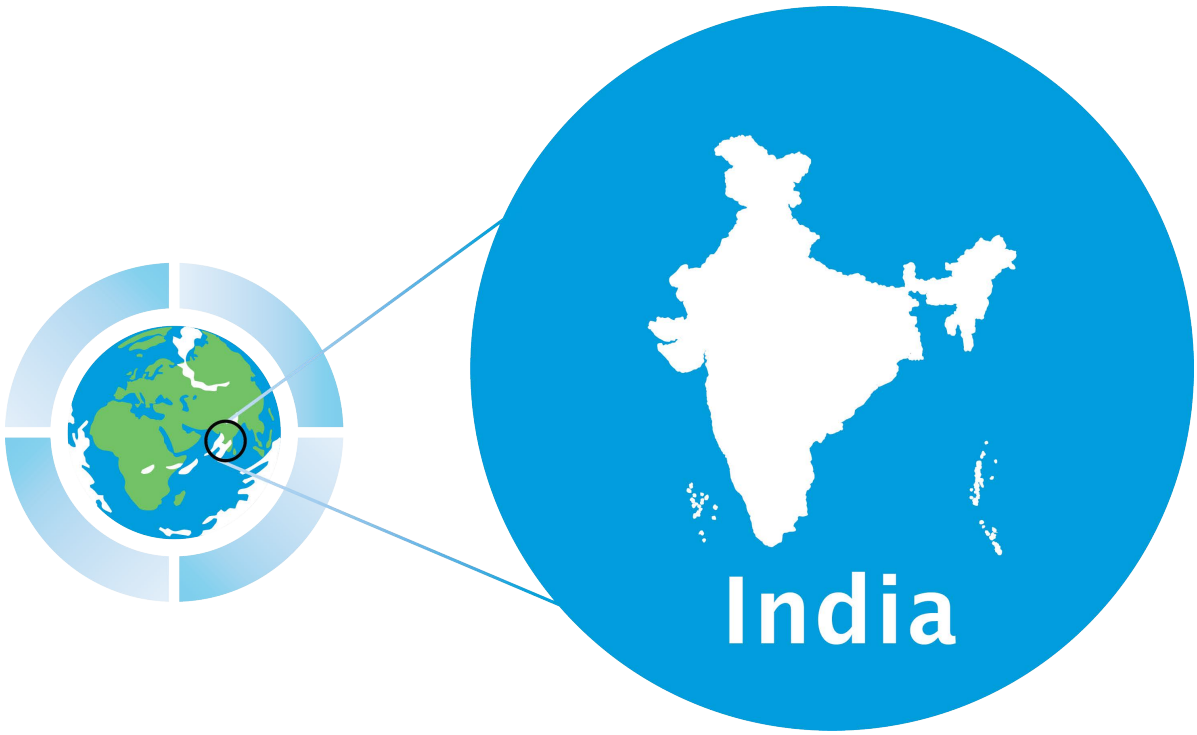
INDIA:
AN EMISSIONS TRADING CASE STUDY



India

The World's Carbon Markets: A Case Study Guide to Emissions Trading

Last Updated: May, 2015

Brief History & Recent Developments

Timeline	
2002	Energy Conservation Act enters into force
2005	Kyoto Protocol comes into force for India on 16 February 2005
2008	National Action Plan on Climate Change (NAPCC) policy instated
2008	National Mission on Enhanced Energy Efficiency (NMEEE) approved
2009	National Mission on Enhanced Energy Efficiency (NMEEE) approved
2009	The PAT (Performance, Achieve and Trade) scheme introduced
2009	India signs voluntary Copenhagen target of 20-25% emissions intensity reduction relative to 2005 levels by 2020
2010	Levy on coal introduced
2010	Energy Conservation Act amended to allow trading in energy saving certificates
2011	India's pilot ETS is unveiled
2012	PAT first compliance period begins (2012-2015)

Table 1: Key Dates

India is currently the third largest polluting country in the world, emitting 2407 million tCO_2 as of 2015.[1] It is expected to contribute 6% of global GHG emissions by 2020.[2] India ratified the Kyoto protocol in 2002; however, as a developing country, it was not required to submit any obligatory reduction commitments. India did submit, in 2009, a voluntary target for reducing the emissions intensity of its GDP by 20-25% relative to 2005 levels by 2020.[3]

The basis of India's climate policy framework is its **2008 National Action Plan on Climate Change** (NAPCC), which specifies eight national objectives for 2017 that center on improving, respectively, energy efficiency, solar technology, sustainable habitats, water, Himalayan ecosystems, "green India", agriculture, and strategic knowledge.[4]

India's **'Perform Achieve and Trade'** (PAT) initiative, which resembles an ETS, is currently undergoing its first phase (2012-2015), which is considered a test phase.[5]

What distinguishes India's PAT from traditional cap-and-trade systems is that cap-and-trade usually entails an absolute cap, whereas PAT specifies energy targets that are intensity-based. India also has a **Renewable Energy Certificate (REC) trading system**, which is a non-ETS, market-based mechanism to fight climate change.

While pilot ETS programs—which focus on the abatement of particulates, not CO_2—are being launched in the three states Tamil Nadu, Gujarat, and Maharashtra,[6] the Indian government has historically opposed taking on mandatory, absolute emissions reduction targets on the grounds that climate change is a problem caused by developed countries. According to Upadhyaya (2010), if such a mentality were to continue to dominate, "it would not be possible to achieve consensus for a cap-and-trade system in the near future."[7]

Domestic Markets

While India has not yet established a carbon market or carbon pricing policy, it does have in place a **'Perform Achieve and Trade' (PAT)**, which promotes energy intensity improvement, and a **Renewable Energy Credit (REC) trading system**. The interrelationships between the two programs are currently being deliberated, and eventually credits from either system may become fungible.[8] For the coming years, the Indian government has mandated the implementation of **pilot emissions trading systems**, which will aim to reduce emissions of particulates, in three states: Tamil Nadu, Gujarat, and Maharashtra. In October 2013, the Pollution Control Board for these regions released guidelines for stationary sources to utilize Continuous Emissions Monitoring Systems (CEMS) to measure emissions.[9]

PERFORM ACHIEVE & TRADE (PAT): PAT has been likened to a 'tradable white certificate' (TWC) system. TWC systems are designed to achieve energy intensity targets at lowest cost through trade in energy savings certificates. This is in contrast to an ETS, where absolute emissions reductions are achieved at lowest cost through trade in emissions reductions certificates.[10] While PAT was launched as a program stemming from the 2008 National Action Plan on Climate Change (NAPCC), its structure flows from the Energy Conservation Act of 2001 (ECA-2001), which requires fifteen energy-intensive sectors to implement **energy efficiency measures**. PAT covers eight of these sectors. ECA-2001 also details the process for purchasing Energy Saving Certificates (ESCerts) ESCerts within the PAT system for compliance in order to avoid defaulting on obligations. For the PAT program, ECA-2001 was amended to enable trading of ESCerts.[11] PAT sets mandatory energy efficiency targets on **478 facilities** that are either part of energy-intensive industries or members of the electricity sector, which together comprise about 60% of India's 2007 GHG emissions.[12] Facilities covered by PAT are called "Designated Consumers," (DC) and the list of these facilities is published annually by BEE.[13] PAT, energy aims to **reduce emissions by 26 million tons of CO_2e, as well as save 6.6 million tons of oil equivalent** over its **first commitment period (2012-2015)** through energy efficiency measures.[14] Covered facilities are generally obligated to improve energy efficiency by 1-2% per year. [15]

Within PAT, **energy efficiency targets** are measured in terms of Specific Energy Consumption (SEC), for which baselines are determined by the April 2007-March 2010 average. The average SEC reduction target under PAT is 4.8% per installation, and it expected that achieving this target will cost industry over USD 5.4 billion.[16] Installations must achieve their plant-specific targets within **three-year compliance periods**. An installation that fulfills and exceeds its SEC target will be able to sell ESCerts for the amount of its surplus energy improvements to installations that are unable to meet mandatory targets. Trading will occur via **regulated exchanges**; platforms for trading ESCerts have been designated in the two power exchanges IEX and PXIL, and BEE has also set up a registry and exchanges for the trading of ESCerts. BEE hopes to enable cross-sectoral use of ESCerts. Companies that purchase ESCerts would do so in order to achieve compliance obligations and avoid **non-compliance penalties**. BEE issued guidelines and regulations in March 2012, and the issuance and trading of ESCerts was to begin after April 2013.[17] The Energy Security Act (2001) provides legal basis for the sale and purchase of ESCerts. To create market liquidity and price discovery

before the market is launched, some ESCerts will be auctioned ex-ante, other ESCerts will be allocated freely to companies, and individual facility targets will be set.[18] Rules regarding banking have not yet been determined.[19] See Figure 1, below.

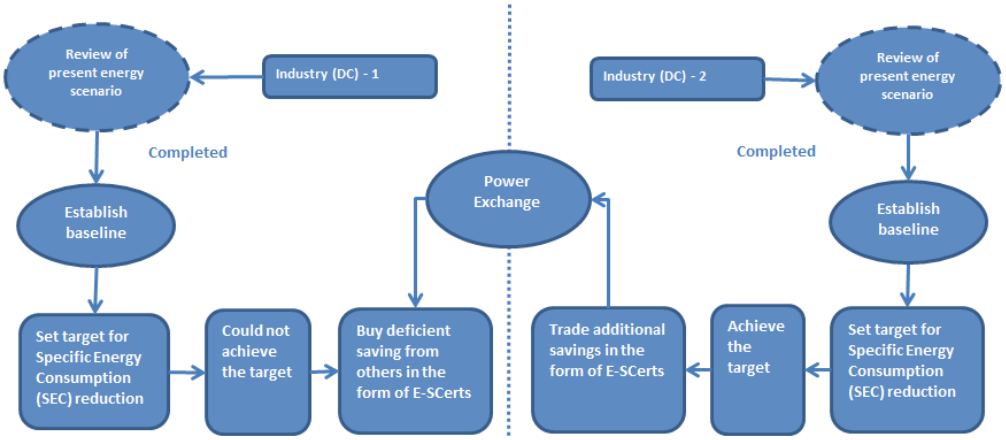


Figure 1: The ESCert Exchange Process within Perform Achieve Trade (PAT)

Source: Climate and Development Knowledge Network, 2013. Available at: r4d.dfid.gov.uk

As shown in Table 1, the PAT covers facilities in **nine sectors**: thermal power, iron and steel, cement, fertilizers, textiles, aluminum, pulp and paper, chlor-alkali and railways. The railway sector has been included in the second phase.[20] A facility is regulated as a DC if it exceeds the sector-specific threshold for annual energy consumption.

Industry Sector	Identified DCs	Annual Consumption Norm to DCs
Aluminum	10	7,500
Cement	85	30,000
Chlor-Alkali	22	12,000
Fertilizers	29	30,000
Pulp & Paper	31	30,000
Thermal Power	144	30,000
Iron & Steel	67	30,000
Textiles	90	3,000
Railways	8*	N/A

*number of probable DCs[21]

Table 2: Designated Consumer & Annual energy consumption in million ton of oil equivalent (mtoe)

Source: Upadhyaya, 2010. Available at: tandfonline.com

The PAT system splits the facilities it regulates into categories based on a plant's energy efficiency potential. The system includes modern, state-of-the-art facilities as well as older, less efficient facilities. Due to a large diversity in plant

designs, vintage of plants, scale of production and process technology,[22] plants are grouped into sectoral bands with a broad target SEC range. This was done in recognition of the heterogeneity of plant types to avoid the closure of inefficient plants under the enforcement of a specific SEC sectoral target. However, SEC targets are calculated for each plant; more efficient plants have lower SEC (targets) to achieve and more inefficient plants higher SEC targets.[23]

PILOT EMISSIONS TRADING SYSTEM: India's two-year pilot ETS mechanism was unveiled February 1st, 2011, and **three states**—Gujarat, Tamil Nadu, Maharashtra—received government mandates to implement programs. While the pilot ETS mechanism **focuses on particulates**, such as SO_2, NO_x, and SPM, which are detrimental to human health.

The pilot ETS mechanism was launched by India's Ministry of Environment and Forests (MOEF) together with the country's Central Pollution Control Board (CPCB) and relevant State Pollution Control Boards (SPCBs). According to the system's design, the SPCBs will determine which pollutants to include and set caps for industry facilities based on desired overall pollutant concentrations. State regulators will then distribute emissions permits to capped facilities, which have the option of either complying with their caps and selling extra permits, or buying from the market the amount of permits by which they exceed their caps. According to the Economic Times (2011), **rationale for experimenting with ETS** is two-fold: (1) it is a cost-effective method of emissions mitigation, and (2) it spurs innovation.[24]

The purpose for this program is to **improve air quality** and to incentivize facilities to do their part in enabling the states as a whole to meet the National Ambient Air Quality Standards (NAAQS). Tamil Nadu, which is in southern India, and Gujarat and Maharashtra in western India have concentrations of particulate matter that are above norms prescribed in NAAQS-2009. High particulate emissions makes meeting NAAQS very challenging.[25]

The pilot systems for the three included states will **cover 1,000 facilities**. SPCBs determine the precise **eligibility criteria** for facilities.[26] The Maharashtra pilot program will encompass the cities of Aurangabad, Tarapur, Chandrapur, Jhalna, and Kohlapur. Selected units must be of medium or large size, be high emitters of particulate matter (PM), and have at least one stack suitable for CEMS. The Tamil Nadu pilot system will encompass the cities of Ambattur, Chennai, Maraimalai, Sriperumpudur, and Tiruvallur. Covered facilities must lie within a 50 KM radius of Chennai City, have at least one CEMS-suitable stack and be of medium or large size. The Gujarat pilot ETS will encompass the cities of Surat, Vapi, and Ahmedabad. A covered industry must lie within a 20 KM radius of one of these three cities, be a high emitter of PM, and have at least one CEMS suitable stack.[27]

The program is modeled after successful past and present cap-and-trade mechanisms, namely the US SO_2 trading program, the Chilean offsets trading program for suspended particulates, and EU ETS for GHGs.[28] A country-wide report from February 2011 estimates the total budget for design and roll-out of this ETS to be INR 360 crore (USD 57.7 million); the single largest cost, comprising over 95% of the overall budget, is installation and maintenance of CEMSs.[29] For any type of ETS to function smoothly, data monitoring, baseline estimations, and regulatory framework must be strengthened.[30] Trading could take place on special platforms created within **power exchanges**.[31] As mentioned earlier, PXIL and IEX are two exchanges in which there are platforms designated for the trade of ESCerts and RECs.

RENEWABLE ENERGY CREDIT TRADING SYSTEM (REC): India's REC trading system was launched in November 2010, and the system's primary purpose is to **promote renewable energy** even in regions that have low potential for renewable power generation. The Indian government plans for this mechanism to contribute significantly to renewable energy generation goals outlined by the NAPCC and the Energy Act of 2003 (EA-2003). The Ministry of Power regulates the REC mechanism. Under EA-2003, the country's State Electricity Regulatory Commissions (SERCs) set targets for power companies to purchase a certain percentage of their total power from renewable sources. These targets are called Renewable Purchase Obligations (RPOs).[32]

To comply with their RPOs or profit from a surplus of RECs, covered entities may **trade** RECs either within or across states. The two key actors in this scheme are Eligible Entities and Obligated Entities. The Eligible Entities are the generators of renewable power and the Obligated Entities are the purchasers of this power or the utilities. Purchasing RECs is treated as the consumption of the corresponding quantity of renewable power and can thus be used towards fulfilling the Obligated Entities' RPO. There are two types of RECs- solar and non-solar. An amendment in the Electricity Act of 2003 required utilities to source at least 0.25% of their RPO from solar power exclusively, starting 2012-13.[33] Each REC represents one MWh of a **covered type of renewable energy**—solar, wind, small-scale hydro (capacity below 25 MW), biomass-based power, biofuels, and municipal waste based power. As a result, facilities are able to meet their renewable energy targets even if the local climate is not well-suited for renewable energy generation. The REC system enables obligated entities to weigh the costs and benefits of achieving their renewable energy commitments by selling electricity from renewable sources or by purchasing RECs.[34]

The Central Electricity Regulatory Commission (CERC) is the federal authority in charge of the REC scheme, and is responsible for coordinating REC processes between the different State Electricity Regulatory Commissions (SERCs) and providing the central regulations for the REC scheme. The implementation of the RECs itself is dependent on the SERCs; they are responsible for setting or changing state RPOs,[35] providing a regulatory framework for the state REC processes and monitoring the REC scheme. The registry process and accreditation of the renewable energy projects is handled by the SERC.[36] Participating generators have **two compliance options**: (1) sell renewable energy at the preferential tariff fixed by the CERC; or (2) sell the electricity generation and environmental benefits associated with renewable energy separately in the form of RECs. RECs are submitted and traded—beginning in April 2011—at India's **two major power exchanges**, IEX and PXIL, within the band of a floor price and a ceiling price to be determined by CERC from time to time.[37] RECs are traded once every month.

In May 2012, as many as 100 solar RECs traded on the IEX, marking the first time these markets included solar REC trading. It is expected that strong renewable policy will prompt enhanced renewable energy investment and capacity building.[38] Figure 3, below, illustrates the country's renewable capacity potential.

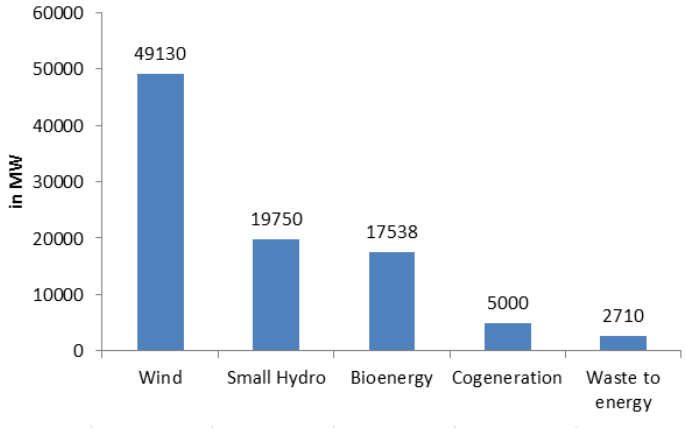


Figure 2: India's Potential Energy Capacity, by Source as of March 2014

Source: Government of India, 2014. Available at: mospi.nic.in, pg.5

Note: Potential solar capacity in India is estimated at **750GW.**[39] The figure was not included in the graph because the number was too large in comparison (15x wind potential capacity).

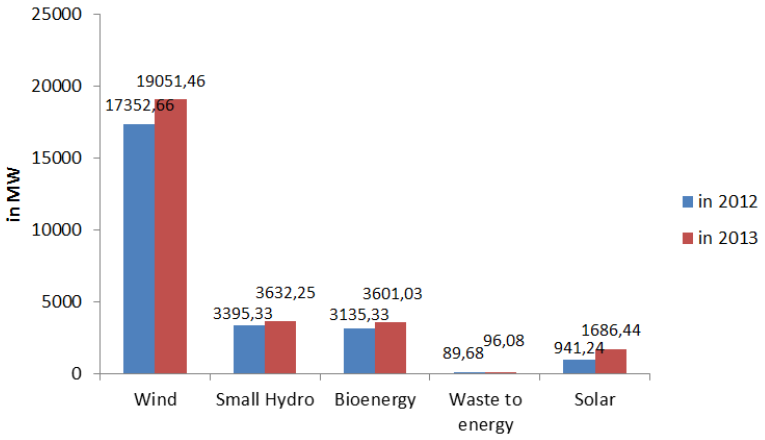


Figure 3: India's Installed Energy Capacity, by Source, as of March 2014

Source: National Institute of Solar Energy (NISE), 2014. Available at: mnre.gov.in

According to 2014 data, installed renewables represented 12% (or 32GW) of the country's total potential capacity,[40] and energy generation from renewable sources has risen from less than 5% of the country's total in 2010[41] to 14% in 2014.[42]

Sector: Grid Interactive Power (in MW)	FY- 2014-15		Total Installed Capacity (as of February 2015)
	Target	Achievement	
Wind Power	2000.00	1512.80	22644.63
Small Hydro Power	250.00	221.60	4025.35
Biomass Power & Gasification	100.00	0.00	1365.20
Bagasse Co-generation	300.00	170.00	2818.35
Waste to Power	20.00	8.50	115.08
Solar Power	1100.00	750.77	3382.78
Total	3770.00	2663.67	34351.39

Table 3: Progress in achieving 2015 targets, as of February 2015

Source: Government of India, Ministry of New and Renewable Energy, 2015. Available at: mnre.gov.in

International Markets

To date, the Clean Development Mechanism (CDM) has been the dominant form of carbon market activity in India. India is the world's second largest supplier of Certified Emissions Reductions (CERs), after China. As of March 2015, India had been cumulatively issued 13% of CERs (or 202.1 million) out of the total 1540.8 million CERs issued around the globe since 2001.[43] Moreover, India had the second largest number of CDM projects[44]—2048 of the 8640[45] — registered with the CDM Executive Board (CDM-EB). Energy endeavors, deriving from wind, biomass, hydro, and energy efficiency projects, comprise the majority of CDM projects originating in India.[46]

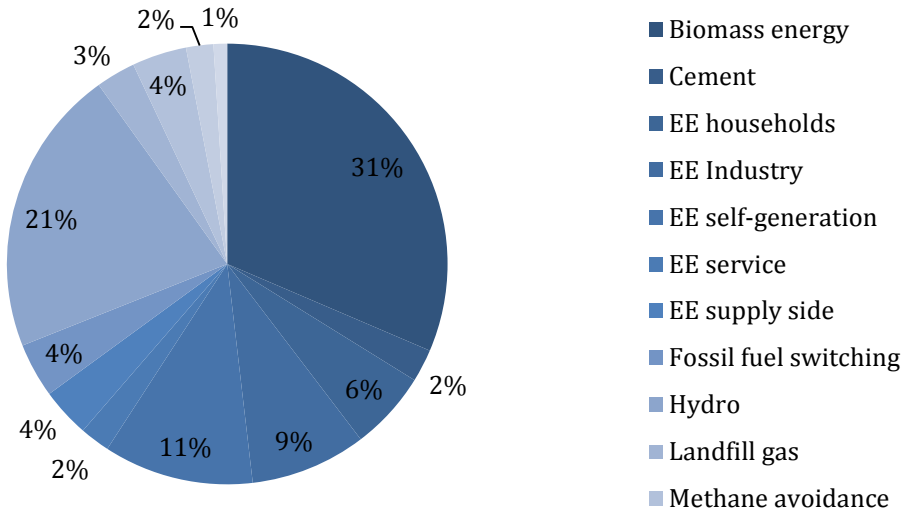


Figure 4: CDM projects by Sector in India

Source: UNFCCC, 2015. Available at: cdmpipeline.org

REGULATION & OVERSIGHT: The Environmental Protection Act of 1986 and accompanying rules empower the MOEF to limit adverse effects of industrial activity. In addition, the State Pollution Control Boards (SPCBs) have the power to implement emissions trading systems within their jurisdictions. While an enabling framework exists for emissions trading, details such as monitoring standards must be elaborated before implementation. For the pilot ETS programs in Tamil Nadu, Gujarat, and Maharashtra, MOEF introduces the ETS regulatory framework. The CPCB sets **monitoring and reviewing standards**. Then SPCBs implement **monitoring and enforcement procedures**.[47]

The **legal framework for PAT** is embedded in various sections of the Energy Act of 2003 (EA-2003). Legal mandates include:

- covered entities must submit a report of energy consumption to the Designated Authority of the State and to the BEE;
- covered entities must establish an Energy Manager responsible for submitting annual energy consumption returns to the Designated Agencies and BEE;
- covered entities must comply with prescribed energy conservation standards;
- covered entities must purchase ESCerts to avoid defaulting on compliance obligations;
- Designated Energy Auditors (DENAs) must monitor and verify covered entities' compliance;

- covered entities must be able to receive ESCerts that can be sold on a market if the compliance obligation is exceeded;
- non-compliant entities must pay INR 10 lakhs (USD 15,710); and
- covered entities must submit to regulation by BEE and process management by Energy Efficiency Service Ltd. (EESL).[48]

The REC scheme is monitored and verified through the combined efforts of the CERC and the SERCs. To receive accreditation for the renewable energy projects, physical inspections and verifications are conducted by the SERC and then the CERC, after which projects receive a Certification of Accreditation and Certificate of Registration, respectively. The CERC is also responsible for validating the transactions occurring on the trading platforms.[49] The SERC ensures Obligated Entities comply with their RPO requirements. For obligations that have not been met, the SERC has the power to penalize the entities and enforce them to meet their RPOs through purchase of RECs.[50]

COMPLEMENTARY POLICIES: A key step in terms of policy and climate action was the launch of India's first ever National Action Plan on Climate Change on 30th June 2008. This plan outlined existing and future policies addressing climate mitigation and adaptation. It also set up seven national missions that will run through 2017.

India's goal for solar, which was approved in 2009, is to increase PV power production and solar thermal generation to 1,000 MW per year, as well as to strengthen research, development, and deployment of solar energy.[51] The voluntary target of the solar mission was to increase solar capacity to 20,000 MW by 2020.[52] This specific goal, as previously mentioned, has been superseded by a new target of increasing solar capacity to 100GW by 2022.

What Distinguishes This Policy?

UNIQUE ISSUES

1. ***PAT*** is the first of its kind—a market system geared towards enhancing energy efficiency—in the developing world.[53]
2. Few other countries, especially developing countries, **have three national market-based environmental programs**—PAT, REC, and CDM—that are actively reducing GHGs.

CHALLENGES

1. India will **need to build its capacity**, namely improve its data collection and its supply of trained manpower, to implement an ETS effectively.[54]
2. The transition from a PAT system to a well-functioning ETS will be challenging and require the Indian government to change its climate priorities away from increasing energy production, and move towards limiting greenhouse gases.
3. Non-compliance **penalties are relatively weak** so they could fail to incentivize compliance.[55]

Author Acknowledgements

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The authors would like to thank, Marion Afriat, Emilie Alberola, Lara Dahan, Katie Kouchakji for very helpful comments and information for this case study. We take full responsibility for any remaining errors.

Disclaimer: The authors encourage readers to please contact the CDC Climat Research, EDF and IETA contacts with any corrections, additions, revisions, or any other comments, including any relevant citations. This will be invaluable in strengthening and updating the case studies and ensuring they are as correct and informative as possible.

REFERENCES

[1] Global Carbon Atlas, Emissions. Published Available at:
http://www.globalcarbonatlas.org/?q=en/emissions
[2] Elzen, M.G. J. den et al. (2012). Analysing the emission gap between pledged emission reductions under the Cancun Agreements and the 2° climate target, The Hague : PBL Netherlands Environmental Assessment Agency. Published April 2012. Available at:
http://www.sustainableguernsey.info/blog/wp-content/uploads/2012/05/2012-M04-290412-pbl-2012-analysing-the-emission-gap-between-pledged-emission-reductions-500114021.pdf
[3] PMR2012. India's Organizing Framework for Scoping of PMR activities. Published 23 April 2012. Available at:
http://www.thepmr.org/system/files/documents/PMR_PA3_India_OrganizingFramework.pdf
[4] World Bank, 2011. State and Trends of the Carbon Market 2011, Published June 2011. Available at:
http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend_LowRes.pdf
[5] Climate and Development Knowledge Network, 2013. Creating market support for energy efficiency: India's Perform Achieve and Trade scheme. Published January 2013. Available at:
http://r4d.dfid.gov.uk/PDF/Outputs/CDKN/India-PAT_InsideStory.pdf
[6] The Economic Times, 2011. India to unveil emissions trading scheme on February 1. Published 27 January 2011. Available at:
http://articles.economictimes.indiatimes.com/2011-01-27/news/28430106_1_emissions-trading-pollution-control-emission-levels
[7] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, *Climate Policy*. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[8] The Hindu Business Line, 2011. India's own emissions trading scheme. Published 18 December 2011. Available at:
http://www.thehindubusinessline.com/opinion/article2726531.ece
[9] Maharashtra Pollution Control Board, 2013. Guidelines for CEMS Selection, Installation and Operation. Published 7 October 2013. Available at:
http://mpcb.gov.in/images/pdf/Industry_CEMS_Guidelines%2007-10-2013_Final.pdf
[10] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[11] The Hindu Business Line, 2011. India's own emissions trading scheme. Published 18 December 2011. Available at:
http://www.thehindubusinessline.com/opinion/article2726531.ece
[12] Climate and Development Knowledge Network, 2013. Creating market support for energy efficiency: India's Perform Achieve and Trade scheme. Published January 2013. Available at:
http://r4d.dfid.gov.uk/PDF/Outputs/CDKN/India-PAT_InsideStory.pdf
[13] Agneya Carbon Ventures, 2011. Perform Achieve and Trade (PAT) under the NMEEE.. Published 1 July 2011. Available at:
http://agneyablog.wordpress.com/2011/07/01/perform-achieve-and-trade-pat-under-the-nmeee/
[14] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[15] Kumar and Agarwala, 2013. Renewable Energy Certificate and Perform, Achieve, Trade mechanism to enhance the energy security for India. Published 24 December 2012. . Available at: http://www.sciencedirect.com/science/article/pii/S0301421512011391, pp. 669-676
[16] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[17] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[18] The Hindu Business Line, 2011. India's own emissions trading scheme. Published 18 December 2011. Available at:
http://www.thehindubusinessline.com/opinion/article2726531.ece
[19] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[20] RDSO, Indian Railways. Energy Audit Manual for Indian Railways. Available at:
http://www.rdso.indianrailways.gov.in/works/uploads/File/Energy%20Audit%20Manual%20draft.pdf, pg. 5
[21] RDSO, Indian Railways. Energy Audit Manual for Indian Railways. Available at:
http://www.rdso.indianrailways.gov.in/works/uploads/File/Energy%20Audit%20Manual%20draft.pdf, pg. 15
[22] Government of India, Ministry of Power, Bureau of Energy Efficiency. Perform, Achieve & Trade (PAT) BEE Experience. Available at:
http://www.iipnetwork.org/PAT-ppt_BEE%20Doc%209.pdf, slide 14
[23] Dhingra, 2011. Perform achieve and trade mechanism (PAT). Available at: http://goo.gl/1fDKdU, pg. 780
[24] The Economic Times, 2011. India to unveil emissions trading scheme on February 1. Published 27 January 2011. Available at:
http://articles.economictimes.indiatimes.com/2011-01-27/news/28430106_1_emissions-trading-pollution-control-emission-levels
[25] Argus Media Ltd, 2012. India initiates pilot emissions trading schemes. Published 16 April 2012. Available at:
http://www.argusmedia.com/pages/NewsBody.aspx?id=793879&menu=yes
[26] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[27] Jindal, 2011. A Case for a Pilot Emissions Trading Scheme in India. MoEF, India. Published 19 September 2011. Available at:
http://www.hks.harvard.edu/var/ezp_site/storage/fckeditor/file/pdfs/centers-programs/centers/mrcbg/programs/ssp/docs/events/conferences/2011/harvard/Jindal_Harvard_Sust_Science_Forum_110919.pdf
[28] The Economic Times, 2011. India to unveil emissions trading scheme on February 1. Published 27 January 2011. Available at:
http://articles.economictimes.indiatimes.com/2011-01-27/news/28430106_1_emissions-trading-pollution-control-emission-levels
[29] Government of India, Ministry of Environment and Forests. Market Friendly Emissions Scheme. Available at:
http://moef.nic.in/modules/others/?f=mfes
[30] The Economic Times, 2011. India to unveil emissions trading scheme on February 1. Published 27 January 2011. Available at:
http://articles.economictimes.indiatimes.com/2011-01-27/news/28430106_1_emissions-trading-pollution-control-emission-levels
[31] Climate and Development Knowledge Network, 2013. Creating market support for energy efficiency: India's Perform Achieve and Trade scheme. Published January 2013. Available at:
http://r4d.dfid.gov.uk/PDF/Outputs/CDKN/India-PAT_InsideStory.pdf
[32] Telang, 2010. Renewable Energy Certificates: India. Published 25 December 2010. Available at:
http://greencleanguide.com/2010/12/25/renewable-energy-certificates-india/
[33] Carbon Credit Capital LLC, 2011. India's Renewable Energy Certificate Market. Available at:
http://carboncreditcapital.com/dev/wp-content/uploads/resources/InFocus8.pdf, pg. 2
[34] Carbon Credit Capital LLC, 2011. India's Renewable Energy Certificate Market. Available at:
http://carboncreditcapital.com/dev/wp-content/uploads/resources/InFocus8.pdf
[35] Livemint, 2013. Realities of renewable energy in India. Published 23 December 2013. Available at:
http://www.livemint.com/Opinion/xzO6GshWpFfxPqywqzhNWJ/Realities-of-renewable-energy-in-India.html
[36] CIGRE, 2012. Implementation of Renewable Energy Certificate (REC) Mechanism in India. Available at:
https://www.recregistryindia.nic.in/pdf/Others/C5_113_2012.pdf, pp. 3- 4
[37] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at:
http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[38] The Hindu Business Line, 2011. India's own emissions trading scheme. Published 18 December 2011. Available at:
http://www.thehindubusinessline.com/opinion/article2726531.ece
[39] Government of India, National Institute of Solar Energy, 2014. Estimated Solar Power Potential in the Country. Published 24 November 2011. Available at:
http://mnre.gov.in/file-manager/UserFiles/Statewise-Solar-Potential-NISE.pdf
[40] Cleantechnica, 2014. India Targets 35% Renewable Energy Share in Installed Capacity Mix By 2050. Published 16 July 2014. Available at:
http://cleantechnica.com/2014/07/16/india-targets-35-renewable-energy-share-installed-capacity-mix-2050/

[41] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at: http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[42] Renewables 21, 2014. Global Status Report 2014. Available at: http://www.ren21.net/portals/0/documents/resources/gsr/2014/gsr2014_full%20report_low%20res.pdf, pg. 120
[43] UNFCC, 2015. CDM Pipeline. Published 31 March 2015. Available at: http://www.cdmpipeline.org/
[44] Germany Federal Ministry of Environment, 2014. Carbon Market Roadmap for India. Published January 2014. Available at: http://www.cdmindia.gov.in/downloads/Carbon%20Market%20Roadmap.pdf
[45] UNFCC, 2015. CDM Pipeline. Published 31 March 2015. Available at: http://www.cdmpipeline.org/
[46] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at: http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[47] Upadhyaya, 2010. Is Emission Trading a Possible Option for India?, Climate Policy. Vol. 5, Issue 10. Published 15 June 2011. Available at: http://www.tandfonline.com/doi/pdf/10.3763/cpol.2010.0105, pp. 560-574
[48] Government of India, Ministry of Power , 2011. PAT Consultation Document, Bureau of Energy Efficiency. Published 10 January 2011. Available at: http://220.156.189.23/NMEEE/PAT%20Consultation%20Document_10Jan2011.pdf
[49] Soonee et al., 2011. Experience of Implementing REC Mechanism in India. Published 19 April 2011. Available at: https://www.recregistryindia.nic.in/pdf/Exp_imp_REC.pdf, pg. 412
[50] Central Electricity Regulatory Commission, 2014. State of Reasons. Published 30 December 2014. Available at: http://www.cercind.gov.in/2014/regulation/sor16.pdf
[51] Sterk et al., 2011. Domestic Emission Trading Systems in Developing Countries—State of Play and Future Prospects, Wuppertal Institute for Climate, Environment, and Energy. JIKO Policy Paper. Published August 2011. Available at: http://www.jiko-bmu.de/files/basisinformationen/application/pdf/pp-ets-developing-countries.pdf
[52] The Economic Times, 2015. Renewable energy sector upbeat on budget proposals. Published 28 February 2015. Available at: http://articles.economictimes.indiatimes.com/2015-02-28/news/59613084_1_energy-sector-welspun-energy-infrastructure-bon
[52] McKinsey & Company, 2009. Environmental and Energy Sustainability: Approach for India. Published August 2009. Available at: http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCEQFjAA&url=http%3A%2F%2Fwww.mckinsey.com%2F~%2Fmedia%2Fmckinsey%2520offices%2Findia%2Fpdfs%2Fenvironmental_energy_sustainability_an_approach_for_india.ashx&ei=7D46VYrdIdDkaLbvgfgH&usg=AFQjCNHV4rciqwce1stB39vboCajGIJc8g&bvm=bv.91427555,d.d2s, pg. 5
[53] Elzen, M.G. J. den et al. (2012). Analysing the emission gap between pledged emission reductions under the Cancun Agreements and the 2° climate target, The Hague : PBL Netherlands Environmental Assessment Agency. Published April 2012. Available at: http://www.sustainableguernsey.info/blog/wp-content/uploads/2012/05/2012-M04-290412-pbl-2012-analysing-the-emission-gap-between-pledged-emission-reductions-500114021.pdf
[54] Mukherjee, K., 2011. India's new trading schemes to cut carbone missions. Published 30 May 2011. Available at: http://southasia.oneworld.net/news/indias-new-trading-schemes-to-cut-carbon-emissions
[55] Elzen, M.G. J. den et al. (2012). Analysing the emission gap between pledged emission reductions under the Cancun Agreements and the 2° climate target, The Hague : PBL Netherlands Environmental Assessment Agency. Published April 2012. Available at: http://www.sustainableguernsey.info/blog/wp-content/uploads/2012/05/2012-M04-290412-pbl-2012-analysing-the-emission-gap-between-pledged-emission-reductions-500114021.pdf