



SEWA  
Self Employed Women's Association



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## ISSUE BRIEF

# THE ROAD FROM PARIS: INDIA'S PROGRESS TOWARD ITS CLIMATE PLEDGE

India, one of the largest economies in the world, has taken strong strides towards achieving its climate goals under the Paris Agreement. The country is on track to meet its key commitment of cutting its greenhouse gas (GHG) emissions intensity by 33 to 35 percent below 2005 levels by 2030, and to achieving 40 percent of its installed electricity capacity from non-fossil sources by the same year. India's solar energy capacity has jumped 1,000-fold from a mere 17 megawatts (MW) in 2010 to more than 23 gigawatts (GW) in 2018.<sup>1</sup>

## NATIONAL OVERVIEW

India is an emerging economic powerhouse and global leader. With the government aiming for an annual gross domestic product (GDP) growth of 6 to 7 percent through at least 2030, India is also one of the world's fastest-growing economies. India is also the world's third-largest energy consumer and GHG emitter although its per capita and historical emissions are low.<sup>2</sup> The Government of India is working to combat climate change while sustaining rapid development and providing energy for cities and villages. Despite significantly improved electrification levels over the last decade, over 10 million households remain without access to electricity.<sup>3</sup>

To build a low-carbon future and curb climate change, the Indian government has committed to deploying expansive solar and wind energy capacity and adopting an array of ambitious climate actions. As a result, the country has made good progress towards meeting its Paris Agreement targets.<sup>4</sup> India is on track to achieve 40 percent non-fossil

fuel electricity capacity, and its targeted reduction in emission intensity by 2030. At the same time, India has more work to do on creating an additional "carbon sink" of 2.5 to 3 billion tons of CO<sub>2</sub>.<sup>5</sup>

Between April 2017 and March 2018, India added about 11.6 GW of renewable energy capacity, more than coal-fired and hydro put together (totaling 9.5 GW).<sup>6</sup> Moreover, investments in the renewable energy sector outnumbered those in fossil-fuel-based projects in 2017 further signaling a transition towards clean energy.<sup>7</sup> To further affirm its commitment to safeguarding the environment, India developed a comprehensive draft India Cooling Action Plan, which marks a key milestone in India's effort to phase down heat-trapping pollutants known as hydrofluorocarbons (HFCs). India's plan also aims to integrate energy efficiency in solutions for meeting the rapidly rising cooling demand in the country.<sup>8</sup>



**INDIA WILL CUT ITS EMISSIONS INTENSITY BY 33-35% OF 2005 LEVELS BY 2030.**



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## THE PARIS AGREEMENT

In late 2015, the 21st session of the Conference of the Parties (COP21) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) was held in Paris. The 196 nations that are part of the UNFCCC approved the Paris Agreement, which aims to limit global temperature rise to well below 2 degrees Celsius, and to make best efforts to keep it to 1.5 degrees. To that end, countries submitted intended nationally determined contributions (INDCs) detailing the level to which they planned to cut emissions and their plans to reach that goal. The Paris Agreement entered into force on November 4, 2016 – and the INDCs are now formally enshrined as part of the Agreement – and hereafter referred to as nationally determined contributions (NDCs).

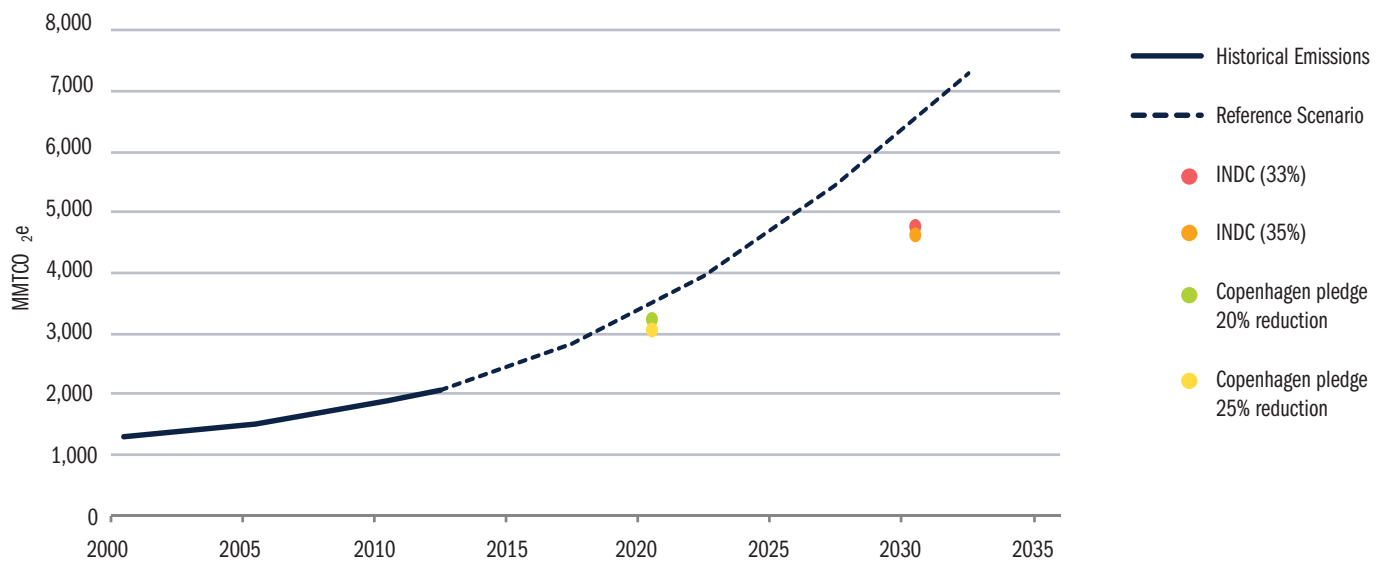
### INDIA'S CLIMATE PLEDGE

The Paris Agreement entered into force on November 4, 2016 and was formally adopted by India on 2<sup>nd</sup> October 2016.<sup>9</sup> The agreement is based on a framework of climate pledges, or Nationally Determined Contributions (NDCs), from individual countries that outline domestic plans to reduce GHG emissions after 2020.

India's pledge lays out a comprehensive approach to limit climate impacts while fostering economic growth, increasing energy access, creating jobs, protecting biodiversity, building resilience in communities to climate impacts, and providing cleaner air and water for its citizens. India's pledge includes the following commitments:<sup>10</sup>

- To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.
- To adopt a path that is climate-friendly and cleaner than the one followed hitherto by others at a corresponding level of economic development.
- To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 levels.<sup>11</sup>
- To achieve about 40 percent cumulative electric power installed capacity from non-fossil-fuel energy resources by 2030 with the help of technology transfer and low-cost international finance, including support from the Green Climate Fund.
- To create an additional carbon sink of 2.5 to 3 billion tons of carbon dioxide equivalent through additional forest and tree cover by 2030.
- To better adapt to climate change by enhancing investments in development programs in sectors vulnerable to climate change, particularly agriculture, water resources, the Himalayan region, coastal regions, health, and disaster management.
- To mobilize domestic funds and new or additional funds from developed countries to implement the above mitigation and adaptation actions, in view of the resources required and the resource gap.
- To build capacities and create domestic and international frameworks for quick diffusion of cutting-edge climate technology in India and for collaborative research and development for future technologies.

INDIA'S GHG EMISSIONS INCLUDING LULUCF



Source: Natural Resources Defense Council; Reference Scenario, based on Government of India Biennial Update Report,<sup>12</sup> emissions projections from IESS 2047's Least Effort Scenario, India's INDC submission to the UNFCCC and calculations using World Bank 2005 GDP and OECD GDP growth projections of 5.8 percent.

## CLIMATE MITIGATION POLICY

### Renewable Energy

Renewable energy is the centerpiece of India's strategy to meet its Paris goals.<sup>13</sup> India aims to install 175 GW of renewable energy (100 GW solar, 60 GW wind, and 15 GW biogas) by 2022. As of November 2018, India is about halfway there, with renewables capacity reaching 71.5 GW, representing nearly 20 percent of India's total installed capacity.<sup>14</sup> Additionally, achieving the 175 GW goal could create up to 1 million job opportunities for over 300,000 workers in the country by 2022.<sup>15</sup>

### Solar Energy

India's solar energy capacity increased dramatically from 2.6 GW in 2014 to over 23 GW by mid-2018, with nearly half of this capacity added between April 2017 and March 2018.<sup>16</sup> The flagship National Solar Mission, which originally aimed to install 20 GW of solar power capacity by 2022, now targets 100 GW of solar by 2022.<sup>17</sup> Although these goals are ambitious, future solar energy growth far beyond them is possible, given India's 750 GW of solar energy potential.<sup>18</sup>

Tariffs for solar projects reached record-lows in 2016.<sup>19</sup> The lowest tariff was ₹2.44 (\$0.04) per kilowatt-hour (kWh) quoted for Bhadla Phase-III solar park auction in Rajasthan, which is lower than the average coal-based electricity rate of about ₹3.4 (\$0.05).<sup>20</sup> Prices have dropped because of supportive policies, less-expensive solar cell imports from China, and specialized financing deals for creditworthy developers. However, the recently imposed import duty on solar cells and modules imported from China and Malaysia may lead to a short-term increase in tariffs.<sup>21</sup>

While large-scale solar is growing at a rapid clip, rooftop solar installations are lagging behind - reaching around 1.2 GW of the total 40 GW target.<sup>22</sup> To scale clean energy, especially for underserved markets and emerging technologies, such as battery storage, a strong policy framework needs to be adopted.<sup>23</sup>

### Wind Energy

India has become the world's fourth-largest wind energy market, with 34 GW of installed capacity in 2018, representing about 10 percent of its total installed power capacity.<sup>24</sup> India plans to install 60 GW of utility-scale wind power and 1 GW of distributed wind power by 2022. After a record-setting 2016–2017, the wind sector added another 2 GW of capacity in 2017–2018.<sup>25</sup> The state-owned Power Grid Corporation is implementing improvements to transmission infrastructure to sustain the momentum in wind installations.<sup>26</sup> At the same time, wind prices reached a record low of ₹2.43 (about \$0.04) in December 2017, discovered through a tariff-based capacity auction conducted by Gujarat's electricity utility.<sup>27</sup>

### Enhancing Energy Access

To expand electricity access, Prime Minister Narendra Modi launched the Saubhagya Yojna, a ₹163 billion (\$2.5 billion) program that aims to electrify all households by December 2018. Run by the Rural Electrification Corporation, the program covers about 30 million households and will provide free power connections to poor families, including the distribution of solar packs and LEDs for remote villages that are not connected to a grid.<sup>28</sup> As of October 2018, India has achieved around 65 percent of this target.<sup>29</sup> In 2011, around 70 percent of India's population primarily relied on traditional biomass for their cooking needs.<sup>30</sup> To improve access to cleaner cooking sources and reduce exposure to harmful indoor air pollutants, the Pradhan Mantri Ujjwala Yojana, a flagship program of the government, aims to provide 50 million liquefied petroleum gas (LPG) connections to women from poor households by 2019. Having met this target ahead of schedule, the government has revised the goal to 80 million households by 2020.<sup>31</sup>

To improve the financial health of nearly bankrupt distribution companies (DISCOMs), Ujjwala DISCOM Assurance Yojana (UDAY) program, launched in 2015, works with state governments to cover up to 75 percent of DISCOM debt and pay back lenders, and improve technical efficiencies.<sup>32</sup> According to market analyses, the UDAY scheme has helped DISCOMs reduce their losses by 70 percent annually.<sup>33</sup> However, payments owed by DISCOMs to generation companies have increased.<sup>34</sup> As India seeks to enhance electricity access, electricity tariff reforms and policy measures are required, both at the central and state levels, to tackle the challenges of the distribution and generating companies.

### Building an Energy Efficient Economy

India is expecting 400 million more people to move to already resource-stressed urban areas by 2050, triggering extraordinary growth in energy-intensive construction and infrastructure.<sup>35</sup> This rapid urbanization presents a tremendous opportunity for energy efficiency. India has created and implemented a National Mission for Enhanced Energy Efficiency (NMEEE), which encompasses a variety of programs designed to improve efficiency across all sectors of energy use. The NMEEE is delivering savings of millions of tons of fuel and conserving gigawatts of energy while reducing greenhouse gas emissions.<sup>36</sup> The Perform Achieve Trade scheme to improve energy efficiency in industries under the NMEEE resulted in avoided emissions of 31 million tons of CO<sub>2</sub> in phase one of implementation between 2012 and 2015, and is expected to avoid another 60 million tons in phase two from 2016-19.<sup>37</sup>

### Green Buildings

One major opportunity for energy efficiency expansion in India involves new building construction. In 2017, the Bureau

of Energy Efficiency extensively reviewed and updated the Energy Conservation Building Code (launched in 2007), which is scheduled to be added as an amendment to the Energy Conservation Act.<sup>38</sup> Telangana is the first state in the country to implement an online energy code compliance system for commercial buildings. By mid-2018, 12 states had adopted the ECBC and several more plan to follow.

India ranks third in the world for Leadership in Energy and Environmental Design (LEED)-certified buildings, with more than 20 million square meters of certified LEED space.<sup>39</sup> Key ministries and cities are adopting green building programs that require Green Rating for Integrated Habitat Assessment (GRIHA) certification for new buildings. If states across India adopt energy-saving building codes and leading developers go beyond minimum code requirements for commercial buildings, an estimated 3,453 terawatt-hours of electricity could be saved cumulatively by 2030. This is the equivalent of powering as many as 358 million Indian homes annually between 2014 and 2030.<sup>40</sup>

### Green Appliances

India has also made significant progress on energy-efficient appliances. Through the BEE, the Ministry of Power has established a mandatory efficiency star-rating system for refrigerators, air conditioners, tube lights, and transformers, and a voluntary star-rating labeling system for more than a dozen other appliances.<sup>41</sup> Looking ahead, stronger codes and standards for appliances will continue to be essential for driving energy-efficiency savings. India successfully implemented one of the largest light-bulb replacement programs in the world, which replaced inefficient incandescent lamps with over 300 million LEDs by 2018. The ongoing UJALA LED program, implemented by Energy Efficiency Services Limited (EESL), has already saved over 40 million kWh of energy per year, mitigating 33 million tons of carbon dioxide annually.<sup>42</sup> Building on this success, EESL has launched a demand aggregation program for air conditioners, which can have a significant impact in making high efficiency air conditioner models more affordable for customers.

Improving the efficiency of space cooling systems is especially important because their use is expected to grow dramatically in the coming decades, and cooling systems both consume significant amounts of energy and use highly potent climate-damaging HFCs. India's Cooling Action Plan prioritizes efficient cooling and the replacement of HFCs with more climate-friendly alternatives.<sup>43</sup> The plan brought together cooling experts and stakeholders to formulate a national cooling framework that sets ambitious goals in key areas of cooling demand. India was a key player in negotiating the Kigali amendment of the Montreal Protocol, and will freeze HFC use at 2024 levels, starting reductions in 2028. In 2017, six of India's largest air conditioner manufacturers an-

nounced plans to leapfrog from outdated R-410A refrigerants to more climate friendly and lower-global warming potential refrigerants, such as R-32 and R-290.<sup>44</sup>

### Transportation Sector

India overtook Germany to become the world's fourth-largest automobile market globally in 2017.<sup>45</sup> Automobile sales—including passenger and commercial vehicles, 3-wheelers and 2-wheelers—totaled around 24.9 million in 2018 in the country.<sup>46</sup> However, access to transportation remains constrained for the majority of the population. Urbanization, growth in incomes, and rising aspirations are likely to propel this growth further.

To boost sustainable transport, the Indian Government is putting in place several policy measures. It has decided to leapfrog from the current Bharat Stage (BS) IV vehicle emission standards straight to much cleaner BS VI (equivalent to Euro VI) emission standards by 2020. Vehicles that fail to meet the standards will not be sold after April 2020. Delhi was the first city to roll-out BS-VI petrol and diesel standards. By April 2019, 13 other major cities across India plan to follow.<sup>47</sup> In addition, the 2015 Corporate Average Fuel Consumption standards require that passenger vehicles improve fuel mileage by 18 percent by 2022 as compared to 2012.<sup>48</sup>

Electric vehicles have garnered momentum in India backed by the Indian government's ambition and support from the industry. Reducing air pollution in major cities and dependence on oil imports are important drivers for India's EV push. The National Electric Mobility Mission Plan 2020 was launched in 2013 to subsidize the cost and facilitate the sale of 6 to 7 million hybrid and electric vehicles over five years.<sup>49</sup>

Further supporting sustainable mobility, battery powered three-wheeled e-rickshaws are fast gaining prominence in India. There are around 1.5 million e-rickshaws in India—more than the total number of electric passenger cars sold in China since 2011.<sup>50</sup> In addition, around 11,000 new e-rickshaws hit the streets every month.<sup>51</sup> While the Indian government is developing a national electric vehicle policy, states and cities are leading with seven states having draft electric vehicles policies. In September 2018, participating at the Global Climate Action Summit, a number of Indian cities have committed to accelerate electric vehicle deployment.

In 2017, the Department of Heavy Industries allocated ₹4.37 billion (around \$67 million) for the procurement of electric buses, e-taxis, and e-autos (3-wheelers).<sup>52</sup> The department selected 11 cities with populations over 1 million for the procurement of 390 electric buses (around 40 buses each for most cities), and is providing up to ₹10 million (\$150,000) per bus. By March 2018, 10 of these 11 cities had completed the tendering process. However, Hyderabad, Bangalore, and

Delhi (amongst the selected list) are planning to procure a higher number of e-buses – 100, 150, and 700 respectively. In addition, the city of Ahmedabad has also implemented plans to procure 100 buses.

Building mass transit systems across urban centers will further reduce emissions from the transportation sector. For example, Delhi's mass-transit system serves around 2.6 million daily riders, reducing the number of vehicles on the streets and avoiding the associated emissions.<sup>53</sup> Other major cities such as Chennai, Bengaluru, Gurgaon, Mumbai, Kochi, Hyderabad, Ahmedabad, Lucknow, Pune, Nagpur, Varanasi, Jaipur, and Kolkata are following Delhi's lead to upgrade their metro rail networks.<sup>54</sup>

## MOBILIZING GREEN INVESTMENT

More than \$100 billion in financing is needed over the next four years to reach India's solar and wind targets.<sup>55</sup> Even greater financing – \$834 billion in total – is needed to achieve India's 2030 Paris targets.<sup>56</sup> In addition to scaling up grid-connected solar and wind power as well as village and rooftop applications, the availability of affordable energy storage solutions could trigger a transformative shift toward renewables.

India is working to provide funding for clean energy through government programs, private investments, and international assistance. India has quadrupled the coal cess (tax), introduced in 2010, to approximately \$6 per metric ton in 2016 to generate \$4 billion annually for its National Clean Energy and Environment Fund (NCEF).<sup>57</sup> The fund has supported several clean energy projects in the country, but in the recent-past the NCEF funds have been diverted to compensate states for losses under India's new Goods and Services Tax.<sup>58</sup>

Catalytic financing leverages limited public funds to bring in greater private investment. India is exploring ways that this system can help foster low-carbon economic growth and development. The Indian Renewable Energy Development Agency Limited (IREDA), a leading federal enterprise, has begun to experiment with one such catalytic finance solution – “Credit Enhancement Guarantee Scheme”. The scheme will help project developers raise capital through the bond market.<sup>59</sup>

Finance is even more of a challenge for small-scale renewable systems, such as rooftop solar and off-grid renewables. Cumulative investment in rooftop solar from 2013 to 2016 has been only \$600 million, much less than the needed \$48 billion. Between 2017 and 2018, there have been multiple lines of credit from development finance institutions specifically for the rooftop solar market in India. Tata Cleantech Capital is the first private entity in India to get funding from Green

Climate Fund for accelerating deployment of rooftop solar in India. IREDA is also in advanced stages of piloting a Credit Guarantee Mechanism for solar rooftop projects.<sup>60</sup> Catalytic financial mechanisms and institutional facilities, such as clean energy finance dedicated teams called “green windows,” can be effective in transforming clean energy markets in the country.

## STRENGTHENING CLIMATE RESILIENCE AND ADDRESSING AIR POLLUTION

Recognizing the growing threat of climate change, cities and states are developing resilience programs to expand disaster planning for extreme weather. For example, the city of Ahmedabad implemented its first-ever Heat Action Plan in 2013, providing an early warning and preparedness system to increase residents' resilience to extreme heat events. Since then, more than 30 cities across 12 states in India have followed suit.<sup>61</sup> Climate solutions, such as cool roofs, are critical for protecting communities from extreme heat. Cool roofs also find a mention in the draft India Cooling Action Plan.<sup>62</sup> In 2017, Hyderabad and Ahmedabad implemented cool roofs program pilots. Encouraged by the results, in 2018, both the cities have planned to scale up the program as a part of their heat action plans and are working on developing cool roof policies.<sup>63</sup> India's National Adaptation Fund on Climate Change aims to support resilience activities in states that are particularly vulnerable to climate change impacts.<sup>64</sup>

Alarming air pollution levels continue to threaten public health in India. To protect communities, the cities of like New Delhi, Mumbai, Pune, and Ahmedabad have adopted real-time air quality monitoring and alert systems.<sup>65</sup> In October 2018, the Ministry of Environment, Forest, and Climate Change (MoEFCC), released a draft National Clean Air Program, which aims to be finalised and launched in the next few months, along with possible targets for percentage reduction of particulate matter by nearly 30 percent by 2024.<sup>66</sup> Ahmedabad implemented a voluntary Air Information and Response Plan in 2017, which includes a school flags program that increases awareness among children about air quality.<sup>67</sup> The New Delhi government has also taken multiple steps during peak pollution period to control its air pollution, including closing a thermal power plant, freezing industrial activities reliant on fossil fuels, and stopping construction activities that leads to dust pollution.

## INTERNATIONAL ENGAGEMENT

India laid strong foundations for greater cooperation on climate action at the 21<sup>st</sup> Conference of the Parties (COP 21) in Paris, where India and France launched the International Solar Alliance (ISA), which aims to mobilize more than \$100

billion by 2030 toward promoting solar power globally.<sup>68</sup> As of 2018, 70 countries had signed ISA framework agreement, 47 of these had ratified and more are set to join.<sup>69</sup>

India was critical in achieving the Kigali amendment to the Montreal Protocol to phase down HFCs, many of which have a per unit climate impact thousands of times greater than that of carbon dioxide.<sup>70</sup> India is also engaging in bilateral partnerships. For example, the US-India Clean Energy Finance Initiative aims to deploy up to \$20 million in project preparation support and catalyze additional finance for distributed solar projects in the country.<sup>71</sup>

As a developing nation, India has to balance the twin challenges of sustained economic growth and social development for millions of its people. While technical, financial, regulatory challenges exist, India has made significant progress in fulfilling its climate pledges. It continues to show the world that combating climate change is compatible with economic growth and rising standards of living.

## **THIS IS THE TENTH EDITION OF INDIA'S CLIMATE ACTIONS ISSUE BRIEF.**

### **ABOUT THE NATURAL RESOURCES DEFENSE COUNCIL (NRDC)**

Since 1970, our lawyers, scientists, and other professionals have worked to protect the world's natural resources, public health, and the environment. NRDC's India Program on Climate Change and Clean Energy, launched in 2009, works with partners in India to advance a low-carbon, sustainable economy. For more information, visit [www.nrdc.org](http://www.nrdc.org) and [www.nrdc.org/india](http://www.nrdc.org/india).

### **ABOUT THE ADMINISTRATIVE STAFF COLLEGE OF INDIA (ASCI)**

Established in 1956 at the initiative of the government and the corporate sector, the Administrative Staff College of India (ASCI), Hyderabad, has pioneered post-experience management education in India. ASCI equips corporate managers, administrators, entrepreneurs and academicians with the skills to synthesize managerial theory and practice; and respond to the ever-increasing complexity of managerial issues confronting government, industrial enterprises and non-government organizations. For more information visit [www.asci.org.in](http://www.asci.org.in).

### **ABOUT THE COUNCIL ON ENERGY ENVIRONMENT AND WATER (CEEW)**

The Council on Energy, Environment and Water (CEEW) is one of South Asia's leading not-for-profit policy research institutions. The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse, and misuse of resources. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with wider public. In 2018, CEEW once again featured extensively across nine categories in the “2017 Global Go To Think Tank Index Report”. The Council has also been consistently ranked among the world's top climate change think tanks. For more information visit [www.ceew.org](http://www.ceew.org).

### **ABOUT INDIAN INSTITUTE OF PUBLIC HEALTH GANDHINAGAR (IIPHG)**

IIPHG is India's first Public Health University under IIPHG Act 2015 of the Government of Gujarat. IIPHG aims to strengthen the overall health system in the country through education, training, research, and advocacy/policy initiatives. It is engaged in various 'Climate Action Initiatives' in collaboration with national and international partners. For more information visit [www.iiphg.edu.in](http://www.iiphg.edu.in).

### **ABOUT SELF-EMPLOYED WOMEN'S ASSOCIATION (SEWA)**

SEWA is a trade union registered in 1972. It is an organisation of poor, self-employed women workers. These are women who earn a living through their own labour or small businesses. Constituting 93% of the labour force, these are workers of the unorganised sector. SEWA organises women to ensure that every family obtains full employment. By self-reliance we mean that women should be autonomous and self-reliant, individually and collectively, both economically and in terms of their decision-making ability. We follow the principles of satya (truth), ahimsa (non-violence), sarvadharm (integrating all faiths, all people) and khadi (propagation of local employment and self reliance). For more information visit [www.sewa.org](http://www.sewa.org).

### **ABOUT THE ENERGY AND RESOURCES INSTITUTE (TERI)**

The Energy and Resources Institute (TERI) is a leading think tank dedicated to conducting research for sustainable development of India and the Global South. TERI was established in 1974 as an information centre on energy issues. However, over the following decades, it made a mark as a research institute, whose policy and technology solutions transformed people's lives and the environment. TERI's key focus lies in promoting: Clean energy, Water management, Pollution management, Sustainable agriculture, Climate resilience. For more information visit [www.teriin.org](http://www.teriin.org).

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