

**MINUTES OF THE**  
**ELEVENTH MEETING OF THE FORUM OF REGULATORS ( FOR )**

**Venue : India Habitat Centre, Lodhi Road, New Delhi**

**Date : 2<sup>nd</sup> March, 2009**

The meeting was chaired by Dr. Pramod Deo, Chairperson, CERC/FOR. The list of participants is at **Annexure-I**.

**Item No.1A : Confirmation of the minutes of the 10<sup>th</sup> meeting of FOR held on 30<sup>th</sup> January, 2009 at Chennai and consideration of Action Taken Report.**

The meeting confirmed the minutes of the Chennai meeting as circulated. The Forum also noted the Action Taken Report as contained in Appendix-II of the Agenda Note.

A brief discussion took place on the issue of compilation of information for Regulatory Information Management System. Chairperson, PSERC said that some special efforts were required at the level of utilities to compile the information and that is why sending the information to FOR Secretariat was taking time. After discussions, there was a consensus that utilities should be asked to institutionalize an IT based system to regularly compile information required for RIMS and submit the same to the SERC concerned. The Forum agreed that RIMS was a useful tool for enhancing the efficacy of regulatory process and the Secretariat should continue to make efforts to compile and update the information under RIMS on the basis of data provided by SERCs.

**Item No.1B : Proposed MOU between FOR and CPUC, CEC, LBNL.**

After consideration, the Forum endorsed the final draft of the MOU and approved its signing by the Chairperson.

**Item No.2 : CERC Regulations on Terms & Conditions of Tariff for the period 2009-14 and FOR Recommendations.**

Secretary, FOR made two presentations, namely on 'CERC Regulations on Terms & Conditions of Tariff for the period 2009-14' and on FOR Recommendations on seven important areas pertaining to distribution segment including staffing of ERCs. A copy of each of these two

presentations is at **Annexure-II & III**. In the discussions subsequent to the presentations, the following main points emerged:

- i) Regarding the recommendations of FOR for implementing pay package of CPSUs for the staff of the ERCs (both at centre and state level), there was a consensus that pay package as applicable in Schedule A CPSUs should be adopted. Secretary, Ministry of Power assured to take appropriate action for implementation of this recommendation of FOR, including advising the State Governments in the matter.
- ii) There was a consensus that the standard bidding document for Case-1 under the competitive bidding guidelines for procurement of power by distribution licensees may be issued by Ministry of Power as early as possible because a common bidding document across the states would help in early finalization of power procurement contracts and in turn would facilitate capacity addition.
- iii) It was suggested by Secretary, Ministry of Power that the SERCs may simplify the procedure for recovery of additional energy charges by the generators on account of use of imported coal. It emerged that generally the SERCs have allowed automatic fuel surcharge adjustment upto a limit beyond which the generators are required to seek approval of SERCs. It was agreed that SERCs would further streamline the process and also ask the utilities to plan the procurement of imported fuel in advance as far as possible. It was also suggested that the generators should enter into fuel purchase contracts of longer duration in order to obtain better prices.
- iv) The need of promoting non-conventional energy sources by setting reasonable renewable purchase obligations and also enforcing penalties for non-compliance thereof was emphasized. It was also noted that a number of SERCs had permitted a preferential rate of ROE for the renewable energy and some of the SERCs had also reduced the cross-subsidy surcharge on purchase of renewable energy by the consumers.
- v) Secretary, Ministry of Power said that there was a need of proper coordination at state level for forecasting the demand and planning the procurement of electricity in advance. After discussions, there was a consensus that power procurement was the statutory obligation of the distribution companies under the Electricity Act and the State Governments should facilitate capacity building of distribution utilities to discharge this obligation in an efficient and effective manner. Central Electricity Authority might help the distribution utilities in setting up their planning cells for demand forecasting and power procurement. The state level coordination forums as envisaged in the Electricity Act, 2003 may also facilitate this matter.
- vi) There was also a suggestion that perhaps an exercise might be started to identify the areas where certain amendments were required in the Electricity Act. It was however, felt that caution needs to be exercised in the matter as the implementation of a number of reform oriented provisions of the Act was in progress and the same should not be affected by such an exercise.

**Item No.3 : Discussion on Demand Side Management (DSM).**

**Item No.4 : Presentation by Bureau of Energy Efficiency (BEE) on ‘Bachat Lamp Yojana’ and ‘Scheme for Star Rating of Office Building’ and Interaction with US Regulators on DSM & Energy Efficiency:**

The following presentations were made on Demand Side Management:

- Various energy efficiency measures being taken by Bureau of Energy Efficiency in India with particular focus on “DSM Initiatives in India” by Dr. Ajay Mathur, Director General, Bureau of Energy Efficiency (Copy at **Annexure-IV**)
- “Policies and Strategies in California to Achieve Maximum Energy Savings” by Ms. Dian M. Grueneich, Commissioner, California Public Utilities Commission. (Copy at **Annexure-V**)
- “Energy Efficiency Lessons and Plans from California” by Mr. Arthur H. Rosenfeld, Commissioner California Energy Commission (Copy at **Annexure-VI**)

The following were the key points that emerged during the discussions subsequent to the presentations:

- i) In US, energy efficiency is being pursued mainly for economic benefits to the local economy and for the consumers.
- ii) Energy efficiency efforts got a special boost in California after the oil crisis and it also led to the formation of the Energy Commission in the State.
- iii) A significant component of the recent stimulus to US economy is for promoting energy efficiency measures.
- iv) For promoting devices like CFLs, it has been found more useful to give upstream subsidy (to manufacturer) in order to reduce transaction costs.
- v) Bureau of Energy Efficiency was requested to circulate to every SERC a full set of documents relating to various initiatives taken by BEE.

During this session of the meeting, a teleconference was also held with Mr. Jon Wellinghoff, Acting Chairman of the Federal Energy Regulatory Commission (FERC). Mr. Wellinghoff highlighted the major activities being taken by FERC for enhancing reliability, promoting non-discriminatory open access and effectively monitoring the wholesale power markets in US. FERC is also paying special attention to appropriate interventions at planning stage for ensuring open access to renewable energy sources. They are giving equal importance to demand side and supply side measures. FERC has powers to direct the Regional Transmission Organisations (RTOs), or transmission service providers for creating a new transmission capacity. In the process of overseeing the power markets, FERC not only investigates the violations but also disgorges unjust profits. It has also formulated anti-manipulation rules under which market transactions are filtered.

**Item No.5: Any other item**

It was agreed that the next meeting of the Forum of Regulators would be held in second week of June 2009 in New Delhi.

The meeting ended with a vote of thanks to the Chair.

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**LIST OF PARTICIPANTS ATTENDED THE ELEVENTH MEETING**

**OF**

**FORUM OF REGULATORS ( FOR )**

**HELD ON 02<sup>ND</sup> MARCH, 2009**

**AT “MAPLE” HALL, CONVENTION CENTRE  
INDIA HABITAT CENTRE, NEW DELHI**

<b>S. No.</b>	<b>NAME</b>	<b>ERC</b>
01.	Dr. Pramod Deo Chairperson	CERC – in Chair.
02.	Shri A. Raghatham Rao Chairperson	APERC
03.	Shri S.K. Misra Chairperson	CSERC
04.	Dr. P.K. Mishra Chairperson	GERC
05.	Shri Bhaskar Chatterjee Chairperson	HERC
06.	Shri Yogesh Khanna Chairperson	HPERC
07.	Shri K.B. Pillai Chairperson	J&KSERC
08.	Shri Mukhtiar Singh Chairperson	JSERC
09.	Shri V.K. Garg Chairperson	Joint ERC for Goa & all UTs except Delhi
10.	Shri Rin Sanga Chairperson	Joint ERC for Manipur & Mizoram
11.	Shri C. Balakrishnan Chairperson	KSERC
12.	Dr. J.L. Bose Chairperson	MPERC
13.	Shri V.P. Raja Chairperson	MERC

14.	Shri Jai Singh Gill Chairperson	PSERC
15.	Shri D.C. Samant Chairperson	RERC
16.	Shri S. Kabilan Chairperson	TNERC
17.	Shri Rajesh Awasthi Chairperson	UPERC
18.	Shri Manoranjan Karmarkar Chairperson	TERC
19.	Shri Himdari Dutta Member	AERC
20.	Shri S.K. Jayaswal Member	BERC
21.	Shri Vishwanath Hiremath Member	KERC
22.	Shri Alok Kumar Secretary	CERC
23.	Shri Sushanta K. Chatterjee Deputy Chief (Regulatory Affairs)	CERC
<b>SPECIAL INVITEES</b>		
24.	Shri V.S. Sampath Secretary (Power)	Ministry of Power
25.	Dr. Ajay Mathur Director General	Bureau of Energy Efficiency (BEE)
<b>FOREIGN DELEGATION</b>		
26.	Dian Grueneich Commissioner	California Public Utilities Commission, USA
27.	Dr. Arthur H. Rosenfeld Commissioner	California Energy Commission, USA
28.	Dr. Jayant A. Sathaye Sr. Scientist & Leader, International Energy Studies Group	Lawrence Berkeley National Laboratory (LBNL)



### PHILOSOPHY

- Balance between 'investment promotion' and 'protection of consumer interest'
- Light handed regulation based on norms.
- Norms aimed at inducing efficiency in operation, are '*relatable to past performance*', and do '*take into consideration latest technological advancements, fuel, vintage of equipments*'.
- Regulatory certainty through multi-year principles.

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## Specific Provisions

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### RETURN ON EQUITY...

- **Pre-Tax ROE**
  - as against the earlier practice of post tax return
- **Beneficiaries not to bear the burden of income tax on**
  - earnings, like UI earning, incentive earning and efficiency gains.

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### RETURN ON EQUITY

- Base rate for allowing return on equity raised from 14% to 15.5% to attract investment.
  - Additional 0.5% for timely completion of projects.
- Base rate to be grossed up by applicable tax rate for the company.
  - Benefit of tax holiday to be available to the project developer.

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### DEPRECIATION

- Depreciation rates for initial 12 years approximate 5.28%
  - Spread over beyond 12 years.
- No provision for Advance Against Depreciation (AAD)
- AAD was on case to case basis
- New dispensation will encourage contracting longer term debt.

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### PROVISIONS PROMOTING HYDRO DEVELOPMENT

- In addition to increased RoE and depreciation rate approximating 5.28%, following provisions to boost development of hydro projects:
  - Depreciation to be allowed on land for reservoir.
  - Developers insulated from hydrological risk during the first 10 years.
  - Enhanced free power and rehabilitation cost allowed according to new Tariff Policy, for expediting project implementation.

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### HYDRO DEVELOPMENT .....

- Tariff for hydro projects has been restructured to incentivise supply of peaking power.
- Additional capitalization:
  - On account of damage caused of natural calamities (but not due to flooding of powerhouse attributable to negligence of Genco) after adjusting for insurance proceeds.
  - Due to any additional work which has become necessary for successful and efficient plant operation.

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**NORMS OF OPERATION**

- Regulatory philosophy of CERC, to incentivise efficiency gains and to periodically pass improvements to beneficiaries, continued.
- Norms of operation tightened based on actual performance, with room for gains for efficiency improvements.
- Target availability for recovery of fixed cost for thermal plants raised from 80% to 85%.

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**NORMS OF OPERATION....**

- Station heat rate, tightened for existing stations
- For new stations, a new methodology with operating margin of 6.5% with respect to design heat rate.
  - Maximum permissible heat rate to ensure that inefficient machines are not procured.
- Norm for secondary fuel oil consumption reduced from 2 ml per unit to 1 ml per unit.
- Savings in secondary fuel oil consumption to be shared with the beneficiaries in the ratio of 50:50.

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**O&M NORMS**

- Reasonable compensation for pay hike factored into O&M norms.
- Escalation for O&M expenditure @5.72%

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**OTHER HIGHLIGHTS**

- Thermal power projects to have two options to take care of R&M beyond useful life:
  - Option-I : Special allowance on the basis of per MW per year.
  - Option-II : Comprehensive R&M with cost benefit analysis
- Incentive linked to availability, to incentivise higher availability (instead of plant load factor) of power plants.
- Upfront tariff fixation for regulatory certainty. Truing up along with next tariff period.

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**OTHER HIGHLIGHTS.....**

- Benchmark norms for prudence check of capital cost of thermal and transmission projects.
- IDC, financing charges and FERV during construction period on the equity beyond 30% norm.
- Sharing of net benefits on re-financing of loan between beneficiaries (2/3<sup>rd</sup>) and developer (1/3<sup>rd</sup>).
- De-scaling factor for O&M norms of thermal projects to take care of economy of scale

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FORUM OF REGULATORS

## Forum of Regulators: Recommendations on Key Issues

11<sup>th</sup> Meeting of 'FOR'  
2<sup>nd</sup> March, 2009

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## In this presentation.....

FOR Recommendations on:

1. Protection of Consumer's Interest
2. Open Access : Theory and Practice
3. Loss Reduction Strategies
4. Policies on Renewables
5. Demand Side Management and Energy Efficiency
6. Multi Year Tariff Framework and Distribution Margin
7. Staffing of Electricity Regulatory Commissions


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## 1. 'FOR' Recommendations on "Protection of Consumer's Interest"

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## Protection of Consumers' Interest

- Model Consumer Charter: Incorporating rights and obligations of consumers recommended.
- CGRF should be located at a place which is easily accessible by the consumer.
- SERC regulations to prohibit engagement of lawyers in CGRF.
- Regulations to provide non-compliance of CGRF orders as contravention of the regulations of SERC

- **making licensee liable for action under section 142 of the Act.**


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## Protection of Consumers' Interest

- Time limit for disposal of grievances by the CGRF.
  - after which consumer should have the right to approach the ombudsman for settlement of non-redressal of his grievance.
- Office of Ombudsman should be funded by SERCs
  - A separate budgetary allocation in SERC budget.
  - SERC may recover such expenses from the licensees directly.


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## Protection of Consumers' Interest

- **Consumer Advocacy:**
  - NGOs should be involved for consumer education and empowerment.
  - FOR to financially support identified competent NGOs or eminent persons to take up/contest important consumer related cases in High Courts, APTEL, and the Supreme Court
  - SERCs to organize regular orientation courses for capacity building of consumer advocates.
- Provision in the GoI rule stipulating requirement of submission of report by ombudsman to be institutionalized by SERCs.


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## 2. 'FOR' Recommendations on "Open Access : Theory and Practice"



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## Open Access : Theory and Practice

- Independence of SLDC
  - SLDC not to report to transmission or trading licensee.
  - Reporting requirements could be on lines of State Electoral Officer under Election Commission.
- Operation of SLDC
  - with STU as a subsidiary of transmission utility as stop-gap arrangement;
  - by a separate entity as soon as possible
- State Governments be advised to phase out single buyer model.
 

***MoP may take up these issues with State Governments***

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### Open Access : Theory and Practice

- A model scheme for technological upgradation of SLDCs recommended.
- Urgent need of financial autonomy to SLDCs.
  - CERC to make regulations for RLDCs to ensure recovery of not only operating and capital servicing costs but also generation of adequate surplus to provide equity for future investments.
  - Similar pattern to be adopted by SERCs for SLDCs.
- Recommendations of the Committee constituted by MoP regarding staffing pattern, organisation structure and necessary incentives for attracting qualified personnel in Load Despatch Centres, endorsed.

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### Open Access : Theory and Practice

- Display of information on OA charges in the websites of SERC/FOR for transparency and to enable informed decision on open access.
- Monitoring of open access transactions by SERCs
- Standby arrangement for open access consumers
  - by levying retail tariff as applicable for respective consumer categories only for the period during which such standby support is requested.
- The cross-subsidy surcharge needs to be calculated as per the formula given in the Tariff Policy unless there are valid reasons for deviation.

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### Open Access Charges

State	Open Access Charges (Rs./kWh)*	Tariff (Discom)**
Assam	2.94	3.25
Chhattisgarh	0.98	3.11
Haryana	0.81	4.55
Himachal Pradesh	1.39	3.04
Karnataka (BESCOM)	1.90	4.15
Maharashtra (MSEDCL)	0.84	4.53
Orissa	1.60	2.91
Punjab	0.57	5.20
Rajasthan	0.97	3.98
Uttar Pradesh	0.76	4.29

\*OA charges for a consumer of 5MW at 11 KV (33 KV in some cases) seeking OA for a month. This includes transmission & wheeling losses (Rs/kWh) calculated assuming power purchase cost as Rs 4/kWh.  
 \*\*Tariff for an embedded consumer of 5MW at 11 KV (33 KV in some cases).


### Transmission and Distribution Loss Calculation

Base Energy Consumption (X) = 3600000 kWh					Power Purchase cost assumed (Y) = 4 Rs./kWh				
S. No.	State	Voltage level	Wheeling Loss (%)	Energy injected into system at T>D (kWh)	Transmission loss (%)	Energy injected into system at G>T (kWh)	Loss (kWh)	Loss in Rs.	Loss (Rs./kWh)
			A	B=X*(1-A/100)	C	D=B*(1-C/100)	E=D-X	F=E*Y	G=F/X
1	Assam	11KV	20.04	4502251.13	6.10	4794729.63	1194729.63	4778918.53	1.33
2	Chhattisgarh (Short term)	33KV	6.00	3829787.23	4.03	3990608.77	390608.77	1562436.07	0.43
3	Haryana	11KV	6.00	3829787.23	2.10	3911937.93	311937.93	1247751.72	0.35
4	Himachal Pradesh	11KV	7.50	3891891.89	3.71	4041844.32	441844.32	1767377.26	0.49
5	Karnataka (BESCOM)	11KV	4.06	3752345.22	4.03	3808914.78	308914.78	1238659.13	0.34
6	Maharashtra (MSEDCL)	11KV	9.00	3956043.96	4.85	4157692.02	557692.02	2230768.08	0.62
7	Orissa	11KV	8.00	3913043.48	4.50	4097427.73	497427.73	1989710.90	0.55
8	Punjab	11KV		3600000.00	9.75	3968919.67	368919.67	1556678.67	0.43
9	Rajasthan	33KV	3.80	3742203.74	4.40	3914439.06	314439.06	1257756.24	0.35
10	Uttar Pradesh	11KV	8.00	3913043.48	5.00	4118993.14	518993.14	2075972.54	0.58




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### 3. 'FOR' Recommendations on "Loss Reduction Strategies"



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### LOSS REDUCTION STRATEGIES

- Focus on reduction of distribution losses
  - Transmission losses not to be clubbed with distribution losses
- For segregation of technical and non-technical loss,
  - baseline data should be compiled for each electricity division.
- Trajectory for loss reduction
  - keeping in view actual loss levels, capital expenditure made in the past for improving the network and future capital expenditure plans

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### LOSS REDUCTION STRATEGIES

- Segregation of feeder for agriculture supply
  - especially in states where proportion of supply to agriculture sector is substantial.
- Sharing of gains
  - Under-achievement of loss reduction target should be borne by the licensee,
  - In case of achievement over and above the targets the gain should be shared between the licensee and the consumers in the ratio to be determined by SERCs.

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### LOSS REDUCTION STRATEGIES

- The utilities should effectively use the theft related penal provisions in the Electricity Act, 2003
- As stipulated in para 8.2.1(ii) of the Tariff Policy SERCs should encourage suitable local area based incentive and disincentive schemes
  - for the staff of the utilities linked to reduction in losses.

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#### 4. 'FOR' Recommendations on "Policies on Renewables"



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### Policies on Renewables

- Minimum level of Renewable Purchase Obligation (RPO) at 5% till 2010 on lines of National Action Plan on Climate Change;
- Need for facilitative framework for connectivity and inter-State exchange of power.
- Suitable mechanism like Renewable Energy Certificate (REC) to promote RE sources.

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### Policies on Renewables

- Preferential tariff based on the cost-plus approach for non firm RE- based projects during loan period
  - after which they should be allowed to compete.
- Bidding Guidelines under section 63 of the Act *needs to be framed by the Ministry of Power*, in consultation with MNRE for bidding amongst:
  - (a) RE sources which can be scheduled, such as bagasse-based generation; and
  - (b) generation projects which cannot be scheduled and which have availed of preferential tariff during the debt repayment period.

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### Policies on Renewables

- GBIs are preferable to capital subsidies for promotion of RE technologies.
- *GBIs should be announced upfront, which could be factored in the tariff to be set by ERCs.*

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## 5. 'FOR' Recommendations on "Demand Side Management and Energy Efficiency"



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## Demand Side Management

- SERCs to direct all the distribution utilities to constitute a DSM Cell within their organizations.
- SERCs to also direct all the distribution utilities to submit DSM Plans along with ARR rates for the next tariff period.
- Recovery of cost of approved DSM programmes should be allowed as pass-through in ARR.

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## Demand Side Management

- SERCs to consider appropriate tariff interventions (like ToD tariff, incentive for energy efficient buildings/ appliances etc) to support DSM.
- *BEE has been requested*
  - to undertake development of Monitoring and Verification protocols for various DSM programmes which may be undertaken by utilities.
  - to prepare draft of a suggested Regulation for appraisal of programmes of DSM and Energy Efficiency in distribution sector.

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## Demand Side Management


- *The State Governments to be requested to consider the following:*
  - Financially supporting the DSM programmes aimed at such category of consumers which are receiving tariff subsidy from the State Governments.
  - Enhancing effectiveness of the State Designated Agency (SDAs).
  - Reduction in taxes on energy efficient appliances.

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## 6. 'FOR' Recommendations on "Multi Year Tariff Framework and Distribution Margin"



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## MYT Framework and Distribution Margin

- Annual revision of performance norms not desirable.
  - Tariff for each year of the Control Period to be determined at the beginning of Control Period.
- Recovery of fixed cost should be linked to achievement for Composite Index of Supply Availability (timely contracting adequate power to meet forecast load ) and Network Availability to be specified by SERC
- For every 1% underachievement in composite availability for urban and/or rural areas, Return on Equity shall be reduced by 0.1% of Equity.

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## MYT Framework and Distribution Margin

- SERCs should disallow adjustment of due subsidy against the outstanding loans.
  - However, adjustment of subsidy against Electricity Duty actually collected by the Discom be allowed.
- State Governments may be requested to ensure timely payment of outstanding dues of consumers like street lighting/water works and if necessary by making deductions from the grant payable to the local bodies.
- SERC regulations should provide for issue of bills on the basis of tariff determined by SERC
  - if State Government does not pay due amount of subsidy in time and in cash.

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## MYT Framework and Distribution Margin

- Action under section 142 if Distribution Licensee does not reduce the losses as per the specified trajectory, despite undertaking capital expenditure towards reducing the losses.
- Differential tariff structure in the area of different licensees in a State should be considered and the tariffs should reflect the efficiencies achieved by a particular licensee.
  - State Government has the discretion to give differential subsidy in areas of different licensees and also allocate the PPAs/Capacity of State Generating Stations in different proportions to different licensees.

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## 7. 'FOR' Recommendations on "Staffing of Electricity Regulatory Commissions"



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## Staffing of ERCs

- ERCs should have autonomy on staffing.
  - IIPA recommendation to MoP : *"the Commissions should have full autonomy in matters relating to staffing pattern, organizational structure and adequate power to recruit staff, as required. An overall ceiling on expenditure could, however, be fixed."*
- Adequate revenues should be generated through fees so that dependence on government exchequer reduces. This will make case for reasonable compensation structure for staff of ERCs. An overall ceiling on expenditure (based on revenue being realized by an ERC) may however be fixed.

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## Staffing of ERCs

- Compensation packages should be attractive
  - Vacancies especially against posts for professionals due to pay packages not being attractive enough to adequately meet expectations of professionals from PSUs/open market.
  - Attractive pay package required also to compensate government officers for the loss of various facilities such as housing, medical etc.
- To attract competent people, compensation package (including pay and other perquisites) as applicable in Central PSUs should be adopted.

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## Staffing of ERCs

- In the absence of facility of government accommodation, ERC should have powers to hire leased housing for the staff.
- ERC Chairperson should have authority to sanction participation of staff of the Commission in international programmes in professional areas of functions.

***Ministry of Power may consider these recommendations for implementation for CERC and for SERCs through State Governments.***


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## DSM Initiatives in India


**Presentation to  
FOR  
By  
Dr. Ajay Mathur,  
Director General  
Bureau of Energy Efficiency  
March, 2009**



### Energy Efficiency Potential and Outcome

Energy Conservation potential assessed as at present (IEP) (15% by DSM)	20000MW
<b>Verified Energy Savings :</b>	
-During X Plan period	877 * MW
-During 2007-08	623 MW
-Estimated for 2008-09	1200 MW
-Target for XI Plan period (5% reduction of energy consumption)	10000 MW
<small>* Only as indicated by participating units in the National Energy Conservation award scheme, for the previous five years.</small>	

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### Legal and Policy Interventions to Promote Energy Efficiency

- Energy Conservation Act, 2001, overcomes some market barriers by enabling:
  - Setting of minimum energy standards for, and affixing energy-consumption labels on appliances and equipment
  - Promulgation of Energy Conservation Building Codes
  - Energy use monitoring, verification and reporting by large energy users, and the establishment of energy consumption norms for these consumers
- BEE and SDAs set up to promote:
  - Demand-side management by distribution companies
  - Enhancing energy conservation in existing buildings, especially through Energy Service Companies (ESCOs)
  - Outreach and awareness programmes

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### Policy Objectives

- Inclusive and sustainable development strategy, sensitive to climate change.
- Achieving national growth objectives through a qualitative change in direction leading to further mitigation of greenhouse gas emissions.
- Devising efficient and cost-effective strategies for end use Demand Side Management- ESCO delivery mechanisms, CDM, etc
- Engineering new and innovative forms of market, regulatory and voluntary mechanisms to promote energy efficiency
- Effecting implementation of programmes through unique linkages, including with civil society and local government institutions and through public-private-partnership.
- International cooperation

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### Energy Efficiency - Action Plan

- Bachat Lamp Yojana to promote energy efficient and high quality CFLs as replacement for incandescent bulbs in households.
- Standards & Labeling Scheme targets high energy end use equipment and appliances to lay down minimum energy performance standards.
- Energy Conservation Building Code (ECBC) sets minimum energy performance standards for new commercial buildings.
- Agricultural and Municipal DSM targeting replacement of inefficient pumpsets, street lighting, etc.
- Operationalising EC Act by Strengthening Institutional Capacity of State Designated Agencies (SDAs) : The scheme seeks to build institutional capacity of the newly created SDAs to perform their regulatory, enforcement and facilitative functions in the respective States.
- Energy Efficiency Improvement in Small and Medium Enterprises (SMEs): To stimulate energy efficiency measures in 25 high energy consuming small and medium enterprise clusters.

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### National Mission for Enhanced Energy Efficiency- 4 New Initiatives

- A market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded. (Perform Achieve and Trade)
- Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable. (Market Transformation for Energy Efficiency)
- Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings. (Energy Efficiency Financing Platform (EEFP))
- Developing fiscal instruments to promote energy efficiency namely Framework for Energy Efficient Economic Development (FEEED)

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### Recent DSM Initiatives

#### CDM Based CFL Scheme- Bachat Lamp Yojana (BLY)



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#### CDM Based CFL Scheme- Bachat Lamp Yojana (BLY)

- ✓ Launched by Minister of Power on 25<sup>th</sup> February, 2009
- ✓ Scheme seeks to replace estimated 400 million incandescent bulbs by CFLs- could save 6000 MW by 2012
- ✓ BEE has prepared a Programme of Activities (PoA) as a voluntary coordinated effort to facilitate the scheme in the entire country and reduce transaction costs
- ✓ 22 CFL manufacturers/ suppliers have agreed to participate- 14 states have initiated the scheme
- ✓ Pilot projects in Andhra Pradesh registered by CDM Executive Board
- ✓ Leveraging of CDM revenues to remove the high first cost barrier- market transformation in favour of efficient lighting

8

## Basic Objectives of BLY

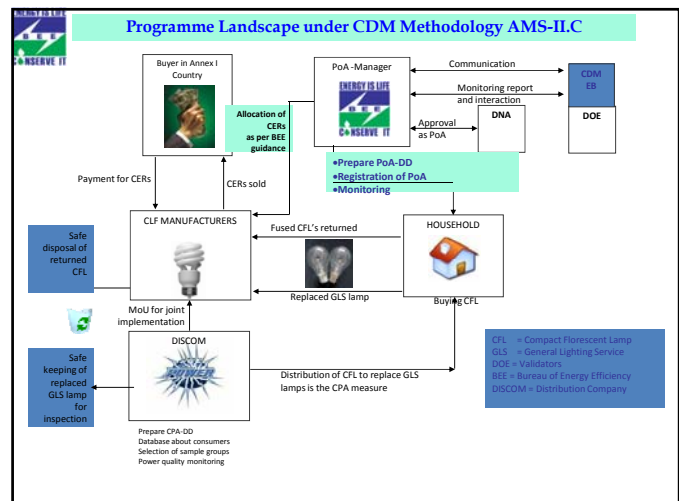
- Replace inefficient incandescent bulbs with CFLs **for households only**
- Reduce price of CFL to that of incandescent bulb-project developer (CFL Manufacturer/ DISCOM) provides initial investment
- Use CDM to recover balance cost
- Monitor energy consumption reduction in a project area as outlined in AMS-II.C of CDM-EB
- CERs generated after monitoring, validation and oversight of CDM Executive Board (CDM-EB) sold in international markets
- Revenue from sale of CERs used to service investments-Estimated revenue/ CFL of Rs. 25 per year- cost recovered in 2-3 years.
- Potential reduction in power consumption~6,000 - 10,000 MW – **XI plan target 4000 MW**

## Project Steps

- Define project area- DISCOM based
- Manufacturer/ Trader of CFL for provision of adequate numbers of bulbs required
- Preparation of Project Design Document (PDD) as per CDM-EB approved templates
- Validation of PDD by certified agencies of CDM-EB- presently 5-6 in India
- PDD, on validation, considered and recommended by Designated National Authority (DNA) of CDM-EB - MOEF
- DNA recommended PDD posed for final approval of CDM-EB
- Monitoring/ validation commences as per AMS-II.C under this framework
- **Programmatic Approach to reduce individual project transaction costs for replicability**

## Programmatic Approach

- **Programmatic approach allowed as a voluntary, coordinated effort-** AMS-II.C allowed to be used in PoA by EB in July, 2007
- Allows for an umbrella framework with many individual projects under an approved methodology
- The multiple PDDs (called CDM Project Activities-Design Documents CPA-DD) part of the PoA
- All PDDs have same monitoring/ validation requirements
- Approval process of individual PDDs simplified substantially- no individual approval of PDDs by EB
- PoA can be run by any agency including government



### Role of BEE

- Awareness and information
- Development of Programme of Activities Design Document (POA-DD)
- Registration of Programme of Activities with UNFCCC CDM Executive Board.
- Monitoring of CFL use in sample households
- Support the CFL manufacturers/ DISCOMs to prepare CDM Programme Activity Design Documents (CPA-DDs)
- Inclusion of CPA-DDs under the PoA after validation
- Facilitate verification of CERs and recommend their allocation to the CFL manufacturers / DISCOM according to their share in emissions reductions in a specified period

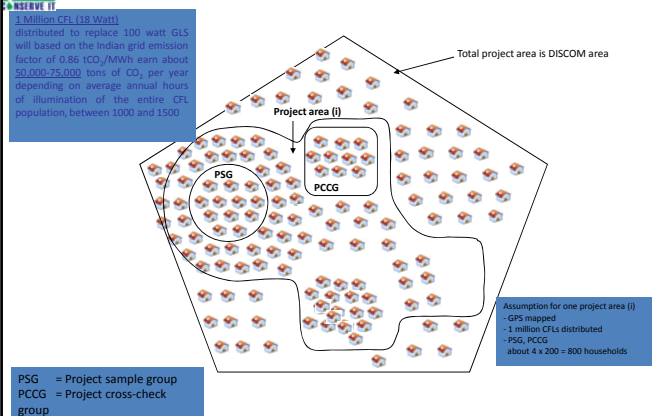
### Role of DISCOM

- Database of households to include name of users/address/average electricity consumption
- Assist in selection of **Project sample group (PSG)**, **Project sample buffer group (PSBG)**, **Project cross-check group (PCCG)** as required under AMS-II.C
- Information on Grid voltage supplied to
- Distribution of CFL Lamps and exchange of incandescent lamps
- Safe keeping of replaced GLS lamps for independent inspection
- Determination of the power correction factor
- Estimation of technical distribution losses in the electricity grid

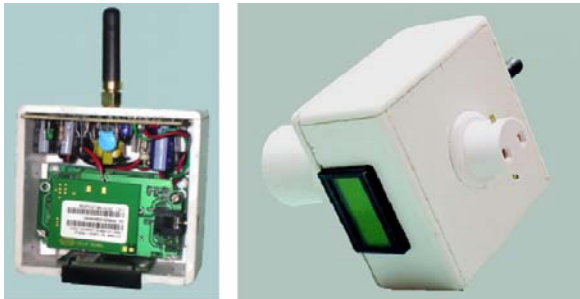
### Role of CFL Suppliers

- **Provide CFL at the price comparable to GLS lamps.**
- Preparing CDM Programme Activity Design Documents (CPA-DDs) for CDM project and submitting them to BEE.
- Collection of fused CFLs through buy-back schemes, and arranging for their safe disposal.
- Distribution of CFLs in association with DISCOM
- Initial investment for the cost differential
- Free Replacement of CFL during the life of project
- **Tripartite Agreement between BEE, DISCOM and CFL Supplier**

### Groups involved in CFL Methodology AMS-II.C



### Monitoring by GSM Based Smart Meters



### Monitoring Steps under AMS-II.C

- **Step 1:** Determination of the project area (s)-Based on DISCOM areas each with a maximum of 1 million CFLs – could be more than 1 CPA area in a DISCOM with a cap of 60 GWh (60 MUs) (around 1 million CFLs).
- **Step 2:** Establishment of a project activity implementation plan
- **Step 3:** Installation of measurement equipment
- **Step 4:** Establishment of PSBG
- **Step 5:** Establishment of CPA database

### Monitoring Steps under AMS-II.C...

- **Step 6:** Monitoring of utilization hours in the PSG
- **Step 7:** Determination of the power correction factor
- **Step 8:** Calculation of the mean and standard deviation of household electricity consumption for lighting
- **Step 9:** Estimation of technical distribution losses in the electricity grid
- **Step 10:** Cross-check of monitoring results by random sampling of households not included in the PSG and PSBG
- **Step 11:** Calculation of emission reductions

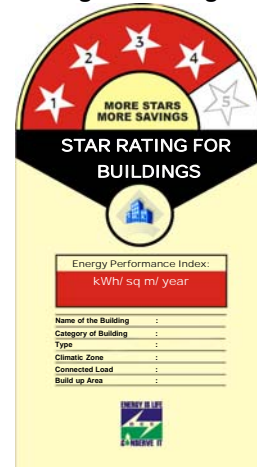
### STAR RATING FOR OFFICE BUILDINGS

- Large potential for energy savings both in government and commercial office buildings.
- The regulation, promotion and facilitation of energy efficiency in commercial buildings is one of the key thrust areas of BEE.
- **Energy Conservation Building Code (ECBC)**
  - specifies standards for new, large, energy -efficient commercial buildings.
- **Energy Service Companies(ESCOs)**
  - upgrade the energy efficiency of existing government buildings through retrofitting on performance contracting mode.

## SCHEME FOR RATING OF BUILDINGS

- The Star Rating Program for buildings is **based on actual performance of the building** in terms of specific energy usage (kWh/sq m/year).
- This programme would rate office buildings on a 1-5 Star scale with 5 Star labeled buildings being the most efficient.
- Five categories of buildings - office buildings, hotels, hospitals, retail malls, and IT Parks in five climate zones in the country have been identified.
- **Office buildings** in the following 3 climatic zones for air-conditioned and non- air-conditioned:
  - Warm and Humid
  - Composite
  - Hot and Dry
- It will be subsequently extended to other climatic zones and building types.

## Building Star-Rating Label



## SCHEME FOR PARTICIPATION

- Buildings having a connected load of 500 kW and above
- The application for each building shall be accompanied by non - refundable registration fee of Rs.1,00,000 (Rupees One lakh)
- Energy Performance Index (EPI) in kWh / sq m/ year in terms of purchased & generated electricity divided by built up area in sq m excluding basement and parking areas
- The total electricity would not include electricity generated from on-site renewable sources such as solar photovoltaic etc.
- Energy performance after completion of 1 year of operation with full occupancy of the building.

## CHECK TESTING & VERIFICATION

- The Bureau will conduct regular sample checks for information provided by the building owner & the EPI
- The user of the label would agree to make available the drawings of the building/facility.
- Information of the defaulters would put out in the public domain including an advertisement in newspaper, together with withdrawal of the authority to use the label.
- Provision for challenge testing the label contents by other star rated building owner have been made in the scheme.



## BANDWIDTHS - AC Area > 50%

EPI(Kwh/sqm/year)	Star Label
190-165	1 Star
165-140	2 Star
140-115	3 Star
115-90	4 Star
Below 90	5 Star

EPI(Kwh/sqm/year)	Star Label
200-175	1 Star
175-150	2 Star
150-125	3 Star
125-100	4 Star
Below 100	5 Star

EPI(Kwh/sqm/year)	Star Label
180-155	1 Star
155-130	2 Star
130-105	3 Star
105-80	4 Star
Below 80	5 Star



## BANWIDTHS- LESS THAN 50% AIR CONDITIONING

EPI(Kwh/sqm/year)	Star Label
80-70	1 Star
70-60	2 Star
60-50	3 Star
50-40	4 Star
Below 40	5 Star

EPI(Kwh/sqm/year)	Star Label
85-75	1 Star
75-65	2 Star
65-55	3 Star
55-45	4 Star
Below 45	5 Star

EPI(Kwh/sqm/year)	Star Label
75-65	1 Star
65-55	2 Star
55-45	3 Star
45-35	4 Star
Below 35	5 Star



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Thank You!

## POLICIES AND STRATEGIES IN CALIFORNIA



March 2009

### TO ACHIEVE MAXIMUM ENERGY SAVINGS

Dian M. Grueneich, Commissioner  
California Public Utilities Commission



## California Public Utilities Commission



- The CPUC regulates privately owned electric and natural gas companies
  - 75% of California Electricity Demand – 227,000 GWh (2007)
  - Sets rates, determines revenue requirements, approves electricity generation portfolios
  - Ensures rates are “just and reasonable”
- Mission Statement: The California Public Utilities Commission serves the public interest by protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates.

2

## California's Top Priority Energy Resource

- 2003 CPUC and CEC Energy Action Plan Established A “Loading Order” of Resource Procurement:
  1. All cost-effective energy efficiency
  2. Demand response;
  3. Renewable energy and distributed generation;
  4. Cleanest fossil-fueled sources and infrastructure improvements.
- 2004 State Law: “The electrical corporation will first meet its unmet resource needs through all available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible.”
  - Implemented through Utility Resource Procurement Plans and Tariffs

3

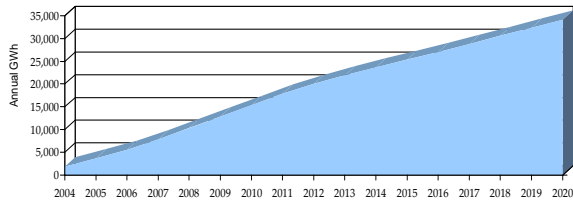
## Energy Efficiency Resource

- **2004-2013 Savings Goals:**
  - Electricity
    - 2,631 GWh in 2013
    - 23,183 GWh cumulative
  - Natural Gas
    - 67 million therms in 2013
    - 444 million therms cumulative
  - Equal to 10 Power Plants
- **2006-2008 Programs**
  - Electricity and Natural Gas Tariffs provide \$1 billion (US) per year
  - Cut energy costs for homes & businesses by more than \$5 billion
  - Cost-effective resource: cost benefit of \$2.7 billion, representing a benefit cost ratio of 2 to 1 return on the efficiency investment (value of savings benefits minus program and customer out-of-pocket costs)

4

## Energy Efficiency Goals Through 2020

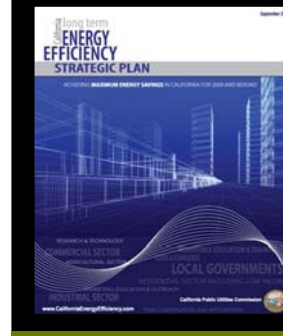
Goals set for CPUC-regulated utilities from 2004 through 2020, in accordance with best available data on energy efficiency potential.



- Based primarily on existing technologies and rates of adoption

5

## A Strategic Plan for California



- **Long-term** (through 2020), statewide utility **Energy Efficiency Strategic Plan**
- Build foundation for continual advancement of energy efficient technologies and practices.
- Shift emphasis from easy to implement, short lived programs, e.g. CFLs, to savings in the built environment
- **Interactive Energy Efficiency Web Portal**

A strategy for achieving and exceeding aggressive state goals, by leveraging industrial, commercial and residential sector efforts.

6

## Energy Efficiency Lessons and Plans from California

Delhi & Mumbai  
March 2009

Arthur H. Rosenfeld, Commissioner  
California Energy Commission  
(916) 654-4930

[ARosenfe@Energy.State.CA.US](mailto:ARosenfe@Energy.State.CA.US)

<http://www.energy.ca.gov/commissioners/rosenfeld.html>

or just Google “Art Rosenfeld”



## Two Energy Agencies in California

- The California Public Utilities Commission (CPUC) was formed in 1890 to regulate natural monopolies, like railroads, and later electric and gas utilities.
- The California Energy Commission (CEC) was formed in 1974 to regulate the environmental side of energy production and use.
- Now the two agencies work very closely, particularly to delay climate change.
- The Investor-Owned Utilities, under the guidance of the CPUC, spend “Public Goods Charge” money (rate-payer money) to do everything they can that is cost effective to beat existing standards.
- The Publicly-Owned utilities (20% of the power), under loose supervision by the CEC, do the same.

3

## California Energy Commission Responsibilities

### Both Regulation and R&D

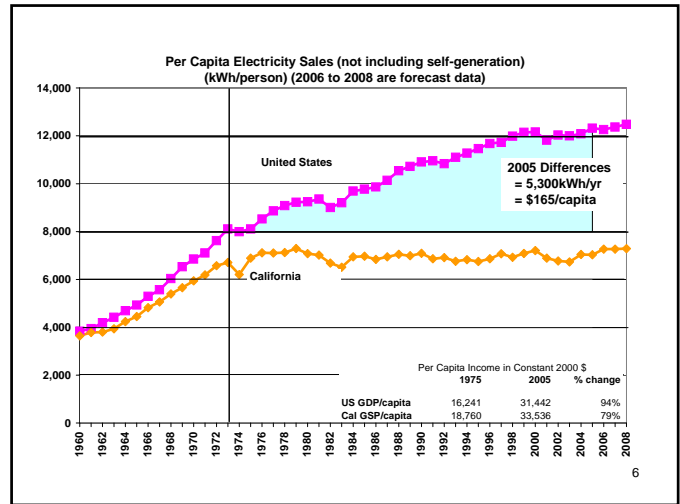
- California Building and Appliance Standards
  - Started 1977
  - Updated every few years
- Siting Thermal Power Plants Larger than 50 MW
- Forecasting Supply and Demand (electricity and fuels)
- Research and Development
  - ~ \$80 million per year
- CPUC & CEC are collaborating to introduce communicating electric meters and thermostats that are programmable to respond to time-dependent electric tariffs.

4

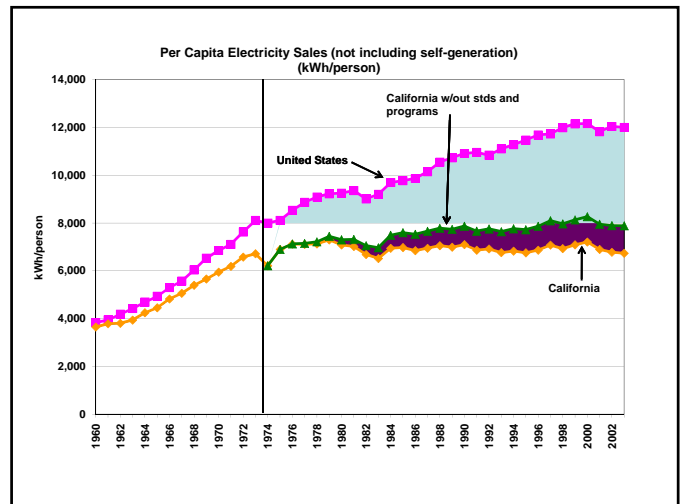
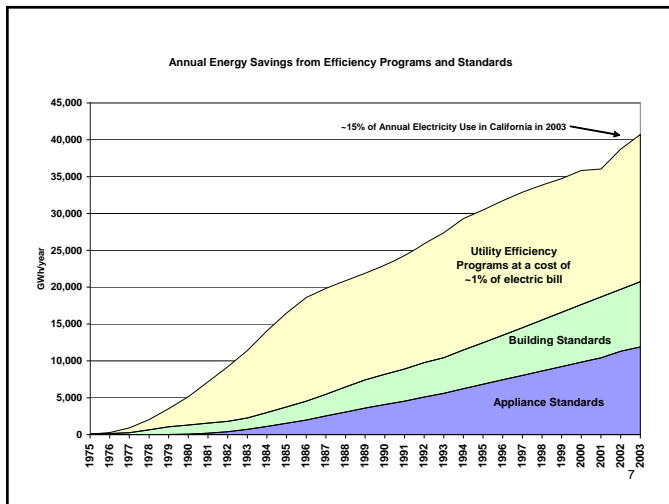
### California's Energy Action Plan

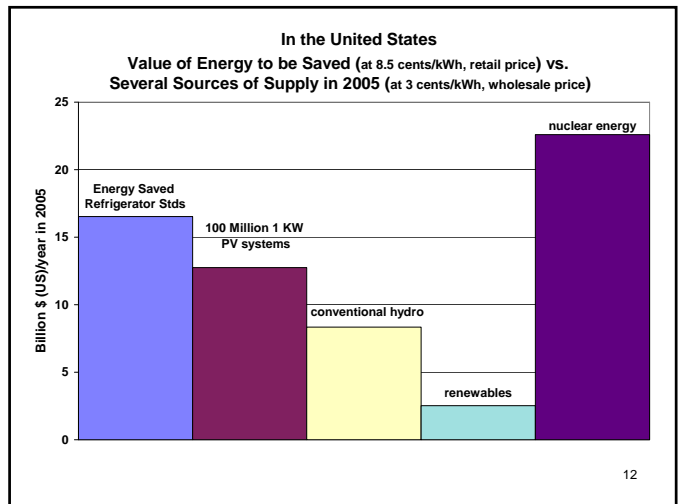
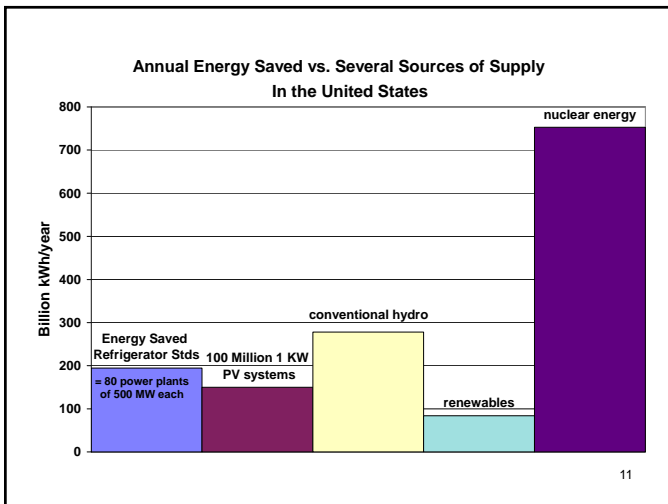
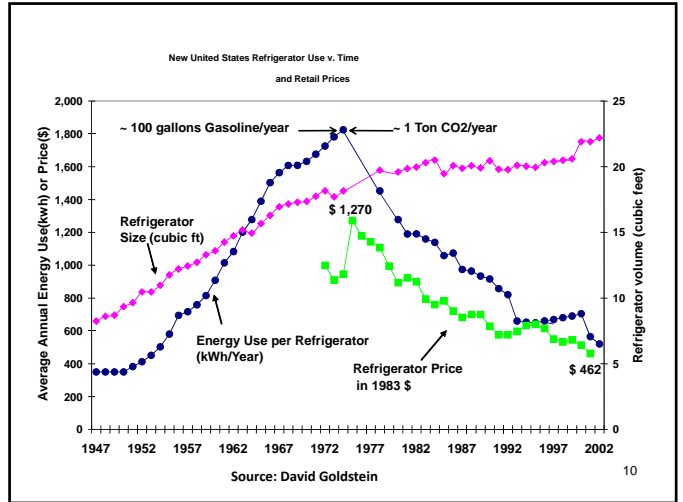
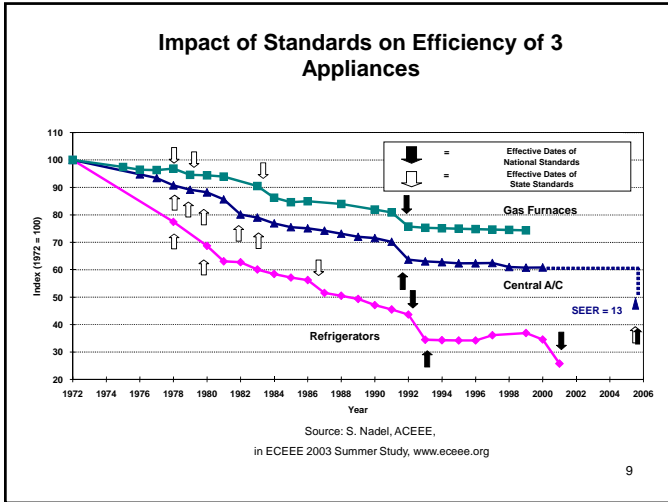
- California's Energy Agencies first adopted an Energy Action Plan in 2003. Central to this is the State's preferred "Loading Order" for resource expansion.
- 1. Energy efficiency and Demand Response
- 2. Renewable Generation,
- 3. Increased development of affordable & reliable conventional generation
- 4. Transmission expansion to support all of California's energy goals.
- The Energy Action Plan has been updated since 2003 and provides overall policy direction to the various state agencies involved with the energy sectors

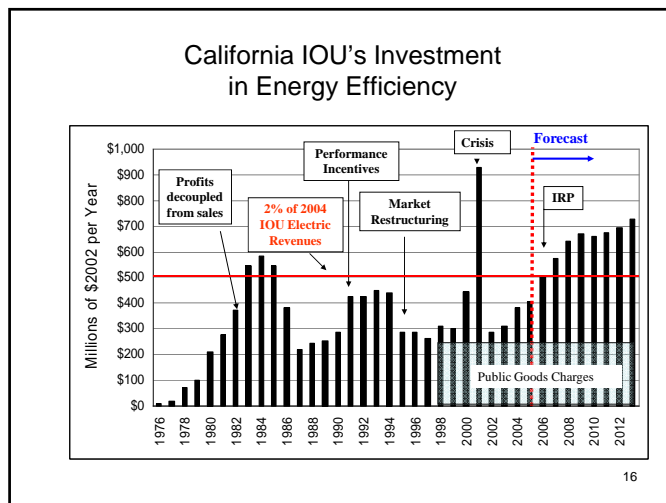
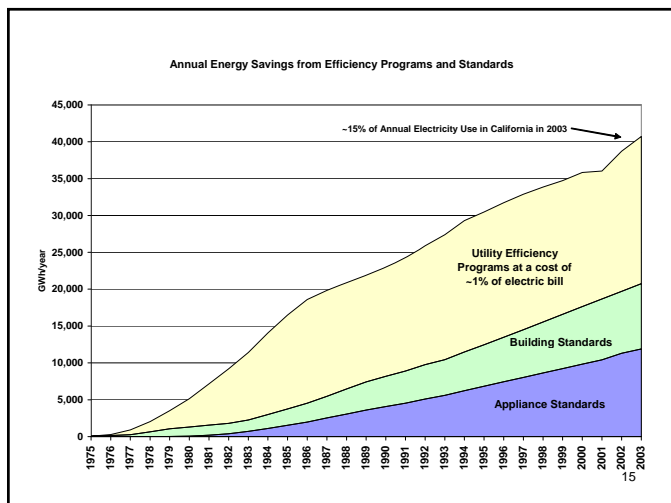
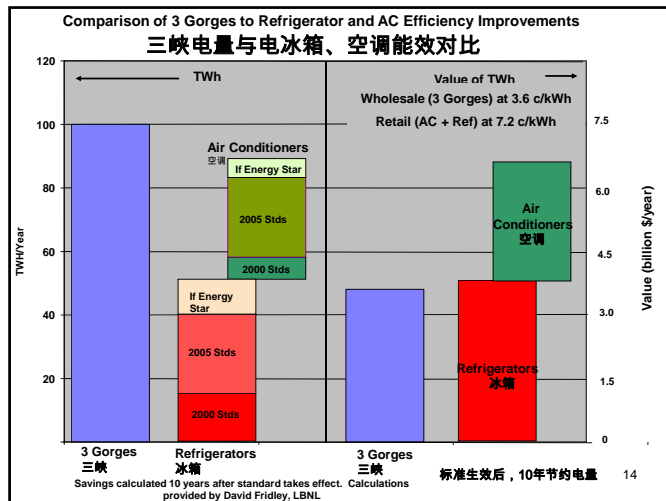
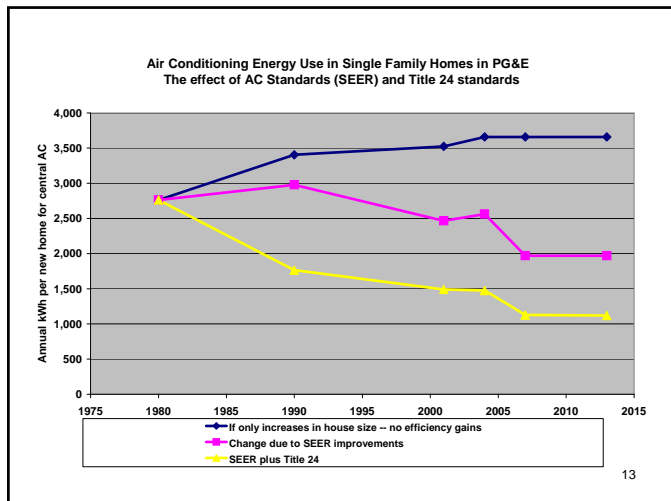
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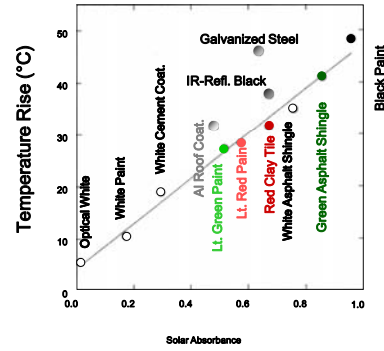




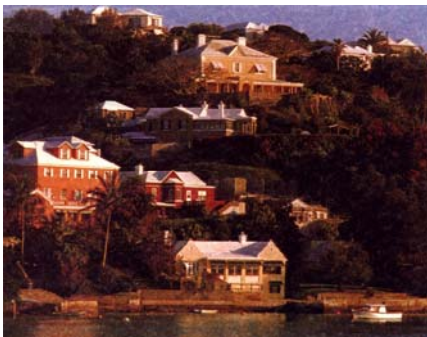


### White Roofs

### Temperature Rise of Various Materials in Sunlight



White is 'cool' in Bermuda



and in Santorini, Greece



and in Hyderabad, India



21

### Cool Roof Technologies

Old

New



flat, white



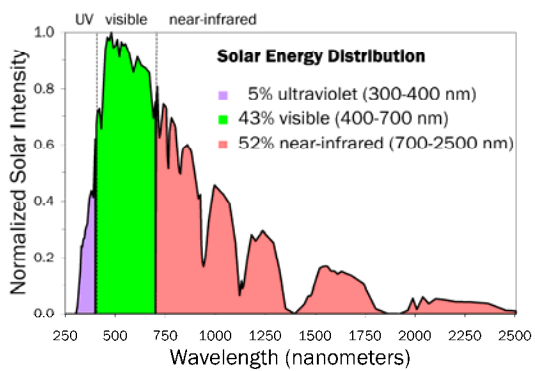
pitched, cool & colored



pitched, white

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### Cool Colors Reflect Invisible Near-Infrared Sunlight



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### White Roofs

- In California and a growing number of US states, white roofs are required for new buildings, and re-roofing to reduce air conditioning load and "smog"(O<sub>3</sub>).
- But a new concept is that white roofs also cool the world directly.

24

## Effect of Solar Reflective Roofs and Pavements in Cooling the Globe

(Source: Akbari, Menon, Rosenfeld. *Climatic Change*, 2008)

	$\Delta$ Solar Reflectivity	CO <sub>2</sub> Offset by 100 m <sup>2</sup>	CO <sub>2</sub> Offset Globally
White Roof	0.40	10 tons	
Average Roof *	0.25	6.3 tons**	24 Gt
Cool Pavement	0.15	4 tons	20 Gt
Total Potential			44 Gt
Value of 44 Gt CO <sub>2</sub> at \$25/t ~ \$1 Trillion			

\* White Roof will be "diluted" by cool colored roofs of lower reflectivity, and roofs that can not be changed, because they are long-lived tile, or perhaps they are already white.

\*\* Compare 10 tons with a family car, which emits ~4 tons/year.

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## CO<sub>2</sub> Equivalency of Cool Roofs World-wide (Tropics+Temperate)

- Cool Roofs alone offset 24 Gt CO<sub>2</sub>
- Worth > €600 Billion
- To Convert 24 Gt CO<sub>2</sub> one time into a rate
- Assume 20 Year Program, thus 1.2 Gt CO<sub>2</sub>/year
- Average World Car Emits 4 tCO<sub>2</sub>/year,  
**equivalent to 300 Million Cars off the Road for 20 years.**

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## Akbari et al. Main Finding



100 m<sup>2</sup> of a white roof, replacing a dark roof, offset the emission of 10 tons of CO<sub>2</sub>

27

• To be published in *Climatic Change* 2008.

## • Global Cooling: Increasing World-wide Urban Albedos to Offset CO<sub>2</sub>

July 28, 2008

Hashem Akbari and Surabi Menon  
Lawrence Berkeley National  
Laboratory, USA  
H\_Akbari@lbl.gov  
Tel: 510-486-4287

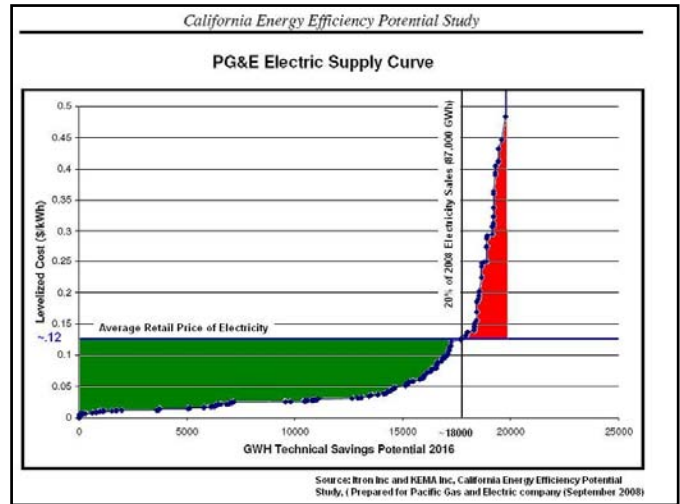
Arthur Rosenfeld  
California Energy Commission,  
USA  
Arosenfe@energy.state.ca.us  
Tel: 916-654 4930

- A First Step In Geo-Engineering Which Saves Money and Has Known Positive Environmental Impacts

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### Conservation Supply Curves and Carbon Abatement Curves

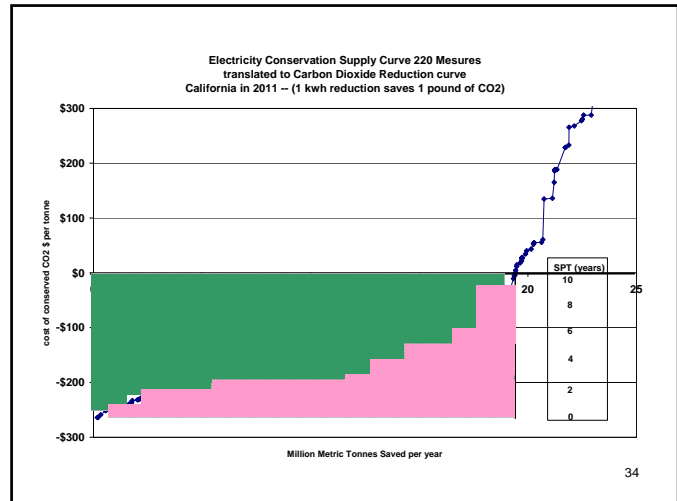
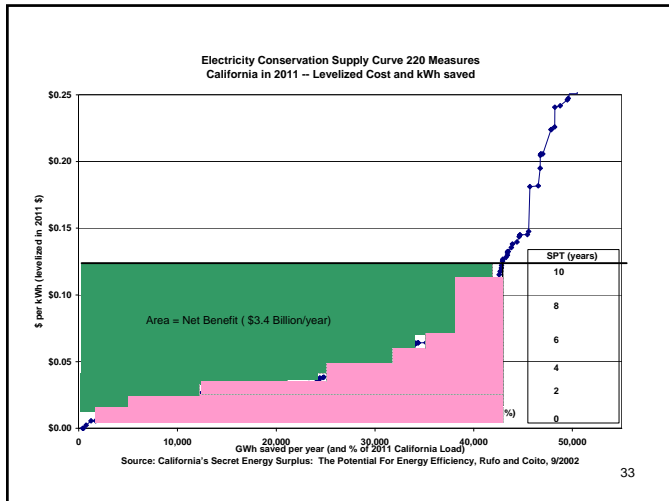
29



### PG&E Electric Supply Curve Summary of Previous Slide

- 200 Projects costing at or below 12 cents /kWh average retail price
- Total Potential Savings of 18,000 GWh for these projects
- This represents about 20% of total electric sales for PG&E in 2008

Technology	Sector	Levelized Supply Cost	Levelized Supply Cost with Programs	Technical GWh 2016
S04_0515	INC	0	0.005	4,549
S01_0515	INC	0	0.005	13,356
WWT_PDW	INC	0.002	0.007	0.08
CRm_ExOp	INC	0.005	0.01	0.41
CRm_HECh	INC	0.005	0.01	4.52
S36_HEVC	INC	0.005	0.01	0.729
Fans_ASD (6-100 hp)	Existing Industrial	0.005	0.012	27.33
Comp_Air_ASD (6-100 hp)	Existing Industrial	0.005	0.012	31.33
Pumps_ASD (6-100 hp)	Existing Industrial	0.005	0.012	54.46
CRm_UAS	INC	0.005	0.01	3.01
WWT_Des	INC	0.006	0.011	1.83
CRm_POHP	INC	0.006	0.011	1.31
CRm_PrPI	INC	0.006	0.011	3.75
CRm_EfFS	INC	0.006	0.011	2.02
Fans_OM	Existing Industrial	0.006	0.014	11.94
Compressed_AirSizing	Existing Industrial	0.006	0.014	49.29
Pumps_OM	Existing Industrial	0.006	0.014	95.2
C_CFL_Over24W	Existing Commercial	0.007	0.025	305.09
CRm_PACR	INC	0.007	0.012	7.89
Compressed_Air-OM	Existing Industrial	0.008	0.015	172.52
CRm_VACS	INC	0.008	0.013	1.45
S36_AC2S	INC	0.008	0.013	1.16
CRm_LPDF	INC	0.008	0.013	2.43
WWT_VFD	INC	0.008	0.013	12.4
S04_0510	INC	0.008	0.013	0
CRm_PrPh	INC	0.009	0.014	0.42
CRm_PMEV	INC	0.009	0.014	0.3
CRm_PMEW	INC	0.009	0.014	0.21
C_CFL_Under15W	Existing Commercial	0.009	0.04	151.16
C_T12_Delamping_4ft	Existing Commercial	0.021	0.027	123.76
C_Ref_EvapFan_ECM	Existing Commercial	0.022	0.027	238.21



## Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?

US Greenhouse Gas Abatement Mapping Initiative  
December 12, 2007

McKinsey & Company

