

## Section 2 - Policies to Promote and Scale-up Local Sustainable Energy Solutions

### 2.1. Policies for Improved Cook-stoves (ICSs)

#### Information, campaign

Awareness of the benefits from the use of improved cook-stoves is crucial for the successful promotion of ICSs. Information should be directed towards the users as well as towards planners and decision-makers. For users, it is important to focus on benefits in the form of saved fuel, saved time to collect fuelwood, as well as increased safety (less risk of fires and burns) and health (less smoke in kitchen). This can be combined with information on the bad health effects of smoke (particles and tar gases that over time increase illnesses). The gender dimension is a major concern in the dynamics of any promotion strategy of ICSs. The issue of improved cook stoves is multidimensional: technical, economic, political, social, cultural and ecological. Each of these dimensions must be considered to understand and successfully promote the dynamics of distribution of improved stoves.



For planners and policymakers, the emphasis needs to be put on the structuring of the improved cook-stove (ICSs) sector to show how it can encourage the development of a sustainable autonomous market through local entrepreneurship. Placing great emphasis on these benefits as well as on job creation for young girls and boys through the creation or strengthening of young entrepreneurs in the marketing of improved cook-stoves (ICSs) is therefore crucial in the promotion strategy for the scaling up of ICSs.

#### Financial promotion of the local solutions to overcome the financial limits of the users

Different sources and mechanisms of financing can be mobilised, such as micro-finance institutions, mutual savings and loans, or revolving funds, institutional investments. They could be backed by international finance, for instance from the Green Climate Fund.

Taking into account the limited financial possibilities of the actors, including local stove producers, and the inadequate classic banking system for the sector, local actors should benefit from financial support for large scale implementation. This includes:

- financial support during the start-up of the activity (ICS production).
- funding for training of actors and the setting up of ceramics production in decentralized centres.
- support of 50% of the first orders from Groups of women promotion (GPF) for the start of their activities of marketing of improved stoves
- financial support to actors for the acquisition of equipment and materials.
- Permanent training and quality control

Providing long-term direct subsidies has been abandoned in many countries. However, developing a programme under the Green Climate Fund is possible. ENDA ENERGIE and its partners have been able to develop such a project and they are implementing it currently.

## **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

CSO's role can consist of

- I. promoting the extension of the distribution network and retailing of ICSs to households in the targeted regions.
- II. Quality control of construction of ICS.
- III. ensuring the reinforcement of communication and sensitization on the benefits of ICSs.
- IV. ensuring the monitoring of project data.

ENDA ENERGIE is involved in a dissemination project (RFA) as an implementing entity. This project is meant to strengthen the growth of the dissemination of improved cook stoves. It aims at the extension and large-scale marketing of improved cook stoves (ICSs) in five regions of Senegal.

### **Capacity Building of persons: installers, local population, administration -**

Training and capacity building focus on training and technical support for actors, equipment and material support for private operators and the setting up of ceramic production centres.

#### **Training of the actors**

The production and marketing of improved cookstoves are in most cases carried out by professionalized private operators, sometimes working in the informal sector. These are potters commonly called ceramists, traditional potters, craftsmen/ blacksmiths and distributors (shopkeepers, traders, associations, mutual societies, federations and women's promotion groups). To ensure the sustainability of production and marketing, the identified actors in the sector are trained in the techniques of manufacturing ceramic inserts, the metal part and the assembly of improved stoves. They are also trained in management, promotion and sales techniques for improved cook stoves.

The Chamber of Trades and Commerce of each region of intervention also participate in the training of the artisans to ensure supervision, monitoring and sustainability of achievements. In addition, master masons are trained for the production of domestic and institutional banco stoves in rural areas.

#### **Technical support**

Ceramists, traditional potters, blacksmiths, distributors and private operators who have acquired solid experience in the production/distribution of improved cook stoves benefit from technical support (quality control) and regular monitoring of their activities. As well as master masons for the production of domestic and institutional banco and institutional fireplaces in rural areas.

#### **Make good technical solutions available: Tech-transfer, quality requirements & standards**

The creation of standards and labels makes it possible to produce reliable, high-quality stoves and is an effective lever for increasing capacity and modernising production methods, while at the same time guaranteeing economies of scale that can lower stove prices.

#### **References**

PERACOD.- Vulgarisation des foyers améliorés au Sénégal : Les acquis du projet FASEN du PERACOD. <https://d-nb.info/1127680684/34>

PRISME.- Les foyers améliorés. Collection : Les technologies à haute performance technologique, n°7. 8p.

## 2.2. Policies for High-efficient Improved Cookstove

### Information, campaign

Awareness of the benefits from the use of clean cookstoves and fuels has been very low, making outreach to the public and policymakers, a high priority for the sector. Few people are aware that the efficiency of biomass cookstoves can be improved to more than 50%. An information dissemination and awareness raising campaign is paramount in scaling up the use of high efficient ICS.

### Financial promotion of the local solutions to overcome the financial limits of the users

Manufacturers of this particular stove have limited ability to realize economies of scale to lower prices to consumers. However, given the efficiency of the stove, carbon finance may offer an additional alternative for reducing the price and increasing the affordability of the cookstoves for the end-users. The hope is that revenues from the sale of such offsets will allow cookstoves suppliers to market these devices at a lower price, thereby expanding sales. Grants are also helpful in promotion of this stove. Grant funding for projects plays an important role in supporting TaTEDO to raise awareness, undertake capacity building of potential entrepreneurs and policy advocacy for this particular stove. Another option could be offering subsidies to manufacturers. For example, in the past [ProBEC](#) used to subsidize 30% of business start-up investments. Once operational, no direct subsidies were provided. EU – under the clean cook program in development in Tanzania, the EU is planning to provide performance-based grants for different clean cooking technologies including ICS.



### Taxes and import duties, including taxes of fossil fuels and of local solutions

One could suggest tax exemption for the raw materials which are used to make this particular stove including iron sheet and fibre blanket. However, practically it is difficult to implement given that those materials have various other uses apart from making ICS.

### CSO implementers, key roles of CSOs, role of CSOs as actors in the process

CSOs key roles in dissemination of this stove have been to undertake adaptive research in development of the stove, capacity building of potential manufacturers, policy advocacy, awareness raising and campaigns with aim to stimulate stove demand. In addition, in Tanzania TaTEDO has set up a company that produces the stoves.

### Capacity Building of persons: installers, local population, administration

Capacity building is important for manufacturing, repair and maintenance. For instance, in Tanzania, TaTEDO has been providing training in the Folk Development Colleges (FDC) in the Southern part of Tanzania mainly on repair and maintenance of such stoves.

### Make good technical solutions available: Tech-transfer, quality requirements & standards

To keep production costs as low as possible in a competitive market, stove producers often use lower gauge metal which breaks more easily. These practices obviously generate mistrust among end users. Without recognized standards, consumers do not know if they are buying a reliable product, while manufacturers of quality cookstoves often see their market share eroded with a flood of cheap copies. Therefore, the existence of standard and enforcement is critically important in scaling up the use of this stove.

## 2.3. Policies for High-efficiency Electric Pressure Cookers (EPC)

### Information campaign

In the case of Tanzania, the main barrier observed for end-users at all levels was low awareness of using EPCs. Very few Tanzanians think that they will ever have the opportunity to cook using electricity and are unaware of the benefits of reduced household cooking expenditure, and the safe and clean cooking that is possible. This low awareness, if not resolved, will become a barrier for demand, support services and commercialization of electric cooking appliances and services.

Awareness raising on the usefulness of EPC is crucial for the introduction. This will stimulate demand, and encourage importers, distributors and retailers to stock and trade in EPCs as demand begins to grow.

### Financial promotion of the local solutions to overcome the financial limits of the users

Low ability to pay is a problem for medium and low-income segments of end-users in both peri-urban/urban and rural communities, the latter due to seasonality of income. For peri-urban/urban end-users, the affordability barrier is because of a lack of priority put on cooking appliances, lack of adequate income and gender income allocation in the households. There is also a perception of a financial barrier to using an EPC, which overlaps with the 'Awareness' theme. Many peri-urban/urban households had tried to use electricity for cooking by using uninsulated and therefore less energy efficient appliances such as electric hotplates, which can use five times the energy to cook heavy foods such as beans as an EPC. The high electricity bills experienced through using inefficient electric cooking appliances gave them a false perception of the affordability of cooking with EPCs.

Credit services for EPCs would be advantageous for the low-income customers in peri-urban/urban settings, which are expected to see a growth in demand for the EPC once it is a fixture in middle to high-income kitchens.

### Taxes and import duties, including taxes of fossil fuels and of local solutions

EPC Gross Margin and Tax Analysis - A gross margin analysis was undertaken to understand the profit of the market chain actors and to illuminate how taxes affect the price of the EPC for end-users. It was discovered that depending on the nature of the businesses involved in the supply chain, the tax burden ranges from 25–35%. This indicates the potential order of magnitude of savings if products were duty exempt and zero rated for VAT.

To address the end-user affordability barrier and the issue of required capital for import duty, advocacy should be pursued to exempt the EPC from import tax and VAT. The analysis also showed that if the saving is passed to the end-user, the price of the EPC could be reduced by 25–35%. This is the situation for solar PV modules and some associated equipment, which is



zero-rated and VAT-exempt in Tanzania; other countries have various exemptions. This is a significant saving, which will increase the number of end-users who are able to buy the appliance outright and decrease the payment burden on those who require credit services.

With regard to the issue of import tax, another potential future avenue would be prudent to think ahead to enable the manufacture of EPCs in-country, as the import of raw materials face much lower import duties than finished products.

### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

Role of CSOs include awareness-raising campaigns and promotion of EPCs to end-users and other market actors, Capacity building training on how to use the EPC for end-users and repair and maintenance, linking financial support for market chain actors and end-users, After sale services for EPCs. Advocate for import tax exemptions and quality standards.

### **Capacity Building of persons: installers, local population, administration**

Closely associated with awareness raising is the requirement for end-user capacity building in the use of EPCs, to support integrating them into cooking practices. A new and unknown device can be intimidating, but this knowledge barrier can easily be overcome through live or recorded cooking demonstrations and dissemination of training materials.

A training of technicians to provide after sales services to EPCs in the event of malfunction or breakdown. This requires setting up the supply chain for spare parts, and ensuring end-users are aware that such a service exists, which will contribute to their increased confidence in purchasing and using the appliance. Once the market grows, the informal repair sector is likely to make efforts to 'catch-up', as it will be within the interest of electrical technicians to invest in learning to repair and maintain the devices as it becomes more common for people to approach them requesting repair services.

### **Make good technical solutions available: Tech-transfer, quality requirements & standards**

Further advocacy work should focus on encouraging to set standards for eCooking devices to ensure only quality appliances are available, thus reducing the risk of appliances with a poor energy efficiency putting end-users off.

High quality EPCs are not easily available in the market, and as demand grows it is likely to be challenging for end-users to source high quality appliances. Standards can help to mitigate this risk.

**References** -<https://sun-connect.org/wp-content/uploads/energies-15-00771-v2.pdf>

## 2.4. Policies for Charcoal production - Efficient Charcoal Making

Most of the African energy policies tend to marginalize biomass energy though about 80% of the national total energy consumption comes from biomass. The omission of a policy objective or statement on sustainable charcoal production from the National Energy Policy means that for the duration of that particular policy cycle, there is no high-level commitment to produce charcoal and fuelwood more sustainably, nor to provide strategic oversight regarding its supply or quality.



Misconceptions about charcoal have led policymakers to select policies that seek to exclude charcoal from the national energy mix, rather than embrace sustainable production techniques. Also, the traditional informal nature of the sector where producers, transporters, and traders are often poorly educated, poor, and lack coordinating networks for advocacy. This contrasts with the advocacy capacity of stakeholders in the fossil gas sector where natural gas prospecting and development companies have resources, experience, and networks to lobby the Ministry of Energy intensively during the formulation of the Natural Gas Policy and the National Energy Policy. Also, companies promoting bottled fossil gas (LPG) are well organised and are lobbying for their fossil gas.

Furthermore, awareness of various laws and regulations regarding charcoal production has been reported to be low for charcoal producers in Tanzania.

### **Information, campaign**

Information is important to charcoal producers and other stakeholders on the usefulness of efficient charcoal production kilns. This can be achieved through mass-media awareness raising campaigns, meetings with stakeholders, use of ICT materials, demonstrations for charcoal makers, etc.

### **Financial promotion of the local solutions to overcome the financial limits of the users**

In many countries, the forest-sector's contribution to the national economy is marginal (2 to 4%), due to the fact that production and use of wood-base fuels are informal and thus escape official statistics (e.g., Uganda: formal sector 11% against 89 % in the informal sector). Consequently, forest governance receives little attention and meagre budgetary allocations. For this reason, national funding often fails to adequately reflect local governments' needs and sources of revenue. In consequence, local branches of the forest service display low human, technical, and enforcement capacities. This problem is often exacerbated by half-hearted or arbitrary decentralization of forest governance which leaves local administrators ill prepared for the challenge of promoting community involvement or investment by the private sector. Such institutional weaknesses lower the morale of local staff and invite corruption. Corruption coupled with unclear policy and legal frameworks is seen as a major cause of unregulated or even illegal charcoal businesses.

**Uncertainty on re-investment of forest revenues in forest management and extension** – For instance, the Tanzania Forest Act of 2002, stipulates that any fees, royalties or other imposts are owed to the Government of Tanzania. This provision means that all royalties are Central

Government revenues and cannot be paid to district or village governments directly. To that effect, there are no legal mechanism to ensure that forest generated revenues at district level are re-invested for forest management and extension undertakings.

Furthermore, the Tanzania's development vision and sectoral policies have **marginalized** the sustainable woodland management land use option for village land. That agriculture is valued more highly than natural woodland, in part, reflects systemic challenges in integrating the complex concepts under-pinning ecosystem service valuation in decisions over allocation of land and natural resources ([Martinez-Harms et al., 2015](#)).

Similarly the economic value of the charcoal trade, in Tanzania estimated at US\$ 650 million, is poorly understood and is not communicated in national accounts ([Sander et al., 2013](#)). For example, official national figures on government revenues from natural forest products do not distinguish charcoal from other products, including timber. Zonal government revenue figures indicate that charcoal comprised between 10 and 71% of natural forest product revenues in some zones ([TFCG, 2015b](#), [Lukumbuzya and Sianga, 2016](#)). The absence of official figures on the value of the charcoal trade contributes to it being **undervalued** as a land use option, when compared with crops with well-documented trade data. Thus, whilst charcoal has many similarities with traditional crops, in terms of its requirements for land, labor, and net primary production, it is not considered a crop in the agriculture policy, and it is under-valued when land use tradeoffs are being made between agriculture and woodland on village land.

Marginalization of sustainable charcoal production in the energy and forest sectors is exacerbated by the land policy in providing no explicit recognition of sustainable woodland management as a recognized land use, and by the agricultural policy in promoting the expansion of agricultural land. If woodlands do not generate income for their owners, including communities, the economic rationale to convert woodland to agricultural land is strengthened. Assuming that sustainable charcoal production can incentivize sustainable woodland management, an opportunity is therefore being missed to embed a sustainable financing mechanism into participatory woodland management.

Despite growing scarcity of wood, charcoal generally remains **underpriced** by more than 20 to 50%, relative to its economic cost in most African countries. This is mainly caused by insecure land-tenure, which leaves many forest areas open to free and unregulated access and use. In consequence, market prices of wood-based fuels reflect only the opportunity cost of labour and capital required for production and transport. Undervaluation translates into wasteful and inefficient production and consumption and creates a formidable disincentive for forest management and tree growing. The following examples illustrate the consequences:

- **Investment costs for improved kilns do not pay off as long as wood remains a free resource.** Despite training support, charcoal burners eventually abandon the improved technology. This is the main reason why the improved kiln has been disseminated for 20 years throughout Africa without much success.
- **Tree growing approaches stay ineffective, as planting and maintenance costs must be taken into account, when competing with open access resources.** Significant subsidies (e.g., Madagascar: 200 to 300 €/ha) are necessary to provide enough incentive. This holds also true for any investments in natural forest management.
- **Substitute fuels such as kerosene and LPG must be highly subsidized to be competitive,** as is the case in a number of countries (e.g., Senegal, Chad, and Tanzania). On the one hand, the need for substantial subsidies and fuel imports creates a long-term foreign exchange burden and tilts a country's trade balance. On the other, no subsidies can ever be high enough to benefit poor households – in consequence, only the wealthier segments of society benefit. Furthermore, state subsidies for substitute

fuels send wrong market signals, further discouraging investment into tree planting or forest management by communities or the private sector.

Open access to natural resources carries the risk of unsustainable overexploitation (the “tragedy of the commons”). By contrast, sustainable forest management presupposes clear and secure long-term forest tenure (“property rights”). By example, a community may be granted exclusive control over natural woodlands growing on their territory, and the exclusive right to sell wood-based fuels harvested/produced thereon. In return, the community would be bound to enter into a formal agreement with the forest service to manage the woodland sustainably and to use improved kiln technologies

### **Taxes and import duties, including taxes of fossil fuels and of local solutions**

For the case of Tanzania, various taxes are reported to be charged on charcoal production and trade. **The fees and taxes are numerous and eroding charcoal dealers’ profits, which is a disincentive to legal charcoal trade.** Therefore, the fees and taxes are identified as one of the obstacles to charcoal dealers’ compliance to legal business.

Introduction of a **differentiated taxation scheme, and presupposes efficient tax collection is a way forward.** Differentiated taxation in this context means that only wood-based fuels stemming from open access areas are taxed. By contrast, communities/farmers who engage in sustainable management on their own properties would remain exempt from taxation (or similar disincentives). This needs to be certified by proof of origin (coupon system on the basis of sustainable exploitation quota). By taxing transport of cut firewood only, the system is comparatively easy to control and promotes efficient administration – as opposed to more extensive and highly decentralised systems based on the granting of firewood cutting permits.

### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

Overseeing forest management, sustainable harvesting, production and use of charcoal. They will also advocate and create awareness on the benefits available in the charcoal industry, assisting local communities in the formulation of by-laws and contracts as well as capacity building and developing networks. They will also play a role of watchdogs, provide advisory services, encourage active involvement of stakeholders; promote policy and legislation implementation; and conduct research. Other areas will be in facilitating fora, public debates and discussions; and defend interests of vulnerable and disadvantaged groups.

### **Capacity Building of persons: installers, local population, administration**

In Tanzania, it is estimated that only about 25% of charcoal revenue is collected partly because most charcoal is transported using motorcycles and bicycles which by-pass checkpoints and do not pay the required permits and fees. Other contributing factors include limited human resource capacity for revenue collection.

It is generally accepted that district councils are unable to fulfil their role to monitor the adherence of forest management plans by villages. It is regrettable that there are no provisions in the forestry law for district councils to monitor the management of non-reserved forests on village lands. In the absence of the regular monitoring of adherence to forest management plans, at both central and village levels, it is not surprising that forest harvesting continues to be unsustainable. Also there is a need for capacity building of charcoal producers on use of improved charcoal production methods including kilns.



### **Make good technical solutions available: Tech-transfer, quality requirements & standards**

There is a need to have uniform packaging material of specified size and with a capacity of carrying 50 kg of charcoal as required by Tanzania regulations. This will be useful in charging royalty payments. Efficient production including use of improved kilns such as Improved Basic Earthmond Kiln (IBEK) introduced and promoted by TaTEDO and utilization of efficient charcoal stoves in households, institutions and Small and Medium Enterprises (SMEs) should be institutionalized in regulations.

### **Specific policies for each solution, not included above**

Sustainable production is more likely to be achieved in woodlands with secure tenure, formalized management, and harvesting plans designed to maintain the broad ecosystem functions of the forest or woodland. Evidence from Niger and Senegal, where the adoption of formalized, community-based wood fuel production has resulted in an increase in the forest stock ([de Miranda et al., 2010](#)). In contrast, in Tanzania and in many of the other top charcoal-producing countries in Africa, charcoal value chains are largely informal with production proceeding in the absence of sustainable harvesting plans ([Sander et al., 2013](#); [Schure et al., 2013](#)). The informality of production, particularly the absence of formalized and sustainable harvesting, has contributed to widespread forest degradation and, to a lesser extent, deforestation, particularly in the vicinity of concentrated markets, such as large urban areas ([Chidumayo and Gumbo, 2013](#)).

Of course, formalization does not guarantee sustainability ([Schure et al., 2013](#)), and that there are examples of government attempts to control supply which have, instead, disrupted supply ([Ribot, 1999](#)), and of informal production in which forest ecosystem services are sustained ([Ribot, 1999](#); [Woollen et al., 2016](#)). Currently there are few past examples of formalized, sustainable charcoal production in practice ([de Miranda et al., 2010](#); [Zulu and Richardson, 2013](#)).

Given that land tenure is tied to land use in the Tanzanian land policy, the absence of explicit recognition for sustainable charcoal production as a land use category, risks the marginalization of sustainable woodland management in favor of agriculture and other cited land uses, particularly given the current trend to privatize village land. Recently, Tanzania has developed the National Charcoal Strategy and Action plan of 2022 among which enhanced sustainable charcoal production and utilisation is one of its strategic objectives.

Wood-fuel policies need to be designed within the context of a sustainable (rural) development approach, and principles of local control and participation adhered to in the planning process. Comparative advantages of locally produced/managed energy sources must be fully exploited. Charcoal can be made sustainable - specifically, through formalization of production, trade, markets, and consumption technologies.

### **References**

The Marginalization of Sustainable Charcoal Production in the Policies of a Modernizing African Nation

<https://www.frontiersin.org/articles/10.3389/fenvs.2017.00027/full>

“Shaping charcoal policies: context, process and instruments as exemplified by country cases”

[https://energypedia.info/images/1/1e/Shaping\\_charcoal\\_policies.pdf](https://energypedia.info/images/1/1e/Shaping_charcoal_policies.pdf)

## **2.5. Policies for Briquettes from biomass/agri waste and charcoal dust. By ENDA - INFORSE West Africa and REDES - INFORSE Latin America;**

Some of the major challenges on the demand side include; poor quality of briquettes, lack of consistent supply, lack of awareness and lack of suitable cooking stoves to burn the briquettes, and affordability. On the other hand, the briquettes producers have limited access to finance to grow their businesses, lack of consistent consumers especially households, inconsistent availability of feedstock and lack of technological knowhow to produce briquettes.

### **Information, campaign**

Briquette's end-users are broadly grouped into domestic (households), commercial-institutional (small/medium businesses, educational and health institutions) and industrial consumers (large thermal energy users including tea factories). Low community awareness of the potential benefits of briquettes limits its use, especially in households. Awareness raising is critically important and should focus to (i) create awareness of different briquettes types, (ii) highlight the benefits of briquettes relative to other fuels and, (iii) demonstrate how briquettes are best used and the right technologies (e.g. stoves) to use the briquettes. A consumer education and awareness raising program could be through meeting sessions, information dissemination and demonstrations on the use of briquettes.

### **Financial promotion of the local solutions to overcome the financial limits of the users**

While most large-scale producers have access to different forms of finance including loans and grants, it remains a hurdle when it comes to small-scale producers. These entrepreneurs are often not able to meet the requirements for financing including collateral, in the case of debts. Financing can thus be advanced through varied forms such as Results Based Schemes (RBF), micro-financing, grant, etc. depending on the stage of technology development in a particular location.

### **Taxes and import duties, including taxes of fossil fuels and of local solutions**

Briquette producers encounter low or absence of local technological capacity to fabricate densification equipment especially for non-carbonized briquettes. Of the four commonly used densifying equipment, that is, agglomerator, screw extruder, pillow briquettor and ram/piston press, only few of these are locally manufactured. The ram/piston/hydraulic press and pillow briquettors are imported from Europe, China or India. Ultimately, the cost of importation is prohibitive making it difficult for emerging briquettes producers to be able to procure quality machines. This challenge can be addressed in two ways; promoting local production and providing fiscal incentives (tax exemptions) to companies.

### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

CSOs have been playing a critical role in awareness creation; facilitating access to the suitable technologies; access to finance; advocating for policies and clear institutional frameworks that support uptake of briquettes and linking the producers to ready markets.

## Capacity Building of persons: installers, local population, administration

Capacity building is important to enhance production of quality briquettes and appropriate use of it. Capacity building should focus on how to produce quality briquettes that meet standards. Area of focus could be on how to carbonize biomass wastes, milling, binding, pressing, drying, packaging, transportation and utilization.

## Make good technical solutions available: Tech-transfer, quality requirements & standards

One of the key barriers to uptake of briquettes especially at the household level is the quality of briquettes. For example, Tanzania Bureau of standards and Kenya Bureau of Standards developed regulations to guide briquette production in their countries: (MEDC 12 (1323) DTZS) for Tanzania and DKS 2912:2020 for Kenya Solid biofuel – Sustainable Charcoal and carbonized briquettes for household and commercial use – Specification. The standard specifies requirements for sustainable production of charcoal and carbonized briquettes from a range of feed stocks including wood and by-products of wood processing, agricultural waste and solid waste. They provide metrics such as moisture content, volatile matter, ash content etc.

## References

[https://www.ctc-n.org/system/files/dossier/3b/200828%20Scenarios%20for%20Briquette%20Value%20Chains%20-%20part%203.2%20of%205\\_.pdf](https://www.ctc-n.org/system/files/dossier/3b/200828%20Scenarios%20for%20Briquette%20Value%20Chains%20-%20part%203.2%20of%205_.pdf)

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Briquette production manual -

[https://www.ctc-n.org/system/files/dossier/3b/briquette\\_production\\_manual\\_2.pdf](https://www.ctc-n.org/system/files/dossier/3b/briquette_production_manual_2.pdf)



## 2.6. Policies for Biogas, Household Scale, by INSEDA - INFORSE South Asia

### Information, campaign

In many Asian countries, campaigning for household biogas is not very important as sufficient awareness is already there. However, the campaign needs to show biogas as one of the green technologies. Biogas campaigns need to be part of campaigns with other technologies, since a biogas plant requires a sufficient number of bovines and enough water on a daily basis, which is not available for all.



### Financial promotion of the local solutions to overcome the financial limits of the users

In India, the Government is promoting household biogas and there is a subsidy. However, the subsidy is thinly distributed from central Govt. to State and then to District to Block to Panchayat and then to village. As a result, not everyone can get a subsidy even if they are willing. Many poor families also need financial assistance in the form of loans from rural banks or microfinance etc. For a 2 cubic meter family size biogas plant there is around a subsidy of USD 150 out of around USD 600 construction cost in most of the Indian States to USD 275 in North-Eastern region where construction cost is much higher. There is a need for removal of all fossil fuel



subsidies to create a level playing field. This includes the gradual removal of subsidies to lower the retail price of fuels to consumers as well as eliminating tax breaks for exploration and exploitation of fossil fuel reserves. According to the IMF current fossil fuel subsidies represent 6.5% of global GDP, the highest externality ever recorded. [https://mnre.gov.in/img/documents/uploads/file\\_s-1592215264726.pdf](https://mnre.gov.in/img/documents/uploads/file_s-1592215264726.pdf)

As an example, INSEDA's Gold Standard VER (Voluntary Emission Reduction) project is aimed at mitigating greenhouse gases (GHGs) via household bio-digesters and at increasing the efficiency rate of the biogas plants by bundling household anaerobic biogas plant installed in the rural areas of Kerala and Madhya Pradesh. Biogas generated from the bio-digesters helps in replacing firewood used for domestic cooking purposes, thus improving the quality of air in the cooking space and also reducing the drudgery imposed on women.

This project perfectly illustrates the immense benefits to be gained for participants in the Gold Standard VER process and the potential for sustainable, nationally appropriate mitigation activities. However, the present process of lengthy registration, verification, and certification has serious shortcomings, particularly for the project developers. The extensive reliance on external agencies for the detailed documentation of every step is prohibitively expensive; problematic, given a rural setting; and time-consuming for small-project developers. The absence of funding or a financial safety net (for instance, the lack of a provision allowing advance payments from buyers to ease monetary pressures on participants) can impede the smooth functioning of the process.

It is recommended that, in keeping with the constraints of grassroots needs and finances, the Gold Standard process should be reformed and simplified, and a funding process should be put in place. Without addressing these concerns, the most valuable mitigation projects (which are in rural areas) will end up being excluded from this process. It is also recommended that there be

further appropriate capacity-building of NGOs and other grassroots stakeholders involved in the carbon credit project.

#### **Taxes and import duties, including taxes of fossils and of local solutions**

Some countries have harmonized sales tax (HST) which is paid on purchases/expenses related to commercial construction and operation of biogas facilities (input tax credits). However, this is difficult to replicate. The Ontario, Canada, the Marginal Effective Tax Rate, which includes federal taxes, currently stands at 32.8 per cent (used for larger biogas plants). The harmonized sales tax and Corporate and Income Tax, together with previously announced Ontario and federal tax cuts, will bring Ontario's marginal effective tax rate in 2010 down to 18.6 per cent - below the Great Lake states average.

#### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

Involvement of CSOs is critical as household biogas plants are feasible in rural areas where CSOs are linked with communities and are helpful in promotion, implementation and monitoring.

#### **Capacity Building of persons: installers, local population, administration**

The Govt. of India has fixed annual training targets for construction and maintenance, refresher training course, users' training, turnkey workers and staff training. Similar training should be initiated by Governments of other countries.

#### **Make good technical solutions available: Tech-transfer, quality requirements & standards**

Technology transfer of household biogas plants to other countries is very important. The Ministry of New and Renewable Energy (MNRE), Govt. of India has approved different types of biogas plants which are eligible for Govt. subsidy and turnkey projects. The implementation is done through PSU banks (Public Sector Units) / NABARD (National Bank for Agriculture and Rural Development)/ IREDA (Indian Renewable Energy Development Agency). There are coordination committees at State and District level. A village level database of beneficiaries is created and is uploaded on the website. The State nodal departments are to maintain records of status of plants. geotagging of the plants at the time of approval and also when commissioned. Photographs are also maintained in records and all plants are physically verified at ground level before a completion certificate is issued and headquarters conducts a 10 to 15% sample verification. There is a need to develop knowledge, raise awareness and implement regulations, standards and certifications for safe trading and use of biogas.

#### **Specific policies for each solution, not included above**

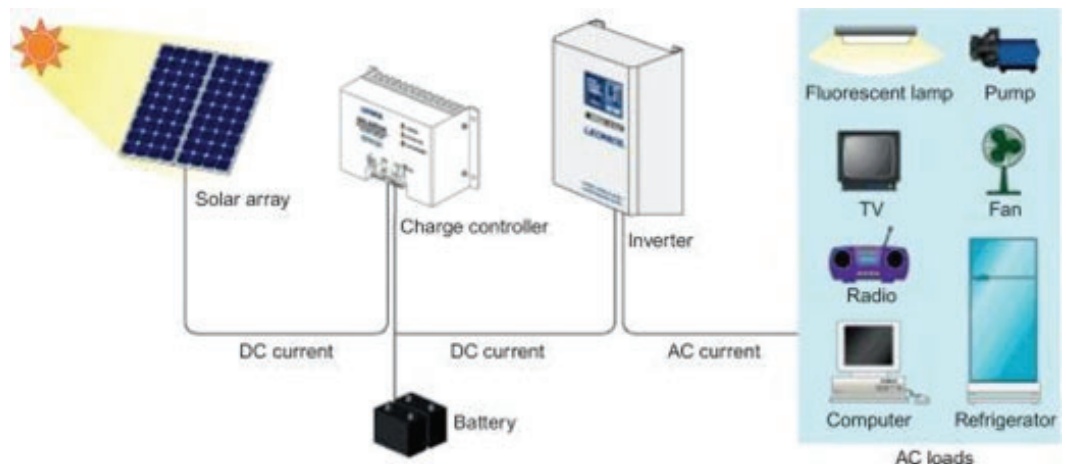
Policy support required will vary depending on the particular location in question, but at the high level the global industry needs, as mentioned in report on "Global Potential of Biogas" of World Biogas Association:

- The drafting of national energy plans to raise the level of renewable energy production and consumption over a future period (a decade is normal) and incorporating into these targets for the production of biogas by anaerobic digestion.
- Anaerobic digestion to be urgently included in all government strategies for meeting greenhouse gas abatement targets recognising the GHG abatement benefits of anaerobic digestion and incentivised via carbon markets.
- Anaerobic digestion to be included in all renewable energy generation incentives.
- The implementation of circular economy strategies with AD at their core; and anaerobic digestion to be nominated as the preferred method of treatment of all biodegradable wastes (human sewage and food; agricultural; commercial; industrial) accompanied by policies to increase capture.

## 2.7. Policies for Solar Home Systems, by INSEDA - INFORSE South Asia

### Information, campaign

A lot of information is available across the countries on solar home systems (SHS) and the systems are easily available in the markets. It needs to be part of the proposed solutions, but a specific campaign is not needed anymore.



### Financial promotion of the local solutions to overcome the financial limits of the users

Governments in various countries have designed different kinds of incentive policies based on the characteristics of different market development phases, including supply push policies for R&D and industry and demand-pull policies for market development.

Policy infrastructure in the renewable energy sector in India took shape with the foundation of the Commission of Alternate Sources of Energy (CASE) in 1981, in the Department of Science & Technology. It became an independent Department of New Energy Sources (DNES) in 1982 and a full-fledged Ministry in 1992.

Who are the decision-makers in India?

The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the ministry is to develop and deploy new and renewable energy for supplementing the energy requirements of the country. They provide direct and indirect tax benefits such as sales tax, excise duty exemptions, and custom duty exemptions.

### National Solar Mission

Jawaharlal Nehru National Solar Mission (JNNSM) 2010, also known as the Solar Mission, is a part of India's National Action Plan on Climate Change (NAPCC). There are three phases to the mission: Phase I (2010-12), II (2013-17), and III (2017-22). Under Phase I, the Rooftop PV and Small-Scale Generation Programme (RPSSGP) aims to encourage the development of rooftop and ground-mounted solar systems.

The Indian government revised the Solar Mission in 2014. It targets 100 GW installed capacity of solar electricity by 2022. To reach this ambitious target, the government announced several policies to promote solar energy.

Here is some information on the policies and regulations that directly impact solar energy development.

As for the timeline of solar policies, some major policies are important for growth of renewable energy. Such as "Electricity Act, 2003", "National Electricity Policy, 2005", "Tariff Policy, 2006",

The “Integrated Energy Policy, 2006” gave provisions for preferential tariff and quotas for opting for renewable energy.

The Government of India initiated mission mode action plans for sustainable growth under National Action Plan on Climate Change (NAPCC) 2008 to address climate change. Its first mission was to intensify solar energy development. It not only set the RPO at 5% of the total grid’s purchase but also a decade long 1% year-on-year RPO growth.

The introduction of Generation Based Incentives (GBIs) was for small grid solar projects below 33 kW. GBIs are for bridging the gap between a base tariff of INR 5.5 and the tariff put in place by the Central Electricity Regulatory Commission (CERC) as a fiscal incentive.

Jawaharlal Nehru National Solar Mission (JNNSM), 2010 is one of the eight fundamental National Mission’s which comprise India’s NAPCC which targeted 20,000 MW of grid-connected and off-grid solar power capacity by 2022 with 2000 MW as the share of off-grid capacity.

Renewable Energy Certificates (RECs), 2011

RECs is a market-based mechanism. It was introduced to enhance renewable energy capacity. It levels the inter-state divergences of renewable energy generation and the requirement of the obligated entities to meet their RPOs with a differentiated price for solar and non-solar.

The Clean Energy Cess (2010) was introduced to levy the amount of INR 50 (0.63 US\$) to every tonne of coal used in the country. The cess created the National Clean Energy Fund (NCEF) that aimed to fund clean energy projects. It provided up to 40 per cent of the total costs of renewable energy projects through the Indian Renewable Energy Development Agency (IREDA). The Cess has now grown to INR 400 (around 5 US\$) per tonne of coal used.

According to the latest notification by MNRE, 30% to 90% Government subsidy on benchmark capital cost is available for all consumers. But it depends on what capacity and type of solar system being installed.

Subsidy one may get for installing a solar system:

- 1kW Solar System – 3kW Solar System = 40% Subsidy
- 4kW Solar System – 10kW Solar System = 20% Subsidy
- More than 10kW Solar System = No Subsidy

The Bangladesh Solar Home Systems (SHS) Program is the largest national program in the world for off-grid electrification. Begun in 2003, SHS installations under the Program ended in 2018. It is the longest, continuously operating off-grid electrification program in the world.

The SHS Program was led and implemented by the Infrastructure Development Company Ltd (IDCOL). Over a 15-year period beginning in 2003, over 4.1 million SHS were sold and supported using a competitive business model that offered consumers a choice of quality SHS, made affordable with financing. About 14 percent of the Bangladesh population (2011 Census), about 20 million people, obtained electricity services through the SHS Program. The SHS Program enabled one-quarter of the unelectrified rural population in 2003 to obtain electricity services far sooner than would have been possible with grid electricity. Building on the credibility gained, SHS distribution to the poorest households under other government programs and commercial SHS sales picked up in later years along with IDCOL-financed sales.

Grameen Shakti, one of the INFORSE South Asia members and project partner in Eco village Development project in South Asia, has installed more than 1.8 million SH.

## **Taxes and import duties, including taxes of fossils and of local solutions**

The tax and investment subsidy policy is in line with the implementation of PV development by reducing the investment threshold. The cases in various countries prove that investment subsidies could help the PV market to realize rapid formation. However, the subsidy is not assessed on the basis of the quantities of power generated, which adds a lot of uncertainty to the subsequent power supply. This confirms that tax and investment incentives should be used as supplementary support instruments but not as the major policy. In India, tax on goods is 12% and services are 18%.

## **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

Civil society plays a crucial role in low-carbon innovation in terms of learning and competence-building. An MIT study in rural India suggests that ongoing efforts supporting the adoption of “off-grid” energy sources such as solar-powered lanterns and microgrids can successfully bring people in remote areas basic energy services from renewable resources – without waiting for a state-run power grid to reach them. The researchers conclude that demonstrations by trusted nongovernmental organizations can inspire households to adopt solar power and help spread the use of renewable energy worldwide.  
<https://energy.mit.edu/news/encouraging-solar-energy-adoption-in-rural-india/>

Grameen Shakti, one of the INFORSE South Asia members and project partner in Eco village Development project in South Asia, has installed more than 1.8 million SHS and holds the eminence of implementing the highest number of SHS by a single organization in the world. This large network of SHS is generating 300 MWh electricity every day, benefiting more than 8 million rural people, covering the remotest corner of the country.

## **Capacity Building of persons: installers, local population, administration**

Capacity building at the local level in remote areas could play a vital role. Barefoot College, brainchild of Bunker Roy who founded the College in 1972, started training young people and semi-literate and illiterate rural women to be solar engineers in the 1990s. Important as many people are not able to install it -  
[https://www.wipo.int/wipo\\_magazine/en/2009/03/article\\_0002.html](https://www.wipo.int/wipo_magazine/en/2009/03/article_0002.html)

## **Make good technical solutions available: Tech-transfer, quality requirements & standards**

PV technology has made tremendous progress over the past few decades, with strong support from governments and technology transfer has already been done in major countries.  
<https://journals.sagepub.com/doi/full/10.1177/0144598720979256>

Important to follow standards to guarantee to deliver results and involve regulatory agencies. "The rise of solar power has generated an array of innovative new products traded across the globe. Since 2016, the World Customs Organization (WCO) has sought to clarify where to place solar energy products in its harmonised system of international trade codes. The WCO's next major update includes codes for solar energy products. The new harmonised system of international trade codes, or HS2022, is set to take effect in two years' time. Clearer, simpler codes should facilitate trade, support the development of incentives for renewables and improve the monitoring of energy access worldwide. The WCO Council adopted these amendments to the Harmonized Commodity Description and Coding System (HS) in June



2019. They will enter into force on 1 January 2022 for all 159 WCO Contracting Parties (158 countries and the European Union)."

[https://energypedia.info/wiki/Quality Standards for Solar Home Systems \(SHS\)](https://energypedia.info/wiki/Quality_Standards_for_Solar_Home_Systems_(SHS))

As per the publication "Quality Infrastructure for Climate Change Mitigation and Adaptation to Climate Change: Potentials, opportunities and chances in Sub-Saharan Africa, in most Sub-Saharan African countries, a favorable policy and an economic and institutional framework still need to be created. Qualified service providers are lacking, and services need to be improved which leads to quality and safety issues in the installation of rooftop photovoltaic systems. The fast development of technologies in the global market makes it difficult for local industries to keep up and at the same time, capacities to effectively control the quality of imported renewable energy technologies are often lacking. Some countries decide to protect their local industries through local content laws or customs duties, thus creating trade barriers and a national market with limited incentives to be competitive concerning quality. The establishment of a functioning quality infrastructure is thus essential if the expectations of policy makers, investors and consumers are to be met. Quality infrastructure services help to increase the quality and safety of renewable energy installations and provide consumers with confidence in this technology. Quality assurance and support services are necessary throughout the value chain.

The International Renewable Energy Agency (IRENA) has identified several benefits of a functioning quality infrastructure for policy makers, manufacturers, professionals and end users. For policy makers, quality infrastructure enables the detection of low-quality products, which allows growing markets to be protected and strengthened and economic growth to be stimulated. Moreover, it helps provide assurance that the renewable energy installations will perform according to expectations, thus supporting the financial viability of the technologies and increasing the return on investment, including that of public incentives for renewable energies. For manufacturers, quality infrastructure can open new markets if locally provided quality infrastructure services are internationally recognized and prove the quality of local products. Through testing and certification, as well as through the implementation of a quality management system in accordance with international standards, products and manufacturing quality can be improved. For the renewable energy industry, certification (for instance, of installers) facilitates hiring processes and improves the competitiveness of service providers.

[https://energypedia.info/wiki/Quality Infrastructure for Solar Energy in the Context of Climate Change](https://energypedia.info/wiki/Quality_Infrastructure_for_Solar_Energy_in_the_Context_of_Climate_Change)

## 2.8. Policies for Mini-Grids

Key decisions are taken when introducing new technologies and sociotechnical systems in general. All the more when we consider that Minigrid is a system, not a product.

This entails various levels of decision making: private and public. Usually we see overlapping policies, for example aiming at different strategic goals (e.g. SDGs). Different policies have different roles and also different degrees of success. Enabling conditions for shifting development pathways are to be defined at a higher level, i.e., development policy and role of electrification. This means introducing Minigrids within policy packages instead of isolated initiatives, e.g., as a component of long term climate policy. When considering systems within already established bigger grids, policies should be included under Distributed Energy renewable resources and focus on community energy solutions.

### Information, campaigns

For users to demand Mini grids, they need to be informed from trustworthy sources about the benefits when compared to the current prevailing options. Thorough assessments of technological needs have proven a convenient tool to address the lack of understanding of different key actors involved in the adoption processes. Development of a large community of practitioners (extended peer communities) may be the best approach available, as opposed to usual expert judgement asked by government agencies.

FIGURE ES.7 Sample institutional framework affecting mini grid developers



Success cases are most efficient in terms of demonstration effect for the general public, final beneficiaries and policy decision makers. Information campaigns can help final users understand how much money they can save. Differentiation of targets is key: general public vs minigrid direct beneficiaries vs decision makers at all levels (see figure ES 7).

Success cases are most efficient in terms of demonstration effect for the general public, final beneficiaries and policy decision makers. Information campaigns can help final users understand how much money they can save. Differentiation of targets is key: general public vs minigrid direct beneficiaries vs decision makers at all levels (see figure ES 7).

### Energy policy for Electrification, reaching SDG7 targets

Countries with a comprehensive approach to planning – which consists of main grid extensions, mini grids, and solar home systems – have achieved the fastest results in electricity access (according to *Tracking SDG7: The Energy Progress Report* shows that, World Bank and others 2019). Countries with the fastest gains in electrification between 2010 and 2018 include Bangladesh, Cambodia, India, Kenya, Myanmar, Nepal, Rwanda, and Tanzania.

**Compared with the main grid and solar home systems, mini grids are a more viable solution for off-grid areas with high population density and demand.** Extending the main grid to serve smaller remote communities that consume a limited number of kilowatt-hours (kWh) per month is prohibitively costly in most cases. Meanwhile, solar home systems are ideal for areas

with low population density and low demand. Mini grids are generally the most economically viable option for servicing areas that are too expensive for the main grid to reach in a timely manner but have high enough demand and population density to support commercial viability.

### **Climate policy**

NDCs and long-term strategies are key for mid- and long-term energy policies, including access to finance (e.g., Green Climate fund and special IFI programmes), carbon pricing and taxing.

The climate effects of this solution are dependent on the emission profile of the local power production and the extent of substitution of fossil fuels, e.g., diesel for the gensets and combustion of other fuels, e.g., GPL, kerosene etc. It is the substitution of local fossil fuel use and the emissions of mini-grid electricity relative to central grid electricity that should be taken into account with regard to climate goals.

### **Financial promotion with subsidies, carbon financing, micro financing**

Since mini grids deal with public goods and are capital intensive investments Public Finance is needed in most cases. Energy cost and quality, i.e. tariffs and subsidies addressing a level playing field are decided at high level, usually national. Job creation, climate policy and other SD goals (see above) are also good examples of social oriented policies that justify public finance included in the policy package.

### **Subsidies**

- Governments may need to provide subsidies to cover the added costs and attract investments in communities where incomes are too low to charge a cost-recovery tariff.
- Subsidies can be in the form of investments subsidies, low-interest loans, operational subsidies, and subsidies to low-income groups.
- Subsidies can provide Lifeline tariffs, where the first kWhs used are set at a low price to allow the poor also to benefit from electricity.
- Subsidies can be used to set the same tariff for mini-grid users and users of the central grid. This is very popular among mini-grid users and is introduced in some countries, e.g., Senegal.

### **Taxes and import duties, including taxes of fossil fuels and of local solutions**

Carbon taxes may help to make renewables in general more attractive but not specifically mini grids. Taxes on some imported capital goods such as inverters or PV modules may hamper implementation. On the other hand, domestic production of capital goods is usually favoured in terms of jobs and trade balance. These decisions cannot be taken outside the long-term policy package and without early and informed participation of stakeholders.

### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process CSO intervention in implementation.**

Public participation makes a difference at all levels. Design of the Mini grid, operation and payment should be dealt with taking into account users and local social organizations. In some countries, NGO-lead companies have been driving mini-grid development, for instance in Mali.

## Capacity Building of persons: installers, local population, administration

Mini grids can be deployed more rapidly than the main grid. Their planning and implementation are more conducive to spontaneous entrepreneurial development, while grid expansion involves several institutions (ministries, utilities, rural electrification agencies) in a longer and more complex series of steps. Nevertheless, implementation may need intervention at various levels of both public and private spheres including beneficiary participation, e.g., community energy (see fig ES.7 above). Mini grids can be a relatively low-cost and timely solution to supply electricity to people in areas that the main grid is unlikely to reach or deliver reliable electricity services in the medium term (five years and more). In such regions, mini grids have an edge over main-grid expansion/ reinforcement in several ways.

Policymakers may view investing in mini grids as a waste of resources in the longer term if they are meant to be replaced by a more cost-efficient main grid with cheaper power supply options. But the arrival/ reinforcement of the main grid does not necessarily mean that the investment in mini grids would be wasted. Indeed, mini grids' generation and distribution assets can be reused in an integrated system, either separately or together, if they are following or can be upgraded to standards for main grids.

Reusing mini grids' generation and distribution assets can enable developing countries to shape their power system into a centralized grid that integrates local systems. On the other hand Community energy solutions can take advantage of availability of connection points and maturity of smart grids systems including advanced storage in urban and peri-urban areas.

## Capacity Building

Designing and enforcing grid-compatible standards requires significant human resources from governments. For example, in Cambodia the regulator advises developers on how to build mini grid systems so that they can integrate with the main grid later (Tenenbaum 2018: 30)

## Make good technical solutions available: Tech-transfer, quality requirements & standards Technology policy.

Mini grids often use smart, remotely controlled electricity meters that allow customers to prepay for their electricity, for example in a pay-as-you-go (PAYG) model. They also often use remote monitoring systems to manage the status of the system in real time from a distance. They can integrate partnership programs throughout the lifecycle of the mini grid that stimulate the local economic development of their clients and do this in collaboration with suppliers of energy-efficient appliances as well as microfinance providers. One possible collaboration partner is mobile network providers that require local power.

The combination of falling costs, new technologies, and favorable enabling environments has made third-generation mini grids a cost-effective option to connect 490 million people worldwide, complementing grid

TABLES.5 Current and projected tariffs, costs, and profits of mini grid operators, 2019 and 2030

Item	2019	2030
Average tariff/kWh	0.45	0.26
Cost of service/kWh	0.43	0.21
Profit on mini grids deployed this year (millions of US\$)	28	608
Cumulative profit on all mini grids deployed (millions of US\$)	153	3,343

Source: ESMAP analysis.  
Note: kWh = kilowatt-hour.

extension and solar home systems to reach universal electrification by 2030 (Tracking Sustainable Development Goal (SDG) 7: The Energy Progress Report 2020, World Bank's ESMAP).

One key aspect is technology trajectories since costs of PV, batteries and inverters have been falling more than expected and this trend is likely to be continued, particularly with regards to storage. Learning curves are relevant not only at the technological frontier, i.e., world market, but also for national long term planning key issues, e.g., local costs and benefits.

### **Quality requirements and tech standards**

Defining clear technical standards and commercial options for integration can address key concerns of mini grid developers and entice them to invest. What happens when the main grid arrives is a major concern for mini grid developers. Investors face two risks: The first is that their assets might be stranded. This can occur when the main grid builds over the mini grid, pulling customers to the cheaper or better service the main grid offers. The second risk is expropriation of assets, which occurs if the utility or the government takes over the mini grid assets without adequate compensation. Governments that are serious about increasing electricity access will want to mitigate these risks to foster mini grid investments and hasten electrification.

Two sets of actions can reassure potential mini grid investors. The first set would define clear technical standards for mini grids, enabling them to connect to the main grid. The second would establish clear rules on commercial options available to mini grids when the main grid arrives. The two sets are intertwined, so they need to be dealt with together.

Setting clear technical standards is key to allowing future connection of mini grids to the main grid at minimal cost. Setting main-grid standards and granting a right to connect, subject to compliance with standards, may be useful where the main grid is likely to expand soon; light standards may be enough where the main grid is likely to expand later.

Technical standards for connection with the main grid should cover the following aspects:

- Equipment (distribution network poles, conductors, and insulators) that ensures the network can handle the quantities of electricity that flow when energized by the main grid.
- Generation synchronization, to ensure the safe and reliable operation of the grid when connected to the mini grid generator.
- Interoperability, which refers to the capability of two or more networks, systems, devices, or components to interact, communicate, and exchange information securely and effectively.

Guaranteeing mini grids, the right to connect, subject to compliance with standards, can further reassure investors. Without a legal requirement, the operator of the main grid may be tempted to exert discretionary power and reject the connection of a mini grid.

Setting grid-compatible or main-grid standards can be useful when the grid is expected to be expanded within the lifetime of a mini grid's assets. At that point, a mini grid operator may well not have received the required return. Having the option to connect to the main grid may allow a mini grid operator to earn the expected revenue, preserving the value of the investment.

## 2.9. Policies for Efficient Light and Electricity Use, INFORSE Secretariat

As explained in the section on solutions for efficient and light and other electricity use, there is huge potential for increasing efficiency and saving expensive electricity. Since manufacturers of lamps and electric appliances do not save anything with energy efficient products, they have little incentive for producing efficient equipment. In addition, often energy efficient lamps and appliances are more expensive to purchase than inefficient ones, but the extra costs will easily pay off with electricity saving after some time, from a few months to a few years. Thus, many consumers will intuitively go for the low-cost purchase rather than looking at the total economy of the purchase of an energy consuming appliance. Therefore, public policies are important to introduce efficient lamps and electric appliances. Different policies have different roles and also different degrees of success. The following pages give an overview of the main policies and where they are best used.

### Information and campaigns

For consumers to demand efficient lamps and appliances, they need to be informed from an independent source about the benefits. If the information is independent, it is normally more trusted by consumers, as company sale materials normally do not show the less positive sides of a project. There are many forms of information campaigns and consumer information. Some of the most successful are:

- National campaigns via internet, TV, radio, newspaper entries and other mass-media. This can be a good way to reach many, but is not always effective. In particular for internet-based information it is critical that many people see the website or social media. It is also critical that information is leading people to action and should be very practical as well as realistic. It should tell people how to act, what they can save, as well as other benefits as well as pitfalls, such as risk of counterfeit products, eventual damage with common types of power failures etc. Many countries have online information for energy efficiency. Not all online information is equally useful. A good example of a useful website is the one by the governmental financed UK Energy Savings Trust, <https://energysavingtrust.org.uk/how-be-energy-efficient-online/>
- Local campaigns at events and/or with energy advice offices can be an important way to promote energy efficiency with personal contacts, where users can get help to save energy, can see energy efficient lamps and some energy efficient appliances, can get answers for questions and can get locally adapted advice with focus on typical issues in the area, what is available locally, etc. An issue with local campaigns is that it is expensive to reach a majority of the population in this way.
- Local energy advisers can assist individuals in saving energy, buying the most cost-effective solutions, including electricity costs, etc. They can visit the homes of the users, they can communicate to users via phones or at local energy advice offices. The advisers can combine advice in efficient electricity use with for instance clean cooking, health and other issues. Local energy advisers can be efficient as good advice can help families to save a lot, if there are solutions available that the families can get and afford. As for local campaigns, it is costly to reach a large part of the population in this way.
- Energy labels, where all producers and importers have to inform about the energy efficiency of the products they sell. This is used in the EU, USA, China and many other places. It is by law an obligation for companies to put an energy label on products showing energy efficiency in a standardized way.

For online sale, the label should be on the website together with other information about the product. Among the benefits are:

- o that all products should have the energy label, so it is easy for consumers to compare,
- o that it is proven to be efficient, and
- o that the companies that shall pay for the label, so the cost for states is limited; but it is important that the state allocate funds for introducing the label and also to make market surveillance, checking that labels are actually showing the correct energy efficiency.

Link to EU Energy label:

[https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about\\_en](https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about_en)

### **Financial promotion with subsidies, carbon financing, micro financing**

Many schemes have promoted energy efficient lamps and appliances with subsidies and micro-financing. Typically grants are useful for introducing energy efficient equipment, to get the first users to use the product and tell friends about it. In some cases special types of subsidies can be helpful. An example is giving away a large number of energy efficient lamps in a country where most people use traditional, incandescent lamps and where there is a power crisis. It is faster to make people change to efficient lamps than building a new power plant. For this to save electricity, it is, however, important that people replace the incandescent lamps, not just use more lamps. Thus, collection of the incandescent lamps can be part of the campaign.

Micro-financing can overcome the investment barrier, where energy efficient equipment costs more, but where consumers save the extra costs in a few months or years. To be most useful, the savings should pay back the loan in less than 3 years. In some successful cases, the power company has been in charge of this, collecting the pay-back of the micro-loan together with the electricity bill. In this way, the consumer's bill will not go up, and when the investment is paid back, the bill will go down.

### **Taxes and import duties, including taxes of fossil fuels and of local solutions**

Taxation including import duties change the user economy of different solutions and thereby the opportunities for people to afford them. It is possible to use reduced or no taxes and import duties to introduce efficient lamps and electric appliances for a time-limited period, similar to subsidies. The choice between subsidies and reduced taxes often depends on what is easier politically.

In general taxes and import duties should not distort the market in favor of fossil fuel or electricity use, so the same taxes and import duties should be applied to imports of fuels for electricity production as for energy efficient equipment.

## **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

CSOs can have several important roles for energy efficiency. Some of them are:

- CSOs are advocating for better rules for energy efficient products, with strong groups, such as the CSO cooperation “Coolproducts Campaign” in EU, [www.coolproducts.eu](http://www.coolproducts.eu) and the American Coalition for an Energy Efficient Economy, [www.aceee.org](http://www.aceee.org)
- CSOs play an active role informing and campaigning for energy efficiency, including with the local solutions catalogue on the INFORSE website, <http://localsolutions.inforse.org/>, the INFORSE – partner website on energy efficiency, <https://selnee.rea.org.ua/en/>, and the website of Centre for Alternative Technology in Wales (<https://cat.org.uk/info-resources/free-information-service>). Beside the internet-based information, many CSOs are also involved in physical information events, as when TaTEDO promotes efficient electric cooking with e-cookers.
- CSOs can manage local energy advice centres and have local energy advisers.

## **Capacity Building of persons: installers, local population, administration**

Basic information of potential for efficient lamps and electric appliances is important for decision-makers on all levels. The above-mentioned campaigns and information initiatives should provide that for the decision-makers, but there is a need for training of the advisers and campaigners. This should include regular updates as new solutions become available and some solutions change in price etc.

## **Make good technical solutions available: Tech-transfer, quality requirements & standards**

The most effective policies for energy efficient lamps and appliances are mandatory requirements for energy efficiency and quality of products. In EU, USA, China and many other markets, mandatory requirements, for instance for high-efficient lamps, have reduced power demand considerably and saved consumers for large part of their electricity bills. In EU, the “ecodesign” regulation requires efficiency for almost 30 product groups, most of which are using electricity, see

[https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/energy-efficient-products\\_en](https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/energy-efficient-products_en).

An extra argument for setting energy efficiency requirements is that manufacturers of electric equipment, that have production of low-efficient equipment, will try to sell the low-efficient products in countries without requirements. This type of “efficiency-dumping” is best avoided with national efficiency requirements.

Behind requirements for energy efficiency are standards, specifying methods to measure the efficiencies in a well-defined manner to give a level playing field and to ensure that the required energy efficiency is also being implemented with efficient products on the market. In the European Union, the standards are managed by CEN, Comité Europeene des Normes that manage thousands of standards, for energy efficiency as well as for many other purposes.

While electric equipment is imported in all countries, this is not necessarily the case for the efficient types, so for specific, efficient products, introducing them into new countries can help their energy efficiency.



## 2.10. Policies for Electric Two-Wheelers

### Information and campaigns, standards

As individuals, companies and cities alike search for solutions for the climate crisis, electric Two-wheelers (e-bikes, e-scooters, e-motorbikes) are increasingly recognized as a valuable tool in the climate mitigation toolbox. Awareness raising of the powerful solutions that e-bikes offer by engaging in a variety of educational and informational events is critically important.

In Kenya, the National Climate Change Action Plan 2018-2022 announced a series of measures facilitating the introduction of EVs and identified the opportunity to reduce 60% of two-wheeler emissions via a transition to electric motorcycles. In June 2020, Kenya adopted technical standards covering vehicles, batteries and safety requirements.

Studies have shown that e-mobility bears the second highest mitigation potential for transport emissions in Kenya, (as most of the electric generation mix is produced from renewables)

Awareness of e-bikes and e-motorcycle is an important first step toward more widespread adoption. In 1<sup>st</sup> June 2022, ABU DHABI - As part of its endeavours to enhance security levels and to raise awareness on measures of safe driving requirements among cyclists and electric scooter riders, and in order to implement bicycles and electric bikes regulations in the emirate, the Integrated Transport Centre of the Department of Municipalities and Transport in Abu Dhabi, launched a public awareness campaign urging cyclists and e-scooter riders to adhere to the safety requirements and instructions on directional boards while driving.

The campaign further encouraged said riders to avoid illegal behaviours that could compromise their safety and the safety of all society members.

### **Financial promotion of the local solutions to overcome the financial limits of the users: Subsidies for local solutions, carbon financing, micro financing**

[Rwanda](#) capped electricity tariffs for charging stations and rent-free land for them, preferential parking and travel lanes for electric vehicles around Kigali, and restrictions on the ages and emissions of polluting vehicles. The Rwanda's second Nationally Determined Contribution (NDC) of May 2020, identifies electric mobility as part of its climate change mitigation measures. The NDC envisions a progressive adoption of electric buses, cars and motorcycles from 2020, replacing conventional vehicle sales and diminishing transport fuel imports.

Government Sponsored Loan - The country of Scotland went a step further in June 2018 by initiating a comprehensive e-bike incentive and publicity program worth £1.3 million (\$1.7 million). Interest-free loans were introduced to provide private citizens with up to £3,000 (\$3,900) towards the purchase of e-bikes. £700,000 was made available to councils, public sector bodies, and community groups for the creation of e-bike pool schemes, construction of secure parking, and the purchase of safety equipment. An additional £100,000 was set aside to fund e-bike demonstrations at community centers around the country (Sutton 2018).

The city of Paris, France, offers its citizens a partial purchase subsidy of 33% towards the purchase of an e-bike. The offer, available since 2017, is capped at 400 € (\$460) for a personal e-bike and 600 € (\$700) for a cargo bike. In addition, up to 400 € (\$460) can be awarded for the purchase of equipment necessary to convert a conventional bike to an e-bike. The program also offers commercial entities no larger than 50 employees a 400 € (\$460) incentive towards an e-bike or conversion kit and up to 1,200 € (\$1,300) towards the cost of a cargo bike ("Lutte contre la pollution : les aides financières à la mobilité" 2018).

### **Taxes and import duties, including taxes of fossil fuels and of local solutions**

Many countries are adopting measures in three broad areas: i) price subsidies, ii) tax breaks and iii) a range of privileges on road use, for example, free or reserved parking, charging and other facilities. Price subsidies – for example to vehicles and electricity tariffs – are sometimes accompanied by a more indirect mechanism to tip the price balance away from ICEs: some countries have imposed fuel efficiency standards on ICE vehicles that raise their cost – thus advantaging EVs. Tax exemptions may include exemption or reduction of fuel tax, registration fees, or import duties; these are currently offered in many countries to consumers and the auto industry during the early stage of EV adoption.

In Kenya, the financial Bill of 2019 reduced excise duty rates for all battery electric vehicles and also provided incentives in the form of reduced excise tax for EVs from 20 to 10% in 2019.

US New E-BIKE act of 2021 introduces 30% US federal tax credit for electric bicycle purchases. The new legislation is designed to make electric bicycles more affordable to average Americans.

Luxembourg's e-bike incentive program offers a flat rate tax deduction for the purchase of a conventional bike or an e-bike limited to 250 watts and 25 km/hour. Citizens can claim a 300 € (\$340) tax deduction for their purchase ("Portail Du Développement Durable et Des Infrastructures: Frequently Asked Questions" 2018).

### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

Information sharing, awareness raising and advocacy on fostering an enabling environment for e-bike.

### **Capacity Building of persons: installers, local population, administration**

Training in repair and maintenance might be important

### **Make good technical solutions available: Tech-transfer, quality requirements & standards**

Government should lead the development of standards for ease of use of charging infrastructure by various vehicle manufacturers, service providers and home-based users. A policy framework should also be set up for recycling and reuse of batteries. Establish harmonized technical regulations and technical standards on charging infrastructure and battery swapping systems, and operate these facilities to ensure safety and interoperability of the systems. Interoperability allows users to have seamless access to charging facilities regardless of their vehicle models. It also reduces the costs of providing and operating charging facilities and battery swapping services because different manufacturers can cooperate in providing and operating these infrastructures and services.

Develop the technical regulations and standards related to vehicle disposal and recycling of expired batteries/accumulators. The improper treatment of electric batteries or accumulators affects the environment negatively. Developing technical regulations and standards will mitigate these negative impacts and may reduce the cost of producing batteries for two-wheelers.

Develop comprehensive regulations and standards related to the safety of electric two-wheel users and other road users.

## **Specific policies for each solution, not included above**

Provision of preferential parking spaces for EVs at major transport nodes, city centre and commercial areas.

Using policy and regulation to pave the way for two-wheeler electrification in Vietnam  
<https://theicct.org/wp-content/uploads/2022/03/ldv-asia-using-policy-and-regulation-to-pave-way-for-two-wheeler-electrification-in-vietnam-mar22.pdf>

Electric two-wheelers in Africa? Markets, production and policy  
<https://www.greengrowthknowledge.org/sites/default/files/Electric%20two-wheelers%20in%20Africa.pdf>

How E-Bike Incentive Programs are Used to Expand the Market  
[https://rise.esmap.org/data/files/library/united-states/Texas/EE/United%20States\\_Texas\\_E-bike%20Incentives.pdf](https://rise.esmap.org/data/files/library/united-states/Texas/EE/United%20States_Texas_E-bike%20Incentives.pdf)

Integrated Transport Centre launches awareness raising campaign on riding bicycles, electric scooters safely in Abu Dhabi  
<https://www.zawya.com/en/life/integrated-transport-centre-launches-awareness-raising-campaign-on-riding-bicycles-electric-scooters-safely-in-abu-dhabi-kqnq1p4v>

## 2.11. Policies on E-Rickshaw, INSEDA - INFORSE South Asia

### Information, campaign

Further information dissemination and campaigns in African countries are needed. For example, Japanese electric two- and three-wheeler manufacturer Terra Motors is set to ramp up the exports of its India-made e-rickshaws to Africa. The company plans to ship 5,000 units of e-rickshaws a year to countries such as Ethiopia, Nigeria, Tanzania and Sudan.

The Delhi local government in India has started a “Switch Delhi” campaign where several users, environmentalists, celebrities, and industry leaders have come forward to applaud the campaign. According to officials, three-wheelers have emerged as the highest-selling EV segment in Delhi since the launch of Delhi’s EV policy in August 2021.

The campaign is focused on generating awareness on the benefits of EV three-wheelers along with the benefits offered under the Delhi EV policy for those who want to make the switch from ICE (Internal Combustion Engine) vehicles to electric vehicles.

<https://www.sundayguardianlive.com/news/delhi-govts-switch-campaign-focusing-electric-three-wheelers>

### Financial promotion of the local solutions to overcome the financial limits of the users

More than anywhere else in India, green licence plates – indicating the vehicle is powered by a rechargeable battery, not an internal combustion engine – are prominent in Delhi. This licence plate aids in offering preferential treatment to zero-emission vehicles, such as parking, free admission in congested areas, and a reduced toll on highways. To some extent, this has been enabled by the state government’s concerted efforts to complement national policies that encourage adoption of EVs.

India launched Faster Adoption and Manufacturing of E-Vehicle schemes in April 2015 and April 2019 to subsidise EVs, but their budgets have been under-utilized. So, with a growing ecosystem of manufacturers, the Delhi government’s revised EV policy has focused on generating demand and providing subsidies, especially to borrowers looking to buy two- and three-wheelers, with a goal that one in four of all new vehicle registrations in 2024 would be for an EV.

For registered drivers, the Delhi government’s financial incentives include a Rs 30,000 (360 US\$) purchase incentive and 5% interest subvention on loans for the purchase of an e-rickshaw, and a waiver of road tax and registration fees. These drivers also receive Rs 7,500 for scrapping and deregistering old rickshaws with internal combustion engines to limit the number of old, polluting models on the roads and prevent informal operation of rickshaws.

### Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME - India)-I &II:

The scheme provides financial incentives for the purchase of electric and hybrid technology vehicles. With a financial outlay of Rs. 795 crore (100 million US\$), it was initially launched for two years (2015-17) – Phase I, which was further extended till March 2019. The Phase I of the scheme provided subsidies for the purchase of eight models electric three-wheelers L5 category (L5 - A three wheeled motor vehicles with maximum speed exceeding 25 kmph and engine capacity exceeding 25 cc if fitted with a thermic engine, or motor power exceeding 0.25 kW if fitted with electric motor) ranging from Rs. 25,000 to Rs 61,000 (316 to 770 US\$). The subsidies are availed by buyers upfront at the point of purchase and the same is reimbursed to the

manufacturers from the Department of Heavy Industries (DHI) on a monthly basis. In Phase II of FAME, a uniform subsidy of Rs 10,000 (126 US\$) per KiloWatt Hour has been allocated to support five lakh three- wheelers.

### **Taxes and import duties, including taxes of fossils and of local solutions**

Government efforts in India towards promoting EVs include placement of EVs in a lower Goods and Service Tax (GST) slab of 5% in comparison to a GST of 12% for conventional ICE vehicles, and lowering the GST on lithium ion batteries from 28% to 18% from July 2018. Furthermore, to ease the installation of charging infrastructure, the Ministry of Power (MoP) recently amended the Electricity Act, 2003, to legalise resale of power (at regulated tariffs) to allow the distribution companies and electricity service providers to set up charging infrastructure. The MoP has also come up with a roadmap for installation of adequate charging stations. The roadmap suggests the installation of charging stations (with at least 2 charging ports) at every 3 - 5 km in urban agglomerations and at least one charging station every 25 km on a highway (PIB, 2018).

### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

E-three wheelers are feasible in cities and outskirts and for short distances in rural areas. However, CSOs can play a role in awareness creation and guide consumers on aspects such as purchase of EVs, available subsidies, performance of EVs and location of charging stations.

### **Capacity Building of persons: installers, local population, administration**

It is important to build capacities of relevant government officials, consultants and practitioners in transport departments and urban local bodies for smoother adoption and facilitation of EVs by different users.

### **Make good technical solutions available: Tech-transfer, quality requirements & standards**

Regulated procedure or policy should be introduced to scrap old vehicles. Too often, batteries are dismantled unscientifically causing pollution and even accidents.

In order to push the adoption of e-autos, following amendments in the permit system can take place:

- As per the age of ICE-powered auto-rickshaws permit renewal should be restricted (starting in highly polluted cities)
- For the initial one-year, open permit system for e-autos should be practised.
- The e-autos should have no or reduced permit fees.
- Permit renewal period for e-autos can be increased in comparison to ICE auto-rickshaws.
- The types of permits that apply for auto rickshaws as commercial vehicles include contract carriage. In most of the metropolitan cities, “closed permit” is issued for the auto-rickshaws to avoid road congestion. However, in smaller cities with absence of public transport, “open permit system” is practiced. A flexible carriage system for e-autos can be adopted.

## **Safety Standards**

The market currently has a huge number of variants of e-rickshaw which do not fall under the category of L5 three-wheelers. Thus, there has to be proper safety checks prior to the approval of the vehicle as this may lead to accidents.

## **Planning Zones**

Electric vehicles zones within cities can be identified/ demarcated for plying of e-autos. These could include tourist centres and parks.

## **Charging Infrastructure**

Charging infrastructure serves as a crucial factor apart from the regulations impeding the growth of e-three-wheelers. Though the electric autos can have home-based charging infrastructure, dedicated public charging infrastructure needs to be developed to support charging needs of e-vehicles. Apart from the provision of public charging stations, provision of charging points should also be there at parking spots in places like malls, and marketplaces. Pilot initiatives with the public transport authorities to promote first and last mile connectivity can further provide the charging infrastructure.

## **Specific policies for each solution, not included above**

### **International best practices**

Globally, several policies, implementation mechanisms and approaches are being promoted for the growth and uptake of EVs. Thus, it is important that global best practices in the EV three-wheeler spaces are identified and translated to the national context to address the associated challenges around the adoption of EVs.

#### ***Sri Lanka***

Branding the electric tuk-tuk – Under the 2018 budget, the concept of ‘tourist-friendly tuk-tuk’ was conceived in collaboration with the hospitality industry. This program provides for existing three-wheeler drivers to register with the Sri Lanka Tourism Development Authority (SLTDA) so that a three-wheeler would not only be a mode of transportation but enable the driver to serve as a local tour guide as well.

Increasing the import taxes on diesel tuk-tuk – As per the 2018 budget proposal, import taxes on a diesel three-wheeler increased by around `50,000 in order to encourage the transition to environmentally friendly electric three-wheelers.

Scrapping – The government will discard and sell as scrap the non-roadworthy three-wheelers.

#### ***Philippines***

Collaborations – One private sector gave e-jeepneys to operators for free in exchange for advertising rights.

Pilots – Joint venture between Department of Energy and Asian Development Bank (ADB) to put 100,000 electric powered tricycles on roads.

Financial Institutions – The government networked with Land Bank of the Philippines (LBP) and other financial conduits, such as rural banks, transport cooperatives, multi-purpose cooperatives to provide loan facilities to drivers of the electric three-wheelers.

Partnerships based Pilots – The Singapore headquartered Decacorn’s, Grab (which is on its way towards becoming a ‘super app’ to provide everything online) has announced to partner with the owners of eco-friendly three-wheeler vehicles (EVs), electric tuk-tuks, in Chiang Mai city, a tourist and cultural center in northern Thailand.

**The key takeaways from the above mentioned international best practices that can be adopted:**

- The electric three wheelers can be given edge to ply in tourist destinations and institutional areas.
- Regulatory restrictions on the diesel three wheelers can push adoption of electric auto rickshaws.
- Scrapping subsidy to old vehicles can compensate the price difference between electric and ICE autos
- Additional benefits such as advertising incentive (incentives for advertising on social media such as Facebook, Instagram, Google influencer, etc.) will attract more buyers
- The initiatives and pilots of electric auto rickshaws within the city will make them more visible and reliable.
- Ease in financial assistance will strengthen the adoption process
- Establishment of charging stations at the major terminals or metro station will also encourage electric three wheelers.

<https://www.teriin.org/sites/default/files/2020-02/Policy%20brief%20-%20EV%20Three-wheelers.pdf>

## 2.12. Policies for Solar Dryers, INSEDA & INFORSE South Asia

### **Information, campaign**

Information dissemination and campaign are required for Solar dryers as well as for market development for dried products which can be on local level depending upon the food items being dried.

Awareness about the appropriate decentralised renewable energy (DRE) technologies, which includes solar dryers amongst the relevant stakeholders is required for taking necessary decisions. Further, given that these are new forms of technologies for many consumers, awareness campaigns will help in increasing credibility and adoption of these products by end-users and financiers. INFORSE and Climate Action Network South Asia is developing a catalogue on local solutions, describing costs and benefits of solutions, how to get them etc. Here solar dryers are featured, see [https://www.inforse.org/evd/output/solution\\_list.php](https://www.inforse.org/evd/output/solution_list.php)

In collaboration with relevant partners, the Ministry of New and Renewable Energy (MNRE) plans to make available a digital catalogue/portal of DRE-powered livelihood solutions to be updated regularly, which could be used by various stakeholders for awareness creation. This catalogue will include detailed information on the solution, installation, usage and best practices to increase income.

### **Financial promotion of the local solutions to overcome the financial limits of the users**

In India, subsidies are available for solar dryers. In recent years, a wave of innovators and entrepreneurs has come up with a variety of decentralised renewable energy (DRE) livelihood applications, which are not only energy-efficient but also economically viable. These include a myriad of solutions such as solar dryers, solar or biomass powered cold storage/chiller, solar charkha, etc. Modular design of such DRE livelihood applications ensures scalability without large investments. Besides, energy efficiency of such solutions is also important, as it in turn, determines their economic viability by reducing the size of the generation and storage (if required) asset.

To promote decentralised renewable energy (DRE) livelihood applications, which include solar dryers, the Ministry of New and Renewable Energy (MNRE), Govt. of India has proposed a policy framework to provide a conducive environment for development and large-scale adoption of these appliances as described below.

Since DRE powered solutions are capital intensive in nature, financing for the end-users and enterprises would be critical to enable the adoption of solutions and scale-up of the sector. In partnership with financial institutions, a financing facility offering first loss default guarantee with partial risk coverage to facilitate access to credit for entrepreneurs and end-users would be developed. With this facility in place, financial institutions may explore development of collateral-free financial products to help meet short-term financing requirements of enterprises as well as stipulate minimum tenure for various values of loan to end-users to ensure repayments are aligned with additional income of the end-users. The facility would encourage financing to women end-users, self-help groups and collectives. Acquisition of assets is particularly challenging for micro businesses, marginalized communities and women. Therefore, enterprises with opex based financial models such as pay-as-you-go, and rental models may also be supported for credit facilitation.



To further enable end-user financing, the ministry may work towards:

- Recognition for DRE-based livelihood solutions under the existing provisions of priority sector lending
- Preference to DRE-enabled variants of technologies under existing interventions such as Rural Innovation Development Fund
- Inclusion of DRE-powered livelihood solutions in the list of products that could be supported under MUDRA, PMEGP

In collaboration with relevant partners, MNRE will commission development of rapid assessment tools, which could be used by bankers and financiers to assess the economic viability of DRE livelihood solutions for various end-users. Such tools, partnerships and training in association with institutions such as NABARD will be used to inform financiers about DRE technologies for livelihoods and equip loan officers in their assessment.

#### **Taxes and import duties, including taxes of fossil fuels and of local solutions**

Solar dryers are mostly constructed on site using different components such as UV sheets, bamboo, solar panels, a charge controller and battery etc. These components have different taxes and therefore it is not possible to suggest tax benefits for the solar dryer specifically. Subsidy and financial assistance therefore are more important for scaling up the solar dryers.

#### **CSO implementers, key roles of CSOs, role of CSOs as actors in the process**

Role of civil society organisations is extremely important to promote solar dryers and other similar technologies in rural areas, as they are well connected with local communities and skilled manpower is required for the construction of solar dryers. The awareness and proper training of farmers is also required for the effective utilisation of the solar dryer as different crops / food items need specific parameters for effective drying.

Besides, the role of CSOs is also essential in creating market linkage and consumer awareness for the use of dried products. Identification of the target group of consumers is also needed, for which CSOs can play a vital role.

MNRE as proposed would partner with livelihood focused civil society organisations (CSOs) and relevant ministries to integrate the discussion on DRE-powered solutions for livelihoods at national and local livelihood summits, town halls and support the demonstration of such technologies at trade fairs and exhibitions.

#### **Capacity Building of persons: installers, local population, administration**

Capacity building, as mentioned above is not only essential in construction of the solar dryers but also in their proper utilisation.

DRE livelihood applications have the potential of creating new local job opportunities in operations & maintenance and installation/fabrication. Trained human resources will be required for these activities. The availability of a trained workforce will further help in increasing the credibility of products for consumers and financiers.

Skill India, SuryaMitra, Biogas Mitra and Varun Mitra initiatives have not only created technology and allied service specific training modules but also trained a pool of youth across many locations. MNRE will facilitate in developing and implementing skills and training programs for DRE livelihood applications, which include solar dryers, with Skill Council for Green Jobs, IITs promoting development and technology, National Institute for Rural Development and other organizations of stakeholder Ministries/ Departments.

Existing community level institutional platforms, such as SHG federation, FPOs (Farmers Producer Organisations), KVKs (Krishi Vigyan Kendra - Agriculture science Centres) etc. will be mobilized to build capacity of potential users/buyers to boost adoption of DRE technologies. Linkages will be established in existing government schemes like MUDRA to support micro-entrepreneurship in the value chain for DRE applications for livelihoods. To such an end, technical training will be complemented with entrepreneurial training modules. A targeted emphasis would be placed on creating skilling and entrepreneurship opportunities for youth from SC/ST communities and women in non-traditional job roles.

#### **Make good technical solutions available: Tech-transfer, quality requirements & standards**

To obtain the desired quality and assure a good return for the producers, the solar dryers must be properly designed and scaled to meet the requirements of specific crops and environments.

To ensure a successful implementation, a comprehensive data mapping of the solar radiation, testing facilities, standard protocols, production of local solar components, development of an efficient drying operation, as well as a promotion of tax incentives, should be established.

#### **Specific policies for each solution, not included above**

**Thailand:** In Thailand, drying is one of the main post-harvest approaches to preserve the quality of agricultural products. Small-scale farmers mostly use open-air sun drying. Since 2013 the Thai MoE has launched many projects for promoting the use of a parabolic solar dryer with the successful example of solar-dried bananas to support the development of renewable energy (CRE) projects in communities.

**India:** One key factor for the success of the solar dryer in India has been the presence of a favorable enabling policy environment. In 2010, the Jawaharlal Nehru National Solar Mission (JNSSM), also known as the National Solar Mission, was launched by the Government of India and State governments to promote solar power. During the second phase (2014–2022), the scaling of solar energy in the country has been promoted. Under this policy, a 30% subsidy is provided for the installation of solar-energy-driven equipment. In some States, such as Tamilnadu, the subsidy for setting up solar dryers was up to 50%.

**Burkina Faso:** In Burkina Faso, high demand for active dryers integrated with a PV-driven system has been identified to dry fruits and vegetables at both cooperative and individual levels (Nonclercq et al., 2009; Boroze et al., 2014).

**DR Congo:** A low cost and locally made greenhouse dryer has been introduced by IITA as an alternative method to improve the quantity and quality of dried products. With the application of a solar dryer, for example, the cassava community processing center, which is managed by the youth and a women's group in Katana, Eastern DR Congo, recorded a significant increase in production of high-quality cassava flour and other derived products as well as improved income.

Links:

<https://www.sciencedirect.com/sdfe/reader/pii/S0973082622000229/pdf>

[Review of solar dryers for agricultural products in Asia and Africa: An innovation landscape approach](#)

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*Some Of the Solutions Presented for Advocacy Under the Project*