KARNATAKA ENERGY CONSERVATION AND ENERGY EFFICIENCY POLICY

2020-2025

PREPARED BY
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ACRONYMS

Acronyms	Definition
BEE	Bureau of Energy Efficiency
BU	Billion Units
CAGR	Compound Annual Growth Rate
CEA	Central Electricity Authority
ESCOM	Electricity Supply Company
DSM	Demand Side Management
EC	Energy Conservation
ECBC	Energy Conservation Building Code
ECBC Directives	Energy Conservation Building Code Directives
EE	Energy Efficiency
EPS	Electric Power Survey
FTL	Fluorescent Tube Light
FY	Financial Year
GDP	Gross Domestic Product
GoI	Government of India
GoK	Government of Karnataka
GW	GigaWatt
HP	Horsepower
HPSV lamp	High Pressure Sodium Vapour lamp
HLC-EC&EE	High-Level Committee for implementation and monitoring of various Energy Conservation and Energy Efficiency Projects/ Programmes
ISI	Indian Standards Institute
INR	Indian Rupee
KERC	Karnataka Electricity Regulatory Commission
KREDL	Karnataka Renewable Energy Development Ltd.

KSECF	Karnataka State Energy Conservation Fund
KVA	Kilo Volt Ampere
KW	Kilo Watt
KWh	Kilo Watt hour
LED	Light Emitting Diode
LPSV lamp	Low pressure sodium vapour lamp
LT	Low Tension
MU	Million Units
MW	Mega Watt
NPC	National Productivity Council
PF	Power factor
PWD	Public Works Department
PAT	Perform Achieve and Trade
SAPCC	State Action Plan on Climate Change
SDA	State Designated Agency
SERC	State Electricity Regulatory Commission
SME	Small and Medium Enterprises
Sq. km.	Square kilometre
S&L	Standards and Labelling

1 PREAMBLE

Energy has been universally recognised as one of the most important inputs for any economic growth and human development. Considering universal energy access and energy security as one of the fundamental development goals for the country, the Govt. of India has undertaken a multi prolonged approach to cater to the rising energy demand ensuring minimum growth in carbon emission. The optimal usage of energy shall be ensured and always carbon emission will be looked upon for every unit generated. Thus, Energy Efficiency plays a significant role in meeting the rising energy demand in a sustainable manner.

An Act to provide for efficient use of energy and its conservation and for matters connected therewith or incidental thereto, the Energy Conservation Act (EC Act), 2001 was enacted on 1st October 2001(effective from 1st March 2002) with an overall objective of providing necessary legal framework for promoting efficient use of energy and its conservation.

The Government of India established **Bureau of Energy Efficiency (BEE)** on 1st March 2002 under the provisions of the Energy Conservation Act, 2001. The mission of the Bureau of Energy Efficiency is to assist in developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001.

As part of this Act, all States have been directed to identify a State Agency to oversee and lead the implementation of energy conservation activities at the State level. The **Karnataka Renewable Energy Development limited has been designated by the State as the "State Designated Agency (SDA)"** to the Bureau of Energy Efficiency (BEE), Ministry of Power, GoI, to initiate, co-ordinate, regulate and enforce all necessary actions contained in the Energy Conservation Act-2001 within the State for effective implementation of the Energy Conservation and Energy Efficiency activities.

Also, the **National Action Plan on Climate Change (NAPCC)** being a significant formulation of India's response to climate change, which leads to take step towards Energy Conservation and Energy efficiency. The GoI had launched eight missions under the NAPCC to find out the mitigation option of climate change. The National Mission for Enhanced Energy Efficiency (NMEE) and National Mission on Sustainable Habitat (NMSH) are aimed at promoting energy efficiency to reduce energy consumption through agricultural, buildings, industrial and municipal sectors.

Karnataka is one of the largest States in terms of source-wise installed generation capacity. Out of the total State energy consumption, the energy consumed by Agriculture sector is about 38%, Domestic Sector is about 22%, Industrial Sector is about 18%, Commercial Sector is about 12% and Municipal about 10%.

The Karnataka is blessed with abundant renewable energy generation to meet the State demand and the State Government's ambitious initiatives to harness the renewable energy and efficient usage has been successful. As the Energy Conservation and Energy Efficiency is the fastest, cleanest and cheapest option than Generation and its easy way to meet energy needs. One unit of energy saved is equivalent to two units of energy generated, the State could save each year by greatly improving Energy Conservation and Energy Efficiency in all the sectors. The sectoral efficiency achieved will contribute effectively for the progressive economy of the nation, which shall meet the international best practices.

Also, the State Government is committed to implement the Energy Conservation Act 2001 and the Government of Karnataka has emphasized the importance of energy efficiency (EE) and its role in addressing the development challenges faced by the State. Accordingly, the Government of Karnataka had notified "The Karnataka Renewable Energy Policy 2009-14" in 2009 to promote and harness the renewable energy and energy efficiency potential in the State. During the Policy period, the Energy efficiency measurers were introduced to attain the energy conservation and targeted to conserve 20% of energy consumed in each sector.

Subsequently, the Government of Karnataka and KREDL have also undertaken several measures at Policy, Regulatory and programme implementation level for promotion of EE sector in the State. For instance, sectors like industries and commercial are being addressed through "PAT scheme", agriculture and municipal sector are addressed through "DSM programme" and energy consumption in buildings being second highest consumers is addressed through "Energy Conservation Building Code and Eco Niwas Samhita Code" in the State.

In addition, the BEE has directed to notify a separate **"Energy Conservation and Energy Efficiency Policy"** in the State for the promotion of energy efficiency initiatives through a policy directive to ensure energy security in the State with parallel activities carried out to enhance progressive economy of Karnataka. **"Karnataka Energy Conservation and Energy Efficiency Policy 2020-2025"** is a policy directive developed to meet the present requirement and cater to the needs of the future by implementing EE strategies. This policy will provide a long-term vision for driving energy efficiency and energy conservation across different consumer categories in the State and also helps the State in establishing as a leading State for deployment of large-scale EE programmes.

This Policy aims to conserve around **744 million kWh** of electricity consumption and would result in avoiding fossil fuel-based generation capacity addition of around **454 MW** in the medium term. This would, in turn, reduce the subsidy burden on the State Government.

2 KARNATAKA ENERGY CONSERVATION AND ENERGY EFFICIENCY POLICY 2020 - 2025

The **"Energy Conservation and Energy Efficiency Policy 2020-2025"** is a policy for the State, to encourage the promotion and large-scale deployment of energy efficiency measures in the State. Ensuring efficient usage of energy directly caters to the local and national economy. The energy saving strategy with modern policy directives, will indeed cater to energy deficient sectors in the region. Amplifying availability of energy in deficient regions will enhance per capita power consumption and in turn will augment the local economy.

The aim of the policy is to bring a common platform and recommends to have an integrated approach to address energy efficiency and energy conservation in all the stakeholders. The policy addresses all the sectors to implement and enforce EE measurers effectively in the State.

The policy intends to strengthen energy security in the State through various Central and State Government initiatives.

Also, formation of proactive committee, defining roles and responsibilities, providing additional powers and duties to the stakeholders, awareness and training programmes, innovative financing and market transformational strategies are a few steps taken to enhance EE & EC activities in the State.

2.1 VISION

- To harness the vast potential of energy efficiency and energy conservation in Karnataka for the benefit of the environment and society.
- To establish Karnataka as a leading State in promoting and deploying EE measures across various sectors for ensuring energy security and sustainable growth.
- State Energy Sustainability through the profitable and efficient use of resources to provide decentralized energy supply to agriculture, industry, commercial and household sector.

2.2 OBJECTIVE

The objectives of the policy are as follows:

i. Policy and Regulation:

- To put in place an overarching framework for identification, development, implementation, monitoring and verification of energy efficiency programmes to be undertaken in the State to tap huge energy savings potential;
- To supplement national level efforts for implementation of various energy efficiency and energy conservation programmes initiated by the Ministry of Power, Government of India; (such as Energy Conservation Building Code, Ujala Yojana, Perform Achieve Trade, LED Street light etc.)
- To lay down the framework for policy implementation and define the roles and responsibilities of various stakeholders.
- Energy Efficiency and Energy Conservation measures have to be implemented through public participation and involvement, creating necessary awareness.

2.3 DEFINITION

Following expressions used in the Policy would have meanings assigned to them as defined hereunder:

- ""**Energy Conservation**" means reducing energy consumption through the rational use of energy;
- "**Energy Efficiency**" means activities or programmes that stimulate customers to reduce energy use by making investments in more efficient equipment or control that reduce energy use while maintaining a comparable level of service as perceived by the customer;
- "**Karnataka Energy Conservation Building Code (K ECBC), 2018**" provides for minimum requirements for the energy-efficient design and construction of buildings. The Code also provides two additional sets of incremental requirements (ECBC+ and SuperECBC) for buildings to achieve enhanced levels of energy efficiency that go beyond the minimum requirements. The Code is applicable to buildings or building complexes that have a connected load of 100 kW or more, or a contract demand of 120 kVA or more and are intended to be used for commercial purposes.
- "**Equipment**" or "**Appliance**" means any equipment or appliance which consumes, generates, transmits or supplies energy and includes any device that consumes any form of energy and produces a desired work;
- "**Perform, Achieve and Trade (PAT)**" is a regulatory instrument to reduce specific energy consumption in energy-intensive industries, with an associated market-based mechanism to enhance the cost-effectiveness through certification of excess energy saving which can be traded.

- "**Energy Services Company (ESCO)**" means a company which is in the business of providing energy efficient and load management equipment and/or services to end-use customers;
- "**Demand Side Management (DSM)**" means the actions of a Distribution Utility, beyond the customer's meter, with the objective of altering the end-use of electricity - whether it is to increase demand, decrease it, and shift it between high and low peak periods, or manage it when there are intermittent load demands in the overall interests of reducing Distribution Licensee costs.
- "**Designated Consumer**" means any consumer specified under clause(e) of section 14 of the Energy Conservation Act, 2001;
- "**Demonstration projects**" means building projects that showcase energy-saving measures and results through computer simulation results. Therefore, one can arrive at energy saving potential measures for large-scale projects in residential/ commercial/ industrial premises.
- "**Distribution Utility**" means a licensee authorised to operate and maintain a distribution system for supplying electricity to the consumers in his area of supply;
- "**Notification**" means a notification in the official Gazette of India or Gazette of State of Karnataka as the case may be;
- "**Policy**" means the Karnataka Energy Conservation and Energy Efficiency Policy 2020-25;
- "**State Designated Agency**" means any agency designated under clause (d) of section 15 of EC Act, 2001;
- Any other terms or expression used in this policy but not defined herein shall have the same meaning given to it by the Energy Conservation Act, 2001, Electricity Act, 2003 and their amendments.

2.4 SCOPE

i. Adoption of EE measures:

- To complement supply-side strategies in order to avoid, reduce, or postpone investments in generation, transmission and distribution infrastructure by slowing demand growth.

ii. Financial Mechanisms:

- Financial assistance for ESCOs
- Incentives for Green Buildings
- Demand Side Management: To control, reduce, influence electricity demand and electricity consumption through the implementation of suitable energy efficiency, energy conservation measures and energy efficiency technology in high energy consumption sectors;
- To reduce the greenhouse gases emissions, lower overall cost of electricity to consumers by economical and efficient use of resources.

iii. Institutional Capacity:

- Technical training programmes to educate on minimizing the technical losses in electricity generation, transmission and distribution by energy conservation measures.
- Awareness programmes to be conducted at Institutions such as schools, colleges, polytechnics, Industrial Training Institutes, etc.

2.5 ENERGY EFFICIENCY POTENTIAL ASSESSMENT AND TARGETS (2020-25)

It was estimated that implementation of energy efficiency measures in different sectors would result in overall energy savings of 9,853 million kWh, around 22 percent of total electricity consumption of the State in FY 2013-14. Energy sales approved by the Karnataka Electricity Regulation Commission for FY 2019-20 was 72,778 million kWh. Based on a similar proportion of savings potential for FY 2019-20, estimated energy savings potential for the State would be 16,029 million kWh i.e., around 22 percentage of total electricity consumption of the State in FY 2019-20.

Sr. No.	Consumer Category	Base Year (2013-14) (MU)		Energy Saving Potential as per NPC study 2009 (%)	Ref. Year FY 2019-20 (MU)	Saving Potential
		Consumption	Saving Potential		Consumption (Excluding losses)	
1	Domestic	9,512	1903	20%	14,556	2,912
2	Commercial	6,342	1205	19%	13,828	2,628
3	Industries (HT and LT)	8,606	861	10%	7,278	728
4	Agriculture	16,759	5028	30%	21,833	6,551
5	Municipal-Street Light and water supply	4,077	856	21%	15,283	3,210
Total		**45,296**	**9,853**		**72,778**	**16,029**

This policy proposes to focus on five major sectors such as Municipal, Domestic, Agricultural, Commercial and Industrial for improving the energy efficiency during the policy period. The key principles that have been followed while stipulating sector-specific targets are:

a. Higher targets assigned to the sectors which offer higher energy savings potential;

b. Higher targets to the sectors that offer lower revenue realization compared to the average cost of supply;

c. Sectors with higher government subsidy exposure;

d. Sector-specific technology interventions measures and commercialization aspects;

e. The sector which is expected to grow at a higher rate during the policy period.

Sector-wise energy savings targets both during the policy period as well as annual as envisaged under this policy are as under:

Sl. No.	Consumer Category	Saving Potential (MU)	Savings Target - Policy Period (Proportion of Energy Savings Potential)	Savings Target (MU)					Savings Target - Policy Period (MU)
				2020-21	2021-22	2022-23	2023-24	2024-25	
1	Domestic	2912	4%	04	15	28	30	40	**117**
2	Commercial	2628	3%	05	10	14	20	30	**79**
3	Industries (HT and LT)	728	2%	02	02	03	03	04	**14**
4	Agriculture	6551	3.50%	20	30	50	60	70	**230**
5	Municipal-Street Light	3210	6.50%	15	20	50	60	63	**208**
	Municipal-Public Water Works		3%	10	15	20	21	30	**96**
Total				**56**	**92**	**165**	**194**	**237**	**744**

In the EE Policy for the State proposed energy savings target is of around **744 million kWh** of electricity consumption and around **454 MW** of generation capacity addition through fossil fuels is avoided.

2.6 POLICY TITLE, TERM, TENURE AND CONTROL PERIOD

This Policy shall be known as the **"Karnataka Energy Conservation and Energy Efficiency Policy 2020-2025".** This Policy shall come into effect from the date of its notifications in the official Gazette of the State government and shall remain in force until FY 2024-2025 or till such time any changes are made to the policy by the State Government.

3 GOVERNANCE & INSTITUTIONAL STRUCTURE

3.1 HIGH-LEVEL COMMITTEE FOR IMPLEMENTATION AND MONITORING OF VARIOUS EC AND EE PROJECTS/PROGRAMMES IN THE STATE

It is proposed that GoK may constitute a High Level Committee for implementation and monitoring of various EC and EE projects/programmes/schemes/activities in the State. This Committee will review and monitor the progress of the State's energy efficiency policy every year as well as at the end of every control period and take appropriate actions to achieve the policy objectives. The HLC-EC &EE shall comprise of the following members:

- Add. Chief Secretary, Energy Department - Chairperson
- Principal Secretary/ Secretary, Finance Department - Member
- Principal Secretary/ Secretary, Urban Development - Member
- Principal Secretary/ Secretary, PWD-Member
- Director Municipal Administration (DMA) – Member
- Managing Director, KPTCL - Member
- Principal Chief Architect, PWD – Member
- Managing Director, BESCOM - Member
- Chief Electrical Inspector, Electrical Inspectorate, GoK - Member
- Chief Engineer, Karnataka Housing Board - Member
- Chief Engineer, Bangalore Development Authority- Member
- Managing Director, KREDL - Member Convener

The roles and responsibilities of HLC-EC&EE are given below:

Stakeholders	Roles and Responsibilities
High-Level Committee for EC & EE	➢ Enforcing and monitoring the implementation of EE Policy in the State; ➢ Resolving policy level issues for accelerating deployment of energy efficiency programmes; ➢ Provide the necessary direction and thrash out the issues for effective roll out and implementation of EC & EE Policy; ➢ Suggest necessary modifications and amendments in the policy to State government; ➢ Arrange to allocate necessary fund from GoK every year for implementation of the various EC & EE Projects and programmes

Stakeholders	Roles and Responsibilities
	➢ Review of consolidated energy savings report for the entire policy period; ➢ Promote energy efficiency standards through the optimization of parameters in the various components and systems of the building. ➢ Support towards the implementation of the following Energy Efficient measurers in various sectors across the States. o Energy Conservation Building Code (ECBC) (Commercial Buildings) o Eco Niwas Samhita (ENS) (Residential Buildings) o Perform Achieve and Trade (PAT) o Demo Projects' Implementation o Agriculture and Municipal Demand Side Management (Ag & Mu DSM) o Standard and Labelling scheme ➢ Guide the implanting Agencies regarding the adoption of the implementation strategies;

3.2 NODAL AGENCY AND ITS ROLES AND RESPONSIBILITIES

The Karnataka Renewable Energy Agency Limited (KREDL), as State Designated Agency, will act as a Secretariat to the High-Level Committee for EC & EE. The KREDL, as the State Designated Agency, will be the nodal agency for facilitating and for successful implementation of this Policy. It will also coordinate with HLC-EC&EE and various departments for development and finalisation of energy conservation /energy efficiency action plan and development of a report on the status of the action plan at the end of each financial year during the policy period.

The roles and responsibilities of the nodal agency are given below:

Stakeholders	Roles and Responsibilities
State Designated Agency	➢ Co-ordination with various departments for effective implementation of the Policy; ➢ Co-ordination with various departments to facilitate the implementation of energy conservation and energy efficiency programmes in Domestic, Commercial, Industrial, Municipal and Agricultural Sectors. ➢ Coordination with various sector-specific responsible departments for getting necessary inputs for the development of EC & EE action plan; ➢ Assortment of the energy savings report submitted by the various sector-specific responsible organizations at the end of each financial year; ➢ Oversee and analysis of the performance of the energy savings and as well as checking, monitoring and evaluating the energy savings achieved by each sector. ➢ Consolidation of energy savings reports submitted by all the Stakeholders at the end of each financial year and submission of the same to HLC-EC & EE for their reference; ➢ Forwarding the details of EC&EE initiatives and energy savings achieved in each sector to the BEE for information and seeking for the recommendations to assist the development of sector wise Energy efficiency initiatives. ➢ Stakeholder consultations with all concerned State departments to discuss implementation modalities of EC & EE measurers ➢ Create awareness and training programmes about energy conservation and energy efficiency among the Stakeholders; ➢ Development of capacity building programmes among all the stakeholders;

Stakeholders	Roles and Responsibilities
	➢ Communicate the achievements of the Policy with all the stakeholders through organization of the workshop; ➢ Implementation of the refortification/demo-projects based on the availability of the fund. ➢ Co-ordination with the Committee members for arranging HLC-EC&EE meeting as and when required.

3.3 POWERS AND DUTIES OF KEY STAKEHOLDER/ STATE LEVEL ENTITIES/ DEPARTMENTS

The roles and responsibilities of key stakeholders are given below:

Stakeholders	Roles and Responsibilities
State Energy Department	➢ Notify the policy defining vision, objective and policy period; ➢ Undertake administrative approval for fund requirement during the policy period; ➢ Consider reduction in taxes and duties on energy efficient equipment; ➢ Amend and modify the policy as and when required;
State Electricity Distribution Companies	Responsible for the preparation of Annual Action Plan and for the implementation of energy conservation and energy efficiency programmes in Domestic, Commercial, Industrial and Agricultural Sectors; and successful implementation of the DSM Regulations in the State, which was notified by the KERC during 2015.
State Electricity Regulatory Commission	Implementation of the EE policy and EE/EC programmes by distribution utilities shall be guided by and governed under regulatory oversight. Enforcing the implementation on DSM Regulations in the State.
Local Bodies and Municipal Authorities	Responsible for the preparation of Annual Action Plan and for the implementation of energy conservation and energy efficiency programmes in the area of public street lighting, Public Water Works and also the successful implementation of ECBC (Commercial buildings), ENS (Domestic buildings) etc;

Stakeholders	Roles and Responsibilities
Sectors responsible organisations (SRO) (PWD, Architect Department, BDA, KHB, KSPHCL, all Boards and Corporations, Universities, etc.,)	➢ Nominating the senior officer as a Nodal officer by the each Sector Responsible Organisation (SRO) for the co-ordination with the HLC-EC&EE and State Designated Agency for providing the necessary inputs. ➢ Development of EC & EE action plan (annual as well as for the policy period) in line with the policy for its implementation; ➢ Evaluation and approval of the annual action plan by the SROs at the beginning of each financial year; ➢ Submission of approved Annual Action Plan to the State Designated Agency for reference; ➢ Responsible for the implementation of the strategies and work plan as per the approved Action Plan. ➢ Preparation of energy savings report (annual as well as for the policy period) ➢ Furnishing of the details of energy efficiency initiatives and energy savings to the State Designated Agency (annual as well as for the policy period) for reference and for onwards submission to the HLC- EC & EE.

4 ENERGY EFFICIENCY AND CONSERVATION STRATEGY AND INITIATIVES

4.1 SECTOR-SPECIFIC POSSIBLE EE PROGRAMME IDENTIFICATIONS

Under this policy, KREDL as the Nodal Agency will continue to implement and upscale the energy efficiency and conservation projects initiated in the earlier Comprehensive Renewable Energy Policy for the period 2020-2025. In addition, KREDL shall identify and develop new programmes to accelerate the pace of development. It shall also deploy various energy efficiency and energy conservation measures to capture the untapped potential in various sectors of the economy.

KREDL shall develop a detailed **energy efficiency and conservation action plan** which will provide a detailed roadmap for all activities envisaged in this policy. Some of these sector-specific programmes through which the energy savings target during policy period can be achieved (including but not limited to the following) are listed below:

(1) Municipal Sector

- **Policy and Regulation:**

i. **EC ACT, SECTION 18:** Regulation of the energy consumption standards for street lighting and drinking and/or waste water pumping.

ii. **EC ACT, SECTION 26:** Impose penalties for non-compliance of either Central or State Government Energy Conservation Regulations.

iii. **EC ACT, SECTION 27, 28, 29:** Power to adjudicate the penalties imposed for non-compliance.

iv. **EC ACT, SECTION 57:** Power of State Government to make rules, by notification, for carrying out the provisions of EC Act and not inconsistent with the Rules, if any, made by the Central Government.

v. Monitor use of Energy Efficient BEE 4/5 star rated pump sets for drinking water supply in City/ town/ Grama Panchayat under Social Welfare Department and Rural Development and Panchayat Raj Department.

vi. Energy Audit of public water works will result in huge potential for saving with avenues related to, installation of new more efficient pumps and pumps components, optimization of the existing pumps through properly sizing of pumps and components, improving the main water flow distribution system and water pumping station operations optimization through better metering and monitoring.

- **Financial Mechanisms :**

  i. The ESCO project for the Municipal is the right way to increase energy efficiency in the public sector. Based on the Municipalities' needs, the ESCOs can finance EE implementation and collect their dues from shared or guaranteed savings accruing from the EE project. The Manual for the Development of Municipal Energy Efficiency Projects was developed as part of the India ESCO/Municipal Energy Efficiency Linkages Programme funded by the International Finance Corporation (IFC).

- **Institutional Capacity:**

  i. Encouragement of green building Codes such as LEED (Leadership in Energy and Environmental Design), IGBC (Indian Green Building Council), and GRIHA (Green Rating for Integrated Habitat Assessment) by providing discounts and incentive scheme.

- **Suggestable adoption of EE measures:**

  i. Replacement of low efficient street lighting lamps with new energy efficient technology such as LED.
  ii. Installation of radio frequency-based street lights with centralised control and monitoring system in the major cities;
  iii. Installation of street light with Supervisory Control and data acquisition (SCADA).
  iv. Monitor Energy Audit of Municipal buildings and commercial buildings which have a connected load of 100kW or contract demand of 120kVA or more according to KECBC 2018 (Karnataka Energy Conservation Building Code). Implementation of identified energy efficiency measures;
  v. Adoption of RTPV (Roof Top Photo Voltaic) on the Municipal buildings.

(2) Domestic Sector

- **Policy and Regulation:**

  i. **EC ACT, SECTION 17:** Power of inspection of buildings to check compliance with requirements of the EC Act.

  ii. **EC ACT, SECTION 18:** Regulation of norms for energy consumption standards in any building. Regulation of the energy consumption standards for equipment and appliances.

- **Financial Mechanisms:**

  i. Providing financial incentives such as soft loans, subsidies, electricity rebates for procurement of EE appliances.

- **Suggestable adoption of EE measures:**

  i. Replacement of Incandescent Lamps (ICLs) with LED lamps;
  ii. Replacement of the air conditioner (includes cassettes and floor standing types) with four/five star labelled air conditioner.
  iii. Replacement of existing refrigerator with four/five star labelled refrigerator; Refrigerator coils should be free of frost by properly adjusting the thermostat. Defrost as and when required as ice acts as an insolent preventing transfer of heat.
  iv. Use of solar water heaters for residential consumers, ESCOMs provide a rebate of Rs. 0.50 per unit, subject to a maximum of Rs. 50 per month for installation of solar water heaters.
  v. Replacement of existing low efficient ceiling fans with superefficient ceiling fans;
  vi. Replacement of existing washing machines with four/five star labelled washing machines;
  vii. Replacement of existing colour TV with four/five star labelled TV;
  viii. Implementing solar rooftop programme under net metering, which shall follow the CEA (Installations and operation of meters) Regulations 2006. The surplus energy injected shall be paid for by the ESCOMs at a tariff determined by the KERC from time to time.
  ix. To ensure a better quality of life [e.g., clean cooking drives through the Ujjwala scheme and Mukhyamantri Anila Bhagya LPG scheme for all Below Poverty Level (BPL) families] is recommended.
  x. Adoption of the "Eco Niwas Samhita – Energy conservation Building Code for Residential" buildings directives.

(3) Agriculture Sector

Agriculture has accounted for the largest share of the total electricity consumption in the State over the last five years. As of March 2018, the Sector consumptions grew up 8% from 2014. Energy consumption in agriculture is mainly through the use of irrigation pumps, and other electrical farming equipment.

- **Policy and Regulation:**
  i. **EC ACT, SECTION 18:** Regulation of the energy consumption standards for agricultural pumping.
  ii. **EC ACT, SECTION 26:** Impose penalties for non-compliance of either Central or State Government energy conservation Regulations

- **Suggestable adoption of EE measures:**

i. Energy Audit and preparation for detailed project report for agriculture sector at the feeder level;
ii. Replacement of existing low efficient agriculture pump sets with energy efficient pump-sets (four/five star rated pump-sets);
iii. Installation of Solar Water Pump sets to manage irrigation without depending on grid connection.
iv. Use drip irrigation for specific crops. Drip systems can conserve up to 80% water and reduce pumping energy requirement.
v. Replacement of existing low efficient pumping accessories with energy efficient/ ISI marked pumping accessories.
vi. RE projects supplement rural energy needs on a sustainable basis and provide decentralized energy supply for agriculture.
vii. Introduction of SMART GRID/ SMART METER will help consumers to monitor and optimize the use of energy.
viii. Use of Smart Control Panel that has a SIM card and a Smart Meter, which will enable a farmer to switch on or switch off these pumps through his mobile and sitting at the comfort of his home.
ix. Remote access of data through cloud and machine learning.
x. Precision farming enables farmers to use crop inputs more efficiently including pesticides, fertilizers, tillage and irrigation water.

(4) Commercial Sector

The energy requirements in the commercial building sector arise from lighting, air-conditioning [Heating, Ventilation and Air-conditioning (HVAC)], diesel generators (DGs), Motors, Pumps, etc.

- **Policy and Regulation:**

i. **EC ACT, SECTION 15:** Amend the Energy Conservation Building Codes to suit the regional and local climatic conditions. Notify Energy Conservation Building Codes with respect to use of energy in the buildings. Direct the designated consumers to comply with the Code and/or energy audit requirements and furnish requisite data at a requisite time.
ii. **EC ACT, SECTION 17:** Power of inspection of buildings to check compliance with requirements of the EC Act.
iii. The commercial building having a connected load of 100kW or more or a contract demand of 120kVA or more has to comply with ECBC.
iv. Incorporation of ECBC in building bye-laws is mandatory and to be enforced at the Municipalities/ Corporations.

v. Adoption of BEE star rating for existing buildings.
vi. State Energy Conservation awards to be handed out to recognise outstanding performers under various building categories like Offices, Hotels, Hospitals, etc.

Financial Mechanisms:

i. Subsidy for Energy Audits for buildings.
ii. Financial incentives for ECBC-compliant construction/retrofits, such as a soft loan, tax rebates, subsidy, indirect financial benefits such as an increase in FSI (Floor Space Index) / FAR (Floor Area Ratio) allowance.

- **Institutional Capacity:**

i. The entity to be assigned for enforcing and certifying ECBC compliance
ii. Entity assigned for checking compliance of mandatory energy audits and reporting

- **Suggestable adoption of EE measures:**

i. Replacement of existing low efficient T5/T8/T12 FTL with energy efficient LED Tubes;
ii. Super-efficient ceiling fan replacement programmes;
iii. Replacement of low efficient pumps with energy efficient star rated pump sets.
iv. Use of Solar Water Heating Systems (SWHS) in Hospitals, Govt. offices, Hotels, Commercial buildings.
v. Chiller replacement/retrofitting, for the private sector commercial consumer category. Use of water-cooled chiller with higher COP and IPLV values, to replace air-cooled chillers.
vi. The usage of DG sets with better specific fuel consumption in commercial buildings. DG sets in buildings greater than 20,000 m^2 (Built-Up Area) BUA shall have a minimum 3 stars rating in ECBC Buildings
vii. The adoption of Rooftop PV in commercial buildings to explore Renewable Energy integrated storage options instead of DG sets.
viii. Demand Side Management (DSM) measures initiated by the power supply utilities to encourage the consumer to use energy more efficiently by modifying their electricity consumption patterns, both with respect to the time and extent of electricity demand; such as Time of Day (TOD) tariffs for HT consumers;
ix. Distributing LED lights under UJALA scheme as a replacement in public buildings.
x. Use of Energy Efficient BEE 4/5 star rated Distribution transformers.

xi. Use of Desiccant cooling systems has been considered as an efficient method of controlling moisture content in air supply. They do not use any ozone-depleting coolants and consume less energy as compared with the vapour compression systems

xii. Compliance with "Energy Conservation Building Code (ECBC)" for the building having a connected load of 100kW or greater or a contract demand of 120kVA or greater and used for commercial purpose.

(5) Industrial Sector

The industrial sector is the largest energy consumer in the economy. Fossil fuels are mainly used for captive electricity generation and process requirements in industries. The main fossil fuels include coal, lignite, natural gas and naphtha. Due to the absence of coal reserves in Karnataka, the State sources industrial coal and lignite from other States or by imports. Energy costs account for up to 20 percentage of the manufacturing costs in large industries. Thus, it is important to improve energy efficiency (EE) in Industries.

- **Policy and Regulation:**

i. **EC ACT SEC 15:** Direct the designated consumers to comply with energy audit requirements and furnish requisite data at a requisite time.

ii. **EC ACT, SECTION 17:** Power of inspection of industries to check compliance with requirements of the EC Act

iii. **EC ACT, SECTION 18:** Regulation of norms for process and energy consumption standards in any industry. Regulation of the energy consumption standards for industrial equipment and appliances including motors.

iv. Initiatives and programmes to be established by the State to advance EE in MSME (Micro, Small and Medium Enterprises) Sector. For e.g. workshops, subsidy for energy audits, demo/pilot projects, other EE projects.

- **Suggestable adoption of EE measures:**

i. Use of energy-efficient motors where economical (i.e., IE3 and IE4). Most energy efficient motors are usually constructed with higher quality materials and advanced manufacturing techniques and result in less waste energy being produced through reduced vibration, noise and heat.

ii. Equipment monitoring should be on a regular basis.

iii. Consider installing a building automation system (BAS) or an energy management system (EMS).

iv. Development of technology-specific demonstration project for various industrial clusters;

v. The Perform Achieve Trade (PAT) is an innovative, market-based trading scheme aims to improve energy efficiency in industries which are required to reduce their Specific Energy Consumption (SEC) within a specified period of three years or face penalty provisions under the mandate of the government.

vi. Initiative and programmes such as workshops, subsidy for energy audits.

vii. The industries must implement and maintain a certified energy management system according to the standard ISO 50001. Implementation of systems with ISO 50001 schemes will help to save around 20% of the energy consumption in industries.

viii. Energy Savings through Heat Recovery is the best identified as part of an overall energy conservation of the industrial process or facility.

ix. Installation of Back Pressure Turbine to eliminate throttling from HP to LP steam and recover power

x. Organization of workshop for the promotion of energy efficient technologies specific to the industry and emphasise attaining specific energy consumption values by energy efficiency interventions.

xi. The industries have to see steady progress in, electricity access to understanding the accurate billing together with efforts towards energy conservation.

- In addition to above-mentioned sector-specific programmes, KREDL shall initiate publicity and awareness programmes to create awareness about energy efficiency and conservation measures among different classes of end users in the State.
- Under this Policy, distribution utilities shall be responsible for the implementation of above-mentioned programmes in the domestic, commercial and agricultural sectors and seek the approval of the KERC for the activities and budgets.
- Municipal Corporations shall be responsible for the implementation of programmes identified in the area of public street lighting as well as public water works.
- KREDL shall also be responsible for facilitation to implement the PAT programmes for the notified designated consumers.

4.2 NOTIFICATION / DIRECTIVES BY GOVERNMENT OF KARNATAKA.

The government of Karnataka has issued the following notifications/directives, so far, for the use of energy efficient technologies and appliances by different consumer categories in the State

a) Mandatory use of Solar Water Heating System in industries, Hospitals, Govt. offices, Hotels, Residential Buildings, Commercial Buildings, etc.

b) Use of LED lights in all Govt. buildings.

c) Mandatory Use of ISI marked motor pump sets, Power capacitor, Foot/Reflex valves in Agriculture sectors.

d) Mandatory use of Energy Efficient Pump Sets confirming to Bureau of Energy Efficiency.

e) Mandatory use of Energy Efficient BEE 4/5 star rated pump sets for drinking water supply in City / Town / Grama Panchayat under Social Welfare Department & Rural Development and Panchayat Raj Department.

f) Mandatory use of BEE 5 Star rated electrical appliances in Government & Public Undertaking Departments.

g) Mandatory use of Energy Efficient BEE 4/5 star rated distribution transformers.

h) Mandatory Compliance with “Energy Conservation Building Code (ECBC)” for commercial buildings having connected load ≥100kW or contract demand ≥120kVA.

i) To set the Air Conditioner operating temperature to 24° C - 25° C in all Government & Public Undertaking Department as per the BEE guidelines.

These notifications shall also remain applicable until issuance of the subsequent amendments by the Government of Karnataka from time to time.

Apart from this, the KREDL has identified similar directives/notifications to be issued by the Government of Karnataka to integrate the use of energy efficient technologies in the government-driven/funded schemes that involve providing energy-intensive infrastructure for the people of Karnataka. Some of these directives/notifications are listed below:

- Mandatory use of LED lighting systems and solar rooftop PV power generation modules in the fuel (petrol/diesel) pumping stations, allotted by the State-run oil marketing companies;
- Mandatory use of LED lighting systems and solar rooftop PV power generation modules in bus stops and bus depots owned by Karnataka State Road Transport Corporation (KSRTC);

- Mandatory use of energy efficient technologies in the housing projects undertaken by the Karnataka Housing Board (KHB), Karnataka State Police Housing Corporation (KSPHCL), and other entities of the Govt. of Karnataka;
- Mandatory use of energy efficient technologies in the housing projects, site/layout development undertaken by the Bangalore Development Authority (BDA)/ PWD/ KRIDL/ KPTCL/ DISCOMs/ KPCL/ Development Authorities and other registered housing societies;
- Mandatory use of LED streetlights by all local bodies for all new/additional lamps.
- Mandatory use of LED streetlights in the layouts developed by Government/ private bodies.

4.3 ACTIVITIES / DIRECTIVES BY KREDL:

The KREDL has taken up the following activities/directives, so far, for the use of energy efficient technologies and appliances by different consumers' categories in the State.

- Successful implementation of Model Energy Efficient Village campaign Programme at selected villages across the State.
- Energy Efficient LED Street lights Programme:
    i. Replacement of the existing low efficient conventional street light fixtures by appropriate capacity Energy Efficient LED street lights at selected TMCs / CMCs across the State.
    ii. Replacement of the existing low efficient conventional street light fixtures by appropriate capacity Energy Efficient LED street lights at selected villages in Grama Panchayaths.
- Energy Auditing & Implementation of the Energy Audit measures at selected Govt. Buildings
- Establishment of Energy Clubs in Govt. schools and organization of various programmes to school childrens.
- Implementation of Energy Efficient projects at selected Govt. schools and residential schools & hostels.
- Energy Efficient Pumps: Replacement of the existing low efficient water pumps along with all accessories by the Energy Efficient BEE 4/5 Star rated pumps at the selected Govt. Hospitals across the state.
- Successful implementation of the Energy Conservation Building Code (ECBC) in the State for Commercial Buildings.
- Successful implementation of Perform, Achieve and Trade (PAT) Scheme in the State.
- Implementation of Radio frequency (RF) based smart LED street lighting programme with auto ON / OFF , dimming facility, single point monitoring, etc.,

- Providing Smart Energy Saver units in the existing street light circuits with auto ON / OFF, dimming facility.
- Implementation of the Energy Efficient measures at selected Govt. Hospitals under BEE Energy Efficient Hospitals Programme.
- Organisation of the various Training Programmes, Workshops, Capacity building Programmes for Govt. and Private Stakeholders across the State.
- Organisation of various publicity and awareness programmes across the State

Energy Efficiency programme for knowledge dissemination by KREDL

i. The inclusion of text modules on energy conservation for 6^{th} to 10^{th} classes into NCERT books in the school curriculum (a proposal was submitted to the Principal Secretary, Primary and Secondary Education, GoK),
ii. Create special branches in Engineering, and degree courses, similar to that of a Diploma from the Board of Technical Examination, Bengaluru.
iii. Syllabus on Renewable Energy has been submitted to the Karnataka State Rural Development, GoK and Panchayat Raj University, Gadag for inclusion in M.Sc/M.Tech courses.
iv. Inclusion of a topic of Energy Conservation and Energy Efficiency in Diploma courses to create an awareness during the educational level. (a proposal was submitted to the Director, Department of Technical Education)
v. Inclusion of a topic on Energy Conservation and Energy Efficiency in ITI college curriculum (a proposal was submitted to the Commissioner, Directorate of Employment)
vi. Setting up a laboratory at Institution level for testing of materials and other equipment.

4.4 FRAMEWORK FOR EVALUATION, MONITORING AND VERIFICATION

KREDL, as the Nodal Agency, shall regularly monitor the implementation of all the provisions of the Policy.

KREDL shall prepare a sector-specific plan for evaluation, measurement and verification of savings from all energy efficiency programmes initiated under this Policy and submit the same to the various departments for implementation. KREDL, as the Nodal Agency, on its own or third party assigned by it, shall undertake monitoring and verification of all the programmes implemented under this Policy. Under this Policy, it is the responsibility of the sector-specific departments to make available necessary data and information to KREDL or third party assigned by it, to measure and verify the savings from the energy efficiency programmes implemented in their respective sectors. KREDL shall consolidate the detailed energy savings report at the end of each financial year and submit the same to HLC-EC&EE for its approval.

For effective implementation of this Policy and delivery of the Policy objective, the organization structure of the Nodal Agency, KREDL will be reviewed and strengthened appropriately by the Government of Karnataka.

4.5 GOVERNANCE FRAMEWORK AND ENFORCEMENT MECHANISM

High-Level Committee (HLC-EC&EE) for implementation and monitoring of various Energy Conservation and Energy Efficiency projects/programmes shall have the powers to enforce the provisions of this Policy. HLC-EC&EE, in consultation with the Government of Karnataka, shall ensure issuance of necessary guidelines/directives in relation to the policy without loss of time for mid-course correction, if required for smooth implementation of this Policy.

5 FINANCING OF ENERGY EFFICIENCY PROGRAMMES

5.1 FUND REQUIREMENTS AND POSSIBLE SOURCES FOR EE FINANCING

Under this Policy, KREDL shall develop a detailed energy efficiency and conservation action plan in consultation with various departments. The Energy Efficiency and Conservation action plan would include the details of the various EE programmes, its objective, programme implementation schedule, funding requirement, a possible source of funding, expected savings, monitoring and reporting framework, responsible department, business model to be deployed and awareness campaign, etc. This action plan shall be developed for the entire policy period as well as for annual and submitted to HLC-EC&EE for review and approval.

The estimated fund requirement to achieve the target set during the policy period is approximately INR 2,000 to 2,500 million. Under this Policy, the Government of Karnataka proposes that funding requirement identified in the Energy Efficiency and Conservation action plan shall be met through Government Grant/Subsidy, Host/Responsible department's budget and private sector participation through design and development of innovative business models.

The Government of Karnataka shall approve the annual budget and make provisions of allocating an annual budget for the development of energy efficiency sector in the State as well as to achieve the target set in the Policy. The budgetary allocation shall be diverted to the concerned implementing agency for implementation of identified and approved energy efficiency projects specified under Energy Conservation and Energy Efficiency action plan.

In order to finance the various initiatives under this Policy, the State Government proposes that nodal agency or sector-specific responsible departments may explore possible avenues for contributing to the fund:

- Grants from Green Climate Fund (GCF) and Green Energy Fund (GEF)
- Carbon Cess
- Projects implemented under State Energy Conservation Fund (SECF) as Revolving Investment fund (RIF).
- Credit line/ Loans from Banks
- Corporate Social Responsibility (CSR) funds - General

5.2 POSSIBLE BUSINESS MODELS AND IMPLEMENTATION PLAN

This section outlines possible business models which State Nodal Agency or responsible Department may utilize for the implementation of the identified energy efficiency programmes under this Policy.

- **Utility Driven Demand Side Management Programme:** Under this Business Model, Distribution Utility shall identify the technology as well as targeted consumer categories based on the load research. Subsequently, Distribution Utility shall design and develop proposed energy efficiency programmes and submit the same to the Regulatory Commission for its approval. Distribution Utility shall also request the Commission to allow recovery of the cost associated with the implementation of the proposed energy efficiency programmes through Annual Revenue Requirement (ARR). The Distribution Utilities will also ensure that the programme document submitted to the Commission adhere to the DSM Regulations and Guidelines issued by the Commission, if any.

- **Government Grant/Subsidy Based Business Models:** Certain electricity consuming sectors such as Domestic, Agricultural, Municipal etc. where average realization is lower than the average cost of supply, the State Government may consider financial support to those energy efficiency programmes aimed at such category of consumers which are receiving tariff subsidy from the State Government. Under this business model, Distribution Utility instead of recovering the entire amount through Annual Revenue Requirement may leverage a part of the government subsidy for the development and implementation of identified energy efficiency programmes for such consumer categories.

- **Energy Services Company Based Business Model:** An Energy Service Company (ESCO) is a professional business providing the entity with a broad range of comprehensive energy solutions including designs and implementation of energy savings projects, energy infrastructure outsourcing and risk management. Under this business model, the sector-specific responsible department can engage Energy Service Company for implementation of identified energy efficiency programmes through a competitive bidding process. Subsequently, they will sign the agreement with ESCO for installation, operation and maintenance of energy efficient appliances along with repayment of cost of programmes linked with resultant energy and load reductions.

The implementation will be undertaken by the ESCO by investing the entire upfront capital cost of energy efficiency programmes. The ESCO will implement energy efficiency programmes and develop and maintain the system to ensure energy savings during the agreed time frame as per Monitoring and Verification Guidelines prescribed under the programme. Sector-specific responsible department will pay the ESCO, based on the energy savings and load reductions achieved through the implementation of programmes.

- **Partial Risk Guarantee Fund (PRGF):** The objective is to provide commercial banks with partial coverage of risk exposure against loans made for energy efficiency projects to mitigate the risk perception associated with the lending for new technologies and new business models associated with energy efficiency projects. The PRGF will directly support the financing of energy efficiency projects by,
    - ✓ Addressing credit risk and transaction structuring barriers to energy efficiency finance,
    - ✓ Engaging and building capacities of commercial financial institutions to provide financing for energy efficiency projects on a commercially sustainable basis.

6 PROCEDURES FOR REVISIONS AND AMENDMENTS

6.1 REMOVAL OF DIFFICULTIES

If any difficulty arises in giving effect to this Policy, the HLC-EC&EE is empowered to issue clarifications as well as interpretations to such provisions, as may appear to be necessary for removing the difficulty either on its own motion or after hearing those parties who have represented for change in any provisions.

Not withstanding anything contained in this Policy, the provisions of the Energy Conservation Act, 2001, the Electricity Act, 2003 and the applicable Regulations issued by the KERC from time to time shall prevail for the purpose of implementations of this Policy.

6.2 POWERS TO RELAX / AMEND

The Government of Karnataka will have power to amend/review/relax/interpret any of the provisions under this Policy as and when required.

6.3 PROCEDURE FOR MODIFICATIONS AND AMENDMENT OF ANY SPECIFIC PROVISION

Sector-specific responsible organizations will suggest the modifications/amendment in the Policy to the Nodal Agency. The Nodal Agency will study the suggested modification and amendment and draft the appropriate modification and amendment if any in the Policy and submit to HLC-EC&EE for its approval. HLC-EC & EE will examine the draft modification and amendment and suggest its recommendation to Government of Karnataka for modifications and amendment in the Policy. The Government of Karnataka will modify/amend the Policy as per recommendation after due consultation process.