Kerala State Mission on Enhanced Energy Efficiency

Action Plan 2009

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Draft

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Introduction

The National Action Plan on Climate Change (NAPCC) was released by the Prime Minister on 30th June 2008.It outlines a national strategy that aims to enable the country adapt to climate change and enhances the ecological sustainability of India's development path. It stresses the need for maintaining a high growth rate is essential for increasing the living standards of the vast majority of people of India and reducing their vulnerability to the impacts of climate change.

The Action Plan enunciates the following principles

- Protecting the poor and vulnerable section of society through an inclusive and sustainable development strategy, sensitive to climate change
- Achieving national growth objectives through a qualitative change in ciretion that enhances ecological sustainability , leading to further mitigation of green house gas emissions
- Devising efficient and cost – effective strategies for end use Demand Side Management
- Deploying appropriate technologies for both adaptation and mitigation of greenhouse gases emissions extensively as well as at an accelerated pace.
- Engineering new and innovative forms of market, regulatory and voluntary mechanisms to promote sustainable development.

Eight National Missions, form the core of the National Action Plan, representing multi-pronged, long term and integrated strategies for achieving key goals in the context of climate change.

These Missions are

- National Solar Mission
- **National Mission on Enhanced Energy Efficiency**
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Eco-system
- National Mission for a Green India
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change.

As part of the National Mission on Enhanced Energy Efficiency a State Mission on enhanced energy efficiency needs to be launched.

Climate change is the greatest danger facing mankind at present. The gradual change in climate that is taking place is a threat to the future of the world, unless steps are taken to avert this change. This climate change is attributed to global warming or the 'green house effect' that is the gradual increase in air temperature in the earth's lower atmosphere.

Scientific studies have projected global average surface temperature to be in the range of 1.4°C to 5.8°C higher, towards the end of the present century. This rise in temperature has happened due to various human activities since the Industrial Revolution 200 years ago. The increase in green house gas emissions, due to rapid industrialization, increased transportation and increased land use by way of building construction, as a result of population explosion, has trapped more heat in the atmosphere enhancing the green house effect.

The Kyoto Protocol is one of the initiatives taken by the United Nations Organizations in 1997 for global effort to reduce green house gas emissions. As per the Protocol, target levels are set for nations to reduce emissions so that green house gas emissions are reduced by 5.2 percent below the 1990 level from 2008 to 2012.India is not required to reduce carbon emissions under the present agreement, but can gain much from the global carbon trade since carbon credit is part of the Protocol. As a developing country, the rigour of the Protocol does not apply to India, but India can benefit much by selling the carbon credit to the developed countries. Hence there is the urgent need to reduce carbon emissions.

The emergence of India as a developed country depends upon its economic health. Environment is part of our economy. In the present economic growth, nothing moves without electricity which is the prime mover of economic growth. The thermal generation of electricity by using coal and petroleum products is considered the root cause of environmental pollution. Hence generation of electricity from renewable sources is to be explored more and more.

The Inter-Governmental Panel on Climate Change has stressed the importance of arresting climate change through Energy Conservation and Energy Efficiency measures. Consumers can meet the ever-increasing costs of energy by adopting energy efficiency measures, which would be profitable by way of pay back periods.

The Stern Review of the Economics of Climate Change estimated that if we don't act now, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP, and if a wider range of risks and impacts is taken into account, estimates of damage could rise to 20% of GDP or more. In contrast the costs of early action to reduce emissions can be limited to around 1% of global GDP each year.

Kerala Scenario

Electricity Generation, Transmission and Distribution and Utilisation

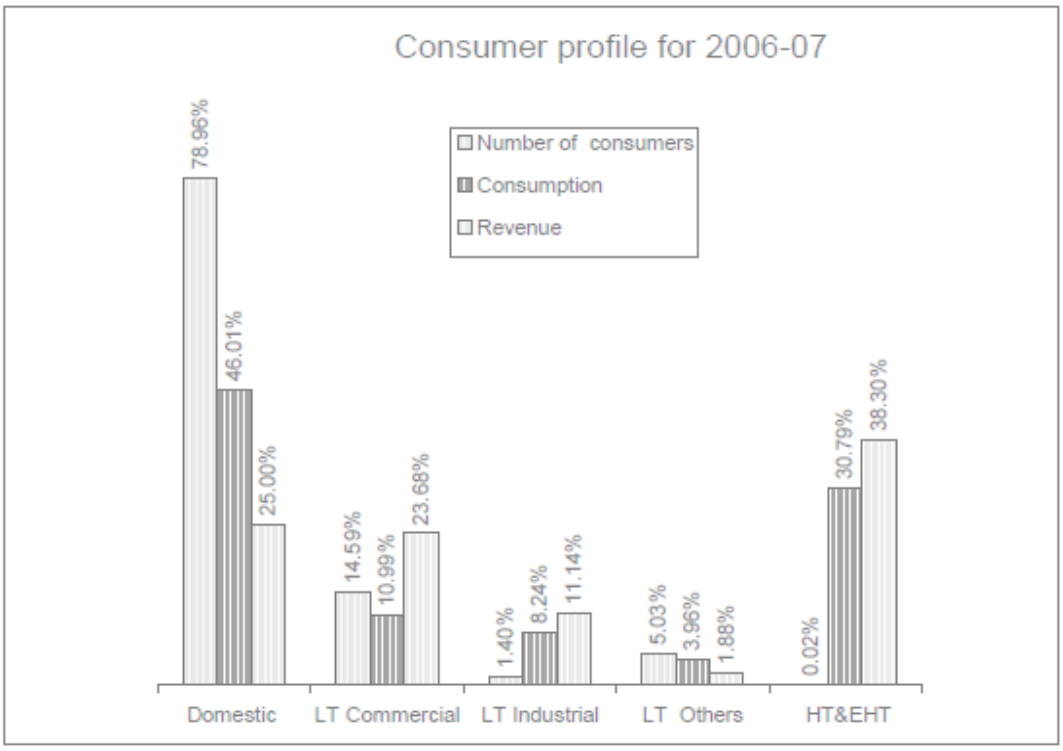
Kerala has a grid mix which is dominated slightly by the hydropower generation.

Sl. No.	Source of Energy	Installed Capacity (MW)
1	Hydel	1855.60
2	Thermal : KSEB	234.60
3	Wind : KSEB	2.03
4	NTPC	359.58
5	Thermal :IPP	177.44
6	Hydel: Captive	33.00
	Total	**2662.25**

Source: KSEB ARR & ERC for 2008-09

In the financial year 2007-2008 the following hydro power was generating 55% of the total generation while Thermal was accounting for the rest 45% of Generation.

The consumer profile of the only utility in the state is given below.



Source: KSEB ARR & ERC for 2008-09

It is observed from the above picture that the domestic consumers accounted for 79 % of the total number of consumers, consumed 46% of the total energy sold. The HT&EHT consumers account for 0.02 % of the consumers, but consumed 31% of the total energy sold. Thus, the domestic consumers constitute the largest group and though avail power at low voltage contribute to increased energy loss and peak hour demand to the power system. The domestic category consume 46% of the total energy sold , but account for only 25% of the total revenue of the Board. The HT&EHT consumers consuming 31% of the energy account for 38% of the revenue.

The total carbon emission in the state through electricity generation is found to be 1,405,078 tCO_2(tonnes of Carbondioxide).

Domestic Sector

Domestic sector is the biggest consumer of electricity in the state and hence perhaps the largest potential in savings. The heavily subsided domestic sector consumes 46 % of the total energy produced and hence the peak demand has increased almost twice that of off peak period. The higher peak demand is instrumental in necessitating purchase of thermal energy from outside the state and hence higher emission factor to the electricity consumed.

There are 77 lakh households in the state with 68.8 lakh domestic consumers of the State Electricity Board with a per capita consumption of 410kWh (KSEB ARR & ERC for 2008-09).The per capita consumption in the state is moderate with the national consumption being 715kWh.

The key instrument in the energy efficiency drive in domestic/ household sector would be regulation, fiscal incentives, information and awareness creation, voluntary agreements, public sector leadership and R & D – innovation.

Existing Programmes

The domestic sector in Kerala is the largest consumer of electricity with a consumption of nearly 47 % of the total electricity supplied by the state utility. Understanding this potential of energy savings, Energy Management Centre has devised a very innovative programme called the Energy Clinic where in the women volunteers are trained to take classes on energy conservation to the women in their localities.

At present 127 trained volunteers are conducting such classes in various localities in Kerala. The programme was found to be successful in the areas where it was implemented. The programme is not only working towards energy efficiency and conservation, but also has been identified as a very good initiative for women empowerment.

Similarly the initiative known as SAVE – Serve as a Volunteer for Energy has enabled the old as well as the young to strive for energy efficiency and conservation. This is an association with a leading Malayalam daily.

Existing Programme Extension Strategies

- Extending the service of Energy Clinic Volunteers to all Panchayats. Special fund for the continuity of the programme along with graduating these volunteers to become energy entrepreneurs by training them on marketing energy efficient/ renewable energy devices through locally established retail stores.

- Special Programmes for Residents Association in corporation areas - ideally ensure a minimum of 1 programme every two months for Residents Associations.

- Support from panchayats and city corporations and municipalities needs to be ensured. A training programme for the officials at the local bodies for sensitizing the officials towards energy efficiency.

- Programmatic Approach like training and deputing energy volunteers in each panchayat/ city/ municipality to provide on spot service for any energy efficient installation.

- Setting up a regular mechanism to monitor the energy efficient practices in areas where awareness is being provided.

- Develop programmes similar to the SAVE Campaign with other news papers.

New initiatives

- Incentives to be established for the use of Energy Efficient Window Panes/Glass and other building materials.

- Energy Management Centre to maintain a list of empanelled dealers/ manufactures for supply and sales of energy efficient materials. The same list needs to be published in the website.

- Regulations for Mandatory White roofs for all houses – to sensitise the builders in the housing sector.

- Categorising the various segments of electricity consumers in the state with the help of utility. The list would be prepared by the state utility and the same may be given to Energy Management Centre for development of further programmes targeting each segment.

- Develop Programmatic Clean Development Mechanism Projects for domestic sector energy efficiency.

- Domestic sector transportation needs to be targeted along with other efficient devices. Associate with organization like PCRA (Petroleum Conservation and Research Association) to develop innovative programmes in this direction.

- Energy Management Centre to develop a special Energy Conservation Code for the domestic buildings

- Local Self Government to be trained to incorporate the code while issuing license to domestic dwellings.

- Tax incentives to be provided for the building annual tax for the energy efficient buildings to encourage such buildings. Establishing energy star for the domestic sector buildings- individual or duplex or multiplex building for human dwelling.

- Builders involved in the construction of apartments for domestic use will have to oblige to the special code designed by Energy Management Centre.

- Ensuring high standards in wiring and installation of electrical apparatus by wiremen and electrical contractors. Annual training programme will be made mandatory for them. The training programme modules will be designed and conducted annually by Energy Management Centre in collaboration with Electrical Inspectorate.

- Mandatory provision for a designated energy manager in construction firms. The energy manager thus designated should be a certified energy manager by the Bureau of Energy Efficiency

- Training modules for schools students on energy monitoring, domestic audits and energy conservation.
- Special programme with Directorate of Public Instructions to cover the 4500 government schools and 7284 aided schools in the state. The unaided private schools will also be provided the support of the training materials. (the figures are for the year 2007-08).

- Life cycle cost analysis and the necessity of eco design would be studied for enhancing the total embodied energy in consumer, buildings and stationary goods. Energy Management Centre would undertake the study with the government support.

- Propagation of Thermal Cooker (Thaapabharani) with the impact assessment of the same.

Segments	**Necessary Inputs and the Responsible Institutions**	**Subsequent Actions**	**Expected / Targeted CO_2 reduction**
✓ Households	Categorization list of the electricity consumers into BPL, APL - Upper Middle Class, Middle Class and the rich affluent consumers - KSEB	Create unique programmes to target each segment of consumers for better household efficiency – Energy Management Centre. Enhancement of the energy clinic programme by graduating them as Energy Entrepreneurs. Special Fund Required for the programme	**132077**
	Creation of a field task force to support Energy Efficiency Implementation at household level - EMC Equipment Specific - Demand Side Management Programmes Development and Monitoring – EMC Implementation – KSEB	Clinic Volunteers can be trained to be the task force volunteers depending on the aptitude. Otherwise a team could be developed and they could get remuneration from the houses they are making efficient CDM Programmatic Approach can be developed for the same similar to Bachat Lamp Yojana.	

✓ Schools	Carbon Foot Printing Resource Material – Energy Management Centre Energy Efficiency Programme such as the SAVE programme for all schools – School Management Establishment of Energy Conservation Clubs in all schools – EMC/ School Management	This will quantify the emissions in the educational sector and would be a interesting exercise for students. Reduction which is quantifiable can also be developed into programmatic CDM.	5000
✓ Domestic Building Sector	Development of Energy Efficiency Building codes for domestic sector households – Energy Management Centre (EMC) Training the Local Self Government(LSG) and the builders on the code – EMC with the support of LSG Implementation of the code- LSG Energy Efficient retrofitting in the existing houses to reduce heat ingress through wall and through roof. Establishing the techno economics of such a retroffiting	Mandatory Code for the buildings in domestic sector which would make energy efficiency an inevitable option for the consumers. Provide incentives for retrofitting the existing buildings to a energy efficient one.	

Sector wise Energy Savings Measures — Industrial Sector

The Energy Management Centre can have a continuous interaction with the respective agencies to implement the energy efficiency programmes.

Annual programmes for Energy Efficiency Improvement and the carbon reduction due the EE programmes needs to be regularly reported to Energy Management Centre. The programmes will be designed by EMC in consultation with the respective departments

The designated industries are already in the preview of Energy Conservation Act 2001 and hence it is mandatory to report to the State Designated Agency (EMC in Kerala).These industries would be providing the data on energy consumption in the industry to Energy Management Centre through the e- filing mechanism provided by the portal designed and maintained by Energy Management Centre.
Other industries can be identified in clusters or through the respective industry association such as Kerala State Small and Medium Industry Associations, the textile industry association, the Steel Rerolling Mills Associations etc….

- Energy Efficiency(EE) Programme for Industrial Clusters
  - ✓ Awareness Programme on general EE measures
  - ✓ Walk through Audits for identified industries
- Regular Interaction with the Industry Associations and EE drive data collection through these agencies.
  - ✓ Regular Questionnaire based industry consumption data collection through industry associations. Every 6 months the data base would be updated.
  - ✓ Outreach, education and recognition drive among members of associations. These activities would be planned as per the specific energy consumption of the sector with a minimum of 6 programmes per year for every association.
- Identification of the clusters and sectors of industries in the state with the assistance of the Department of industry.
  - ✓ Regular Update of energy consumption information through the Department to EMC – the update would be every 3 months with a consolidated report every year.
  - ✓ Regular joint programmes with the Department on Energy Efficiency and Conservation programmes for industries

- ✓ Association with the Bureau of Public Enterprises to undertake the third phase of energy efficiency programme for Kerala State Public Sector Industries.
- ✓ Establish regular feedback (from industry to EMC) in every programme undertaken to quantify the benefits.

- Equipment Specific EE Drive: Identification and dissemination of Cost Savings Potential Identification of industrial equipments such as Motors; compressors; etc…

Financing for the industrial sector can be directed to the Kerala State Energy Conservation Fund. Customer specific incentive schemes will be developed depending on the emission reduction that would be achieved.

Segments	**Necessary Inputs and the Responsible Institutions**	**Subsequent Actions**
✓ Designated Consumers(DC) as per the EC Act 2001	EMC and the DC. The DC has to utilize the EMC website for	E filling of the energy consumption data as and when stipulated by EMC. Evaluation of the consumption every year and a discussion at the factory premises in that regard.
✓ Non Designated Consumers – large industries	EMC and the Industry Associations together will develop benchmark targets and EMC can think of providing E filling separately for the industry.	Target can be set up industry associations for all large industries with the technical assistance from EMC.
	Industries Department will make energy audit mandatory in all large industries	
	EMC will be developing guidelines for the energy audits	
✓ Small and Medium Industries	Cluster Identification – Industry Associations Cluster based EE drive- EMC. Quantification of the EE measures undertaken and the emission reduction achieved in this respect.	A continuous interaction of the associations and EMC and a massive EE drive initiaive from the industry association
	Department of Industries with the technical support of EMC conduct regular programmes for industries.	Set stipulated targets for every small and medium industries in emission reduction
	Utility will provide the required data with regard to the customers to EMC on a regular basis so that EMC can identify the required group for EE improvement	
✓ Kerala State PSUs	Undertake the third phase of the programme of Bureau of Public Enterprises with EMC - to be initiated on a faster pace. Implementation after the Energy Audit has to be undertaken under government drive	The BPE and EMC would undertake the follow up measures in a faster pace in view of the climate change.

Sectorial Energy Savings Measures — Commercial Sector

The commercial sector is one of the fastest growing sector and the energy consumption in this sector is huge. The sector will cover the buildings which account for a huge amount of power consumption and under commercial tariff of the utility.

Enforcement of Energy Conservation Building Codes (ECBC) as a mandatory for the designated Buildings and review of the code for the climatic and socio economic conditions of the state.

A series of programme to address the commercial sector power consumption needs to be chalked out.

- Making ECBC compliance check mandatory for the designated buildings in the state.
- A joint team formation with the officials of Energy Management Centre and the local self government for ECBC Compliance checking. The team will be formed with in a period of one month.
- Regular feedback mechanism on consumption from designated buildings in the state. The buildings will report in the provided form to Energy Management Centre. Every six month a consultant from EMC would be evaluating the questionnaire from the designated buildings which then will go for review meeting at the building if there is scope for further improvement.
- Identification and Recognition for the most efficient building in the state
- Association with the merchants' body with Energy Management Centre to develop better reach for the mission on energy efficiency.
- Develop a plan to include non designated buildings into the preview of ECBC through awareness, mandatory norms and recognition
- Energy Efficiency Improvement in all government buildings
- Ensure the compliance of ECBC in all new government buildings
- Special task force to ensure energy efficiency in government buildings by way of constant reporting on the building details by PWD to Energy Management Centre who will act as a technical body for evaluation and comments on the building EE measures
- Special Training for PWD Engineers by the Centre for walk through audit and reporting.
- Data Centre Energy Efficiency at the IT centers and adopting best practices.

- A Energy Efficiency plan and ECBC compliance check at all the info parks of the government.
- Feedback mechanism for all Utility driven DSM programme to the Centre.
- EMC, Directorate of Public Instructions and Directorate of Technical Education for continuous programme on Energy Efficient practices in all schools and colleges.
- Undertake carbon footprinting in government offices as a gesture towards zero carbon offices

Segments	Target	Road Map	Implementing Agency
✓Govt Buildings	15% reduction in Energy Consumption	• Energy Audit of all Government Buildings with implementation methodology • Mandating Procurement of Energy Efficiency Equipments by public sector	• EMC – knowledge Partner • PWD – Implementation Partner • EMC- Review and implementation
✓Educational Institutions Schools and Colleges	Quantification of the Energy Consumption by Educational Institutions • 10 % reduction in Energy Consumption	• Energy Conservation Clubs • Energy Audits • Energy Efficiency Training Modules for Schools and Colleges	ECS EMC School Managements DPI
✓IT Firms/ Data Centres	Consumption Quantification and reduction in consumption by 10 %	• Encouraging Energy audits/ data centre audit in the firms • Quantify the consumption in this sector • Specific road map for lesser consumption • Caps on subsidies for non implementation of energy efficiency measures	• EMC • Data centre designing agency like CDIT and BSNL • Market penetration for Data centre audit professionals • Utility managers of IT firms
✓Designated Buildings	Implementation of ECBC	Making the ECBC mandatory as such and later amending Responsibility LSG and EMC	ECBC compliance check Training modules and training – EMC Implementation – LSG

Sectorial Energy Savings Measures — Transport Sector

The programme in this sector would require initiating a programmatic approach to energy efficiency.

- Identify the bus fleet owners and run exclusive programmes for them
- Constant monitoring of Energy Efficiency Practices needs to be undertaken with auto rickshaws and taxis.
- Petrol/ Gas filling stations should be one focal point for knowledge dissemination
- State Owned Fleets need to be converted into energy efficient fleets in 12 months
- Special training programme for the state owned fleet drivers and mechanics
- Provision for mass transport system to be encouraged in every office including government offices
- Identify Government offices with large number of employees and implement mass transport system in an economical way
- Discourage the use of motorised (fossil fuel driven) personal vehicles to office provided a mass transport system is in place. Charge for parking spaces in offices as a means to discourage personal motorised vehicles. The same amount can be used to subsidize the bus charges.
- Work with the city traffic and road development authorities such as NATPAC to ensure less crowded roads and thereby reducing emissions
- Identify a target emission reduction in the transport sector with the help of pollution control board and thereby achieving the set target. The target identification can take a time period of 6 months and the implementation procedure would take another 6 months.

Segments	Necessary Inputs and the Responsible Institutions	Subsequent Actions
✓ Bus Fleet Owners	Trifurcation for small, medium and large ie; say 20 buses/trucks or more are large fleet owners 20 to 10 -medium bus fleet owners < 10 - small fleet owners • The trifurcation and preparing the list - RTO at each location. • Devise the EE drive for each segment – EMC • Implementation Assistance - EMC & RTO	Every group of bus fleet operators will be provided EE target and continuous support and time line to achieve the target.
✓ Public Transport Systems	✓ Look out for new cleaner fuels for public transport systems ✓ KSRTC will be responsible ✓ Enhance the public transport system to provide to the ever increasing moving crowd. ✓ Enhancement of fuel efficiency in the current system- Assistance PCRA and EMC. ✓ Emission reduction and efficiency improvement targets ✓ Implementation of mass transport system for any office having 50 employees or more.	Introduction of cleaner fuels. EE improvement in the existing system Emission reduction targets for every year or two years
✓ Individual Vehicle Owners	✓ Target the segment through awareness – Focal point petrol/ diesel/ gas outlet- PCRA will provide the materials and with active involvement of EMC ✓ Awareness campaign through exhibitions, meeting, exhibition etc..in the same manner and in association with PCRA.	
✓ Schools and Colleges mass transport system	Set targets for improvement in efficiency and emission reduction for the school vehicles – EMC would provide the consultancy support for the activity. Discourage students coming by motorised personal vehicle and encourage the use of school transport system.	✓ Revision of the set target every 2 years. ✓ Continuous monitoring and support to the institutes undertaking the emission reduction and efficiency target

Conclusion

The Prime Minister's Climate Change Action Plan is one of the boldest steps in combating climate change which affects one and all in the world in varying proportions. Enhanced Energy Efficiency Action Plan is perhaps the fastest implementable action plan.

The various stakeholders need to be brought together to work towards a global goal in a local action platform. A budgetary allocation to the various sectors in the action plan needs to be allocated with an annual review.

Lets us imbibe the spirit of the global goal of combating climate change and understand the fact that "It is neither too late nor too early when survival is at stake".