energy savings
Industry Association

ESIA Submission:

Victorian Energy Upgrades (VEU) Program
Commercial and Industrial (C&I)
Heat Pump Water Heating (HPWH)
Consultation

12 July 2021

Submitted via energyupgrades@delwp.vic.gov.au to Victorian Energy Upgrades,
Department of Environment, Land, Water and Planning, Victorian Government

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1. Introduction

The Energy Savings Industry Association (ESIA) welcomes the opportunity to provide this submission to the Commercial and Industrial Heat Pump Water Heating (HPWH) Issues Paper Consultation which commenced on 15 June for Victorian Energy Upgrades (VEU) program, Department of Environment, Land, Water and Planning (DELWP), Victorian Government.

We referred to the consultation webpage: https://engage.vic.gov.au/commercial-and-industrial-heat-pump-water-heating

About ESIA

The Energy Savings Industry Association (ESIA) is the peak national, independent association representing and self-regulating businesses that are accredited to create and trade in energy efficiency certificates in market-based energy efficiency schemes in Australia. These activities underpin the energy savings schemes which facilitate the installation of energy efficient products and services to households and businesses. Members represent the majority of the energy efficiency certificate creation market in Australia. Schemes are established in Vic, NSW, SA and ACT. Members also include product and service suppliers to accredited providers under the schemes. As well, the ESIA represents member interests in national and state initiatives that include energy efficiency and demand reduction, such as the Federal Government's Climate Solutions Fund and the NSW Peak Demand Reduction Scheme due to commence in 2021.

Further engagement

We welcome the opportunity to discuss this submission further, please contact the ESIA Executive Officer at comns@esia.asn.au.

2. Responses to consultation questions

1. **Do you think there is a market for a deemed activity that incentivises the installation of HPWHs in commercial and industrial sectors? What are your views on the demand for the activity and supply chains, now and in the next three years?**

   Answer:

   Yes, there is a significant pool of opportunity now with further growth into the future. HPWHs have made significant in-roads into large commercial applications over the past 25 years although penetration has been limited by high prices.

   Some ESIA members are new entrants and innovation leaders in equipment design, manufacture and distribution at affordable prices when supported by the VEU in the residential space. This expertise should transfer into the commercial and industrial space for certain upgrade configurations.

   We generally expect supply chains to respond to increased demand for HPWHs upgrades due to the following drivers:

   a) Reduced costs: due to scheme incentives becoming available.

   b) Technology advances: major improvements in energy efficiency, capacity, and life cycle (now estimated to be 15 years) have occurred in HPWH designs. (For example, high temperature HPWH systems can now deliver water up to 90 degrees Celsius.

   c) Low-cost sustainable power: abundant low-cost solar PV power is available in an increasing number at commercial and industrial (C&I) sites.

   d) Gas replacement will become more attractive as electricity emissions intensity factors reduce.

2. **What are the benefits and potential drawbacks or risks to making HPWH systems that serve multiple private residences eligible under the proposed activity?**

   Answer:

   Potential benefits

   - HPHWs in multiple private residence settings provide a significant pool of opportunity.
   - There are legacy AGL and Origin systems that body corporates have been left to maintain. They are looking for opportunities to upgrade these.
   - HPHWs deliver significant bill savings to residential premises that often struggle to access energy efficiency or solar. Sharing a large HPWH is an economical way to deliver energy savings greater than 60% compared to traditional electric and gas systems, reducing hot water costs dramatically.
   - HPWHs are an ideal solution for body corporates wishing to use solar power during the day. Morning hot water heating (over 50% of all hot water consumption) can access solar power to deliver even greater sustainability and hot water savings, reducing grid feed-in rates during low power usage times.

- As emissions intensity of electricity falls below gas it will provide further emission savings benefits. In the meantime, a solar + heat pump conversion will provide major benefits and is a commercially attractive bundled option.)

Potential drawbacks

-

Potential risks

-

3. **Do you agree with including product eligibility requirements that will enable demand response for the proposed activity?**

   Answer:

   a. Yes, but not yet and then a transition would be needed to make it mandatory.

   b. **If Yes, please provide further detail, e.g. what capabilities do you think should be required and how should compliance be evidenced?**

      Answer:

      It should be optional initially as currently there is no equipment available with inbuilt demand response capability and there is unlikely to be by the effective date when the activity is scheduled to commence.

      It would be shortsighted to hold up opening the C&I HPHW opportunity under the VEU given the significant emissions reductions and economy-wide benefits that can be delivered now.

      Fully integrated demand response solutions are being developed (with trialing in South Australia) using Wi-Fi, metering, hot water storage and switching technology. However, it will take time for technology and solutions to be commercialised.

      Add-on demand response technologies for eligible installed systems may be developed and commercialised.

      These features should attract further incentives such as a peak demand reduction incentive.

   c. **If No, please explain why you do not agree with inclusion of demand response.**

      (NA)

4. **If you have downloaded and tested the draft guidance materials and TRNSYS modelling files which have been developed for the product registration process please provide feedback here.**

   Answer:

   Some ESIA members have accessed TRNSYS which is very technical and which may be a barrier for use by parts of industry, and therefore an activity uptake barrier.

- It would be helpful if DELWP could host another session which is live to provide real time discussion (the initial session was recorded and is now hosted at Engage Victoria).

Access to software due to costs may also be a barrier.

- The ESIA requests clarity on how the TRNSYS software will be made available to industry (for example free of charge or at a subsidised cost to address this potential barrier).

Currently there are six TRYNSYS templates.

- It is recommended that DELWP be prepared to produce further modelling templates after further discussion and/or as the activity commences and the need for variations may become apparent (which may or may not be TRYNSYS).

What range of HPWH capacities (kW) do you think will be supported by introducing the proposed activity and why?

Answer:

Various sectors of industry will mobilise the most straight forward and suitable commercially viable options for them. It will not necessarily be system size but project complexity and viability that will determine rapidity of uptake.

For example, 1-10 units x 1 kW manifold systems will deliver an appropriate outcome across a range of settings: any configuration that is fit for purpose should be acceptable.

Activity requirements and guidance need to be flexible to enable tailoring of systems to suit the complexity of the system installation rather than size.

Industry will be best placed to determine how to best meet customer needs. This may be with a deemed or M&V solution where neither approach is included or excluded based on system size.

Industry standards already provide ample guidance to suit various settings. For example, a 90kW system in one building may need a consistent hot water load and a standard style solution, whereas an industrial solution such as a medical processing site may need more checks and balances and engineers to address health, safety and indemnity issues.

Often, the system will be hybrid to maximise efficiency and return on investment. For example, a heat pump is well placed to warm water from cold, coupled with an electric or gas booster which is a most efficient way to maintain high heats continuously.

5. **Do you think there is a demand for an application-based deemed activity, that incentivises the installation of larger capacity HPWHs than the current proposed activity, but smaller capacity than what is suitable for the M&V method?**

Answer:

a. Yes, and there must be an option to choose which methodology is most suitable for the individual project: small or larger deemed, or M&V.

Different customers and solution providers will prefer different approaches to suit their circumstances (such as for commercial lighting upgrades either under the CLF or M&V methods).

Customers are likely to use the deemed activity to overcome capital hurdles as financial incentives are provided upfront under deemed methodology. M&V may provide greater longer-term rebates; however, these cannot be accessed for 12-18 months after project completion.

Deemed methodologies are more broadly understood and historically have had better uptake by solution providers. Further, establishing a baseline for the M&V method may not be possible or straight forward, therefore a deemed methodology would be acceptable and preferred.

b. What range of HPWH capacities do you think would be supported by this third activity?

In summary, the ESIA would like to see flexible technology options allowed to best meet specific site requirements with no limit on HPHWs capacity.

It is likely to be overly prescriptive to suggest which size of system, 500W-1.8kW or 1.8-10kW, would suit either the small-to-medium or medium-to-large product modelling deemed method scenarios available. And while it seems reasonable that capacities for M&V solutions are likely to be 10-90kW systems for a return on investment to be justifiable, industry needs the flexibility to choose which method to use.

Some customers will accept less VEECs for a deemed method, even for large projects, if they receive a full incentive upfront, and the upgrade is fit for purpose as determined by a qualified provider and delivered sooner than under the M&V method. (Even if the VEECs created are less due to the more conservative VEEC allocation under the deemed approach.)

Some examples:

- An installation for a large hospital with high demand for hot water may be easy to design and not require M&V. The hospital will find a deemed approach acceptable, particularly if they need their upgrade quickly to provide an essential service and they can fund the gap.
- If a site is remote with service provider expertise limited, the deemed approach is likely to be attractive and do-able. If the service provider does not have time or capability to access TRNSYS, they can still deliver an acceptable option and create VEECs to get a more energy efficient system installed than would otherwise be the case.
- Manifolding smaller units (500Wto 1.8 kW) can be an effective solution for office hot water and for pre-heating of larger sites with intermittent hot water usage patterns.
- Pre-heating hot water into a ring-main, if the site has occasional high peak loads, delivers excellent return on investment in some circumstances.

        - In this scenario, the ring main (reticulation) is heated by a conventional gas water heater. As ring-main losses account for around 5% to 10% of the total hot water load, it is relatively inexpensive to have excess capacity built into the ring main heating system.
        - In this pre-heating hot water scenario, excessive hot water demand events (i.e. a cold snap occurring with 100% hotel occupancy during winter holidays), may only occur occasionally.
    - Currently, hybrid gas and HPWHs solutions often deliver the most attractive return on investment.
    - Solution providers may develop business models that enable them to roll out more systems:
        - in a range of sizes, in a remote community, using the deemed method; or
        - in a set size, in a city, using the M&V method.

- The ESIA suggests that some guidance on fit for purpose metrics may be helpful to gauge that a comparable amount of hot waster will be made available to the customer. This should not however, be prohibitively prescriptive. (Rather, somewhat like the building class and space type guidance provided for spaced heating, and in consultation with industry.)

  For example, a rough guide could be within a band width of 20% difference, and if it falls outside of this range, then appropriate explanatory notes are to be provided and agreed upon in principle by the customer (with a customer signature required on a standard form). Explanatory notes could include those based on industry benchmarks and the individual situation, such as:

    - Site needs have changed due to an increase or decrease in site occupancy or production.
    - The increase is based on usage of 45 litres of hot water per person per day, or, not based on this but some other metric, otherwise the system may be inadvertently oversized.
    - Meeting the needs of peak load has been determined by, for example, peak load occurring regularly or once a year (therefore helping to justify that it is more cost effective to, or not to, supply full peak load capacity solely with the HPHW system).

6. **Do you see any potential for the proposed HPWH activity to result in undesired outcomes or incentivise unsuitable installations?**

   Answer:

   a. Yes

   b. **If yes, please provide further information about the concerns you have.**

      Answer:

There is the possibility of under-sizing or over-sizing, however, it is important that unnecessary constraints and evidence requirements are not placed on industry or upgrades simply will not occur.

Make the activity flexible enough to let appropriately qualified professionals and tradespeople determine suitable solutions.

c. How do you think these undesired outcomes can be avoided?

Answer:

Under-sizing: Peak loads need to be identified and appropriately sized equipment provided. Equipment capacity is provided by manufacturers. Load requirements can be provided by the client or calculated based on estimations. This does not, in most cases, require hydraulic engineers.

However, installing a system that meets peak load may not be the most efficient solution, for example if it occurs only once a year. Instead, the systems should be designed to meet baseline load, with for example a gas booster installed to operate only during peak load periods.

It should be acceptable to simply declare that the load that is being achieved, for example, a 50kW baseload is what the system is designed around. (Notably, most systems are hybrids and they deliver the best return on investment.)

Over-sizing: Design solutions that are acceptable need to be flexible to ensure a designer is not encouraged to design the most energy efficient solution with marginal benefits.

A defined load requirement: Replaced systems should be required to meet the incumbent hot water delivery performance (if it is requested by the client) and a minimum of 60% energy savings of the design load, or the new design load criteria.

In the case of a hybrid gas or electric and HPWH system, the proportion of the load addressed by the HPWH should be clearly stated in solution design proposals and rebate applications.

7. Would the proposed HPWH activity incentivise you to become accredited to provide this activity through the VEU program?

Answer:

Yes, several ESIA members have indicated they will become accredited; however, this will largely depend on profitable commercialisation at volume at a reasonable pace early on as this activity requires significant capital investment and upskilling by businesses. Engagement will also depend upon attractive incentives being available for an upgrade and the ability for flexible approaches to suit installations including choice of deemed and M&V methods not being restricted based on system size.

8. What types of businesses or industries would you expect to provide this activity?

Answer:

Business likely to provide HWHPs may include a combination of heat pump manufacturers, hydraulic engineers, plumbers, electricians, consultants and equipment suppliers, certificate aggregators, and facility and property managers with sizable property portfolios.

9. **Do you see barriers to the uptake of the proposed HPWH activity?**

Answer:

a. Yes

b. If yes, what barriers do you anticipate?

Answer:

Yes. Excessive and difficult design compliance may make it difficult and expensive for smaller solution providers – administration costs and engineering may make the upgrades under the VEU uneconomical.

For example, small apartments or industrial changing rooms should be easy to model and excessive design compliance may make delivering solutions prohibitively expensive.

The cost of TRNSYS software could be prohibitive to smaller participants, particularly if not provided free of charge, or without a payment plan based on usage and project completion through to VEEC creation.

c. What solutions do you see for overcoming these barriers?

Answer:

Simple, easy to use deemed factors and a flexible M&V approach in line with already rigorous international industry standards (such as M&V IPMVP).

Access to low-cost or no-cost modelling software.

Easy-to-implement scheme compliance procedures.

10. **What do you think is the most appropriate deemed equipment lifetime for HPWHs in commercial and industrial settings?**

Answer:

a. 15 years

b. Please explain your answer.

Answer:

HVAC and HPWH technology have improved significantly in recent years and a 15-year life cycle is now typical. Compressors can easily be replaced – their life depends on use, for example 10 years.

Vitreous enamel cylinders without a heating element do not suffer from the degradation effects caused by element heat spots. So, if used in a storage capacity at 60 degrees Celsius they will last longer than 15 years.

Stainless steel cylinders with a heating element will also last longer than 15 years, provided water quality meets the manufacturer's warranty conditions.

Another way of considering the benefit of HPHWs upgrades is that in commercial and industrial settings, a typical upgrade may occur only every 20 years. This may include a 15-year period and then major maintenance such as replacing a compressor which will see lifetime extended to 20 years. Therefore, a 15-year lifetime is, at least, very reasonable.

11. **Do you think it will be achievable to provide sufficient evidence to meet the eligibility requirements of a pre-existing hot water storage tank?**

Answer:

a. No

b. **If not, please explain why and suggest what evidence may be more suitable (e.g. proving the condition of the tank rather than the age).**

Answer:

Our understanding is that hot water storage tanks do not necessarily print the dates of manufacture or installation on the name plate, and/or it may be illegible due to aging.

While it may be reasonable that equipment installed by from, say, 2010 may have a legible label with adequate information, secondary evidentiary requirements should be acceptable in any case.

For example, evidence may be that the equipment is more or less than 10 years old, including declarations either by:

- the customer - ideally with provision of an invoice for purchase or maintenance or photographic evidence.
- The service provider – with an explanatory note such as equipment type or certain installation features that help determine its installation date.

The ESIA recommends making it *optional* to remove a storage tank that is less than 10 years old and is still fit for purpose. This is because if removal is mandatory, this will create an unnecessary barrier to upgrade.

12. **What share of the commercial and industrial HPWH market do you think includes an electric resistance heating element for use when ambient temperatures are outside of safe operating conditions?**

a. Answer as percentage

Answer:

5-10%

b. Do you think VEU program incentives should account for this electric resistance back-up function?

Answer:

No.

The incentive is best kept simple and given that the electric resistance back-up function is rare it is better if it is excluded from the TRNSYS modelling default, however it should be possible to add it in. This should be reflected in the specifications and should not be an overly burdensome or time-consuming consideration.

While new heat pumps on the market can operate at extremes, the entire hot water system should be designed and sized to satisfy load in all conditions, hence the legitimacy of a hybrid system including electric resistance backup.

If it is a hybrid electric and HPWH system, for example electric is used for recovering heat loss in the ring main, it might be best to define what percentage of the total load is to be heated by the heat pump, such as 95% if ring main losses are 5%.

13. Do you agree with incentivising the installation of HPWHs which use lower global warming potential refrigerants?

Answer:

a. Yes, broadly in principle, but not necessarily or immediately.

b. If not, please explain why?

Answer:

Refrigeration de-gassing is handled in accordance with Australian Standards and as such evacuated gases are disposed of responsibly under mandatory requirements, so the VEU does not need to add another layer of complexity at this point.

Modern HPWH and HVAC systems do not leak 15% of refrigeration gas. If they did, they would stop working after one or two years.

However, incentivising the more environmentally friendly gases under the VEU such as carbon dioxide, if introduced, could be stipulated in the product application process, rather than having to be proved at the point of installation. This approach is preferable penalising less environmentally friendly gases.

More consultation is needed.

14. Do you agree with the proposed method for rewarding/penalising refrigerant choice?

Answer:

a. Yes, but do not delay commencement of the activity as this is not a primary objective / benefit of the VEU.

b. If not, please explain why?

Answer:

(See a. answer above)

15. Do you think it is appropriate to use more accurate electricity emissions factors similar to those proposed in the 2019 RIS (averaged over the deemed HPWH lifetime) for commercial and industrial HPWH activities?

Answer:

a. Probably.

b. Please explain your answer.

ESIA members considering this activity generally currently support using one emissions factor averaged over the lifetime of the system. This smoothed approach (rather than a stepped one which changes perhaps every six months) is easier for all parties to administer and avoids confusion and disappointment for customers.

This approach will help to incentivise gas over electric which is reasonable given that there are more legacy gas systems than electric ones.

Using the 2019 RIS modelling approach would be reasonable.

For more information regarding this submission, please email ESIA Executive Officer, comns@esia.asn.au