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NSW Energy Security Target and Safeguard 2020 submission by STIEBEL ELTRON Australia.

Director
Climate Change and Energy Savings Policy
NSW Department of Planning, Industry and Environment

Thank you for inviting interested stakeholders such as STIEBEL ELTRON Australia to provide a submission about the NSW Government Energy Security And Safeguard Consultation paper.

STIEBEL ELTRON Australia is a daughter company of STIEBEL ELTRON International - a German company that was established in 1924, and that has been operating in Australia since 1995. Our key achievements in the Australian market have been in providing electric efficient home comfort solutions, domestic hot water heat pumps, electric instantaneous hot water systems, compact storage water heaters and space heating. More recently we have launched into the Australian market heat pumps packages that offer heating, cooling, hot water, even pool heating from off-the-shelf packaged systems. These heat recovery and energy recovery ventilation systems can be a standalone system, or they can be installed in combination with a heat pump as an even higher energy efficiency solution and are backed by more than 44 years of research and experience in other markets across the globe.

STIEBEL ELTRON has made a large investment in Australia, both financially, and in the development and training of staff and service engineers, transferring years of experience in R&D and established performance standards from the EU into the local market. This investment in resources has helped advance Australian standards and local market understanding of domestic hot water heat pumps. Australia-wide we have offices and showrooms with training facilities and warehouses, generating direct and indirect employment for hundreds of individuals.

NSW has had large penetration in renewables such solar PV & Wind, 19% of total generation in 2019[1], with more renewable generation installations to occur. Whilst this has had a positive impact on the reduction of CO_2 emissions and could also lead to reductions in the cost of electricity, renewable generation brings challenges around consistency of operation, although this can be offset when operating in conjunction with other sources of generation.

The rapid uptake and installation of rooftop solar has presented us with the issue of excess electricity generation during the day, which has created problems for the grids. The supply side of the market generates too much power at times which do not align with demand. The electricity grid of the future will transition to a two-sided market[2]. Heat pumps are ideally suited to integrate with a two-sided market in combination with an energy management system.

This submission emphasises on heat pump technology, which provides many net benefits for the ESS: energy efficiency, onsite renewables generation, thermal battery systems, EMS suitability for peak demand reduction and the perfect choice with electric vehicles (with the energy saved form not using electric resistive elements could be enough kWh's to operate an EV for local travel).

Heat pumps for hot water, heating and cooling should be a central technology in the ESS as an energy saving opportunity. Heat Pumps can either be air-sourced, ground-sourced, or water-sourced, with efficiencies between 150% -550%, depending on source temperature and supply temperature conditions. Domestic heat pumps for hot water have been supported in the RET since early 2000, not just financially through STC subsidies, but also as a mechanism which creates incentive to have products approved and tested. With the RET winding down and the STC's reducing, there is a requirement to create a MEPS for heat pumps. There are many reasons why heat pumps should be highly regarded in the ESS as an integral part of what is required to help move forward.

Responses to questions

13. What are the most promising opportunities once commercial lighting reaches market maturity?

- Commercial/industrial (air, water & heat pumps sourced) for hot water and warm water for hygiene or agriculture industry or industrial processing for replacement of gas, oil or electric water heaters.
- Domestic hot water heat pumps for replacement of electric resistive element and gas water heaters.
- Heat Pumps for hydronic heating (underfloor or radiators) for gas boilers (Estimation of numbers installed gas boilers 30,000). These could be based very similar to the Renewable Heat incentive in the UK[3].

[1] https://www.energy.gov.au/publications/australian-energy-statistics-table-o-electricity-generation-fuel-type-2018-19-and-2019
[2] Two-sided markets -ESB COAG Paper-Consultation.pdf
[3] https://www.ofgem.gov.uk/environmental-programmes/domestic-rhi/about-domestic-rhi

- Possible savings for heating a 200m² home for underfloor heating with 40°C. Possible savings in Sydney zone 20,960 kWh/year and Canberra zone (colder climate areas NSW) 49,532 kWh/year

	Sydney	Canberra
Heat Demand (kWh/year)	19944	48586
Heat Pump energy usage (kWh/year)	3970	11201
SCOP*	5.02	4.34
Gas Boiler energy usage (kWh/year)	24930	60732.5
Gas Boiler Efficiency	80%	80%

*Seasonal Coefficient Of Performance is the ratio of energy delivered over electrical energy purchased, as an average over the year.

14. What would prevent the uptake of new opportunities? What support (including new standards and calculation methods) does industry need to transition to new opportunities?

- Lack of incentives for manufacturers/distributors against conventional gas and electric water heaters that have a lower capital cost. However, to be able to offer some form of incentives scheme, it is necessary to have a proper assessment methodology for heat pumps, for both product performance and overall applications specific performance. Since nothing quite exists in Australia for this purpose, it could be left in the 'too hard' basket and nothing eventuate. Without incentives there will be no uptake, obviously.

- On the other hand, if assessment methodologies are not adequate, underperforming products and poor estimation of energy savings would potentially lead to an uptake by many, which could hurt and set back the industrial/commercial heat pump industry again as it occurred 10 years ago with the unfortunate rorting by some of the RET scheme for commercial heat pump renewable energy credits. So what could happen here would be a 'boom-bust' cycle, where the assessment process is not set up appropriately from the beginning, where it becomes clear at some point, or there is high suspicion, that savings are not being met and the process closes down. If assessment methodologies are seen as too difficult, too complex and costly to comply with, this would also lead to many not seeing the benefit of these opportunities as the sacrifice would outweigh the benefits.

- The support required here to transition to new opportunities and create a robust process for performance assessment can be provided by borrowing ideas from existing incentive schemes of European nations. Some of these have been implemented for over a decade, have been verified to provide the purported energy savings based the estimation tools used and have the endorsement of government and industry bodies, where financial benefits are provided to those making use of these technologies in the forms of subsidies and grants. A great example of this is Switzerland, through a national program backed by *EnergieSchweiz* (EnergySwitzerland) under the name "Heat Pump System Module" (*Wärmepumpen-System-Modul*)[4], for the creation of efficient heat pump systems in existing and new buildings (up to

[4] https://www.energieschweiz.ch/page/de-ch/waermepumpen

15 kW capacity). It compares products equitably and makes sure that the entire process from selection to installation, commissioning and operation is done appropriately. A quality assurance auditing process is carried out for this, with at least every fifth system checked. It makes use of a calculation and estimation tool for energy savings in a variety of heat pump applications that was developed almost 20 years ago and for the last 10 years has been continuously validated through measurement and verification. This tool, however, is suitable for much larger applications, such as schools, hospitals, sport centres, etc and is used elsewhere as well (it is our understanding that Austria has adopted a very similar methodology in performance estimation).

- Incentive schemes incorporating tools and methodologies such as these could provide a clear pathway for the implementation of an adequate performance assessment in Australia, that short-circuits the process with tried and tested solutions that have verified outcomes, serving also as a basis for the development of specific Australian standards for this purpose.

- The above approach is different to what this sector of industry has seen, particularly in the domestic market, with performance assessment methodologies based on product characterisation followed by detailed, state of the art simulation. This, however, has been done mainly for sanitary hot water applications for which there has been *already* a validation process in the field for solar hot water systems (and heat pumps to a degree) and we see the following risks with attempting a similar approach for the proposed heat pump opportunities we have indicated:
    - By design, this approach requires detailed knowledge of an application, as detailed models and system simulation need to be carefully constructed. It is quite an onerous task that would fall on the participants/applicants of the scheme, would require engaging highly specialised consultants in the field and would be very costly. We anticipate this would not be taken by most. Even after having done all this, which would probably only be justified for highly lucrative opportunities, it may *still* not provide the savings expected as there would be no validation mandated for this process, since it also a *deemed* savings approach, by design. There would be no way to know for sure if the model approximates reality sufficiently well

    - If it is too simple, basing the modelling on sanitary hot water use only and being a deemed energy savings approach, it then risks being too conservative for actual savings provided even for suitable applications. For non-sanitary hot water applications there would be no confidence of the suitability of this approach and attempting to use it for such could see the whole assessment process come into question, criticised and worst-case scenario, see it shut down completely in a repeat of what happened 10 years ago.

- We believe there is no other choice for a fair scheme, set up properly from the start, that covers both product performance, performance under use for specific applications and a variety of applications with the most flexibility and ease, but to follow closely European experiences in this industry, as explained before. It would be a concerted effort between industry, stakeholders and government coming together for this task.

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19. Which cleaner fuel switching activities should the scheme provide incentives for?

    - The scheme should support air source and ground source heat pumps for hot water and warm water for hygiene or agriculture industry or industrial processing for replacement of gas, oil or electric water heaters.

20. Should the scheme cover technologies that are being wound down under the SRES? If so, what is the best way to do this?

    - We believe the scheme should be open to technologies such as domestic heat pumps being wound down under the SRES in a way similar to the VEU program, with ESC incentives in addition to those under the SRES. Currently the SRES is the only mechanism that encourages manufactures to test, approve to standards and meet performance requirements to achieve incentives. Once the SRES declines and there is less of incentives manufactures could release products with only Watermark approval and there is no requirement for performance under any current code or legislation, which could flood the replacement market.

38. Would the above ideas help make the Safeguard more customer-centric? Do you have other suggestions?

    - Effective measurement and verification of energy savings using real-time measurement of energy savings and simplified calculations methodologies
    - Bringing energy savings closer to the end-user by reducing barriers to entering the scheme, to encourage increased participation and drive behaviour change.

45. What else can the NSW Government do to ensure the continuous improvement of the ESS?

    - The energy conversion factor for electricity and gas needs to be a variable figure due to changing generation. With more renewable generation and localised generation of electrical energy (Roof Top Solar PV)

Please do not hesitate to contact me if we can be of further assistance. I can be reached via glenn.day@stiebel-eltron.com.au or by calling 0419 718 822. We are happy to continue our engagement with the Department in the further development of the ESS.

Kind regards,

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