

Business Unit

Challenges affecting growth of SHS

*Strictly Private
and Confidential*

06 March 2018

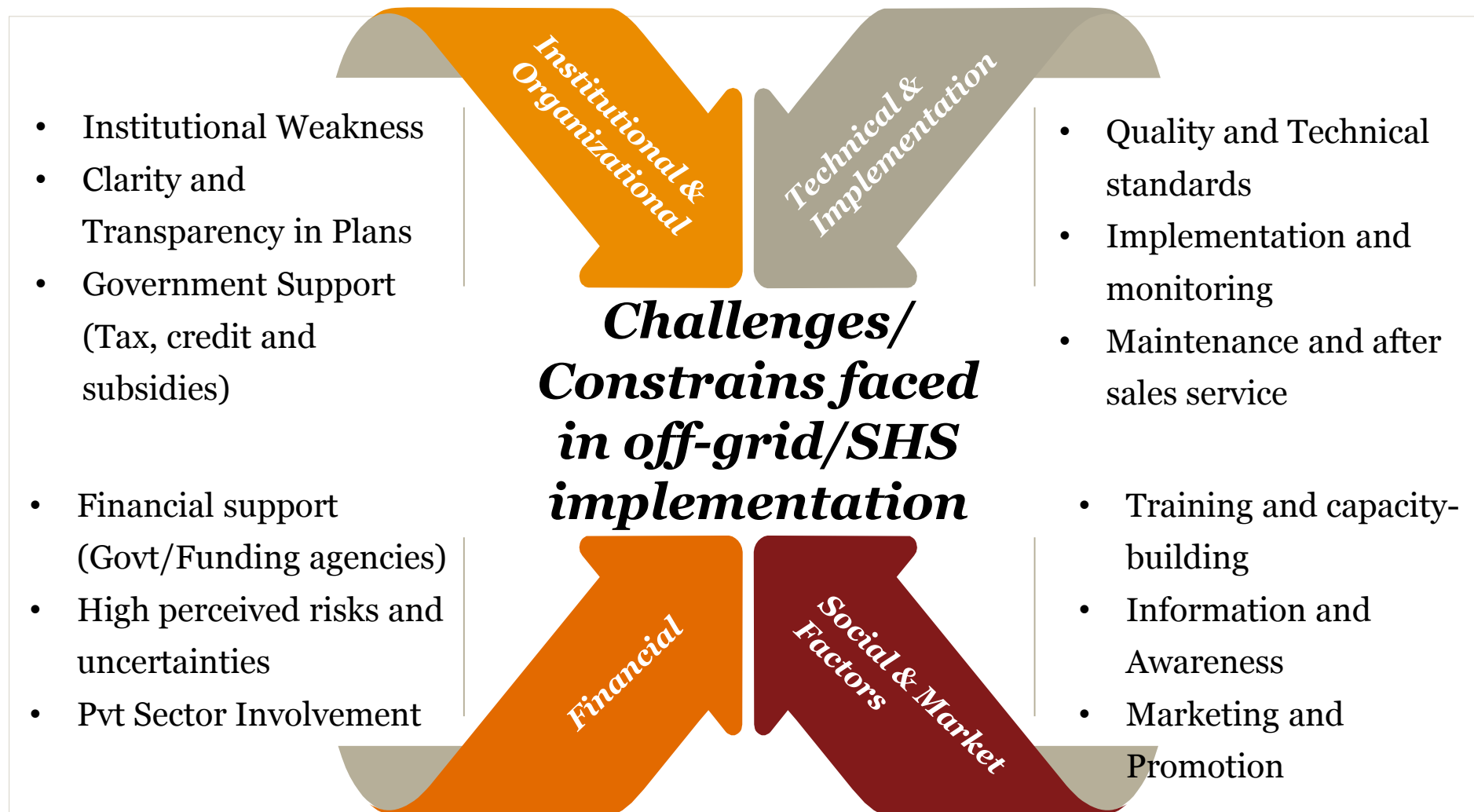


pwc

Agenda

1	Broad classification of challenges	3
2	Country Wise Challenges	4
2.1	Afghanistan	5
2.2	Bangladesh	9
2.3	Bhutan	15
2.4	India	19
2.5	Nepal	27
2.6	Pakistan	31
2.7	Sri Lanka	37
3	Summary of major barriers	40

Broad classification of challenges



Afghanistan - Context

- Around 73 percent of the population lives in rural areas – Only 11 percent of them have access to grid connected electricity. 33 percent of urban populations has electricity access
- No dedicated SHS program currently operational in Afghanistan
- In the past, under 2 different programs SHS installations had been done.
- The program sponsored by the government agency MRRD was discontinued due to quality related issues.
- The other was sponsored by USAID (United States Agency for International Development) from Sep 2009 to March 2012 which met with success.
- No major (documented) progress has taken place since then

Afghanistan - Challenges

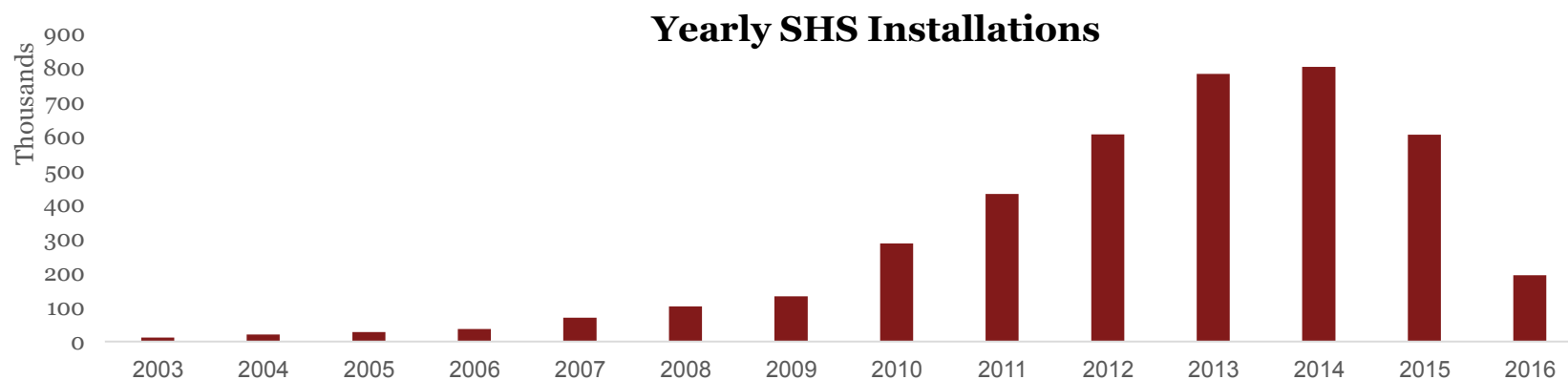
- **Institutional –**
 - In the Rural Renewable Energy Policy of Afghanistan drafted in 2013, actions related to off grid electricity access, especially use of SHS is limited
 - No specific targets have been mentioned
 - No dedicated program for SHS
 - Poor institutional framework and infrastructure present at the sub national (provincial) level due to which there is negligible regional participation from provinces
 - Capabilities of the relevant provincial agencies needs to be strengthened, both in terms of sectoral knowledge and sufficiency of human resources
 - Government needs to incentivize and provide an enabling environment and integrate Off-Grid/SHS into their electrification strategy and planning
 - Poor baseline data available - Acts as a major hindrance for kick starting a SHS program
- **Technological –**
 - Non existence of any technical and quality standards for SHS
 - No checks and balances related to inspection and monitoring of past SHS installations
 - Past experience with poor quality products (cheap imports) have led to market spoilage

Afghanistan - Challenges

- **External Factors –**
 - Threat to kidnapping and criminal activities, especially in remote areas is a major challenge
 - In the past there have been unforeseen incidents where equipment have been stolen or the technical staff responsible for installation has been kidnapped
- **Financial Issues –**
 - No major financial support from the government
 - The grant from USAID has been the only funding received related to SHS
 - The financial condition of rural households inhibits any large upfront payment
 - Purchasing habit has been small, incremental purchases for daily lighting needs such as kerosene, candles, and batteries, rather than large upfront purchases
 - Penetration of microfinance organizations is negligible making it difficult for private players to make an entry
- **Information, Awareness, Human Resource challenges**
 - Huge information and awareness gap – for end consumers as well as technical support staff at provincial and village level
 - Need to develop support frameworks, certifications, and skills-building programs

Bangladesh - Context

- Solar Home System (SHS) Program in Bangladesh has largely been a success..
 - About 4.1 million SHSs installed in off-grid rural areas of Bangladesh till October 2016
 - Around 18 million beneficiaries, covering 12% of the total population of Bangladesh as part of this programme
 - Installations saw steady growth over the first ten years and peaked in 2013 - 14 with over 0.8 million SHS distributed in a single year. However, there has been a gradual decline in annual growth since then



- **As the market evolves it is important to look for new challenges or barriers that might be unfolding**

Bangladesh - Challenges

- **Lack of clarity with respect to Bangladesh Government's aggressive grid electrification plans is creating uncertainty for SHS providers and end users**
 - Government has set target to provide 100 % electrification by 2018
 - The Rural Electrification Board (REB), which is responsible for grid expansion in rural areas has elaborated a Master Plan with details of the intended grid extensions.
 - Plan is not accessible to the public or the Partner Organisations (POs)
 - As per the rules of IDCOL's SHS program, in case the electricity grid is extended to a location of a SHS within 6 months of installation, the value of that system is deducted from subsequent eligible disbursements to the POs.
 - Without access to the plan the POs do not know where and when the grid will be extended.
 - Hence entire risk has to be borne by the POs who would suffer from financial losses if the grid extends sooner than expected to a region where they are active
 - Additionally, uncertainty regarding grid electrification plans is also putting the end users in a spot. They are unsure whether to purchase SHS or wait in the hope that soon they would also be provided with on-grid connection.
 - This is leading to reduced demand and adoption of SHS by end users

Bangladesh - Challenges

- **Entrance of unregulated poor quality SHS providers at low prices**
 - In order to transition to a commercially viable, demand-driven (and not subsidy-driven) market, IDCOL gradually encouraged the promotion of local manufacturing and assembly of SHS components
 - The resulting competition led to cost reduction of systems which also enabled IDCOL to gradually reduce the level of required subsidies
 - Over time, the reduction in costs also prompted firms and entrepreneurs to start own businesses for SHS dissemination outside of IDCOL's program, ie through open market
 - As this parallel market is not under the ambit of IDCOL, the SHS offered do not have to fulfill regulatory requirements such as quality, maintenance, environmental standards etc
 - Such products are much cheaper than the SHS disseminated under IDCOL and hence appeal more to the end users.
 - Over the last couple of years, on account of lack of regulations, the quality of the SHS offered in this parallel market has reduced drastically
 - Falling global solar prices have also resulted in influx of imported low quality SHS products in the market, especially from China

Bangladesh - Challenges

- **Disposal and safe recycling of used batteries**
 - Responsibility of POs to collect expired-warranty batteries from the users and return them for recycling. A significant fraction of used batteries were initially being dismantled and refined under uncontrolled conditions.
 - While incentives introduced by IDCOL have resulted in increasing the share of batteries recycled through formal sector, it continues to be a challenge for IDCOL
 - The problem will only grow as the unregulated SHS market starts to increase
- **Need to adopt innovative models as the program scales up**
 - Under current model onus is on POs to collect payments from households in timely manner
 - In the past, while the POs did face issues with respect to collection efficiency, measures taken by IDCOL ensured that collection efficiency gradually reached above 90 percent
 - With more households come under the ambit of the program, IDCOL will need to look at new financial models or collection mechanisms which are more scalable and more efficient than collecting dues from the field
 - This becomes even more important from the perspective of POs who would be eager to rationalize their expenses in the backdrop of declining financial help in the form of subsidies

Bangladesh - Challenges

- **How to ensure stakeholders are kept abreast of evolving market dynamics as the market matures**
 - Lack of awareness among existing customers that provision to upgrade to bigger and efficient systems exists (emphasis on moving up the energy ladder)
 - Are local technicians adequately trained to install and maintain more complex systems, and to counsel consumers toward higher quality components
 - As more and more grid electrification takes place, how to reach out and encourage customers to adopt or continue using SHS
 - Can consumers be supported to identify higher and lower quality components, especially with cheaper sub-standard systems flooding the market
 - Can the manufacturers innovate and broaden their product offerings so that existing customers can transition upward through the energy tiers

Bhutan - Context

- Bhutan achieved 100 percent electricity access in 2014
- The Royal Government of Bhutan considers households with installed Solar Home System as electrified
- Under the ADB launched ‘Rural Renewable Energy Development Project’, households were identified in remote isolated villages where grid extension would not be possible
- All such households were provided with Solar Home Systems free of cost by the government through the grant provided by ADB
- Under the program around 984 solar home systems have been installed and 1,132 sets of old solar home systems have been rehabilitated

Bhutan - Challenges

- **Government should look out and make provisions for future expenses**
 - Post installation and initial O&M grant for 3 years provided by ADB, the expenses related to O&M services are being financed by the government through budgetary allocations
 - Essential that the government make adequate budgetary provisions for any future expenses, such as - replacement of existing systems, providing subsidy to users who may want to upgrade their system size, providing subsidy to grid connected users who may want to purchase the systems
 - Intent should be to become self-sustainable to finance future investments rather than only depend on grants
- **Disposal of used lead batteries**
 - While it is a common issue in almost all countries, the difficult terrain of Bhutan poses additional challenge
 - In the remote locations at which households are located there is no adequate resources to discard and safely dispose the batteries
 - Government will have to not only raise awareness among the users but also create a system which ensures that the batteries are recycled through a formal set up

Bhutan - Challenges

- **Increase awareness levels and usage of SHS by end users**
 - While the SHS systems were given free of cost, repair and maintenance is also provided without any charge. (To enhance the feeling of ownership households are only required to pay 10% of the cost of the spares in case of spare parts replacement)
 - Hence awareness among the end users is limited
 - Users need to be educated about provision for upgrading existing systems without incurring additional cost
 - Similarly even technicians have to be made aware and trained for such requirements
 - Due to remote location the interaction between technicians and users do not happen on a regular basis
 - Challenge for the government to facilitate a periodic and effective communication channel
 - Additionally most of the SHS usage in Bhutan is only for lighting purpose
 - Government should look at encouraging consumers to diversify SHS use from consumption to production purposes

India - Context

- Among the SAARC countries, India is the largest by size
- Own set of challenges and complexities – Wider geographic expanse, economic diversity, electoral politics
- While institutional framework is comparatively much stronger with specific off-grid programs, it is difficult for the government to cater to the entire off grid population
- Hence there has been large involvement of private sector too
- Two distinct delivery models - SHS are either sold through commercial model or through government programs (with subsidies)

India - Challenges

- **Parallel government programs running with different guidelines**
 - Implementation of solar home lighting system is a part of various programs of MoP and MNRE.
 - Both programs have different set of guidelines, technical standards and financial incentive mechanisms - no clear demarcation of applicability
 - Existence of two parallel programs with different guidelines leads to –
 - Greater complexity and confusion for the end stakeholders
 - Reduces the accountability of the organizations in charge of implementing the programmes
- **Low local or regional participation from state governments**
 - While a number of private SHS implementing agencies have strategically positioned themselves and have concentrated on specific regions, often customizing their offerings, no such initiatives have been taken for the government programs
 - No specific targets for SHS installations or other off-grid measures set by the state governments – leading to low state- or district-level coordination and enforcement

India - Challenges

- **Lack of clarity and transparency with government's electrification plans**
 - There has been instances where grid electrification under Power for All scheme has been extended to villages where solar home systems have been deployed recently
 - Though the definition of village electrification does not cover electrification of complete village / households- *“A village is to be considered electrified if basic infrastructure such as Distribution Transformer and Distribution lines are provided in the inhabited locality and only 10 percent of the households in the village are connected to the grid with all public places like schools, panchayat office, health centres, dispensaries, community centres, etc. included”*, yet uncertainty in installation affects both – the SHS implementing agencies as well as the end users.
 - Despite the exit strategy defined by certain states and proposed in draft national policy, there arises a situation where extension of SHS cannot be extended due to the lack of clarity on grid-extension under government schemes.

India - Challenges

- **Distortion created by subsidised kerosene**
 - India has one of the highest subsidy levels for kerosene in the world, despite the subsidy being provided for using kerosene as cooking oil, it has largely been used as a lighting fuel
 - Kerosene, being highly inefficient, polluting and damaging to both health and environment, availability at such subsidized rates, tended to price out viable and cost-effective decentralized renewable energy alternatives, like Solar Home Systems
- **Issues related to quality of installed SHS systems**
 - SHS systems sold via both, the commercial model as well as government based schemes
 - Since subsidy under government scheme can only be availed if all procedures are followed, quality of components being used is not a major issue.
 - Major reason - Use of low quality components; no guidelines that require commercial installations to adhere to any quality standards or certifications
 - Cost, being a major decision factor for end users, attempts are being made to increase affordability by using cheaper sub-standard products, resulting in loss of trust among the rural population, further resulting in market spoilage

India - Challenges

- **Issues related to system integration, performance and after sales service**
 - Multiple implementation agencies present in India – Under commercial mode, agencies employ different models. Based on type of sale - product sale vis a vis system sale followed by after sales service. Based on distribution –in-house channels/ leveraging on existing retail channels/ Village Level Entrepreneur (VLE)
 - Agencies using untrained technical personal - issues have arisen due to inaccurate assumptions, unsuited system sizes, design calculations based on rule of thumb
 - Inadequate and poor after sales service has been a barrier, particularly in villages or regions located remotely due to both, manpower as well as logistical challenge
 - Agencies only selling products – Lower up front cost makes it more attractive but in case of malfunction, the user has to carry the equipment to the nearest authorized service center
 - Agencies selling through VLEs - Issues on account of inadequate or lack of technical expertise in handling complex issues

India - Challenges

- **Financial Challenges**

- Most implementing agencies have tried to facilitate SHS purchases either through government subsidy or by developing relationships with microfinance institutions (MFIs).
- According to the agencies, availing subsidies is a long, complex and cumbersome process involving a lot of paperwork, administrative processes and checks, followed by delays in the release of subsidy by MNRE/NABARD
- Agencies have also tied up with MFIs for providing credit. However there has been mixed success – low penetration of MFIs, reluctance to lend to consumers in areas where they don't currently have presence, difficult to gauge credit risk
- Instances of irregular instalment payments resulted on account of consumers being unsatisfied with the performance of the SHS
- For implementing agencies with own financing, irregular payments pose significant working capital issues. (Generally the initial down payment is kept low considering the low financial ability of the consumers being served)
- A large segment of population still do not have access to formal banking sector, thus raising finance to facilitate purchases for such consumers is a major challenge

India - Challenges

- **Information, Awareness, Human Resource challenges**
 - Similar to other countries, raising awareness and providing adequate information to both adopters and non- adopters has been a major challenge
 - Lack of knowledge by adopters has resulted in improper usage, constant tampering, and inability to maintain the system. This creates a negative perception
 - Scaling-up will also be constrained without competent technical manpower
 - As the market evolves, all stakeholders will have to be trained, informed and encouraged to upgrade to bigger and efficient systems
 - Implementing Agencies/ Manufacturers will have to innovate and broaden their offerings
 - Along with raising awareness, it is also essential to effectively market the product
- **Disposal of used lead batteries**
 - Big challenge considering the large size of the country and the existence of a number of agencies who sell SHS via the commercial model
 - Difficult to deal and coordinate with a large number of last mile distributors
 - Lack of awareness among users who sell the disposed batteries to the informal sector - offer higher proceeds since the cost of recycling through informal sector is cheaper.

Nepal - Context

- SHS market in Nepal is heavily dependent on the government's (AEPC) subsidy program
- SHS installations through the AEPC program constitute approximately 75-80 percent of the overall installations
- Up to 60 percent of the system cost is covered by subsidy – based on wattage and location
- The government has received grants from agencies like KfW and DANIDA
- Strong processes put in place by government to ensure product quality and training of skilled manpower

Nepal - Challenges

- **No definitive rural electrification plan**
 - Lack of clarity and coordination between government bodies has led to situations where grid connection has been provided in villages/regions where SHS systems were installed in the recent past
 - Uncertainty affects both, the end users as well as the SHS suppliers
 - Also leads to duplication of efforts and wastage of resources
- **Issues due to difficult terrain**
 - Some of the villages in which SHS is implemented are extremely remote
 - Poor infrastructure and access roads affects maintenance, monitoring and after sales service
- **No definite mechanism for collection of disposed batteries**
 - Considering the environmentally sensitive terrain of Nepal, government needs to ensure that used batteries are disposed or recycled through an environmentally responsible manner

Nepal - Challenges

- **Government should look at being self sustainable –**
 - While the entire SHS program is heavily dependent on the subsidy received from the government, the government itself is dependent on external funds and grants
 - Hence SHS sales are capped by the available funding from donors.
 - There have been instances in the past where AEPC (Government body) has reduced the subsidy amount since it exhausted most of its funds leading to sharp drop in sale of SHS
 - With only 72 percent of rural population having electricity access there is huge scope for SHS installations
 - Government needs to look at ways of involving the private sector

Pakistan - Context

- No full fledged SHS program in Pakistan
- There have been pilot SHS projects from various administrative bodies which have met with mixed success
- Few private and public sector corporate organizations have also undertaken SHS implementation programs on a smaller scale, often targeting a particular village or community as part of CSR initiative.
- Private sector involvement is gradually increasing
- IFC has launched a Lighting Asia – Pakistan program in 2015, which is aimed at increasing access to clean affordable energy in households underserved by the electricity grid in Pakistan. SHS also forms a part of the program

Pakistan - Challenges

- **Government needs to have a more constructive focus towards SHS–**
 - Although AEDB has set a target to provide renewable energy to around 8000 rural villages (majority through SHS), no substantial progress has been made
 - Coordination between AEDB and the provincial energy departments needs to improve. Currently there is very low regional participation from provinces
 - Merely establishing targets is not enough. Has to be backed by support in the form of enabling policies and institutional support
 - Capabilities of the relevant provincial agencies needs to be strengthened, both in terms of sectoral knowledge and sufficiency of human resources
 - Accountability and hierarchy between central and provincial agencies are not clearly defined
 - Currently there is no precedence of monitoring implementation progress as no national or regional level programs or targets have been set for SHS implementation
 - With private sector presence increasing government needs to incentivize and provide an enabling environment
 - Government also needs to improve inter departmental coordination and streamline long term electrification planning

Pakistan - Challenges

- **Quality and Implementation issues –**
 - Since there is no dedicated SHS program there is no agency entrusted with the responsibility of setting technical and quality standards
 - Similarly there are no checks and balances related to inspection and monitoring of SHS installations – No measures to protect the interest of the consumers
 - Majority of the panels/systems are imported with no check on quality. Unfavourable experience of past projects or usage of low quality over the counter products has also created a negative sentiment among the users
 - As per an IFC report there is significant regional variation in the amount off-grid households pay for the lighting technologies, often due to the remoteness of the province – this also points to inadequate or under developed last mile distribution system
 - While such issues have persisted from a long time, lack of data management practices, both at central or provincial level has prevented agencies from taking more informed decisions
 - There is no record of past SHS systems that have been installed, what are the issues that have been faced, in which regions it has been a success or a failure and on what account

Pakistan - Challenges

- **Financial issues –**
 - Grants and aids received by the government has not been directed towards providing electricity access to the rural population
 - Hardly any financial support from the government to incentivize purchase of SHS systems
 - Private companies too face difficulty in raising finance
 - While the microfinance industry is growing in Pakistan, lending to private companies for renewable energy initiatives has not yet picked up - MFIs find it difficult to gauge credit risk, look at such investments as high risk as they are skeptical of quality issues and after sales service, also lack the capacity and resources for continuous monitoring
 - Onus is on the government to look at ways in which it can encourage commercial partnerships between MFIs and private SHS vendors
 - Investments in increasing information flow and capacity building of financial institutions will be crucial.

Pakistan - Challenges

- **Information, Awareness, Human Resource challenges**
 - Huge information and awareness gap exists – one of the biggest challenges in implementation of SHS
 - Lack of adequately trained and competent workforce
 - Government needs to develop support frameworks, certifications, and skills-building programs
 - Needs to encourage, train and build local capacity in the supply chain
 - Along with raising awareness, it is also essential to effectively market the product

Sri Lanka - Context

- By 2016, almost 98 percent of the total rural population and 99 percent of the urban population had access to electricity. Sri Lanka considers SHS also as a means of electrification
- Majority of the SHS implementations in the country have been through two sequential projects co-funded by the World Bank and Global Environment Facility (GEF) and implemented by the government
- There has also been significant involvement and contribution of the private sector and micro finance institutions in the successful implementation of SHS under the two projects

Sri Lanka - Challenges

- **Technical and Implementation issues –**
 - Some SHS selling companies have not given adequate post installation technical support
 - There have been instances where companies have not replaced components on time even if they were within the warranty period –More prevalent in the rural areas
 - Supply chain issues and unavailability of components in rural areas as a challenge
- **Financial factors – Past practices need to evolve**
 - MFIs have so far played a significant part in improving SHS sales. However the door-to-door collection approach (MFI credit officer visits each household on an agreed day every month) followed by MFIs needs to evolve
 - Inherent weakness in the current mechanism - high travel costs, risk of credit officers mishandling collected cash, customers not being present or not having adequate funds on the date of visit
 - The gradual increase in consumer base combined with rising fuel prices are making it difficult for many MFIs to sustain this collection mechanism
- **Other common issues also persists such as - lack of clarity in government's electrification plans and challenges related to safe disposal of used batteries**

Snapshot of barriers and their impact

Issue/Barrier	Impact			Comments
	High	Medium	Low	
Overlapping of grid and off-grid	Nepal	India	Bangladesh, Bhutan, Sri Lanka	Barrier not faced in Pakistan & Afghanistan due to low SHS implementation
Institutional weakness	Pakistan, Afghanistan	Bangladesh, Nepal, Bhutan, Sri Lanka, India		Large countries like India, Pakistan & Afghanistan should have active involvement of central as well as local authorities (de-centralization)
Conventional fuel subsidies	India	Pakistan	Bangladesh, Pakistan, Nepal, Sri Lanka	
Quality issues	Pakistan, Afghanistan	India	Bangladesh, Bhutan, Nepal, Sri Lanka	
Capacity building	Pakistan, Afghanistan	India	Sri Lanka, Nepal, Bhutan, Bangladesh	
Last mile Distribution	Pakistan, Afghanistan	India	Bhutan, Bangladesh	
Battery Recycling	India, Sri Lanka, Pakistan, Afghanistan, Bhutan, Nepal	Bangladesh		
Program funding through grants/ subsidies	Pakistan, Afghanistan	India	Bangladesh, Sri Lanka, Bhutan, Nepal	
MFI Set up	Afghanistan	Pakistan	Sri Lanka, Bangladesh, India	Bhutan & Nepal – SHS implemented without MFI
Use of Innovative financial model		India, Pakistan	Bangladesh, Bhutan	In Bangladesh, Bhutan & Nepal funding has been through grants and aids.
Awareness of SHS	Afghanistan	Nepal, India, Pakistan	Sri Lanka, Bangladesh	