

DECENTRALIZED ENERGY CONSERVATION INITIATIVE FOR DEVELOPMENT (DECIDE) IN URBAN INDIA: A PRACTICAL APPROACH

Dr. Meenakshi Sinha Swami

Assistant Professor.

Department of Economics, Mata Sundari College for Women,
University of Delhi, New Delhi-110002

Abstract

Energy conservation possibilities have to be tackled head on and alternatives have to be decided upon. With climate change on our doorstep and energy consumption on the rise, innovative steps are required for meeting energy management challenges.

This research paper, looks into the various aspects which have been analyzed for converging localities or neighborhoods towards sustainable energy usage, or planning for low energy consuming neighbourhoods through various energy conservation measures, possible energy mix plans, household level initiatives, locality or neighborhood level initiatives, and overcoming energy deficit in a sustainable manner.

Decentralized Energy Conservation Initiative for Development (DECIDE) deals with selecting an area, studying the requirements and possibilities of the area and forming an action plan and implementation strategy. DECIDE can be practically put to practice in localities. Energy Conservation Parameters (ECP) formed for the localities and most ECPs could be applicable in general for NGOs and local area committees which are interested in bringing existing localities closer to energy conservation neighborhoods, and also for those planning new sustainable localities. Energy Conservation Parameters (ECP) as a part of DECIDE is for the ground level DECIDE has been the outcome of an intensive study of the Dayalbagh area in Zone II of Agra Development Authority.

Key Words: *Energy Conservation Parameters; Decentralized Energy Conservation; Development; Urban India; Sustainable Neighborhood Development*

JEL Codes: JEL: O - Economic Development, Technological Change, and Growth, JEL: Q - Environmental and Ecological Economics; JEL: R - Urban, Rural, and Regional Economics)

INTRODUCTION

In India power consumption has doubled over the period 1990 and 2012, and still according to a NSSO study, 25 percent of the people do not have access to electricity. Moreover India is highly dependent on imported petroleum products which comprise more than 36 percent of our energy basket. Renewable energy contributes a mere 6 percent, though the government is trying to make a strong foray into the renewable energy's contribution to the power consumption basket.

Resource conservation is possible when energy requirement and possible pattern of usage is looked at for environmental benefit from it to the locality and the country in turn.

Decentralised energy conservation cannot be ignored since energy conservation is a much needed practice for localities. Decentralized Energy Conservation Initiative for Development (DECIDE) in urban India has a wide implication on the energy management since it includes forming Energy Conservation Parameters (ECP) for the locality under focus for conservation. There are a number of small steps that have to be taken to bring localities or neighborhoods closer to sustainable lifestyles and the benefits from these small steps will pervade through the locality and will have positive national and global impact.

Planning Commission Deputy Chairman Montek Singh Ahluwalia also agreed that it was important for the state to give authority to local people to make rules and impose penalties. The Twelfth Five Year Plan would give primacy to this aspect as the business-as-usual approach had not worked [1]. The ministry of New and Renewable Energy (MNRE) is implementing 'Development of Solar Cities' aimed at reducing at least 10 per cent of the projected demand of conventional energy through renewable energy installations [2]. In the XIth Plan (2007-12) MNRE had proposed to develop 60 cities as 'Solar Cities' Centre would provide financial support up to Rs. 50 lakh for each city to the respective state governments for preparation of master plan, awareness generation and capacity building activities [3] and the XIIth Plan (2012-17) plan has carried it forward, but what is required are ground level initiatives.

The present research based study presents Decentralized Energy Conservation Initiative for Development (DECIDE) by deriving and analyzing end-use Energy Conservation Parameters (ECP). Framing ECP will help existing localities move closer to energy conservation neighborhoods, and also for planning new sustainable localities. This can be generalized at the national level for policy initiatives. The present paper also helps to reconsider the ways in which energy is used and to rethink the possible changes in the end-use energy consumption pattern in a typical unplanned urban locality in North India as a sample.

To some extent the challenges can be met by improving the conventional energy systems or introducing renewable energy systems as backups and bringing in quality services for the whole locality. A major shift away from the usual unsustainable consumption patterns is

needed, at the same time ensuring clean affordable energy services for all including the lower income groups of the locality or neighborhood.

EXPERIMENTAL ASPECT

DECIDE helps in framing the energy conservation parameters, they are constructed with the help of possible changes that can be brought about for energy conservation initiative at the ground level. After finding the alternatives for energy conservation possible in the region, the possible people initiatives, the possibility of forming NGO's, possible MNRE and MOEF Initiatives and subsidies and also NGO initiatives at the ground level.

Firstly a plan is required to be formed for doing a primary study of the area. An assessment of the present status and prevalent methods should be undertaken at the secondary and primary levels.

For the primary study, a sample size should be decided, and sample area should be selected. The questionnaire design should include awareness of the respondents for energy conservation, present practices that have been undertaken by them, interest of the respondents to go in for energy conservation and initiatives which the respondents are ready to undertake within a certain time period. The aspects should include all the aspects concerning energy consumption as power, for travel, for cooking, for the kind of cooking methods which are in use by the respondents etc. These initiatives which the respondents are ready to undertake should be on the personal level in their residences, colonies, and by joining NGO's or other local groups. The second and third part of the questionnaire or schedule should be administered only after sensitizing the locality. The first part deals with awareness and the other parts of the questionnaire deal with interest and initiatives towards management of energy consumption.

The primary data should be analysed for statistical significance through inferential statistical assessment. The tests should be applied for finding the overall significance of the possibility of change towards energy conservation the locality is ready to go in for, the difference among the sample scores on the basis of income groups etc. The kind of inferential hypothesis that can be framed should be based on the significance of possibility for energy management in the area and other hypothesis should look in to the possible divergence between income groups concerning their awareness, interest and initiative for change. Anova or non parametric equivalents can be applied such as Mann Whitney U or Kruskal Wallis H.

Finally a SWOT analysis can be conducted to bring forth DECIDE (Decentralized Energy Conservation Initiative for Development) which can be undertaken for conservation is areas chosen, to deal with energy conservation

ENERGY CONSERVATION PLAN IMPLEMENTATION

The aspects covered here are 1. Energy conservation aspects of the locality; 2. Household consumption of electricity; 3. Electrical Appliances preferred; 4. Forms of usage; 5. Modes

of energy usage; 5. Possibilities in energy mix,; 6. Ways to control personal use of motorized vehicles; 7.Parameters derived for energy conservation for the particular locality; 8. Household level plans; 9. Community level plans

DECIDE (Decentralized Energy Conservation Initiative for Development) in localities and colonies

Houses should be better oriented to suit climatic conditions. Use eco-friendly material for their construction, and ecological building aspects should be included in changes that can be made to conserve energy, Reduce electricity usage by reducing the number of electricity based equipments, alternatives are always available, alternatives like solar power can be harnessed for cooking through solar cookers, solar thermal concentrator disk systems, possibility of alternative plans for local small commercial establishments like eateries and shops etc. transportation can be tackled head on by drives on awareness of change in modes for a healthy lifestyle, possibility of aspects should be surveyed and sensitization of various aspects should be undertaken. The possibilities are many and they should be examined like make fewer trips, use eco-friendly and energy saving transportation mode, demand for good public transport, Join a car/taxi pool, go for pooled ownership of houses, Reduce speeds for possible cyclists and walking and crossing public, demand a cycle lane, Buy locally made, long-lasting materials thus saving on transportation costs. Possibility of having colony garden for vegetables where the residents who have an hour to spare like the senior citizen, other men or women who have an hour of spare daily, few times a week or once a week can come together for togetherness and contribution while saving on transportation costs.

Energy Conservation Parameters (ECP)

ECP can be framed for individual localities by finding out through a survey 1. The current pattern of energy usage, 2. Giving options of researched possibilities, 3. Energy mix plans for households, 4. Possible local initiative for community level conservation etc, 5. Cutting down on vehicular traffic through adequate plans 6. Every conservation shift to be a learning experience for the locality.

ECPs framed for the area under study. Through selection study and action, an area can be transformed such that it can conserve energy and improve its surroundings. Thus making localities safer for its residents

Plan for practically applying DECIDE in localities

- a. Each member conserves energy as a responsible human being
- b. Focus on green building and communal spaces
- c. Each household operates within an energy consumption limit
- d. High power consuming electrical appliances kept to the minimum
- e. Walking and/or cycling given preference over short distances
- f. Number of motorized vehicles limited and restricted usage inside the colonies
- g. Preference for energy mix
- h. Embracing voluntary simplicity and frugality

- i. Energy efficient appliances
- j. Efficient common transportation
- k. Try to be a model for a future way of life

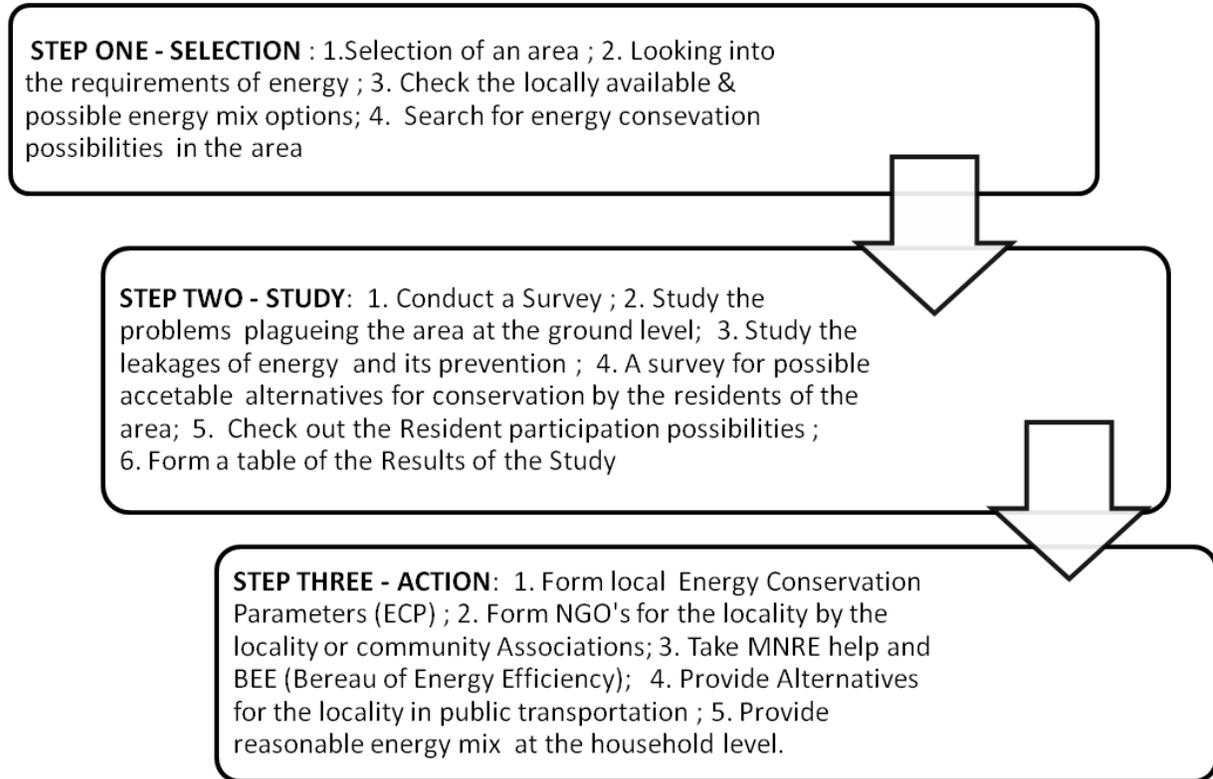


Table 5.1 DECIDE in Action

CARRYING OUT A SWOT ANALYSIS

SWOT analysis helps with the possibilities of overcoming weaknesses and threats and forming an action plan for bringing the area closer energy conservation. The following is the SWOT analysis for the area

The aspects that can be examined here are Preference for energy conservation, Energy conservation measures taken up in the area, density of air conditioners, preference for cyclists, Residents interested in a separate cycle lane for short distance travel, Interest shown in other devices run by solar systems, Interest in buying solar cookers, Residents want a shared transport service to decrease the usage of car and residents may be interested in shared car parking outside their colonies. NGO initiatives for the area can be assessed and their possible enhancement towards contribution for energy management in the locality examined, many questions can be probed like how many want to be part of such local associations where they can jointly carry awareness drive and increase awareness for energy management. Thus they can apprise people of health benefits and economic benefits from alternatives to

their present lifestyle choices, workshops can be conducted, case studies can be discussed , local NGO can be formed from among the residents to improve the area, the residential welfare association can be roped in and sensitized towards bringing in changes,

PRACTICAL ASPECT: AN ACTION PLAN

The residents and NGO's can capitalize on the strengths and opportunities brought forth in the SWOT analysis. Accordingly a) More Projects Should Be Undertaken, b) Workshops and Exhibitions Held, c). Awareness program by NGO's and residents, d). MNRE Initiatives and subsidies taken advantage of, and e) Committee of Cycle Users formed etc.

COST –BENEFIT ANALYSIS FOR HOUSEHOLDS

An equation has been created as part of possible action plan for measuring individual preference for conversion to renewable sources of energy of individual households or for similar income group residents of a colony as a unit

Here igc_1 is the incremental gains from conversion to renewable energy sources from the traditional electricity supply for individual households or for similar income group residents of a colony:-

$igc_1 = \text{Benefit} - \text{Cost}$

$$= [\Sigma 6eb_1 + 3red_1 + (3\beta m_1 - 3av_1)] - [\Sigma(3\beta fc_1 + 2\beta r_1) - \Sigma(3af_1 + 2am_1)] \dots\dots i$$

Benefit comprises of $[\Sigma 6eb_1 + 3red_1 + (3\beta m_1 - 3av_1)]$, $6eb_1$ the environmental benefit present and future due to usage of alternative sources of energy (CO₂ emission reduction etc), $3red_1$ possible reduction in environmental degradation due to conversion to alternative modes of energy reduction and av_1 & βm_1 is the annual cost occurring as a multiplication of monthly cost of running the unit through the solar system and the supplied electricity respectively, and $(3\beta m_1 - 3av_1)$ is the present annual benefit

Cost comprises of solar installation is $[\Sigma(3\beta fc_1 + 2\beta r_1 + 2am_1)]$, βfc_1 the fixed cost due to conversion to renewable form of energy, βr_1 the replacement cost occurring after every 6 years and am_1 is the cost of maintenance due to accidental faults.

Preference for Conversion Calculation

$preco_1$ is the preference for conversion.

$$preco_1 = \Sigma(\eta_1 + 2i_1) + \Sigma(2y_1) \dots\dots ii$$

η_1 is the knowledge of conversion and environmental degradation, i_1 is the interest and aspiration to reduce energy consumption and y_1 is the annual income of the household. $\Sigma(\eta_1 + 2i_1)$ is the qualitative factor and in turn affects adoption of solar energy generation

For high family income groups for which cost of conversion is not an issue then η_1 and $2 i_1$ gain importance and could turn out to be important criterion for conversion along with the exception of problems associated with the new form of energy use.

Polluter Pay Principal for Externalities

Polluter pay principal is an environmental economics policy principal which requires that the cost of pollution or any other negative externality be borne by those who cause it, thus internalizing the externality. A separate analysis can be undertaken to include quality of air and health benefits, serenity of the environment, reduction in noise etc. The loss of benefit due to personal disturbance due to pollution and noise can also be included and its cost as an externality suffered by others. Health risks must also be added.

Achievable Outcome

- Area specific

CONCLUSION

DECIDE brings forth various possibilities for moving closer to energy conservation. An action plan should be formed which represents the requirements and acceptable possibilities for the area. Highlighting the initiatives at household level will lead to demonstration effect which will accelerate the movement towards energy conservation. NGO's and residents can come together to popularize sustainable aspects of living, through workshops and exhibitions as mentioned in the action plan, projects can be taken up for further research, possibility of aid programmes exists since conserving energy is an important issue for many national and international bodies, agencies and non- governmental organizations.

The positive changes which the people in the locality or neighborhood are interested in, itself tells a great deal about the nascent feelings among the residents for pursuing a sustainable lifestyle. Through this research work, one can measure the possibility of changes which the people are ready to undertake individually and as a whole, in a particular area. The parameters on which possibility of sustainable changes can be adopted or molded to measure such changes. Therefore changes through consensus in many localities or neighborhoods can be brought about.

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