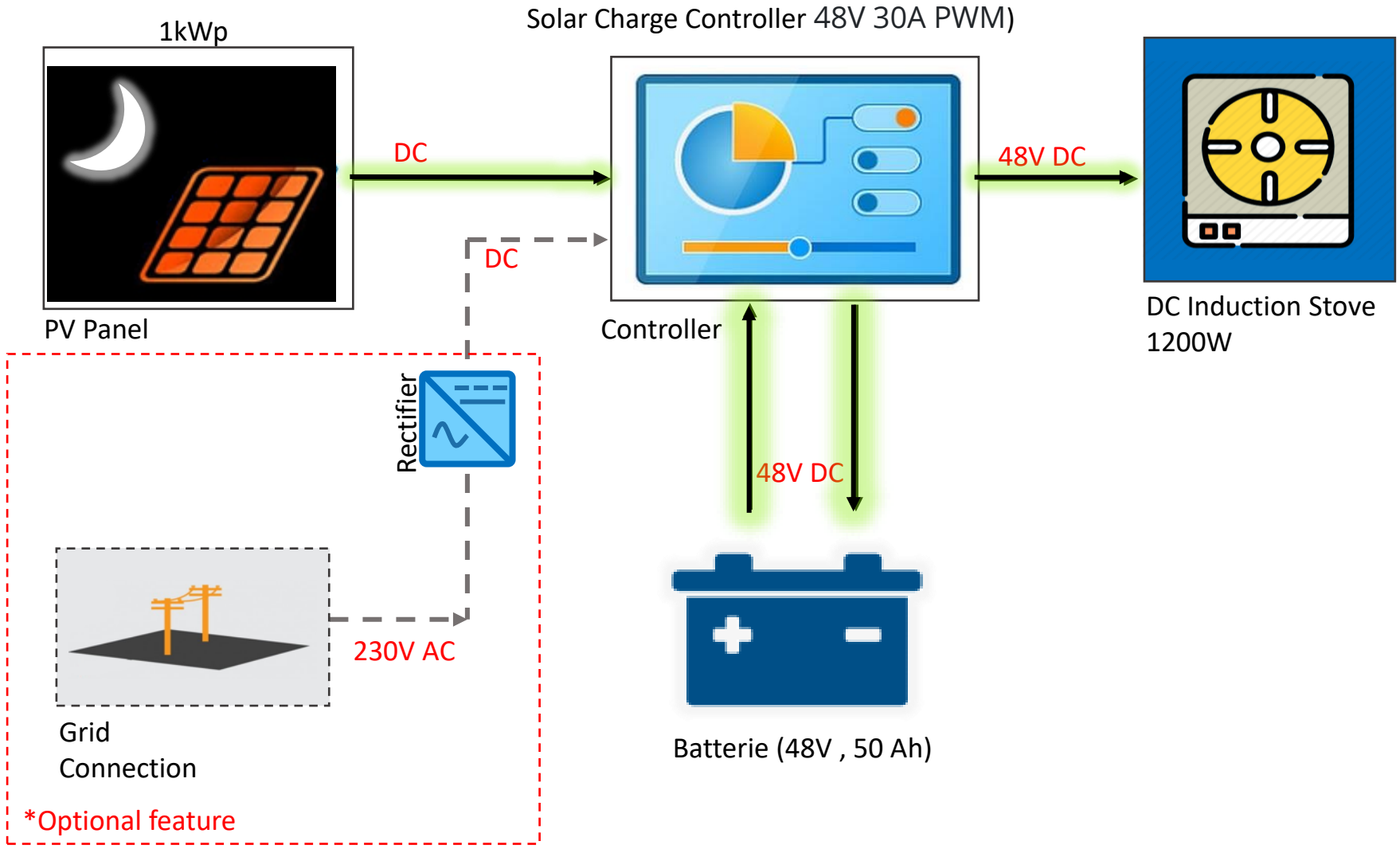
Stakeholders Consultation Meet
On
Solar based Induction Cooking Solution
25-03-2023

Proposed Solution:
Solar based Induction Cooking Solution.



* Please share your experience/suggestion for optimising the overall system cost

Estimation of Equipment Sizing

1. Average household consumption: 7-9 LPG cylinders annually and spends over 3-4 hours per day for cooking. In rural areas also biomass-based cooking spends similar time pattern.

The total thermal energy consumed in cooking process through LPG lies between 2843 MJ to 3655 MJ.

Heat transfer efficiency: 57%
(LPG based burner)

Equivalent

The equivalent electrical energy requirement lies between 940 kWh 1209 kWh for the cooking.

Heat transfer efficiency : 84%
(Induction-based cooking)

SN	Particulars	Units	Case 1	Case 2
	LPG for Cooking			
1	Average LPG Cylinders used by a Household per Year	Nos/Year	9	7
4	Energy available annually from LPG cylinders	MJ	6413	4988
5	Thermal energy transfer efficiency of LPG stove	%	57%	57%
6	Thermal Energy used annually for Cooking	MJ	3655	2843
	1 kW Induction Stove for Cooking			
7	Thermal energy transfer efficiency of Induction stove	%	84%	84%
8	Equivalent electrical energy required for cooking (Annually)	kWh	1208.7	940.1
9	Per Day electricity required for cooking	kWh	**3.31**	**2.58**

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Equipment Sizing

- As against a requirement of **2.58 – 3.31** units of electricity for cooking, in India, 1 kWp solar panel can produce average electricity between 4 to 5 kWh (kilowatt-hours) per day.
- Annual generation is between 1460 to 1825 kWh.
- 1kWp system can cater cooking requirements* for both type of households using average seven or nine number of cylinders for a period of 7 Years.

Solar ICS system Requirement

SN	Particulars	Unit	Value
1	**Solar Panel Specification**	**Wp**	**1000**
2	**Solar Charge Controller (48V)**	**A**	**30**
3	**Battery (Considering the 70-100% loading with back up time of 2 to 2.85 Hrs)**	**Ah**	**50**
4	**Induction Cook Stove**	**W**	**1200**

*__Assumption__: depreciation for seven years in generation on an average 2% annually and charge controller and battery losses of 5%.

Mode of Implementation and Business model

- **Demand Aggregation :**
  - Intended / target quantity- 1 Lakh/ 25,000 quantity for demonstration
  - Target states/UT for demonstration at scale: Uttar Pradesh , Ladakh & Other states
- **Deployment model:**
  - Selection of suppliers shall be done on L1 basis on individual bulk procurement.
  - Auction of Services for Investment, Installation, and commissioning of such equipment to Rural and Urban Households against supply of equipment by EESL
  - Upfront payment to EESL to be made against the delivery of such equipment to the service providers.
  - Selection of Service providers shall be on H1 basis, with a minimum price pegged at the cost of all products provided to such a bidder along with an added percentage of procurement PMC charges of EESL.
  - Benefits of subsidies, if any, including Solar Rooftop could be leveraged in the business model to reduce the costs.
  - 100% benefits of Carbon Credit ownership shall be passed on to the Service providers under.

Discussion Points

a) **Target Groups**:

- Rural & Semi Urban Households
- BPL Category
- CSR Projects
- Grid connected/ Off Grid
- Firewood & LPG users

b) **Targeted Partners**:

- MNRE for On grid RTS subsidy
- MoPR & MoUD
- State Departments/ Renewable Agencies & SDAs
- SRLM and SHGs
- Demand Aggregators
- Carbon Financers , Micro Financing Agencies.
- Multilateral/ Bilateral Agencies

Solar Panel: Techno-commercials

Proposed by EESL

1. 2X500/ 3X 335 Watt (Peak) Mono Crystalline Solar Panel along with standard mounting structure, cables and accessories.

Discussion Points

- Type of Solar Panel (Mono/Poly)
- Size of Solar Panel: 1,000 Wp
- Configuration & Costing : 3X335 Watt or 2X500 Watt
- Performance Warranty & Period
- Safeguard Measures
- Procurement and Deployment plan

Solar Charge Controller: Techno-commercials

Proposed by EESL

1. 48V 30A PWM solar charge controller suitable for 2 hours backup

Discussion Points

1. Capacity
2. Type of Controller – PWM or MPPT?
3. Placement of Charge Controller
4. Warranty
5. Cable Requirements : To the Battery & To the Load (Length of cable & Insulation requirements)
6. Procurement and Integration plan

Battery: Techno-commercials

Proposed by EESL

1. Battery Pack: 48V 50Ah Lithium Iron Phosphate Battery and having cycle life >2000 ,16S 30 A BMS along with Enclosure

Discussion Points

1. Type of Battery: Lithium Ion/ VRLA
2. Capacity: Sufficiency of 50Ah for the proposed Load of 1200W/ Other Options vs costs?
3. Minimum Cycles- 3000 cycles with SoC of 80%
4. Type and capacity of cells– Pouch Type/ Cylindrical Cells/ Prismatic | 3.2 V X 15 cell Series
5. Depth of Discharge (DoD)-
4. Placement of battery and its enclosure
5. Safety Accepts- Fire Safety
6. Grid charger: Type and capacity
7. Warranty and period?

Induction Cookstove: Techno-commercials

Proposed by EESL

1. 48 V 1200 W Induction Cookstove (DC cookstove, preferably with efficiency parameters in the range of 5 star labeled BEE rating for induction hob)

Discussion Points

1. Capacity
2. Number of Burners
3. DC/AC Cookstove
4. Max Warranty can be provided
5. Efficiency: 5 Star or otherwise vis-à-vis costs?
6. M&V : IoT module type and integration

Discussion Point: Financing, costs and behavioral incentives

1.Financing options :

- Government subsidies
- Loans for renewable energy projects
- Leasing: The user pays a monthly fee to use the system, without having to pay the full upfront cost of the system.
- Crowd funding
- Carbon credits, etc.

2. **Reduced carbon emissions and associated cost savings**

- Reduced energy bills
- Long-term cost savings
- Health benefits
- Environmental benefits

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Discussion Point: Financing, costs and behavioral incentives

3.**Behavioral incentives**

- Social norms
- Peer pressure
- Financial incentives
- Education and awareness
- Marketing and branding
- Convenience

4. What are the upfront costs/requirements

- Solar Panel
- Charge Controller
- Battery
- Induction Cookstove
- Accessories, Cables, awareness, M&V, etc.

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Discussion Point: Financing, costs and behavioral incentives

5. Initial investment Recoup time (tentative)

6. Government or NGO that offer financial assistance or incentives?

7. Costs of solar-based induction cooking solutions compare to traditional cooking solutions in the long run?

- Energy efficiency
- Lower maintenance costs
- Reduced fuel costs
- Long lifespan
- Environmental benefits

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Discussion Point: Financing, costs and behavioral incentives

8. **Carbon financing can be a powerful tool to support the adoption?**
   - Revenue generation
   - Investment
   - Subsidies
   - Awareness-raising
9. **Challenges associated with financing solar-based induction cooking solutions**
   - Upfront costs
   - Limited understanding of the technology
   - Lack of regulatory support
   - Behaviourial issues

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Discussion Point: Financing, costs and behavioral incentives

10. **What role can financial institutions play in promoting the adoption of solar-based induction cooking solutions?**

- Offering loans and credit facilities
- Developing specialized financing products
- Partnering with manufacturers and distributors
- Providing technical assistance

Discussion Points on Carbon Financing

1. Target beneficiary and their impact on baseline:
    - Firewood-based consumers or it can be mixed i.e., both firewood & LPG based consumers.
    - On-grid or Off-grid Connected
    - How the Carbon Credit value varies w.r.t to the baseline of Firewood & LPG based Consumers.
    - How the carbon credits will be evaluated in the case of the Solar powered Induction cookstoves and Grid powered Induction Cookstoves.
2. Project Period /Cycle Time : Carbon Financing
3. Carbon credits can be anticipated annually from the single System.

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Discussion Points on Carbon Financing

4. Market/exchange value of the Carbon Credit.

5. Strategies for maximisation of carbon credits – Baseline, Coverage of SDGs, M&V etc..

6. M&V mechanism:

- For quantifying the usage.
- M&V on sample basis or 100%.
- Frequency and modality

7. Investor will claim the carbon credit for entire cycle or only for the time he will gets the ROI.

8. VCUs in Compliance or Voluntary market?

9. List of expectations from EESL for the proposed program.

Thank You

Registered and Corporate Office: NFL Building, 5th & 6th Floor,
Core – III, SCOPE Complex, Lodhi Road, New Delhi – 110003

For More Information, pl contact:

solarics@eesl.co.in

Tel.: +91 (011) 45801260

Website: www.eeslindia.org