SUSTAINABLE ENERGY POLICIES FOR PROMOTION OF SOLAR COOKERS IN INDIA

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ABSTRACT

This paper is premised on the need to enlarge the scope of India's public discourse on energy security to include the imperative of reaching clean energy at affordable prices to a widely dispersed rural population currently without access to commercial energy sources. In this context, the paper identifies, after a review of India's current policy framework for solar cookers, specific measures and incentives, which, if adopted, could lead to increased use of solar cookers by households, institutions and businesses. The specific role of different stakeholders in achieving these objectives is also identified.

Key words: energy security, sustainable energy, solar cookers, policy, incentives

1. INTRODUCTION

Access to abundant, clean and affordable energy sources is a paramount concern for developing countries striving to raise the quality of life for their citizens. In India, with its billion plus population and very low per capita incomes, the public discourse on energy security has hitherto focused excessively on balancing the country's heavy oil import dependence with its energy-intensive growth paradigm. There is an urgent need to enlarge the scope and definition of energy security to address the need for reaching clean energy at affordable prices to a widely dispersed rural population currently unable to access formal energy sources.

2. BACKGROUND

It is now widely acknowledged that quality of life is closely linked to availability of clean energy sources. In India, fuel wood, agricultural waste and cow dung comprise the main non-
fuels – both commercial and non-commercial. The latter, used predominantly for cooking purposes, directly displace LPG (liquefied petroleum gas) and Kerosene. More than 60 per cent of Indian households rely on non-commercial fuels for cooking, two thirds of them entirely on fuel wood. India's consumption of fuel wood, chips and dung cake was around 223 million tonnes of oil equivalent in 2001.

Despite rapid urbanization and the increasing availability of LPG and kerosene, consumption
of non-commercial fuels is expected to increase steadily over the next two decades. [1]

Solar cookers can provide a clean alternative to fossil fuels. India's location in the tropics is its great advantage. The country gets an average of 5 to 6 hours of sunshine in most parts, for over 300 days a year, making solar cooking an eminently feasible option for households, community kitchens, hospitals and even commercial catering establishments. The benefits are manifold.

It has been estimated that use of solar cookers by households can reduce LPG consumption by 4 cylinders a year.[2] In other words, from the consumer's perspective, investment in solar cookers will be recovered in just one

[1] Government of India, Planning Commission: Tenth Plan Document, 2005 pp 759-800
[2] Based on discussion with MNES officials.

year, whereas for the Indian government, it could save on subsidies that are currently being doled out to make both LPG and kerosene affordable to the lower income strata of society. If community kitchens, hospitals and restaurants also take to solar cookers of the appropriate technology, the savings could be much more.

3. PURPOSE

At present, solar cookers are low on India's policy priority and consequently, their penetration and reach is limited. In order to promote the use of solar cookers, the Indian government may have to come up with a concerted and comprehensive policy framework. This paper attempts to identify some of the contours of such a policy framework.

4. ALTERNATIVE ENERGY SOURCES - FOCUS ON THE FEASIBLE

In its quest for non-conventional sources of energy, which still constitute less than a single percentage point in India's total commercial energy basket, India has embarked upon an ambitious program, earmarking substantial funds and manpower in both research and development (R&D) and pilot projects. In fact, it is the only country in the world which has a dedicated ministry exclusively to oversee the development of non-conventional energy. The gamut of non-conventional energy programs includes solar heating, solar photo-voltaics, geo-thermal, wind energy, bio-fuels including bio-diesel and biomass gassifiers, co-generation technologies, waste-to-energy projects, etc. Recently, India even launched a massive hydrogen fuel cell program, earmarking substantial sums for R&D.

While it is imperative that an import-dependent developing country like India pursue multiple fuel options and diverse sources of supply, it is neither necessary nor desirable to spread its meager R&D budget thin by allocating it to all kinds of fuels and projects. Hydrogen fuel cells, for example, are being developed by multinational corporations like Ford Motors etc which have invested massive sums of money in the project. It is futile for India to aspire for breakthroughs on a fraction of the budgets these corporations have set aside for fuel cell development. While intellectual property rights will be zealously guarded and patenting will render these technologies costly to acquire, the ever-increasing evidence of climate change could be used by the architects of Kyoto Protocol to persuade developers of fuel cell and other sophisticated energy technologies to share them with developing countries in the larger interest of arresting global warming.

Of the Rs.60.5 billion (US $ 1.37 billion) earmarked by the Government of India last year for all non-conventional energy sources, solar was allocated Rs. 9.07 billion (US $ 204 million).[3] However, most of it went to development of photovoltaics for stand alone power generation units. Electricity is only a secondary energy need for the majority of poor Indians living in rural communities. Fuel for cooking is a more pressing daily need and therefore, needs to be provided first. With only a fraction of the amount invested in developing photovoltaic technology, India can promote solar cookers. Ease of use and abundance of sunshine make it an attractive option.

Therefore, the need of the hour is a review of the on-going renewable energy programs to separate those that hold potential from those that entail long lead periods and huge investments. Since the yield in terms of benefits could be much larger for a comparable or smaller size of investment, solar cookers and water filtration plants present a very attractive option. Re-allocation of R&D budget as well as subsidies to develop and improve upon existing models of solar cookers and water filtration plants must be taken up as a priority. There is also an urgent need to rope in universities and research institutions engaged in scientific research (such as the Indian Council of Scientific Research) to develop and upgrade models of solar cookers and water treatment plants. Funding should be provided to these institutions and universities for such research.

5. REALLOCATE SUBSIDIES

Affordability of energy sources is a paramount concern for India. With annual per capita income being as low as US $ 285, few people have the purchasing power to avail of commercial fuels even if they are available. Therefore, the Government of India has designed a range of subsidies, both hidden and open, to ensure a modicum of energy security for the relatively weaker sections of society.

Kerosene and LPG subsidies are among the most egregious of all fuel subsidies in India. The outlay on these two subsidies in FY 2005 was around Rupees 35 billion (US $ 790 million). Each cylinder of LPG carries a subsidy of Rupees 150 (US $ 3.40) while there is a subsidy of Rs. 9 (20 cents) on each litre of kerosene. As against this, the entire solar energy program budget last year was a mere Rs.46 billion (US $ 1 billion). While fossil fuels are being subsidized in the name of the poor, the even poorer population that cannot even afford the subsidized fuels is lost sight of. There is a strong case for

[3] India Budget 2005-06 Demands for Grants

substantially increasing the budget for solar energy programs, especially solar cooker programs either by diverting fossil fuel subsidy or through a cess on fossil fuel sales expressly levied for the purpose. Targeting subsidies at the poor through subventions to appropriate programs and technologies should be taken up forthwith.

6. MAINSTREAM GENDER SENSITIVE POLICIES

The Indian Parliament recently enacted a law to reserve a third of its seats exclusively to women, perhaps the first legislative body in the world to do so. The Indian Constitution awards equal suffrage rights to women and recent laws ensure equal rights to property for women. Panchayats (rural local governing bodies) led by women are a common feature in many Indian states. Women now occupy responsible positions in virtually every profession including the armed forces.

Yet, these success stories are limited to a small section of women from educated and privileged classes while the large chunk of rural women are condemned to daily drudgery - trudging miles to fetch firewood for cooking and drinking water. Besides, cooking with firewood or dung-cake exposes them to indoor smoke which has been found to be the major cause of respiratory diseases among rural women. Promoting solar cookers as a supplement to firewood and cow dung fuel could reduce this drudgery significantly.

Polices to mainstream gender cannot ignore technology that reduces the drudgery of rural women. In fact, in recent years, the Indian federal budget has set aside funds under the head 'gender-budgeting' exclusively to benefit women. In the FY 2006 budget which has just been presented to the Indian parliament, Rs. 2875 billion (US $ 65 billion) has been set aside for women-oriented schemes although solar cookers do not feature in them. There is a case for including promotion of solar cookers under this budget head.

7. LEGISLATE FOR CLEAN DEVELOPMENT

Effective January 1, this year, China has in force, a law mandating the use of renewable energy. For instance, builders are now required to construct buildings that exploit solar energy to the extent of 20 per cent of their requirements. There is no reason why India cannot also legislate for greater use of renewable energy in which solar cookers are expressly or implicitly included. Having an enabling and supporting legislative framework is the starting point for ensuring energy security and solar cookers cannot remain outside this paradigm.

8. STRENGTHEN DISTRIBUTION NETWORKS

At present, there is no organized network for distribution of solar cookers to remote regions of rural India. The Ministry of Non-Conventional Energy Sources (MNES) has nominated nodal agencies for providing information about solar cookers, but these are located in the state capitals and not in rural areas where demand is likely to be the highest. Since 2002, private entrepreneurs have also been encouraged to set up what are called 'Akshay Urja (renewable energy) shops to stock solar energy products.

The Public Distribution System, India's success story in extending food grains at affordable prices to the economically weaker sections is well-established country-wide network of 400,000 Fair Price Shops – the largest distribution network in the whole world. Its reach extends to remote rural areas as well. Without setting up additional infrastructure, the same network can be harnessed to stock and sell solar cookers in villages as well as towns. Considering their bulk, some additional space may have to be leased. After-sales service should be ensured through a network of voluntary social workers or civil society organizations which can be trained in conducting minor repairs and trouble-shooting. In fact, according to feedback received from India's Ministry of non-conventional energy sources, repairs and maintenance are perceived to be a perennial problem. The ministry has recently launched self-employment groups trained to repair solar cookers. This is a step in the right direction.

9. PUBLICISE AND INCENTIVISE MANUFACTURE AND USE OF SOLAR COOKERS

At present there is no information in the public domain about solar cookers except on the ministry websites which are not accessible to the rural consumers at whom it is targeted. [4] Even city-dwellers have no idea where these can be procured or how they can be used to supplement conventional cooking fuels. Therefore, a focused and vigorous campaign effort designed to convey the benefits of solar cookers – much the same way contraception was popularized to control population – is the need of the hour. Every available medium – including village panchayats, voluntary health workers, civil society organizations, television, radio, pamphlets and posters – should be harnessed to spread the message of solar cookers. The perception that solar cookers are just a novelty needs to be dispelled.

[4] www.mnes.nic.in

Publicity should go hand in hand with availability of solar cookers in every tehsil and district. India's Ministry of Non-Conventional Energy Sources has some schemes offering funds for civil society organizations coming forward to conduct seminars or organize demonstrations of solar cookers, but it is not clear how successful these schemes are. [5] The scheme needs to be enlarged, strengthened and more crucially, monitored. Mass media like television channels and radio can reach rural population quickly and effectively and these need to be tapped to popularize use of solar cookers.

The most common version of solar cookers is the box type with a single reflecting mirror manufactured by small enterprises according to the specifications prescribed by MNES. While the estimated potential demand for solar cookers in India is around 10 million units, the combined annual production of all kinds of solar cookers including box types and parabolic cookers is only 75,000. There are no more than fifty odd units manufacturing these devices. Clearly, there is a case for providing specific and attractive incentives to increase the number of enterprises engaged in manufacture of box cookers.

The Indian Renewable Energy Development Agency (IREDA), the nodal agency for conceptualizing and providing support for various renewable energy schemes, does not have a comprehensive scheme for promotion of solar cookers. The incentives currently offered are limited to modest financial support for publicity and demonstration to be disbursed to NGOs (non-government organizations) and an annual award for the best performing NGO. IREDA also operates a loan scheme with interest subsidy for purchase of solar cookers.

Some box type solar cookers are available with electrical back-up. A standard size cooker for a family of four costs Rs.1500 (US $ 34) per unit. The community type solar cooker which can fry, bake and roast food for a large number of people may cost anything from Rs.50,000 (US $ 1136), but it is not locally manufactured. It is imported from ULOG Group of Switzerland and marketed by an NGO based in the western state of Gujarat.

The financial incentive currently offered by IREDA is only interest subsidy and even that has many strings attached to it. For instance, individuals desirous of availing a bank loan to purchase solar cookers need to produce security in the form of collateral. Since solar cookers are aimed primarily at the rural poor, there is a case for relaxing some of these conditions.

[5] While disbursal is done after careful scrutiny of the proposal, post-disbursement monitoring of schemes is rather weak.

10. UPSCALE SOLAR COOKER TARGETS

According to MNES officials, cookers with large parabolic reflectors or mirrors are likely to have a much larger market than the single reflector box design which is not perceived to be very efficient. The data furnished by MNES shows 17,760 solar cookers were sold in 2005-06, less than the 22,478 sold the previous year. There are no targets for household models whereas a target of 15 solar concentrating systems covering 4000 sq.km of dish area was set for 2005-06. Implementation of targets was entrusted to IREDA.

A survey of the list of large concentrator-type solar cooker users in the country reveals that religious organizations with community kitchens have been at the forefront. For instance, in Tirupati, a popular temple in Andhra Pradesh, the temple trust has set up the world's largest solar cooking installation where food for about 15000 persons is cooked every day. It is an automatically tracked concentrator system which converts solar energy into steam.

Twelve other systems are working in various parts of the country, with a dish area of 4500 square meters. Almost all of them have been installed in religious organizations which, being non-profit organizations, get a central financial assistance to cover 50 per cent of the cost subject to a maximum of Rs.5000 per sq.m of dish area. Businesses and profitable organizations, however, get a much smaller incentive of only 35 per cent of the cost subject to a maximum Rs.3500 per sq.m of dish area.

Perhaps this explains why religious and charitable organizations have shown greater interest in solar cookers. One sure and quick way to spread the use of solar cookers is to promote them in schools having mid-day meal schemes. According to India's finance minister, 5.8 million students benefit from this scheme. Even if each solar cooker is designed to cook for 500 students, it would straight away entail setting up 12,000 concentrating units – a substantial jump. The Indian government is thinking along these lines. Apart from significant savings on commercial fuels, this would also sensitize children and their parents about the feasibility of using solar cookers even in their households.

11. EFFECTIVE MARKETING STRATEGIES

While central policy and intent is of importance, the adoption of solar cookers will spread only through ready availability, cost effectiveness, ease of use, convenience in terms of time saving and multiple dishes being cooked simultaneously, and by word of mouth as satisfied customers talk to their friends and acquaintances. Some

reinforcement in the media as well as information on locations where the cookers will be available will facilitate the adoption. It must be remembered that food and its preparation are steeped in culture and tradition. Policy initiatives or economics alone may not persuade people to change their traditional habits and cuisine. Therefore some efforts are required by local bodies to demonstrate that the recipes can be adapted for use with this alternative medium of cooking without loss of traditional flavours and textures.

Ultimately, the success of the solar cooker program in India – as elsewhere - will depend upon its cultural acceptance by the majority of the population. Shaping perceptions will be paramount. If promoted as a device for the rural poor, solar cookers may not find much acceptance in a country of rising aspirations where people covet the next level of gadgetry. Instead, the emphasis should be on the environment-friendly attributes of solar cookers, their ease of use and their nutritional impact. Policies should also avoid emphasizing the rural-urban divide, projecting the device as suitable for everyone who wishes to reduce burning of fossil fuels to reduce the damage to the environment.

12. CONCLUSIONS

Like in every other innovation, it is the initial push that matters. Once it gathers momentum, the innovation will gain widespread acceptance without much further effort. Policies now should focus on giving solar cookers that much needed initial push.

What is required is collective effort by all stakeholders – users, civil society organizations, local authorities, private investors, traders and marketers and the government including parastatal organizations.

1. Legislating for clean development by mandating use of renewable energy in all feasible applications (with specific mention of the role of solar cookers) is an initiative that should come from the Indian parliament. Advocacy by public interest groups would help parliament take up this issue.
2. The Indian government should re-allocate R&D budget as well as subsidies to develop and improve upon existing models of solar cookers as well as water filtration plants. Universities and research institutions will have to take up R&D on solar cookers and water filtration plants as priority areas.
3. Incentivising and upscaling targets for manufacture of solar cookers needs to be undertaken by the governments – both central, (Ministry of Non-Conventional Energy Sources & IREDA) state and local bodies through appropriate policies, programs and subsidies.
4. Gender mainstreaming measures with focus on solar cookers as useful devices for reducing the drudgery of women need to be undertaken by Civil Society Organizations through the use of mass media. Civil Society Organizations also have a key role to play in shaping cultural perceptions about use of solar cookers. Government support for this effort can come in the form of specific budgetary allocation for promotion of solar cookers. .
5. Strengthening solar cooker distribution networks should be the collective effort of the Food Corporation of India – the parastatal that controls the public distribution outlets, IREDA, village co-operatives, women's organizations and civil society organizations.