Pakistan Scenario

SAARC Workshop
“Techniques on Energy Conservation and Efficiency in Buildings”

Dambulla, Sri Lanka | 26 – 28 August 2019
ENERCON to NEECA Journey

1985: Started as USAID Project


1989: First MD Appointed, Budget Allocated, Recruitment Initiated

1993: Transferred to the Ministry of Water and Power

1996: Transferred to the Ministry of Environment

1997: Status Changed to Attached Department in Ministry of Environment

2011 till to date: Transferred to Ministry of Energy (Power Division)

October 2016: Transformed into NEECA

August 2018: 1st Board Meeting
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved in Principle by the Federal Cabinet</td>
<td>Sept 2009</td>
</tr>
<tr>
<td>Introduced in National Assembly</td>
<td>January, 2011</td>
</tr>
<tr>
<td>Administrative control of ENERCON transferred to Ministry of Water &amp; Power after 18th Amendment</td>
<td>July, 2011</td>
</tr>
<tr>
<td>Bill withdrawn from National Assembly for amendments</td>
<td>December 2011</td>
</tr>
<tr>
<td>Consultative Meeting held with Provinces</td>
<td>April 2012</td>
</tr>
<tr>
<td>Approved by Council of Common Interests (CCI)</td>
<td>May 2014</td>
</tr>
<tr>
<td>Approved by Prime Minister under Section 16(2)</td>
<td>April 2015</td>
</tr>
<tr>
<td>Vetted by Law &amp; Justice Division</td>
<td>April 2015</td>
</tr>
<tr>
<td>Introduced in National Assembly</td>
<td>April 2015</td>
</tr>
<tr>
<td>Referred to NA Standing Committee on Water &amp; Power</td>
<td>May 2015</td>
</tr>
<tr>
<td>1st Meeting of the Standing Committee held</td>
<td>8th July 2015</td>
</tr>
<tr>
<td>Approved in 2nd Meeting of the Standing Committee</td>
<td>25th August, 2015</td>
</tr>
<tr>
<td>Report of NA Standing Committee presented</td>
<td>9th December, 2015</td>
</tr>
<tr>
<td>Bill Presented in National Assembly ( Inputs Given by MoST)</td>
<td>21st January, 2016</td>
</tr>
<tr>
<td>Bill Presented in National Assembly (Observations of MNAs)</td>
<td>18th February, 2016</td>
</tr>
<tr>
<td>Bill Presented in National Assembly (Observations of MNAs/Necessary Changes Accepted)</td>
<td>26th February, 2016</td>
</tr>
<tr>
<td>Bill Approved by the National Assembly unanimously</td>
<td>26th February, 2016</td>
</tr>
<tr>
<td>Introduced in Senate (Referred to Senate Standing Committee on Water &amp; Power)</td>
<td>14th April, 2016</td>
</tr>
<tr>
<td>Presented in meeting of Senate Standing Committee on Water &amp; Power</td>
<td>30th May, 2016</td>
</tr>
<tr>
<td>Approved by the Senate Standing Committee on Water &amp; Power</td>
<td>16th June, 2016</td>
</tr>
<tr>
<td>Report of Committee Submitted-Bill Presented and Passed by Senate</td>
<td>17th June, 2016</td>
</tr>
<tr>
<td>Consent of President Given</td>
<td>June, 2016</td>
</tr>
<tr>
<td>Published in the Gazette of Pakistan</td>
<td>1st July, 2016</td>
</tr>
<tr>
<td>Notification for Establishment of NEECA(S.R.O.953(I)/2016)</td>
<td>6th October, 2016</td>
</tr>
<tr>
<td>Constitution of NEECA Board Approved by the Cabinet</td>
<td>23 November, 2017</td>
</tr>
<tr>
<td><strong>Notification of NEECA Board by Ministry of Energy (Power Division)</strong></td>
<td><strong>12 December, 2017</strong></td>
</tr>
</tbody>
</table>
**Energy Efficiency Potential & Loss**

- Total Primary Energy Supply (PES) = ~80 MTOE
- Total Final Energy Consumption = ~50 MTOE
- Transformation + Transmission Losses = 30 MTOE
- End Use Efficiency Loss = ~32 MTOE  
  *(Inefficient wires, industrial processes, appliances and motor vehicles)*

**Total Final Productive Use** = 50 - 32 = upto 18 MTOE

- Total Loss = ~62 MTOE
- Imported Energy = 34 MTOE (>10 Billion USD)  
  *(As per SBP report on Imports Payment By Commodity)*
Sectors Covered under NEECA Act

**Transport**
Means road transport, railways, aviation and such other means of transportation as the Board may determine.

**Building**
Means all buildings including private domestic household, commercial, industrial, public and community buildings.

**Power**
Means generation, transmission and distribution system of electricity.

**Industrial**
Means small scale, medium scale and large scale industry involving manufacturing, making, formulating, altering, repairing, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal.

**Agriculture**
Means activities of practices of soil management, land preparation, harvesting, threshing, mechanized livestock and agriculture farming, livestock and agriculture farm irrigation and drainage, livestock and agriculture produce transportation, agrochemical management, livestock and agriculture plant and agriculture food processing, preservation and value addition, biomass recycling, range land and forest management, livestock and agriculture harvest manager.
Composition of the NEECA Board

1. Chairman — Federal Minister for Power Division
2. Vice Chairman — Secretary, Power Division

Members:
- **Federal Secretaries** (Finance, Petroleum & Natural Resources, Planning, Science & Technology, Industries, Housing & Works, Climate Change)
- **Provincial Secretaries** (Designated Departments)
- Chairman OGRA & NEPRA
- Managing Director NEECA
- One Nominee from Chambers of Commerce & Industry
- One Person from Agriculture sector nominated by the Federal Govt.
- Five sectoral experts as members from the Private Sector (Power, Industry, Transport, Agriculture & Livestock and Buildings)
Designated Agencies Nominated by Respective Provincial Departments

As per NEECA Act, “Designated Agency” means an agency designated as such by the Board or a Provincial Government for the purpose of this Act.

NEECA Board to notify Designated Agencies nominated by the respective Provincial Departments including GB & AJK.
<table>
<thead>
<tr>
<th></th>
<th>NEECA Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Initiate, Catalyze, Coordinate Implementation</td>
</tr>
<tr>
<td>2</td>
<td>Prepare NEC Policy</td>
</tr>
<tr>
<td>3</td>
<td>Recommend national EE standards</td>
</tr>
<tr>
<td>4</td>
<td>Establish infrastructure</td>
</tr>
<tr>
<td>5</td>
<td>Demonstration, R&amp;D</td>
</tr>
<tr>
<td>6</td>
<td>Recommend financial and fiscal incentives</td>
</tr>
<tr>
<td>7</td>
<td>Program Development</td>
</tr>
<tr>
<td>8</td>
<td>Establish systems and procedures</td>
</tr>
<tr>
<td>9</td>
<td>Establish Protocols of coordination</td>
</tr>
<tr>
<td>10</td>
<td>Carry out Energy Audits / Energy use Assessments</td>
</tr>
<tr>
<td>11</td>
<td>Certify &amp; Designate Energy Auditors and Managers</td>
</tr>
<tr>
<td>12</td>
<td>Prohibit manufacture sale or import of energy inefficient equipment</td>
</tr>
<tr>
<td>13</td>
<td>Establish system of designated consumers</td>
</tr>
<tr>
<td>14</td>
<td>Display of EE Labels</td>
</tr>
<tr>
<td>15</td>
<td>Prescribe and implement building energy code.</td>
</tr>
<tr>
<td>16</td>
<td>Create awareness and disseminate information on EC / EE</td>
</tr>
<tr>
<td>17</td>
<td>Prescribe penalties for inefficient practices.</td>
</tr>
</tbody>
</table>
KEY POLICIES AND DIRECTIVES FOR EE IN PAKISTAN

• National Environmental Policy 2005 by MoEn (now MoCC)
• National Energy Conservation Policy 2006 by ENERCON (now NEECA)
• National Climate Change Policy 2012 by MoCC
• National Sustainable Development Strategy 2012 by MoCC
• Framework for Implementation of Climate Change Policy 2013 by MoCC
• Vision 2025 by Ministry of Planning Development & Reform in 2014
• National Energy Efficiency and Conservation Act 2016
The Framework for Implementation of Climate Change Policy (FICCP) includes 735 actions. About 22 priority actions deal with energy security in the country with objectives:

- To develop and enhance renewable energy sources and uses to achieve green growth in the energy sector.
- To develop and obtain clean energy technologies and uses to achieve low carbon growth in the energy sector.
- To reduce total energy demand through conservation and efficiency.

<table>
<thead>
<tr>
<th>No.</th>
<th>Categories</th>
<th>Priority Actions</th>
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<tbody>
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<td>Policy/ law making and implementation</td>
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<td>2</td>
<td>Enabling Environment</td>
<td>3</td>
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<tr>
<td>3</td>
<td>Institutional Strengthening and Capacity Building</td>
<td>4</td>
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<td>4</td>
<td>Awareness</td>
<td>2</td>
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<td>5</td>
<td>Assessment/ Research</td>
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<td>6</td>
<td>Infrastructure/ Technology Implementation</td>
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# National Energy Conservation Policy

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<td>Preamble</td>
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<td>Goal</td>
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<td>Agriculture Sector</td>
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<td>5.1</td>
<td>Energy Conservation and Poverty Alleviation</td>
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<td>5.2</td>
<td>Energy Conservation and Gender Mainstreaming</td>
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<td>5.3</td>
<td>Energy Conservation and Sustainable Development</td>
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<td>5.4</td>
<td>Energy Conservation and Environment</td>
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<td>5.5</td>
<td>Energy Conservation and Better Health</td>
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<td>5.6</td>
<td>Energy Conservation and Economic Self Reliance</td>
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<td>Policy Interventions</td>
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<td>Integrating Energy Conservation into National Energy Policies</td>
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<td>Energy Conservation as an Industry</td>
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<td>6.9</td>
<td>Corporate Plans</td>
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<tr>
<td>7.0</td>
<td>Implementation and Monitoring</td>
<td>11-12</td>
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</tbody>
</table>
EE systems are complex... Scaling up has been an implementation challenge.

Supply Side Options (Conventional Supply & Large Scale RE):
- Large Investments
- Fewer Stakeholders
- Standardized Solutions
- Less Transaction Costs
- Homogenous Market

Demand Side EE Measures:
- Small and Dispersed
- Multiple Stakeholders
- No "One Size Fits All" Solutions
- High Transaction Costs
- Heterogenous Market

But solutions have been developed and are being applied...
Challenge??

Government policies can help bridge the efficiency gap
Challenge??

When it comes to energy policy regarding building efficiency, there are many stakeholders and many, many opinions.
EE Potential in Buildings

OVERALL POLICY PACKAGE for ENERGY EFFICIENCY in BUILDINGS

Governance Framework

Targets and Planning
- Policy roadmap and targets
- Energy-efficient spatial planning and urban district planning (for new buildings only)
- Voluntary Agreements with commercial or public organisations
- International co-operation

Infrastructure and funding
- Energy agencies
- Energy efficiency funds
- Energy saving obligations for energy companies
- Feed-in-tariff for certified energy savings
- Government agencies and budget

Eliminating distortions
- Removal/reform of subsidies to end-user energy prices and on energy supply
- Energy/CO₂ taxation and emission trading
- Removal of legal barriers
- Regulation of energy companies

Specific policies and measures for energy efficiency in new and existing buildings

Regulation
Transparency and information
Incentives and Financing
Capacity building and Networking
Promotion of energy services
RD&D and BAT promotion

Efficient Design Upto 30%
Retrofits + Efficient Appliances 30-40%
Efficient Design + Retrofits + Efficient Appliances + Training of Occupants Up to 60%
● SRO issued for implementation / enforcement after approval from the Law Division
- But now as per Provisions of the NEECA Act, the Provincial Designated Agencies and NEECA will adopt their own implementation/revision strategies with the consent of NEECA Board.

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY
ISLAMABAD, THURSDAY, MARCH 28, 2013

PART II
Statutory Notifications (S.R.O.)
GOVERNMENT OF PAKISTAN
MINISTRY OF SCIENCE AND TECHNOLOGY

NOTIFICATION
Islamabad, the 28th March, 2013

S.R.O. 249 (E)2013.— In exercise of the powers conferred by Section 25 of the Pakistan Engineering Council Act, 1975 (V of 1976), the Governing Body of the Pakistan Engineering Council, with the previous sanction of the Federal Government, is pleased to direct that the following further amendment shall be made in the Pakistan Engineering Council (Conduct and Practices of Consulting Engineers) Bye-laws, 1986, namely:

“11. Application of Building Code of Pakistan (Energy Provisions-2011).—(1) The Provisions of the Building Code of Pakistan (Energy Provisions-2011) shall apply for engineering design of buildings and building clusters that have a total connected load of 100 Kilo Watts or greater, or a contract demand of 125 KVA or greater, or a conditioned area of 900 m² or greater, or un-conditioned buildings of covered of 1,200 m² or more.

(2) The scope of the energy provisions is applicable to the following to provide minimum energy-efficient requirements for the design and construction of:
   a) new building and their systems;
   b) new portions of existing buildings and their systems, if the conditioned area or connected load exceeds the limit prescribed under sub-by-law (1);
   c) new systems and new equipments in existing buildings; and
   d) increase in the electricity load beyond the limit mentioned in sub-by-law (1).

(3) Constructions and retrofitting of buildings or building clusters in violation of the Building Code of Pakistan (Energy Provisions-2011) shall be considered as violation of professional engineering work as specified under clause (xxiv) of section 2 of the Pakistan Engineering Council Act, 1975 (V of 1976).

(4) The provisions of the Building Code shall be revised by the Pakistan Engineering Council initially after one year of implementation and thereafter every three years.”

ENGR. SYED ABDUL QADIR SHAH
Chairman
Pakistan Engineering Council
Islamabad.
NEECA Act 2016 & Building Sector

“Buildings Sector” means all buildings including private domestic household, commercial, industrial, public and community buildings;

10. Powers and functions of the Federal Government to facilitate and enforce efficient use of energy and its conservation:

13. Powers and functions of Provincial Governments to facilitate and enforce efficient use of energy and its conservation:
MAP OF CLIMATE ZONES AND LIST OF CITIES

Climate Zones of Pakistan

Maximum Recorded Temperatures

Minimum Recorded Temperatures
Housing Categories per Income Group 1

**Income & electricity usage**

- **High-income Group**: (5%)
  - Family Income: Greater than 1000 USD/M
  - Electricity Consumption: >700 units

- **Middle-income Group**: (15%)
  - Family Income: 500-1000USD/M
  - Electricity Consumption: >300 unit

- **Low-Middle-income Group**: (20%)
  - Family Income: 200-500USD/M
  - Electricity Consumption: 100-300 units

- **Low-income Group**: (60%)
  - Family Income: 100-150USD/M
  - Electricity Consumption: 50-100 units or No electricity

**Electrical Equipment/Appliance**

- **High**
  - Everything in the market

- **Middle**
  - 6 lights, 4 fans, Wash machine, refrigerator, Iron, 2 AC

- **Low-Middle**
  - 4 lights, 3 fans, Wash machine, refrigerator, Iron, No AC

- **Low**
  - 2 light bulbs, 2 fans, iron ?, wash machine?, refrigerator?
Housing Categories per Income Group 2

Construction Unit Cost / EE&C Awareness

- **High**
  - Building Unit Cost: PKR 2,500-5,000 ft² or more
  - Energy Efficiency Awareness: High
  - Enforcement Applicable

- **Middle**
  - Building Unit Cost: PKR 1,500-2,500 ft² Energy Efficiency Awareness: Middle
  - Incentive may be required

- **Low-Middle**
  - Building Unit Cost: PKR 1,000-1500 ft² Energy Efficiency Awareness: Low
  - Difficult to find benefit

- **Low**
  - Building Unit Cost: PKR 1,000 ft² Energy Efficiency Awareness: Low
  - Difficult to find benefit
**Cooling Load on Different Standards – Margalla**

**Location:** Islamabad, Pakistan

**Building Type:** TelCo Headquarters Office Building

**No. of Floors:** 3 Floors with a separate 2 floor Parking Building

**No. of occupants:** 1320

**Total Area:** 468,000 sft.

**Total AC Area:** 172,737 sft

**HVAC System:** 2 Water Cooled Screw Chillers + 2 Medium Water Temperature Screw Chillers with Primary Secondary Pumping + DOAS System.
Issues/Barriers & Proposed Action Plan
ISSUES & BARRIERS

Not enough promotion

Building Code is not adopted to Building Authorities for their review except for few

Not enough awareness on Building Code & no penalty to Building owners

Certain Provision of BCP-EP-2011 have been adopted by few Development authorities

Only enforcement by PEC act. No enforcement to Architects registered under PCATP
ISSUES & BARRIERS

Insufficient resources & capability in Building Authorities
Not strict enough vetting & Inspection
Not enough awareness & capability in Professionals
Not enough awareness in society end-user

Required Capacity Development & Awareness raising
The Cycle Of Energy Code Development And Implementation
### DATABASE

<table>
<thead>
<tr>
<th>STATIC DATA</th>
<th>VARIABLE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built up Area</td>
<td>EPI</td>
</tr>
<tr>
<td>Climate Zone</td>
<td>kWh</td>
</tr>
<tr>
<td>Envelope Summary</td>
<td>kVA</td>
</tr>
</tbody>
</table>
The Conundrum

- New construction is a very small % of total construction
- So what do we do for existing construction?

WRITE A CODE FOR EXISTING CONSTRUCTION? / !
Building Energy Audits

- **Benchmark** performance of existing buildings
- **Highlight** potential for savings
The main objective of the Building Energy Audit was to find out how energy flows in the building and what should be done to improve end use efficiency to optimize energy use in the building without compromising recommended comfort level and determining the financial implications involved in improving the energy use characteristics in the building. The Scope also covered water saving potential.

The implementation of only one measure an investment of about 1.2 million Pak Rs, average **55,000 units (50%)** reduction has been recorded. Further, retrofitting of appliances with energy efficient ones will significantly reduce the billing amount of the entire A-Block. The motion sensors have been installed in the selective corridors A-Block. HMI screen/sub-meters were also installed at 2nd-Floor.
Introduction of Energy Efficient Zig-Zag Brick Kilns in Pakistan

- 250 Zig-Zag Kilns are operational and numerous under Construction Regulations Issued by Punjab Government for Construction of Zig-Zag Kilns Only.
- Capacity Building of 3000 Brick Kiln Owners & Related Professionals completed.
- HEC Approved Technical Development Fund Project of 8 Million Pak Rs developed by NEECA and NUST on “Retrofitting of Brick Kilns to Improve Energy Efficiency and Environmental Impact”.
- Further International Assistance through CCAC, ICIMOD, GEF and UN in Pipeline.
Building Sector Activities

- Development/Revision & Implementation of Energy Conservation Building Codes for Commercial & Residential Buildings
- Building Energy Audits, Centralized HVAC Energy Assessments, Installation of Building Energy Management Systems
- Energy Efficient Products Installation in 5 Million Houses under Prime Minister Scheme
- Buildings Energy Rating System
Road Map for Energy Efficiency & Conservation Programs

EE&C Roadmap for Pakistan

Integration of existing mandates, Institutional Arrangements and Policy Direction

Review of existing progress, gaps and opportunities – newly identified priorities

Consideration of targets, operational issues and capacity

Review of existing progress, gaps and opportunities – newly identified priorities

Integration of existing mandates, Institutional Arrangements and Policy Direction

Consideration of targets, operational issues and capacity