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Indian Climate Change Policy: Exploring a Co-Benefits Based Approach[1]

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I. Introduction

What approach should India adopt in formulating policy responses to climate change, both domestically and internationally? In recent years, there has been a vibrant debate on this question (Dubash 2011; Dubash 2012; Kanitkar et al. 2009; Narain 2009; Raghunandan 2012; Rajamani 2009). India has established a National Action Plan on Climate Change with eight subsidiary "Missions"; each state is now in the process of producing State Action Plans on Climate Change with recommendations on how mitigation and adaptation could be mainstreamed into development policy and, at the central level, an "Expert Group on Low Carbon Strategies for Inclusive Growth" has released an interim report (Planning Commission 2011a).[3] Clearly, there is a growing body of climate-related policy in India.

At the same time, there is no clear and consistent approach or framework that directs and guides these efforts. The "co-benefits" formulation in the NAPCC is promising: measures that "promote our development objectives while also yielding co-benefits for addressing climate change effectively"(Government of India 2008, section 2).[4] While useful as a broad concept, the NAPCC's articulation of co-benefits is conceptually insufficient, and lacks the methodological clarity needed to actually guide policy trade-offs and priorities. The Planning Commission has also attempted an initial framing of India's low carbon approaches within a co-benefits template (Planning Commission 2011b). Without clearer specification, however, a co-benefits approach risks being used in an *ad hoc* manner to either justify business as usual development policies or to opportunistically sell a particular policy without sufficient justification of its advantages over other comparable policy options.

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[1] We gratefully acknowledge research contributions by Seher Shah and Prabhat Upadhyay towards this paper. The ideas in this paper have also been refined through discussion with colleagues on the Expert Group on Low Carbon Strategies for Inclusive Growth, comments during a faculty seminar at the Centre for Policy Research, and feedback during a review workshop held at the Centre for Policy Research in January 2013. We have also benefited from comments by MV Ramana, Shantanu Dixit, and Harald Winkler. All remaining errors of fact and interpretation are the responsibility of the authors alone.

[2] Girish Sant was instrumental in shaping the ideas in this paper. While he unfortunately passed away in February 2012, he is acknowledged as an author here in recognition of his contribution. He is deeply missed by his colleagues and friends.

[3] The authors have also been involved with the Expert Group as Members and, in the case of Ashok Sreenivas, through providing technical input.

[4] While the term "co-benefits" has historically been used to describe ancillary benefits of climate policies (Smith and Haigler 2008; Smith 2011), the NAPCC notably inverts the prioritization – development benefits are primary and climate gains as supplementary or "co"-benefits.

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In this paper we propose and develop a methodology for operationalizing a co-benefits approach to climate policy formulation. We use the technique of multi-criteria analysis (MCA), an approach that is widely used for decision making that requires making choices between and examining trade-offs across multiple objectives of policy, such as growth, inclusion and environment. In addition, we develop a framework for consideration of implementation issues. Since this framework requires policymakers to state explicit reasons for choosing policies, with reference to the multiple objectives that each policy seeks to achieve, it is particularly well suited to the operationalization of a co-benefits approach. In this paper we focus on policies related to energy, which lend themselves to considerations of mitigation co-benefits, but we believe the approach can also be modified to address adaptation concerns.

Adopting an MCA-based co-benefits approach will likely bring gains to both domestic policy making and India's international climate stance. Domestically, this approach would increase the coherence of policy making early in the decision process. Specifically, it forces policymakers to consider the impacts of policies on multiple objectives, and helps identify policies that undermine one objective while promoting another. Forcing explicit consideration of multiple objectives helps ensure that more than just lip service is paid to considerations such as inclusion and environment.

Internationally, a well-specified co-benefits approach is a necessary first step to articulating how India's domestic co-benefits based policy approach links to our international stance based on the centrality of the principle of "common but differentiated responsibility and respective capabilities" (CBDRRC) (Rajamani 2011, 125; Dubash 2007, 34; Raghunandan 2012, 123) as articulated in the United Nations Framework Convention on Climate Change. At the moment this linkage is imprecise and unclear, and leads to a disconnect between domestic and foreign policy on climate change.

We begin this paper with an explanation of why a co-benefits approach is a sound basis for India's response to the global and national mitigation challenge. Second, we lay out our approach to institutionalizing the co-benefits approach, drawing on the tool of multi-criteria analysis (MCA). We briefly introduce MCA, and develop a framework for application of MCA to India's climate policy challenge, while illustrating the approach with a few simple examples.

II. Why a Co-Benefits Approach is Appropriate for India

Should a poor developing country with a substantial poverty burden play any role in mitigating what is a global problem caused in the main by developed countries? If so, then how? This is a deeply contentious issue that often leads to polarized views. By placing a co-benefits approach at the heart of the NAPCC, our national policy-makers implicitly project the co-benefits approach as an answer to these questions. However, this answer is neither argued nor justified. Before we enter into a discussion of operationalizing co-benefits, therefore, we first explore what approach to mitigation a country such as India should take and why. Since this issue is not the primary thrust of this paper, we present the argument only in brief, with reference to the necessary literature.

Our own view is guided by three lines of argument. First, India is not in a position to accept caps on greenhouse gas emissions in the short or medium term, because India does not bear responsibility for the problem of climate change as compared to developed countries, and because caps would place unacceptable limits on India's development. Second, for reasons of self-interested politics, ethics and prudence, India should explore ways of addressing climate mitigation, but in a manner that is consistent with and ideally enhances development objectives. Third, a co-benefits approach is a useful way to walk a line straddling both our development interests and effective climate action. We explore each point in turn.

First, the concept of CBDRRC is the correct point of reference for assessing what countries should do with regard to climate mitigation. However, there is little agreement on how both responsibility and capacity are to be defined, with disagreement generally running along North-South lines (Rajamani 2011, 124–125). However, by no metric does India emerge as a country with major responsibility for the problem. The warming impacts of greenhouse gases are proportional to concentrations of greenhouse gases. Looking at cumulative emissions in the atmosphere from as late as 1970 to 2009 (a time period that actually understates contributions by industrialized countries), India had contributed 3.3% of cumulative emissions as compared to 24.4% for the US and 13.5% for China (Jayaraman, Kanitkar, and D'Souza 2011b, 139).[5] On the basis of annual per capita emissions, India's emissions at 1.7 tonnes per person are about 25% that of the global average, placing India in the very bottom tier of emission levels.[6] Arguing that India is a "major emitter," just because its current annual emissions (about 4% of world totals) are among the five highest by countries at present[7] may point to a salient fact, but does not translate to responsibility, because it both ignores past contributions and does not contextualize total emissions against the number of people whose development interests are supported by those emissions.

Turning to capacity, the story is more mixed. In terms of the level of development and the scale of future challenges, India has relatively low capacity. About 76% of India's population fall below the global average poverty line of $2 a day, a proportion that is twice as high as other industrializing countries such as China and South Africa.[8] At $3,214 India's GDP (PPP) per capita is also half that of China, and 8% that of the USA.[9] Given existing technology, addressing developmental challenges will certainly require increases in energy consumption, and therefore in greenhouse gas emissions, in absolute and per capita terms. At the same time, India has made recent gains in terms of its technological and industrial base that allows deeper engagement with the challenge of low carbon development (Raghunandan, 2012). In sum, therefore, certainly on grounds of responsibility, and to a more limited extent on capacity, there is no case for India to accept absolute limits on greenhouse gas emissions.

Second, the arguments above do not, in fact, support a position that India should continue with a business as usual approach to development. Instead, there is a strong case that India should re-

[5] Following Kanitkar et. al. (2010), we have chosen a start date of 1970, a point at which scientific understanding of the problem developed. If the start date is 1850, prior to the industrial revolution, India's share goes down to 2.6%.

[6] World Resources Institute, Climate Analysis Indicators Tool (WRI CAIT) dataset, 2011. Available online at http://www.cait.wri.org/. Last accessed on 30th January, 2012.

[7] World Resources Institute, Climate Analysis Indicators Tool (WRI CAIT) dataset, 2011. Available online at http://www.cait.wri.org/. Last accessed on 30th January, 2012.

[8] World Bank, Development Research Group. Available online at http://data.worldbank.org/indicator/SI.POV.2DAY. Population below $2 a day is the percentage of the population living on less than $2.00 a day at 2005 international prices. Data refers to most recent value available during time period 2000-07. There is no common reference year for all the countries. The figure is based on the latest national survey conducted in the country.

[9] World Bank, International Comparison Program Database. Available online at http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD.

examine its approach to sustainable development, while not giving up on the necessity, indeed imperative, to eradicate poverty and improve living conditions for its citizens. To begin with, if global emissions are to reach half of current levels by 2050, as the Intergovernmental Panel on Climate Change (IPCC) projects is required, then even if industrialized country emissions tend toward zero, emissions from developing countries as a bloc necessarily need to slow down and even decline, (Baer et al. 2008, 15; Jayaraman, Kanitkar, and D'souza 2011a, 58). As a large developing country, India must play a role. In addition, a consistent application of India's own reference to ethics in climate change would suggest that the current state of scientific knowledge confers on India an obligation to not completely ignore climate impacts in our development strategies. This argument is amplified by the fact that India's poor are among the most vulnerable to climate impacts. There is a political corollary to this ethical argument: the least developed countries and small island states increasingly view India's role in climate negotiations as unsupportive of effective action (Dubash 2012, 15–16; Raghunandan 2011, 15). Both in terms of winning the support of our least developed allies, and in terms of great power aspirations, India has to creatively contribute to climate mitigation, albeit in a manner compatible with our level of development and our capabilities.

Finally, the requirement, then, is for a nuanced approach that allows India to pursue its development and poverty eradication goals, but do so in a manner that reduces fossil fuel consumption and therefore greenhouse gas emissions. A systematic approach is required to consciously identify areas where development goals and climate mitigation objectives not only align but also reinforce each other, in other words, co-benefits. This in turn calls for a decision-making framework for assessing synergies and trade-offs. It should be noted that such an approach need not and likely will not always prioritize a low carbon option over others. Instead, it implies that climate change mitigation is seen as one among multiple development objectives against which policy choices are assessed.

The primary reason to develop and apply such a methodology is to enhance the quality of domestic policy-making, to make maximum use of the various policy initiatives currently under preparation. However, as suggested earlier, there is also a potential secondary gain in terms of the coherence of India's international negotiating position. The credibility of a co-benefits approach would be enhanced when it is backed by an explicit decision-making methodology. Not having such a methodology opens India to the criticism of tautology: measures that bring co-benefits are those we implement, and we implement those that bring co-benefits. Instead, a framework such as the one suggested here would make clear, on the basis of independent criteria applied through a uniform process, just which actions are fully justified by India's co-benefits approach, and which actions may be good for mitigation outcomes but would set back our domestic development interests. The latter actions would then clearly require international support.

This clarity would be consistent with and buttress India's position internationally on the centrality of the principle of CBDRRC. For countries such as India, a co-benefits approach to climate mitigation is appropriate and necessary. But, consistent with CBDRRC, such an approach may not be appropriate for developed countries that bear a higher responsibility for and capacity to deal with climate mitigation, and who should take on absolute emission cuts (IPCC 2007, 776), even if that means prioritizing climate mitigation over other domestic goals. As stated above, however, articulation with the international climate change regime is a secondary consideration in this paper. For the remainder of this paper, we focus on developing a methodology for operationalizing a co-benefits approach in India.

III. Toward Operationalising Co-Benefits: Multi-Criteria Analysis

While the objective of maximizing synergies between climate and development policies is widely written about, the literature on how best to do so is still emergent. One strand of the literature emphasizes attention to poverty alleviation by, for example, limiting climate mitigation action in poor countries only to cases where there are clear poverty-limiting benefits (CDKN 2011, 2). A set of case studies of middle income countries leads to the idea of promoting "poverty-alleviating mitigation actions" (PAMAs), which have the objective of limiting poverty at the same time as reducing emissions (Wlokas et al. 2012, 19–21). Others have examined linkages between climate mitigation and the full suite of Millennium Development Goals (AEA 2011; Kreft et al. 2010, 9–14). An analysis based on an integrated assessment model seeks to demonstrate that there are cost gains when climate protection policies are combined with other objectives related to energy security and local air pollution, as a way of making a case for a co-benefits approach (McCollum, Krey, and Riahi 2011, 429). While all these studies provide arguments for a co-benefits approach, none of them develop an explicit methodology that would guide policymakers in applying such an approach.

Here, we suggest that an approach built around multi-criteria analysis (MCA) provides a useful starting point for a co-benefits approach. MCA is a broad name for a family of analytical techniques that are particularly relevant when assessing likely policy outcomes relative to multiple objectives, when values and consequent prioritization across those values may differ, and where it is important to assess both quantifiable monetary impacts and unquantifiable impacts. MCA is often contrasted with cost-benefit analysis, which is considered more suitable when a single objective is sought to be achieved, when outcomes and costs can be quantified, and where investments can be directly assessed.[10] Since MCA can involve subjective judgements, both on prioritization across objectives and on the ability of outcomes to meet objectives, the robustness of the process through which these judgements are arrived at is important: the judgement process must be transparent and leave an "audit trail" of supporting data and reasoning. As explained later, these judgements could also be subjected to peer review, focused discussions or stakeholder consultations or other such processes to reduce the element of subjectivity. Depending on how it is structured, MCA can help rank options, provide a basis for including or excluding certain options, or even simply facilitate deliberation among options by making clearer, in a robust and comparable framework, the advantages and disadvantages of various options. Distinct advantages of MCA are a) it provides a transparent rationale for a policy decision; b) it allows criteria and judgements to be revisited with improved data, better understanding or changed circumstances; and c) it provides a mechanism and incentive for multi-stakeholder participation and input into policy processes. There are a variety of different analytical approaches that fall under the general category of MCA, with varying degrees of quantitative and analytical sophistication.[11]

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[10] For a useful and practical overview see (UK DCLG 2009).

[11] See, for example, (R. Ramanathan 2001) for an example of Analytical Hierarchical Process, an approach designed to select an optimal outcome among alternatives through ranking of relative outcomes. Multi

Implementing MCA consists of several steps (UK DCLG 2009, 30–45). First, the context for the decision – the decision makers, other players involved, the broader policy context – is identified. Second, the options to be appraised are delineated. Third, the criteria for assessing the consequences of each outcome are laid out. Fourth, each option is scored against the criteria by the stakeholders. Fifth, any weights being used are applied to the options. Sixth, the resultant scores (scoring + weights) are assessed. Finally, the results are examined and subject to sensitivity analysis. As mentioned above, all these steps ought to be done through a transparent process with participation of stakeholders in order to maximize the validity of judgements, the learning that the process will engender and political consensus around the final decision.

Versions of MCA are increasingly being used in decision making. For example, EU countries use MCA for procurement over a minimum limit (UNEP 2011, 48). In the UK, MCA is used for a number of decisions by local government and was also used in transport related decisions (UK DCLG 2009, 18). MCA is considered particularly useful in environmental decision making, where the challenges of multiple objectives, choices, trade-offs and valuation are particularly important (Brown and Corbera 2003a; Brown and Corbera 2003b, S51; Munda 1995; Ramakrishnan Ramanathan 2006; Munasinghe, 2007; Minisry of the Environment, Japan, 2009).

The most ambitious effort to develop a multi-criteria analysis framework to climate policy with relevance for both mitigation and adaptation has been attempted by the United Nations Environment Programme (UNEP 2011, 103–130). The framework is built around a “hierarchical criteria tree” containing generic criteria divided into a number of categories. These include financing, GHG mitigation, social criteria such as reducing inequity, environmental criteria, climate impact criteria, and political and institutional criteria such as improved governance. The study develops a menu which can then be fine-tuned and applied in select country cases. Although the approach developed in our paper was developed separately and independently, it shares several features with the UNEP study. However, we have also sought to keep in mind the practical realities of limited time, resources and capacities of policymakers, as a result of which the approach here is designed less to be a menu of all possible contexts and policy options and more to provide a parsimonious and accessible tool.

IV. A Methodology for Application of MCA to Climate Policy in India

A tool for analysis of co-benefits needs to be easily understood, transparent, participatory and tractable if it is actually to be put to use as both a deliberative and policy analysis tool by governments and other stakeholders. The ultimate goal of the framework proposed here is to contribute to decision making that explicitly and intelligibly contributes to multiple outcomes, and does so in a manner that also accounts for implementation challenges and costs.

To begin with, we use the following terminology in laying out this framework:

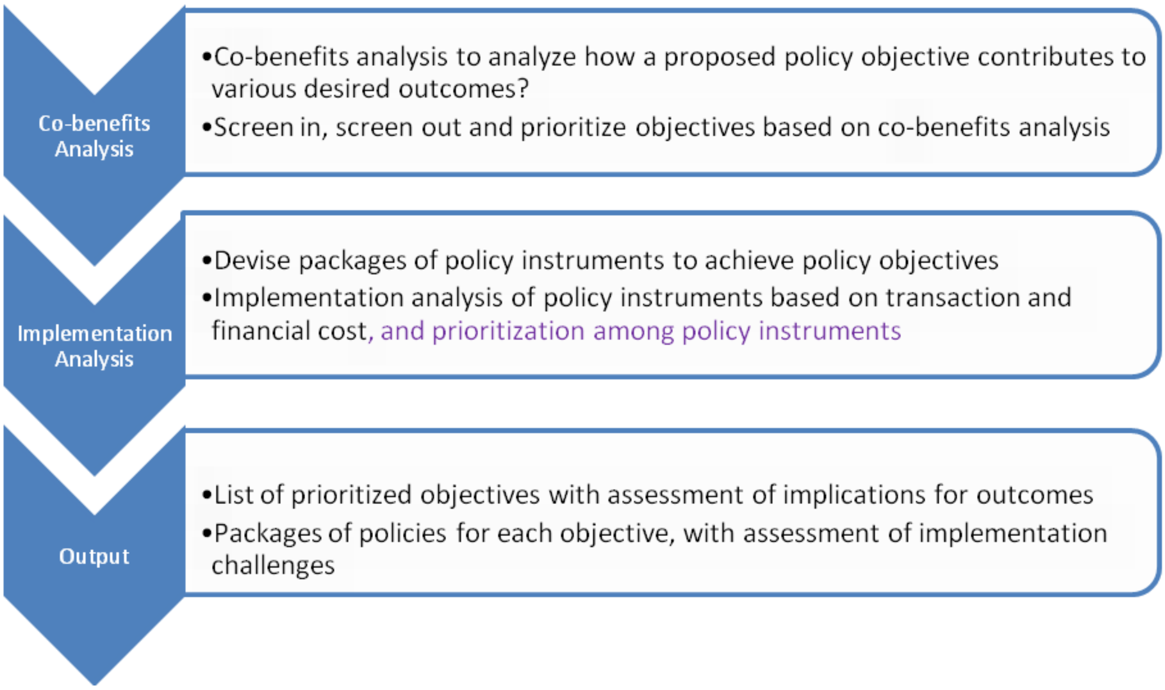
- Outcomes: refers to ultimate outcomes of the policy process such as economic growth, inclusion, local environmental gains and greenhouse gas mitigation;

Attribute Utility Theory uses utility functions to convert various criteria into a single dimensionless scale of utility for analysis.

- policy objectives: refers to proximate objectives of policies in specific sectors such as enhancing appliance efficiency or improving public transport;
- policy instruments such as taxes, regulations, market instruments or combinations of these designed to achieve objectives.

We propose a two-step methodology. The first step is a *co-benefits analysis* that assesses whether and to what extent a given policy objective, if achieved, delivers on co-benefits across multiple outcomes. For example, we seek to establish if a particular policy objective is likely to simultaneously enhance economic growth, inclusion local environmental gains and GHG mitigation, or whether there are trade-offs across these, and the extent of trade-offs. The outcome of this analysis can provide the basis for screening out deeply problematic policy objectives whose other impacts outweigh any GHG mitigation benefits they may have, and screening in those that simultaneously achieve multiple objectives. This step looks only at the desirability of a policy objective, setting aside considerations of cost and implementability.

The second part of the analysis introduces pragmatic considerations toward implementation -- an *implementation analysis*. This step requires first detailing policy instruments (regulation, taxes, creation of markets, investment promotion incentives, labelling etc.) with which to achieve the policy objectives that are selected using the co-benefits analysis. The implementation analysis looks at transactional and financial costs of implementation.



The result of this process is a set of prioritized objectives, each with an assessment of the likely implications for the ultimate desired outcomes such as economic growth, inclusion, local environment and climate mitigation. For each objective, the methodology requires preparation of a package of policy instruments with an assessment of implementation issues and challenges. Below, we detail each of the two steps in the analysis in more detail, providing examples of the approach.

V. Co-Benefits Analysis

Policy-making in India, as in other countries, increasingly has to take into account multiple objectives. It is no longer adequate for a particular policy to promote growth if it is undermines sustainability or inclusion, or vice versa. The co-benefits analysis is intended to provide a framework to analyse the impacts of any policy objective under consideration on the full range of outcomes across economic, social, and environmental goals. The intent is to compel *explicit* consideration of these impacts, both positive and negative, into policy formulation.

The specific articulation of outcomes for a co-benefits analysis should be based on a clear understanding of national priorities. For example, in some cases, stimulating growth may be paramount, in others generation of jobs may dominate, and in yet others, local environmental pollution may be high up the list. Since this framework was initially developed in the context of India's 12th Five Year Plan, for the purpose of this exercise we have followed categories used in the Plan process, and suggest a minimum set of four outcomes against which policy objective should be assessed:

- Economic growth: growth is necessary to create the economic wherewithal for improved livelihoods and lifestyles for the population, and to enable higher provisioning for necessary physical and social infrastructure. While growth is a complex category that includes multiple interactive effects, we suggest an analysis of economic growth include, at minimum:
    - Impacts on aggregate demand and efficiency of resource use;
    - Creation of jobs;
    - Implications for energy security and in particular for fuel import costs.
- Inclusion: the poorest and most vulnerable should gain a substantial share of this growth so as to reduce poverty and inequality, improve access to goods and services, and also to act as an engine for further development; this is an explicit objective of India's planning process. Inclusion has at least two dimensions:
    - Improving outcomes for the poorest and most vulnerable;
    - Reducing disparities in distribution and limiting inequality.
- Local environment: outcomes of many low carbon policies also have local environmental gains as well as related benefits in health or other well-being, as greenhouse gas emissions are often (although not always) accompanied by other pollutants, unsustainable resource extraction and unhealthy or otherwise poor lifestyles. Particularly salient are:
    - Pressures on land;
    - Pressures on water, and water pollution;
    - Air pollution.
- Carbon (and other GHG) mitigation: promotion of development in a low carbon manner.

The first step is to develop a list of policy objectives, which can then be analysed for their effects on achievement of co-benefits outcomes. For example, promotion of renewable energy and improvement of appliance efficiency could be desirable objectives for consideration.

However, developing this list at an appropriate level of generalization is important for methodological clarity and consistency. We suggest that the list of policy objectives should be at the highest possible level of aggregation that does not materially affect the impact on the co-benefits analysis. For example, when considering increasing the efficiency of energy use, the likely implications for co-benefits will vary across the following sub-sectors: energy supply efficiency; industrial use efficiency; appliance efficiency; building efficiency; automobile efficiency; and agricultural use efficiency. However, further dividing these policy sub-groups might not help clarify impacts on co-benefits. For example, dividing industrial efficiency into steel and cement sub-sectors likely will not change the analysis. Consequently, the appropriate degree of specificity for co-benefits analysis of efficiency-enhancing measures is at different sectoral scales as listed above. In sum, the list of policy objectives should be at the broadest possible level that lead to specific co-benefits implications and, in general, will consist of a pathway-sector/sub-sector pair.

Once policy objectives are identified, the next step is to undertake a qualitative assessment of likely impacts of each objective on the four co-benefit outcomes (growth, inclusion, local environment and carbon mitigation) using a consistent template as detailed further below. Analysis of the impacts of an objective on outcomes should be based on available published research and clear articulation of the causal pathway through which objectives impact outcomes. For example, improved public transport could yield positive inclusion outcomes because the poor rely disproportionately on public transport. Where information is insufficient or is felt to be inconclusive, this should be noted. The methodology therefore, also results in identification of research questions or issues for further investigation.

The template used for the co-benefits analysis begins with a summary description of the policy instrument – how it works, the policy actors, and the timeline. For the last, we consider 2-5 year implementation periods as short run, 6-15 as medium term and > 15 long term. The next section of the template provides for a qualitative analysis of co-benefits along outcomes of growth, inclusion, local environment and global environment. The template provides for qualitative descriptions of the likely impacts of the policy objective on each sub-dimension of the outcome (e.g. job creation under growth). Based on the descriptions and analysis, the user assigns a qualitative score on a scale of 1 to 5 for each outcome. A higher score indicates that a policy objective does more to contribute to a given co-benefits outcome and a lower score that it contributes less, including perhaps worsening the outcome compared to business-as-usual. A thumb-rule could be that a score of 3 indicates a neutral impact, while a score of 5 indicates a strong positive impact and a score of 1 indicates a strong negative impact. It should be noted that the value of this score lies not in the absolute number but in the relative impact on the outcome (vis-à-vis other outcomes) sought on a 1 to 5 scale. Finally, the user is prompted to examine interactive effects across policy objectives under consideration. This last section is necessary because each policy objective does not operate in isolation. For example, a shift in transport policy has implications for biofuels and vice versa.

The results of this analysis, as we discuss later, could cautiously be used to inform decision-making in two ways. First, the scores arrived at above could be aggregated to provide a summary score for each policy option. From one point of view, aggregation may be somewhat misleading as it assumes that the objectives are independent from each other and are equally weighted.[12] On the other hand, purely as a method of comparative representation as is done widely in different contexts, we suggest that cumulative scores are useful, particularly when looking at wide divergences in aggregate scores. Second, we also represent scores graphically in "spider diagrams" that provide a way of visualizing variation across outcomes more intuitively and also address any concerns with aggregating scores. The larger the area of a spider, the better the objective does at fulfilling multiple objectives. Spider diagrams can also be overlaid one over the other to make comparisons easier.

An essential element of the methodology is that all qualitative arguments and scoring should be subjected to a process of consultation and feedback to identify weaknesses in the argument and/or disagreements over the scores. This process of discussion and deliberation should involve a wide range of stakeholders, including technical experts, policymakers, industry, users and civil society and local communities, in order to capture all perspectives. The expectation is that with repeated iteration, the knowledge base on which the co-benefits analysis is based will improve through identification of key issues, addition of information and refinement of arguments and scores. Indeed, facilitating a structured discussion is itself an important objective of the co-benefits analysis.

The co-benefits analysis, in sum, is intended to provide:

- Identification of the causal mechanisms (with positive and negative impact) through which policy objectives impact each outcome;
- Identification of research gaps;
- A structured basis for deliberating on the likely outcomes of policy objectives;
- Initial indication of the impact of each proposed objective on multiple outcomes.

Below we provide some examples that help elucidate the approach. The policy objectives analysis is illustrated through three examples: (a) inducing a modal shift in urban transport towards public and non-motorized transport; (b) promotion of biofuels, specifically bio-ethanol and bio-diesel and (c) improving the efficiency of domestic appliances. Each of these policy objectives is first independently assessed and scored for its impacts on the four chosen co-benefits. Subsequently, the objectives are compared to each other based on the scores attained by each of them.

a. **Inducing a modal shift towards public and non-motorized transport in cities**

Indian cities are growing and also motorizing rapidly with national sales of two-wheelers and cars growing at about 12% p.a. between 2005-06 and 2011-12 (SIAM 2012)**.** A Government of India commissioned report indicates that the modal share of two-wheelers and cars in Indian cities will steadily increase[13] from 24% in 2007 to 46% by 2031 in a business as usual scenario, while shares of public and non-motorized transport would decrease from 46% and 30% respectively to 26% and 28% respectively in the same period (MoUD 2008). Average recurring GHG emissions from bus-based

[12] We are grateful to Anupam Khanna and Prabir Purkayastha for drawing our attention to this during a review meeting.

[13] These numbers are for cities categorized as 'category 6' (very large) cities in the report, but the trend is similar across categories.

public transport is about 20-30 gm / passenger-km and non-motorized transport results in no recurring emissions[14]. In contrast, recurring emissions from two-wheelers and cars are about 50 and 100 gm / passenger-km respectively (Sperling 2004). Therefore, inducing a shift towards public and non-motorized transport from two-wheelers and cars is a candidate to be considered for reducing GHG emissions. However, measures to promote this shift will also have considerable additional impacts on other objectives. These effects are captured in the template in Table 1.

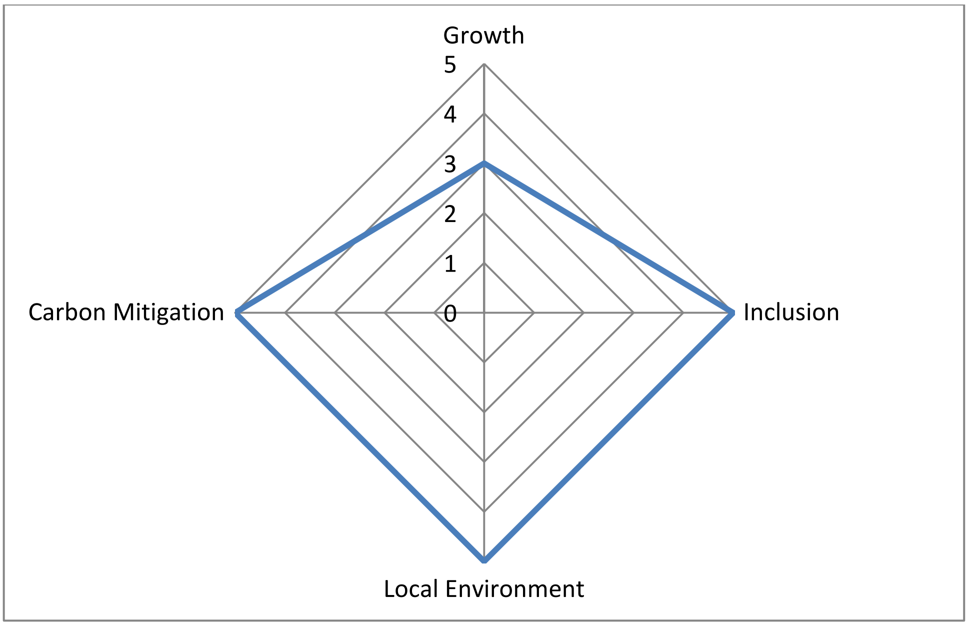
Table 1: Modal shift in Urban Transport as a policy objective

<table>
<tr><td colspan="4">Description of Policy Objective:
• Objective: Induce a modal shift in urban transport from private vehicles to public and non-motorized transport
• Policy actors: Urban local bodies, state governments and Government of India
• Time-scale: Medium term</td></tr>
<tr><td colspan="2">Co-benefit</td><td>Description of benefit or cost</td><td>Qualitative grading 1 to 5</td></tr>
<tr><td rowspan="3">Growth</td><td>Impacts on aggregate demand and efficiency of resource use</td><td>• Reduction in demand for automobiles and two-wheelers, partially compensated by increase in demand for buses and bicycles
• Reduced congestion, reduced fatalities and injuries (Woodcock et al. 2009)</td><td rowspan="3">3</td></tr>
<tr><td>Creation of jobs</td><td>• Reduction in employment in automobile and two-wheeler segment, partially compensated by increased employment in bus and bicycle segments.</td></tr>
<tr><td>Energy security</td><td>• Increased energy security due to reduced petroleum demand and reduced imports (Planning Commission, 2011).</td></tr>
<tr><td rowspan="2">Inclusion</td><td>Improving outcomes for the poorest</td><td>Significantly improves access to transport of citizens with lower incomes since unit costs of public and non-motorized modes are lower than private modes.</td><td rowspan="2">5</td></tr>
<tr><td>Reducing</td><td>Helps in reducing disparities as more people</td></tr>
</table>

[14] It results in moderate one-time emissions for infrastructure and equipment, if one considers life-cycle emissions.

	disparities in distribution	start using similar modes	
Local Environment	Air	• Public transport has lower tail-pipe emissions per passenger-km than cars and two wheelers, while non-motorized transport have zero emissions (MoPNG 2003) leading to improved health.	5
	Water	• No impact on water	
	Land	• Reduced need for paved surfaces relative to private transport systems, reducing pressure on scarce urban land.	
Carbon mitigation		• Net lower GHG emissions per passenger-km (Sperling et al. 2004). • Approximately 24 million tons of CO2 can be saved in 2020 if this is pursued aggressively (Planning Commission 2011a).	5
Total (4-20)			**18**
Interlinkages with other policy objectives +ve or –ve		A modal shift in urban transport would result in reduced need for fuels overall and therefore potentially reduce the need for bio-fuels. It would have no impact on domestic appliance efficiency improvement. (Note: in the context of a complete analysis across multiple policy objectives, there would be many additional linkages to examine.)	

Figure 1: Graphical Representation of Modal Shift in Urban Transport



b. Improving the usage of Bio-fuels

As our next example, we will examine a policy on promotion of bio-fuels. In the Indian context, it may be required to separately consider the two main bio-fuels sought to be promoted, viz. Bio-ethanol from sugarcane, and bio-diesel from Jatropha, because they have quite distinctive technological, socio-economic and hence policy features.

With mounting oil import costs and energy security as the main concern, but also viewing global emissions and local air pollution as relevant issues, Government of India announced a National Bio-fuels Policy in 2008 (MNRE 2009) and has been taking a number of calibrated measures to promote bio-fuels. The Policy mainly targets transportation as the major sector using petroleum-based fuels. Crude oil consumption in 2010-11 was about 141 million tonnes and imports constituted about 86%. In order to reduce dependence on imported oil and also mitigate air pollution, the Bio-fuels Policy advocates use of environment-friendly bio-fuels made from indigenous and renewable biomass resources. The Policy aims at blending of both petrol and diesel with appropriate bio-fuels i.e. bio-ethanol in petrol and bio-diesel in diesel up to 20% by 2017.

The Policy specifically claims that its "approach to bio-fuels… is somewhat different to the current international approaches which could lead to conflict with food security [since] it is based solely on non-food feedstocks to be raised on degraded or wastelands that are not suited to agriculture, thus avoiding a possible conflict of fuel vs. food security" (MNRE 2009, 3–4). The Policy also envisages benefits for employment and income generation from such production of Bio-fuels.

The above claim, even if taken at face value, is applicable only to bio-diesel and not to bio-ethanol which is to be made mainly from cultivated crops grown mainly on irrigated land. For bio-ethanol, while the Policy speaks of also using sweet sorghum, sugar beet and other raw materials, the mainstay would be sugarcane due to its abundant availability. In any case all are conventionally existing crops, even though some may require further promotion such as sweet sorghum. Feedstock for bio-diesel, on the other hand, requires to be grown afresh in the case of jatropha shrubs, or an effective, sustainable supply chain organised in the case of oilseeds from pongamia trees at present growing mainly in the wild.

Therefore issues of feedstock availability, as well as issues relating to land-use, risks and costs associated with relatively new technologies and processes, are quite different for the two kinds of bio-fuels. It is indeed for this reason that whereas a mandatory 5% blending of petrol with Bio-ethanol has been in place for several years, and a 10% blending mandate has been announced but not enforced due to availability issues, no mandates at all have been announced for bio-diesel. The Policy explicitly states that bio-ethanol blending will be mandatory up to the target year, whereas bio-diesel blending levels will remain "recommendatory in the near term" (MNRE 2009, 4). For these reasons, bio-ethanol (Table 2) and bio-diesel (Table 3) will be treated separately in the analysis to follow.

Table 2: Promoting Bio-ethanol as a policy objective

Description of Policy Objective: • Objective: promote economy-wide adoption of Ethanol Blended Petrol (EBP) with mandated percentages of ethanol (5-10 % currently going up to 20% by 2017) • Policy Actors: Central and State governments • Time-scale: short to medium term			
Co-benefit		**Description of benefit or cost**	**Qualitative grading 1 to 5**
Growth	Impacts on aggregate demand and efficiency of resource use	• ethanol prices may rise due to domestic availability constraints arising from sugarcane production fluctuations and demand from rival industries, neutralizing price advantages especially at higher blend percentages (Ray, Miglani, and Goldar 2011; USDE and USEPA 2012) • adverse impact on other ethanol-using industries likely due to diversion to EBP (Modi 2010) • blends with more than 10% ethanol would require modifications in engines, costs of which would be passed on to consumers, although these are expected to be moderate especially over the longer term	3

		(Ray, Miglani, and Goldar 2011; IEA 2010) • drop in sugar production due to diversion of cane for ethanol consequent to policy amendment permitting direct conversion of cane juice to ethanol rather than manufacture from molasses (Ministry of Agriculture & Irrigation 2008) may trigger sugar imports at higher prices and/or drop in sugar exports (Raghunandan 2008)	
	Creation of jobs	• minor job creation in ethanol production and blending	
	Energy security	• lower volumes of petroleum imports and commensurate savings in foreign exchange • uncertainty in sugarcane production may reduce ethanol production and require ethanol imports at higher costs (Modi 2010; Ray, Miglani and Goldar 2011); this problem has already been experienced even at 5% blending levels (Bhardwaj, Tongia, and Arunachalam 2007), and will obviously worsen considerably at the projected 20% EBP (Ray, Miglani and Goldar 2011)	
Inclusion	Improving outcomes for the poorest	• likely rise in sugar prices due to diversion of cane to ethanol production as noted above	2
	Reducing disparities in distribution	• cane farmers may get lower price from ethanol manufacturers due to diversion of cane from price-controlled sugar mills	

Local Environment	Air	• some lowering of tailpipe pollutants, especially carbon monoxide (IEA 2010), albeit slightly offset by lower fuel economy with EBP worsening with percentage of dosing (USDE and USEPA 2012)	4
	Land	• likely push to increase scarce irrigated area under cane	
	Water	• likely push to increase area under cane will have negative impact on water use and soil health due to increased fertilizer application especially at blends > 5% (Raghunandan 2008; Sant et al. 2010)	
Carbon mitigation		• substantial gains compared to fossil-fuel use due renewable sugarcane crop (IEA 2010) • but above partially offset, especially at higher percentage of blends, due to manufacturing processes (Sant et al. 2010) and due to land-use changes if large-scale diversion of land to sugarcane cultivation takes place	4
Total (4 to 20)			**13**
Interlinkages with other policy objectives +ve or –ve		Ethanol-blended petrol (EBP) is expected to be used mostly in petrol-driven personal passenger vehicles and reduced usage of such vehicles due to increased resort to public transport may reduce demand for EBP. There are no specific inter-linkages with the other policy objectives	

Figure 2: Graphical Representation of Promoting Bio-Ethanol

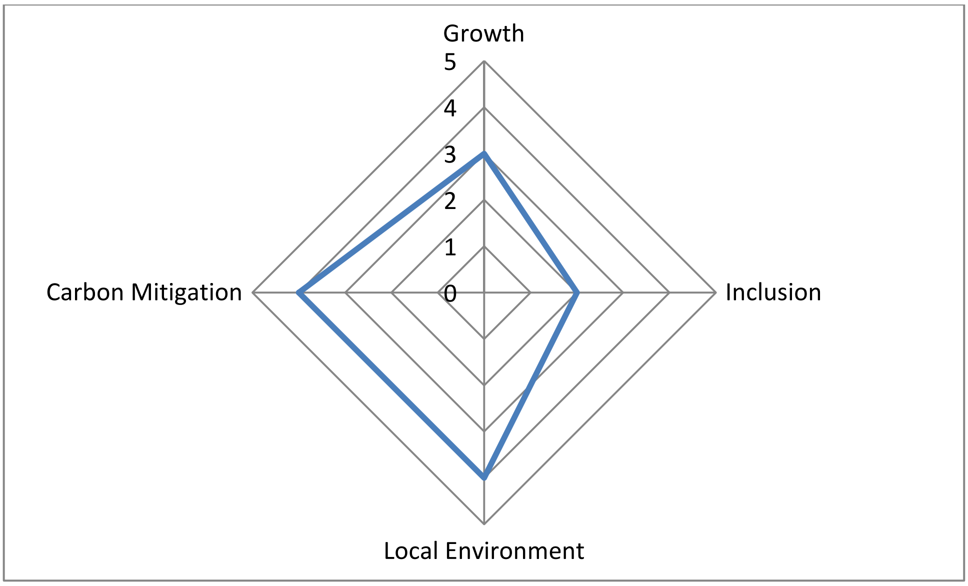


Table 3: Example of promoting Bio-diesel as a policy objective

Description of Policy Objective: • Objective: promote bio-diesel with recommendatory dosing of diesel up to 20% by 2017 with bio-diesel from vegetable oil feedstock especially Jatropha • Policy Actors: Central and State governments • Time-scale: short to medium term			
Co-benefit		**Description of benefit or cost**	**Qualitative grading 1 to 5**
Growth	Impacts on aggregate demand and efficiency of resource use	• savings from lower petroleum imports • potential for higher returns from agriculture, countering the effects of declining food commodity prices (FAO 2008) However, the above would be offset by: • savings may be lower than expected given absence of mandates and uncertainties in feedstock availability as already evidenced even for 5% dosing.[15]	3

[15] Minister for New & Renewable Energy, Mr.Farooq Abdullah, informed the Lok Sabha that although fairly large production capacities had been established for production of bio-diesel, "no bio-diesel has been

		• higher than anticipated cost of Bio-diesel due to low productivity of Jatropha cultivation[16] and/or higher input (fertilizer, water etc) costs (Altenburg et al. 2009; Reinhardt et al. 2007; Ariza-Montobbio et al. 2010)[17] • relatively high bio-diesel production costs often necessitating subsidies (FAO 2008)	
	Creation of jobs	• stated policy expectation was that introducing this new crop especially in 'waste'/poor quality land would generate new jobs/incomes from cultivation, sale of seeds, extraction of raw oil and de-esterification (Planning Commission 2003); • however analysis and experience so far suggests that gains would be less than anticipated due to low productivity of jatropha cultivation, low availability of 'waste' lands and merely shift of crop from food grain to jatropha even at low blend percentages not to speak of higher blends (Singhal and Sengupta 2012)	
	Energy security	• marginal if any gains since more than 5% bio-diesel blending appears highly unlikely	
Inclusion	Improving outcomes for the poorest	• diversion of land from food crops to jatropha would cause food prices to rise and impact	1

procured by oil marketing companies for blending with diesel during last three years." cited in government Press Release dated 26 March 2012 and available at http://pib.nic.in/newsite/erelease.aspx?relid=81724

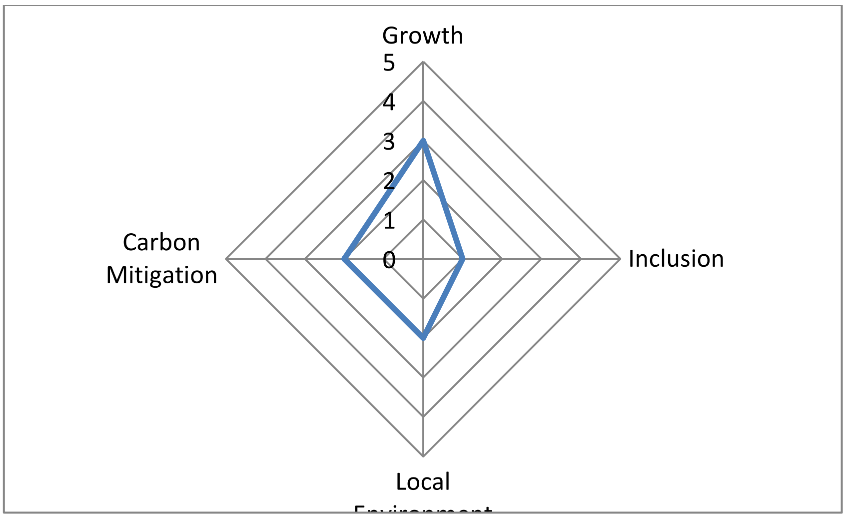
16 Altenburg et. Al. (2008) discuss these problems based on field studies and interviews with experts and development agencies. This report reviews much of the literature and results obtained in the field, and concludes that field experiences in India show yields to be "well below 1kg (per plant)" which translates into 2 tonnes/ha or less. Most other independent researchers have also substantiated such figures.

17 Reinhardt (2007), puts yield at 1.4 tonnes/ha in poor soil.

		negatively on food security (FAO 2008; Asbjørn 2009) • diversion of substantial "wasteland" and degraded forest land to Jatropha cultivation would deprive the rural poor of access to common resources of fuel, fodder, medicinal plants etc (Rajagopal 2007; Lapola, Priess, and Bondeau 2009; Boin 2010; Sant et al. 2010; Singhal and Sengupta 2012)	
	Reducing disparities in distribution		
Local Environment	Air	• some lowering of tailpipe pollutants from vehicular combustion (IEA 2010)	2
	Land	• diversion of degraded forest land and "waste land"/scrub lands to mono-crop cultivation impacts negatively on bio-diversity and other environmental services (FAO 2008; Gmünder et al. 2012)	
	Water	• intensive jatropha cultivation in rainfed/ dryland increases acidification of soil and stress on groundwater due to eutrophication and higher demand for irrigation (FAO 2008; Ravindranath, Chaturvedi, and Murthy 2008; Gmünder et al. 2012)	
Carbon mitigation		• uncertainty about mitigation achievable, which could even be negative especially if full lifecycle and land-use changes are accounted for (Jha 2009; Boin 2010; Reinhardt et al. 2007; FAO	2

	2008) • soil carbon sequestration expected to be negatively impacted by land-use changes particularly from degraded forest lands, scrub lands etc (Romijn 2011) • use of wastelands or degraded forest lands for jatropha cultivation would also negatively impact on the Green India Mission targets of increasing forest cover which obviously would sequester more carbon than jatropha plantations (MoEF 2011; Ravindranath, Chaturvedi, and Murthy 2008)	
Total (4 to 20)		**8**
Interlinkages with other policy objectives +ve or –ve	Bio-diesel is expected to be used in freight and public transportation sectors and, as such, to facilitate mass transit and road-to-rail inter-modal shifts. However, as the above analysis and low off-take of bio-diesel shows, jatropha-based bio-diesel seems to have little potential in India for making a positive contribution to either cost savings or lower GHG emissions and local pollution in aid of the above-mentioned policy objectives	

Figure 3: Graphical Representation of Promoting Bio-Diesel



c. **Introducing super-efficient electrical appliances**

The electricity sector is responsible for 38% of GHG emissions in India (MoEF 2010b). The domestic and commercial sectors together consume about 34% of the electricity consumed in India (MoSPI 2012). Electricity consumption by these sectors has been growing at over 9% p.a. – primarily driven by the electrical appliances used in domestic and commercial buildings. It is expected that sales of appliances such as fans, refrigerators, televisions and air conditioners will increase significantly due to rising prosperity. It is also known that there is significant potential for improving the energy efficiency of these appliances, thus leading to reduced electricity consumption and hence lower GHG emissions (Chunekar et al. 2011). Therefore, this is a policy objective that deserves consideration. Scoring for this objective is given in Table 4.

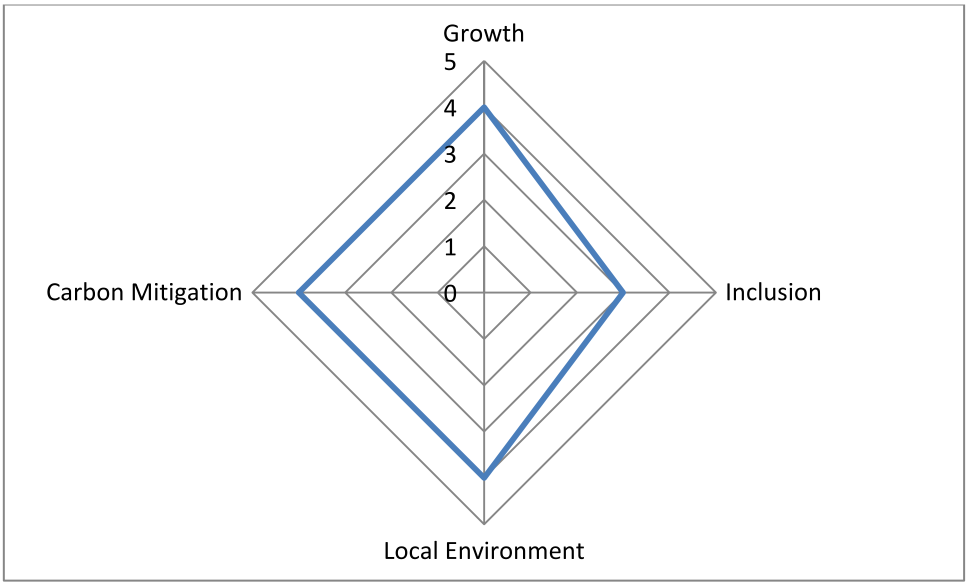
Table 4: Improving domestic appliance efficiency as a policy objective

<table>
<tr><td colspan="4">Description of Policy Objective:
Objective: Introduce super-efficient electrical appliances
Policy actors: Bureau of Energy Efficiency, appliance manufacturing industry and distribution networks
Time-scale: Medium term</td></tr>
<tr><td colspan="2">Co-benefit</td><td>Description of benefit or cost</td><td>Qualitative grading 1-5</td></tr>
<tr><td rowspan="4">Growth</td><td>Impacts on aggregate demand and efficiency of resource use</td><td>Mildly positive effect due to increased demand for appliances due to lower operational costs
Positive impact as energy inputs for unit energy services are reduced, but will be tempered by possibly greater usage of appliances and higher number of appliances due to rebound effect</td><td rowspan="4">4</td></tr>
<tr><td>Creation of jobs</td><td>Mild growth in jobs in appliance industry in keeping with increased demand, tempered by reduced jobs in the power sector due to reduced capacity</td></tr>
<tr><td>Energy security</td><td>Neutral or mildly positive if reduced need for power capacity results in reduced imports of coal or natural gas</td></tr>
<tr><td></td><td></td></tr>
</table>

Inclusion	Improving outcomes for the poorest	Merely increasing efficiency of domestic appliances neither promotes nor discourages inclusion[18].	3
	Reducing disparities in distribution	Similar to the above argument	
Local Environment	Air	• Reduced electricity demand would lead to fewer power plants, reduced coal demand, and hence improved air quality at power generation and coal mining sites. • Reduced life-time cost of appliances (perhaps supported by subsidies to mitigate up-front costs) could result in increased appliance use and purchase– a “rebound effect”.	4
	Water	• Reduced demand for power plants would result in reduced water demand, reduced water pollution from fly ash, and reduced water depletion due to coal mining.	
	Land	• Reduced demand for power plants and coal mines would reduce requirement for land significantly	
Carbon mitigation		• Similar to the reasoning for local environmental gains. GHG savings in 2020 could be about 31 million tons CO2 equivalent (Chunekar et al. 2011).	4
Total (4-20)			**15**
Interlinkages with other policy objectives +ve or –ve		There are no cross-linkages of this objective with either inducing a modal shift in urban transport or with promotion of bio-ethanol / diesel.	

Figure 4: Graphical Representation of Domestic Appliance Efficiency

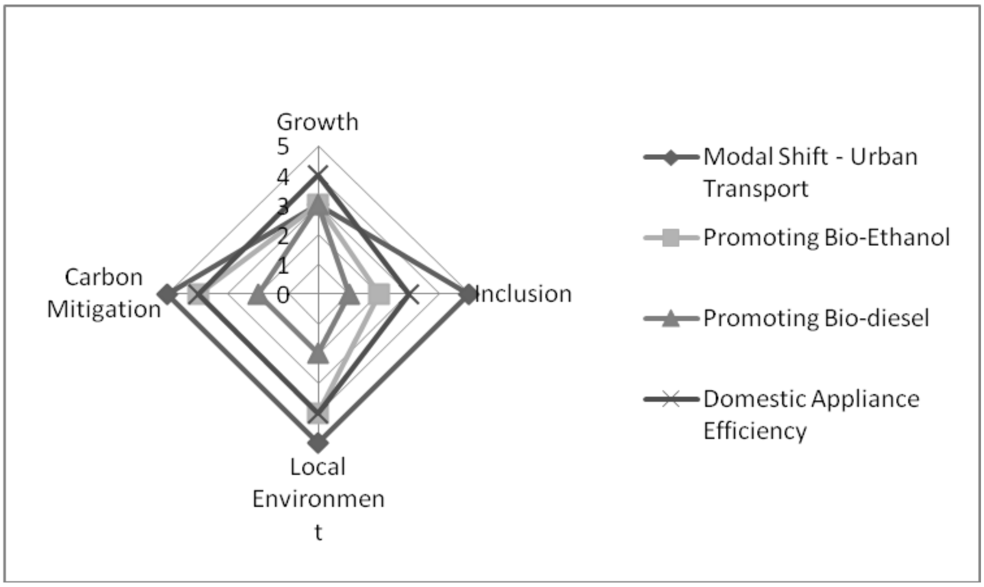
[18] Increased up-front costs may put some appliances out of reach of the poor though lower life-time costs may compensate for it. Precise impact on inclusion can be determined once details about specific policy instrument(s) and appliance(s) are known.



Interpreting the Results of Co-Benefits Analysis

It is important to interpret the results of the co-benefits analysis appropriately. The co-benefits analysis offers a way to systematically examine the strengths and weaknesses of a policy objective across multiple desired outcomes. Using the examples above (See Figure 5), both the urban transport modal shift and the appliance efficiency improvement objectives yield positive outcomes across all the co-benefits outcomes. By contrast, the biomass fuels objectives score lower, and score very low on some of the objectives, indicating negative outcomes. This is also reflected in the graphical representations of the bio-fuel examples enclosing smaller areas as compared to the urban transport modal shift and appliance efficiency improvement examples. The former two are therefore better suited to achieving multiple objectives simultaneously. When examining any single objective, the analysis also allows identification of possible trade-offs. For example, promoting a modal shift in urban transport is likely to strongly support inclusion and both environmental objectives, but is neutral, at best, with regard to growth objectives.

Figure 5: Graphical Representation of Multiple Policy Options



Note, however, that this analysis does not lend itself to examining which policy objective best meets any single objective. For example, since we are not comparing the absolute effects of policies on an outcome, we cannot use this approach to examine whether appliance efficiency or bio-diesel promotion would yield greater potential for carbon reductions. Indeed, the absolute magnitude of impact – how much any objective absolutely contributes to undermines growth or greenhouse gas mitigation – is not part of the analysis; instead the focus is on the relative impact across the co-benefits outcomes. The objective of the analysis is to explore whether and to what extent policy ideas perform when benchmarked simultaneously against multiple outcomes.

In addition, the analysis helps identify mechanisms through which policies affect outcomes. For example, the analysis of appliance efficiency shows that both local and global environmental impacts of appliance efficiency may be at least partially reversed through the "rebound effect" – users may increase absolute use in response to greater efficiency (and hence lowered cost) of service provision. The co-benefits analysis is aimed at identifying and, through debate, discussion and peer review, refining understanding of these mechanisms.

Once sufficient levels of agreement are reached on the resulting scores through a process of discussion and debate, these could be used cautiously for actual decision-making. A variety of possible decision rules could be used. For example, it could be decided that any policy objective that scores very low on any of the co-benefits outcomes should be ruled out. Alternatively, any objective that scores an aggregate score of less than a certain amount (perhaps 8 or 9, reflecting a low performance overall) could be excluded and those that score above a cut-off reflecting good overall performance (15 or 16) could be included for further development, with those in between subject to further scrutiny. Instead of including or excluding, these scores could also be the basis for prioritisation. Any of these decision rules could be accompanied by an exercise of giving weights to the different outcomes to reflect national priorities. For example, inclusion might be given higher weight than carbon mitigation. Ideally, these decision rules, too, would be developed based on discussion and deliberation. The use of these decision rules in conjunction with the analysis would sharpen the decision making process and make explicit the logic and expectations behind decisions.

VI. Implementation Analysis

Agreement on policy objectives is of limited use if progress is not also made toward achieving those objectives through specific policy instruments. The second part of the analysis therefore focuses on understanding implementation challenges.

The starting point is to develop a menu of policy instruments that would contribute to achieving a desired policy objective. These instruments would typically cluster around a few categories: regulations, creation of markets, taxes, subsidies, voluntary measures and disclosure instruments. There are variations on each of these categories based on the scope of the instrument, the monitoring and verification systems put in place and so on. The underlying reason for developing this list of instruments is a recognition that instruments have different characteristics when it comes to implementability, both in terms of ease of implementation on the one hand and financial costs on the other. This step of the analysis helps identify obstacles to implementation along both dimensions.

The template used for the analysis begins with a summary description of the policy instrument – how it works, the policy actors, and the timeline. For the last, we consider 2-5 year implementation periods as short run, 6-15 as medium term and > 15 long term. The discussion of implementation that follows is divided into two components that seek to explore the sorts of obstacles that often hinder implementation of policy: ease of implementation and financial costs.

The analysis of ease of implementation is divided into two categories: political economy and transactions costs. The political economy component is aimed at understanding the extent of likely challenges *ex ante* to putting in practice a policy instrument. The presence of stakeholders who might lose from implementation, and who might mobilize against it, for example, would constitute grounds for a negative score, while the presence of actors who would gain and support the policy instrument would result in a positive score. Analysis of transactions costs is intended to capture several elements salient to implementation of a policy instrument *ex post.* These include: the presence or absence of specialised institutions and/or human resources skills required to implement the policy; the existence or not of substantial monitoring and verification issues, and the scope for rent seeking. As with the objectives discussion, the analysis is then translated into a qualitative ranking to allow comparison on a 1 to 5 scale, with higher numbers indicating greater ease of implementation and smaller numbers indicating potential challenges to implementation.

The analysis of costs is intended to capture in a relational manner the degree of challenge anticipated in mobilizing the finance needed to implement a policy. While a more complete assessment would require careful quantitative analysis, the task here is to qualitatively identify factors that might ease the path to raising finance or make it more difficult. Once again, the analysis has two components: unit-cost of the instrument and financial feasibility. As with the previous category, the outcome is scored from 1 to 5.

One measure of the cost of an instrument is how it affects the unit cost of an associated service or benefit, for example, cost per unit of energy provided or saved. The cost per unit of energy saved requires benchmarking a policy instrument against the existing dominant form of providing energy in a similar form for a similar purpose. Using the three categories of change developed above – fuel supply shift, efficiency increase and structural change in demand – the analysis is conceptually clear for the first two. So for a new source of energy, such as solar power, or for efficiency improvements, the benchmark will be existing marginal costs of utility based generation. For the third category, structural changes in demand, the analysis is conceptually harder since the comparator cost is less clear. For a modal shift away from private transport and toward public transport, or a shift from road to rail freight, for example, the appropriate benchmark is the existing cost of providing a unit of service – passenger mile travelled or freight-mile travelled. In each such case, the benchmark cost used must be carefully justified. Formal techniques such as cost-benefit analyses could be employed to arrive at the actual cost per unit service provided or saved. A highly affordable instrument, i.e. one whose assessed unit costs are very low, would receive a score of 5, and a highly expensive instrument would receive a score of 1, with other instruments falling in between.

The second component is the financial feasibility of implementing the policy instrument, which translates to the ease of accessing or mobilizing finance, which is in turn a function of project risk, including the risk profile of the borrower. Relevant considerations include the scope for recovering the cost from consumers or users, the gestation period for the project, and the amount of up-front investment required in the project. For example, projects requiring high up-front investments and with low possibility of recovering the costs from users would be harder to finance as they would essentially have to rely on government budgetary support for long periods of time. On the other hand, projects that either require smaller amounts of investments or would be backed by direct or indirect cost recovery mechanisms would be easier to finance. For example, public investment in rail freight capacity may or may not yield adequate returns, depending on the pricing structure for rail freight, which in turn is subject to political economy considerations.[19]

The qualitative analysis of implementability issues across both dimensions above is likely to be a difficult challenge, but we suggest it is better to explicitly undertake this exercise than to not consider implementation issues at all. As with the co-benefits analysis, a critical element of the methodology is reflection, deliberation, consultation and debate over the analysis in order to refine policy instruments and assess prospects for implementation. Below, we provide examples of two competing policy instruments to illustrate the analysis.

Example: Policy instruments for enhanced appliance efficiency

There could be two broad approaches to achieving the objective of introducing super-efficient appliances, each of which has two sub-approaches. At the first level, the instruments could either be incentive based (encourage adoption of efficient appliances) or penalty based (discourage purchase of inefficient appliances). At the second level, the instruments could either target manufacturers or they could target consumers. For illustration, we present an analysis of two incentive based instruments – one targeting consumers and the other producers.

Consumer incentives: Consumer incentive instruments would essentially offer rebates or discounts to consumers buying efficient appliances, along with some mechanism to reimburse dealers or manufacturers if the rebate or discount is on the product price.

Table 6: Example: consumer rebates as a policy instrument for introducing super-efficient appliances

Description: Consumer rebates for purchase of super-efficient (5 star +) rated appliances		
Policy objective: Promote purchase of super-efficient electrical appliances		
Actors and instrument	• Actor(s): BEE, distributors / dealers, consumers	
Timeline	• Program roll-out can take place in 1 to 1.5 years	
Implementability		
	Description	**Qualitative Ranking (1-5)**
Political Economy	• Politically feasible for appliances that are widely used – particularly by the poorer classes. Thus, consumer incentives for lighting and ceiling fans will be supported, televisions and refrigerators less so, and support may	1 (ACs) 4 (fans)

[19] Note that this determination should be done entirely from the perspective of the agency providing the financing, without considering social gains and losses. Thus, the fact that an efficient appliance rebate program can decrease financial pressure on loss-making utilities, while a social gain, is not relevant to evaluation of an instrument unless the entity providing the rebate directly gains from the resultant financial savings.

	not be politically feasible for air conditioners.	
Transaction Costs and Institutional Costs	• Requires setting up institutional structures to monitor / audit sales of efficient appliances and appropriately disburse the incentives. • Monitoring could lead to rent-seeking opportunities • Costs of disbursement to many consumers could be large	1
Costs		
Cost / unit energy saved or provided	• Energy efficiency measures are among the cheapest ways to save energy (EPA 2008; Planning Commission 2011a, 31). However, it would involve some initial cost to promote super-efficient appliances, though this cost will be recovered in the long-term.	4
Ease of financing	• High ease of financing as the program will likely be funded by the government, with low investment needs and short gestation time for realisation of benefits.	5
Total (5-20)		**11 (ACs)** **14 (Fans)**
Linkages across Instruments +ve or -ve	Consumer incentives will interact positively with the existing appliance efficiency star rating programme, as it will lower the effective cost of higher rated appliances, thereby making it possible to rachet up each star category.	

Incentivising Manufacturers: An alternative approach to improve efficiency of domestic appliances could be through a policy instrument that incentivizes manufacturers to produce and introduce efficient appliances into the market. This would naturally result in lower consumer prices (compared to the counterfactual) and hence promote uptake of efficient appliances.

Table 7: Example: Manufacturer incentives as a policy instrument for efficiency improvement

Description: Manufacture incentive for sale of super-efficient (5 star +) rated appliances		
Policy objective: Introduce super-efficient electrical appliances into the market at competitive prices		
Actors	• Actor(s): BEE, manufacturers of appliances	
Timeline	• Program roll-out can take place in 2 to 2.5 years, since there could be longer negotiation process with manufacturers	
Implementability		
	Description	**Qualitative Ranking (1-5)**
Political Economy	• May lead to some resistance as it may be seen as favouring a few. But since	1 (ACs) 4 (Fans)

	this would pass through to consumers, the resistance may be limited. Also it would differ by type of appliances; widely used appliances may receive support.	
Transactions Cost and Institutional Costs	• Given the small number of manufacturers for most appliances, institutional overheads associated with implementing such a scheme would be low. • Limited scope for rent-seeking	4
Costs		
Cost / unit energy saved or provided	• Energy efficiency measures are among the cheapest ways to save energy. It has been estimated that the cost of conserved energy is only 0.63 Rs / kwh, for a program targeted at fan manufacturers (Singh et al. 2012). • There will be some initial cost to promote super-efficient appliances, though this cost will be recovered in the long-term.	4
Ease of financing	• High ease of financing as the program will likely be funded by the government, with low investment needs and short gestation time for realisation of benefits.	5
Total (4-20)		**14 (ACs)** **17 (Fans)**
Linkages across Instruments +ve or -ve	Manufacturer incentives will interact positively with the existing appliance efficiency star rating programme, as it will lower the effective cost of higher rated appliances, thereby making it possible to rachet up each star category.	

Interpreting the Results of Implementation Analysis

Reflecting on the analysis in Tables 6 and 7 above, manufacturer incentives have an advantage in implementability terms over consumer incentives (See Figure 5 and 6). This comes through in a higher overall score and the spider diagram shows the difference rests in the transaction costs. Moreover, the analysis suggests that the scoring will differ by appliance type, with incentives for efficient air conditioners winning less likely to win political acceptance than those for fans or refrigerators as shown clearly in Figure 6. The process of asking systematic questions about implementation provides insights such as these.

Figure 5: Graphical Representation of Implementation Analysis of Rebate Programs

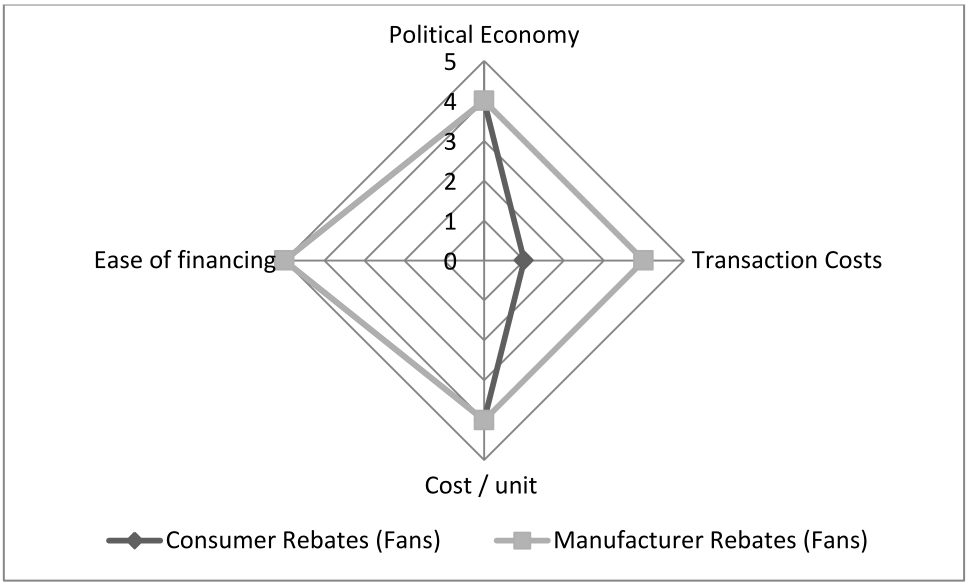
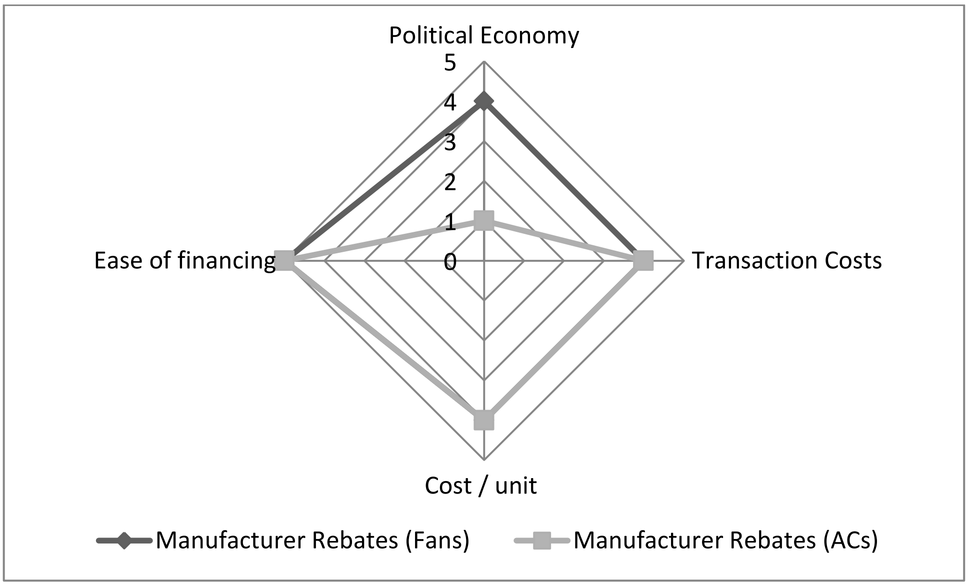


Figure 6: Graphical Representation of Implementation Analysis Across Appliance Types



VII. Conclusion

The framework laid out in this paper is intended to provide a basis for a rational and structured approach toward co-benefits based climate policy formulation. It seeks to provide a way to explicitly address the achievement of multiple objectives of policy, in a manner that provokes discussion and debate, makes explicit what are often implicit assumptions, and brings into the light often hidden considerations such as the political economy of implementation.

India has formally espoused a co-benefits approach, but in the absence of clear specification, it risks being little more than an ad hoc and often ex post justification for business as usual policies. If systematically applied, however, a co-benefits approach can stimulate real shifts in policy direction, not only toward lower carbon futures, but also more explicit efforts to internalize inclusion and local environmental gains. And as discussed earlier, it can also enrich India's international negotiating position.

The methodology is founded on qualitative judgement, which may give some readers pause. However, it is important to realize that the framework design calls for qualitative judgement to be backed by clear argumentation and detailed reference to supporting theoretical and empirical literature. In other words, the intent is to generate informed and rigorous judgement, not guesswork. Moreover, the framework allows for the results of quantitative work, including modelling results to be represented within the template. In this sense, this is a structured tool that allows existing work to be better summarized and placed within an analytical framework; MCA analysis is intended as a complement to other forms of analysis. Finally, the framework calls for judgement to be embedded within a process of transparent discussion and deliberation, so as to refine understandings and analysis over time, and identify weak points. If used consistently and properly, a co-benefits analysis will increasingly contribute to the ability to make informed judgements. Given the absence of methodological rigour in most prevalent climate policy formulation, we believe adoption of such a framework will be a step forward.

We anticipate that policy makers and government departments at various levels, think tanks and researchers, and advocates such as NGOs and citizens groups would be the major users of this tool. Within the Government, it is likely that analysis of objectives would take place at an integrative level, such as the Planning Commission or an equivalent entity in the states, while policy instrument analyses would be undertaken by line ministries at the Centre and/or State, or at various levels of local government. We would also expect that non-government policy research agencies or citizen groups would be able to use this tool to explore various policy options, by comparing policy objectives and then evaluating policy instruments for the chosen objectives. They may also play a role as critical reviewers of government led assessments. We suggest that using these templates as the basis for a broader policy dialogue through public consultation processes would enhance the validity and credibility of government policy formulation. Indeed, the MCA approach and the templates suggested here would strengthen public consultation processes, which otherwise are often diffuse and lack focus.

There are several policy mechanisms already in process that would be enhanced by application of this tool. Various missions of the NAPCC could deploy a co-benefits approach to choose among objectives and instruments, as could the final report of the Expert Group on Low Carbon Strategies for Inclusive Growth of the Planning Commission. Indeed, the draft 12th Plan, which draws on the Group's interim report, makes explicit reference to a co-benefits approach, using an earlier iteration of the framework proposed here. Similarly, many states have produced state action plans on climate change, and more are in progress. These plans tend to have large numbers of unprioritized objectives and instruments. This approach could provide a basis for seeking broader feedback, focusing criteria, and subsequently prioritizing on the basis of co-benefits and implementability.

The ideas presented here are a starting point, and there is certainly scope for improvement and refinement, building on pilot tests of the methodology. For example, the framework is not currently written to address adaptation policies, but could and should be adapted to do so. The template could be simplified and modified, as appropriate. Users could, for example, choose to place weights on outcomes, or combine the co-benefits and implementation analysis into a single step.

Ultimately, our main concern is with more explicit design and intent in India's domestic climate policy, and more informed consideration of trade-offs and synergies with other aspects of India's development policy making. We submit that achieving this outcome requires more deliberate and more deliberative decision making, and that a structured tool of the sort proposed here would help contribute to improved co-benefits based policy-making in India.

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