g/km by 2020. **Can/Should India leapfrog?**
- **Supported content of NAMA:** Current post-2022 targets are up-scaled to match the EU targets conditional upon international support for technology transfer enabling India to leapfrog. As such manufacturers would face similar challenges as with current targets.

Implementation of NAMA

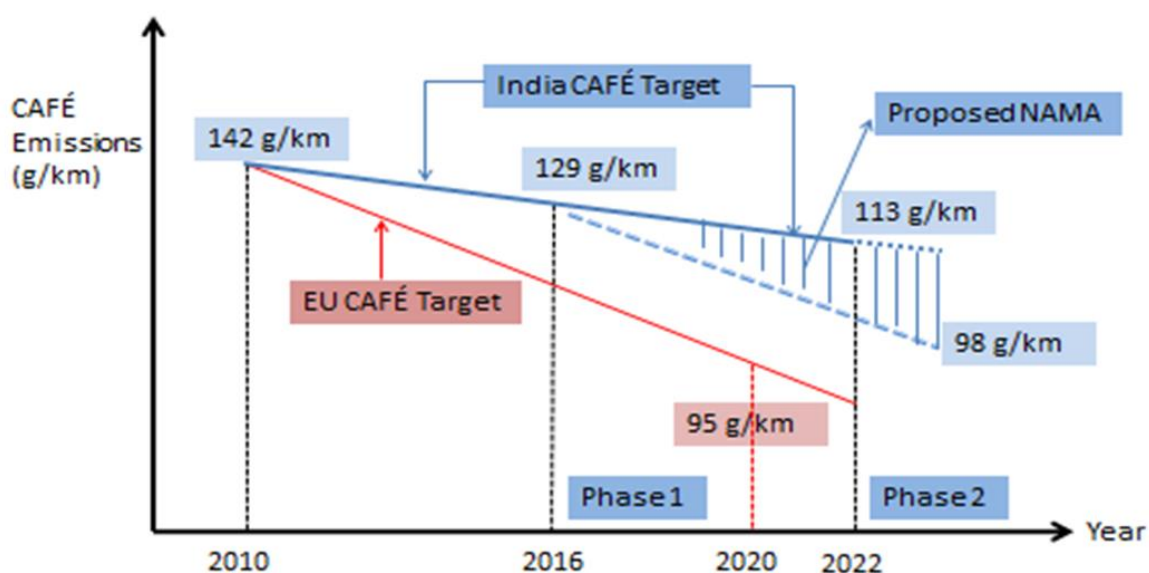
The implementation of the NAMA will follow the same timeline as that of the targets for CAFÉ standards and BEE star labeling scheme enforcement.

MRV of NAMA

The key indicators for the domestic Measuring, Reporting and Verification (MRV) of Fuel Efficiency NAMA are tracking the progress of fleet-wide CAFÉ standards and tracking the enforcement of BEE star labels. With respect to the former, manufacturers are mandated to provide annual sales data to the Ministry of Road Transport and Highways, which would compute average kerb weight of car sales during the year of each manufacturer, and the corresponding CAFÉ standard. The computed CAFE would be checked against compliance against 2015-16 and 2020-21 standards at the end of those target years. As far as the latter is concerned, the fuel efficiency value quoted by the manufacturer indicating the star rating will be monitored for conformity of production which can serve as MRV to track progress in the labeling scheme. The international finance which is proposed

for covering the cost of outreach activities for the labeling scheme may be MRVED through annual audits of BEE.

Figure F.1: Illustration of Proposed NAMA



Assessment of the Idea against TERI-NAMA Approach

	Positive	Negative
Political Acceptability	High Government is already pursuing the possibility	Moderate: Depends on the terms of technology transfer
Transformation of economy	High: Avoid lock-in in low efficiency vehicles, contribution to energy security; may push technological innovation globally (higher norms in USA, China, Japan)	
Cost-effectiveness /Implication	Moderate: reduced fuel bill for consumer but high upfront cost	High: high upfront investment, long pay-back period
Social and Local	Low/Moderate: willingness to buy expensive vehicle but demand for	High: manufacturer not interested, infrastructure

Acceptability	cleaner air	challenges, fear drop in sales, only 8 out of 80 models meet the Phase I standards
Environmental Impacts	High: GHG emissions and air quality	
Institutional feasibility	High: already existing framework	
Domestic Resource Usage	Low/Moderate:	High: Import of technology/product
Reduction in undesirable impacts	High: reduced pressure on oil imports	

Key Deliberation Points

1. Political Acceptability of International Dimensions

International climate finance is proposed which would enable the auto manufacturers to pay BEE for implementing the star labeling system. This represents the cost of enforcement of the standards which would be used by BEE for the outreach of the labeling scheme. Transfer of finance through international funding agencies will save the auto manufacturers of this additional burden, given that it would already require them a significant investment in the necessary technology for meeting the CAFÉ standards. Given the pressure from various civil society groups (in addition to the domestic pressure) to curb air pollution in India's metros, availing climate finance for this purpose is expected to be internationally politically feasible.

2. Transformation of Economy

The norms will incentivize automobile companies to invest in systems and components that will enable reduce the fleet-wide CO₂ emissions. These include including investments to improve tyre efficiency through penetration of low rolling resistance tyres, engine technology improvements in turbochargers and variable transmissions using new materials, use of idle stop and dual-clutch transmission, electric air conditioning, reducing vehicle weight through improved aerodynamic features of vehicle design, use of efficient air conditioners, etc.

These developments will enhance private sector participation in auto component manufacturing SMEs which would align well with the new government's 'Make in India' initiative. Successful implementation of the CAFÉ standards will also have important consequences for energy security as it would result in a net fuel savings of 20 million tons by 2025.

3. Cost Effectiveness

Cost to Manufacturer

The standards specify the fuel consumption norms that manufacturers have to meet. Compliance with the standard would require manufacturers to invest in new technology and production lines. This would require time to redesign and retool in order to meet the standards. The standards are

therefore being specified for the sales that occur between the fiscal years 2015-16 and 2020-21. It is expected that the 2015-16 standards could be met through fine tuning and optimization of current designs whereas the 2020-21 standard would require complete redesigning and retooling.

As per unofficial BEE estimates, car prices are likely to rise by Rs.25,000-40,000. According to SIAM, the price increase with taxes included will rise to between Rs.80,000 to Rs.1 lakh, depending upon the models.

As far as cost of penalties are concerned, car makers that fail to meet carbon emission norms will be fined Rs.10 lakh initially and asked to pay a penalty of Rs.10,000 per day till such time the car models meet the norms¹⁷.

Cost to Beneficiaries

While it may be expected that the increase in cost of vehicles due to adoption of fuel efficiency technologies will be passed on to the consumers, it should be noted that the capital costs increase will be matched by a decrease in running cost of the vehicles due to the improved mileage whose payback period may be estimated by modeling variations in future oil prices.

Cost to Regulator/Government

A fee per car would be charged to the auto manufacturer payable to BEE for rolling out the star labeling system. This would cover the costs of outreach.

The government also provides fiscal incentives to encourage fuel efficiency in vehicles. An excise duty is levied by the Ministry of Finance at the rate of 8% for vehicles with efficiency of above 90% of average by the Ministry of Finance. While the auto sector expected more tax cuts for fuel efficient vehicles in Budget 2015, these have not been met and there is scope for more fiscal incentives to be extended for high mileage vehicles in future.

4. Social and Local Acceptability

The cultural acceptability of the fuel efficiency NAMA can be argued to be significant. This is so because mileage is one of the most important criteria for Indian middle-class consumers when it comes to purchasing of vehicles. Thus vehicle manufacturers would be forced to report correct information when it comes to fuel economy. Accuracy of information would further be strengthened by mandatory star labeling system. In addition, the job creation in the automotive and engine component manufacturing sectors that would spin off from the implementation of these standards would further enhance the social acceptability of the NAMA.

5. Environmental Consequences

Implementation of CAFÉ standards will have implications on CO₂ reduction as well as indirect benefits of improved air quality. While CO₂ emissions savings are projected to come down from a fleet-wide average of 142 g/km in 2010-11 to 129.8 g/km by 2021-22 and 113 g/km from 2022 onwards, some of the engine components which would need to be introduced to enhance fuel economy would also have co-benefits in mitigating PM pollution such as HC and NOx.

6. Institutional Adequacy and Compliance

The legal and institutional framework is in place in the form of Energy Conservation Act (2001) and Motor Vehicles Act (1988) which empowers the Ministry of Power and Ministry of Road Transport and Highways respectively to notify and provide technical regulations for implementation of the

¹⁷ Consultation Paper on Passenger Car Fuel Economy Labeling and Standards Framework, BEE (2011)

CAFÉ standards. The BEE star labeling scheme is under the charge of Ministry of Power. However of the more than 80 car models plying on Indian roads at present, only 8 comply with these standards. With the mandatory labeling system in place from 2014, the situation may be expected to improve in the coming years.

7. Domestic Resource Use

As far as human resources is concerned, the labeling scheme is run by qualified experts from the BEE which being an autonomous and trustworthy regulator, is likely to encourage synergies with SIAM. In terms of technological and financial resources, the target for CAFÉ standards is expected to drive the auto sector to mobilize the requisite funds to meet the fuel efficiency norms. Thus these barriers are the key bottlenecks in implementation of the NAMA.

Annexure 3
Nationally Appropriate Mitigation Actions:
Overview of Policy and Action

Nationally Appropriate Mitigation Actions: Overview of Policy and Action

Executive Summary

MRV of NAMAs

- NAMAs have to undergo a process of measurement, reporting and verification of their impact, including GHG emission reductions achieved.
- MRV is closely linked to the source of support with separate guidelines for NAMAs that have been funded by domestic sources and those funded internationally.
- MRV guidelines for domestically supported NAMAs stress upon existing arrangements, systems and processes in a country for measuring and verifying emission reductions achieved.
- At this stage, guidelines do not exist for NAMAs funded internationally. Similarly, there is no agreed guideline on MRV of support provided to developing countries.

NAMA Support

- No multilateral channel for dedicated NAMA support exists at present.
- Dedicated channels for NAMA funding are few and largely bilateral, but these are offering substantial resources at the moment.
- Pre-existing support facilities have also started re-channeling support for NAMA preparation and implementation. But the nature of this finance is unclear as some facilities were established for development cooperation.
- Grants and concessional loans are the major type of finance being offered.
- Focus of most support providers is on leveraging private sector finance and supporting the most difficult/innovative aspects of a NAMA.
- At present, no guideline/norm exists on the amount of support provided for covering incremental costs of actions.
- Sectors such as buildings and transport which had limited performance in CDM appear to have significant traction among NAMA support providers.
- Support facilities are following different procedures for project selection- ranging from call for proposals to a pre-approved project pipeline developed by financial institutions/in consultation with countries.
- Many support providers expect some form of ex-ante approval by governments for the submitted NAMA proposals. The exact nature of approval differs in case of different facilities, even those established by the same country.
- Limited direct involvement of recipient countries exists in strategy development/decision making in bilateral support facilities.

Key findings from NAMA databases

- Large number of NAMAs demonstrate a need for international finance for mitigation
 - NAMA proposals are developed with the view of attracting international funding
 - NAMA proposals must generate co-financing for the activity from public-private sources such that international finances can be phased out eventually (Unilateral NAMA with supported elements)
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- Key elements of selected NAMAs are – transformation, modernization, energy security, feasibility, and ambitious mitigation goal
 - Most NAMAs are seen as holistic sectoral programs which incorporate for setting up funds and financial mechanisms, capacity building activities across stakeholders, and implementation framework for MRV.
 - These were in the form of policies, programmes, programme of activities, specific actions, research and development activity, capacity building, funds and incentive framework, market based mechanisms, domestic credit trading mechanisms etc.
 - Relationship between NAMAs and other market based mechanisms are yet not clear though few countries visualize it as a means for generating additional funding beyond international support under UNFCCC framework.
 - All sectors except agriculture and LULUCF are extensively developing NAMA proposals.
 - Renewable energy and energy efficiency are seen as main action for mitigation
 - NAMAs are developing extensively worldwide. Activities are well distributed across regions though concentrated in few countries. However, many readiness programmes and capacity building activities are being undertaken on NAMAs in many different countries.
 - MRV development is restricted due to data limitations. Countries are increasingly engaging in readiness via GHG inventorization in specific sectors and/or across economy.
 - Most activities on NAMAs in countries are happening out of speculation/ambivalence and no formal NAMAs are proposed by the national government yet.
 - Channel of flow of finances are bilateral (mostly for capacity building activities) and thus the exact nature of financial and capacity building support by the Non-Annex 1 as per UNFCCC mandate is not clear.
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Introduction

The phrase ‘nationally appropriate mitigation actions’ has come a long way since it was first introduced in the Bali Action Plan in 2007. From a qualifying expression for embedding national circumstances into voluntary mitigation actions taken by countries it has now come to imply a mechanism to facilitate mitigation actions in developing countries. The abbreviation ‘NAMA’ arguably has overshadowed the political underpinnings of its parent articulation. On the ground, it seems to have moved away from the conditionality of MRV-able support with technology, finance, and capacity building to the issues of guidelines for MRV, ambition of mitigation and the actions as such. This paper provides a brief overview of how NAMA landscape has evolved over the years in terms of policy discourse as well as actions being pursued by various countries with a label of NAMAs.

NAMAs in the Policy Space

Over the years the discussions at the UNFCCC on the subject of NAMAs have focused on three key aspects i.e. clarity of the concept; a registry acting as a multilateral platform for registering NAMAs and facilitating support; and the procedures for Measurement, Reporting and Verification (MRV) of NAMAs and support. Figure 1 provides a synoptic overview of developments under each of these aspects within the UNFCCC, from 2007 onwards. While the policy debate around the NAMA Registry has been closed with the establishment of its web-based platform, the questions relating to the concept and MRV continue. In addition, there have been developments relating to support for NAMAs, both within and outside UNFCCC which have significant policy implications.

The Concept of NAMA

The debate on NAMAs in terms of policy has dealt with defining type of mitigation actions that can be called NAMAs. While the research community has tended to label all sorts of desirable mitigation actions as NAMAs, there is an emerging recognition that an action with mitigation benefits (primary or co-benefit) becomes a NAMA once the government of the country of origin / implementation reports it in public domain as NAMA. It is also recognized that NAMA can take various forms. In terms of its scope a NAMA may include a variety of policies – national policies, sectorally focused policies; different kinds of targets – emission reduction below BAU in tonnes CO₂ equivalent, GDP intensity based targets; and specific programmes, climate actions/projects conceptualized as NAMAs. This means there is no fixed definition of scale for designing NAMAs. In terms of governance aspect of NAMAs three types namely, unilateral NAMAs, supported NAMAs and credited NAMAs are most prevalent options in international discussions. However, countries are increasingly recognizing hybrid NAMA types as the new focus of support where both national government and international community support a given NAMA activity together under some agreed arrangement. The possible combinations of these two ways of categorization are the source of issues dealing with diversity of NAMAs in the UNFCCC discussions.

	Concept	Registry	Measurement, Reporting and Verification (MRV)
2013	<p>Warsaw, COP 19</p> <ul style="list-style-type: none"> Work programme continues, exploring issues such as methodologies to determine baseline in the context of diversity of NAMAs 	<ul style="list-style-type: none"> First version of web-based registry was deployed in October 2013 Fully functional prototype was deployed in April 2013 	<p>Warsaw, COP 19</p> <ul style="list-style-type: none"> Adopted general guidelines for domestic MRV of domestically supported NAMAs
2012	<p>Doha, COP 18</p> <ul style="list-style-type: none"> Parties decided to establish a work programme, running from start of 2013 to end of 2014, to further the understanding of the diversity of NAMAs 	<ul style="list-style-type: none"> Prototype Registry website became operational from August 2012 	
2011	<p>Durban, COP 17</p> <ul style="list-style-type: none"> Parties decided to continue NAMA workshops 	<p>Durban, COP 17</p> <ul style="list-style-type: none"> Parties decided to develop the registry as a dynamic, web-based platform Secretariat was requested to develop a prototype of the registry 	<p>Durban, COP 17</p> <ul style="list-style-type: none"> Guidelines for the preparation of BURs were adopted Modalities and guidelines for ICA were adopted
2010	<p>Cancun, COP 16</p> <ul style="list-style-type: none"> Conference of Parties (COP) requested the UNFCCC secretariat to organize workshops for developing countries to understand the diversity of mitigation actions submitted, underlying assumptions and any support needed for the implementation of these actions 	<p>Cancun, COP 16</p> <ul style="list-style-type: none"> Parties decided to set up a registry to record NAMAs seeking international support and facilitate matching of finance, technology and capacity-building support for these actions Registry would record information on NAMAs seeking international support; support 	<p>Cancun, COP 16</p> <ul style="list-style-type: none"> Parties decided that non-Annex I Parties will submit national communications every four years; and biennial update reports (BURs) every two years Parties decided to conduct international consultations and analysis (ICA) of BURs A work programme was agreed upon for the development of modalities and guidelines for: <ul style="list-style-type: none"> a. facilitation of support to NAMAs

2007

	<p>available from developed country Parties for these actions; support provided for NAMAs, and recognized domestic NAMAs</p>	<p>through a registry; b. MRV of supported actions and corresponding support; c. BURs as part of national communications; d. domestic verification of domestic NAMAs; e. ICA</p>
<p>Bali Action Plan, COP 13</p> <ul style="list-style-type: none"> The term Nationally Appropriate Mitigation Actions (NAMAs) was coined 		<p>Bali Action Plan, COP 13</p> <ul style="list-style-type: none"> NAMAs will be measurable, reportable and verifiable in the context of sustainable development, supported and enabled by technology, financing and capacity building.

Figure 1: Evolution of NAMAs in Negotiations at the UNFCCC

Measurement, Reporting and Verification of NAMAs

Both domestic and international NAMAs have to undergo a process of measurement, reporting and verification (MRV). COP 16 decided that both the categories of NAMAs would be MRVed domestically. However, the type of MRV would differ depending on the funding source of the activity, i.e. NAMAs supported by international financing would follow international MRV guidelines while domestically supported NAMAs would have to follow internationally agreed domestic MRV guidelines.

From the point of view of total effort of a country on MRV of its voluntary mitigation contributions, the current architecture is developing at two levels. The **first level** of MRV would be at the country level. Discussions on NAMAs have been closely linked with deliberations on increasing the frequency of country level reporting. In COP 16, Parties agreed that developing countries will submit biennial update reports (BURs). Countries would report an update to the previous national communication along with description of the mitigations actions being undertaken, domestic MRV arrangements in place and support needed and received¹⁸ by developing countries. The contents of BURs would undergo an international consultation and analysis (ICA), involving a technical analysis followed by a presentation to Parties involving an oral question and answer session. The **second level** of MRV would occur at the level of individual NAMAs. This would be undertaken by domestic agencies based on agreed guidelines that would differ depending upon the source of finance of NAMA (domestic or international). Generic guidelines for domestic MRV of NAMAs which would be domestically

¹⁸ Developing countries have to submit National Communication (NATCOM) once in four years. Under the enhanced reporting, the BUR (once it two years) would become a part of the NATCOM in cases where it coincides with the NATCOM reporting year.

supported were decided upon in COP 19 in Warsaw¹⁹. The guidelines are voluntary in nature and stress upon utilizing the existing arrangements, systems and processes in a country for measuring and verifying emission reductions achieved. A COP guideline does not exist at this stage for NAMAs supported internationally. As per the present trend of NAMA support, some commentators hold the view that such MRV would be ‘donor driven’ as per the processes of individual support providers²⁰.

International Support for NAMAs

International support has been a defining aspect for NAMAs as it sets the premise for differentiating between domestic and supported actions and could delineate the nature of MRV procedures they would undergo. Some clarity on available support has been seen after the NAMA registry became operational in late 2013. To identify and understand the way NAMA support is developing, we focus on support providers who have expressed their interest through the NAMA registry. For the purposes of this paper, we follow the categorization of support agreed by Parties and followed in the registry templates i.e. financial support, technological support and capacity building support.

(1) Available sources of support

Eight support providers have explicitly recorded their interest in extending support through the registry²¹. These correspond against 39 submissions of NAMAs requiring support. The Green Climate Fund (GCF) is also nearing operationalization. Dividing these sources according to the channels they belong to and the degree of exclusivity²² these channels have for NAMA support, available support can be classified into 4 broad categories (Table 1):

- A. Bilateral Channels with exclusive focus on NAMAs
- B. Bilateral Channels where NAMAs are one of the areas of support
- C. Multilateral Channels with exclusive focus on NAMAs
- D. Multilateral Channels where NAMAs are one of the areas of support

Among the sources of bilateral support, Austria’s NAMA Initiative and the NAMA Facility by United Kingdom and Germany are two initiatives which have been established for dedicated funding for NAMAs. Both these channels have been established recently, the former was registered with the NAMA registry in early 2014 and the latter was announced during COP 18 in Doha. NAMA facility is the first dedicated facility established for NAMAs and has already started disbursing support. Five support submissions are from already existing initiatives and facilities/funds established for development cooperation, with a global or regional focus on environment and climate change. The International Climate Initiative (IKI), for instance, is an initiative of Germany’s Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). IKI funding focuses on the broader theme of climate protection, under which mitigation forms one category. Similar is the submission from German Federal Ministry for Economic Cooperation and Development (BMZ). Three Investment Facilities, namely Neighborhood Investment Facility (NIF), EU-Africa Infrastructure Trust

¹⁹ Decision 1/ CP 16, The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, para 61, 62, UN Doc. FCCC/ CP/ 2010/ 7/ Add.1, 11 March 2011

²⁰ Lachlan Cameron et. al, “Annual Status Report on Nationally Appropriate Mitigation Actions”, Report by Ecofys and ECN as part of Mitigation Momentum Project (2012)

Anmol Vanamali, “Emerging trends in climate finance”, Report by Center for Clean Air Policy (CCAP) under Mitigation Action Implementation Network (2012)

²¹ As of April, 2014

²² By exclusivity we mean whether the channel has an exclusive focus on NAMAs or funding for NAMAs have been integrated into the broader areas of support provided.

Fund (ITF) and Latin American Investment Facility (LAIF), which come under the broader rubric of EuropeAid- the European Union Commission’s Directorate General for Development and Cooperation, have also extended support for NAMA development.

Among the multilateral channels of support, no channel has only NAMAs as an area of focus. However, the Global Environmental Facility (GEF) and the Green Climate Fund (GCF) both would provide support for NAMA financing. The GEF has submitted its intention of provide NAMA support in the registry. In 2013, it supported four countries for NAMAs. The GCF’s governing instrument mentions support provision for NAMAs and LCDS. The fund is expected to operationalize by the end of 2014 but at present, does not hold significant resources.

(2) Type of funding support available

The key types of funding instruments used by different facilities are²³:

Support Submission	Type of support
NAMA Facility	Grant and Concessional Loan
Austrian NAMA Initiative	Grant and Carbon Finance
IKI	Grant and Private Loan
Climate related ODA funding	Grants and Concessional loans
NIF	Grant, Guarantee and Equity Financial Instruments used: technical assistance and risk capital operations
LAIF	Grant and Private Loan Financial instrument used: loan guarantees, interest rate subsidies, technical assistance and risk capital operations
ITF	Grant, Guarantee and Equity
GEF Trust Fund	Grant

Most facilities have indicated an interest in providing support in the form of grants and concessional loans. A key focus of most facilities is to use public finance for leveraging private sector financial flows by using tailored climate finance instruments such as loan guarantees, interest rate subsidies, risk capital etc. Some facilities also mention carbon finance i.e. resources provided to a project to purchase greenhouse gas emissions reductions as a type of support²⁴. Some initiatives mention their intention

²³ Source: NAMA registry submissions on support (as of April, 2014)

²⁴ Under Kyoto Protocol, emission reductions purchased by Annex I Parties from projects developed in non-Annex I Parties can be used for achieving the former’s legally binding emission reduction targets. In case of NAMAs, a category of credited NAMAs, i.e. emission reductions from NAMAs projects which can be bought by Annex I Parties have been discussed by some countries, notably by Korea.

to finance the most innovative parts of a NAMA. For instance, support from NAMA facility for Mexico's NAMA in buildings sector will be utilized in a manner that pilot interventions could be scaled up to the sector level through improving the capacities of agencies, introduction of legislative frameworks and building codes; financial assistance for application of ambitious energy efficiency standards and inclusion of eco-technologies; and improving and disseminating existing promotion and incentive instruments in the country²⁵. Facilities like ITF, NIF and LAIF engage with development finance institutions (largely European) to blend their grant funding with loans i.e. to receive a grant contribution from these, a project must be financed by an eligible European Finance Institution. GEF provides pure grants.

(3) Purpose of support

NAMA support is available for preparation of NAMAs and NAMA implementation. The former includes design and development of concrete NAMA proposals which can be readily funded. Among the support providers mentioned before, four provide support exclusively for preparing NAMAs (table __). Three provide support for NAMA implementation, while GEF supports both.

While most facilities provide support to all countries, some have specific focal areas. E.g. Austrian NAMA Initiative prefers funding to Africa, SIDS and LDCs. NIF, LAIF and ITF were established for greater regional cooperation for financing of capital intensive infrastructure projects. As elaborated in the previous section, sectors which had limited performance in CDM appear to have significant traction as NAMAs. From a funder's perspective as well, sectors such as residential and commercial buildings, transportation, transport infrastructure, energy supply and energy efficiency appear to be favorable ones. The recently funded NAMAs validate this case. Among the four NAMAs funded by GEF in 2013, three focus on energy generation, energy supply and end-use sectors such as buildings, transport etc²⁶. Two of the four proposals selected for in-depth review in NAMA facility's first call for proposals focus on transport sector. The facility is also funding a building energy efficiency NAMA in Mexico.

As per the provisions of the convention, NAMA support should cover the incremental costs incurred during implementation of actions. In the absence of a definition of incremental costs under UNFCCC, actors developing NAMAs can independently define how they arrive at these costs. Further, different agencies use their own metric of estimating the amount of support they can provide. In some cases such as Austria's NAMA initiative and NAMA facility, an upper limit of support that would be provided per NAMA is explicitly mentioned. GEF defines a five step approach to determine the 'incremental costs', which are eventually arrived at through negotiations²⁷.

²⁵ Source: <http://www.mitigationpartnership.net/nama-sustainable-new-housing> and

http://nama-facility.org/fileadmin/user_upload/pdf/NAMA_Facility_General_Information_Document_April2014.pdf

²⁶ Source: GEF website

²⁷ http://www.thegef.org/gef/policy/incremental_costs

Table __: Landscape of Support Available for NAMA development

Support Submission	Support provided for		Coverage	
	NAMA preparation	NAMA implementation	Regional	Sectoral
NAMA Facility		√	All	Energy supply Transport and its infrastructure Residential and commercial buildings Agriculture Waste management Industry Forestry
Austrian NAMA Initiative	√		Africa, LDCs, SIDS	Energy supply Residential and commercial buildings Energy efficiency
IKI	√		All	Energy supply Transport and its infrastructure Residential and commercial buildings Agriculture Waste management Industry Forestry
Climate related ODA funding	√		All	Energy supply Transport and its infrastructure Residential and commercial buildings Agriculture Waste management Industry Forestry
NIF	√		Eastern Europe	Energy supply

			Middle East and North Africa	Transport and its infrastructure Industry Forestry Waste management
LAIF		√	Latin America and Caribbean	Energy Supply Transport and its infrastructure
ITF		√	Africa	Energy supply Transport and its infrastructure
GEF Trust Fund	√	√	All	Energy supply Transport and its infrastructure Residential and commercial buildings Agriculture Waste management Industry Forestry

All: Africa, Asia Pacific, Eastern Europe, Latin America and Caribbean, LDCs, SIDS, Middle East and North Africa

(4) Modalities and procedures for providing support

The facilities follow different procedures for project selection. Both IKI and NAMA facility, the former operational since 2008 while latter from 2012, issue call for proposals²⁸. IKI issues a call annually. NAMA facility has recently issued its second call for proposals; however the frequency of its calls is not specified. The selection procedures are also similar. A technical support arm of the funding body, GIZ in the case of IKI (called IKI Programme Office) and GIZ and KfW (called Technical Support Unit), assess the submitted applications and forward them to the decision making body i.e. BMUB for IKI and NAMA Facility Board for NAMA Facility, which takes the final decision. The NAMA facility further involves an independent third party for review of submitted project outlines. In the second stage, detailed funding proposals are submitted. Both facilities mention that they share results of the evaluation process with the project developers in writing, probably for clear communication on the reasons of success/failure.

In European Union Commission's Investment Facilities i.e. NIF, ITF and LAIF, a group of financial institutions (called Project Financier Group (PFG) in case of ITF and Financial Institutions Group (FIG) in case of LAIF and NIF) have a major role in project identification. Funding decisions are made from a pre-existing project pipeline compiled by the eligible Financial Institutions (FIs). Each facility has different set of eligible FIs. For instance, in NIF, these include European Public FIs and bilateral FIs of

²⁸ <http://www.international-climate-initiative.com/en/about-the-iki/iki-funding-instrument/>

<http://www.climatefundsupdate.org/listing/international-climate-initiative>

member states while in LAIF some Latin American Finance Institutions are also eligible²⁹. Except for LAIF, where project pipeline is presented at least once a year to the LAIF Board, the exact frequency of approval of funding in these facilities is difficult to arrive at through publicly available data.

Quite understandably, the role of national governments is significant in NAMAs. Many support providers also expect some form of ex-ante approval by governments for the submitted applications. These range from endorsements by developing country partners (as in the case of GEF, Austrian NAMA Initiative) to a formal letter of consent from the country government (NAMA facility requires a letter both the UNFCCC focal point and the sectoral ministry along with project outlines).

Informally, countries are involved in project identification and design in facilities which select projects from pre-defined pipelines³⁰. But direct strategic involvement of recipient countries in prioritizing projects appears limited except in ITF which has a steering committee with equal representation from EU and African countries. In NIF, countries are invited as observers in Board meetings.

Table__: Snapshot of project selection procedure followed by major NAMA support facilities³¹

Support Submission	Project Selection Procedure
NAMA Facility	<p>Two stage selection process</p> <p>A competitive call for proposals is advertised to seek submissions for project outlines in a prescribed template. National governments or qualified delivery organizations can submit. The outlines are first assessed against a set of eligibility and ambition criteria. The delivery organizations of the selected project outlines would conduct an in-depth appraisal and due diligence of the NAMA Support Project. On that basis, the respective Delivery Organization will submit the full-fledged proposal to the NAMA Facility for the final funding decision by the NAMA Facility Board.</p>
Austrian NAMA Initiative	<p>While detailed selection procedure was unavailable at the time of writing, the facility expects full endorsement of the national governments for the NAMA activity. Qualified delivery organizations that would support implementation should be named by the national authorities.</p>
IKI	<p>Two stage selection process</p> <p>BMUB announces annual call for proposals. Project outlines are submitted in a prescribed format. These are evaluated by BMUB.</p>

²⁹ paper on EU blending facilities

http://ec.europa.eu/europeaid/where/neighbourhood/regional-cooperation/irc/documents/nif_flyer_for_website_en.pdf

³⁰ paper on EU blending facilities

³¹ Sources: UNFCCC NAMA registry, Websites of Individual facilities

	In stage two, the selected applicants submit a formal funding application in prescribed templates. BMUB evaluates the project applications received and then makes the final funding decision.
Climate related ODA funding	On behalf of BMZ, bilateral climate-related funding is channeled through GIZ and KfW.
NIF	<p>Selection from pre-defined project pipeline.</p> <p>A pipeline of potential projects is collated by eligible European Public Financial Institutions. The selected proposals are forwarded for approval by the NIF Board. NIF grants are pooled with loans from the eligible Finance Institutions (when possible).</p>
LAIF	Similar to NIF, selected from pre-defined project pipeline.
ITF	<p>Selection from pre-defined project pipeline.</p> <p>A project proposer's idea is first assessed by the group of Project Financiers called Project Financiers Group (PFG). Upon acceptance, the Grant support applications are submitted to the ITF Executive committee which decides on grant requests. The fund links grant support with loan investments by eligible Development Finance Institutions (DFIs).</p>
GEF Trust Fund	Grant applications are to be made in a Project Identification Form (PIF), prepared in consultation and through support from the GEF Agencies. Prior to approaching the agencies, applicants must verify the eligibility of the project (assessed through a list of indicators) with the country GEF Operational Focal Point. There are 10 GEF Agencies, which act as a channel between the country and GEF and assist in development, implementation, and management of GEF projects.

NAMAs on the Ground

The first reference to any activity being labelled as a NAMA comes from the academic literature which refers to the pledges that countries submitted to the UNFCCC in the context of the Copenhagen Accord of 2009. While some developing country commentator continues to clarify that these pledges are not NAMAs, many researchers still refer to them as NAMAs, including the reports prepared by the UNFCCC secretariat. The second set of activities is those that are listed by UNFCCC NAMA Registry and other bilateral data sources where information on NAMAs has been made public. These bilateral channels include NAMA information listed in the Global Environment Facility (GEF), International Partnership on Mitigation and MRV (Mitigation Partnership), NAMA Facility, UNDP and International Climate Initiative (IKI).

Observations from Non- Annex 1 mitigation pledges in Copenhagen

Under the UNFCCC Cancun Agreements, both Annex 1 and Non-Annex 1 parties have announced a diversity of mitigation goals and actions respectively to Copenhagen Accord. Over 140 Non-Annex 1 parties communicated their intention to be listed as agreeing to the Accord³² (Figure 1). Some of them have put forward a list of mitigation actions proposed to be NAMAs, as well as the related context, conditions and considerations associated with these actions in the given format under Annexure II, Copenhagen³³. There are important observations drawn from assessment of the pledges:

1. Most of these pledges do not specify aspects such as types of gases and sectors covered, methodologies proposed for estimating GHG reduction etc., yet give useful insights into the kind of actions which Non-Annex1 countries conceived to be NAMAs.
2. The sectors and type of actions remained open to all sectors and not much clarity on type of action (such as renewable energy, energy efficiency, fuel switch) is proposed by most countries. Some Research and Development activities were also proposed to be NAMAs (For example: Eritrea, Macedonia).
3. Around 40% of country submissions explicitly discussed 'NAMAs' with financial and technical support provided by international community, while approximately 60% of the submissions reflected on 'domestic mitigation actions' without any mention of NAMAs per se.
4. The submitted mitigation actions range from economy wide goals to policy, plans and specific project activities. These actions are divided into 3 categories:

1) Economy Wide Goals

- a. **GHG emission below BAU Level** – Emission reduction in comparison to a business-as-usual scenario in a base year.[Countries: Israel, Mexico, Brazil, South Africa]
 - b. **Carbon Neutrality** – GHG Mitigation for economy's carbon neutrality.[Countries: Bhutan, Costa Rica, Maldives]
 - c. **GHG Strategy/Inventory**- Preparation of national GHG Inventory as mitigation action and/or drafting strategy for mitigation economy wide, for example, establishment of National Secretariat for Climate Change.[Countries: Afghanistan, Sierra Leone, Tajikistan]
 - d. **GHG Intensity target** – Emission reduction per unit GDP.[Countries: India, China]
- 2) **Sectoral Programme** – These include sector wide energy efficiency programme, Renewable energy targets, transport demand management, agriculture, forestry and REDD+ mechanisms [e.g. Peru, Jordan, Madagascar]
 - 3) **Specific project activity** – These include projects targeting specific gas, technology or activity in a specific sector. For example, Jordan proposed to build and develop the Amman dry port located south of the city on an 80 m new ring road to create a new corridor, with the aim of reducing the congestion of trucks and pollution [e.g. Ethiopia, Togo, Gabon, Ghana]

³²https://unfccc.int/meetings/copenhagen_dec_2009/items/5262.php

³³<http://unfccc.int/resource/docs/2011/awglca14/eng/info1.pdf>

Interestingly, countries also indicate that the use of Clean Development Mechanism (CDM) established under the Kyoto Protocol and REDD Plus mechanisms will not be excluded from the ambit of NAMAs. For instance, Cameroon communicated that it will undertake NAMAs through REDD and CDM projects, reforestation, and sector-specific mitigation actions developed as part of its National Mitigation Strategy³⁴.

While the assessment of Copenhagen pledges by Non-Annex 1 countries is provided to give a background on how countries envisioned their mitigation actions and proposed them to be at the time of Copenhagen Accord submissions in 2010. It gives an interesting link to how countries have emerged in terms of their NAMA development and its other related activities in due course of time. Several new initiatives, support mechanisms, mitigation proposals have been developed by countries as described in the next section.

NAMAs post Copenhagen

The section is divided into three categories which together provide an update on NAMA development around the world. While it gives the best available information on NAMAs, some asymmetry in results may be seen due to information gaps in the registry. To the best of understanding, the authors have attempted to give statistics after eliminating duplicity and inconsistency in the available information.

2.2.1 Technical Description of NAMA Activity

- a) Type of NAMA Support (unilateral supported, bilaterally supported, multilaterally supported, credited NAMAs, hybrid NAMAs)
- b) Type of NAMA Activity (economy wide goal, sectoral programme, specific project activity, capacity building)
- c) Level of NAMA development (stage of implementation, ongoing studies, completed projects, proposal/planning)
- d) Entry point to support (support for preparation, support for implementation, support for technical assistance)

2.2.2 Sectoral-wise Distribution of NAMAs

- a) Key sectors of NAMA activity
- b) Types of NAMA action

2.2.3 Country-wise Distribution of NAMAs

- a) Activities in countries with maximum NAMA submissions

2.2.1 Technical Description of NAMA activity

Type of NAMA Support

Myriad activities on NAMAs are taking place around the world. On one hand Non-Annex 1 countries are submitting NAMAs to the Registry seeking support for preparation/implementation and for recognition (unilateral), on the other hand facilities like International Climate Initiative, Mitigation Partnership, NAMA Facility, and GEF are supporting countries with various bilateral activities on NAMAs.

³⁴https://unfccc.int/meetings/cop_15/copenhagen_accord/items/5265.php

- 1) Out of the total submissions in the Registry, **91% NAMAs seek support for preparation and implementation while only 9% are unilateral in nature**. NAMAs for recognition are submitted by Chile, Uruguay and Serbia – all with focus on energy sector. Thus, **high level of global NAMAs demonstrates a clear need for mitigation finance**.
- 2) Maximum submissions to the **Registry** are concentrated in few countries from **Latin America (Chile, Uruguay), Europe and Central Asia (Serbia) and Middle East (Jordan)**.
- 3) For activities outside the Registry, **Mitigation Partnership is involved in most NAMA activities with countries mainly in Asia and Latin America**. **International Climate Initiative** ranks second in order of activities within NAMAs centered in similar region. Both of these are primarily engaged in technical assistance and advocacy to the national government/key stakeholders in preparation and implementation of NAMAs.
- 4) Currently, **5 NAMA projects are approved within GEF Trust Fund** for activities in the energy sector. Not much progress is currently seen in development of proposals within this support.
- 5) Within the First call for NAMA proposals, **NAMA facility short-listed 5 NAMA projects** from Mexico, Colombia, Costa-Rica, Indonesia and Chile for consideration under support for implementation. Out of these, the Mexican³⁵ NAMA project on sustainable urban housing is currently implemented and others are currently undergoing in-depth appraisal.
- 6) In Uganda, **UNDP is developing a NAMA Design for an improved Charcoal value chain for Uganda**, including at the production level, introduction of improved kiln³⁶. The objective of the NAMA study is to provide Uganda with an opportunity to help shape its future low-carbon development. It looks at the holistic programme considering all components of the value chain – forest management, production, transportation and end use.
- 7) **Progress on NAMA activities within Africa is the slowest** within all facilities. Only 3 projects are currently submitted to the Registry from Mali (2) and Kenya (1) on sectoral programme and capacity building activities. Interestingly, the project by **Ethiopia on Inter-Urban Electric Rail NAMA submitted to the Registry was later withdrawn** due to reasons not known.
- 8) **NAMA support** is primarily **hybrid (both unilateral and supported elements)** in nature wherein the support provided is in support of a specific component of the NAMA proposal and not for entire NAMA implementation. From the database it is observed that those NAMAs are mainly supported which have the **ability to leverage additional public and private finance in due course of project implementation**. For example: Colombian NAMA is a combination of sustainable transport and urban development, linked to large national investment programme of more than USD 500 million with support for USD 200 million from BMU under NAMA Facility.
- 9) **Few NAMA activities (3 per cent) depend upon market based mechanisms to support finances for future NAMA activities**. For instance, Chile is developing a NAMA on setting up domestic platforms for generating and trading credits for forest and climate mitigation activities and the Solid Waste NAMA in Peru puts special emphasis on exploring opportunities to utilize market-based mechanisms and a results-based approach for the provision of future support. Similar emphasis on exploring REDD+ opportunities for activities is also observed.

³⁵ For case summary details, look up section on ‘Country-wise distribution of NAMAs’

³⁶http://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/MDG%20Carbon%20Facility/CharcoalNAMASTudy_9Jan2013.pdf

Type of NAMA activity

Within the landscape of NAMAs, the type of NAMAs can be organized within the following categories:

- a) **Sectoral Programme:** Implementation of NAMAs for the entire sector such as Energy Sector, Transport, Buildings etc. This may incorporate for setting up stabilization funds, Scaling up of activities within a sector etc.
- b) **Specific Project activities:** Implementation of NAMAs for the specific project activity such as installation of solar water heaters in Belgrade. 5000 m2 collectors for 7000 households supplying 2700 MWh.
- c) **Economy wide goal:** Strategies including economy wide projects in a NAMA which will have implications on national emission balance.
- d) **Capacity Building activities:** Providing technical advisory services to facilitate expert exchange, building institutional structure for NAMAs and developing competence among key stakeholders for effective approach to international funding.

Also, there are activities which comprise a combination of two or more determined categories of NAMA activities.

	Sectoral Activity	Specific Project Activity	Economy Wide Goal	Capacity Building	Financial Mechanism
Sectoral Activity		✓		✓	✓
Specific Project Activity				✓	✓
Economy Wide Goal		✓		✓	
Capacity Building	✓	✓	✓		

1. **Major trading in NAMA activities globally is in 'Sectoral Programmes' category.** These are broad based activities like policies, plans and programmes which are implemented by developing of a list of activities (specific actions) within a sector, financial mechanism (for example: setting up funds for renewables in energy sector), and capacity building activities among others. **Compared to the trend in project development in CDM, this appears as a marked shift in the manner NAMA development is taking place.**
2. **In the Registry,** two major categories of NAMAs are observed, distributed starkly among regions. However, this comparison is not taken as a baseline because most of the submissions in each region are driven only by a handful of countries.
 - a. **Sectoral Programme of activities** are most popular in countries in Latin America and Middle-East
 - b. **Specific Project activities** are the primary NAMA type in countries in Europe and Central Asia.

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3. Most NAMA activities within Mitigation Partnership and IKI focuses on capacity and awareness building among key stakeholder participants in countries on NAMAs. The **international support to develop data, monitoring and MRV processes and NAMA frameworks highlights the potential for international actors to facilitate the preparation of related domestic frameworks.**
 4. There is no NAMA wherein support in the form of technology transfer is facilitated.
 5. Economy wide NAMA activities are few, some of which are listed for GHG Inventorization, and for preparation of low carbon national strategies/policies in the country. Also in an interesting case, Tunisia is taking an economy wide goal to select a list of 40 NAMA projects all of which have implications on national emission balance with the objective of promoting renewable energy and enhancing energy efficiency.
 6. **NAMAs are generally rated higher on transformation of a specific sector or for promotion low carbon development practices (use of renewables, promotion of energy efficiency) mainly targeted to achieve voluntary mitigation goals/ambition of Non-Annex 1 countries.**

Level of NAMA Development and entry point for support

1. Most of NAMAs currently are in Planning/proposal stage or have their proposals already developed. Those that are developed lack concrete details on MRV and are awaiting support for implementation from Registry and outside of it. However **countries are now developing inventories, databases and sectoral knowledge base crucial for development of NAMAs and MRV.** The MRV framework has not yet been developed and related support has been requested by countries. This is because **data availability limits the level of detail that estimated emission reduction potential can be based on.**
2. Wide expanses of capacity building projects within NAMAs are either 'completed' in most projects or are currently 'ongoing'. Some countries where capacity building activities have already concluded are: Thailand, Brazil, Congo, South Africa, and Serbia.
3. The 'Approved' projects are by GEF. These are mainly sectoral programmes and supported for preparation and implementation of NAMAs.
4. **Facilities are also supporting preparation and implementation of National Plans and Strategies as part of NAMA activity** beyond which specific NAMA projects are targeted to be culled out from the bigger mitigation/low carbon strategy for the country. The scale and scope of activities labeled under the NAMA category is thus very large and ambiguous.
5. It is observed that NAMAs are supported internationally for a small component of the projects wherein leveraging of domestic finances is conditioned. Hence, in nature, NAMA activities are **unilaterally developed and co-financed with international support.**
6. Major channel of flow of money in the NAMA activities outside the Registry is from BMU. While most of this money is flowing in for support for technical assistance, this draws significant **relations to the nature of ODA flows** for Germany. Studies indicate that Germany reports most of its aid as technical assistance/cooperation than any other donor, accounting for over one-third of German Bilateral aid³⁷. Thus, the nature of support of these activities (ODA commitments or Climate Finance) is still ambiguous. Other channels of support are Ministry of Environment Canada, Ministry of Environment Japan, USAID, Swedish Energy Agency, NEFCO and JICA.

³⁷[devinit.org/wp.../Investments-to-End-Poverty-Chapter-8-Germany.pdf](https://devinit.org/wp-content/uploads/2016/06/Investments-to-End-Poverty-Chapter-8-Germany.pdf)

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7. Registry does not provide any information on support for NAMAs till now.
 8. Most activities are implemented by GIZ and CCAP with support from domestic implementing agencies and primary stakeholders.
 9. Total finance disbursed for each project activity is way lower than the total sum needed for project execution. This point towards **setting up financial mechanisms designed to overcome the specific barriers for investment and to leverage additional public and private finance** domestically.

2.2.2 Sector-Wise Distribution of NAMAs

1. NAMA activities were primarily dominated by the Energy sector (24% projects) followed by Buildings (13%), Transport (12%), Waste (12%) and Industry (10%) all of which have nearly equal project share.
 2. In agriculture, forestry and LULUCF, few projects are submitted to the Registry and no other activity outside UNFCCC NAMA Registry is underway. This could primarily be due to the sensitivity of the sector to a developing economy and also due to issues of MRV and implementation.
 3. Apart from specific sector activity, most NAMAs were categorized general due to lack of clarity about specific sector type and were mainly economy wide capacity building activities. There must be an increased effort in creating solid project structures on NAMAs in developing countries.
 4. Lot of activity around transport is happening in Asia Pacific region. Projects in industry, energy, waste and buildings are also developing in close numbers.
 5. Countries in Europe and Central Asia are engaging in NAMA project activities mainly in Buildings and Energy sector. While in Latin America, waste is one of the prominent sectors of focus.
 6. Complex sectors like Transport which were not well suited to be tackled by CDM/JI are now effectively addressed through concept of NAMAs.
 7. Countries which less actively participated in CDM/JI are now effectively developing concepts on NAMAs like countries Latin America which are much ahead of other regions at present in NAMA activities.
 8. There are activities with combinations of sectors such as sustainable 'transport and urban development'; 'waste and tourism'; 'buildings and industry' are being developed, linked largely to the national mitigation programme / low carbon development strategy of the country.
 9. Main areas of activity within mitigation (NAMAs) are in renewable energy and energy efficiency.
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2.2.3 Country-wise Distribution of NAMAs

Major NAMA activities are taking place in Chile (10), Indonesia (5), Jordan (8), Mexico (7), Serbia (14), Thailand (5) and Uruguay (6) –56% of all NAMA activities are located in these 7 countries. However, in many cases, literature that refers to NAMA in a country is speculative/ambitious activities which appear to not have been started formally for instance activities in India and South Africa. The section describes specific initiatives in two countries namely, Chile and Mexico.

CHILE

Key sectors: Transport, energy, waste, forestry

Support channel: IKI (1), Mitigation Partnership (4), NAMA registry (4), NAMA facility (1) – For recognition, preparation and implementation

Action type: Sectoral Programme, Capacity Building, Financing Mechanism

Energy sector Chilean NAMA- case example: In one innovative attempt, Chile is developing a NAMA in the form of Price Stabilization Fund with the help of Mitigation Partnership in an effort to make Chile's electricity supply less dependent on imported fossil fuels and to encourage the development of non-conventional renewable energy (NCRE) sources. All of these projects though supporting the preparation of NAMAs primarily include drafting NAMA approaches, capacity building activities and policy advocacy. Within the Registry, Chile has also proposed a 'Public-Private Clean Production Agreements' as 'NAMAs for Recognition' and 'Self-Supply Renewable Energy Systems (SSRES)' for 'Support for implementation' to propel larger private sector investments in Energy sector and for creating markets.

The first step in the MRV process for a renewable energy project financed by the NAMA is envisaged to complete a standardized baseline calculation according to the type of project being undertaken. The tool would estimate the emission reduction potential of a project and calculate emission factors for a reference and a mitigation scenario. Renewable supply installations would be identified with unique ID numbers and meters would be installed that would measure electricity, heat production or both. This data would be reported on a predetermined basis. From this, GHG impacts would be measured and recorded.

While such landscaping for countries is important to identify options and opportunities identified as NAMAs by countries, **information asymmetries in different sources of data** make such analysis very difficult. For Instance, Chilean project for SSRES is listed in both – the NAMA Facility outside of the UNFCCC NAMA Registry and is also submitted to the Registry for 'Support for Implementation'. Such asymmetries blur information on support and do not qualify if the actions would be supported within the Registry or outside of it. Though there are proposals developed, Chile has not yet received support for implementation of their activities in the Registry.

MEXICO

Key sectors: Industry, Buildings, Energy sector; energy efficiency is its prudent choice of actions

Support Channels: NAMA Facility (1), Mitigation partnership (2), International Climate Initiative (2), and NAMA Registry (2)

While the two submissions by Mexico to the Registry are still awaiting support, NAMA Facility is implementing a Housing NAMA for Mexico for up scaling of energy efficient housing in the country outside of the Registry. This bilateral arrangement between Mexico and NAMA Facility is ambivalent given that the facility does not provide any such information to the Registry. Moreover, BMUB is providing approx. 14 million Euros for the entire up scaling project to be implemented by GIZ, wherein the actual financial requirement for the projects runs into billions of Euros. The hybrid nature of support along with their MRV Conditionality for domestic countries is yet unclear in the international policy regime.

Housing NAMA, Mexico- Case example: Mexican government has initiated a wide range of programs aimed at improving energy efficiency of residential buildings, particularly in the low- and medium income markets where robust growth is expected over time. Government envisages NAMAs in this sector to increase and up scale the penetration of energy efficient appliances and building design, and permit technology up-scaling to make new homes increasingly efficient as program develops. The NAMA approaches buildings efficiency from the ‘whole house approach’. Efficiency benchmarks are set for total primary energy demand, for each building type, taking into account climatic variables. This approach ensures a simple and cost effective MRV system. It also empowers stakeholders to find the most cost effective solutions as opposed to prescribing specific technologies, providing incentives to reduce the total energy demand by taking into account the interaction all of the implementable measures. Under the NAMA concept, improved design features such as efficient window design and longer overhangs can compete effectively with technology innovations such as solar water heaters, thus avoiding the fixed perception on ‘winners’. Furthermore, the tiered benchmark approach enables donors to target their support towards the specific activities that align with their development priorities and provides flexibility for regulators should they seek to increase the stringency of the program over time.

For donors and investors interested in directly supporting new energy efficiency homes, a “NAMA Fund” will be set up to be the initial recipient of all donor funds, be it in the form of soft-loans or in the form of grants. Funding provided for the NAMA will address both the supply and demand side, providing bridge loans for housing developers and support for home buyers in the form of grants and supplemental mortgage finance.

NAMAs in India

India's official position on NAMAs so far has been that, in accordance with the para 1b(ii) of the Bali Action Plan, where the term NAMA originated in 2007, only those mitigation actions that are provided with financial and technological support are to be labelled as NAMAs. Hence, despite a lot of activity in other countries, India has not yet labelled any of the on-going or planned action as NAMA, primarily for the fact that necessary multilateral climate finance has not been made available yet. Although, initially some of the missions under the NAPCC were presented as possible NAMAs in the SBSTA meetings, Indian experts have refrained from promoting any mitigation actions as NAMA.

However, in order to explore the issues related to NAMAs, particularly those emerging from the diversity of NAMAs, India established a committee to discuss the same. The mandate of the committee was similar to the tasks under the Work Stream two under the Durban Platform exploring technical and implementation issues arising out of the diversity of NAMAs. The proceedings of this committee apparently are for internal use by the government only. So far, there has not been published any public report on the matter.

Recently, however, in an event jointly organized by the Ministry of Railways and the Asian Development Bank (ADB), it was suggested that the Vision 2020 for the Indian Railway could be considered as a NAMA. The estimated implementation cost is INR 800 crore. Since, this is a vision document and India is politically committed to achieve its aspirational goals, it was suggested that it may be considered as domestic-NAMA, however, the possibility to explore financial support for some parts of the Vision and hence consider them as supported NAMA was also proposed. In the same meeting, the Ministry of Environment and Forest expressed their consent to this initiative and also indicated that the government is soon likely to come out with a NAMA strategy for India.

Parallel to this, German government had commissioned a study through KfW to explore NAMAs in four countries, including India. While there was a workshop on this study where preliminary findings were shared, not much information is available in the public domain yet. In year 2013, the German government through GIZ entered into a bilateral agreement with the Indian government to undertake a 4 year long exercise focusing on capacity building in India on the issue of NAMAs and towards the end developing one or two detailed NAMA proposals. So far, this joint initiative has not held any public discussion on the matter.

Way Forward

The above discussion suggests that there exists considerable activity and enthusiasm among the researchers and in some developing countries on the issue of NAMAs. Some developed countries have been proactive in pushing the agenda of NAMAs through ODA support, Germany being the leader in the lot. Others include UK and some Nordic countries. The UNDP's LECB program too has been supporting about 25 countries in identifying and/or implementing NAMAs. India has been cautious on this matter, but has recently shown openness to the idea.
