Low Carbon Roadmap for India (with case study of Ahmedabad City)

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Low Carbon Roadmap for India & Ahmedabad follows an integrated framework of sustainable development & climate mitigation. This approach starts with aligning the national development objectives and targets with global climate change objectives; backcasting to achieve a low carbon society through an appropriate selection of various interventions: technological, social/institutional, shared costs/risks, avoiding lock-ins and modifying preferences. These interventions flow through various drivers, hinged on the principles of innovation, co-benefits and sustainability. The road map is intended to communicate to the policy makers - how to effectively integrate climate change actions in the development plans of the country & city. The actions outlined, we believe, would guide effective transition towards a Low Carbon India & Ahmedabad. The proposed analysis is in line with the national position articulated in India's "National Climate Change Action Plan". The LCS transition analyzed converges with the 2 ^{0}C global "aspirational" stabilization target, as agreed in various global forums. It is also found that US$ 3 Trillion investment in energy infrastructures is needed till 2050, under the BAU scenario, most of which is in the power sector. Delayed actions towards low carbon transitions are likely to result in infrastructure 'lock-in' that acts as barrier to make such a transition. It was also found that the marginal abatement costs under the LCS scenario is significantly lower than the conventional development scenario.

This analysis assesses two paradigms for transiting to a low carbon future in India. First pathway assumes conventional development pattern together with a carbon price that aligns India's emissions to an optimal 450 ppmv CO_2e stabilization global response. The second emissions pathway assumes an underlying sustainable development pattern caricatured by diverse response measures typical of the 'sustainability' paradigm. An integrated modeling framework is used for delineating and assessing the alternate development pathways having equal cumulative CO_2 emissions during the first half of the 21st century (Figure 1).

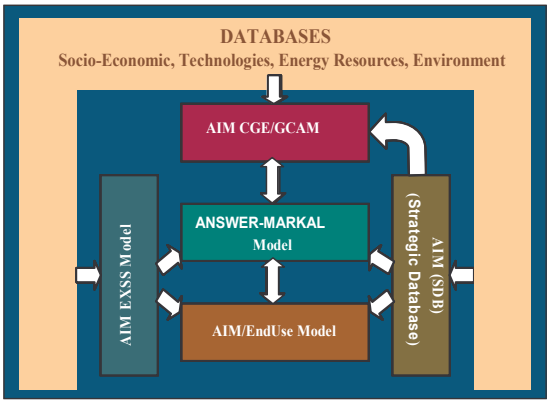

Fig 1: Integrated Modeling Framework

It can be seen from the figures below (Figures 2 & 3) that under the conventional development pattern (together with a carbon price), the mitigation target of 83.5 billion tCO_2 for the 450 ppmv CO_2e stabilization scenario is achieved through a major intervention in the infrastructure & the power sector comprising of measures such as extensive use of advance technologies like CCS and greater proliferation of nuclear energy. These measures are predominantly on the supply side. It is also important to mention that the reduction is primarily on account of decoupling energy and carbon, whereas the actual energy consumption increases as compared to the base case. Identifiable technology co-operation areas comprise of energy efficiency, wind/solar/biomass/small hydro, and nuclear/CCS.

However, under the sustainability scenario, the same mitigation target can be achieved by a combination of initiatives on both supply and demand side, thereby widening the technology use. On the supply side, infrastructure & clean power again plays a crucial role. While on the demand side, measures like dematerialization, sustainable consumption and end use device efficiency play a key role. Identifiable technology co-operation areas are transport infrastructure technologies, 3R/material substitutes/renewable energy, process technologies and urban planning/behavioural changes.

The LCS opportunity for developing countries arrives with a window of opportunity, as it gives a chance for such countries to avoid critical lock-ins; particularly in long-lived infrastructure assets. From the perspective of a country, like India, the LCS opportunity is a window to decide about the future flow of energy through infrastructure and other behavioral and lifestyle related choices.

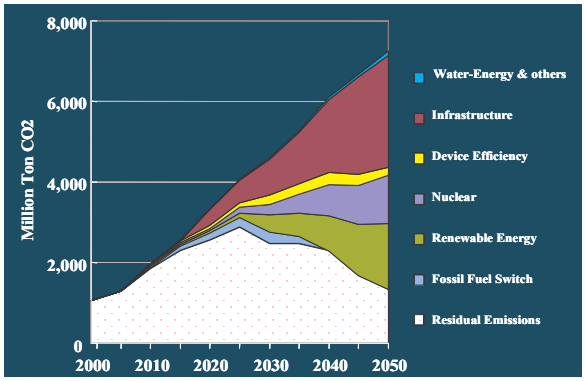

Fig 2: Mitigation under conventional development

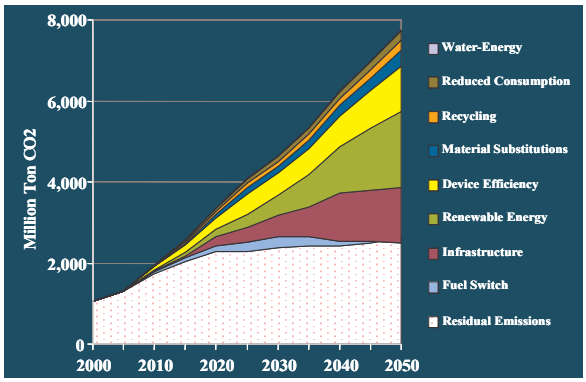

Fig 3: Mitigation under Sustainable low carbon path

The LCS framework should also look at opportunities which create various kinds of co-benefits apart from direct GHG emission reductions. Such co-benefits, like improved air quality, provide an opportunity to minimize social costs of such a transition. The other advantage of such an approach would be in achieving "multiple dividends", at minimum social cost. It helps in achieving various developmental goals of the country and therefore, is in line with the concept of sustainable development.

The study on Ahmedabad, using AIM/End Use model & AIM/ExSS tool, develops a low carbon vision for the city of Ahmedabad. In order to transit to a low carbon society in Ahmedabad, several countermeasures are required. It is interestingly observed from the model output that for such a transition in Ahmedabad, decoupling of economic growth and energy use emerges as the highest mitigation potential as compared to decarbonisation of energy. This LCS opportunity is a means through which we can align long term infrastructure choices (transport, power, building/urban infrastructure) to avoid critical lock-ins and simultaneously achieve sectoral mitigation of CO_2.