ENERGY EFFICIENCY POLICY FOR POWER SECTOR IN DELHI

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By

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Abstract

Delhi needs an energy efficiency policy for its power sector. Power consumption has grown by leaps and bounds, requiring capital investments in additional generation capacity. Rising and uncertain peak demand requires purchase of power at high costs, or very often discoms take resort to power cuts. Though several large power projects are coming up, adding significant amounts to total power available for Delhi, prudence dictates that we should take steps to reduce the rate of growth of demand.

Demand can be controlled, without affecting the economic growth rate, through some simple measures, largely policy changes and changing the economic incentive structure. Due to the very short time available to us, we have not been able to add any new perspective or measure, but we tried to look for some of the most simple, tried and tested measures and technologies, which have been implemented in many different parts of the world.

This paper enlists some of those measures, which will need little policy changes, and technologies which are not very expensive to introduce. It also tries to make a modest effort to present some new innovative methods.

Foreword

This paper is a result of research work done over a period of a month. Most of the time in research was spent interacting with people who have researched into the energy efficiency issues, and the problems facing ESCO business models.

We would like to thank our research guide Dr. Partha J Shah, for giving us directions and guidelines throughout the period of the research paper. We would also like to thank CCS (Centre for Civil Society) for giving us an opportunity to write this research paper.

We would like to give special thanks to Saurabh Gupta, Area Convener, Energy Regulation and Practice, Regulatory Studies and Governance Division TERI for providing us with crucial inputs, suggestions.

We would also like to express our gratitude to Mr. Akash Jain, Director Pranat Engineers Pvt. Ltd. for giving us relevant inputs.

All mistakes, however, will remain our responsibility.

New Delhi, July 2009

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1. Introduction

In this chapter, we will provide some background to the topic. The need for an energy efficiency policy for electricity sector will be underlined.

1.1 Background

Delhi's power demand has been increased continuously and the dependence on the power from outside has been increasing simultaneously. Though, the power corporations have earned sufficient surpluses during the winter season when Delhi has power-surplus, the summer peaks are way high above the total arranged capacity which leads to load shedding.

Power reforms have largely succeeded in taking care of rising T&D losses. Number and duration of power cuts have gone down. But problems still persist around the peak time. Since investing in additional generation capacity requires huge capital, it is more prudent to arrest the growth rate of demand as a negative MW of power is cheaper than any additional MW. This requires an EEP (Energy efficiency policy) applied to electricity sector.

1.2 Problem

The major problem is demand and supply gap in the present phase due to growing demand. Delhi's demand can go up to 7000 MW by 2010[2], or even more. Satisfying this rapidly rising demand requires huge investments, and these investments usually have significant social, and environmental consequences (land acquisition, pollution). It is better to invest in reducing demand by increasing the efficiency of electricity usage.

1.3 Purpose

Energy is essential for economic and human development. In the recent years growth in global demand for energy has caused tremendous fluctuations in prices. Additionally, high fossil fuel consumption has contributed to global climate change.

The solution to this twin problem of environmental damage and limited supplies of conventional energy is to use these conventional resources more efficiently, while simultaneously developing new sources of energy. We already have the technical and the industrial means to exploit fossil fuel reserves more efficiently, develop competitive carbon-free production and to improve energy efficiency in household and transportation sector. But for all these technologies to be effective, we need a proper institutional framework in which all stakeholders are well informed and can act with freedom. A well researched and effective public policy will divert investment to appropriate technologies and will enact regulatory measures which will take care of economic growth and environment and will be acceptable to all stakeholders.

A policy designed to increase efficiency in electricity use will have two principle benefits. It will enable us to supply more consumers with same generation capacity, and it will slow down the growth of electricity demand and will reduce the amount of capital needed to add new generation capacity needed for this growth. It will also reduce the pressure on the transmission network, and will result in higher quality of electricity delivered to end-customer.

1.4 Limitations

The paper was written in a very short time and incorporates only a very limited set of recommendations. Also many of these recommendations were applied to cities of developed countries; where the socio-economic factors are different from Delhi.

1.5 Research questions

1. What are the different policies that may reduce the rate of growth of power demand.
2. How can they be applied to Delhi?
3. What factors have hindered the expansion of ESCOs in Delhi?

1.6	Abbreviations
DSM	Demand Side Management
ESCO	Energy Services Company
GNCTD	Government of National Capital Territory of Delhi
GRIHA	Green Rating for Integrated Habitat Assessment
LEED	Leadership in Energy and Environmental Design
MU	Million Units

MW	Mega Watt (1 Million watts)
NCR	National Capital Region
ToD	Time of Day
TERI	The Energy Research Institute
UI	Unscheduled Interchange

1.7 Outline of the document

Chapter 2: Chapter 2 introduces a draft policy which contains measures primarily aimed at cutting down the growth rate of electricity demand. It explains various aspects related to technological, administrative, financial, legislative measures and awareness about energy efficiency.

Chapter 3: It explains the various new technologies implemented worldwide to increase efficiency of electricity usage.

Chapter 4: Outlines the administrative measures suggested and gives some examples of success of these measures worldwide.

Chapter 5: This chapter provides legislative measures required to bring this energy efficiency policy.

Chapter 6: This chapter provides some of the fiscal measures necessary for the suggested measures to succeed.

Chapter 7: This chapter emphasizes the necessity of educational and awareness campaigns for popularizing the energy efficiency techniques.

Chapter 8: This chapter finishes the document by adding certain riders, especially with regard to functioning of ESCOs in Delhi.

2. Draft Policy

"The policy aims to reduce the electric intensity i.e. to reduce the amount of electricity needed to produce a unit economic output. The policy aims to reduce the growth rate of electricity demand without affecting the economic growth. The Policy aims to achieve this by

- Reducing the rate of growth of household demand by
    1. Discouraging the use of heavy electricity consuming appliances.
    2. Discouraging consumption during peak hours, and incentivizing use of appliances during off-peak hours.
    3. Encouraging use of more energy efficient appliances, by gradually phasing out old appliances.
- Increasing overall efficiency of electrical consumption in industrial sector by
    1. Encouraging use of more environment friendly structures.
    2. Incentivizing use of fuel-efficient technologies.
    3. Reducing the cost of energy audits by tax-breaks for companies who reduce their total electricity consumption.
- Increasing efficiency of electricity consumption in buildings by
    1. Encouraging construction and design according to ECBC standards.
    2. Encouraging use of buildings for generating solar power by methods like net metering.
- Providing citizens information on how to use electricity more wisely and efficiently. Education and awareness campaigns are necessary so as to keep electricity consumers up-to-date about the latest energy efficiency technologies available.

1. The tariff structures have to be redesigned to incentivize energy conservation and to change the amount and timing of customer demand.
2. Innovative principles, like 'take one less, get one free', '20-20' can be used.
3. Retailers and Sellers of electricity consuming equipment should be involved in these awareness campaigns.
4. Industrial managers, engineers, architects etc should also be involved in these awareness campaigns.

- Encouraging higher efficiency technologies and methods. Special focus would be on fuel switching technologies, load management techniques and measures,
- Removing or modifying the existing laws which hinder the operation of ESCOs. Also, establishing institutional set-ups and frameworks which will help these entities expand and exploit the full potential of Energy efficiency market in Delhi, and also ease the entry of new players in the field.
- Government will give tax breaks to entities/households and technologies implementing the energy efficiency measures, in order to shorten the time period of return on investment on these technologies.
- The government will introduce standards and regulations to ensure implementation of different measures meant for household, commercial and industrial sector. It will also set achievable efficiency targets for these sectors.
- Making DSM strategies a necessary part of charters of the various Discoms and making energy efficiency targets a necessary part of charters of various public entities.

3. New Technology

New Technologies which will help in making electricity consumption more efficient are

3.1 Intelligent Meters

The meters used should have the following additional features:-

1. In addition to the meter displaying normal readings, the meters are able to record the readings of AC and 9 Ampere switches as well.

2. These meters can record demand data online and create an online demand profile. The feature will enable time of day metering and flexible tariffs.

3. The meters will be able to add and record any power generated by the consumer and compensate the consumer for any net electricity fed into the grid. This is called net metering.

3.2 AC outage Technologies

New AC outage technology can be used which can either be attached to the intelligent meter or to the AC itself. The technology notifies the consumer during peak time hours by giving an indication that the peak time is being experienced by the city by turning the AC off. So, after that, if the customer continues to operate the instrument, he can be charged a very high tariff for power use during peak time and if this measure fails to check demand, an outage can be imposed directly on the consumer by sending a signal which causes the outage system to switch off the AC. The intelligent meter technology is essential for the AC outage technology.

3.3 Energy efficient appliances

The energy efficiency technologies have improved the appliances' efficiency but the costs of these appliances are still more than the inefficient appliances. Many administrative and fiscal measures have been suggested in order to reduce their costs

and increase their demand. Japan's Top runner programme is a shining example of success of these programmes. The following table illustrates its success.

Product Category	Energy Efficiency Improvement (Result)	Energy Efficiency Improvement (Initial Expectation)
TV receivers (TV sets using CRTS)	25.7% (FY 1997- FY2003)	16.4%
VCRs	73.6% (FY 1997- FY2003)	58.7%
Air Conditioners (Room air conditioners)	67.8% (FY 1998- 2004 freezing year)	66.1%
Electric Refrigerators	55.2%(FY 1998- FY 2004)	30.5%
Electric Freezers	29.6%(FY 1998- FY 2004)	22.9%
Gasoline Passenger Vehicles	22.8%(FY 1995- FY 2005)	22.8%(FY 1995- FY 2010)
Diesel Freight Vehicles	21.7%(FY 1995- FY 2005)	6.5%
Vending Machines	37.3%(FY 2000- FY 2005)	33.9%
Computers	99.1%(FY 1997- FY 2005)	83.0%
Magnetic Disk Units	98.2%(FY 1997- FY 2005)	79.0%
Fluorescent Lights	35.6%(FY 1997- FY 2005)	16.6%

Though Delhi is implementing its own star rating system for appliances, it is restricted to refrigerators and ACs. More appliances need to be bought under the scheme.

3.4 Zero Energy Buildings

These buildings have zero energy in-take from the grid. They generate electricity on their own, sometimes feeding any power surplus that they have into the grid. They can also draw power from grid when needed, but the net is near to zero. They have high setting up costs, cause minimum carbon emissions and very low operating costs. These are the most energy efficient buildings which use high technology and environmental design. A combination of building laws, financial incentives, and awareness campaigns are needed to popularize these buildings, or even to incorporate some features of these buildings into the regular building structures.

3.5 Most Energy Efficient Technologies for the Industry

Bureau of Energy Efficiency (BEE) has recommended some standard Energy Efficiency Practices for specific Industries which include new technologies and some management

systems which increase the efficiency of the system as a whole. These measures have to be adopted and promoted. The technologies are specially recommended for energy intensive industries.

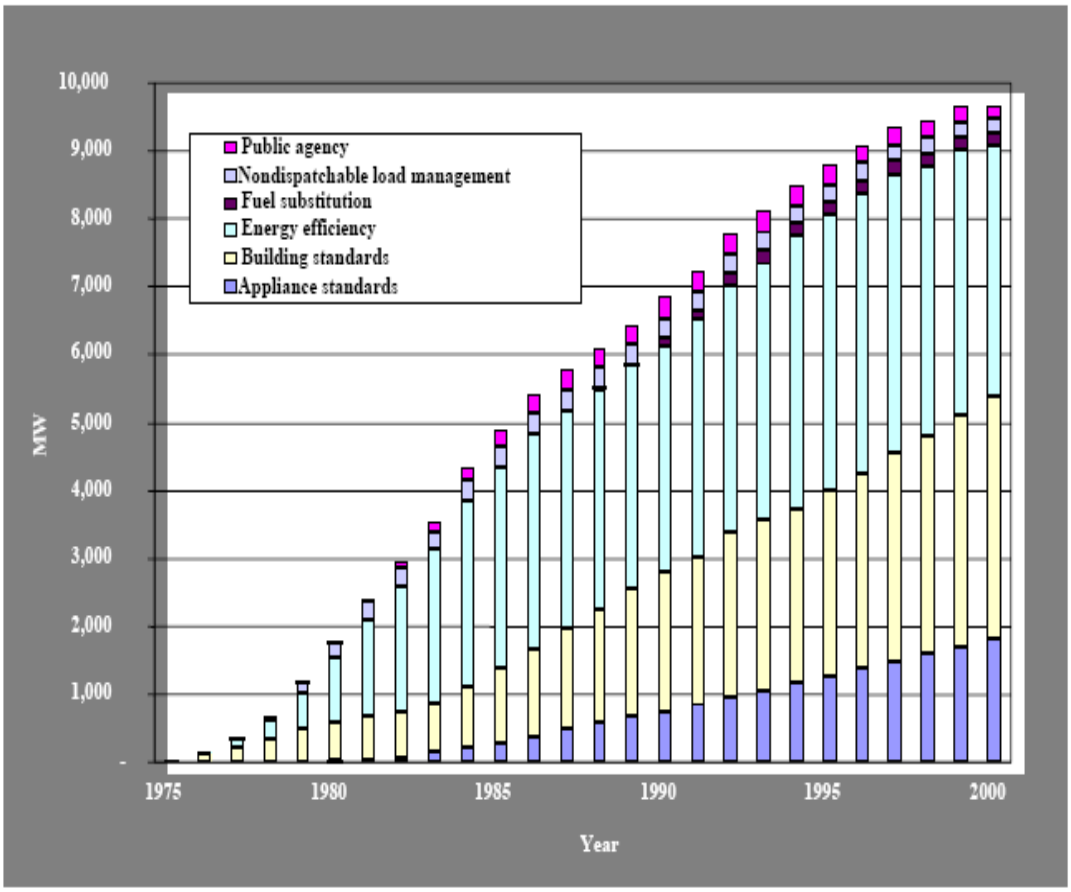
3.6 Bio-Diesel Technology

Bio-Diesel Plants use 'Jatropha' and other commercial crops to generate power and this can be done at a large scale. The crops used in bio-diesel plants are commercial and hence farmers can be given incentives to grow these crops. It is an eco-friendly technology and requires small investments. It is not a mass power generating technology and hence small units of 8 MW can be setup as pilot projects. The bio diesel plants act as backup units for an industrial complex or a separate power generating unit for a rural area. The programme can be tied up with NREGA, where farmer can be made to grow these crops. They not only will get employment but will also generate productive assets.

4. Administrative Measures

Administrative measures can have significant impact on energy savings. Administrative measures often involve enforcing of rules and regulations regarding energy consumption. A variety of administrative mechanisms add up to the total approach. The figure below details the breakup of individual measures taken for energy efficiency in California.

Figure 6.2: California Cumulative Energy Efficiency Savings



Source: California Energy Commission *2002*

Delhi needs to establish a dedicated agency for energy efficiency which can ensure implementation of other measures. BEE is already taking steps for that.

4.1 Energy Ratings

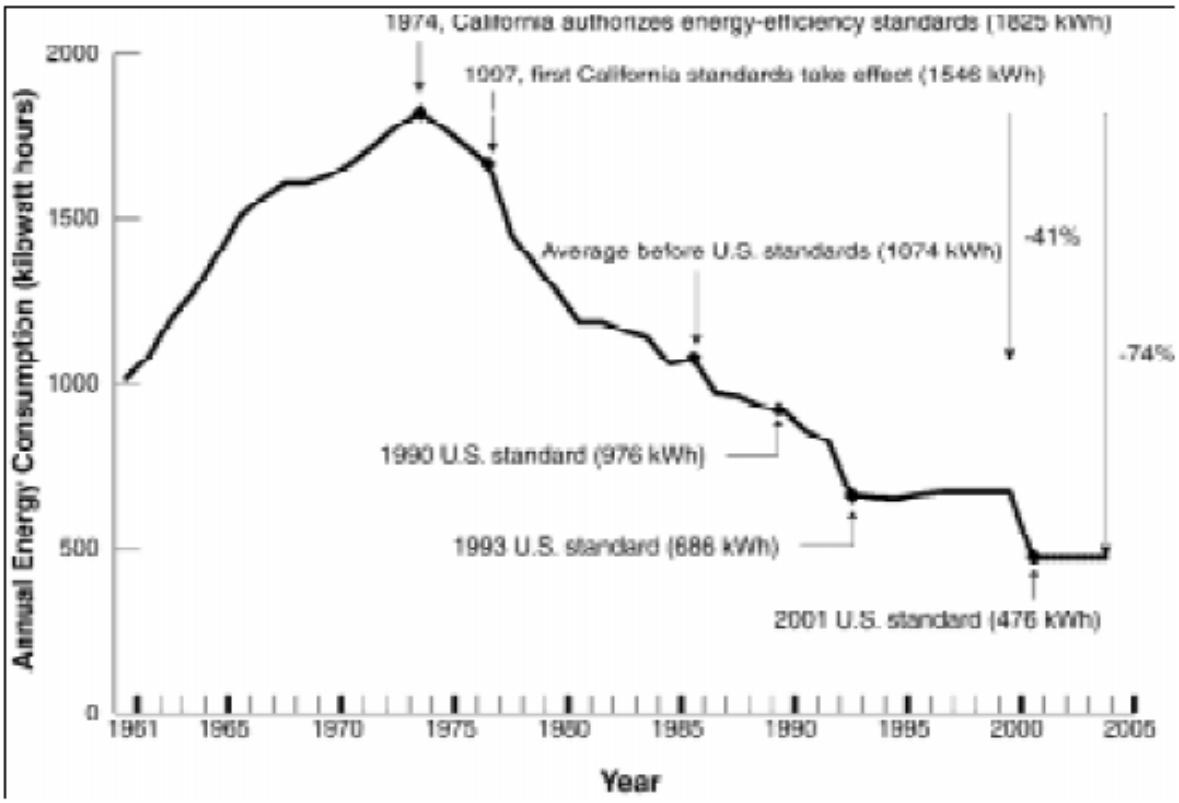
The Energy Ratings which are necessarily provided by most of the appliance manufacturing companies, they should be expanded across more number of appliances. Every appliance can have a minimum energy rating to be maintained in Delhi. The rating has to be different for different appliances. It can be bought for freezers, room heaters, fans, computers, kitchen equipment etc. This will also reduce the dumping of inefficient appliances by foreign countries in Delhi.

4.2 Energy Efficiency Monitoring Committee of Delhi (EEMCD)

The EEMCD has to introduced in Delhi (may be under BEE) in order to induce more Demand Side Management Measures as compared to present. It looks after implementation of Laws introduced under the subject and acts as energy efficiency advisor to various departments of Delhi Government.

4.3 Minimum Energy Performance Standards

The Industrial connections need to meet a Minimum Energy Performance Standard (MEPS) in addition to the ratings of each appliance. The MEPS has to be introduced and implemented by an energy efficiency monitoring body introduced by legislative measures. The different industries have to be rated after energy audits and a minimum energy standard has to be maintained under the ratings given. Energy standards have the following effect as it had on California after setting minimum energy standards.



4.4 Consumer Indexing System (CIS)

The Consumer Indexing System has to be maintained by DISCOMs in order to gather a demand side profile of their region. This involves surveying the households to check the type, number, energy ratings, etc. of different appliances in their distribution zone. This measure will help in determining the demand profile more accurately, devising laws to re-shape this demand, and also help monitor the implementation of policy as there will be a feedback mechanism in place. The CIS needs to be monitored in a fixed time period in order to register new appliances added to the system. Also, a mechanism can be placed whereby any appliance bought will be registered with the DISCOMs. This will create a huge database for discoms, which will help them determine exact end use of electricity.

4.5 Energy Audit

The Energy Audit can check the energy efficiency at three levels of the system i.e. the feeder level, the consumer level and in industries at the appliance level (pumps, power generating machines, the system itself, etc). The energy audits produces a set of measures which if followed can improve the system in general and these measures need investments which can be recovered from the savings made due to high energy efficiency.

ENERGY AUDIT RESULTS (GOVERNMENT BUILDINGS)						
Building Particulars	Annual Energy Consumption (Million kWh)	Annual Energy Savings (Million kWh)	Percentage Savings (Million kWh)	Annual Energy Savings (Million Rupees)	Investment (Million Rupees)	Payback Period (Years)
Rashtrapati Bhavan	3.4	0.8	23	5.0	5.1	1
Prime Minister Office	0.8	0.3	32	1.7	5.0	3
Sanchar Bhavan	2.6	1.2	46	7.6	14.7	1.9
Shram Shakti & Transport Bhavan	2.0	0.8	39	4.3	15.8	3.7
R R Hospital	10.0	2.9	28	8.8	4.5	0.5
Airport	71.3	1.6	20	5.9	18.0	1.5
Rail Bhavan	2.4	0.6	25	4.0	16.3	4.2
AIIMS	36.9	9.3	29	7.1	107.0	1.6

Since the Electricity Conservation Act has been passed in 2001, nine govt. buildings have been audited and the results range from 20% to 46% savings. Hence, the audit is the best way to identify key measures to be implemented so that energy efficiency of the building can be improved. A case study has been shown below.

Case Study: Nanjing Chemical Plant

Basic Information (Before DSM):

Annual Output: 377,674 tons

Annual Electricity Consumption: 191,837,160 kWh

Electricity Expenses/Total Production Cost: 10.39 percent

DSM Implementation:

Start Year 2002

Measures:

A: Retrofit Electrolytic Tanks

B: Retrofit On-Site Water Plant Pump Houses

Total DSM Investments: $ 544,000

Benefits from DSM programs:

Annual Electricity Savings: 9, 904, 800 kWh.

Annual Economic Benefits from Electricity Saving: $565,000

Production Capacity Increase: 33 percent.

Source: Energy Foundation, China Sustainable Energy Programme

4.6 Time of Day Metering

With intelligent meters in place and higher monitoring from the DISCOMs, day and night time (or peak and off-peak time) metering can be different and simultaneously we can introduce different fares for the multiple slots. At present, tariffs have very less effect on the demand as they are fixed. But with time of day metering, a demand based formula can be introduced.

Investment and Payback for energy efficiency options						
EE Option	Existing Price (Rs)	Usage (Hrs/Day)	Payback with existing tariff	Payback under ToD	Incremental payback under ToD	Life (Years)
Bulb to CFL	90	6	3.6 months	2.9 months	2.6 months	3
Old Tube lights with EE tube lights	460	6	2.5 years	1.7 years	1.5 years	8
Old fans with EE fans	1585	12 (8 months)	7.2 years	4 years	4.6 months	10-15
Old AC with EE AC	13500	8 (4-5 months)	10 years	4.7 years	11 months	10-15
Source: TERI analysis *Incremental payback indicates the payback of additional cost spent on energy efficient options in case of new purchases.						

For example, BEE had done surveys for nine buildings in Delhi. The payback period can be as less as 3 years in highly energy inefficient environment.

At micro-level, the system is profitable for DISCOMs and favorable for Energy Audits.

4.7 Energy Conservation Building Code (ECBC)

ECBC has been designed for newly constructed buildings having 500 KW demand or a contract demand of 600 KVA (Kilo Volt Ampere). It takes into account various parameters like ventilation, position of windows, natural lightening, heat insulation. The building code has not been made mandatory till now. Though, it can be customized by the state officials according to the state requirements. Therefore, the govt. can initially make the ECBC a mandatory measure for new buildings falling in the category.

5. Legislative Measures

5.1 A Legislative framework

A legislative framework needs to be designed which takes care of following things.

1. ECBC is made mandatory.
2. Energy Audits should be made for consumers using above a particular unit level according to their particular connection category. They should be required to do energy audits (or efficiency consulting) within three months and after calculation of payback period and financing, ESCOs or they themselves need to make the investments and register it with the EEMCD.
3. EEMCD needs to be given power to monitor any agency on the efficiency aspect and enforce the laws drafted.
4. Licenses needed to enter the market should be abolished for ESCOs as they have captured only 1% of the potential in Delhi region and also, this will promote more efficiency and awareness.
5. Penalties need to be paid by the defaulters if the MEPS are not maintained by the consumers.
6. Also, as in case of transport where govt. has continuously raised bars for efficiency standards, minimum energy ratings need to be raised for each type of appliance individually especially for refrigerators and ACs. Also, a minimum efficiency of the system needs to be maintained by industrial consumers specific to the industry. These measures have to be monitored by EEMCD.

6. Fiscal Measures

Fiscal measures can be introduced for a wide ranging instruments and techniques. They can be applied to some of the aforementioned measures as well.

6.1 Weighted Tax w.r.t. Ratings

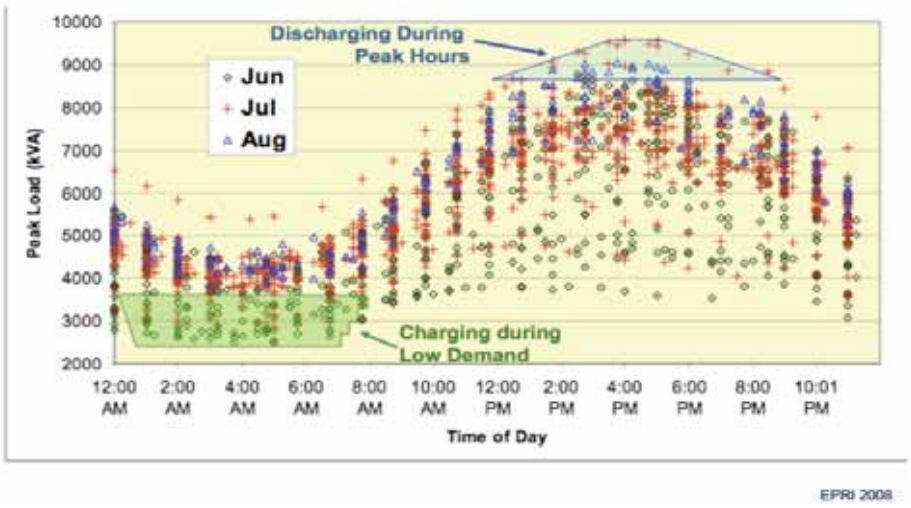
The tax on appliances can be levied in such a way that the tax is the largest on the least energy efficient appliance, with other parameters constant, and is least on the most energy efficient appliance in the same category and with same configuration. The measure will force consumer to make choices favoring energy efficient instruments and will also encourage their sales. Since the price gap sometimes is very less between the instruments with same configuration, the tax will create a disincentive to buy the energy inefficient appliance. One negative consequence might be that it may reduce the demand among the lower economic strata of the society and hence affect the Human Development Index.

6.2 Solar Subsidy

The setting up cost of a solar power plant is very large and the prime reason for less use of this technology. States like Tamil Nadu give 80% subsidies on setting up a solar power plant. Delhi govt. has to increase subsidies for micro-level use of the technology. Moreover, after intelligent meters, the energy produced outside grid can be fed into the grid. So in order to popularize the use of solar cells in buildings, govt. has to subsidize the setting up of the plant or give high return on the units fed into the grid.

6.3 Time of Day Metering

The ToD Metering provides an economic incentive to use electric appliances during non-peak hours. Therefore, tariffs have to be set in such a way that the consumer shifts to the scheme since it promotes energy efficiency (refer 4.6). The tariff as set by DERC should have an economic incentive for the consumer to shift to this feature. The consumer need not forcibly follow ToD because the system needs intelligent meters for which consumer has to pay. Generally, the demand is seen in the following pattern during peak months of June July and August for a period of 24 hours. :-



A lot of demand can be shifted to non-peak hours by ToD.

6.4 Zero Energy Buildings (ZEB)

The ZEBs have to be provided with tax sops in order to defray the huge initial investments made by the companies. These types of efficient buildings are very important to mitigate the climate change and hence, should be promoted. ZEBs have to be vigorously promoted as they are the future of sustainable economy. Hence, enough tax sops should be provided by the govt.

6.5 Promoting Bio-Diesel Technology

The govt. need not provide any subsidy for the Bio-Diesel Programme. The growing up of Jatropha and the projects to convert it into bio-diesel comes under NREGA

programme. The bio-diesel project and the farmers can be paid under the act for starting up an income generating project.

6.6 Delhi Energy Fund (DEF)

DEF needs to be promoted as a vehicle for encouraging research for technologies involving smarter grids and higher energy efficient measures. DEF can sponsor technologies for ESCOs. As the energy sector is research driven, govt. needs to align this investment vehicle with different technical institutions.

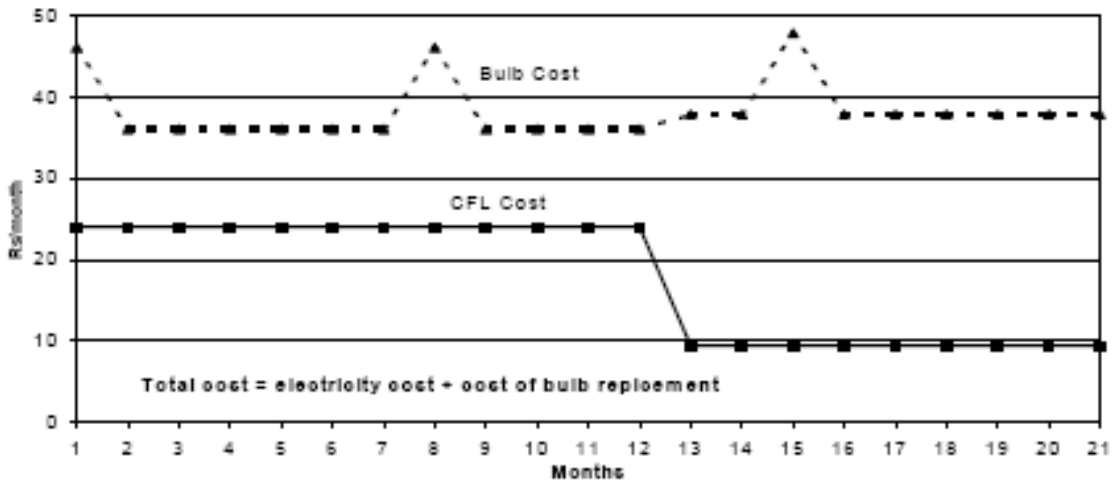
6.7 Financing Vehicle for ESCOs

The financing for investment after the audits is required and hence an investment vehicle should be promoted by the govt. to ease the investments made by the consumer initially.

6.8 Leasing CFL Lamps

Bulb Type	Equivalent Wattage	Price	Operating Price (5 hours)	Payment after lease/ month	Life	Payback period
Incandescent Bulb	60	10	36	……..	7 months	……
CFL	15	180	9	24	53 months	12 months

Consumers will save nearly Rs. 237 cr. If 24 lakh lamps are leased, 100 MW can be saved. This in turn saves Rs. 400 cr. of taxpayers' money required to install similar capacity to generate electricity. Hence leasing is a preferable method to induce energy efficiency in the system. The leasing can be possible if DISCOMs do the consumer indexing rightly.



The graph shows the consumer Lease Payment of the consumer

6.9 The "20-20" measure

The "20-20" is a fiscal measure which states that if a consumer curtails his demand by 20% compared to the previous year's estimate in the same month, then he will get a discount of 20% on his bill. The measure should only be applied in peak summer months. The other measures need some time to take-off, till then this measure can suffice. The rebated money need to be given as subsidy to the DISCOMs by the govt.

7. Education and Awareness

7.1 Citizen Charter

Every DISCOM has to maintain a citizen charter where they have to increase the awareness regarding energy efficiency and initialize new campaigns. A special Energy charter has to be released to advertise financing and give incentives for energy audits. Specific targets should also be mentioned in these charters.

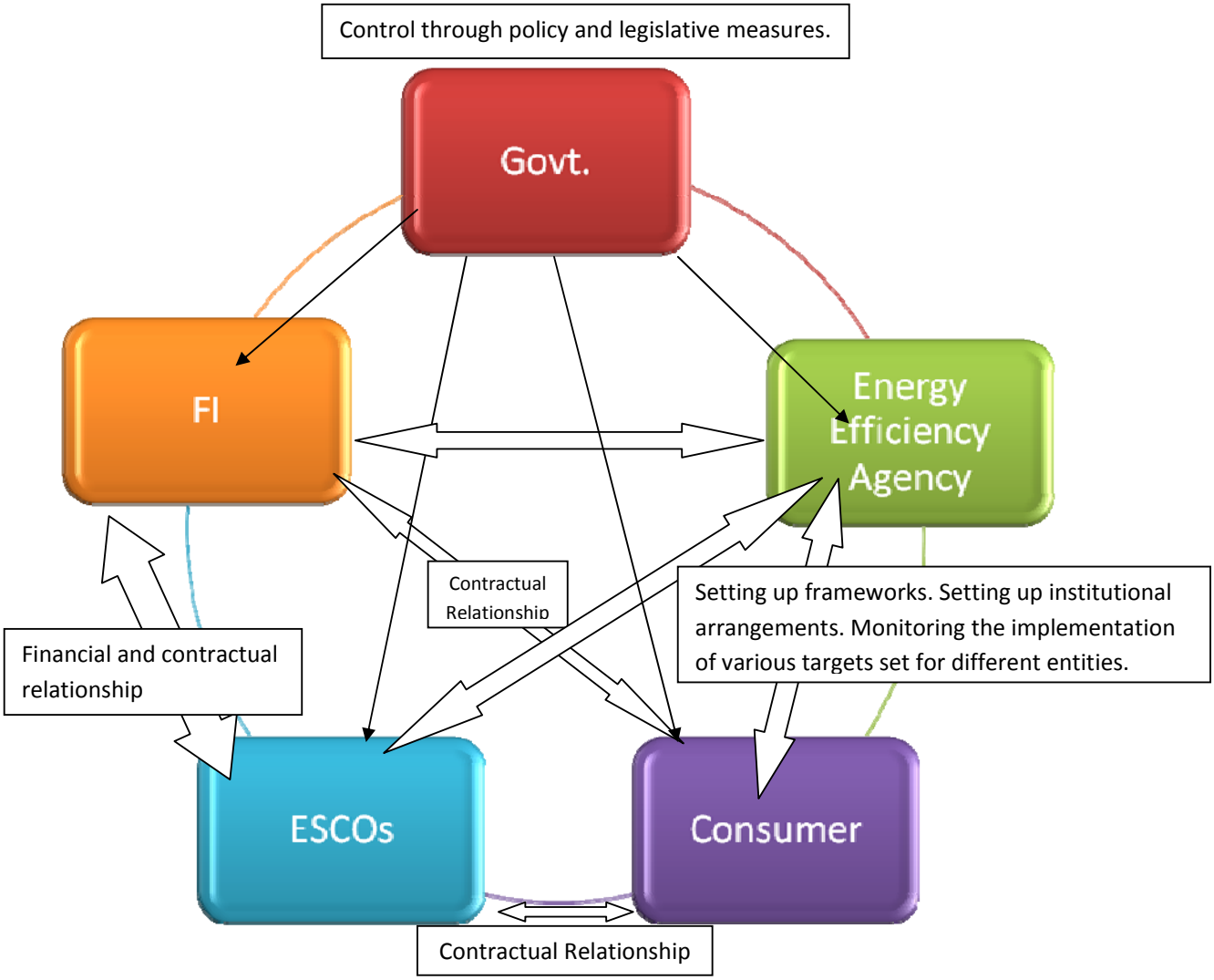
7.2 Awareness Initiative

An energy awareness campaign regarding investment schemes need to be initialized by the DISCOMs as they are nearest to the consumer. The awareness by itself can discourage the use of inefficient appliances. Also, special initiatives need to be taken on teaching the energy ratings. Often, lack of information is the main thing precluding the adoption of any energy efficiency technology.

7.3 Delhi's Golden Carrot

Refrigerator amounts to 28% of Delhi's consumption in summers and 44% in winters. The govt. can start a "Golden Carrot" drive as US started it in California in 1997. The drive concentrates on giving a subsidy to the developer of a low cost and highly energy efficient refrigerator beating all standards in the market. The govt. will help the developer manufacture by investing in the project and help the developer market it.

A possible mechanism for energy efficiency companies and financing them is given as below.



The Energy Efficiency financing structure:

There are five entities.

1) The Government: Its role is limited to only formulation of policies, and intervening when asked to do so by EEA.

2) EEA (Energy Efficiency Agency) : Principle functions will be

   a. EEA will recommend action to be taken against defaulting parties. The measures recommended can either be monetary or punitive (revocation of licenses, etc).

   b. EEA will form frameworks under which the consumer, the financing institution and the ESCOs will interact. It will also maintain a fund, which will cover the costs of defaults (the costs over and above of what had already been paid in the form of fines by the defaulting party).

   c. EEA will also implement and monitor new codes for buildings (residential and commercial) and give star ratings to households , based on the building designs, kind of electric equipment used, total electricity consumed and other parameters. The ratings can be reviewed yearly and used to determine tariffs. Buildings which move down the energy ratings can be charged higher rates than what they might have otherwise paid. While the ones who move down can be given rebates. Initially this can be done for large consumers and if the scheme works smoothly, it can be extended to smaller consumers, who form the majority of consumers in Delhi.

3) The ESCOs will provide energy services like auditing, efficiency consulting and arranging suitable financial contracts which will enable the consumer to replace old equipments with minimum of expenses.

4) The FIs will have contractual and financial relationship with ESCOs. The ESCOs will advise consumers on the most suitable financing package available, and then after arriving an agreement on the repayment scheme, the three parties will enter into an agreement. If any of the parties default, the defaulter is penalised by the EEA, while the other parties get compensated. If the default occurs because of failure to meet energy efficiency standards then the ESCO is the defaulting party. If it occurs due to failure to

pay back by consumer, then the customer is the defaulting party. The defaults cases are decided are EEA, after cross checking the reasons of default.

5) The consumers will be incentives by law to cut down their consumption. Every household's electricity consumption will be tracked and in case the monthly bill exceeds 1000 units for three consecutive months, the household would be required to consult an ESCO and get a report prepared for the household. The Report would highlight the areas where the household can cut down on electricity consumption and how it can finance those measures. The cost of report will be borne by the household. The report will however only be advisory in nature, initially. Based on how people react to such reports (prevailing studies indicate they adopt energy conservation methods) the reports can be made enforceable or can continue to be advisory in nature.

6) EEA should come up with following rating index for different buildings. The additional amount should be charged along with the existing tariffs. The guiding principle should be that, people should pay extra if the growth in their demand requires Delhi to arrange for additional capacity during any period of the year, than what Delhi has already arranged based on their present demand. Suppose a building is consuming 100 units, and if the demand of building grows up by 11 % during peak time in July, this means if the entire Delhi went by the same pattern, then govt will have to arrange for 5 % additional power capacity, since the current average growth rate is assumed to be 6% . This should then attract additional charges, for arranging that capacity (arranging it either through Short-term PPAs or IEX). The charges could be 10 % extra for every percentage point increase in demand, with an upper limit at 100 %.

   The index will suppose 100 as standard consumption. 100 is a consumption level where Delhi does not need to add any additional generation capacity. 110 is the rating where Delhi would need to arrange 1 % extra power. If the building actually shows any reduction in demand, they should be given rebates in the similar pattern. Given the fact

that the enterprises will already benefit from lower energy bills, if they reduce their consumption below a certain point, the quanta of rebate offered can be changed, at the lower levels.

Rating Index	Additional Charges
>150	Flat 100 % extra charges
150	50 % extra charges
140	40 % extra charges
130	30 % extra charges
120	20 % extra charges
110	10 % extra charges
100	Normal tariff applies
90	2 % rebate
80	4 % rebate
70	6% rebate
60	8 % rebate
50	10 % rebate
40	12 % rebate
30	14 % rebate
20	16 % rebate
10	18 % rebate
<10 (if reduction is more than 10 % of previous demand)	25 % rebate

8. Riders

There are many riders, especially related with the functioning of ESCOs in Delhi.

1) Banks are not interested in supporting ESCOs, neither are other Financial Institutions, as ESCOs have failed to come up with a foolproof mechanism to determine the baseline i.e. the exact amount of money that customer saves when she starts using energy efficient appliances provided by an ESCO.

2) Subsidies are not favored, as government is slowly dismantling the subsidy regime and another subsidy regime for renewable energy is not seen as prudent thing to do.

3) Government does not favor providing too many incentives for energy efficiency appliances since consumers are already benefitting over the life cycle of the equipment, and providing tax breaks in order to make hidden savings visible is not the right thing. Instead consumers should be sensitized about the hidden benefits.

4) Technological and practical barriers in determining the baseline.

5) Subsidy regimes are unsustainable, not the prudent thing for propagating sustainability.

6) Current business model is a little difficult to apply to household, as cost of collection itself might exceed the expected energy savings.

7) Collection of savings from households is a difficult and cumbersome task. RWAs can come forward to help ESCOs.

8) Tying ESCOs with Discoms is not a viable option, as DISCOMs can directly approach the appliance and equipment manufacturers and run the energy efficiency programmes themselves. Tying up with ESCOs with their current business model, will only introduce a middleman between consumer and discom.

9) There is no function which is unique to an ESCO, and which a discom cannot do. Discoms do not get any value addition.

10) IREDA is the only financing vehicle which is available to ESCOs right now.

11) Energy Efficiency Service Ltd, a company dedicated to increase energy efficiency is being set up by central government. The company will have equity participation from four government power companies -- NTPC, Power Grid Corporation, Power Finance Corporation and Rural Electrification Corporation. The combined holding is likely to be in the range of Rs 325 crore

12) More Awareness about the efficiency measures needed.

13) Consumer concerns needed to be addressed.

14) TERI's recommendations on Time of Day metering not accepted due to consumer concerns, high charges during peak hours might have been unpopular.

15) Manufacturer's on their part are too wary to enter ESCO market as they do not want risks.

16) Difficult for ESCOs to enter heavily politically influenced markets like agriculture and talk about energy efficiency, given the inherent riskiness of their business model.

17) ESCOs face operational problems such as lack of trained staff, vehicles etc. as well

18) As of now, only DSM measures bought and financed by utilities can work.

19) Reaching out to the consumers is the only hope for energy efficiency measures, people have to be convinced about these technologies.

20) The appliances are slowly moving towards higher efficiency standards.

21) DERC ambivalent over ToD process.

22) Political concerns override the technical and economic concerns.

23) Subsidies are generally not good model for energy efficiency equipments, since the system has to be sustainable and doable, and should be able to adjust to different conditions.

24) Most of the current projects have been pilot demonstration projects, but the models developed cannot be implemented on a large scale. Everyone is working on different models, and no single model is fool-proof.

25) Solar water heater project is suffering from practical problems. Roof access is not uniform. Hot water is needed in peak winter months, when there is little sunlight, pipes waste lots of water etc.

26) People are learning about different problems from different pilot projects. These projects are more of learning projects.

27) A programme which reduces the subsidy as well as increasing the efficiency will be much more attractive.

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