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**Energy Poverty, Institutional Reform and Challenges of Sustainable Development: the case of India**

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## **Energy Poverty, Institutional Reform and Challenges of Sustainable Development: the case of India**

### **Abstract**

This paper assesses recent efforts by the Indian Government to tackle energy poverty and sustainable development. It focuses on the new integrated energy policy, and initiatives to disseminate improved cookstoves and develop energy alternatives for transport. The success of government initiatives in cleaner biomass cookstoves and village electrification has historically been limited, and institutional reforms in the 2000s promoted market-led and 'user-centred' approaches, and encouraged biofuels as a 'pro-poor' route to rural development and energy security. The paper argues that such interventions have reopened tensions and conflicts around land-use, intra-community inequalities and the role of corporate agendas in sustainable energy.

**Key words** (6) India, energy poverty, sustainable development, jatropha, cookstoves, biofuels

## Introduction

International pressure has been increasing on China and India to curb greenhouse gas emissions associated with high levels of economic growth and energy demand. At the same time, expanding access to modern, yet clean, energy services is considered to be critical for multiple Millennium Development Goals (MDGs) including the eradication of poverty and hunger, and promotion of gender equality, educational attainment, health and environmental sustainability (UNDP, 2010). India's government has traditionally appealed to its economic development objectives and the historical responsibility of Annex I countries to claim exemption from binding climate targets. However, this argument may be losing moral and political force (Rai and Victor, 2009) especially given the fact that booming levels of economic growth have largely benefited only the upper and middle classes (Rao et al., 2009). A glaring energy gap persists with 86% of rural and 20% of urban households relying on solid biomass as their primary fuel source (Government of India, 2006a). This paper assesses recent efforts by the Indian Government to integrate energy poverty and wider sustainability objectives through institutional reforms and dedicated projects in problem areas. We focus specifically on the new Integrated Energy Policy, and initiatives to disseminate improved cookstoves amongst the poor and to develop biofuel substitutes for the country's booming transport sector while simultaneously promoting rural development. .

Although there is an extensive literature in leading energy-related journals on prospects for sustainable energy and widening energy access in India, the topic has been little explored in development studies as such. Exceptions include papers on specific aspects such as improved cookstove projects (Smith, 1993; Simon, 2010), biofuels policy (Ariza-Montobbio et al., 2010), fuelwood practices and forestry management (Agarwal, 1986; 2001; Eckholm, 1984; Jewitt, 1995; 2002; Jodha, 1986; Nagothu, 2001) and partnerships for energy technology transfer (Forsyth, 2007). These studies demonstrate that energy-related interventions are no more exempt from the political, institutional and community conflicts that normally characterize development projects than more widely studied cases. The originality of this paper lies in its application of these fundamental insights from development studies research to make critical sense of attempts to address energy poverty and sustainable development concerns in India. It has particular significance for researchers, NGOs and policy-makers within the fields of development studies, geography, and energy studies

A towering figure in these discussions since the 1980s, the late Amulya Reddy, helped pioneer the sustainable energy paradigm that stressed equity alongside rising concerns about the environmental impacts of fossil fuels and nuclear power (Goldemberg et al., 1989; Goldemberg and Johansson, 1995). This paradigm suggested a focus on energy services, rather than magnitude of energy consumption, to facilitate a wider range of technological options for energy as an instrument of 'need-oriented, self-reliant and environmentally sound development' (Goldemberg et al., 2001:330). It also recognised that focusing on technologies in isolation from institutions and culture was inadequate. These ideas have left a rich legacy of decentralised biomass and solar energy experiments led by NGOs, research centres and state-level agencies for rural energy access (e.g., see Chanakya et al., 2004; Hiremath et al., 2009; Sharma, 2006) and continue to influence public interest campaigns around energy

(e.g., Prayas, 2010). In this paper, however, we focus on recent government policy with specific reference to: first, framing of an integrated energy policy that might reconcile development and environmental objectives; second, initiatives on energy poverty at the rural level; and third, efforts to address the sustainability and security implications of rising energy demand.

Our analysis is rooted in a systematic review of research on the energy/development nexus in India and empirical analysis of key policy-related documents including the recent contribution of the Planning Commission to an integrated energy policy. This allows us to trace how energy initiatives, like many other development programmes, have been characterised by a shift from more ‘top down’ or state-centred approaches ‘that engaged citizens as clients or even as servants’ (Kumar and Corbridge, 2002:73) to ‘user-centred’ and/or market-based initiatives that seek to ensure that projects can be sustained without external assistance. We argue that in practice, their success in meeting ‘pro-poor’ agendas is limited and conflicts over land use, community power relations and corruption have been brought to the fore.

### **Integrated Energy Policy: Framing Energy Security, Sustainability and Energy Poverty**

In this section, we examine the framing of energy policy at a national level and the role of sustainability imperatives around climate change and energy poverty. We suggest that while climate change has had some impact on a framework centred, as in other countries, on security of energy supplies, energy poverty is marginalized in the overall picture despite being generally acknowledged as a problem.

Although India and China are frequently bracketed together to highlight the problem of rising emissions from non-Annex I countries, the comparative politics of climate change is becoming more complex. The International Energy Agency’s (IEA, 2007) 2030 projections put China and the USA as the biggest global energy consumers with India ‘a distant third’. The US Energy Information Administration’s 2010 figures show India’s share of world energy consumption going from 2.5% in 1990 to 4.1% in 2007 to a predicted 5.1% in 2035 which puts the oft-cited doubling of India’s energy demand from 2008 to 2030 in a different perspective. By contrast, comparable figures for China are 7.6%, 15.76, and 24.62%, and for the USA: 23.8%, 20.5%, and 15.5% during the same years. Per capita primary energy consumption is estimated at 439 kg of oil equivalent in 2003 compared with 1090 in China, 7835 in the USA and a world average of 1688 (Government of India, 2006a). Yet, the same figures that seem to exonerate India to some extent in the global climate debate prefigure a persistent energy gap within the population. In 2005, India had the world’s largest number of people (412 million) without access to electricity; the level of electrification is estimated to be 62% by comparison with China’s 99% (IEA, 2007).

For the 11th Five-Year Plan, 2007-2012, the Government of India’s (2006a) Planning Commission produced an influential report recommending an integrated energy policy. Integration is a theme that extends to the organisation of policymaking given that India has five different Ministries in the energy sector - the Ministries of Coal; Petroleum and Natural

Gas; Atomic Energy; Power; and New and Renewable Energy (MNRE) – making it difficult to treat the environmental externalities of different energy sources uniformly or to target clean energy subsidies for the poor.

Energy security is a major theme in the Planning Commission report and is defined as ‘primarily about ensuring the continuous availability of commercial energy at competitive prices to support its economic growth and meet the lifeline energy needs of its households with safe, clean and convenient forms of energy even if that entails directed subsidies’ (Government of India, 2006a:xxiv). However, the report primarily focuses on issues that the authors themselves describe as a narrow, but dominant, outlook on energy security, namely, supply and price disruptions to crude oil and petroleum markets arising from the high proportion of imports in India’s total oil consumption (72% in 2004-05). Indeed, obtaining equity oil and gas in foreign locations is emerging as a significant part of India’s foreign policy alongside the widely reported nuclear power pact with the USA. The website of the Oil and Natural Gas Corporation (ONGC), the largest in this sector in Asia, mentions participation in 40 projects in 15 countries. Although a project to build a natural gas pipeline from Iran through Pakistan to India is dormant, US and Asian Development Bank (ADB) backing allowed India to join the TAP pipeline project (subsequently renamed TAPI for Turkmenistan-Afghanistan-Pakistan-India).

Concerns about threats to energy resources now extend to the supply of coal. In figures for primary commercial energy which excludes traditional biomass, coal/lignite occupies 54% compared with 33% oil, 9% gas 9% and 1% nuclear (Government of India, 2006a).

Bhattacharya (2010) notes that though IEA and Planning Commission forecasts of future energy demand vary due to different methods and assumptions, fossil fuels are expected to supply over 80% of energy demand in all scenarios with coal accounting for about 45%. However, the Planning Commission report highlights a decline in the quality and accessibility of domestic coal; others mention freight delivery problems and commercial inefficiencies in this sector (Rai and Victor, 2009). These factors foreshadow a dreaded future in which large quantities of coal would need to be imported to maintain the aspired 8-10% growth rate over the next two decades. The Planning Commission therefore calls for clean coal technologies and new methods of extraction. Coal combustion in India is dominated by conventional plants with an acknowledged low efficiency of 30%, although there is now a push towards installation of supercritical technology with efficiencies of around 45%. Improving efficiency of coal-fired power plants is widely seen (e.g., Bhattacharya, 2010; Rai and Victor, 2009; Rao et al., 2009) as a significant and feasible mode of lower-carbon development.

Enhancing energy efficiency across the industrial sector which is the largest user of commercial energy in India (42%) is one of eight National Missions in the Government of India’s 2008 National Action Plan on Climate Change which spans adaptation and mitigation. Others include missions on Sustainable Habitat (which includes energy efficiency in residential and commercial sectors) and the National Solar Mission for power generation. The Plan also sets out various energy-efficiency initiatives introduced in the 2000s including a labelling programme for appliances (2006), the Energy Conservation Building Code (2007)

for the design of new, large commercial buildings, the requirement for energy audits in certain large energy-consuming industrial units (2007), the Bachat Lamp Yojana that allows households to exchange incandescent for compact fluorescent lamps, and the National Urban Transport Policy (2006) for promoting greater use of public and non-motorized transport.

Yet, ‘even when the country has adequate energy and even when there are no technical failures, the poor may not get clean energy’ (Government of India, 2006a:66). The Planning Commission report acknowledges the problem and the gender, health and literacy implications of traditional biomass use, but devotes little space to addressing energy poverty. It recommends redefining the rural electrification programme to include electrification of all households (as opposed to village areas alone), a basic lifeline energy entitlement of 30 units of electricity and 6 kg of LPG or kerosene equivalent per month to each household, and a large-scale social experiment with community-sized biogas plants. However these recommendations appear disconnected from wider discussions about institutional reform in the energy sector and its implications for addressing energy poverty.

### **Energy Poverty and Institutional reform**

Two themes dominate discussions of energy poverty in India: access to electricity and access to improved stoves and fuels for cooking, both in the rural context. In this section, we examine the tensions between different institutional frameworks for addressing these problems. Although there is a general consensus that the old state-centred, centralised approach to energy policies was flawed, significant conflicts can be seen over implementation of market-based models stimulated by the World Bank. Yet, there are a number of ideas and practical experiences around alternative decentralised models of energy access (e.g., Goldemberg et al., 2004; Hiremath et al., 2009; Prayas, 2010), lessons from which are still to be taken up more widely by government.

#### Electricity reform and rural electrification

Estimates of rural households with electricity access vary from 44% (Bhattacharya, 2010) to 55% (Ravindranath and Balachandra, 2009). India also has a chronic mismatch between electricity supply and demand (Bhattacharya, 2010) as even those with electricity access suffer from ‘unscheduled outages, load shedding, fluctuating voltage and erratic frequency’ (Government of India, 2006a:2). Ruet (2005) has argued that transformation of the sector requires not just new monetary investment but organizational change (‘enterprisation’) in the State Electricity Boards (SEBs); at present, their often intricate accounting and budgeting mechanisms are inadequate for allowing basic good practice such as preventing servicing which might deal with the problem of frequent breakdowns.

The need for reform of the electricity sector has therefore been widely noted, with hopes pinned on the Electricity Act 2003 which the Prayas Energy Group describes as a ‘watershed in the Indian power sector, with fundamental and far-reaching impacts’ (Prayas, 2006:1). In practice, its impact on expanding energy access has been limited, though advocates for an equitable energy policy (Prayas, 2010; Reddy, 2002; Sankar, 2002) continue their efforts to link the agendas.

The Electricity Act 2003 was the culmination of power sector reforms that began in the early 1990s with the start of economic liberalisation and that followed the ‘World Bank model’ (Byrne and Mun, 2006) of unbundling vertically integrated, state-owned utilities and allowing entry of private companies including multinational corporations, often without public consultation. This post-1991 model suffered some spectacular failures in India, most notably over the Dabhol/Enron project which came to be known as a major corporate scandal. Energy analysts and civil society activists uncovered the exorbitant costs written into the power purchase agreement (e.g., Sant et al., 1995), and the project was eventually cancelled in 2001 after extensive opposition. Criticism also centred on the World Bank model implemented by state governments in Orissa and Andhra Pradesh in 2001 where steep tariff rises failed to produce improved performance and mass protests erupted. By comparison, public objections to reforms in Karnataka were met with a deliberative process involving citizen/consumer groups, following which compromises were reached and citizens organised to promote conservation and renewables (Byrne and Mun, 2006; Reddy, 2002).

In the 2000s, electrification initiatives for the poor emerged more strongly from the Ministry of Power stimulated by Section 6 of the 2003 Electricity Act which states that the appropriate government ‘shall endeavour to supply electricity to all areas including villages/hamlets’. The Rural Electricity Supply Technology (REST) Mission of 2002 proposed to accelerate electrification of all villages and households by 2012; the successor RGGVY scheme launched in 2005 included the commitment to provide a free connection to below-poverty-line (BPL) households. Advocates for decentralised energy (DE) technologies have long highlighted lessons from experiments with biogas, biomethanation and biomass gasification (Chanakya et al., 2004; Ravindranath and Balachandra, 2009; Reddy et al., 1995), though most of them recognise challenges beyond the initial technology push if such systems are to be locally sustained. The 2003 Electricity Act was welcomed for allowing smaller players such as Panchayats, co-operatives and NGOs into the management of energy supply including from stand-alone units delinked from the grid. DE technologies are also seen as part of wider livelihood-stimulating systems that can be integrated into rural development strategies (Bhattacharya, 2006; Hiremath et al., 2009; Sharma, 2006). Government policy for rural electrification (Government of India 2006b) formally acknowledges decentralised options where grid connectivity is not considered to be feasible or cost-effective, though intra-community conflicts are still likely to affect implementation. Historically, the government’s programmes in decentralised energy options such as biogas have been technology-driven, lacking sensitivity to the significance of wider socio-economic cleavages (Dutta et al., 1997; Neudoerffer et al., 2001). Abbasi and Abbasi (2010) also caution that environmental pollution may be just as great a problem with community-level biomass units as centralised generation but harder to treat due to its dispersed nature.

### Initiatives for Cleaner Cookstoves

Decentralised systems for expanding energy access also include a strong focus on cleaner cookstoves/fuels given that 86-90% of rural households depend on solid biomass for cooking



(Bhattacharya, 2006; Government of India, 2006a). Indoor and outdoor air pollution from combustion of solid biomass is one of the biggest risk factors in premature death and has recently been characterised as a significant contributor to climate change (Venkataraman et al., 2010). Since women and girls are largely responsible for biomass fuel collection and cooking, they are disproportionately affected in terms of drudgery, educational attainment and health effects (Jewitt, 2002; Shailaja, 2000; Smith, 2000; Smith et al., 2004; Venkataraman et al., 2010). A number of state governments, NGOs and local organisations have attempted to address this problem since the 1980s with the Clean Development Mechanism (CDM) now providing impetus for some projects. Here, we focus on the efforts of central government where, under the influence of the World Bank's Energy Sector Management Assistance Program (ESMAP), there has been a shift from a state/subsidy-led approach to a market model.

The National Program for Improved Chulhas (NPIC) that ran from 1985-2002 focused initially on improving fuel efficiency, coming as it did in the wake of the 1970s fuelwood or 'other energy crisis' (Eckholm, 1984). The chulha (stove) designs developed by partner organizations were forced to conform to the fuel efficiency-based quality controls of the Ministry of Nonrenewable Energy Sources (MNES) Chulha Approval Committee with the result that partners were restricted in their ability to respond to consumer cook stove preferences (Simon, 2010). By the mid-1990s, the NPIC's emphasis started to shift from efficient to cleaner stoves following challenges to the assumption that fuelwood demand was a major driver of deforestation (Hanbar and Karve, 2002; Nagothu, 2001; Simon, 2010) and growing concern about the health problems caused by indoor air pollution (Bruce et al., 2000; Shailaja, 2000; Smith, 2000; Smith et al., 2004; Venkataraman et al., 2010).

Although the NPIC's state-led subsidy-based approach succeeded in generating employment for artisans and producing stoves that were widely affordable to the poor, the bureaucratic enforcement of the MNES's fuel efficient chulha policy often resulted in 'improved' stoves that caused higher levels of pollution than traditional chulhas (Smith, 2000; Hanbar and Karve, 2002). It was also criticised for failing to give sufficient recognition to wider socio-economic and cultural factors, and the views of women who strongly shape household fuel and cooking preferences but were ignored in stove design (Shailaja, 2000). NGOs and international donors (UNDP, 2004) therefore called for more participatory and gender-sensitive approaches.

Also criticised by the World Bank's ESMAP as an unwieldy public enterprise failing to generate household demand, the NPIC program was terminated in 2002 and followed by market-based initiatives and flexible governance mechanisms which, unrestricted by the MNES quality controls, could, in principle, cater for local cook stove and fuel preferences. In reality, however, this flexibility came at a price. Simon's (2009: 2010) research in Maharashtra revealed that ESMAP's efforts to promote 'development through market expansion' (Simon 2010: 2022) undermined some of the NPIC's success in targeting the poor by causing cookstove prices to more than double and by tending to exacerbate pre-existing inequalities in social and financial capital. In particular, it created opportunities for diverse

brokering activities and corruption whilst lowering employment prospects for many artisans (who were forced to focus their efforts on selling stoves to wealthier households) causing the ‘environmental benefits of marketization [to] accumulate within wealthier sectors of society while the burdens of indoor environmental degradation disproportionately afflict poorer segments of the population’ (ibid:2022-23).

More recently, the Government of India launched an ambitious National Biomass Cookstove Initiative (MNRE, 2009) which aims to deliver significant gains in health and socio-economic welfare of the poorest while contributing to reduction of greenhouse gases. An extensive report conducted for the MNRE (2010) made a number of recommendations including further R&D efforts on stove design, the use of existing delivery networks for dissemination, plus micro-credit and subsidies equivalent to the established subsidy for liquid petroleum gas (LPG). The new initiative promises to adopt a different structure from the NPIC by taking ‘the user’ as its starting point and treating investment in cleaner cooking technology ‘not as a handout to poorer households, but rather as an economically sustainable business solution’ (MNRE, 2009:1). It is expected to continue the post-NPIC market-based model on the back of which the Shell Foundation, in particular, has pursued partnerships with local NGOs to promote enterprise-based solutions for deployment of improved stoves. However, future research will need to examine how the user-centred philosophy is actually translated in practice and be alert to possible tensions around enterprise models identified by Simon’s (2009; 2010) research and the limitations of cross-sectoral partnerships that aim to introduce commercial contracts where there are significant differences in political resources amongst involved parties (Forsyth, 2007).

So far, we have looked at how imperatives of energy security and sustainability, and the shift from state-centred to market- and/or user-centred philosophies of governance have impacted on energy policy as a whole and on efforts to modernize energy services for the rural poor. In the next section, we consider efforts to address the sustainability implications of economic growth with specific reference to the energy/transport nexus.

### **Pitfalls of Sustainable Energy Policy: the case of Biofuels**

The transportation sector is responsible for 15% of commercial energy consumption in India (IEA, 2007). Given rising demand for transport fuel of which only around 20% is currently met by domestic petroleum, biofuels attracted the attention of the Indian government as a means of reducing dependence on oil imports. In addition, ‘pro-poor’ and forestry/environmental agendas (the latter echoing those of the NPIC) were invoked through the promise of regenerating ‘wastelands’ and an early emphasis on stimulating rural development. In practice, the policy has been beset with public controversy, commercial setbacks and internal ministerial disquiet.

In 2003, a mandate to blend petrol with 5% ethanol (derived from molasses) was introduced in 9 states but subsequently withdrawn. Analysis by the Planning Commission (Government of India, 2006a), suggested the failure was due to a lack of surplus ethanol with India actually importing ethanol from Brazil since 2002. In 2003, the Planning Commission also set out a

National Mission for Biodiesel to be led by the Ministry of Rural Development, which targeted a 20% blending of diesel with biodiesel by 2011-12 (Government of India 2003). Of particular interest was the production of biodiesel from the oil-bearing plant, *Jatropha curcas*. The Mission encouraged a number of large-scale *Jatropha* cultivation projects sponsored by state governments which have since proven controversial. A national consultation held in Andhra Pradesh on the impacts of biofuel crops stimulated organised opposition led by the Deccan Development Society (2007) which highlighted displacement of people from their lands for water-intensive, monoculture plantations that threatened biodiversity. In 2008, some media reports (e.g., Dey and Jayaswal, 2008; Lane, 2009) suggested that the biodiesel mission had been quietly shelved citing policymaker fears of a corporate 'land-grab' by Shell/Bharat Petroleum, BP (which subsequently withdrew from its alliance with D1 Oils) and Reliance among others. In fact, a more expansive National Policy on Biofuels was introduced in 2009, this time led by the Ministry of New and Renewable Energy, setting a recommended target for 20% blending of both diesel and petrol with biodiesel and bioethanol by 2017 (Government of India, 2009). Despite the failures of the 2003 mandate for bioethanol, a compulsory 10% blending was introduced in 2008 in 20 states and 4 union territories.

Acknowledging the wider international controversy over the impact of biofuel crop cultivation on rising food prices, the national biofuel policy claims to be distinctive as it 'is based solely on non-food feedstocks to be raised on degraded or wastelands that are not suited to agriculture, thus avoiding a possible conflict of fuel vs. food security' (Government of India, 2009:3-4). Echoing policy shifts within the cookstoves case study, however, the promotion of biofuels has resulted in intermediate actors (local community members, state governments, forest officials, tribal development organizations, commercial biofuel processors etc.) competing to push forward their own development agendas and institutional frameworks (Ariza-Montobbio et al., 2010). For example, Rajasthan has adopted a commercial approach with government land being leased to private biofuel companies for up to 20 years with no upper limit on the maximum size of the plot leased. By contrast, the National Watershed Development Program for Rainfed Areas (NWDPPRA) echoes more traditional state-led development initiatives, representing itself as more 'pro-poor' and seeking to 'rehabilitate' wasteland by distributing it to small farmers for the cultivation of *Jatropha* and other crops. The third main approach to *Jatropha* cultivation combines elements of market-based and state-led subsidy-based approaches and focuses on the development of contract farming on privately-owned land as seen in one of the leading biodiesel producing states, Tamil Nadu, where the government announced a plan to cultivate 100,000 ha of *Jatropha* by 2012 (Government of Tamil Nadu, 2007-08).

A key problem with many of these initiatives is the gap between technical projections of *Jatropha*'s promise and the 'actual ecological, economic, and social failure of the crop at the farm level' (Ariza-Montobbio et al., 2010:876). Research in Tamil Nadu (ibid) revealed that irrigated *Jatropha* in farmers' fields often yielded a tenth of that grown at research stations (750 kg/ha compared to 7500 kg/ha) while rainfed *Jatropha* yielded only 450 kg/ha. Such low levels of productivity forced many farmers to uproot their *Jatropha* plantations and return to

previous cropping systems. Friends of the Earth Europe (2009) argue that of India's 63 million ha of officially recognized wasteland, over 18 million ha is not suitable for any form of cultivation, including *Jatropha*. Even where wastelands are suitable for cultivation, *Jatropha* survival rates have often been poor; especially where such land is unirrigated or where soil quality/fertility is poor (Ravindranath et al, 2009). According to Bekunda et al. (2008) the problem has been compounded by a lack of prior research on the yield potential of *Jatropha* under different agro-ecological conditions. So while *Jatropha can* be grown on land unsuitable for food production, its nutrient (especially nitrogen) demands are quite high, so yields are higher on agricultural land and with irrigation. Clearly, that calls into question the Government of India's (2009:6) claim that 'the issue of fuel vs. food security is not relevant in the Indian context' and highlights additional conflicts over the use of nutrients and water (Ghosh et al., 2007).

Simplistic discourses about wasteland regeneration have also tended to gloss over questions of who gains (and who loses out) from this process, helping create 'the space for interventions that are one-sided, driven by a technical (productivity-oriented) or techno-economic (return-oriented) rationality, rather than a balance between these and social needs and ecological function' (Ariza-Montobbio et al., 2010:880). The point that 'apparently unproductive wastelands are an important source of livelihoods for many rural communities' (Kumar, 2002:764), especially the landless, has long been recognised in development studies and especially within the social forestry literature (Jodha, 1986; 1992; Pathak, 1994; Shailaja, 2000; Jewitt, 2002; Rajagopal, 2007). Yet biofuel policy has learned little from the long history of competition and conflict between India's poorest rural people and the state over access to fuel resources, agricultural land and other key subsistence and cultural resources (Pathak, 1994; Corbridge and Jewitt, 1997; Corbridge and Kumar, 2004; Jewitt, 2008). Research in Chhattisgarh by the social activist Souparna Lahiri (2008:3) suggests that the Forest Department and Forest Development Corporation have responded to government pressure to increase biofuel cultivation with 'indiscriminate planting of *Jatropha* saplings on any land – forest or non-forest or disputed, and often forcibly – leading to blatant violations of rights of the vulnerable forest communities'. In some areas, Forest Department staff have been accused of planting *Jatropha* on farm and wasteland cultivated by tribal villagers to prevent it being legally notified under the Scheduled Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006. Lahiri's observations echo an earlier argument that 'all systems of forest management in India are bound up with a political context which is not advantageous to the rural poor, and takes its cue from existing structures of inequality in the distribution of land and rights to local citizenship' (Kumar, 2002:777).

Even when land is not co-opted for *Jatropha* cultivation, the long gestation time (3-5 years minimum) favours large farmers who can accept the 'delayed gratification' associated with forgoing income from their land while they wait for tree crops to mature (Corbridge and Jewitt, 1997). Far from being pro-poor, therefore, 'the pattern of cultivation of *Jatropha* is generating upward redistribution, the big farmers being the only ones who benefit from it, if at all' (Ariza-Montobbio et al., 2010:876). Other key beneficiaries include government agencies and agricultural research stations (from new knowledge provided by contract

farmers which results in the development of more profitable varieties) and biodiesel processing plants (from biofuel agro-processing subsidies, tax breaks and legislation that prevents more decentralized forms of biodiesel manufacture).

As in the debate on rural electrification, decentralised energy models still remain attractive in the case of Jatropha. Ariza-Montobbio et al. (2010) suggest that the crop could be beneficial within a more participatory framework or small-scale enterprise-based model that would serve local energy needs. Oil extraction and the production of cattle fodder derived from Jatropha, for example, could be undertaken by small-scale village-level industries rather than being controlled by private companies as they are at present (ibid; Openshaw, 2000). But the poor performance of Jatropha on marginal land is likely to result in competition between food and fuel crops for land and water as well as between marginal and landed households over natural resource use and management priorities.

## **Conclusion**

In this paper, we have suggested that although sustainability imperatives have impacted on national energy policy frameworks in India, progress towards addressing the country's extensive levels of energy poverty remains limited. There is a dominant preoccupation in policy circles with chronic supply shortages in the case of electricity and threats to energy security given a high level of oil imports, new concerns over domestic coal supplies and rising energy demand associated with high levels of economic growth. Although a number of government-sponsored initiatives have been introduced for expanding rural energy services especially around improved biomass cookstoves and village electrification, their success has historically been limited (Neudoerffer et al., 2001). Failures have largely been interpreted in terms of wider critiques of 'top down' state-led initiatives, and market-led or user-centred initiatives are being promoted in their place. Novel ideas for decentralised energy/livelihood systems abound and may yet be facilitated by the unbundling provisions of the 2003 Electricity Act and the new National Biomass Cookstoves Initiative which aims to ameliorate the lack of gender- and user-sensitivity in the previous cookstove programme. Nevertheless, the problem of clean energy services for the urban poor remains marginalised in the overall discussion on energy poverty (Bhattacharya, 2006; Dhingra et al., 2008). Also, conflicts so far engendered around large corporations involved in building new sustainable energy enterprises (sometimes in partnership with local organisations) highlight the fact that projects must still operate within a context of pre-existing inequalities in access to social and natural capital as well as ecological constraints. This is especially evident in the promotion of jatropha cultivation as a pro-poor route to energy security, an option that has struggled to meet expectations and instead generated controversy around the displacement of the poor from 'wastelands' Similar problems remain relevant for the enterprise approach to energy poverty more generally and the wider reconciliation of sustainability and economic growth. As Neudoerffer et al (2001) suggest, technology-led programmes need to be redesigned to bring in a participatory planning culture that is more sensitive to inequalities of class, caste and gender.

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