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2 °C target, India's climate action plan and urban transport sector

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ABSTRACT

This paper examines climate impact of urban transport sources in India and its proposed mitigation plan to achieve 2 °C reduction goal in post-Kyoto era. In 2014, global economies agreed on adopting independent national determined contributions (INDCs) and action plans to reduce their carbon emissions. Subsequently, India released its INDCs in October 2015 with a commitment to reduce 33–35% of its CO_2 emission by the year 2030, compared to 2005 level. Adoption of green energy, afforestation and sustainable way of living were identified as key action points to achieve the underlined goal. However, this does not give clear guidelines for establishing sector specific targets and proposed interventions required for achieving post-Kyoto targets and measuring impacts in the near future. In case of transport sector, a strong emphasis was laid on mass-transit projects, energy efficient vehicles, bio-fuel and stringent vehicle emission norms to achieve desired results. Personal vehicles are identified and accepted as prominent contributor of air emissions; while, carbon emission and particulate matter from goods transport is equally responsible for deteriorating air quality in urban areas. Several regulatory and fiscal measure for reducing transport based carbon emission are documented; however, their adoption may affect communities and stakeholders in varied manner. Therefore, it becomes inevitable to conduct need assessment and stakeholder consultation to determine plausible challenges, prior to introducing a desired planning reforms. Further, the involved personnel in India should actively engage transport-based stakeholders during policy identification and its effective implementation to achieve desired results.

1. Introduction

The effectiveness, efficiency and subsequent impact on ambient environment determines sustainability of a transportation system (Jeon and Amekudzi, 2005). In terms of global climate impact, transport sector consumes nearly one-fourth of energy and releases ~22% of the total carbon (CO_2) emissions (OECD, 2010). By the end of 2015, there is an anticipated increase of 80% carbon impact from transport sector due to exponential rise in personal car ownership, air transport and freight dependency (IEA and OECD, 2009). This would add to serious energy security issues, environment quality deterioration, safety issues and human health impact (Batty et al., 2015). In context of developing countries including India, this phenomenon is considerably critical with current rate of urbanization and associated increase in personal vehicles, congestion and environmental problems (UNFCCC, 2015).

This makes it necessary to realize how anthropogenic activities would continue to induce climate impact and create an irreversible threat to the overall planet. Several global action and climate treaties were signed in order to reduce CO_2 emissions and adapt to change in climate patterns. The current paper considers India's commitment and analyses its action towards reducing climate impact of road transport sources in-line with its recently adopted independent national determined contributions (INDCs). On the other hand, it is critical to note that India's population is heterogeneous in nature – varying in their socio-economic needs, geographical presence and mobility requirements. A large scale transformation of existing infrastructure and policy framework would be required to mitigate impact and promote inclusive growth in near future. This paper would identify factors critical for achieving the underlined targets, in post-Kyoto scenario, by dis-

Abbreviations: CDM, clean development mechanism; CO_2, carbon dioxide; COP, Conference of the Parties; GDP, gross domestic product; GHG, greenhouse gases; INDC, independent national determined contributions; IPR, intellectual property rights; MoEF&CC, Ministry of Environment, Forest and Climate Change; NAPCC, National Action Plan for Climate Change; UNEP, United Nations Environment Programme; UNFCCC, United Nations Framework Convention on Climate Change; US, United States.

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cussing current policy and planning measures adopted for managing mobility needs across India.

2. Pre-2015 global climate actions and plans

In 1994, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in order to collectively reduce CO_2 emissions and mitigate global climate impacts. The first carbon reduction treaty was formulated at Kyoto in the year 1997 (adopted in 2005) based on 'common but differentiated responsibilities' approach with committed emission reduction targets for industrialized countries. In its first phase (2005–2013), the Annex-I countries committed to reduce greenhouse gas (GHG) emission by 5% below 1990's level by adopting national commitments and market-based mechanisms (such as international emission trading, clean development mechanism and joint implementation). According to Townsend (2014) and Clark (2012), the growth of global GHG emissions did not slow down with implementation of first commitment period of Kyoto. This is due to – i) *overall GHG emission reduction in European regions*, due to increased emission trade permissions based on CDM project implementation in the developing part of world; and ii) *GHG emissions increase in other parts of world*, due to increase in shift of manufacturing and production facilities to the rapidly growing economies. However, the first phase of Kyoto Protocol paved a way for collateral discussions by creating an equal decision-making platform for the developing and least developed economies around the globe.

Since the year 2011, the Conference of the Parties (COP) continued to work for mobilizing global commitments in the post-2015 regime and faced challenges during allocation of emission reduction responsibilities among the participating countries. The developed nations strongly demanded emission targets for developing countries (especially India and China) owing to their higher GHG emission in the current scenario. On the other hand, the developing nations argued that industrialized nations are responsible for climatic degradation since the industrial revolution. The later parties debated that mandatory emission targets would render an additional burden on their economic growth and development agenda. However, the last three COP meetings resulted in notable political dialogues, knowledge exchange and mass call for global action. Recently, the developing nations agreed to adopt 'Nationally Appropriate Mitigation Actions (NAMAs) as their voluntary contribution towards achieving a global deviation from the 'business as usual' emission scenario, till the year 2020. This has further laid the foundation for adopting INDCs by the COP ratifying nations at Warsaw Convention (COP 19 in the year 2013), which aimed at developing mutually acceptable post-2015 contributions and was discussed during Paris Convention in the year 2015.

According to Warsaw Convention, all the member nations, accept Least Developed Countries and Small Island Developing Countries, would be developing transparent, quantifiable, comparable, verifiable and ambitious INDCs (GIZ, 2015). It was identified that the adopted INDCs would be: i) absolute, economy-wide emissions target, ii) developed as deviation from a business-as-usual scenario, iii) intensity-targets that are based on gross domestic product (GDP), and iv) a set of policies and actions laid to achieve 2 °C reduction target relative to pre-industrial levels. On December 2014, the COP nations decided to submit their up-front information in order to achieve adopted INDCs, by the end of 1st of October 2015. In the mid of October 2015, 120 parties who are responsible for ~85.8% of global GHG emissions submitted their INDC's. Among these, 74% of the INDCs were GHG emission based-targets; while, the remaining were action-oriented or non-GHG target based commitments. Further, nearly 52% INDC targets were developed on a baseline scenario (1990s' emissions), 24% were base year (different for each nation) and rest were fixed or intensity based declarations. On the similar lines, India submitted its carbon reduction target and action plans to reduce poverty and reduce negative externalities of these development goals in near future.

3. Key summary of India's INDC

On 2nd October 2015, India adopted its national GHG target and Non-GHG target for the next ten years' period (2021–2030). The Ministry of Environment, Forest and Climate Change (MoEF&CC) adopted stakeholder interactions and GHG emission modelling methods to identify most suitable INDC targets for Indian growth conditions (as described in Fig. 1). It is important to note that, in the year 2013, India declared a voluntary goal of reducing its emission intensity (per GDP) by 20–25% by the year 2020, from 2005 levels. In the last five years (since 2005), India's GDP based emissions are noted to decrease by ~2% owing to its policy measures that targeted adoption of clean energy, improvement in industrial efficiency, reduction in transport emissions and lowering energy footprint of the building sector (UNEP, 2014). On the similar lines, India declared its INDCs commitments in 2015 and ratified the Paris Convention in 2016 (October) with a broad aim to eradicate poverty and continue to grow on low carbon path, through extensive support of global clean technologies and financial resource pool.

On the analysing the proposed INDCs, it was observed that India's carbon reduction targets were developed on an 'intensity benchmark' in order to achieve ~33–35% reduction in its total CO_2 emission in the year 2030, compared to 2005 level. On the other hand, the indirect targets are aligned with reduction of 40% fossil-based electricity generation and an exponential increase of forest sinks to reduce ~2.5–3 billion tonnes of CO_2 emissions. Various policy measures were identified to achieve underlined emission reduction agenda: i) rapid adoption of clean and renewable energy sources, ii) energy efficiency enhancement across industries, iii) creating resilient and less carbon intensive urban centres, iv) upcycling of waste, v) developing safe, smart and green transport networks, vi) controlling pollution, and vii) increasing green cover. It was mentioned that the existing National Missions under National Action Plan for Climate Change (NAPCC) may be realigned with the proposed plan; however, a need for clarity on sector specific actions and associated emission reduction targets was observed. Further, a financing requirement of 2.5 trillion US dollars was determined for implementing proposed climate mitigation and adaptation plan (MoEF&CC, 2015). A strong need for global collaborative research was reiterated by the authorities to promote transfer of clean technology and intellectual property rights (IPR) to the developing countries.

One significant observation during analysis of India' INDC's was adoption of national or overall carbon intensity in the year 2005 as a benchmark to develop 2020 mitigation targets and action plan. Therefore, an overall reduction plan was proposed in submitted document; however, there is a need for clarity on targeted impacts and challenges faced during implementation of proposed transformation across different sectors. This preliminary study therefore examines how on-road transport and associated interventions would support in achieving underlined carbon reductions targets of India, in the post-Kyoto era.

4. India's INDC and road transport sector

According to the European Business and Technology Centre (EBTC, 2013), the GDP contribution of India's transport sector is estimated to grow exponentially at an average rate of 5.5%, which