DIVECHA CENTRE FOR CLIMATE CHANGE

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Policy Brief
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Energy Policy for India's Agriculture and Micro Small & Medium Enterprises Sector: Do we have reliable data?[1]

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Highlights:

- **Aiming at multiple objectives- energy security, climate change, energy for all, economic growth- India's energy policy design is vulnerable to economic, social and transaction costs if not backed by reliable and adequate data.**

- **Energy demand/consumption data at the unit level, accounting for complex relationship between energy-needs (services) and means (devices and carriers) and network of supply and demand factors, is essential for effective policy design.**

- **Present policy brief focuses on two key sectors- agriculture and Micro Small and Medium Enterprises (MSME).**

- **In India there is no single source/ survey that provides a comprehensive compilation of data on type of energy, procurement source, its quantity, quality, cost, devices /implements/technology, and use intent.**

- **All encompassed large-sample surveys offer a little to policy design as energy-based information- is incomparable across surveys, scope is dwindling over years, stress on quantity but not on intent, pay scarce attention to quality, do not account for evolving energy scene and leaves little room for critical assessment.**

- **Sector specific exclusive energy surveys are ideal, but yet to come about. Meanwhile, increasing the scope of 'energy' in large-sample surveys- giving its due importance, ensuring consistency in information and expanding on existing energy related queries- will be useful.**

1. This policy brief is partly based on the paper "India's energy data: Are we equipped for an inclusive policy design?" co-authored with Hippu Salk Kristle Nathan. The author thanks Ashwin K Seshadri reviewing the draft of this policy brief, and Asha Srinivasan for help in formatting this policy brief.

Introduction

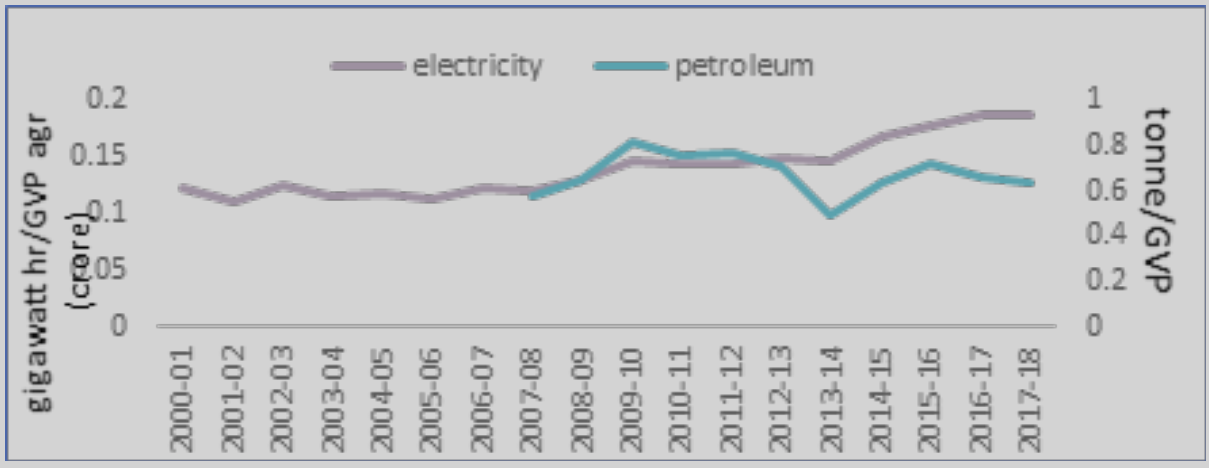
Reliable and adequate data is crucial for effective policy design that minimises economic, social and transaction costs. This becomes complex, when one is aiming at multiple objectives like that of India's energy policy: mitigating climate change, economic growth, energy security, energy for all, to state few. Energy consumption/demand data at the unit level, key for designing energy policy, is inadequate, inconsistent and less than ideal to aid design a comprehensive energy policy. We demonstrate this in the case of India's agriculture and micro small and medium enterprises (MSMEs): two sizeable sectors, crucial in terms of India's growth, employment and social welfare, albeit historically plagued with issues of inadequate and inefficient energy services (see figure 1). By doing so, we offer framework and recommendations to improve the quality of the data. The discussion is based on detailed review of all publicly available large-sample surveys on agriculture and MSMEs that provides farm and firm level data respectively.

MSME

- 21% units cited power shortage as one of the four primary reasons for the sickness of the unit (GOI, 2009)
- Due to inefficient equipment and lack of superior technological solutions, energy accounts to nearly 50% of the total production costs (SIDBI, 2016)
- Potential to save 10-30% of energy (SIDBI, 2016)

Agriculture

- Contribution to gross value added is only 10.4 %, but accounts for 20.47% of the total electricity consumed (GOI, 2019)
- Steady increase of energy intensity, more energy consumption per unit of agriculture produce



Source: Author's calculation using CSO, 2019, CSO, 2015 and GOI, 2019

- Business as usual, diesel consumption for pumping water will increase from 40Twh in 2020 to 75Twh in 2030 and around 100Twh by 2047 (Niti Ayog, 2015)

Figure 1: Energy Consumption in Agriculture and MSME sector: Inadequate, Inefficient and Potential to improve.

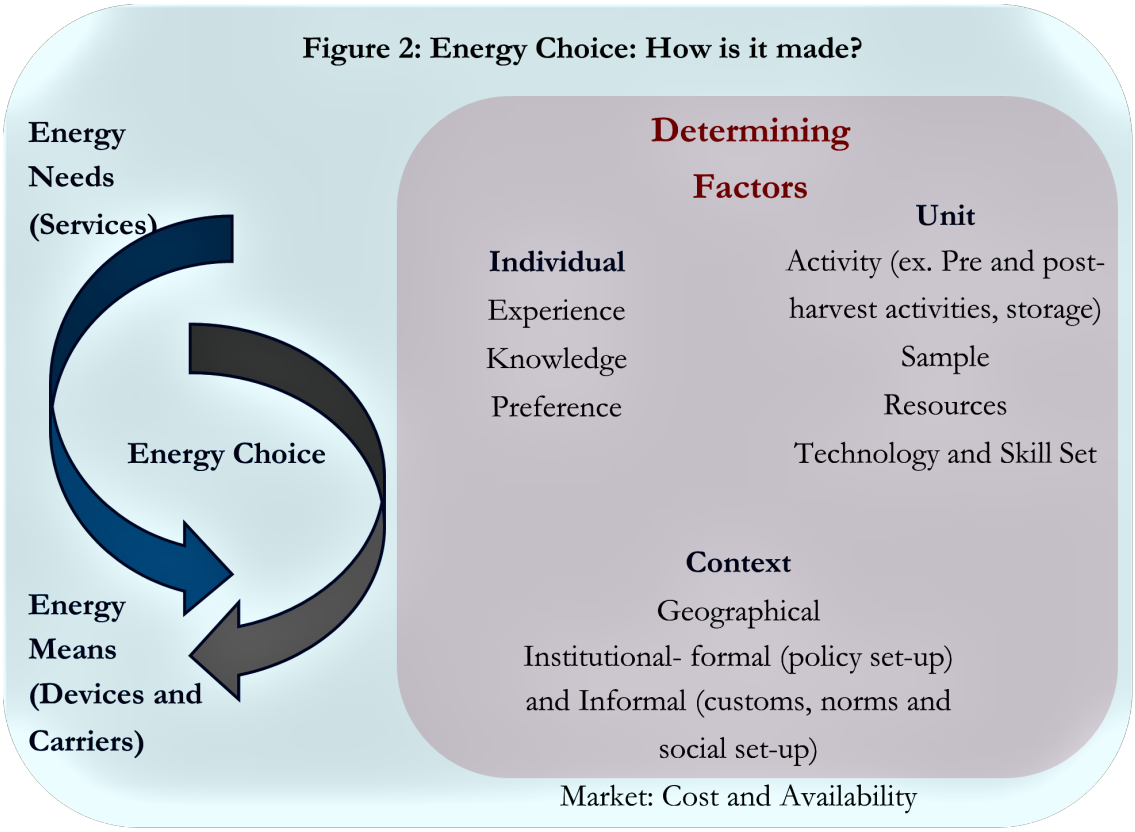


Figure 2: Energy choice: How it is made?

II. Making Energy Choice

Energy choice is a combination of energy needs: services and means: device and carriers. (Kowsari and Zerriffi, 2011 and Nathan, 2016). This combination(s), is determined by interaction of several demand and supply factors, spanned across socio-cultural, economic, technological and institutional domains at individual, unit and contextual level (Fig.2).

III. Energy Related information in Large sample surveys: What is missing?

Ideally, energy related information usable for informed policy design should encompass above mentioned components (fig 2). In India there is no single source/ survey that provides a comprehensive compilation of data on type of energy, procurement source, its quantity, quality, cost, devices /implements/technology, and use intent. However, large sample surveys on agriculture and MSMEs present some information on energy. Following are such surveys available for the two sectors under question. MSME census by Central Statistical Organisation (CSO) since 1973-74 and the latest being in 2006-07, Survey of Informal Enterprises by National Sample Survey Organisation (NSSO) since 1990, latest survey conducted in 2015-16, Annual Survey of Industries by CSO obtain comprehensive and detailed data covering small and large manufacturing units since 1959, the latest in 2017[i]. (MOSPI, 2017); Situation assessment surveys by NSSO (2005, 2014), Indian Human Development Survey (2012) covered farming households (NCAER, 2012). These periodic surveys pool in all major aspects of the sector in a commendable effort. Nevertheless, energy related information provided in these surveys fall short of aiding a well-thought-out policy design. Following are the reasons why.

- **Nominal presence**

Over years, energy related information, in large-sample surveys, thinned down and remained ceremonial at best. For example, number of fuels covered MSME census dramatically fell from 13 in second census (1987-88) to just four in the latest census (2006-07). Similarly, number of agriculture appliances incorporated in the survey came down from 11 to 4 in subsequent rounds.

- **Inconsistency**

Energy related information was incomparable across different rounds of surveys, limiting the scope to understand the changes over years. For example, 1st MSME census provides quantity and value of different energy sources consumed, 2nd and 3rd census just state the primary source of energy of the unit, and in 4th census it is again quantity and value of the energy sources. In case of agriculture sector, while the first farmer assessment survey sorted information on types of appliances used for irrigation (the most energy consuming activity)- electric pump, diesel powered, manual/animal powered etc, the second survey skipped this query.

- **Stress on quantity but not on intent**

Information on quantity of energy consumed, which these large-sample surveys generally provide, without any idea of what it is used for is little help from policy point of view. For example, in a biomass based MSME unit, electricity is a desirable energy source for cooling purpose but not so much for producing heat energy, when biomass gasification technology could be a sustainable alternative. In fact, farmer assessment survey provided information on consumption of different energy sources for various agriculture activities (eg. irrigation, harvesting, threshing) in the first round, but failed to carry forward to the next round of survey.

- **Scarce attention to quality**

None of the surveys give information that could assist a technical assessment of quality of energy services. Instead, few surveys enquire user's perception of quality of energy service, which may not give a complete picture. When micro and small enterprises are expected to pick top two major problems, they face among the choice of nine: ranging from raw material shortage, high-cost credit and labour issues, 'erratic power supply/ power cuts' being one of them (NSSO, 2017), it is highly unlikely one will get a fair idea of the quality of energy services in India's MSME sector.

- **Do not account for evolving energy scene**

Periodic surveys are ideal to chart the evolution or better, aid it. At macro level, this calls for the surveys to incorporate the essence of change in the given sector and specifically, involves enquiries into particular policy programmes. For example, in the wake of Information Communication Technology (ICT) revolution, to weigh its impact or to assess its applications for the sector's development, a detailed, if not exhaustive, inquiry about its usage was incorporated in the surveys: agriculture sector (NSSO, 2005 and NSSO, 2014) and MSME units (NSSO rounds, 67th (2010-11) and 73rd (2014-15) (NSSO, 2012; 2017)). For nearly two decades now, 'sustainability' was part of India's development narrative, in addition to that, notable policy effort was made to match India's energy objectives, in all major sectors. However, surveys on the two sectors under question, blatantly underrepresented these developments, limiting their usefulness in the evolving scenario[ii]. For example, starting from 2000, Government of India (along with other funding agencies), has supported nine different energy efficiency programmes among MSMEs (Biswas et. al, 2018) and none of them found place in these surveys.

- **Little room for critical assessment**

In these all-encompassing large-sample surveys, the possibilities to assess critical-linkages between energy consumption/demand and key supply and demand factors (fig.2) are only limited. Especially, limitation in relating energy consumption to techno-economic factors is of little assistance to India's sustainable development goals. For example, Government of India has developed India Energy Security Scenarios 2047 (Niti Ayog, 2015) for agriculture sector along with other major sectors. This is a tool where energy future pathways, ranging from pessimistic to ideal, were simulated by choosing a combination of supply and demand factors: size and efficiency of the implements, different energy sources and technology and policy innovations, ranging from "least effort" to "heroic effort". This exercise is a clear indication of the host of information one needs at the micro level to make a meaningful policy design, which is missing in the large-sample surveys.

IV. Policy Recommendations and Conclusion

- **Exclusive survey**

It is clear, from the number of components involved and complex relationships they form to influence energy demand/consumption, that anything short of sector exclusive energy surveys will have partial utility in a comprehensive policy design. As India aims at transforming its energy sector, collecting appropriate data accounts for crucial first steps. This calls for expertise from variety of fields, as well as, economic and labour-intensive bureaucratic apparatus, a worthwhile effort, nevertheless. Meanwhile, it is useful to make amendments to the existing surveys to enhance the quality of energy related information. Following are few recommendations.

- **Due importance**

Energy, like few key components, like credit, raw material, access to market etc, is crucial for the growth of the sectors in question. Therefore, it is only logical that it gets appropriate emphasis in the large-sample surveys. Like, for example, Minimum Support Price, a State support market intervention system, is a stand-alone component in 'Situation Assessment Survey of Agricultural Households' (NSSO, 2014). Similarly, access to credit: 11 different sources, outstanding loan, interest payable- was extensively covered in case of 'Unincorporated Non-Agricultural Enterprises (Excluding Construction)' (NSSO, 2017).

- **Consistency**

Maintaining consistency in the information presented, as we discussed earlier, is key to chart and explain the changes. Between 2011 and 2013, petroleum consumption in agriculture sector fell, after a steady increase of 8% per annum in the previous five years, (CSO, 2019) only to raise again from the next year. This corresponds with dramatic rise and fall in petroleum prices[iii]. If

<table>
<tr><th colspan="2">Have any energy conservation measures been taken during last financial year with respect to electricity? Yes or No</th></tr>
<tr><th>If No, because</th><th>If Yes</th></tr>
<tr><td>It accrues no benefit to the unit</td><td rowspan="5">What are the reasons for taking up EC measures?
a) Aware of the benefits
b) Insisted by parental firm/vendor
c) Received financial/technical assistance from the State
d) As being successfully adopted by peers
e) others</td></tr>
<tr><td>Not aware of any measures</td></tr>
<tr><td>Costly</td></tr>
<tr><td>Cumbersome to procure</td></tr>
<tr><td>Difficult to install/operate</td></tr>
<tr><td>Others</td><td>In which of the following activities, measures were taken
a) operating manufacturing equipment
b) operating office equipment (computer and other devices, lighting and AC)
c) packaging and storage
d) others</td></tr>
<tr><td></td><td>Which of the following measures were taken?
a) opted renewable energy
b) Procured/installed efficient technologies
c) modified existing technologies
d) others</td></tr>
</table>

Box 1: Expanding on energy queries: An Illustration.

Note: Above line of enquiry is by no means exhaustive but merely indicative of different supply and demand factors at play with respect to EC measures.

only 'Situation Assessment Survey of Agricultural Households' could have carried on the break-down of consumption of different energy sources across agricultural activities[iv] in to the second round in 2013-14, in it, one could have found out how this, price and therefore demand, turbulence played out at the ground level[v].

- **Expanding on existing queries**

Expanding on already existing energy related queries is another way of enriching the data. For instance, Annual Survey of Industries (starting from 2008-09) enquires if "unit had taken any Energy Conservation (EC) measures" for four energy sources: coal, electricity, oil and gas. This yes/no query alone does not offer substantial insights. Instead, follow up queries around this choice would be useful. Like, reasons for unit's failure to take up said measures; to understand the EC measures that units find (technologically, economically and institutionally) viable, a guiding frame to promote new measures, etc. To illustrate this, Box 1 presents a sample set of questions in case of EC measures in electricity.

Conclusion

As India embarks on sustainable energy pathways to address multiple objectives, reliable data on consumption/demand at the micro level is imperative. As sector exclusive energy surveys are yet to materialise, increasing the scope for 'energy' in large sample surveys is useful for policy making. At the same time, as large-sample surveys are accessed and used by wide range of academia and policy thinkers, energy is brought a step closer to greater visibility and better dialogue. This is particularly crucial in the case of the said sectors, as they have greater bearing on inclusiveness, India's other key development goal[vi].

References:

1. Biswas, T, Sharma, S and Ganesan, K (2018), Factors influencing the uptake of Energy Efficiency Initiatives by Indian MSMEs, Council on Energy, Environment and Water (CEEW)

2. CSO (2015), Summary of Macro Economic Aggregates at Constant (2004-05) prices, 1950-2013-14, National Accounts Statistics, Ministry of Statistics and Programme Implementation, GOI

3. CSO (2019), Energy Statistics, 2019, Ministry of Statistics and Programme Implementation, New Delhi

4. GOI (2009), Quick Results: Fourth All India Census of Micro, Small and Medium Enterprises 2006-07, Development Commissioner (MSME)

5. GOI (2018b), Annual Report 2017-18, Ministry of Petroleum and Natural Gas, New Delhi, available at http://petroleum.nic.in/sites/default/files/APR_E_1718.pdf, accessed on 12 June 2020

6. GOI (2019), Pocket Book of Agricultural Statistics, 2019, Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation and Farmers Welfare, New Delhi

7. Jha, G.K, Pal, S, Singh, A (2012), Changing Energy -use Pattern and the Demand Projection for Indian Agriculture, Agricultural Economics Research Review, Vol.25 (No.1) January- June 2012 pp 61-68

8. Kowsari, R. and Zerriffi, H. (2011), Three-dimensional energy profile: A conceptual framework for assessing household energy use, Energy Policy, Vol. 39, No.12, pp. 7505-7517

9. MOSPI (Ministry of Statistics and Programme Implementation) (2017), Ministry of Statistics and Programme Implementation: National Data Archive- Annual Survey of Industries, Available at http://microdata.gov.in/nada43/index.php/catalog/ASI (last accessed on 06 June 2019)

10. Nathan, H.S.K. (2016), Energy Access and Energy Poverty: Concepts and Insights on Measurements; Asian Development Bank Institute (ADBI) Seminar Series, Tokyo, August 31

11. NCAER (2012), Income and Social capital questionnaire, India Human Development Survey – II 2011-12, NCAER, New Delhi

12. Niti Ayog (2015) India Energy Security Scenarios Version 2 – 2047, Sector specific

insights – Part I: Energy demand sectors, Energy division, Niti Ayog, Govt. of India, August. Available at http://indiaenergy.gov.in/bkp/iess/docs/demand.pdf: accessed on 10 Aug 2019

13. NSSO (2005), Access to Modern Technology for Farming, Situation Assessment Survey of Farmers, Report No. 499 (59/33/2) NSS 59th Round (January–December 2003), NSSO, Ministry of Statistics and Programme Implementation, Government of India

14. NSSO (2012b), Household Consumption of Various Goods and Services in India, 2009-10, NSS 66th Round, NSSO, Ministry of Statistics and Programme Implementation, Government of India

15. NSSO (2014), Key Indicators of Situation of Agricultural Households in India, NSS 70th Round (January–December 2013), NSSO, Ministry of Statistics and Programme Implementation, Government of India

16. NSSO (2017), Operational Characteristics of Unincorporated Non-Agricultural Enterprises (excluding Construction) in India, NSS, 73rd round, July 2015-June 2016, NSSO, Ministry of Statistics and Programme Implementation, Government of India

17. SIDBI (2016), Unlocking Energy Efficiency Potential in MSME through 4E Programme, AEEE Webinar, New Delhi. Available at http://www.aeee.in/wp-content/ uploads/2016/06/SIDBI-Webinar_4E.pdf; accessed 30 June 2020

Notes:

i. Using the definition of MSMEs i.e., a specified range of investment in plant and machinery (In accordance with the provision of Micro, Small & Medium Enterprises Development (MSMED) Act 2006), one can use this data source to conduct analysis on MSMEs.

ii. ASI is an exception, as it provides some information on energy efficiency and energy conservation among manufacturing units.

iii. Crude oil prices raise from 85.09 $/bbl in 2010-11 to 111.89 $/bbl in 2011-12 and fell to 84.16 $/bbl in 2014-15. (Ministry of Petroleum and Natural Gas, 2019)

iv. ploughing, irrigation, harvesting, threshing, cane crushing, transport.

v. Energy supply and demand have significant implications for the composition of output, management practices and profitability in agriculture (Jha et al, 2012).

vi. Rural households and urban slum dwellings are two other examples of sectors with bearing on both inclusive and sustainable development.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