Paying for Renewable Energy: Devising Policy Implications from a Concept Centric Review of Literature

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Abstract

Renewable energy based energy transition is gaining momentum the world over. End consumer's willingness to pay for it is an important variable in the transition plan, which can help meet set green energy targets. This study provides a concept-centric literature review of 70 research studies investigating consumer's willingness to pay for renewable energy. Analysis suggests that it's a reflection of one of 3 concepts: First, it indicates public acceptance of renewable energy, with higher public acceptance translating to higher stated willingness to pay for green energy. Second, it mirrors the preferred attributes of green energy supply, specifically in deregulated retail electricity markets. Third and finally, it emulates the non – use values of renewable energy, namely bequest and option values. Basis the analysis, this study recommends policy interventions that will help accelerate the pace of green energy adoption in developing countries, where green energy transition is still in its nascent stages

Key words: Energy transition, Renewable energy, Willingness to pay for renewable energy, concept-centric literature review

Introduction

The United National Sustainable Development Goals (UN SDGs) number 7 seek immediate attention to increasing the of share of Green Energy/Renewable Energy Sources (RES) in the global energy mix (The Sustainable Development Goals Report, 2018), due to its varied socio-economic benefits (Tongsopit, Kittner, Chang, Aksornkij, & Wangjiraniran, 2016) (Buonocore, et al., 2015) (Hirsch, Parag, & Guerrero, 2018) (Shahbaz, Loganathan, Zeshan, & Zaman, 2015). Given these advantages, "green energy transition" is in focus for many countries(Fattouh, Poudineh, & West, 2018). However, negative externalities/ problems of RES also call for immediate attention.

Not only is generating electricity from RES is costlier, as compared to conventional energy (Stram, 2016), there is also problem of Intermittency, caused due to uncertainty and variability of the wind/solar natural resource(Bessa, Moreira, Silva, & Matos, 2013). More specifically, the fuel source is not available with certainty and consistency, during all times of the day. Added to this are the problems of visual distortions and noise effects, especially in wind power projects (Ali, Mansur, Baharudin, & Hassan, 2016). Thus, given the negative externalities, a suitable policy framework is warranted such that investments in RES generation are sufficiently attracted.

Electricity generation from RES can either be incentivized through Feed-In-Tariff (FIT)/ or Renewable Purchase Obligations (RPO)/ Renewable Purchase Standards (RPS), or can be a

mix of both. On one hand FITs are price guarantees that offer a higher price of power generated to RES generators (to be purchased by power supplying utilities), while RPOs/ RPS are quantum guarantees, that ensure a minimum quantum of RES based electricity procurement from generators, by power supplying utilities. Between the two, price guarantees by way of FITs have been more successful in attracting investments into the renewable energy sector (Wall, Grafakos, Gianoli, & Stavropoulos, 2018), (Nicolini & Tavoni, 2017)(Sun & Nie, 2015).
FITs offered for RES generation have historically been higher than thermal power generation and with fixed and longer durations (Ivanova, 2012). This has in turn added to the cost of power procurement for power suppliers (who procure power and supply to end consumers of electricity). One pass through mechanism, by which energy/power suppliers can recover these higher costs, has been to charge the end users with a green energy tax on monthly electricity bills. Worldwide, many countries pass on the extra cost of RES generation to end consumers by way of renewable energy surcharges in monthly electricity bills, like Canada (Bohringer, Rutherford, Rivers, & Wigle, 2012), Germany (Busgen & Durrschmidt, 2009), China (Schuman & Lin, 2012) and Italy (Bigerna & Polinori, 2014), amongst others. Hence end user/ consumer's Willingness To Pay (WTP) for RES-E becomes a significant variable for policy building, which can help meet the national targets set.

Since RES based generation is not separately marketed to end consumers in many markets, the monetary assessment of WTP for RES is done using non-market valuation techniques. Quantitative valuation techniques most commonly used have been the ***Contingent Valuation Method*** (CVM - a stated preference technique)(Arrow, Solow, Portney, Leamer, Radner, & Schuman, 1993) and the ***Discrete Choice Experiments*** (DCE – a revealed preference technique)(Hanley, Wright, & Adamowicz, 1998)(Adamowicz, Boxall, Williams, & Louviere, 1998). In both these methods, a respondent is presented with information on RES-E generation, and asked to state/ reveal the maximum Willingness to Pay. This study reviews 70 Peer Review Journal (PRJ) studies that have assessed WTP for renewable energy, either with the use of CVM, or DCE or through qualitative methods. It differs from the already published literature reviews(Stigka, Paravantis, & Mihalakakou, 2014), (Soon & Ahmad, 2015)(Ma, et al., 2015)(Oerlemans, Chan, & Volschenk, 2016). While Stigka et.al (Stigka, Paravantis, & Mihalakakou, 2014) summarize the WTP studies that focus specifically on local community's acceptance of renewable energy projects, Soon & Ahmad (Soon & Ahmad, 2015) conduct a meta-analysis of over 30 studies based on various valuation methods used.Ma. et al.,(Ma, et al., 2015)comment on the variations in WTP estimates arising out of study design differences or demographic reasons. Oerlemans et.al.,(Oerlemans, Chan, & Volschenk, 2016)study the possible errors in the use of non-market valuation of WTP for RES-E, and suggest possible solutions. Adding to the existing body of reviews, this paper provides a concept – centric summary of all included studies, following the guidelines of Webster & Watson (Webster & Watson, 2002) and helps in identifying the different meanings/concepts behind a consumer's stated/revealed WTP for RES-E.

Literature analysis conducted suggests that WTP for renewable energy is a reflection of either of the following 3 concepts:

- Public acceptance of higher shares of renewable energy in the national energy mix.
- Preferred electricity supply attributes of RES based electricity supply.
- Total Economic Value (TEV) of RES.

Each of the above mentioned concepts are detailed in this literature analysis. The objective is to understand the many meanings of WTP for RES. This paper is thus structured as follows: Section 2 provides an overview of the literature review design followed. Section 3 carries details of all emerging concepts from the literature analyzed. The 3 emerging concepts have been detailed and relevant articles are summarized in sub-sections 3.1, 3.2 and 3.3. Finally, section 4presents future research and policy interventions that can greatly enhance the RES share in final energy mix, especially in developing nations, which are currently in their nascent stages of RES market development.

Research Design

Identification of Literature

Literature published in reputed journals was searched using the following keywords: "Willingness to pay for renewable energy"; "Paying for green energy"; "Willingness to pay for green energy"; "Contingent valuation and renewable energy"; "Discrete choice experiments and renewable energy"; "Choice experiments and renewable energy"; "Willingness to accept for renewable energy", "Grounded theory and renewable energy". Articles published between 2010 and 2019 were included to part of this analysis.

A bibliometric analysis suggests that majority of the WTP studies used the CV method to quantify WTP for renewable energy, which has most commonly related to the social acceptance of RES. DCE applications appeared in 33% of total studies and have been the method of choice to quantify preferred attributes of RES based electricity supply. As many as 40 studies of the total 70 studies included in this review, were published between 2015 and 2019, suggesting recent research interest in the subject. The dominance of developed economies in this area is also established clearly as close to 80% of the studies have been undertaken in developed countries.

The next section, section 3 and subsections 3.1, 3.2 and 3.3 explain each of the emerging concepts captured by WTP for RES in more detail.

Willingness to pay for renewable energy: Emerging concepts from literature

3.1 WTP captures public acceptance of higher shares of renewable energy in the national energy mix.

Policy support to increase share of RES in final energy mix is now pronounced in more than 150 countries (Agency, 2013). However, public/social acceptance of RES is a necessary pre-requisite if the set targets are to be met, due the several negative externalities associated with RES power projects (Devine-Wright, 2005)(Larson & Krannich, 2016)(Schwenkenbecher, 2017)(Enevoldsen & Sovacool, 2016). Higher social acceptance would translate to easier project execution and faster achievement of RES targets.

Social acceptance of renewable energy encompasses the following 3 factors (Wustenhagen, Wolsink, & Burer, 2007):

- Local community acceptance (Not-In-My-BackYard; NIMBY feelings)
- Acceptance by policy makers
- Market acceptance (captured by willingness to pay for the new innovation).

Of the above, NIMBY feelings have sharply risen due to visual, noise and sound disturbances, of wind power projects (Bell, Gray, & Haggett, 2005). To understand this aspect better, countries have tried to assess what end users of electricity will pay for renewable energy, and equate it to reflect the amount of public/ social support for proposed green energy projects. Once understood, this WTP is charged as an RES premium in end users monthly electricity bills, so as to financially support meeting RES targets (funds pool creates is then used to finance renewable energy purchase by the power supplying utilities). Examples of such RES surcharges can be found in many European countries (Bigerna & Polinori, 2014) (Andor, Frondel, & Vance, 2017) but to a much lesser extent in Asian economies (Schuman & Lin, 2012)).

To adjudge the social acceptance of RES, the Contingent Valuation Method has been most useful. Energy access and security related benefits of RES Increased energy security and higher employment opportunities encourage consumers to pay for RES (Longo, Markandya, & Petrucci, 2008) (Ku & Yoo, 2010) (Zografakis, Sifaki, Pagalou, Nikitaki, Psarakis, & Tsagarakis, 2010). The WTP for RES is not only restricted to its usage in electricity, but also in the transportation sector, mandated through the Renewable Fuel Standards (RFS). As an example, Korean residential consumers would pay higher for RFS than for renewable energy based electricity supply (Huh, Lee, & Shin, 2015). Apart from cleaner fuel options, RES can also be used in distributed form for which the social acceptance is on the rise. While "space loss aversion" and high capital costs act as barriers for distributed RES (Scarpa & Willis, 2010), social popularity is climbing due to reduced reliance on local grid(Kowalska-Pyzalska & Ramsey, 2018). Further, altruistic values of RES – a greener and cleaner environment for the community nudge consumers to pay (Hyo-Jin Kim, 2018)(Menges, Schroeder, & Traub, 2005).In most cases, the revealed WTP is charged as premium for RES based electricity or fuel, and pool of funds created is used to meet the set targets.

However, countries which have been historically charging RES based premiums, end consumers are exhibiting resistance to accepting higher shares of RES. it is also observed, that in countries where RES premiums are charged to end consumers, social resistances have been on the rise. In Germany, WTP for wind powered electricity fell by 17% in just 2 years between 2013 and 2015(Andor, Frondel, & Vance, 2017).This originated from the fear of unjust use of funds – also noted in other countries (Dagher & Harajli, 2015). Apart from this, RE is also considered socially unequal. It is widely believed that residents residing in close proximity of RES power projects bear the negative effects (such as noise, visual and flicker disruptions), while positive externalities are benefitting by all end users of electricity. To compensate consumers for the resultant welfare loss, monetary payments/doles are required to be made by the local government, in line with consumer's Willingness to Accept (WTA)) for new/proposed RES projects (Botelho, Pinto, Lourenco-Gomes, Valente, & Sousa, 2016)(Groothuis, Groothuis, & Whitehead, 2008)(Polinori, 2019).Thus RES have increasing met with NIMBY and LULU (Locally Undesirable Land Use) feelings. While the NIMBY and LULU syndromes are most apparent for wind and solar projects, odor related concerns are making Waste- To –Energy projects socially undesirable (Sun, Ouyang, & Meng, 2019). Barriers at state and local administration level also add to RES social acceptance levels (Ntanos, Kyriakopoulos, Chalikias, Arabatzis, & Skordoulis, 2018). Given the increasing social reluctance around renewable technologies, more in-depth qualitative investigations have appeared in literature in the recent past(Zoellner, Schweizer-Ries, & Wemheuer, 2008), (Kunze & Busch, 2011) and (Richards, Noble, & Belcher, 2012)**,**so as to dig deeper into thesocial phenomena surrounding renewable energy.

WTP for green energy has also been studies in developing economies but observed to be much lower than the developed countries, due to lower affordability (Azlina, Mahirah, & Sin, 2018). However, the increasing environmental issues, growing bequest values of RES, and increased energy access promises through distributed RES nudge consumers to pay more for it (Xie & Zhao, 2018)(Mozumder, Vásquez, & Marathe, 2011)(Alam & Bhattacharyya, 2017).

To suppress social resistance issues surrounding green energy projects, some solutions emerge from the literature analysis:

*Involving community members in joint development of RES-E generation projects:*Community development of RES project may become the new normal where key community players can spearhead project development. This will ensure that social negative sentiments emanating from the community are kept at bay.However, there also various factors that need to be accorded priority. First, even within community development, proximity of residence to RES project can make community members demand higher returns on investments(Woo, Chung, Lee, & Huh, 2019). Thus spacing of RES project in land parcels need to consider this for socially optimal planning. Second, “Opinion Leaders” - identified as influential community members who opine positively about the benefits of RES, should play a key role in RES project development (Pedersen & Waye, 2007) . Presence of Opinion Leaders is known to offset negative sentiments spread by “***Landscape Guardians”*** (a community group who raise anti- RES-E sentiments by discussing negative aspects of RE projects)(Hall, P.Ashworth, & P.Devine-Wright, 2013). However, technical knowledge of RES project development and of the technology itself must be high amongst such opinion leaders(Rogers, Simmons, Convery, & Weatherall, 2008)
*Higher Research and Development (R&D) spends to identify newer forms of RES:*As of today, the RES presence has been dominated by wind and solar energy. However other forms of RES are also available but remain untapped, while having higher social acceptability. Marine renewable energy technologies (like tidal and offshore wind energy) are far less visible to urban dwellers and are thus more socially desirable(Polis, Dreyer, & Jenkins, 2017).Other forms of RES that deserve more R&D focus are Forest Biomass(Solino, Vazquez, & Prada, 2009), Natural Gas (Cheng, Cao, Woo, & Yatchew, 2017), Fuel Cells (Lim, Kim, & Yoo, 2018), and Hydro Power (Arega & Tadesse, 2017). Thus turning

attention to these new sources can help avoid social resistance issues surrounding wind and solar energy.

Creating awareness of positive externalities associated with RES : Consumer awareness and perception towards RES can greatly influences WTP for RES (Liu, Wang, & Mol, 2013). Consumers are often found to hold heterogeneous perceptions about RES, based on their individual knowledge and awareness levels about RES benefits (Ivanova, 2012), which in turn influences their WTP for it. Knowledge amongst consumers, that land use by solar energy projects is “reversible” readies them to pay for it (Vecchiato & Tempesta, 2015)(Azucena Gracia, 2012). Awareness of negative impacts of nuclear energy encourages Japanese consumers to pay a 6% premium for wind and solar energy over nuclear energy (Morita & Managi, 2015), and sometimemake consumers even seek compensation for the welfare loss they would suffer should new nuclear plants be developed(Murakami, Ida, Tanaka, & Friedman, 2015). This social awareness about different types of RES, its costs and benefits can be achieved through a 2 fold strategy : First by identifying “Green energy champions” (typically, young, more educated and richer consumers) who can fast spread this knowledge about positive impacts of RES (John A. Paravantis, 2018). Second, by higher Peer-effects, where RES technology adoption is fostered due to peer-to-peer influences in a community(Yamamoto, 2015) . Thus information sharing on RES benefits through “Green Energy Champions” and Peer effects will help standardize consumer awareness and perception levels.

*Increasing the distances of RES projects from urban landscapes:*Regular sightings of wind turbines from residential locations lead to consumer welfare loss, which nudge consumers to seek compensation for it. Compensations can be provided based on their Willingness to Accept (WTA)(Bergmann, Hanley, & Wright, 2006), however this adds to project costs, either borne by project developers, of the government. The associated welfare loss is sometimes so pressing that residents have also been willing to pay to have RES projects at a distance from area of residence(Ladenburg & Dubgaard, 2007)(Brennan & Rensburg, 2016). This can be remedied by implementing minimum setback distances, that mandate a minimum distance of renewable energy project sites from residential areas – a strategy that has empirically proven to increase social acceptability of RES projects (Brennan & Rensburg, 2016).

3.2 WTP mirrors the preferred electricity supply attributes of RES based electricity supply in deregulated retail electricity markets

In deregulated retail electricity markets, end consumercan choose preferred electricity supplier as well as the source of supply as well.This promotes competition amongst power suppliers, and as a result brings in operational efficiencies and price parity. **In such markets,** consumers WTP reveal the preferred attributes of RES-E supply, if chosen. For this, Discrete Choice Experiments Method has been more successful, since DCEs help understand the isolated influence of electricity supply attributes on consumer’s willingness to pay for it. In a typical DCE, a respondent is asked to reveal his/her willingness to pay (instead of state his willingness to pay as is done under Contingent Valuation studies), based on attributes/properties of the product, which is being valued. Various “choices” are presented to the respondent, which vary on the product “attributes” and on the “level of attributes”. One such attribute of interest has been the content of power – grey/green power. A typical “attribute” could be the source of RES-E (wind based or solar based), and a typical “level” can be the % share of electricity supplied (10% or 20% of total electricity supply). The WTP for RES-E thus revealed, is a function of how the respondent values each of these attributes and is referred to as “Marginal Willingness To Pay”, and captures the “cost” that the respondent is willing to bear to enjoy RES based electricity supply. Of the 70 studies included in this study, 13 studies employed the DCE method.CVM applications to identify the attributes of electricity supply also exist in literature, presented by Wiser(Wiser, 2007)andAkcura(Akcura, 2015), however DCE studies have been more pronounced.

Literature analysis confirms the following attributes of RES based electricity supply that make consumers willing to pay for it:

Higher share of RES in the national energy mix: Over the years, consumer preferences have turned overly positive towards RES, preferring a complete decarbonisation of the grid. From a preference of 100% hydro energy fueled grid, consumers now support a 100% wind power fueled energy mix (Goett, Hudson, & Train, 2000). However, introduction of solar energy steered interests away from wind energy, due to its technological maturity and potential for distributed consumption (Borchers, Duke, & Parsons, 2007) – Mandatory solar power contracts are more preferable than voluntary wind/ methane/biomass/generic green energy based electricity supply contracts. However, wind energy appears to win over natural gas, due to wider reach of social benefits of wind energy(Nkansah & Collins, 2019). Higher RES penetration in national energy mix is also preferred over adopting energy efficient practices at individual level, in order to reduce carbon emissions at the national level more effectively(Alberini, Bigano, Ščasný, & Zvěřinová, 2018). Not only does the share of RES in the energy mix matter, but also the source of RES in the electricity supply mix. Content preference – that relates to choice of green power source such as nuclear, wind or solar, has been used to identify end consumers as either “Potential users of Wind and Solar”, or “Traditional Users” or “Climate change sensitives”(Cicia, Cembalo, Giudice, & Palladino, 2009). Consumers can also be either “Value seeking”, “Price Sensitive” or “Green” and can vary in their rate of “switching” from the existing fuel supply contract to a RES based supply contract. Typically, an electricity supply mix that promises a mixed RES supply is preferred over a single RE source based supply (like only wind energy based or hydro energy based)(Yang, Solgaard, & Haider, 2015).

*Attributes of green power supplying utilities:*Not only does the content of power (renewable/thermal) matter to the end consumer, various attributes of the power supplying entity also hold significance in consumer’s WTP. Publicly owned power supplying companieswith a higher share of renewable energy in their supply mix garner a higher WTP for green electricity supply, than for green power supplied by energy co-operatives (Rommel, Sagebiel, & Müller, 2016). Transparency in power pricing strategies, a seamless communication strategy, a more democratic decision making process followed by the power utilities, locally sourced power and the extent of localization of power supplying entity are consumer welfare enhancing variables that spurs consumer’s willingness to pay for renewable energy (Sagebiel, Muller, & Rommel, 2014)(Kalkbrenner, Yonezawa, & Roosen, 2017). Heterogeneous preferences amongst consumers (based on the above identified attributes) have been used to bucket consumers into "Green participators", "price conscious democrats" or "change makers"(Sagebiel, Muller, & Rommel, 2014), whereby different consumer categories carry different WTP for RES.

Potential use of RES in remote areas and providing energy access through RES mini-grids and micro-grids systems: RES based micro-grids and mini-grids are gaining popularity to end energy poverty issues, especially in remote rural areas where the national grids is unable to expand, due to pressing technological and financial constraints of power transmission utilities. The ability to meet peak hour demand with reliable electricity supply fueled by solar PhotoVoltaic (PV) is the main reason why rural consumers exhibit WTP for RES(Graber, Narayanan, Alfaro, & Palit, 2018). The promise of lower noise effects and complete absence of flicker effects , along with the opportunity to use available roof space makes consumers prefer solar based micro/mini grids, over wind based systems(Su, Liu, Zeng, Streimikiene, zentis, & Seskiene, 2018)

*RES in newer forms:*Newer forms of RES are now being increasingly identified, deviating from the conventional reliance on wind and solar energy. RES powered electric vehicle charging and Waste-To-Energy are 2 such new technologies. RES powered Electric Vehicles promise reduced dependence on fossil fuel based transportation, and subsequently protects consumers from oil price volatility. On the other hand, use of Waste To Energy systems extend the lifespan of urban landfills – which in many countries is a growing concern. Both these applications have garnered positive WTP from end consumers positively(Lim, Lim, & Yoo, 2014)(Nienhueser & Qiu, 2016).

From the above analysis it becomes clear that in deregulated retail electricity markets where consumers are able to adopt electricity supply contracts on choice, understanding end consumer's choice process and variables that impact consumer welfare within that, must be made a necessary pre-requisite to power supply contract design. This will enable power supplying entities to ensure and retain high consumer satisfaction.

3.3 WTP for RES reflects the Total Economic Value of planned green projects

A consumer's willingness to pay for a non-marketable commodity can be for one of the following values, that the consumer attributes to the unseen/unused product (Janekarnkij, 2008):

- **Use value**: consumer is willing to pay for the actual use of the product – for direct use or for indirect use purposes.
- **Option value**: consumer wants to pay to retain the option of consuming the product in the future, for self – consumption.
- **Non use values**
  - **Bequest Values**: The product is of value for use by future generations and hence consumer's exhibit willingness to pay.
  - **Existence values**: Even when the product may not be directly or indirectly used, there is a value attached to its existence, which nudges consumers to pay for it.

11 studies included in this review have focused on Total Economic Valuation of renewable energy. Under this framework, it becomes clear that WTP for RES has been most prominent for the *non-use values* of consuming RES. The existence value associated with crop based electricitt supply is considered a novel proposition that make consumer's willing to pay for it even when the same is not being directly consumed(Li, Jenkins-Smith, Silva, Berrens, & Herron, 2009).*Existence values and Option value*of wind, solar and ocean energy observe positive WTP from consumer's (Yoo & Kwak, 2009)(Kwak & Yoo, 2015). High existence values for RES (wind, solar, hydro, ocean and geothermal energy)are commonly on account of significant positive ramifications on livelihoods, ecology and the surrounding habitat, as also for emissions reduction (Pang, Zhang, Ulgiati, & Wang, 2015)(Garces-Voisenat & Mukherjee, 2016)(Botelho, Ferreira, Lima, Pinto, & Sousa, 2017)(Jones, Ripberger, Jenkins-Smith, & Silva, 2017)(Cook, Davíðsdottir, & Kristofersson, 2018). On the other hand, b*equest values* for REShave become stronger in the post Fukushima nuclear incident era. Consumers willingly want to pay more for other RES, that can potentially replace nuclear power plants (Chul-Yong Lee, 2016)(Nakano, Miwa, & Morikawa, 2018).However, this willingness to pay has reduced over time due to the already existing RES-E surcharges, and the fear of unjust use of funds by local power supplying units in meeting the said RES targets (Guo, Liu, Mao, Jin, Chen, & Cheng, 2014).

Conclusion and policy recommendations

WTP for RESmost commonly mirrors the social acceptability of renewable energy. Amongst the available valuation method, the Contingent Valuation Method (CVM)has been most preferred to capture social acceptance values. Community resistance to a higher share for RES in nation's energy mix can be attributed largely to the feelings of NIMBYism, continued collection of RES-E surcharges in monthly bills and feeling of unjust use of these funds collected by power utilities. In some countries, end consumers actively seek compensations for proposed renewable projects in the urban vicinity. Literature analysis suggests several policy tweaks/interventions that can keep social issues at bay. First, there is an urgent need to turn focus to new renewable energy sources (apart from wind and solar energy) – technologies that do not suffer from noise, visual and flicker issues. Second, minimum setback distances for RE projects must be mandated for RE projects in urban dwellings. Third, consumer awareness on both RES costs and benefits should be enhanced with immediate importance. This can be done through identification of "Green Energy Champions", and RES opinion leaders. The presence of such players in social networks of existing RES adopters/ possible RES adopters can eliminate existing misconceptions around higher RES use. Fourth, CVM based social acceptability studies must precede setting of national RES targets. This practice is currently absent in most developing nations, that are in the nascent stages of RES development. Without getting a sense of social acceptance of RES in the country, RES targets set may remain underachieved. However, caution should be exercised in design and conduct of such studies so as to avoid possible errors in data collection, analysis and interpretation.

Sixth, there is a need to transition to distributed RES based systems that can effectively alleviate problems of energy access. Awareness campaigns, on costs and benefits of such grid-connected or battery-operated systems can be deployed through “Opinion leaders” identified by local government bodies/ urban local bodies of energy poor nations. Solar energy or biomass energy based distributed RE projects should be given priority over small wind energy systems.

Seventh, community development of RE projects can become the new project development model. Public participations from community key stakeholders in project development decision can significantly reduce social resistance to new and upcoming RE projects. Appropriate “voice” (influence)should be accorded to the community members, to ensure that community interest in the project development is retained. Seventh, countries that are in the process of liberalizing retail electricity markets can greatly benefit by introducing “green energy defaults” – where the default electricity supply is from renewable sources. Successful marketing of green contracts by power suppliers can be based on the understanding of attributes of such supply, wherein DCE based studies can provide helpful insights. This will ensure higher rates of consumer switching/shopping, i.e. changing from existing fuel supply contracts to “green energy contracts”. This will also remedy the “attitude-action” gap towards RES-E adoption.

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