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Political Feasibility of Enhancing India's Midcentury Target for Emissions Intensity

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About KAPSARC

The King Abdullah Petroleum Studies and Research Center (KAPSARC) is a non-profit global institution dedicated to independent research into energy economics, policy, technology and the environment across all types of energy. KAPSARC's mandate is to advance the understanding of energy challenges and opportunities facing the world today and tomorrow, through unbiased, independent, and high-caliber research for the benefit of society. KAPSARC is located in Riyadh, Saudi Arabia.

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Key Points

India's greenhouse gas emissions have grown along with its rapid economic growth, making it the world's third-largest emitter after China and the United States. Under the Paris Agreement, India has committed to reduce its emissions intensity relative to its GDP by 33-35% by 2030, compared with its 2005 level. In this study, we assess the evolving political will to enhance India's stated commitment to combat climate change. We use the KAPSARC Toolkit for Behavioral Analysis (KTAB) to simulate the collective decision-making process among Indian policymakers and to analyze the political feasibility of enhancing India's midcentury targets for its emissions intensity. Key findings from this study are as follows:

- India's efforts to fulfill and enhance its climate pledges must balance its need to reduce pollution and combat climate change against its desire to maintain its rapid economic growth.
- The Prime Minister's Council on Climate Change leads the formulation of India's emissions targets under the Paris Agreement and climate change discussions more generally. The prime minister advocates for a more aggressive midcentury target than most of the government, to show that India is ambitious about combatting climate change.
- Energy companies, the coal sector and related ministries adopt a more conservative position with respect to enhancing India's climate change targets.
- Indian stakeholders broadly agree that the country needs to increase its midcentury emissions intensity target to between roughly 40-65%.
- Because of their technical capabilities and proximity to decision-makers, think tanks play a significant role in setting India's nationally determined contribution (NDC) targets. Most think tanks are currently more conservative than the political actors, advocating an emissions intensity reduction target of between 46-49%.
- Over time, the majority of actors, led by the prime minister, are expected to support an emissions intensity reduction target of around 50-55%.

Summary

In 2015, at the historic 21st session of the Conference of Parties (COP21) in Paris, parties to the United Nations Framework Convention on Climate Change (UNFCCC) reached an agreement to reinforce the global response to climate change. They established a global action plan aimed at keeping the global temperature increase to well below 2 degrees Celsius (C) above pre-industrial levels and to limit this increase to 1.5 C. The Paris Agreement obligates all parties to communicate their best efforts through nationally determined contributions (NDCs), pursue national mitigation and adaption measures to achieve their NDC objectives, and strengthen those objectives in the years ahead. India ratified its NDC in October 2016 with three main targets: achieving 40% of its power capacity from non-fossil fuel sources, reducing its emissions intensity relative to its gross domestic product (GDP) by 33-35% below 2005 levels by 2030, and creating an additional 'carbon sink' of 2.5-3 billion tonnes of carbon dioxide equivalent (CO_2e) by 2030.

In this study, we focus on the evolving political will of actors toward enhancing the emissions intensity target for 2050 (i.e., the midcentury target). We use the KAPSARC Toolkit for Behavioral Analysis (KTAB), a model of collective decision-making processes (CDMPs), to analyze how the positions of Indian stakeholders will change over time with respect to India's emissions intensity reduction target. KTAB provides a simulation of the evolution of political support in India, based on data gathered from semi-structured interviews conducted in May 2018 in New Delhi with subject matter experts familiar with the Indian political discourse on this topic.

The data gathered from the subject matter experts indicate that the majority of actors that can influence India's midcentury emissions reduction target, directly or indirectly, currently support targets ranging from 40-65%. The coal industry (e.g., Coal India and coal public sector undertakings [PSUs]), the energy industry and several energy-related ministries currently advocate for targets ranging from 43-45%. Conversely, two actors, the state of Gujarat and the Centre for Science and Environment (CSE), advocate the most ambitious targets, ranging from 60-62%.

India's Prime Minister (PM) Narendra Modi is the most influential actor within the decision-making process, and his active engagement in the climate change debate is driving the outcome. While the experts opined that he would support a midcentury target of 55% (more ambitious than most government actors), the KTAB simulation indicates he is willing to compromise slightly in order to build political consensus. As a result, the simulation indicates that a consensus is likely to form in which the majority of actors are likely to support this target over time. However, two actors stand out as outliers: the CSE continues to push for a much more ambitious target of 62%, and Coal India is expected to maintain its support for a 43% reduction target.

During interviews with subject matter experts, many emphasized that decisions regarding the formulation of India's NDC occur in a centralized process focused around the PM's Council on Climate Change. Through a sensitivity analysis, we found that the outcome is the same regardless of whether we assume that the decision is made within a small circle, or if decision-makers informally recognize the views of actors in the broader political environment in India in the process of making their decision. Among the Council members, the Minister of Urban Development, as well as non-government members within the Council, are instrumental in slightly lowering the PM's level of ambition.

Introduction

During 2015's 21st session of the Conference of Parties (COP21) in Paris, countries party to the United Nations Framework Convention on Climate Change (UNFCCC) agreed on a structure where they would commit to 'contributions' toward a global climate agreement. These commitments, Intended Nationally Determined Contributions (INDCs), were the foundation of post-2020 climate action. Once ratified, the INDCs became Nationally Determined Contributions (NDCs). The Paris Agreement aims to hold the increase in the global average temperature to well below 2 degrees Celsius (C) above pre-industrial levels and limit this increase to 1.5 C. Further, the Paris Agreement invited countries to develop midcentury, long-term low greenhouse gas (GHG) development strategies.

This paper uses the KAPSARC Toolkit for Behavioral Analysis (KTAB) to conduct a stakeholder analysis of the politics of India's evolving commitment toward the development of midcentury GHG targets. This paper explores the political feasibility of India enhancing its midcentury emissions intensity target within the framework of its NDC. KTAB produces a simulation of actors' evolving advocacy in this political debate using a model of collective decision-making processes (CDMPs).

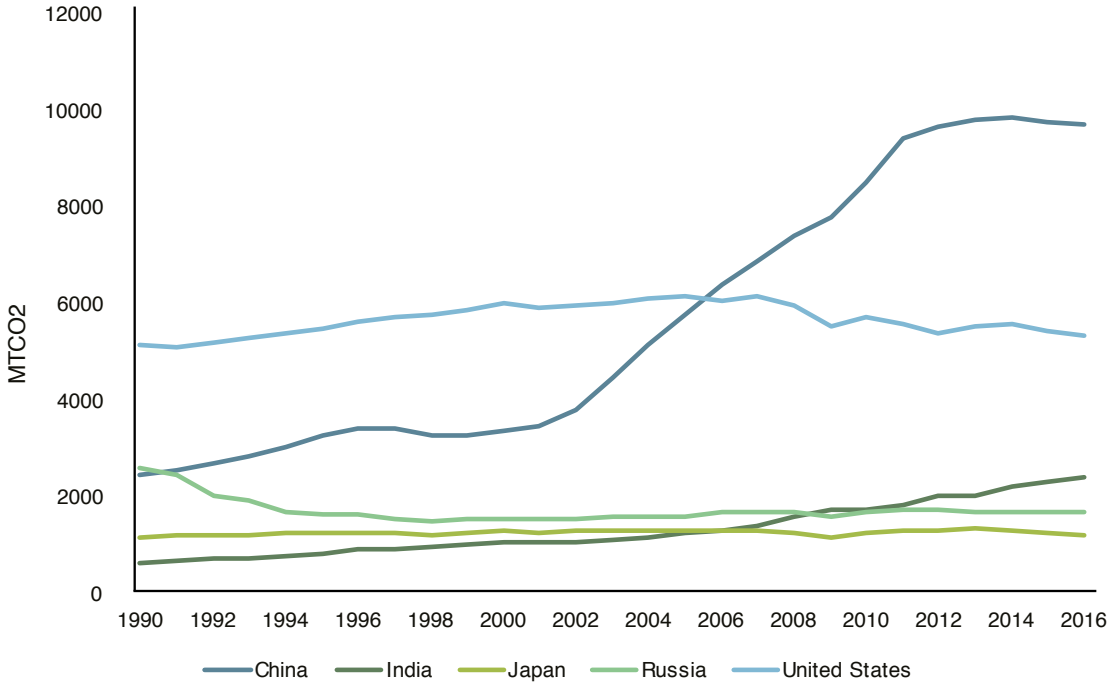
India holds a unique position within the UNFCCC's climate change discussions. It is an emerging economy with high poverty rates, and a large and fast-growing population that consequently produces low levels of per capita emissions but a high level of emissions in aggregate. The country is very sensitive to the short-term threat of emissions posed by pollution, and it is conscious of the long-term threats associated with climate change. However, because of the limited resources India has to address the issue, climate policymaking remains a complex issue for the country.

In recent years, the Indian government has tried to develop policies that will address climate change. It released its first National Action Plan on Climate Change (NAPCC) in 2008, announcing eight key measures on energy efficiency and renewable energy. Its eight subsidiary missions have been approved, and their implementation has started. Several states have also embarked on processes to formulate state climate plans.

In 2009, at the 15th session of the Conference of Parties (COP15) in Copenhagen, India released a long-term 'nationally appropriate mitigation action' plan to reduce the emissions intensity of its gross domestic product (GDP) between 20-25% by 2020, compared with its 2005 level. Later, at COP21, India revised this target and announced its intention to reduce the emissions intensity of its GDP by 33-35% by 2030, compared with its 2005 level. The NDC announced at COP21 also includes a commitment to achieve 40% of its cumulative electric power installed capacity from non-fossil fuel-based energy sources by 2030. To mitigate its carbon footprint, India also plans to increase forest and tree cover to create an additional carbon sink of 2.5-3 billion tonnes of carbon dioxide equivalent (CO2e) by 2030. The INDC was ratified on October 2, 2016, becoming India's first nationally determined contribution (NDC) under the Paris Agreement. India is strengthening its comprehensive approach, based on the NAPCC, through its key missions on energy efficiency and solar energy (Government of India 2015).

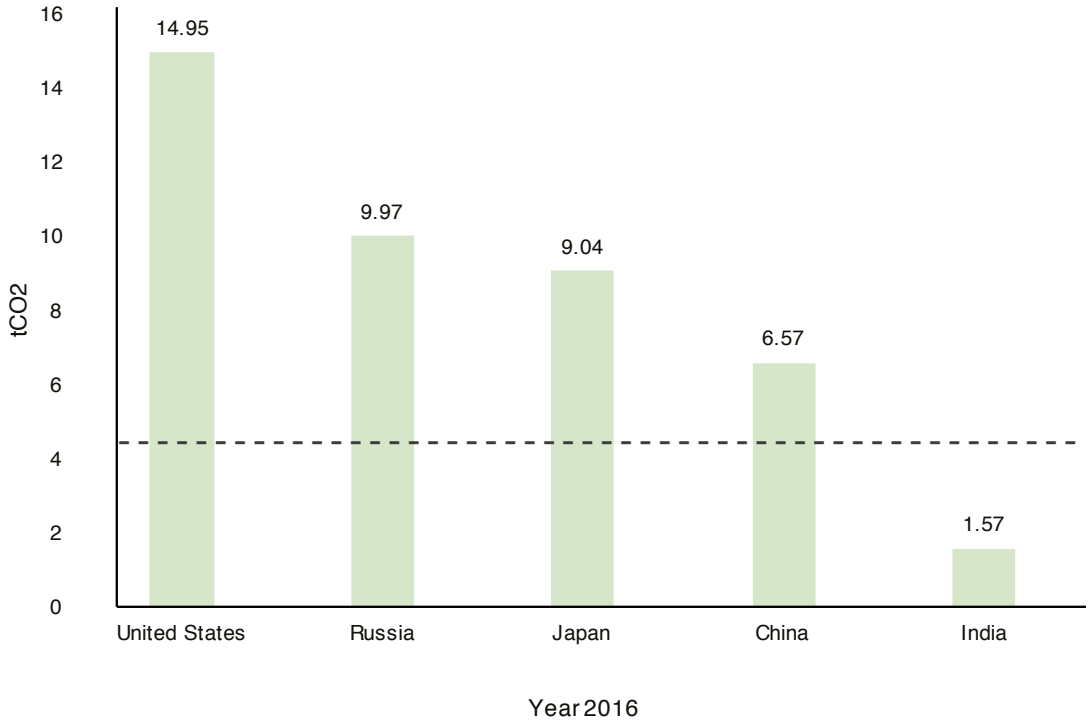
India is the world's third-largest source of GHG emissions after China and the United States, having emitted 2.4 billion tonnes of carbon dioxide (CO2) in 2016. However, on a per capita basis, its CO2 emissions stand at just 1.8 tonnes, well below

Figure 1. Total CO2 emissions from fuel combustion of the top five emitting countries (1990-2016).



Source: Global Carbon Atlas.
Note: MTCO2 = Megatonnes of CO2.

Figure 2. CO2 emissions per capita of the top five emitting countries (2016).



*dashed line indicates world average.
Sources: International Energy Agency (IEA), Energy Atlas.
Note: tCO2 = total CO2.

the world average of 4.2 tonnes (Figures 1 and 2). India's emissions are, of course, driven by its fuel mix, with coal as its primary fuel source. India relies on coal as a cheap source of energy to help increase access to electricity among its population and to maximize economic growth. However, India is also highly vulnerable to the impacts of pollution in the short term and climate change in the long term. Various studies have pointed to the growing frequency and intensity of extreme weather events in India that have the potential for significant adverse impacts on people's livelihoods, especially given that its population is dependent on agriculture and other climate-sensitive sectors. However, the need to provide cheap sources of energy while also combatting climate change creates a significant policy dilemma for the Indian government (Bhatt et al. 2018).

India's Climate Change Governance Process

The Indian constitution enshrines both features of a federal and unitary system. The executive powers of the central government and of states are clearly defined. Since his election in 2014, Prime Minister Narendra Modi has established a centralized power structure with direct control over many key portfolios, including climate and access to energy. Under the current government, the Prime Minister's Council on Climate Change (PMCCC) was reconstituted to coordinate national action on assessing, adapting to and mitigating against climate change. The PMCCC enables the unambiguous engagement of various scientific entities on the issue of climate change. In the Council, sectoral line ministries and think tanks provide input on matters of climate change and provide general support during discussions before international meetings on climate change (Dubash and Joseph 2015). The ministries under the Council are also tasked to ensure India achieves its NDC targets. The PMCCC is a key government body that provides insights into and helps formulate action plans regarding the assessment of, adaptation to and mitigation against climate change in India.

Figure 3 shows the composition of the reconstituted PMCCC. The prime minister is the chairperson of the Council, with relevant ministries members of the Council. The Council also includes representatives of civil society, mainly officially recognized non-governmental organizations and think tanks. Within the Council, the Ministry of Environment, Forest, and Climate Change (MoEFCC) is the nodal ministry for climate change negotiations. The members of this committee act as advisers to the prime minister, or chairperson. Ultimately, the prime minister is the final authority on all issues relating to climate change policy (Bhatt et al. 2018).

Figure 3. Composition of the Prime Minister's Council on Climate Change (PMCCC).

Prime Minister

Minister of External Affairs	Finance Minister	Minister of Environment, Forest and Climate Change	Minister for Water Resources	Minister for Agriculture	Minister for Urban Development
Minister for Science and Technology	Minister of State for Power, Coal and New and Renewable Energy	Cabinet Secretary	Foreign Secretary	Secretary, Ministry of Environment, Forest and Climate Change	Non-governmental members

Source: Ministry of Environment, Forest and Climate Change, India.

KTAB and the Spatial Model of Politics (SMP)

KTAB is a platform that enables the modeling and analysis of CDMPs. CDMPs capture the political bargaining process, both explicit and implicit, among a set of actors – which can include individuals, institutions, constituencies or identifiable groups or 'blocs.'

This paper presents an analysis of plausible outcomes for CDMPs. We use a specific instantiation of a model in KTAB, based on the Spatial Model of Politics (SMP), one of the most prominent and best-established CDMP models. The SMP simulates how actors interact with and influence one another over time to arrive at a 'feasible outcome' for the modeled question. This reflects a model-based view of the expected outcome for actors' collective support for – or opposition to – enhancing the Indian midcentury emissions intensity target. The experts' aggregate knowledge characterizes the current political landscape (referred to as turn 0), but all simulations beyond turn 0 are based purely on the KTAB SMP calculations.

This paper deliberately focuses on analytic results. For a detailed technical description of the underlying model and its calculations, interested readers are directed to two related KAPSARC papers for more detail:

> "An Introduction to the KAPSARC Toolkit for Behavioral Analysis (KTAB) Using One-Dimensional Spatial Models" (Wise, Lester, and Efird 2015a).

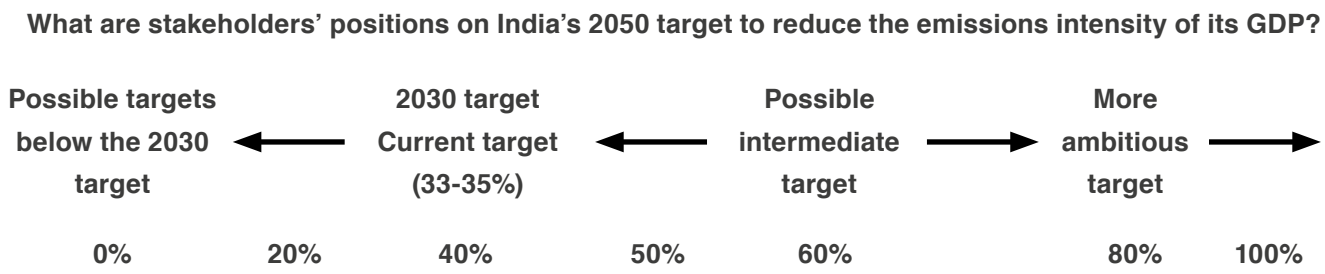
> "Multidimensional Bargaining Using KTAB" (Wise, Lester, and Efird 2015b).

Both papers are freely available on KAPSARC's website and the KTAB portal, as is the program's source code and documentation. Please visit www.ktab.software for all related papers, the latest version of the software and all materials of interest related to KTAB.

KTAB analysis of the political feasibility of enhancing India's midcentury target

The first stage of a KTAB analysis is to define the question, i.e., defining the topic in contention among the various actors/stakeholders. As a result, a spectrum of potential actor positions is defined, as shown in Figure 4. This study focuses on stakeholders' positions regarding India's 2050 target to reduce the emissions intensity of its GDP under its NDC. Subject matter experts familiar with India's dynamics regarding this issue were interviewed to obtain information on relevant stakeholders. These semi-structured interviews focused on qualitative information pertaining to the research question, as well as quantitative data for the KTAB simulation.

Figure 4. Spectrum of actor positions.



KTAB SMP data input

Data for this study were collected through semi-structured interviews with eight subject matter experts in New Delhi in May 2018. Subject matter experts interviewed are affiliated with the following:

- Central Ministry, government of India
- The Energy Research Institute (TERI)
- The Brookings Institution, India
- Observer Research Foundation
- Center for Policy Research
- Council on Energy, Environment and Water
- TERI School of Advanced Studies

With the assistance of experts, we identified the key actors involved in the decision-making process, either directly or indirectly, for our specific question. The list includes government entities, officials, states, energy companies, private sector and nongovernmental actors such as think tanks and advocacy organizations. Experts were then asked to assign each actor a numeric value for the following properties:

- Position: the location of an actor on the linear spectrum shown in Figure 4. In other words, what is the actors' advocacy with respect to support for/opposition to a more ambitious emissions reduction target in the next framework package?
- Influence: the relative degree of political power for each actor. The most powerful actor is assigned a value of 100, and others are weighted relative to the most powerful actor.
- Salience: the relative priority each actor assigns to the new emissions reduction target compared with other issues over which it must exert influence.

After the data collection process, experts' data are aggregated into one dataset, referred to as the baseline dataset, a weighted average of values assigned by experts for each of the three properties needed for a KTAB simulation. Table 1, below, displays the baseline dataset.

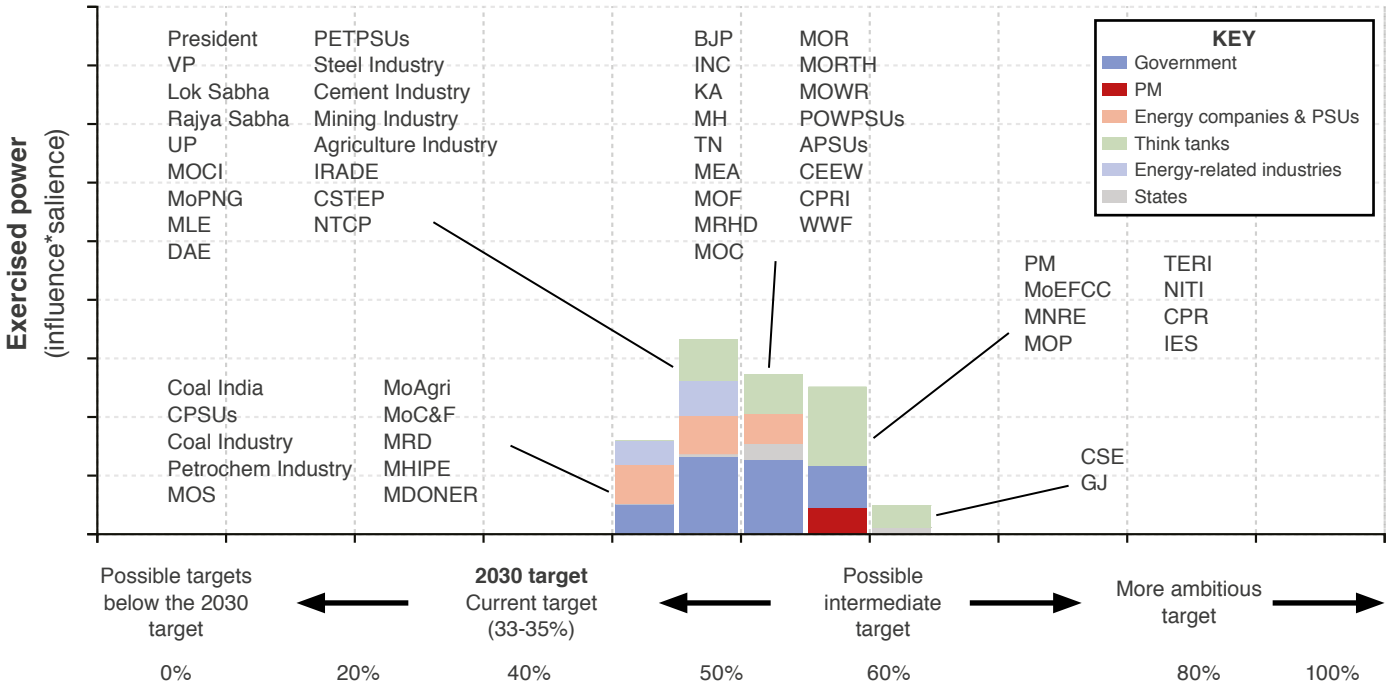
Table 1 in Appendix 1 shows the initial expert-based data used in the analysis. It is important to note that in the Indian political structure, one minister can be appointed to handle more than one ministry. Thus, the table may include two or more ministries as one actor. In our analysis, we assume the minister's view would reflect the ministry's position.

KTAB CDMP simulation results

With the above data, we can simulate the outcome of the CDMP around the emissions intensity midcentury reduction target in India. The SMP simulates interactions between actors over time in a unit called 'turns,' in which actors iteratively attempt to influence each other based on their evolving perception of how best to achieve their desired outcome.

Figure 5 shows turn 0 of the simulation. The bar graph is a representation of the actors' initial positions based on their average input, depicting the current state of affairs. The location of each bar on the horizontal axis illustrates the actors' positions, while the height of each bar indicates their exercised power: a product of an actor's influence and salience. At first glance, it is apparent that most actors are concentrated around the middle of the spectrum, with no extreme outliers. Actors to the left side of the spectrum include Coal India; coal public sector undertakings (PSUs); the Ministry of Steel (MoS); the Ministry of Agriculture and Farmers' Welfare; the Ministry of Chemicals and Fertilizers; the Ministry of Rural Development; the Ministry of Mines; the Ministry of Heavy Industries and Public Enterprise (MHIPE); and coal, petroleum and chemicals industries. These actors adopt the most conservative positions on India's midcentury emissions intensity reduction target of between 43-45%. Of the actors in this study, they advocate for the least enhancement to the 2030 target.

Figure 5. Initial (turn 0) distribution of actor's positions and effective power.



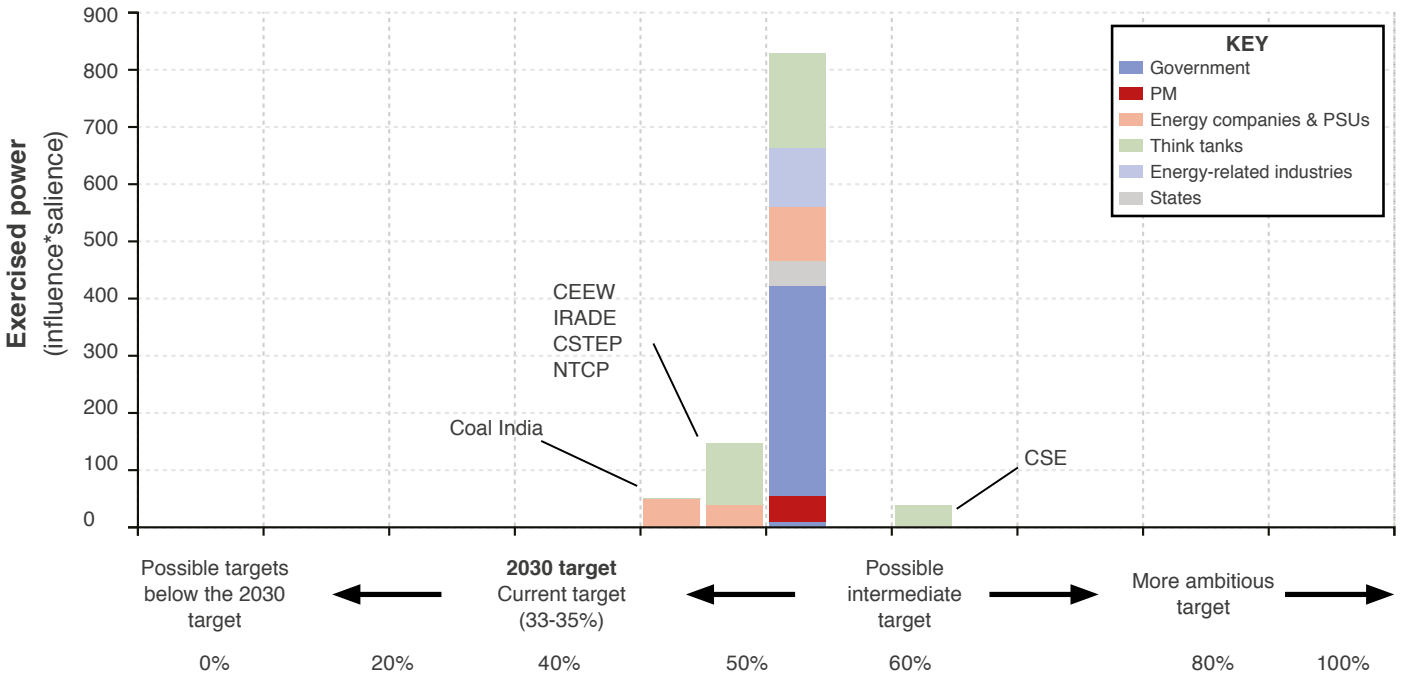
Source: KTAB simulation.

Note: Please refer to Appendix 1 for acronyms.

On the right side of the spectrum, two actors are slightly more ambitious than many actors among the group. The Centre for Science and Environment (CSE) and the state of Gujarat occupy positions supporting targets around 60-62%. These two actors are known to be the most ambitious on the climate front. Another group of actors that advocate moderately ambitious reductions coalesce around targets ranging from 55-60%. The prime minister (in red) is the most prominent among these actors, along with the Ministry of Environment, Forest and Climate Change, the Ministry of New and Renewable Energy and Ministry of Power, The Energy and Resources Institute (TERI), the National Institution for Transforming India (NITI) Aayog, the Center for Policy Research (CPR) and the Indian Environmental Society (IES). TERI, NITI and the CPR are all notable think tanks that share the same position, likely because of their engagement with the government as a consultancy group.

The remaining actors form the two clusters in the middle and occupy positions supporting slightly ambitious or slightly conservative targets. The Integrated Research and Action for Development (IRADE) and the Center for Study of Science, Technology and Policy (CSTEP) are two notable think tanks that take a slightly conservative stance. They tend to focus on modeling emissions intensity targets, and as such, their positions may be viewed as support for a realistically achievable target even if it may be less ambitious.

Figure 6. Final (turn 15) distribution of actor positions and effective power.



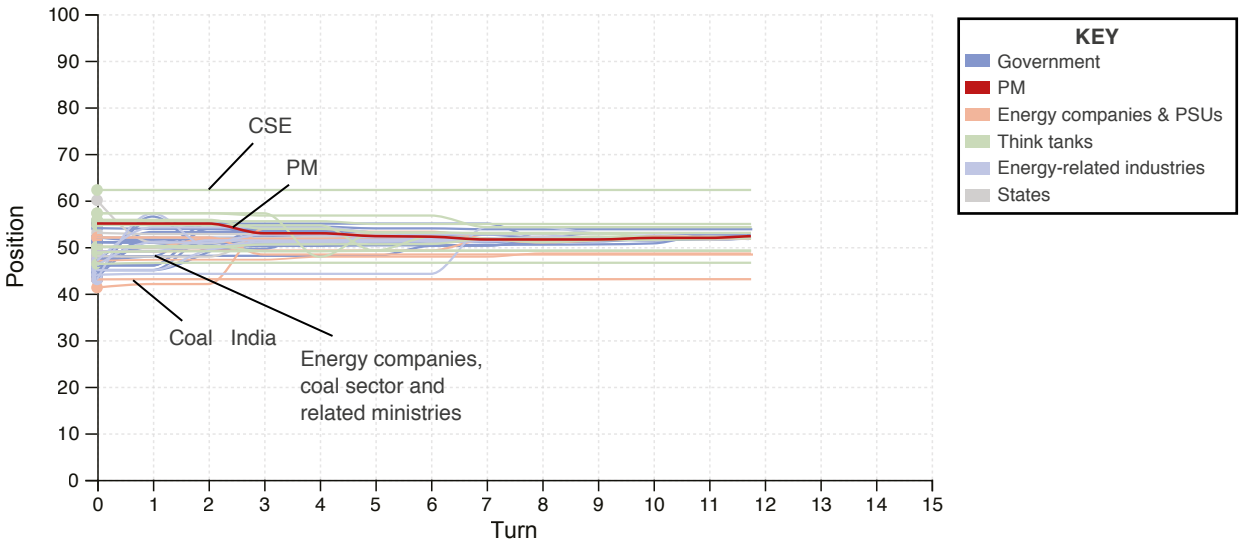
Source: KTAB simulation.

Note: Please refer to Appendix 1 for acronyms.

The simulation lasted 15 turns, which represents the end of the CDMP as determined by the model. Each turn represents an amount of time, though this is a model construct and not a precise measure. In brief, a 15-turn simulation might represent a year's worth of interactions, at least for the order of magnitude. The final turn is shown in Figure 6. Note that the narrow disagreement among actors has largely disappeared, with the outcome approaching a form of consensus comprising of the majority of actors supporting a target of 52%. However, CSE remains an advocate for a significantly higher emissions intensity reduction target of 62%. On the left side of the spectrum, Coal India remains supportive of the least ambitious target, its initial target of 43%. Think tanks such as IRADE, CSTEP and CEEW support slightly more conservative yet achievable targets ranging from 46-49%, whereas TERI supports a more ambitious target of 57%. While the prime minister initially supported a target of 55%, over the course of the simulation he is persuaded to shift his position to 52%, which is instrumental in forming a consensus around this slightly less ambitious and more feasible target.

Figure 7 shows the simulation results from another perspective, with actors changing their positions over time in response to pressure during the CDMP. The range of advocated positions in India is narrow and narrows further over time, meaning that there is unlikely to be a contentious debate around the 2050 emissions intensity reduction target. Although positions vary initially, most actors join the consensus at around turn 7. As Figure 6 also shows, the only outliers are CSE and Coal India, who are uncompromising and do not shift away from their initial positions. Figures 8, 9, 10, and 11, below, display a breakdown of the various groups and illustrate each group's behavior and interactions during the simulation.

Figure 7. Changing actor positions by turn (all actors displayed).



Source: KTAB simulation.

As seen in Figure 8, the vast majority of ministries and government entities reach consensus at 52%. Although actors in this group start with positions ranging from 43-55%, most see value in joining the consensus following the shift in the prime minister's position from 55% to 52%. The prime minister's change in position to a slightly less ambitious target could be seen as a sign of the central government's willingness to accommodate differing views and make a consensus more feasible.

Figure 9, above, displays states' behavior throughout the simulation. The five major states in India in terms of population and contribution to GDP play indirect roles in the policy process as the National Action Plan on Climate Change recognizes their roles in its implementation. As a result, all states have formulated their own State Action Plans on Climate Change (SAPCCs) under the provision of the Ministry of Environment, Forest and Climate Change. Moreover, Gujarat is known to be the most progressive state on the climate front and initially supports a highly ambitious midcentury target of a 60% reduction in emissions intensity. It moves to join the consensus by accepting a proposal from the mining industry. On the other hand, Uttar Pradesh opposes any target above 48%, making it the least ambitious state. But it also soon joins the consensus by accepting a proposal by Tamil Nadu. Maharashtra, Karnataka and Tamil Nadu initially advocate positions close to the consensus point and do not shift significantly. By the fourth turn of the simulation, all states stand at approximately 52%, supporting what is ultimately the majority position.

Figure 8. Changing actor positions by turn (only government actors displayed).

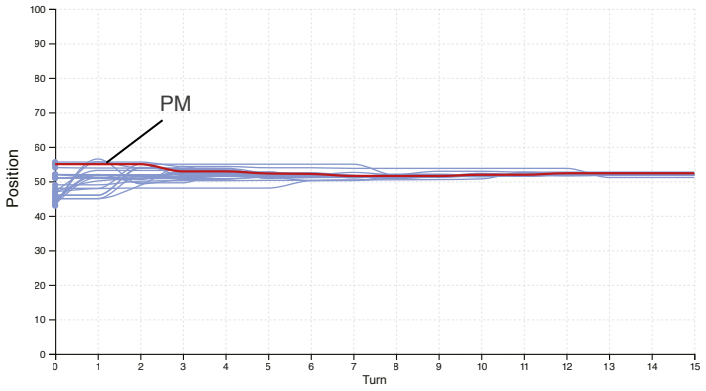
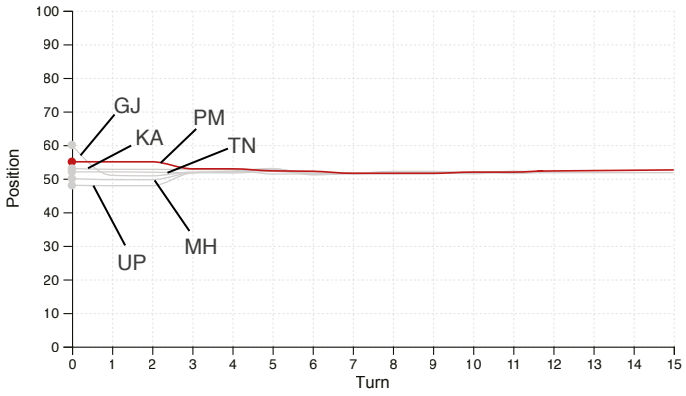


Figure 9. Changing actor positions by turn (only states displayed).



Source: KTAB simulation.

Note: Please refer to Appendix 1 for acronyms.

Figure 10. Changing actor positions by turn (only energy-related industries and public sector undertakings displayed).

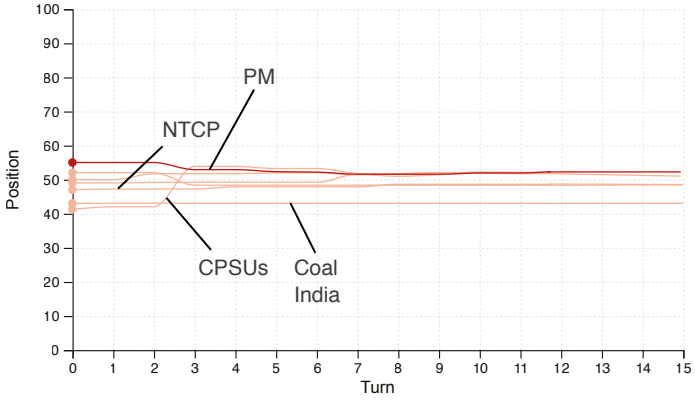
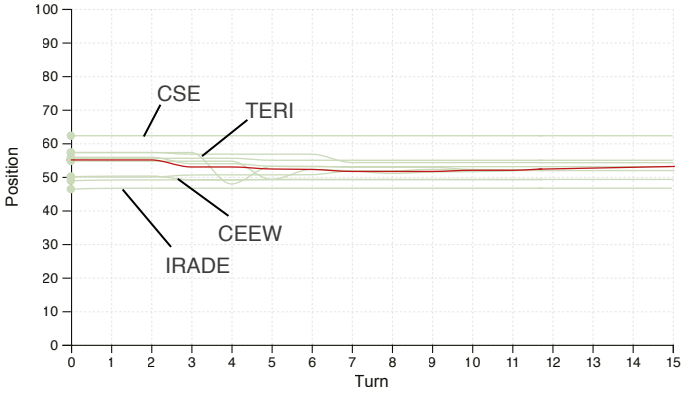


Figure 11. Changing actor positions by turn (only think tanks and NGOs displayed).



Source: KTAB simulation.

Note: Please refer to Appendix 1 for acronyms.

Figure 10, above, illustrates the behavior of energy-related industries and PSUs. This group includes the majority of actors opposing ambitious targets, with many initially advocating targets below 50% and as low as 42%. The Ministry of Coal PSUs show a significant move from their initial position at 42% to 53% by accepting a proposal from government-affiliated think tank NITI Aayog. The coal industry is influenced by TERI to join the consensus. This may be due to their modeling of the efficiency of coal-fired power plants.

Mining, steel, petroleum, chemicals, agriculture and cement industries initially oppose any targets above 50% but soon see value in joining the majority to support a target of 52%. Coal India remains committed to its initial position of 43% until the final turn and neither offers nor accepts any proposals. This could be because coal power plants provide base load power to the grid, leading Coal India to put more pressure on the coal sector, which may become a significant problem in the near future. Further, Coal India is only a supplier and, even with its complete production capacity today, is in no position to meet demand, leading to rising imports. That position is not going to change, as demand will be much higher given the increasing base of coal consuming units.

Figure 11 displays the behavior of think tanks during the simulation. Indian think tanks and non-governmental organizations play a significant role in climate advocacy and modeling energy intensity targets. Subject matter experts interviewed for this study emphasized the influence of think tanks on climate change-related policy formulation in India. Actors in this group occupy diverse positions ranging from 46-62%. A number of actors stand out among the group, particularly CSE, IRADE and CEEW. CSE supports significantly higher targets, while IRADE and CEEW take a conservative approach by supporting achievable targets. TERI initially supports an ambitious target of 57%, but ultimately joins the consensus toward the end of the simulation. NITI Aayog, the only governmental policy think tank, seems to support the PM's position during the simulation and joins the consensus as soon as it starts to emerge at 52%. Other think tanks initially advocate positions closer to the consensus point and do not shift their views significantly.

Prime Minister's Council on Climate Change – Sensitivity Analysis

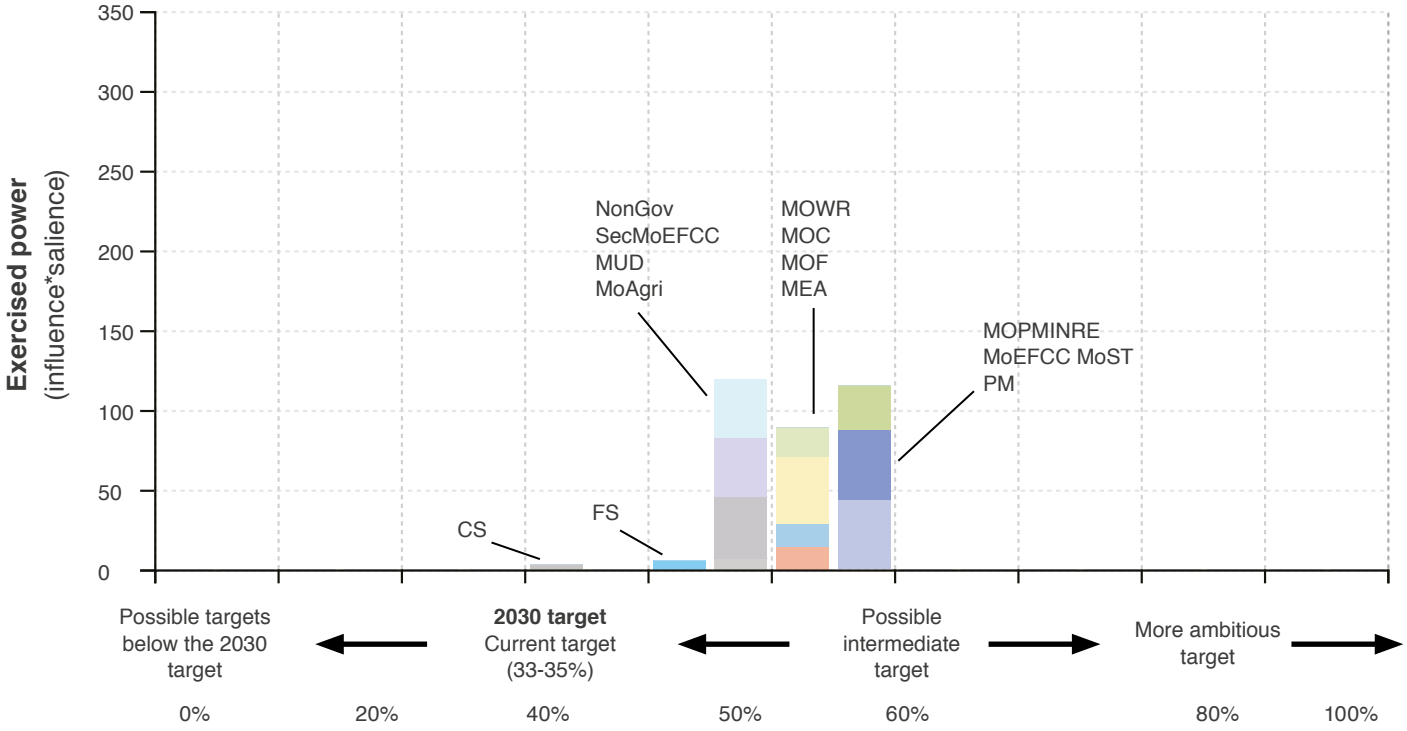
As previously mentioned, the Prime Minister's Council on Climate Change was established with the mandate of coordinating national-level action on assessing, adapting to and mitigating against climate change. The Council also helps ensure India achieves the targets set out in its NDC. The prime minister is the chairman and decision-maker of the Council, with 18 members acting as an advisory body on climate change policies.

During interviews for the study, one recurring theme emphasized by subject matter experts was that reaching a decision on the emissions intensity reduction target involves a centralized process, and the decision is often reached in a closed circle. Using KTAB, we can test whether the simulation changes with only this subset of actors in the analysis, ignoring the influence of actors outside the Council. The results of this second simulation allow us to assess whether this assumption makes a difference to the outcome.

The average of the experts' input for this subset of actors can be found in Appendix 1, Table 2. Note that the cabinet secretary and foreign secretary, while members of the Council, were not included as actors, as none of the experts believed they had pronounced views on the issue. As such, they are not expected to try to influence the outcome and can be dropped from the simulation. Values assigned to nongovernmental members include the average of four individuals: Nitin Desai, Chandrasekar Dasgupta, Ajay Mathur and J.M. Mauskar.

Figure 12 shows the initial positions advocated by actors in the Council (turn 0). The data remain unchanged from the expert inputs in the first simulation: the prime minister takes a more ambitious view supporting a target of 55% along with the Minister of MoEFCC, the MNRE and the Minister of Science and Technology. Taking a slightly less aggressive position, the Minister of External Affairs, the Minister of Finance, the Minister of Water Resources and the Minister of Coal support a target of 51%.

Figure 12. Initial (turn 0) actor distribution of actor positions and effective power.

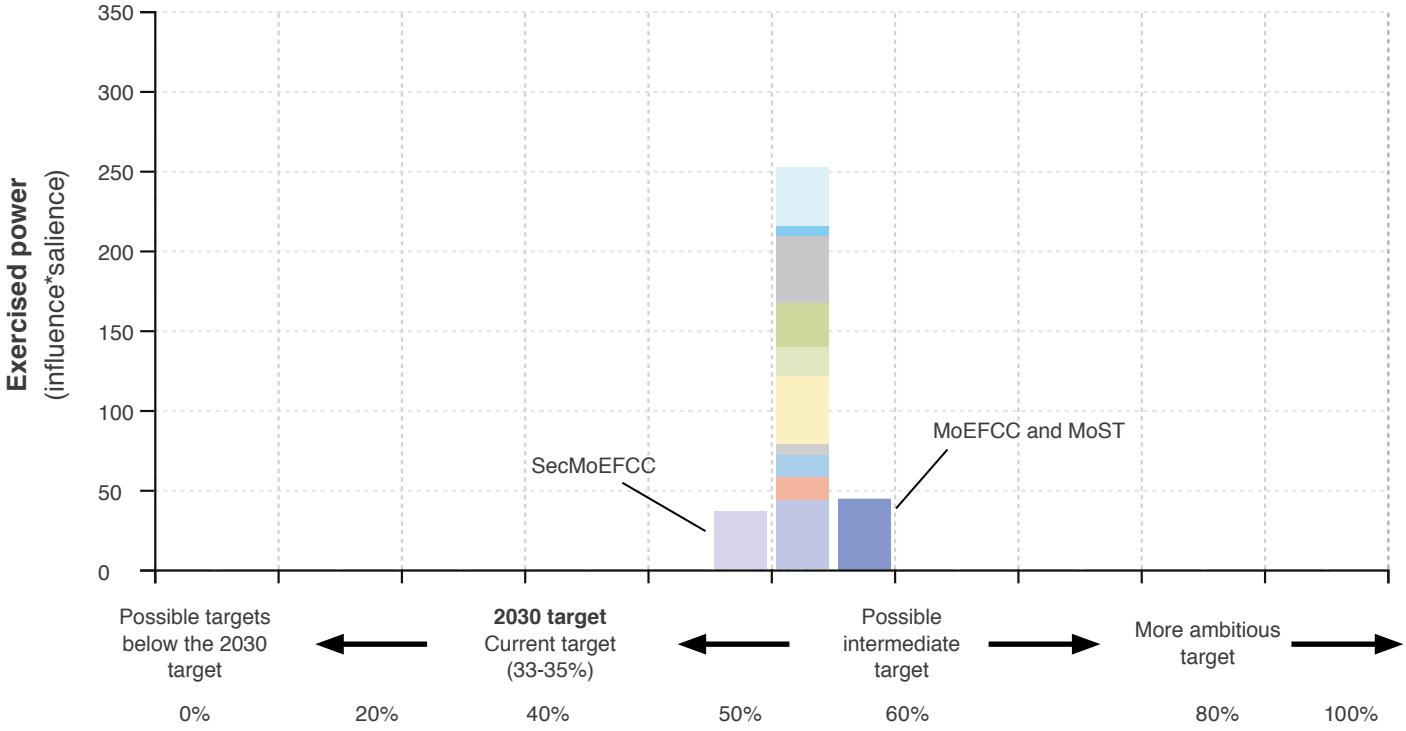


Source: KTAB simulation.

Note: Please refer to Appendix 1 for acronyms.

Actors slightly to the left in this figure, representing support for marginally less ambitious targets, include the Minister of Agriculture and Farmers' Welfare and the secretary of MoEFCC, supporting a target of 45%. The minster of urban development stands at 47%, while nongovernmental members advocate a position of 48%. The foreign and cabinet secretaries initially advocate the least enhancement to the target, at 44% and 34%, respectively.

Figure 13. Final (turn 17) distribution of actors' positions and effective power.



Note: Please refer to Appendix 1 for acronyms.

Source: KTAB simulation.

This simulation ran for 17 turns, which is slightly longer than the original simulation but not meaningfully different. By the final turn of the simulation, shown in Figure 13, most Council members cluster around an emissions intensity reduction target of 52%, the same target reached in the original simulation. The only exceptions are the Minister of MoEFCC and Science and Technology and the secretary of MoEFCC. However, their final positions are not appreciably different than the PM's, and likely represent just a slight preference for marginally higher or lower targets. Thus, we can infer from this sensitivity analysis that the outcome is likely to remain the same, regardless of whether we assume that the decision on the midcentury target is based on closed-door discussions without any influence from stakeholders in the broader Indian political context, or whether it is a process that informally incorporates the views of actors outside the Council.

Significant Events Since the Study's Data Collection

United Nations Climate Change Conference (COP24)

World leaders and policymakers gathered in December 2018 for the annual United Nations (U.N.) Climate Change Conference (COP24) in Katowice, Poland, the core objective of which was to finalize a rulebook governing the Paris Agreement. The rulebook includes guidelines and procedures that will operationalize nearly all the provisions of the Agreement, including how countries will provide information about mitigation, adaptation, and financial support for climate action in developing countries.

Prime Minister Modi and U.N. Chief Antonio Guterres met before COP24 to discuss the upcoming conference and the importance of completing the Paris Agreement's rulebook. After their meeting, Guterres acknowledged India's support of the Paris Agreement and thanked Modi for his commitment to increase India's NDC. Moreover, the government of India released a document expressing the expected outcomes of COP24. Environment Minister Dr. Harsh Vardhan said, "[The] outcomes of COP24 should be balanced, inclusive, comprehensive and consistent with the principles of [the] UNFCCC, its Kyoto Protocol and Paris Agreement including equity, common but differentiated responsibility and respective capabilities (CBDR-RC), and climate justice." (MoEFCC 2018)

At Katowice, India emphasized its climate change concerns and reaffirmed its Paris Agreement commitments. In addition, the government's statement issued after the Katowice meeting praised COP24's outcomes as positive. However, it noted its reservations on two counts where negotiations failed to meet the country's expectations. First, the Paris Agreement recognized the principle of CBDR-RC, which acknowledges the historical injustice of climate emissions and considers the differentiated capabilities and responsibilities among countries in tackling climate change. During COP24, India was the key country to raise this principle and emphasize the importance of considering equity in the stocktaking process. Given the policy dilemma faced by India regarding the need to reduce emissions yet maintain economic growth and provide cheap energy for its large population, this is a critical consideration. However, developed countries blocked the recognition of this principle in the adopted rulebook. Moreover, developed countries' contributions to climate finance were diluted in the rulebook, exacerbating the challenge of addressing the historical inequity of countries' contributions to global emissions.

The results of the KTAB analysis in this study show significant alignment with India's statement on COP24. The emissions intensity reduction target agreed upon by most actors in the KTAB simulation shows a balanced ambition level that could ensure serious action on the climate front and still maintain space for economic growth while accommodating the country's increasing demand for energy. India's emphasis on CBDR-RC signifies its commitment to both aspects.

India 2019's General Elections

India's general election was held from mid-April to mid-May, 2019, to elect the members of parliament who will constitute the Lok Sabha. The Bharatiya Janata Party (BJP) led by Prime Minister Modi has been re-elected for another five-year term. In their campaign manifesto, the BJP emphasized the issue of climate change and the efforts it has been making to tackle the challenges this issue presents (BJP 2019). The BJP's main national opponent, the Indian National Congress (INC) also stated in their manifesto that "climate change has now emerged as a serious challenge for the world community" (INC 2019), and that they are committed to implementing the National Action Plan on Climate Change. Although the BJP won the elections, the prominence both leading parties gave to climate change and the environment in their manifestos shows how critical this issue is becoming to India.

Conclusion

The KTAB SMP results provide an insight into the Indian climate debate, particularly the midcentury emissions intensity reduction target. The simulation results indicate that actors participating in the CDMP, either directly or indirectly, are likely to support a midcentury target of approximately 52%. There is a narrow range of views regarding the midcentury target, compared with the domestic political decision-making process of enhancing NDCs in many other countries. Over time, this narrow difference in views is expected to close around a slightly reduced ambition of the Indian prime minister. This simulation result suggests that the prime minister leads the climate conversation in India and that he is willing to make minor concessions to obtain the support of actors pushing for less ambitious emissions targets. Most actors directly involved in the policymaking process reach a consensus on this issue by the end of the simulation.

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Appendix 1. KTAB Input Datasets

Table 1. Baseline dataset - weighted average of expert inputs.

CODE	Actor	Description	Group	Influence	Position	Salience
PRES	President	Ram Nath Kovind	Government	18.4	45	27.4
VP	Vice President	M. Venkaiah Naidu	Government	16.4	45	27.4
PM	Prime Minister	Narendra Modi	Government	81	55	54
LOKSAB	Lok Sabha (House of People)	House of the People	Government	74	47	33
RAJSAB	Rajya Sabha (Council of States)	Council of States	Government	61	47	32
BJP	Bharatiya Janata Party	Bharatiya Janata Party	Government	53	54	31.4
INC	Indian National Congress	Indian National Congress Party	Government	34	52	27.4
MEA	Minister of External Affairs	Sushma Swaraj	Government	49	51	29
MOCI	Minister of Commerce and Industry	Suresh Prabhu	Government	52	49	39
MOF	Minister of Finance	Arun Jaitley	Government	42	51	34
MoAgri	Minister of Agriculture and Farmers, Welfare	Radha Mohan Singh	Government	30	44.6	23
MHRD	Minister of Human Resource Development	Prakash Javadekar	Government	31	52	34
MoEFCC MoST MoES	Minister of Environment, Forest and Climate Change Minister of Science and Technology Minister of Earth Sciences	Harsh Vardhan	Government	68	55.6	65
MOC MOR	Minister of Coal Minister of Railways	Piyush Goyal	Government	70	51	60
MORTH MOWR	Minister of Road Transport and Highways Shipping Minister of Water Resources, River Development and Ganga Rejuvenation	Nitin Jairam Gadkari	Government	48	52	39
MoPNG	Minister of Petroleum and Natural Gas	Dharmendra Pradhan	Government	64	47	46
MoC&F	Minister of Chemicals and Fertilizers and Parliamentary Affairs	Ananth Kumar	Government	35	43	34
MOS	Minister of Steel	Chaudhary Birender Singh	Government	39	43	32
MHIPE	Minister of Heavy Industries and Public Enterprises	Anant Geete	Government	35	43.4	24
MRD MoN	Minister of Rural Development and Minister of Mines	Narendra Singh Tomar	Government	27	44	24

Appendix 1. KTAB Input Datasets

MOP MNRE	Minister for State Power Minister of New and Renewable Energy	Raj Kumar Singh	Government	46	55	60
MLE	Minister for State for Labour and Employment	Santosh Kumar Gangwar	Government	34	46	27
MDONER	Minister for State Development of North Eastern Region	Dr. Jitendra Singh	Government	24	44.5	15
DAE	Minister for State for Department of Atomic Energy	Dr. Jitendra Singh	Government	30	48	32
MoC&F2	Minister of State for Chemicals and Fertilizers	Inderjit Singh Rao	Government	33	46	27
GJ	Gujarat	Shri Vijaybhai R. Rupani	States	27	60	39
KA	Karnataka	Shri Siddaramaiah	States	30	53	38
MH	Maharashtra	Shri Devendra Fadnavis	States	26	50	35
TN	Tamil Nadu	Shri Thiru Edappadi K. Palaniswami	States	20	52	36
UP	Uttar Pradesh	Shri Yogi Aditya Nath	States	17.5	48	26
Coal India	Coal India		Energy companies & PSU	74	43	66
NTCP	National Thermal Power Corporation		Energy companies & PSU	62	47	62
POWPSUs	Ministry of Power PSUs (Public Sector Undertakings)	Power Grid, and National Hydroelectric Power Corporation (NHPC)	Energy companies & PSU	60	52	58
PETPSUs	Ministry of Petroleum and Natural Gas PSUs	Balmer Lawrie & Co. Limited Bharat Petroleum Corporation Limited Biecco Lawrie Co. Limited Chennai Petroleum Corporation Limited Engineers India Limited Gas Authority of India Limited Hindustan Petroleum Corporation Limited Indian Oil Corporation Limited Numaligarh Refinery Limited Oil India Limited Oil & Natural Gas Corporation Limited	Energy companies & PSU	46	49	58

CPSUs	Ministry of Coal PSUs	NLC Neyveli Lignite Corporation	Energy companies & PSU	35	41.25	51
APSUs	Department of Atomic Energy PSUs	NPCIL Nuclear Power Corporation of India Ltd. NFC Nuclear Fuel Complex	Energy companies & PSU	36	50	44
Petro & Chem	Petroleum and chemicals industry	Private sector	Energy-related industries	27	43	41
Coal	Coal industry	Private sector	Energy-related industries	47	44	65
Steel	Steel industry	Private sector	Energy-related industries	38	47	43
Cement	Cement industry	Private sector	Energy-related industries	36	49	43
Mining	Mining industry	Private sector	Energy-related industries	34	46	50
Agri	Agriculture industry	Private sector	Energy-related industries	30	45	38
CPRI	Central Power Research Institute		Think tanks	34.2	50	39.2
TERI	The Energy and Resources Institute		Think tanks	60.4	57.2	70.8
NITI	National Institution for Transforming India		Think tanks	62.1	55.8	62.5
WFF	World Wide Fund		Think tanks	32.8	54.7	54.2
IES	Indian Environmental Society		Think tanks	35.3	57.2	59.2
CSE	Centre for Science and Environment		Think tanks	53.3	62.2	70.8
CPR	Center for Policy Research		Think tanks	49.2	55.5	65.8
CSTEP	Center for Study of Science, Technology and Policy		Think tanks	52.5	48.8	72.5
IRADE	Integrated Research and Action for Development		Think tanks	46.3	46.3	70
CEEW	Council On Energy, Environment and Water		Think tanks	48.8	50	75

Source: KAPSARC expert interviews.

Appendix 1. KTAB Input Datasets

Table 2. Scenario dataset - weighted average of expert inputs.

Actor	Description	Influence	Position	Salience
PM	Prime Minister	81	55	54
MEA	Minister of External Affairs	49	51	29
MOF	Minister of Finance and Corporate Affairs	42	51	34
MoAgri	Minister of Agriculture and Farmers, Welfare	30	45	23
MoST	Minister of Science and Technology	68	56	65
MoEFCC	Minister of Environment, Forest and Climate Change	68	56	65
MOC	Minister of State for Coal	70	51	60
MOWR	Minister of Water Resources	48	52	39
MOP MNRE	Minister of State for Power and New and Renewable Energy	46	55	60
MUD	Minister of Urban Development	67	47	58
CS	Cabinet Secretary	27	34	12
FS	Foreign Secretary	27	44	22
SecMoEFCC	Secretary, Ministry of Environment, Forest and Climate Change	50	45	73
NonGov	Non-governmental members	48	49	76
Minister of Earth Sciences	Nitin Jairam Gadkari	48	52	39
Minister of Coal	Dharmendra Pradhan	64	47	46
Minister of Railways	Ananth Kumar	35	43	34
Minister of Road Transport and Highways Shipping	Chaudhary Birender Singh	39	43	32
Minister of Water Resources, River Development and Ganga Rejuvenation	Anant Geete	35	43.4	24
Minister of Petroleum and Natural Gas	Narendra Singh Tomar	27	44	24
Minister of Chemicals and Fertilizers and Parliamentary Affairs	Raj Kumar Singh	46	55	60
Minister of Steel	Santosh Kumar Gangwar	34	46	27
Minister of Heavy Industries and Public Enterprises	Dr. Jitendra Singh	24	44.5	15

Source: KAPSARC expert interviews.

About the Authors

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About the Project

KAPSARC has developed the KAPSARC Toolkit for Behavioral Analysis (KTAB), an open source software platform, to model and analyze collective decision-making processes (CDMPs). KTAB is intended to be the standard platform for analyzing bargaining problems, generalized voting models and policy decision-making. We intend to use KTAB to assemble the building blocks for a broad class of CDMPs. Typical models in KTAB will draw on the insights of subject matter experts regarding decision-makers and influencers in a methodical and consistent manner, helping researchers to identify feasible outcomes of CDMPs.

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