



Indian Quest for Sustainable Energy Regime: The Changing Narrative

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Of late 'Aatmanirbhar Bharat' has become much talked about development paradigm in Indian mainstream discourse. There is inverse relationship between security attributed by local capacities and vulnerabilities by import dependence. Recognizing the matrix, the Indian state opted for self-reliance as early as in fifties. It was then known as import substitution strategy. The strategy however lead to encouragement of rentier tendencies- the license-permit raj, leading to abnormal profit making and concentration of political power. In the nineties when statist model lost its charm, seen more as failure and market as success, the Indian state embarked upon economic liberalization. Indeed, with the support from external players the country did register double digit growth. The 'neoliberal growth' as it was called has its own contradictions, manifesting in high reform driven growth with top of the pyramid controlling the wealth generating processes, the rise of new middle class but along with surging volume of unsustainable people at the bottom. India thus witnessed market driven welfare regime with a very peculiar class configuration of super rich, service sector driven middle class and sizeable class aspirant class and marginalizing poor. This being demographically unsustainable arrangement disrupted socio-political equilibrium leading to discontent protest including farmers protest making the state to apologize and withdraw the reforms. The political backlash made the state to go for popular schemes but the challenge was aggravated by the outbreak of the pandemic and its poor management. However, despite the volatile political ethos in northern India, the return of ruling dispensation to power questioned the wisdom that the market driven growth can trickle down. What was more challenging that the state has limited resources to upgrade its systems on external support. The crisis thus posed the structural issues including the return of self reliance in its new avatar MLP (manufacturing link production) In this synoptic backdrop the paper attempt is to look at the pulls and pressures of transition from external dependence to domestic production taking energy as case study with its potential and limitation.

In recent times, the Indian energy security concerns have expanded the agenda by including 'aatma nirbharata' as policy template. In the context when global engagement is creating vulnerabilities, the countries are looking for a more secured growth path by developing local capacities. Faced with high import dependency, India needs to conceptualise an energy regime that ensures security of energy and energy services to its diverse stake holders located in fossil fuel and clean energy space simultaneously. The conceptualisation become complex because the Indian energy mix is dominated by hydrocarbons and it will continue to be so in near future. India needs them to meet its energy needs. However, India also need to harness its renewable resources which she has in abundance to make it energy independent. The need has been further reinforced by the growing incidence of climate change triggered by the fossil fuel leading to Paris Agreement 2015. India the third largest consumer of hydrocarbon is indeed a leading polluter. No wonder India has to reconfigure its energy mix incrementally, enhancing

the share of clean energy. India thus has to construct a transition pathway that restrains the consumption of dirty fuel along with increasing share of clean fuel. It is complex and challenging task because it calls for convergence of diverse competing and conflicting pressures. India needs transition to expand its supply of energy by adding renewables in its energy mix. India needs transition to harness energy from its rich renewable resources. India needs transition to make energy available and accessible to those who have been either on margin or left out. India needs transition to correct the uneven distribution and consumption of energy and to narrow down the energy disparities which is reflection of its uneven growth processes. Apparently, the trajectory of last seventy-five year do not hold any promise for radical change in near future despite the fact that power is highly politicised subject in electoral polity. However, it will be unfair to argue that over these years, there has been very little political attention to it. What has happened that electoral politics looked at energy as commodity to be transacted by the political market rules. Consequently, energy flow has been determined by economic flows. It became the subject of political choice, being made accessible on the strength of subsidies. The possibility of renewable emerging as energy source changed the matrix with the sharpening of the debate on its adverse consequences on global ecology threatening the survival of the ecosystem. Today with the escalation of threat at existential level, it has become the central part of global energy security discourse. The question that needs to be examined whether renewable will be addressing the challenges that did not find place in the hydrocarbon based global energy order. If Paris Agreement is a pointer, than it can be argued that there is ample global understanding to push the energy divergence into a framework of convergence. India as leading energy consumer of hydrocarbon and investment destination on renewable has privilege position to play active role in shaping sentiments. Indian transition strategy thus is of global significance. In this chapter drawing from preceding observations, attempt is made to examine and evaluate the Indian transition in the larger context of sustainable energy for all.

Indian transition choice, the pathway is critically influenced and determined by the global pressure reinforced by the local energy necessities. Unlike the past when there was no choice but to play within the orbit of hydrocarbon, today India has option to go for renewables but its growing energy demand compels it to be the stake holder in both the market. What however puts the country on difficult position when the choice becomes a zero sum proposition. Thus, not only, the strategy of transition has to work towards harnessing the rich endowment of renewables to change the energy mix in conjunction with a distribution regime that ensures energy justice but has to protect the supply of hydrocarbon to them as well to meet their immediate energy needs. At one level these are conflicting goals but need to be necessarily synergise to minimise the risk of disruption. It was clearly evident in the Glasgow COP26 where India along with many others had to defend its interest to retain coal as source of energy. What is challenging is that while defending its hydrocarbon interest, India promotes renewables that too within the framework of energy regime of sustainable energy security for all. In other words while providing space for reconciliation, India needs an alternative strategy, incrementally directing the transition process to its goal. Apparently, it has yet to define that alternative regime. It is clear from the preceding chapters that despite a number of initiatives to harness the renewables and setting of ambitious targets well appreciated globally, the Indian energy mix will remain dominated by hydrocarbon and the distribution continued to be skewed even with the incremental growth of renewables. Is it due to the limitation of renewable as source of energy or positioning of renewable in development matrix?

Seemingly, the transition is driven more by quantitative than qualitative concerns of energy security. It seeks change in the quantitative share of renewable in energy mix, not harnessing of its potential to play transformative role as did the coal in making of industrial revolution in Britain or oil in empowering America as global power.¹ The flaw lies in not recognising the transformative nature and potential of renewables by subsuming its profile as residual supplies of electricity to rural and remote setting. The contention here is that to play the transformative role, it has to be relocated in the larger frame of self-sustainability. Self-Sustainability becomes relevant because market driven high consumption regime could challenge the sustainability of renewables itself. Renewables too consume critical materials thereby setting limits to their potentials itself and they do leave carbon footprint as well. This means if the transition goes to its logical end and renewable becomes predominant source of energy, then it could face the supply constraints of critical materials which are not so widely distributed. Thus, the transition at global level cannot be assumed on the infinity of critical materials. Moreover, the geopolitics of critical material might impinge upon the pace and nature of transition.² This brings the issue of responsible and sustainable consumption into the transition debate. It needs no elaboration that responsible consumption is critically linked to income distribution. Societies with high income inequality face challenge of addressing the issue of redistribution in strategizing energy transition. Apparently, this requires a distinct and different strategy which ensure inclusive energy security where distribution is equally factored possibly built-in in transition process.

Transition in developing countries has its own complexities and context. Faced with energy poverty, these countries are simultaneously pushing consumption of hydrocarbon and the renewables, this inevitably makes transition protracted and contesting in nature. What is critical that in their drive to catch-up, the acceleration in the pace and scale could defeat the larger objective i.e. sustainable energy security and pave way to the tragedy of common at national level. Further a highly skewed divide between urban and rural setting, may make their transition trajectory to pursue multiple strains as it progresses. The very organisational profile, the economy, and the social needs of the urban and rural setting has huge divergence. Hence the energy transition which is more than technological issue is bound to witness multi-layered trajectories with different set of drivers. What poses most serious challenge is the fact that the imperatives of convergence of the multiplicities may make the transition incremental in nature, underwriting status quo than transformation thereby subverting the possibilities of fundamental changes, ensuring energy security particularly in rural setting. Thus in recognition with the divergence of sustainability issues between urban and rural, their “commons”, it make sense to conceptualise the role and path of energy transition in rural setting distinctly, as source of empowerment than be the symbol of rural electrification counted by the number of electrical poles and electric points in private and public space. Given the fact that present energy system

¹ India intends to be global solar power.

² Rare earth materials are a crucial input for certain clean-tech applications such as wind turbines, solar panels, batteries for electric vehicles, and other storage media. Lately, focus has been on China as being home to a significant share of the world's rare earth resources and its activities in acquiring control over overseas rare materials. However, critical scholars show that also rare earth materials respond to market forces. In recent years mines for different rare earth resources have been closed in the US and South-Africa, because China was able to provide these materials cheaper. These scholars expect that when China will use rare earths to exert geopolitical pressure, mines around the world can be expected to reopen and markets will diversify again (Buijs and Sievers 2011) or shift to new technologies. See, Daniel Scholten, & Rick Bosman, “The geopolitics of renewables; exploring the political implications of renewable energy systems”, *Technological Forecasting and Social Change*, 103 (2016): 273-283. <https://doi.org/10.1016/j.techfore.2015.10.014>

is yielding to alternative energy due to its own unsustainability, makes the need to strategies transition in developing economies in a meta frame that recognizes the relevance of urban rural dichotomy in short term, advocates for DRES as driver to rural transition and underlines the possibilities of DRES mainstreaming sustainable energy security for all. It is contended here that 'Energy Swaraj' provides that meta framework.

The concept of 'Energy Swaraj' draws its meaning and content from Gandhian understanding of Hind Swaraj and Gram- Swaraj which is premised on the idea of creating an ecosystem based on primacy of local community, local initiatives and local resources organised in decentralised frame. Swaraj by definition meant the engagement of the self with its habitat to create solution to its challenges. Thus, it places high premium to self action as generator of knowledge. And it is this centrality of the self that defines the organisational principle in the form of village swaraj as the decentralized form of governance where each village is responsible for its own affairs as self-efficient autonomous entity. Thus, it places ownership of the local affairs with the local community. So, it recognises the centrality of community in relation to State and Market. It assumes that community empowerment is dependent upon participation. It is the dialectical relationship between community empowerment and localism that sums up the tenant of Gandhian understanding of Gram Swaraj. As a corollary thus Energy Swaraj assumes utilisation of local resources for generating and fulfilling energy needs. Energy Swaraj can be defined as 'Localised Energy Self Sufficiency'.³ It calls for revisiting energy society relationship. It looks at the demand for energy from the perspective of growing and evolving need which unlike popular understanding is a dynamic concept. It acknowledges that the need grows and evolves with 'the interdependence of action' among the multiple units in the ecosystem. It is argued that "The multiple units that can become embroiled in demanding energy—people, practices, technologies, meanings and institutions—are thus shown to transform in relation to each other in expected and unexpected ways. This is important for understanding existing and potential flexibility in practices and energy demand."⁴

In Gandhian connotation energy is means, "demand for energy is not for energy itself, but for undertaking services, for example heating and illuminating . Importantly, contextual circumstances – those such social, cultural, political, and historical – sway people's need for services and consequently shape their energy demand. This concept recognises energy as a resource that enables people to perform services, and these services interact with individuals and communities. Therefore, unravelling the social constructs of energy poverty requires a framework that connects the energy demand of both individual and communities and the associated energy sources (e.g. electricity and gas) and services (e.g. heating and cooking), along with their underlying social dimensions."⁵ It is argued that service oriented approach being multidimensional provides a comprehensive and nuanced understanding than the access

³ Chetan Singh Solanki, *Energy Swaraj: My Experiment with SOLAR Truth*, (New Delhi: Notion Press, 2019). https://books.google.co.in/books/about/ENERGY_SWARAJ.html?id=zfexDwAAQBAJ&redir_esc=y

⁴ Elizabeth Shove, "Energy and Social Practice: From Abstractions to Dynamic Processes," in *Complex Systems and Social Practices in Energy Transitions: Framing Energy Sustainability in the Time of Renewables*, ed. Nicola Labanca, (New York: Springer, 2017) 207-220. https://www.researchgate.net/publication/316638299_Energy_and_Social_Practice_From_Abstractions_to_Dynamic_Processes

⁵ Yuwan Malakar, "Social Constructs of Energy Poverty and the Resulting Capability Deprivations in Rural India," (PhD Thesis, The University of Queensland, 2018). <https://espace.library.uq.edu.au/view/UQ:a184dfd>

or total energy approach.⁶ The assumption is that energy demand is not for energy per se but driven by energy services. Thus, unlike the prevailing understanding to look at energy security as supply driven, here it is looked at demand driven. Apparently, this shift changes the very approach and policy perspective. This brings the issue of defining attributes that constitute relevant energy services in a given context.⁷

The premise could be further extended by observing that “energy services should be evaluated from a “capability perspective” rather than from a mere utility point of view”⁸ In other words how and to what extent the electrification in centralised and decentralised form, enhances the capabilities thereby the quality of life of the people. Using The capability approach / perspective developed by Sen and others, it is argued that “that an individual’s quality of life should neither be assessed based on how much resources she possesses nor on how much she has consumed. An individual’s quality of life should be assessed based on what opportunities are available in order for them to lead a life she has reason to value.”⁹ In their understanding enhancing capabilities maximises the opportunities and accrues the degree of freedom to make choice. From their perspective evaluation of DRE need to be made on its contribution to capabilities building of individual, community or the ecosystem. Gram swaraj expects an energy system with energy services that contributes in capacity building of the people enabling them to make their choice. It is the choice of the community that defines the services and thereby the energy demand not the other way round. It further argues that access of energy services alone need not ensure that all houses could be able to convert it into capacity building. It is argued that “that access to electricity alone may not contribute to just and equal opportunities for all. It suggests that rural electrification policy, in addition to electrifying new houses, needs to accommodate ways to promote electricity use for various purposes that may have significant contribution on people's lives.”¹⁰ In the absence of that it might encourage unequal distribution of opportunities. Grid based energy did become though by default, contributor to disparities while providing access of energy. This goes against the very objective of sustainable energy for all which is the premise of Energy Swaraj and the Gram Swaraj.

In imagining the dynamic contribution of energy services in capability building it will be relevant to consider a model based on convergence between DRES and Sustainable Product Service System (SPSS). Looking from Gandhian perspective of localisation of energy production with local resources for the local, DRE system provides, the architecture where “small-scale energy generation units (structure), at or near the point of use, where the users are the producers—whether individuals, small businesses and/or local communities. These production units could be stand-alone or could be connected to nearby others through a network to share, i.e. to share the energy surplus. In the latter case, they become locally distributed energy networks, which may, in turn, be connected with nearby similar

⁶ Rosie Day, Gordon Walker, & Neil Simcock, “Conceptualising energy use and energy poverty using capabilities framework,” *Energy Policy*, 93 (2016): 255-264. <https://doi.org/10.1016/j.enpol.2016.03.019>

⁷ Yuwan Malakar, “Social Constructs of Energy Poverty and the Resulting Capability Deprivations in Rural India,” (PhD Thesis, The University of Queensland, 2018), p 6.

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

networks.”¹¹ The Sustainable Product-Service System “offers models providing an integrated mix of products and services that are to gather able to fulfil a particular customer demand (to deliver a ‘unit of satisfaction’), based on innovative interactions between the stakeholders of the value production system (satisfaction system), where the economic and competitive interest of the providers continuously seeks environmentally and socio-ethically beneficial new solution’.”¹² When S.PSS is located in the framework of DRE it provides “a promising approach to diffuse sustainable energy in low/middle-income contexts (for All), because it reduces/cuts both the initial (capital) cost of DRE system purchasing (that may be unaffordable) and the running costs for maintenance, repair, upgrade, etc. (that may cause interruption of use), while increasing local employment, related skills and entrepreneurship, as well as fostering for economic interest the design of low environmentally impacting DRE products, resulting in a key leverage for a sustainable development process aiming at democratizing the access to resources, goods and services.”¹³

It is observed that by offering a combination of product and services, SPSS shifts the business focus from selling a product to the unit of satisfaction. Further “it shifts primary innovation to stakeholder interaction than merely being technologically determined. Significantly it shifts the in value from individual ownership to access to goods and services.”¹⁴ The model envisages that the ownership and some responsibilities over the life cycle of the small generator unit (of renewable energy) and of the products that use the electricity, i.e. the Energy-Using Products/Equipment, lies with provider. This saves the customer not only from initial investment of generator and energy using product and equipment but from life cycle cost of maintenance as well. Payment is made only as per use/period.¹⁵ Thus it is observed that “The SPSS offer model applied to Distributed Renewable Energy (DRE) is a win-win approach to diffuse them (DRE) in low and middle-income (all) contexts, because it reduces/cuts both the initial investment cost of hardware purchasing and the life-cycle costs of maintenance, repair, upgrade, etc. while improving local skills and rising local employment, resulting in a key leverage for a sustainable development process aiming at democratizing the access to resources, goods and services.”¹⁶ Thus by focusing on accesses to energy services than the ownership of hardware, it eliminates the burden of initial investment and life cycle maintenance cost thereby enhances accessibility. Further “The offer development within a specific context of use leads to the involvement of local rather than global stakeholders; this favours local production and employment, as well as local skills and competences.”¹⁷

¹¹ Yuwan Malakara, “Evaluating the role of rural electrification in expanding people's capabilities in India,” *Energy Policy*, 114 (2018): 492-498. <https://doi.org/10.1016/j.enpol.2017.12.047>

¹² Ibid.

¹³ Carlo Vezzolo et al., *Designing Sustainable Energy For All*, (New York: Springer, 2018). p 19. <https://www.springer.com/gp/book/9783319702223>

¹⁴ Ibid.

¹⁵ Ibid

¹⁶ Ibid

¹⁷ Elisa Bacchetti, Carlo Vezzoli, & Paolo Landoni, “Sustainable Product-Service System (S.PSS) applied to Distributed Renewable Energy (DRE) in Low and Middle-income Contexts: A Case Studies Analysis,” *Procedia CIRP*, 47 (2016): 442-447. <https://doi.org/10.1016/j.procir.2016.03.085>

SPSS in the frame work of DRE can be imagined in four distinct scenarios.¹⁸ “In first scenario ‘Energy for All in Daily Life’ Business to consumer, B2C energy supplier which could be the local collective body either gram panchayat or local community based body, owns both the DRE system (solar panel storage etc) pays for it purchase and initial investment and be responsible for maintenance and repair. The community, the consumer makes periodic payment thus “This configuration makes access to energy economically affordable even in low- and middle-income contexts, so that the quality of life could be greatly improved.”¹⁹ In second scenario ‘Energise Your Business without Initial Investment Cost, Business to Business, ‘B2B facilitates the rural entrepreneurship where ownership could be with the local collective body which provides the power on per period /time. This encourages local entrepreneur “who do not have to face any initial investment, except for the purchase of the necessary Energy-Using Equipment (e.g. sewing machine for a tailor shop) which are not included in the offer. In this way, small entrepreneurs/businesses even in low- and middle-income contexts can receive stable energy access, thus being able to guarantee the production/delivery of a predetermined quantity of products/services within a given time, thus satisfying clients and opening market opportunities.”²⁰ A possible third scenario could be where “single users and small communities acquire an ownerless package consisting of a Distributed Renewable Energy system plus a set of energy using products for daily life, paying for them per use. The option differ from others on the ground that customer pays only for services this enhances the affordability.”²¹ The last option could be where entrepreneur is provided ownerless package of DRE system and equipment to start the business. “This comes to be very relevant, especially in low- and middle-income contexts, where many small entrepreneurs/businesses cannot get a loan from traditional banks. With stable access to energy, they could increase their business opportunities and working conditions, while empowering local economic growth.”²²

The combine of SPSS and DRE can have transformational impact economically, socially environmentally and above all empowering in terms of promoting local entrepreneurship and decision making by community participation. It is argued that from consumer’s perspective, the combine enhances the satisfaction “because SPSS offers access to (energy) satisfaction rather than mere (energy) product ownership, thus reducing/avoiding initial investment costs and running costs, e.g. maintenance and repair of energy products, which are frequently too high for low- and middle-income customers.”²³ Further it is argued that since it promotes local level activities it leads to local employment generation, skill formation and facilitating growth of start-ups besides energy services.

In the above four scenario the provider plays the key role of initiator in terms of ownership. The question thus arises who could be that provider in the Energy Swaraj model. In the context of energy poor countries this has to be the responsibility of the state. The state in Gandhian Swaraj imagination mean the local government. In Gandhian perspective ‘every village will be

¹⁸ Carlo Vezzolo et al., *Designing Sustainable Energy For All*, (New York: Springer, 2018). p 54. <https://www.springer.com/gp/book/9783319702223>

¹⁹ Ibid.

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

²³ Ibid.

republic or Panchayat having full power to govern.’²⁴ If local government both institutionally and functionally is not developed enough to take this responsibility, handholding might be required and it is where the Social entrepreneur could play a role as partner in promoting ‘sustainability transitions.’²⁵ Their ability to connect people and institution to promote a coherent relationship plays vital role in creating social values and in the process social capital. This could transform local wherewithal into organized mode thereby triggering the germination of local entrepreneurship. It is argued that the “entrepreneurs can leverage resources to create new institutions and norms or transform existing ones—and make efforts to identify political opportunities, frame issues, and induce collective efforts to infuse new beliefs and norms into social structures. In other words, social entrepreneurs can foster development in many different ways: by getting new legislation or regulations passed; getting old legislation or regulations enforced; shifting social norms, behaviours, and attitudes among fellow citizens, corporations, and government personnel; changing the way markets operate; and finding ways to solve problems or meet previously unmet needs.”²⁶

In Gandhian imagination energy consumption has to be restrained, need based and self sustaining which means that energy services should be so designed that it minimises the use of energy even if it is renewable. Thus, it recommends rationalisation of consumption.²⁷ It needs to be underlined here that in consonance with Gandhian understanding, the SPSS-DRE model has to be the anchor of localisation processes to meet the challenges of sustainable energy security. Localisation as observed earlier, refers to the utilisation of local resources, local producer, local consumer and the localisation of the economy. Apparently, this suggests the organisational principle need to be defined in terms of decentralisation processes. Localisation also carry with it a degree of self-reliance though not autarky. It is not close universe but a universe which dynamically interacts with larger universe on its localising strength. In other words it is local that defines the terms of its engagement not the other way round. Further it is an ongoing process. It needs to be emphasised that localisation is not always be posited in terms of adversarial relation with externalities. That will be narrow view of recommending evolution of man nature relationship. The contention here is to look at localisation in conjunction with externalities.

²⁴ C S Solanki, *Energy Swaraj: My Experiment with SOLAR Truth*. Notion Press 2019

²⁵ Like business entrepreneurship, SE recognizes and acts upon what others miss: opportunities to improve systems, create solutions, and invent new approaches. Venkataraman (1997), studying traditional entrepreneurship, sees the creation of social wealth as a by-product of economic value created by entrepreneurs. In SE, by contrast, social value creation appears to be the primary objective, while economic value creation is often a by-product that allows the organization to achieve sustainability and self-sufficiency. In fact, for SE, economic value creation, in the sense of being able to capture part of the created value in financial terms, is often limited, mainly because the customers who may be willing but are often unable to pay for even a small part of the products and services provided. See, Christian Seelos, & Johanna Mair, “Social entrepreneurship: Creating new business models to serve the poor,” *Business Horizon*, 48, issue 3 (2005): 241-246. <https://doi.org/10.1016/j.bushor.2004.11.006>

²⁶ Suyash Jolly, Rob Raven, & Henry Romijn, “Upscaling of business model experiments in off-grid PV solar energy in India,” *Sustainability Science*, 7 (2012): 199-212. <https://link.springer.com/article/10.1007/s11625-012-0163-7>

²⁷ intervention in products and services (e.g. design product and services that do not necessitate processes that could pollute a lake), to (d) intervention in consumption patterns (e.g. understand which consumption patterns do not (or less) require products with processes that could pollute that lake). See, Suyash Jolly, Rob Raven, & Henry Romijn, “Upscaling of business model experiments in off-grid PV solar energy in India,” *Sustainability Science*, 7 (2012): 199-212, p 103. <https://link.springer.com/article/10.1007/s11625-012-0163-7>

Localisation is central in defining a strategy towards sustainable energy security. A synoptic view of contemporary debate on localism shows its proximation to Gandhian perspective on energy swaraj. Localism has gained currency in discourse mainly for two counts, as response to globalisation deficit second to mitigate the challenges of environment crisis. It is argued that “localisation be seen as a viable transformative strategy to remedy the harmful effects of globalisation.”²⁸ It can be defined as a process “actively discriminating” in favour of flow of ideas, technologies, information, culture, money and goods with the end goal of rebuilding local economies worldwide.”²⁹ Further it is even visualised as transformative sustainability. Thus, it addresses local concerns of global issues. It asserts that “unlike the utopian pasts, global communication would make a localised post oil peak future very different—an ecologically sustainable world where there are fewer physical connections but vastly more communication between individual.”³⁰ Further it is premised on proximity between producer and consumer. Thus the decision making focuses on meeting the needs locally. It is described as “concentric circle of self-sufficiency, conceiving that at the centre is the household, the most important economic and social unit.”³¹

Having looked at the definition of localisation from diverse perspective it will be relevant to examine it as a proposed strategy for sustainable energy security. Premised on the strength of diversities, the strategy ought to promote each locale, solving its problems in its own way. Thus, localised problem solving promotes adaptability and participatory culture. This makes the system transparent and develops management culture distinct to the nuances of the locality because the people know better of their habitat both its problems and potential.

Scale is very central to the idea of localisation to encourage production essentially based on local resources and very limited supply from outside. It also assumes that incentive structures like tax regime would be favouring small and medium scale production. Further it is community that becomes the unit of social organisation and focus of action. It is observed that “in practice localisation means developing community owned local institutions like workers owned and run cooperatives, community gardens and restaurants local power generation local money and communal forms of land ownership.”³²

The literature on localisation and sustainability provides a nuanced perspective by bringing the concept of sustainable renewable energy sufficiency.³³ It brings out that energy self-sufficiency promoted by localisation process, contributes to sustainable energy security. Energy self-sufficiency by definition has local connotation. “Renewable energy self sufficiency (RESS) simplified means the energy demand of a region is covered by the energy produced in the region based on renewable energies “³⁴It encompasses multiple dimensions like calculation of the volume, the content meaning the kind of use, the scale ie territoriality to be factor and the

²⁸ Ibid.

²⁹ Ibid.

³⁰ Ibid.

³¹ Ibid.

³² Ibid.

³³ Chantal Ruppert-Winkel & Jürgen Hauber, “Changing the Energy System towards Renewable Energy Self-Sufficiency—Towards a multi-perspective and Interdisciplinary Framework,” *Sustainability*, 6, no. 5 (2014): 2822-2831.

³⁴ *ibid*

decision making process ie who defines the goal and values.³⁵ In brief Energy Swaraj is spelled out as the following:³⁶

State of self-regulation where individuals and societies become sensitive to energy needs, they govern the generation and consumption of energy from within their locality using local available resources.

“Establishing Energy Swaraj means generating and consuming energy in holistic manner without affecting the environment and sustainability of life on the Earth.

A system of generation and consumption of energy by the local for the local-Energy Swaraj is a model of democratization of energy.

Energy Swaraj is about generating and fulfilling ALL energy needs on 24x7 basis, but before generating energy, avoiding the energy needs if avoidable, minimizing the energy needs if minimizable and generating only if it is really required.”³⁷

Having spelled out the broad tenets of Energy Swaraj , the issue in debate could be to understand the place of DRES in this ecosystem. How DRES could contribute in promoting the model of Energy Swaraj. It is clear from the above that Gram Swaraj and by extension energy swaraj is premised on decentralization mode of governance. As analysed in details in earlier chapters, DRES is by definition is “small-scale energy generation units (structure), at or near the point of use, where the users are the producers—whether individuals, small businesses and/or local communities. These production units could be stand-alone or could be connected to nearby others through a network to share, i.e. to share the energy surplus. In the latter case, they become locally distributed energy networks, which may, in turn, be connected with nearby similar networks.”³⁸ By extension it is decentralization mode of energy production system. However, it could still be part of centralized system if it is linked to the grid system, Therefore to be part of energy swaraj it has to have no linkages with grid. And the energy produced is renewable and local.

Being organized in decentralized mode, DRES in consonance with Gandhian understanding underwrites the predominant role of the community as collective owner of the project. The community owned DRES model thus redefines the relation between energy and society. It is observed that , “community ownership models cover the entire energy value chain: they can provide localised generation for power, heat and energy-related services (e.g. storage, charging electric vehicles, energy trade with surrounding communities); enable efficient energy use; and provide flexibility to the entire power system.”³⁹ These models could be constructed around the following options:

³⁵ Ibid.

³⁶ CS Solanki, *Energy Swaraj: My Experiment with SOLAR Truth*. Notion Press 2019

³⁷ Ibid

³⁸ Fabrizio Ceschin Lilac Osanjo Mugendi K. M'Rithaa Richie Moalosi Venny Nakazibwe Jan Carel Diehl **Distributed/Decentralised Renewable Energy Systems.**https://link.springer.com/chapter/10.1007/978-3-319-70223-0_2

³⁹ IRENA, *COMMUNITY OWNERSHIP MODELS INNOVATION LANDSCAPE BRIEF*. 2020

Community-owned electricity generation plants, such as solar PV plants, wind power plants and biomass plants, can be developed to fulfil the electricity needs of the local community.

Community-owned district heating systems, such as biomass, wood pellet, solar, geothermal, and combined heat and power plants, can be implemented to serve the heating needs of the local community.

Community energy storage systems involve the deployment and operation of batteries by communities to store the electricity generated locally or consumed from the grid to meet the peak demand of the community.⁴⁰

Community energy efficiency programmes, either as a core or complementary activity, encourage members to take measures to reduce their consumption or invest in building retrofits. They may encourage such actions through direct investments, education and outreach, provision of technical and financial advice, or partnerships with local authorities. Community electricity retailers buy wholesale electricity produced by community-owned electricity generation plants and sell energy services to local communities and other third-party supporters.⁴¹ The energy swaraj underlines on community ownership to encourage the local participation in non energy related economic activities besides it contribute in generate social capital which plays persuasive role in restricting out migration to urban centers. The rural poverty has been the driving factor pushing towards urban migration. DRE in this framework is expected to empower the rural economy by developing local supply chain thereby creating jobs in the rural economy itself. Energy Swaraj frame also finds disagreement to conceive it on perpetual financial support from the state. A perpetually state supported scheme reflects short term understanding and being unsustainable is bound to degenerate or fail. The Swaraj frame does recognize the roles of the state as prime mover as fund provider but it strongly underlines that the scheme be so internalized by the ecosystem that it moves away from the state funding. What is argued here that with internalization, its ownership goes to the community hence funding too becomes the community responsibility.

Source of finance is crucial in defining the transition process. Financing for whom and by whom is serious concern of the Swaraj framework. The Indian state has been providing the end user finance in the form of subsidies and tax rebate to promote transition.⁴² The experience overtime shows that these mode of financing are not sustainable even if they do contribute in accessibility in short run. Besides their distortionary implications are well documented. According to reports from ground “government-supported end-user financing, as currently structured, may not be the most effective means in accelerating the diffusion of off-grid solar technologies in the country. This form of end-user financing is limited by the fact that a large segment of the population which requires off-grid solar technologies does not have access to the formal banking sector. Furthermore, firms that wish to pass the savings of subsidized solar products on to their customers face bureaucratic hurdles, resulting in loss of time and revenue. By examining the experiences of both the firms and the end-users, this study suggests that the focus of financing for the diffusion of off-grid solar technologies should shift from the end-user

⁴⁰ Ibid.

⁴¹ Ibid.,

⁴² Kartikeya Singh. 2017. “Financing for Whom by Whom? Complexities of Advancing Energy Access in India.” CGD Policy Paper. Washington, DC: Center for Global Development

to the firm and entrepreneur.”⁴³ The point is that ecosystem needs to be so conceived that initial support loses its relevance over time by making the project to move on auto pilot mode. It is only when the project is on self propelling mode that it triggers the points of innovation and creativity. It is observed by some studies that local conditions driven by declining cost of solar manufacturing and relative rise of income of rural poor have “supported and will continue to enable breakthroughs in financing innovations from emerging off-grid solar energy enterprises that put these technologies within reach of the rural poor.”⁴⁴ With specific reference to off grid projects it is found that technology providers do not depend on end users finance because they “use micro-finance institutions as a distribution channel for their products, not as a provider of credit. While the same study states that the “presence of willing banking partners was crucial to entering a new region,” anecdotal evidence coupled with survey results show that the majority of off-grid solar enterprises are not using bank financing for the sales of their products.”⁴⁵ They are making use of micro finance. The strengthening of micro finance institution by off grid enterprise reputedly lead to its being used “to improve livelihoods and eradicate poverty by providing people with small, manageable loans to support income generating activities. Providing loans specifically for energy technologies that can be used for income-generating activities or increasing productivity is one of the primary ways in which microfinance is playing a role in helping expand energy access around the world.”⁴⁶ Thus it contributes in promoting financial self sufficiency. The point that emerges from the study is that innovative business model emanating from grass root approach could make it possible to overcome the barrier to pay energy services despite financial limitation.

In contrast if the DRES is visualized in centralized mode, it loses its potential to promote empowerment by participation of the community. This is illustrated by the draft document of the “National Policy for Renewable Energy based Micro and Mini Grids”. According to document, DRE solutions are expected to meet the power needs of consumer at the last mile access by “providing reliable and cost-effective energy service, cater to productive and commercial loads, accommodate future loads, and connect with grid and feed surplus power if needed.”⁴⁷ It is planned to set up at least 10,000 renewable micro-and mini-grid projects across the country, with 500 MW of generation capacity of average size of 50 kW to be developed by ESCO by 2022. It is expected that each micro and mini grid project has to have capacity to meet the basic needs of every household to provide energy for services beyond lighting such as fan, mobile charging; productive and commercial requirement⁴⁸The partners in project include, State Nodal (Renewable Energy Developmental) Agencies (SNA),Public Sector Organizations (Ex: SECI) Rural Energy Service Providers (RESPs),Financial Institutions (NABARD/IREDA/RRB/ Commercial banks) and Panchayats. A closer scrutiny of the report makes it very clear that the State and the ESCO have predominant role in defining designing

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Anand Gupta, “MNRE: Draft National Policy on RE based Mini/Micro grids,” *EQ International*, June 2, 2016. <https://www.eqmagpro.com/mnredraft-national-policy-on-re-based-minimicro-grids/>

⁴⁸ According to it the beneficiaries include, Households (lighting, mobile charging, TVs, fan and other appliances etc.) Agriculture (irrigation pumps) Commercial(shops, telecom towers, ice-makers, battery/ lantern charging and renting etc.)Productive(milling, rice de-husking, wood/ metal workshops, foundry, small & micro industry, village industry, atta chakki.)Social institutions(schools, medical centres, public buildings, community buildings.) Government or Panchayat Offices. Municipal Functions –(Street Lights)

initiating promoting and maintaining the project. The responsibility from site identification to Planning and Development is with the State government/ SNA. Report observes that “The role of Panchayat and Village Energy Committee so far confined to local approvals and No objection certificate etc in governance, has been extended to promote community participation by creating Village Energy Committee. Responsibilities of the VEC include developing a plan and identifying households interested in getting a connection and ensuring connections for households on a priority basis, and quality of power supply, and others The overall responsibility of service and maintenance assigned with the ESCOs over the life of the projects.”⁴⁹

Recently MNRE has released guide line extending the date of third phase of off grid solar power plants to March 2021. It was earlier targeted at 2018-19 and 2019-20.⁵⁰ “Under the Phase III of Off-grid and Decentralized Solar PV Applications Programme of MNRE, off-grid solar power plants of individual size up to 25 kWp can be installed in areas where grid power has not reached or is not reliable. Such plants are mainly aimed at providing electricity to Government schools, hostels, panchayats, police stations and other public service institutions.”⁵¹ These guidelines provide implementation framework for operation of off-grid solar PV systems through Renewable Energy Service Company (RESCO) mode.⁵² “A Renewable Energy Service Company (RESCO) is an ESCO Energy service company which provides energy to the consumers from renewable energy sources, usually solar photovoltaics, wind power or micro hydro. RESCO or BOOT model is about pay as you consume the electricity. Solar Power Plant is owned by the RESCO or ENERCO (Energy Company). The customer serviced does not own the Solar Power Plant. Customer have to sign a Power purchase Agreement (PPA) with actual investor at mutually agreed tariff and tenure. Customer only pays for electricity consumed on a per unit price for power basis. RESCO developer is responsible for its annual operations & maintenance (O&M). The RESCO gets the benefit by selling the surplus power generated to the DISCOM.”⁵³

The programme aims to address the issue non reliability of power in the areas where grid power despite being available is not a reliable proposition. In RESCO model, it is expected that the vendor would install and operate the plant of the capacity of 10 kWp for at least 10 years and solar PV plants of capacity above 10 kWp for at least 15 years. The plants will be installed by the RESCO on BOOT basis. After completion of this time period the plant will be handed over to the beneficiary in operating condition. The beneficiary is expected to make payment to the RESCO company according to the daily minimum guaranteed power. To ensure the

⁴⁹ Draft National Policy on RE based Mini/Micro grids. Ministry of New and Renewable Energy SPV Division

⁵⁰ The first phase was 2010 to 2013 with target of 200MW against 253MW was sanctioned, the Phase 2013-17 was targeted at 500MW but 713 MW was approved, in third phase target of 118MW was to be accomplished by March 2020. This does not include PM Kusum Scheme and Saubhagya scheme of Ministry of Power. See, “Brief on Off-grid Solar PV Programme,” Ministry of New & Renewable Energy, Govt of India. <https://mnre.gov.in/solar/solar-offgrid>

⁵¹ “Draft Guidelines for Implementation of Off-Grid Solar Power Plants in RESCO model under MNRE Programme,” Centre for Energy Regulation, May 18, 2020. https://cer.iitk.ac.in/odf_assets/upload_files/MNRE_RESCO_1.0.pdf

⁵² RESCO, Wikipedia, October 2, 2019. <https://en.wikipedia.org/wiki/RESCO#:~:text=A%20Renewable%20Energy%20Service%20Company,%2C%20cooperatives%2C%20and%20community%20organisations>

⁵³ CAPEX OR RESCO – WHICH SOLAR MODEL IS BETTER? BLUEBIRD SOLAR.COM 24-9-2019

implementation a Power Purchaser Agreement to be between RESCO the Power Producer and Power Purchaser i.e. beneficiary.⁵⁴

It is clear from government policy papers that India's off grid approach and policy is clearly driven by the state and the private companies, with very marginal space for local agencies either institutionally i.e. Panchayat and the community. This is because the energy security is perceived from top down perspective not recognizing that "providing an electricity connection, does not necessarily mean reliable electricity access for households. Currently, electricity supply is highly unreliable for most rural consumers."⁵⁵ The fact that despite reaching to consumers, the quality of electricity remains of low underlining the absence of clarity in policy making. DRE is pursued without a defined perspective consequently it is not sure how far it will go to ensure sustainable energy security.

Summing-up it can be argued that though the arrival of renewable energy has opened the possibilities of changing the share of clean energy in energy mix but its potential to play transformative role ensuring availability and accessibility to the segment of society denied and deprived under centralised energy system could be possible only if it is placed as integral component of the ecosystem.

India is very important market and player in global energy affairs. It is the third largest consumer with more than eighty percent import dependence. All account say that its energy consumption will continue to grow. The inevitability of energy transition is well argued. However the intent of substituting dirty fuel with clean energy had set back when it was forced to enhance coal imports and augment its production belying the earlier proposition of India becoming free from increasing imports. The Glasgow meet not only underlined the need to go for more coal but India fought bitterly on watering down the phrasing of the draft. Even if Glasgow was an aberration it cannot be denied that coal and other hydrocarbons will continue to be fuel of deficit in global energy mix. In fact the line was sharply drawn between Asian and western transition, former calling for increasing rise of clean energy while the former wanted a global energy regime sensitive to writing off of coal and move on target based gas energy transition. The prospects of renewables certainly enhanced the challenge of distribution associated with them. However the break through in RE technology along with issues of intermittency and storage has changed the global agenda. The geopolitics of hydrocarbon is **different from geopolitics of renewables, where the technology not raw material is controlled by a few and the resource say solar is universally distributed.**

⁵⁴ Implementation of Ph-III of the off-grid solar PV programme, which covers installation of three lakh solar street lights, distribution of 25 lakh solar study lamps and installation of solar power packs of total aggregated capacity of 100 MWp. In addition, under AJAY Ph-II over three lakh solar street lights would be installed. Further 20MW Projects of Concentrated Solar Thermal will be undertaken," See, Aarushi Koundal, "Budget 2020: Solar power's allocation rise by 0 per cent," *The Economic Times*, February 01, 2020. <https://energy.economictimes.indiatimes.com/news/renewable/budget-2020-solar-powers-allocation-rises-by-10-per-cent/73842088>

⁵⁵ Amol Phadke, Won Young Park, & Nikit Abhyankar, "Providing reliable and financially sustainable electricity access in India using super-efficient appliances," *Energy Policy*, 132 (September 2019): 1163-1175. <https://doi.org/10.1016/j.enpol.2019.06.015>