

Labelling for Solid Biomass Cook Stoves

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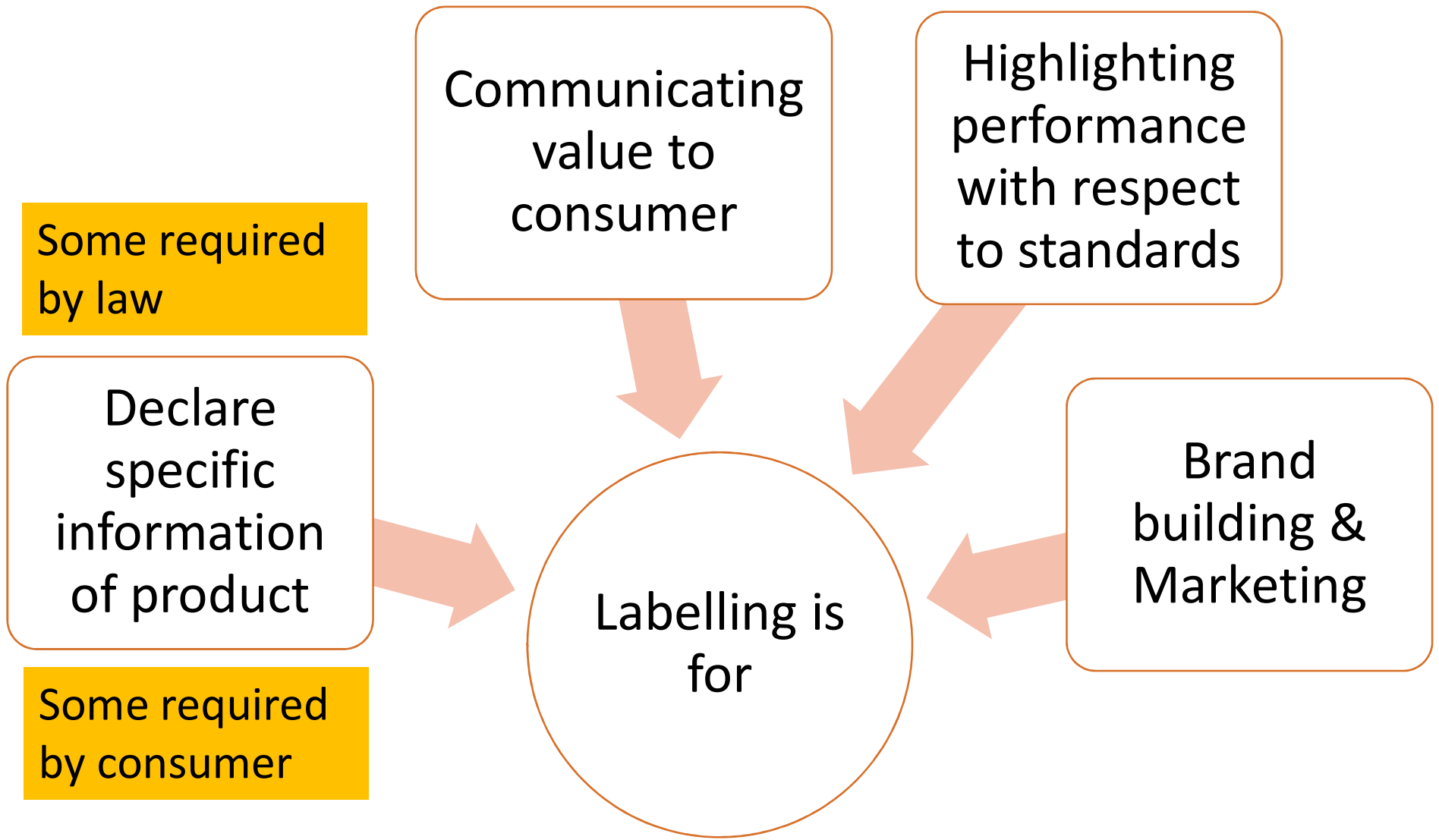
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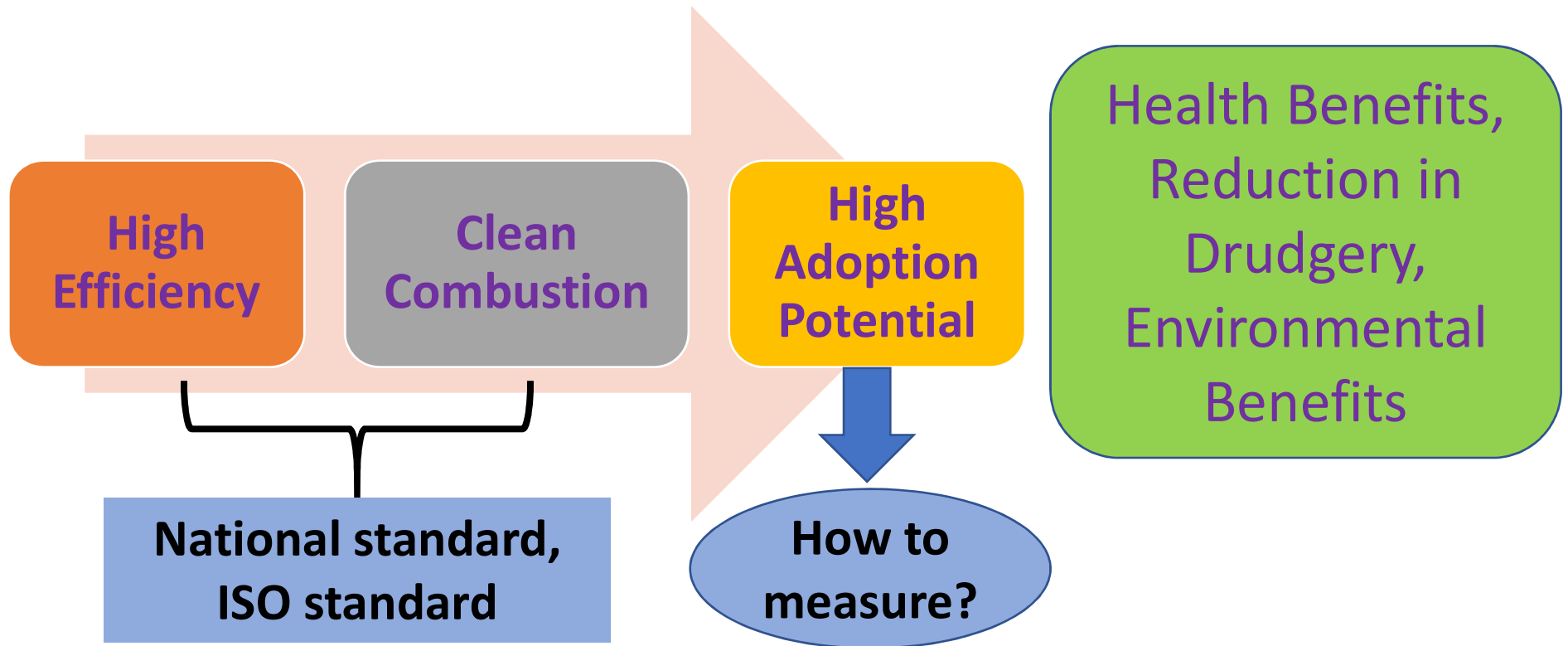
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Understanding Labelling



Considerations for a label for solid biomass stoves



Challenge

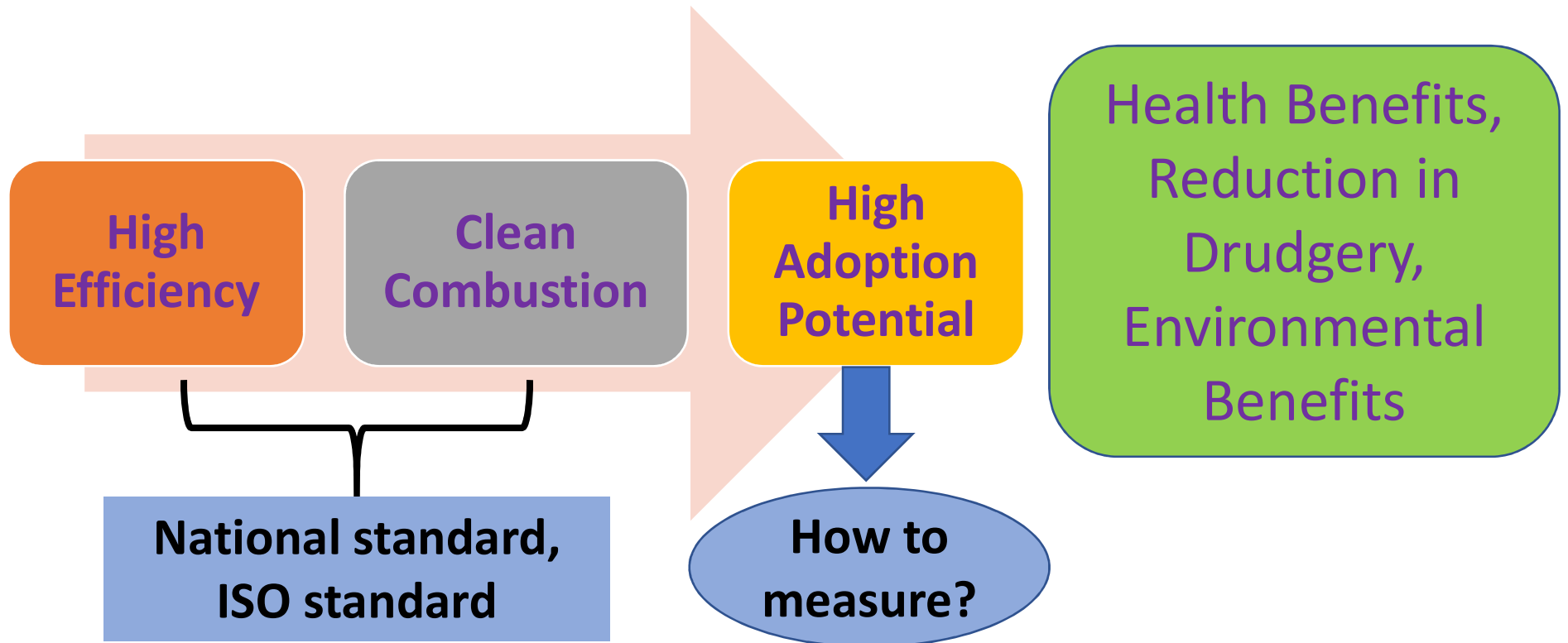
- High efficiency and clean combustion do not guarantee high adoption.
- Lack of adoption → Benefits possible from the product not delivered
→ “Improved Stoves are a failure!”

Considerations for a label for solid biomass stoves

Help users, cookstove programme implementers, policy makers to compare across products and choose stoves that are clean, efficient **and most likely to be consistently used.**

Motivate manufacturers and designers to improve products and services, from the viewpoint of clean operation, efficiency **and user friendliness.**

Considerations for a label for solid biomass stoves



- Donors, Distributors, Project implementers
- Much larger in numbers
- **Prefer performance against standards**

- Users, Heads of Households
- Minority
- **Interested in service features, economics, PLUS performance against standards**

Expectations from the Label

No compromise on nationally / internationally acceptable norms for efficiency and emissions permissible for 'clean' cook stoves.

- Alignment with existing globally accepted standards.

Should integrate parameters critically relevant for cooking performance and widely desired by cooks / users.

- Data available from country-wide surveys / interactions.

Should reflect high performance delivered in the field.

- User motivated to move away from traditional chulha.

Should catalyse improvement in technology.

- Researchers, manufacturers motivated to innovate.

Main Building Blocks of Labelling Scheme

The methodology of star rating for improved biomass cookstoves: barrier analysis of adoption and plan for remediation of barriers in India and elsewhere by S. K. Tyagi and Chandra Prakash, *Biofuels*, April 2018

Demonstrated a practically feasible approach to multicriteria performance rating, based on existing standards.

AIREC Cooking Energy Service Decision Support Tool developed by Priyadarshini Karve, Svati Bhogle, Rekha Krishnan in 2015

Methodology refined through applications in numerous field level projects, leading to high success rate of adoption.

User preference data available from various field areas across India.

ISO Standard 19867-1:2018(E), First Ed, 2018-6

Clean cookstoves and clean cooking solutions — Harmonized laboratory test protocols

Includes considerations from IWA Tiers of Cookstove Performance

Recommendation: Label in Four Parts

Star Rating (Required)

- based on multiple criteria around energy efficiency, emissions performance, safety and user-friendliness
- Weighted average allows for varying importance given to different parameters

Performance Related Information (Required)

- Useful for decision making on the basis of user's personal priorities

Legally Mandated Information (Necessary)

- Useful for all types of buyers
- Legal compliance requirements fulfilled

'Good to Provide' Information (Useful accessory)

- Additional information regarding use, maintenance, precautions etc.

Logic of Star Rating

- Scoring scheme for each parameter is on the basis of a test that is either **widely accepted** or **widely applicable**.
 - Substandard performance → Score = 0
 - Adequate performance → Score = 5
 - Best performance → Score = 10
- Aggregate Score = $AVG (W_1P_1 \dots W_nP_n)$
 - W_n = Weight given to parameter number n
 - P_n = Score of the stove for parameter number n
- From practical considerations, n may not be more than 7.

Logic of Star Rating

- Aggregate Score = $AVG (W_1P_1 \dots W_nP_n)$
 - W_n = Weight given to parameter number n
 - P_n = Score of the stove for parameter number n
- Star rating is awarded as per following scheme:
 - Aggregate Score = 0 : No star
 - Aggregate Score = 0-2 : 1 star
 - Aggregate Score = 2-4 : 2 star
 - Aggregate Score = 4-6 : 3 star
 - Aggregate Score = 6-8 : 4 star
 - Aggregate Score = 8-10 : 5 star
- Scores are rounded off to nearest integers.



Parameters for Star Rating...1

Thermal Efficiency

- Most accepted parameter for assessing performance of any energy device
- Test protocol as recommended by ISO19867 (test to be used appropriate to stove type).
- Rating (as per IWA Tiers):
 - Up to Tier 2: 0
 - Tier 3: 5
 - Tier 4: 10

CO Total Emission

- Crucial parameter for health impact
- Test protocol as recommended by ISO 19867 for CO concentration per unit useful energy output
- Rating (as per IWA Tiers):
 - Up to Tier 2: 0
 - Tier 3: 5
 - Tier 4: 10

PM2.5 Total Emission

- Crucial parameter for health impact
- Test protocol as recommended by ISO 19867 for PM2.5 concentration per unit useful energy output
- Rating (as per IWA Tiers):
 - Up to Tier 2: 0
 - Tier 3: 5
 - Tier 4: 10

Safety

- Crucial parameter for accidents and injury risk assessment
- Test protocols and calculation as recommended by ISO 19867
- Rating (as per IWA Tiers):
 - Up to Tier 2: 0
 - Tier 3: 5
 - Tier 4: 10

Parameters for Star Rating...2

Heat Output Controllability

- Indicator consistently identified as important in Indian users' feedback
- Test measuring time lag between procedure and desired effect (TEST PROTOCOL TO BE DEVELOPED)
- Rating:
 - No controllability: 0
 - Time lag more than 10 sec: 5
 - Time lag within 10 sec: 10

Cooking Versatility

- Indicator consistently identified as important in Indian users' feedback
- Tests measuring aspects of heat transfer to the pot required for Boiling, Roasting Roti, Frying (TEST PROTOCOL TO BE DEVELOPED)
- Rating:
 - Not performing well for boiling: 0
 - Good performance for only boiling: 5
 - Good performance for Boiling + at least one of roasting and frying: 10

Cooking Flexibility

- Indicator consistently identified as important in Indian users' feedback
- Test based on verification of manufacturer's claim of number of items to be cooked simultaneously on single fire
- Rating:
 - Only one item cooked at a time OR one item cooked and one or more kept warm simultaneously on a single fire: 5
 - More than one items cooked simultaneously on a single fire: 10

Examples of Star Rating

- **Fixed multi pot stove with chimney**

- Efficiency: 0, CO: 0, PM:0, Safety: 5
- Heat o/p control: 10, Versatility: 10, Flexibility: 10
- Weighted AVG = 5
- **Star rating = 3**

- **Portable single pot ND stove**

- Efficiency: 5, CO: 5, PM:5, Safety: 10
- Heat o/p control: 10, Versatility: 5, Flexibility: 5
- Weighted AVG = 6.4
- **Star rating = 4**

- **Portable single pot fan stove**

- Efficiency: 10, CO: 10, PM: 10, Safety: 10
- Heat o/p control: 5, Versatility: 5, Flexibility: 5
- Weighted AVG = 7.9
- **Star rating = 4**

The more parameters have a high score, higher will be the star rating.

Even if a stove performs poorly on one or two parameters, good performance on other parameters will help it have a competitive star rating.

Possible Variations – Opinions Sought!

- **Use different weights on different parameters.**
 - What to weigh more and what is the justification?
- **In order to be eligible for labelling a certain minimum efficiency and/or emission performance must be met.**
 - What should be the thresholds that would not trivialise the importance of user-friendliness?
 - Why not thresholds for user-friendliness parameters too?

Should we revisit the issues after trying out the rating process with actual products?

Performance Related Information

Parameters important to decision making by users, but their applicability is location and situation dependent.

E.g., accessibility of fuel is an important consideration for users, however the same fuel may be accessible or inaccessible depending on location.

Testing only to verifying the claim made by manufacturer/developer on each parameter.

E.g., Manufacturer's claim of optimal pot size and food quantity is verified by testing if the food cooks properly for the specified conditions; the test centre will not try out various combinations to figure out the optimum features.

Performance Related Information...1

Stove Type:

- Exclusively uses solid biomass fuel/Requires another energy source as auxiliary input/Hybrid (can use different types of fuel sources)
- Charcoal making/Other valuable by products making (specify)
- Only Cooking/Cooking + Other applications (specify)

Recommended pot size and weight of food for each pot holder:

Thermal Efficiency of the Stove (with specification of the fuel type recommended for best performance):

CO and PM2.5 measurements of the Stove (with specification of the fuel type recommended for best performance):

Performance Related Information...2

Recommended fuel/fuels for best performance (in terms of emissions reduction):

- Pellets/Briquettes/Hard wood chips/Hard wood blocks/Wood sticks/Loose biomass/Charcoal/Mineral coal/Cowdung cakes/Any other

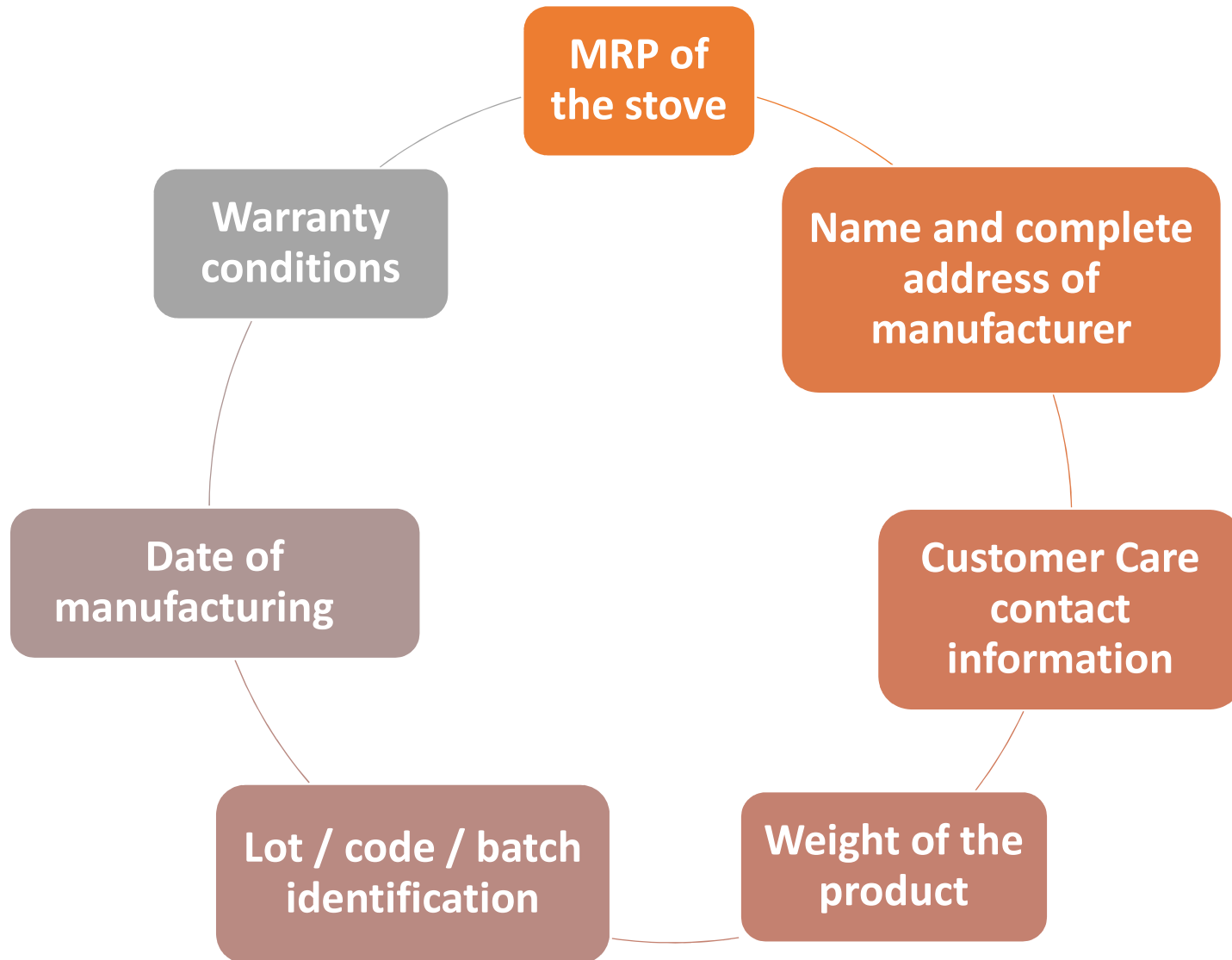
Can also be operated with fuel/fuels (no guarantee of best performance):

- Pellets/Briquettes/Hard wood chips/Hard wood blocks/Wood sticks/Loose biomass/Charcoal/Mineral coal/Cowdung cakes/Any other

Specifications for auxiliary energy source (if applicable):

Specifications for alternative fuel sources other than solid biomass (if applicable):

Legally Mandated Information



It is recommended that this information be provided by both factory made as well as artisanal cook stoves.

‘Good to Provide’ Information...1

(User manual – mandatory for labelled stoves?)

Instructions for use

- primarily pictorial, with minimum text preferably multilingual

Recommendations to improve performance

- e.g., use of pressure cooker, energy efficient cooking pots, in built chimney, better kitchen ventilation, etc.

‘Good to Provide’ Information...2 (User manual – mandatory for labelled stoves?)

Cautions and troubleshooting

- primarily pictorial, with minimum text preferably multilingual

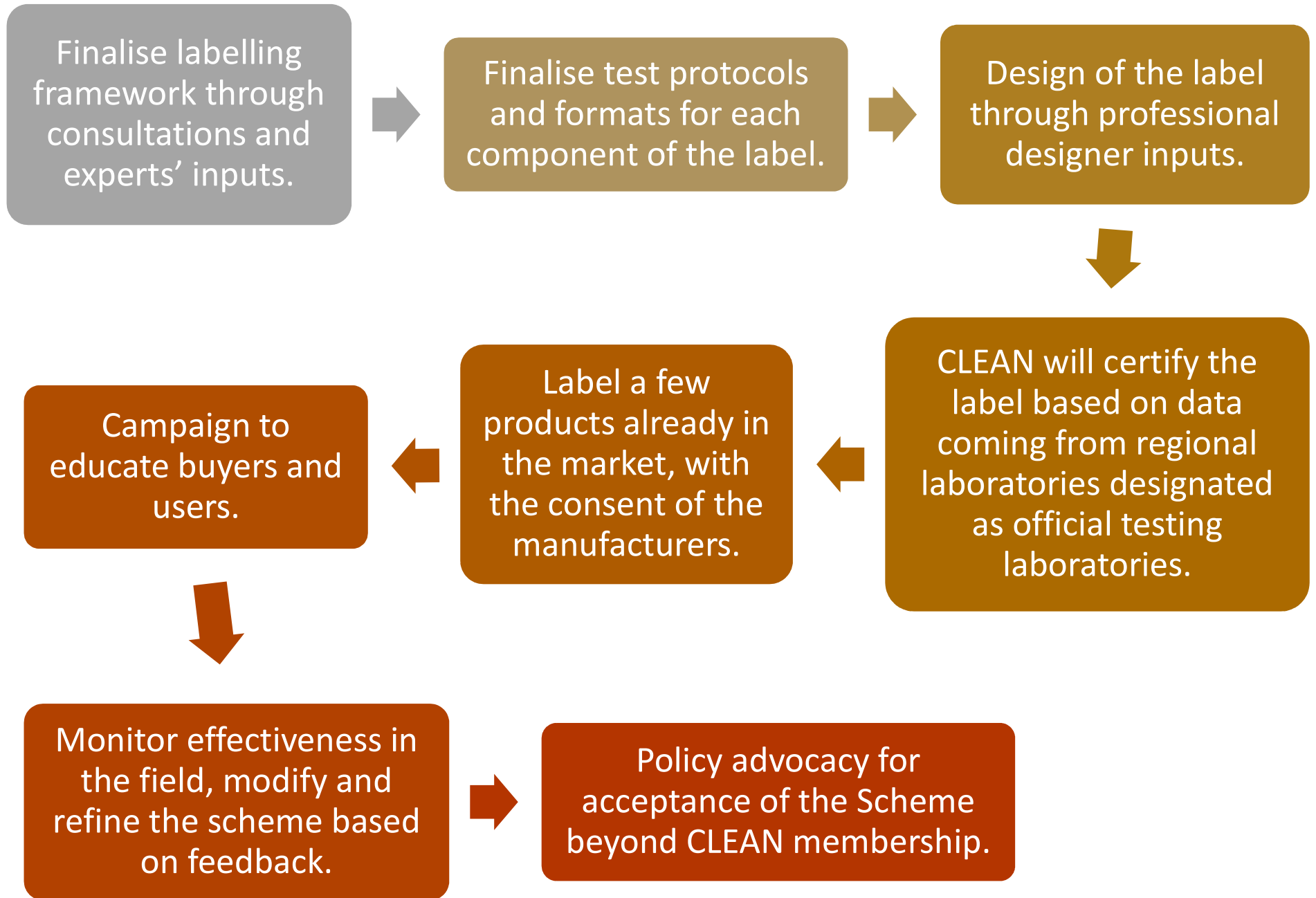
Spare parts and service and maintenance options offered at the dealer location and at the manufacturer location

- primarily pictorial, with minimum text preferably multilingual


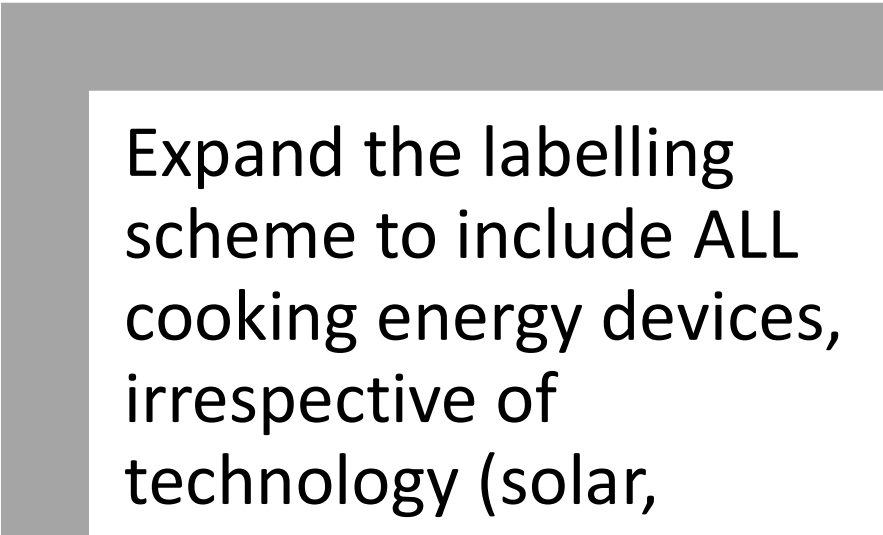
Basis for star rating

- Describing the calculation in detail

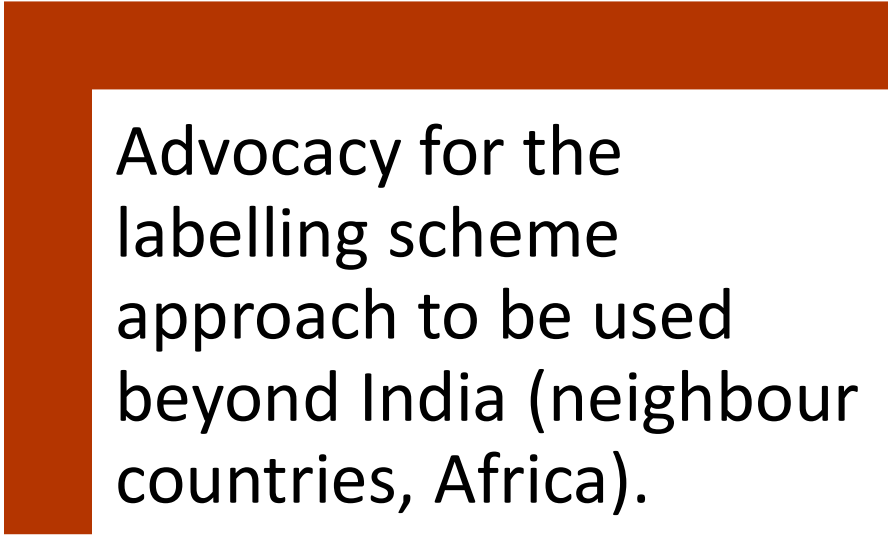
How to Operationalise the Labelling Scheme?



Universalisation of the Labelling Scheme?



Expand the labelling scheme to include ALL cooking energy devices, irrespective of technology (solar, biogas, LPG, electricity...).



Advocacy for the labelling scheme approach to be used beyond India (neighbour countries, Africa).

Vision of a Cooking Energy System Label



**Legally Required
Information**

**Performance
Related
Information**

User Manual with 'Good to Know' Information

Thank you