



GETTING CITIES CLIMATE-READY:

The Story of India's First Mandatory Energy Efficient Building Compliance System & How to Guide in Five Steps

Key Messages

- Buildings, especially commercial buildings, are developing at a rapid pace in India and are already a major energy consumer. Advancing energy efficiency in buildings across India's cities is critical to saving energy, increasing energy access, combating pollution and strengthening prosperity. Building energy codes are effective tools for ensuring energy efficiency in construction and operation of buildings.
- The two states of Telangana and Andhra Pradesh demonstrated clear political will at the highest level in emphasizing energy efficiency in buildings as a central energy solution and remained committed to effective code implementation. This went a long way in facilitating the implementation of the Telangana's Energy Conservation Building Code (ECBC) compliance framework piloted in Hyderabad, which is one of the first online code compliance system ever implemented in India.
- Telangana established the Development Permission Management System (DPMS), an online platform that integrates ECBC compliance into the application system for construction permits. The Telangana technical steering committee, created by a government order, led the process and momentum to pilot code development, compliance framework and online system in Hyderabad.
- Focused on real estate developers, broad and continued outreach efforts through stakeholder engagement,



Minister K.T. Rao

Municipal Administration and Urban Development, Telangana State

"India has made a commitment to contribute to global efforts to cut down carbon emissions. The State of Telangana and the City of Hyderabad will do our part. We are committed to energy efficient buildings and developing a sustainable city that protects our communities and grows our internationally-based economy."



including individual meetings and roundtables to discuss barriers and solutions worked to increase awareness on the code along with drafting of extensive knowledge material.

- Capacity building and training programs with architects, engineers and technical consultants were part of strengthening knowledge among users. Developing an online compliance system with the trained third-party assessor model was key to overcoming the limited enforcement capacity of urban local bodies (ULBs) for ECBC compliance.

To accelerate efficient building construction, State of Telangana and the Greater Hyderabad Municipal Corporation partnered with the Administrative Staff College of India (ASCI) and the Natural Resources Defense Council (NRDC) to develop and adopt energy efficiency building codes and create a compliance framework. Key stakeholders engaged to develop the code included real estate developers, architects, engineers, and leading Indian and international experts, including technical partners at the International Institute of Information Technology (IIIT) Hyderabad and the Bureau of Energy Efficiency (BEE).

This multiphase pilot project successfully created India's first mandatory compliance system. Real estate developers can use the online compliance system to meet the Telangana ECBC. The project focused on implementation with an objective to create a model that other fast-growing Indian cities can replicate to save consumers money while reducing harmful air pollution and developing climate resilient cities. Plans are underway to expand the online system across Telangana, Andhra Pradesh and other states in India.

Hyderabad, the booming high-tech capital of Telangana, India's 12th largest state, is pioneering the energy code compliance system through online building approvals. It requires that all new commercial and public buildings, and major retrofits, be certified as complying with the state's ECBC before construction begins. The energy code sets minimum energy efficiency standards that real estate developers must meet through various technologies, such as energy-efficient windows, lighting, building materials, ventilation, landscape orientation, heating and cooling systems and overall design in their building projects. Locking in energy savings is a key way India can meet its skyrocketing energy demand in its growing cities.

New building construction is expanding in Hyderabad and across the region. Commercial office space in Hyderabad, already at 64 million square feet as of 2015, is projected to almost double by 2022. Additionally, about 5 million square feet of commercial mall space is expected to be operational by 2022. Since this rapid growth in buildings will

exponentially increase energy demand, there is a window of opportunity now to construct energy efficient buildings that will lock in energy savings for years to come, boost economic growth through greater energy access, and reduce pollution.

When fully operational, the ECBC could deliver 86 terawatt hours of cumulative energy savings for Telangana and Andhra Pradesh by 2030. That is enough to power up to 8.9 million Indian households annually over the next 17 years based on current energy consumption levels. Capitalizing on energy efficiency can show the way to scale up efforts in India's fast growing and energy-strapped cities—especially considering that a significant percentage of buildings in India are yet to be built.

The Energy Efficiency Building Code in Telangana

In 2001, the Indian Parliament passed the Energy Conservation Act, establishing India's Bureau of Energy Efficiency (BEE) as the nodal institution to spearhead energy conservation policies. With state and national government agencies as well as local and international experts, BEE developed the ECBC for the commercial buildings in 2007 and amended later. The ECBC sets minimum efficiency standards for new commercial buildings and is a model for states to modify, adopt and implement the code as state law.

Buildings account for more than 30% of India's electricity consumption, and the total built space in the country is growing at a tremendous rate. The ECBC has the potential to transform the way buildings are constructed and to unleash significant energy savings. Constructing more efficient buildings is also a central strategy to achieve India's climate target to reduce emissions intensity of its Gross Domestic Product by 33% to 35% from 2005 levels by the year 2030 as part of the Paris Agreement.



Shri S K Joshi

Chief Secretary, Government of Telangana

"With the growing Indian economy, the real estate market is expected to grow by leaps and bounds. Developers in the country need to seize this opportunity and incorporate energy efficient measures in their projects. This will ensure an energy-smart future for our cities.

In this endeavor, States have to play a critical role by molding investments in taking energy efficient measures. A multi pronged approach has to be adopted through incentives, mandates and robust building codes leading to overall energy and cost savings."

KEY FEATURES OF THE TELANGANA STATE ECBC

- The Telangana State ECBC applies to any commercial building or building complex that has a plot area of 1,000 square meters or more or a built-up area of 2,000 square meters or more.
- Buildings of a certain type, such as multiplexes, hospitals, hotels, and convention centers, must comply with the ECBC, irrespective of their built-up area.
- The code offers a Star Rating system using a single star rating mandatory with “prescriptive method” or “whole building performance method” for all commercial buildings. For two stars or more, officials can award incentives, such as expediting the building approval process for construction and occupancy.
- Code compliance is verified through third-party assessors during the building design approval stage and after construction.
- Applications for building permissions for commercial buildings must include ECBC compliance verification forms, available on the state online system.



Mr. Abhay Bakre

Director General, Bureau of Energy Efficiency,
Ministry of Power, Government of India

“The expansion in adopting and deploying energy efficient technologies is a key element in India’s efforts to combat climate change. It also serves the purpose of driving a holistic socio-economic growth. Electricity saved drive cost savings, which can in turn be utilised for enabling wider access to electricity.”

Recognizing the energy and cost savings of efficient buildings and to address growing energy needs, the State of Andhra Pradesh (before state bifurcation into Telangana and Andhra Pradesh) enacted legislation to make the ECBC mandatory in December 2014. ASCI and NRDC along with guidance from BEE, have been key knowledge partners in working with the state to modify and adopt the code into law.

The Telangana State ECBC (TS ECBC), like the Andhra Pradesh ECBC, applies to any commercial building or building complex that has a plot area of 1,000 square meters or more or a built-up area of 2,000 square meters or more. Buildings of a certain type, such as multiplexes, hospitals, hotels, and convention centers, must comply with the code, irrespective of their built-up area.

Savings Potential and Impact

The ECBC is estimated to save 25% to 40% of energy use in buildings. Based on scenarios (high, medium and low) for code compliance, NRDC and ASCI estimated that with a combination of ECBC compliance and voluntary rating programs, India can potentially save more than 3,000 terawatt-hour (TWh) of cumulative electricity by 2030. The

saved electricity is sufficient to power more than 350 million Indian homes annually between 2014 and 2030.

ASCI and NRDC formed a technical committee in Hyderabad constituting key stakeholders during the code adoption period to guide the implementation process. The technical committee continues to provide critical inputs for the pilot project’s overall goals. While Andhra Pradesh continues to make significant strides in implementing the framework, especially with construction in the new capital city Amaravati, the origins of the pilot are based in Hyderabad since the code was originally adopted there in 2014.

Pilot Objectives

The overall goal of the pilot project was to develop an online compliance framework for building energy efficiency codes in India. The specific objectives included:

- increase awareness about the energy savings potential from code implementation;
- garner support from real estate developers, architects, engineers and other key stakeholders;
- develop a collaborative process of code implementation bringing along all the stakeholders;
- establish technical resources to facilitate compliance; and
- create an online compliance model that is fast, transparent, and replicable to other cities.

How to Guide in Five Steps: Implementing the ECBC Online Compliance System

The project was implemented in five overlapping steps. The first step focuses on stakeholder engagement and building the evidence base, leading to a roadmap for the pilot framework. The second step focuses on establishing a technical steering committee and mandatory code adoption. The third step is developing the online compliance system. The fourth step is building local capacity for implementation and developing a supportive infrastructure including technical resources for code implementation. The fifth

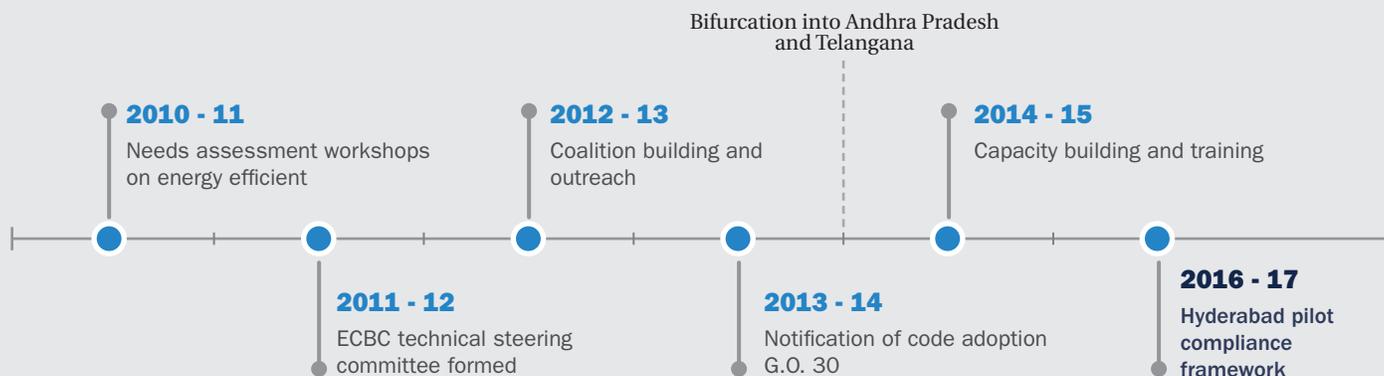


Principal Secretary Arvind Kumar

Municipal Administration and Urban
Development for the Telangana State

Hyderabad is pioneering a system for online energy code compliance that can potentially be a role model as several Indian cities continue to grow at a rapid pace while striving to meet energy demand.

Timeline of ECBC Adoption and Implementation in Telangana and Andhra Pradesh



step focuses on evaluation of the system geared towards improvement.

Step 1: Stakeholder Engagement and Evidence Base

As an initial step, to engage market leaders and government officials, ASCI and NRDC held several stakeholder meetings with real estate developers, building experts, and local representatives. The series of meetings included several workshops, involving over 40 energy experts, scientists, policy makers, government officials, and local stakeholders from India. In addition, international experts visited, and comparative research was conducted on building code compliance in leading cities in Europe, the United States, China and elsewhere. The goal was to integrate the best evidence regarding energy efficiency into the pilot planning.

To build the evidence base, NRDC and ASCI published a series of peer-reviewed reports and case studies in India. The research analyzed existing energy efficiency policies, building compliance system, the building stock, and stakeholder perspectives including that of real estate developers. The purpose of reports and papers was to demonstrate that energy efficiency measures work in India, and to create a roadmap towards code adoption and implementation.



Chief City Planner, Devender Reddy
Greater Hyderabad Municipal Corporation

I am focused on how to use technical and non-technical solutions to save energy in Hyderabad. Community awareness, technology, implementation with capacity building, incentives and enforcement are the key steps.



V Suresh
Chairman, Indian Green Building Council

As a pioneer in accelerating green building concepts in the country, IGBC has already facilitated 6.33 Billion sq.ft of green footprint in the country, a journey that began in Hyderabad with the GBC building. Hyderabad's online compliance system for ECBC buildings is a scalable and replicable model to advance green buildings for other cities and states across India.

Local media also played a critical role in developing the pilot framework and highlighting its importance. News articles in English and Telugu elevated the need for energy efficiency measures to save energy in the face of power outages and pollution. The city government also issued advertisements in local newspapers and trade publications before the code was made mandatory, and later in inviting applications for third-party assessors' training and certification.



Taking Energy Efficiency to New Heights: Analysis and Recommendations for the Buildings Sector from the Hyderabad Experience
<https://www.nrdc.org/sites/default/files/efficiency-newheights.pdf>



Building Efficient Cities: Strengthening the Indian Real Estate Market Through Codes and Incentives
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Step 2: Mandatory Code Adoption and Technical Steering Committee

The Chief Secretary appointed a Technical Steering Committee to oversee the development of a state-wide

code. The Technical Steering Committee is chaired by the Principal Secretary of the Municipal Administration and Urban Development Department (MAUD) and involves active participation of ministries and departments including Energy, Roads and Building, department of Town and Country Planning, Urban Local bodies and Housing as well as leading real estate developers and academic experts. ASCI and NRDC are knowledge partners for the Technical Steering Committee with IIIT Hyderabad as the key local expert.



Professor Rajkiran Bilolikar
ASCI

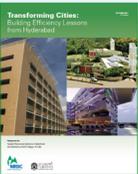
A robust code compliance framework has emerged in Hyderabad and Telangana, as a result of significant effort from the state and city administration. It can have a profound impact, providing a simplified and 'hi-tech' approach to building modern India.

Based on many stakeholder and public consultations, the ECBC was enacted into law under government order 30. The first year the ECBC was voluntary to allow developers and stakeholders to ramp up activities. The code became effective and mandatory a year later. After bifurcation, the ECBC became mandatory in both Andhra Pradesh and Telangana.

Step 3: Online Code Compliance Framework

Once the ECBC was adopted, the Telangana government through the technical committee focused on developing an online compliance framework for ECBC code compliance with a pilot program in Hyderabad.

For building permits, the Telangana government created an online platform for building applications, the Development Permission Management System (DPMS). Andhra Pradesh has also developed and adopted a similar DPMS. The online DPMS integrates the ECBC requirements into the online process for building permits, making the ECBC mandatory. Real estate developers must demonstrate that their building meets energy efficiency requirements through a certified-empowered third party assessor before a construction permit is issued. The DPMS expedites the building permission process and makes it transparent and accountable.



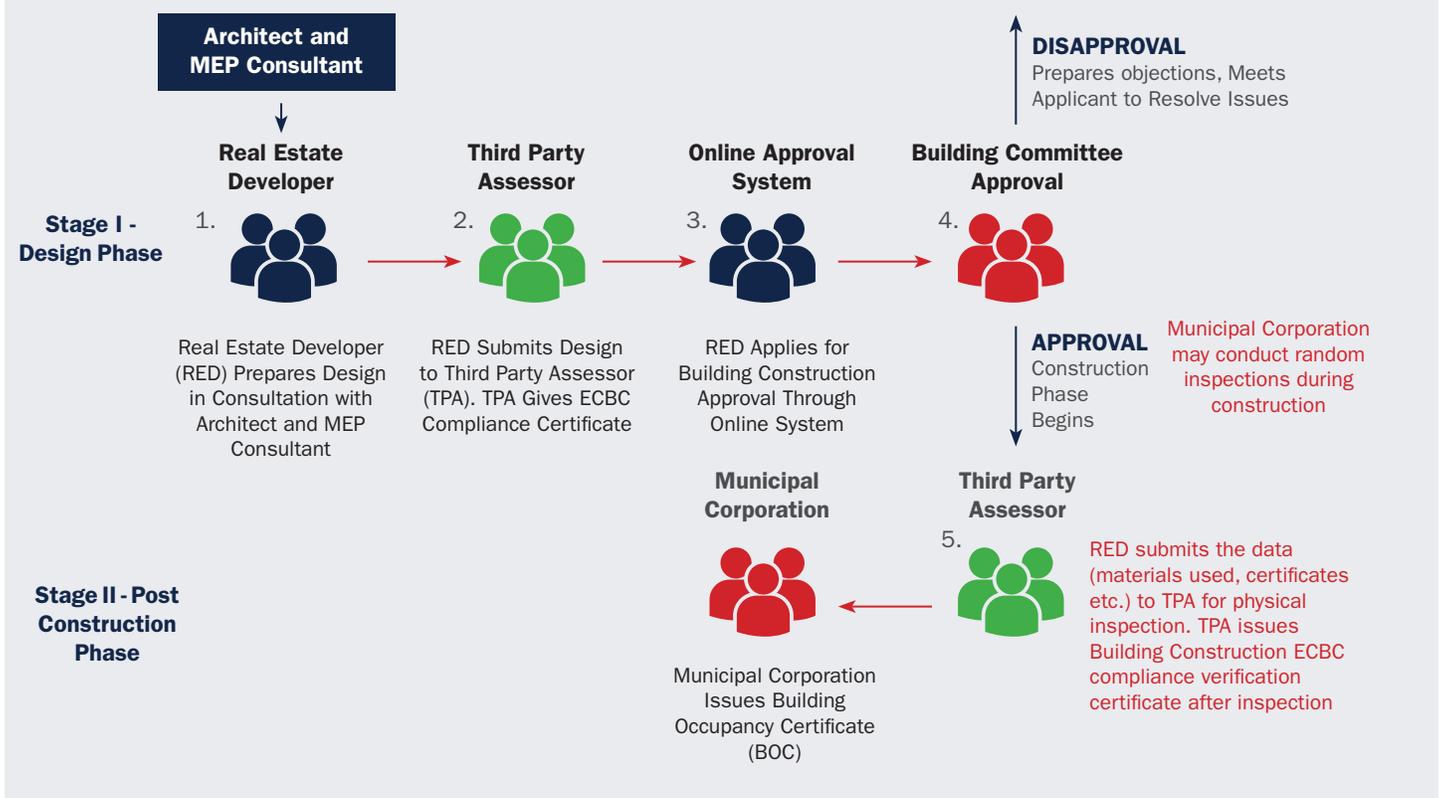
Transforming Cities: Building Efficiency Lessons from Hyderabad

<https://www.nrdc.org/sites/default/files/india-transforming-cities-2014-report.pdf>

Government Order 30 – Mandatory ECBC



HYDERABAD ECBC APPROVAL PROCESS & STEPS



Step 4: Local Third-Party Assessors and Capacity Building Resources

The Telangana government, based on recommendations from the technical steering committee used several methods to strengthen technical capacity, starting with the pilot project in Hyderabad. Empaneling third party assessors and creating a two-tiered approach (design and construction phase) to code compliance were critical. In a large-scale capacity building exercise, supported by BEE and United Nations Development Program (UNDP), more than 700 architects, engineers, and experts received training on the ECBC in both Telangana and Andhra Pradesh. The State of Telangana, with ASCI, NRDC, and IIIT Hyderabad, conducted workshops to enhance capacity among builders, designers, engineers, architects, and other stakeholders on the code compliance process.

The Telangana government also launched a program to train a pool of 100 ECBC experts in Telangana to augment the technical capacity around code compliance. In addition to capacity development, Telangana through Greater Hyderabad Municipal Corporation and TSREDCO, empaneled and licensed nearly 40 Third Party Assessors to facilitate ECBC compliance.

To enable the use of the online compliance system and provide answers on the technical aspects of the code, the Telangana State government along with ASCI and NRDC, developed a list of Frequently Asked Questions (FAQs). In addition, based on real estate developer and stakeholder feedback that specific portions of the TS ECBC needed clarification, the Telangana government along with IIIT Hyderabad, ASCI and NRDC developed a handbook with a set of draft guidelines for compliance. The handbook with draft guidelines provides easy-to-understand provisions that clarify and interpret portions of the TS ECBC and integrate it with the online compliance system.

Step 5: Evaluation

Since the TSECBC and Hyderabad pilot serve as model, evaluating the compliance and implementation is important. To evaluate implementation of the ECBC, ASCI and NRDC are developing an evaluation system with Hyderabad. A series of case studies on the online system, to document developer experiences and process for commercial buildings, is planned. In addition, evaluation updates are part of periodic stakeholder and the technical steering committee meetings.



Anjali Jaiswal
NRDC India Director

This is revolutionary for building construction in India. They'll be designed smart from the start. That will enable them to save energy, reduce pollution and build healthier communities. This is the first city—but there will be more—to put energy efficiency savings into action that works for developers, the city and the community.

The aim of the evaluation is to improve the code compliance process and track its progress. The evolution also promotes recordkeeping and gathers information that may lead to broader benchmarking practices. The evaluation through its findings and recommendations is also an effort to improve governance and capacity among developers, architects and stakeholder to build better, more efficient buildings.

Retrofitting Mahindra Towers: How an Innovative ESCO Model Lowers Energy Bills with No Upfront Cost
<https://www.nrdc.org/sites/default/files/esco-energy-retrofit-mahindra-CS.pdf>

Saving Money and Energy: Case Study of the Energy-Efficiency Retrofit of the Godrej Bhavan Building in Mumbai
<https://www.nrdc.org/sites/default/files/energy-retrofit-godrej-bhavan-CS.pdf>

Article on TS ECBC



Chairman, South, C Shekar Reddy,
Indian Green Building Council

Energy efficient buildings make business sense. The incremental cost of green buildings, if any is, around 3% which can be recovered in two or three years by means of a reduction in operational cost.

Key Lessons Learned

Working closely with the states of Andhra Pradesh and Telangana on code adoption and compliance, ASCI and NRDC conducted a series of stakeholder consultations. Through these consultations, ASCI and NRDC identified the following common barriers and recommendations for building code compliance:



Addressing Lack of Awareness: ECBC compliance is generally not discussed in real estate transactions. Broad stakeholder engagement, including individual meetings and roundtables to discuss barriers and solutions; case studies, reports, factsheets, and presentations from local and international experts; and engaging the media and trade associations in local languages in addition to Hindi and English are vital to increasing awareness.



Engaging Government Officials: Government officials at multiple levels are critical to code adoption and compliance. In Andhra Pradesh and Telangana, leadership by the Chief Secretary and engaging key ministries proved effective in creating government support. Creating the technical steering committee through a government order has helped momentum in piloting the code compliance framework and online system in Hyderabad.



Involving Real Estate Developers: Real estate developers are critical to achieving energy efficiency. Ensuring the developer inputs are part of the code and framework is essential to making them work. In particular, real estate developer associations can be forward-thinking and can help create solutions, such as incentive programs.



Capacity Building: The designers and technical consultants to the building project are the actual “users” of the code incorporating provisions into the building design and construction. However, many professionals have limited knowledge of code provisions or find it challenging to meet the code requirements – especially building materials, testing, and modelling of mechanical systems. Introductory ECBC programs and training increase information for users. Building on these trainings, programs to empanel third party assessors also increase user knowledge.

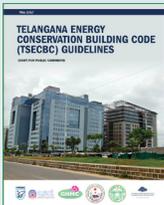


Compliance and Enforcement: Urban local bodies in India, and elsewhere, are often under-resourced. ECBC notification in a state also requires amendments to existing bye-laws, which, in turn, mandates various departments to make decisions about changes to entrenched processes and revisions to official documents. Government decision making can take time – due to multiple high priority focus areas of work coupled with the challenges emerging from change of administrative personnel. As seen in Andhra Pradesh and Telangana, developing an online compliance system with the trained third-party assessor model is key to overcoming the limited enforcement capacity of the ULBs

ENDNOTES

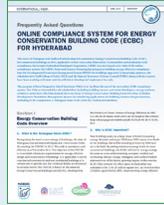
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Highlighted Resources for the TSECBC Online Compliance System:



Telangana Energy Conservation Building Code (TSECBC) Guidelines

http://tnredcl.telangana.gov.in/PDFs/TS_ECBC_guidelines_MAY_24_2017.pdf



Frequently Asked Questions Online Compliance System for Energy Conservation Building Code (ECBC) for Hyderabad

http://www.ghmc.gov.in/Townplanning_Reports/TSECBCFAQs.pdf



Building a Better Future: Implementing the Energy-Saving Building Code in Hyderabad

<https://www.nrdc.org/sites/default/files/better-future-energy-saving-building-code-hyderabad.pdf>

ASCI – NRDC Building Efficiency Case Studies:



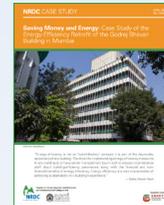
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Building Smart from the Start: Spotlight on Energy-Saving Commercial Office Building in Noida, India

<https://www.nrdc.org/sites/default/files/energy-saving-construction-legacy-spectral-CS.pdf>



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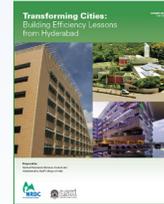
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<https://www.nrdc.org/sites/default/files/real-estate-efficiency-codes-IB.pdf>



Taking Energy Efficiency to New Heights: Analysis and Recommendations for the Buildings Sector from the Hyderabad Experience

<https://www.nrdc.org/sites/default/files/efficiencynewheights.pdf>



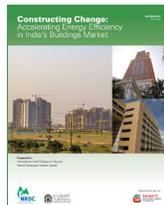
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Greener Construction Saves Money: Incentives for Energy Efficient Buildings Across India

<https://www.nrdc.org/sites/default/files/energy-efficient-construction-incentives-IB.pdf>



Constructing Change: Accelerating Energy Efficiency in India's Buildings Market

<https://www.nrdc.org/sites/default/files/india-constructing-change-report.pdf>



Capturing Energy Savings Opportunities through Increased Building Efficiency

<https://www.nrdc.org/sites/default/files/energyefficiency-fs.pdf>



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