

# Workshop on Gas Water Heater Energy Efficiency Policy

5<sup>th</sup> November 2021

Hosted by CLASP/HIMA^Verte



## Background

As part of the effort to address the national gas shortage facing Pakistan, CLASP and HIMA^Verte have been supporting NEECA and PSQCA in research into water heaters energy consumption and potential options for MEPS and Labelling of both gas and electric water heating products. Most recently this process resulted in outline proposals for minimum performance thresholds for all water heater types.

However, the recent high degree of political commitment expressed by the Minister for Science and Technology, with the support of Senator Nauman Wazir, has accelerated this process, particularly with respect to Gas Water Heaters. As part of the overall accelerated process, agreement was reached with PSQCA for CLASP and HIMA^Verte to propose revised MEPS for gas and instantaneous water heaters, and associated changes to the testing method that may be necessary.

This meeting is part of that accelerated process with members of the ministerial working group (including PSQCA and NEECA) and other manufacturers being presented with, and discussing, potential areas of improvements to locally produced products and recommended thresholds for Gas Water Heater MEPS and test method revisions.

## Objectives of Workshop

With the overriding objective of reducing individual Water Heater Gas Consumption, present to water heater manufacturers and other key industry and institutional stakeholders:

- 1) Potential areas of improvements to existing products with associated estimates of savings potentials of individual actions.
- 2) Proposals for parameters for improved Water Heater Efficiency regulation, and associated MEPS thresholds
- 3) Suggestions for revisions to the current gas water heater testing methodology to aid clarity and enable effective implementation by stakeholders.

## Proceedings:

### 1. Goal, Current progress & short term objectives

Mr. Salman Zaffar kicked off the meeting with a round of introductions, identified the overarching goal of gas conservation and recapped the salient points from the previous workshops and ministerial meetings. Mr. Salman then described the short-term objectives of presenting an outline for water heater regulations during the workshop. The draft proposal for MEPS and draft revised gas water heater standard will be delivered to PSQCA for distribution by the 10<sup>th</sup> of November to the working group. The working group can then finalise and submit for approvals by the 12<sup>th</sup>.

Once this is finalized CLASP will work with NEECA to come up with labels within 6 weeks of finalization of MEPS. The target date for that at the moment however is set tentatively for the 8<sup>th</sup> of December.

### 2. Options for MEPS, test methods & their feasibility in Pakistan

Mr. Stuart Jeffcott began his presentation by identifying the current PSQCA standards for gas water heaters (PS 4858) and pilot lights (PS 4860). The standards define thermal efficiency, heat loss parameters and pilot light parameters and due to the urgent need for regulation, the same headings have been retained. Values for BAU (business as usual), BAT (best available technology) and MEPS levels were then presented for typical products of 35-gallon gas storage and 8 Litre/min. gas instant water heaters.

#### Heat Loss:

- Current MEPS are 10% per hour and BAU is estimated between 7-10%. The BAT in the world is much lower at 0.5%.
- Currently, approximately 1-2 inches of glass wool insulation is used but typically the top of the storage tank or piping does not have insulation.
- Option for Improvement were to insulate the top of the tank, use thicker insulation or switch to foam/polystyrene each with increasing savings potential

Mr. Asad Mehmood from NEECA then commented saying the manufacturers should conduct testing and R&D in their facilities. Mr. Salman answered by pointing out that some manufacturers like Canon and Super Asia are conducting tests, however many smaller manufacturers do not have relevant facilities.

#### Thermal Efficiency:

- Current MEPS are 65% and BAT is 74%. Currently, Pakistani water heaters are estimated to be operating between 50-65%
- The typical burner assembly is a large open combustion chamber
- No pre-mixed air produces a low-temperature flame with a high excess air factor.
- The flue is a steel pipe running from the base and protruding some 3-4 inches from the top.
- Some models have original and retrofit zigzag/conical baffles.
- Improvement actions include refined burner design, pre-mixing of intake air, baffles or change flue design to increase the surface area for heat-exchange.

#### Pilot lights:

- The current MEPS for any gas appliance are at 0.59 kWh and BAU is between 0.1-0.4 kWh. The BAT is 0.07 kWh (or zero if electronic ignition)
- Noted that pilot lights typically run 24 hours a day for the whole year.
- Proposed actions would be switching to electric ignition (although this may be unsuitable for Pakistan) and/or installing a gas flow limiting valve.

### 3. Target performance parameters & MEPS

Based upon the discussion, the following three parameters and the initial revised MEPS levels were proposed for the typical 35-gallon storage type water heater.

Performance parameters (storage type)	Unit of measurement	MEPS level proposed	Existing MEPS level
Heat Loss	% of stored heat of water lost per hour	2	10
Thermal Efficiency	% conversion of total energy used to that in the stored heated water	70	65
Pilot gas consumption	kWh of energy equivalent of gas burnt for one hour	0.1	.59

For the typical instantaneous type water heater of 8 Litres/minute capacity, only the thermal efficiency parameter is proposed for setting the revised MEPS.

Performance parameters (instantaneous type)	Unit of measurement	MEPS level proposed	Existing MEPS level
Thermal Efficiency	% conversion of total energy used to that in the stored heated water	78	65

Mr. Stuart then added that the purpose of MEPs is to set a performance level and it is up to manufacturers to decide how they can achieve the minimum performance requirement.

Mr. Asad then mentioned that manufacturers are faced with design problems and whether there are any proven designs. Mr. Salman replied to say that a document with a few design recommendations associated with each performance parameter of the MEPS would be developed, to offer guidance to manufacturers.

Mr. Winton Smith also stated that we should avoid mention of construction techniques within the MEPS document. To cover dynamics of construction, another supporting document should be developed to provide a preferred or nominal design of a typical water heater that is likely to achieve the required performance standards.

Dr Ainy from PSQCA was then interested in what the manufacturers felt about the proposed level and whether it was achievable. The manufactures present stated that an increase in 5% of thermal efficiency seems achievable. Mr. Stuart added that 70% thermal efficiency would be the recommended minimum level. For efficiencies higher than 70% corresponding NEECA star-labels can be given.

Mr. Tajammal from Canon and Mr. Hammad from Super Asia then stated that manufacturers should be given some time to test different designs to achieve the proposed MEPS.

Mr. Hammad mentioned that some temperature regulators are faulty and water is stored at a high temperature as a result and enquired whether the standards being developed will include LNG use as well as natural gas. Stuart replied by saying LNG was not considered thus far, but will be looked into.

Mr. Stuart then described the shortcomings of the current standard. He pointed out that the main body mixes test methods, performance requirements, construction, and safety requirements. The testing method described in the existing PSQCA standard seems appropriate though it does not align with consumer operating conditions. Mr. Stuart suggested that the requirement of assumed operating temperature of 70 °C should be revised to 45 °C to better reflect end user operating conditions. However after deliberations everyone agreed that bringing it down to 60°C would be better. The manufacturers pointed out that in large households that will allow more people to shower as they mix cold water to bring it down to comfortable levels.

Suggestions for revised MEPS document:

- Restructure the main body to improve understanding by separating testing, MEPS performance and construction.
- Review the current test method to identify any room for improvement.
- Remove construction requirements to allow innovation by manufacturers.
- Revise testing conditions to better match operating conditions.

Dr Ainy then asked for any recommendations for testing methods. Mr. Salman stated that the draft MEPS document will provide detailed test methods for each performance parameter.

Mr. Hammad then added that construction requirements should be in place considering the Pakistani Market. Mr. Asad Mehmood added that international standards often contain material, construction, and performance requirements.

Mr. Hammad mentioned that while the larger companies such as Super Asia would be able to adjust their manufacturing process to meet the new MEPS, we should collectively develop these standards to also help the smaller manufacturers comply. He said that it would be good if PSQCA or PCSIR could hold training sessions for these small manufacturers to build their capacity.

Mr. Ismail of PSQCA added that aspects such as burner design are important for complete combustion, which can be verified by monitoring oxygen level in the flue gasses.

Mr. Wasim of PSQCA appreciated the holding of this workshop and the meaningful recommendations, as it would assist him in developing robust recommendations in his capacity of Chair of the working group established by Senator Nauman Wazir for recommending MEPS.

Mr. Wasim requested CLASP to share any relevant standards from other countries, which could inform us during the process of revising the MEPS for Pakistan.

Mr. Salman then ended the proceeding and told the participants that a revised draft for MEPS would be presented soon.

## Key Takeaways:

- Initial MEPS for storage and instantaneous type water heaters were proposed

- Delivery of the first draft document for these MEPS would be presented by 10<sup>th</sup> November 2021 followed by the working group finalizing / agreeing on the draft by the 12<sup>th</sup> of November.
- Manufacturers broadly agreed that the proposed MEPS levels were achievable
- Some manufacturers will conduct tests at their facilities over the next week for further verification of the feasibility of the proposed MEPS levels

#### List of participants

Sr No.	Name	Organization	Presence
1	Mr. Hammad	Super Asia	In-Person
2	Mr. Tajammal	Canon	In-Person
3	Mr. Abdul Qayyum	Nas Gas	Online
4	Mr. Shahzad	Waves	Online
5	Dr Ainy Zehra	PSQCA	Online
6	Mr. Wasim	PSQCA	In-Person
7	Mr. Ismail	PSQCA	In-Person
8	Dr Irfan	PCSIR	Online
9	Mr. Asad Mehmood	NEECA	Online
10	Mr. Stuart Jeffcott	CLASP/HIMA^Verte	In-Person
11	Mr. Winton Smith	CLASP/HIMA^Verte	Online
12	Mr. Ali Habib	CLASP/HIMA^Verte	In-Person
13	Mr. Salman Zaffar	CLASP/HIMA^Verte	In-Person
14	Mr. Meekal Jamil	CLASP/HIMA^Verte	Online
15	Mr. Abdul Rehman	CLASP/HIMA^Verte	In-Person