

# ARENA's Integrating Renewable Energy for Industrial Process Heat Training Summary

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Australian Government  
Australian Renewable  
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## WHY COME TOGETHER?

The Integrating Renewable Energy for Industrial Process Heat Training session, held in Sydney on 2-3 July 2019, focused on building capability in integrating renewable energy systems in industrial processes among energy consultants, industry government representatives and academics. The training aimed to help attendees understand how to optimise renewable energy systems, industrial heat pumps, and thermal storage for both continuous and batch processes for all sizes of industrial processes and sites. The sessions also provided an opportunity for attendees to engage with each other and share lessons from personal experiences.

Presenters included:

- Mr. Stephen Drew, a process integration consultant and also a member of ARENA's Advisory Panel
- Dr. Martin Atkins from the University of Waikato, New Zealand
- Mr. Bradley Anderson from the NSW Office of Environment and Heritage
- Mr. Alan Pears AM, a Senior Industry Fellow at RMIT University and senior consultant with the Australian Alliance for Energy Productivity (A2EP).

This summary presents key takeaways and discussion points from the workshop.

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## DAY 1:

Presentations focussed on understanding the true heating and cooling demands of a process, before considering how those demands can most effectively be met.

The workshop showed how a system optimisation approach ("process integration") can be used to find opportunities for process optimisation, heat recovery, and fuel switching to renewable energy heating technologies. This includes the requirement for the appropriate placement and integration of heat pumps, thermal storage and renewable energy technologies.

Attendees were introduced to the PinCH 3.0<sup>1</sup> software that comprises tools to identify minimum heating and cooling demand for a given process and to design optimised heat exchange networks.

The key functions of the PinCH software are:

- determines the absolute heat recovery and cost savings potential
- enables a fast and flexible estimation of different scenarios and designs
- supports the systematic optimisation of various types of industrial processes
- allows the correct integration of thermal storage

Alan Pears talked about the trend toward disruptive and radical technological changes. He envisioned modular technology, storage technologies beyond batteries and thermal storage such as process storage as the exciting future for renewable energy in process design. He suggested that digitisation and data synthesised from different streams will be crucial in shaping the future of renewable energy in the industrial landscape.

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<sup>1</sup> Martin Atkins acknowledged the support of Lucerne University of Applied Sciences and Art from Switzerland who provided Dr. Atkins and the attendees, the use of their PinCH 3.0 software in this training.

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## DAY 2:

Attendees learned how to use the PinCH 3.0 software including an introduction to the PinCH tutorials to help them apply the approach to their current projects. They were also provided with a trial version of the PinCH software to become more proficient with the software.

To assist in building a robust business case to improve chances of successfully implementing promising projects within organisations, Bradley Anderson from the NSW Office of Environment and Heritage presented a session on “Building the Business Case” that outlined common mistakes made, alongside hints and tips.

Day 2 sessions underpinned understanding the economics of renewable energy systems through LCOE (levelised cost of energy) and LCOH (levelised cost of heat) approaches and the role of marginal abatement cost curves.

Finally, approaches to building renewable energy transition roadmaps were explored in the context of rapidly falling technology costs and the trend toward greater distributed energy and load flexibility.

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## KEY LESSONS FOR ATTENDEES:

- It is critical to start with the process first, rather than the utilities.
- Understand the process and the fundamental demand for heating and cooling.
- Optimising the process first including through heat recovery reduces the cost of transitioning heating and cooling utilities to renewable energy.
- Process heat recovery is often the best investment to get started on the roadmap to zero emissions.
- Siting heat pumps optimally across the ‘pinch point’ provides simultaneous heating and cooling and can prove highly cost-effective.
- A good way of improving the process heat efficiency is by using the process integration “pinch” approach.
  - Process integration can help to understand the minimum possible heating and cooling required for a process and the barriers and opportunities to achieving that.
  - Once the process heating and cooling demand is optimised, process integration helps to identify the optimal means to integrate renewable energy and energy storage to meet the process requirements.
- Some renewable and disruptive energy technologies can provide significant productivity benefits such as more precise control and higher throughput.
- A robust business case to improve the process will require consideration of key company drivers and may require engagement with several levels of an organisation across different disciplines (e.g engineering, operations and finance).
- A best-practice way of ensuring the company continues to improve its process heat efficiency and reduce its carbon emissions, is through the development and regular redevelopment of a road map to its energy/efficiency end goal.

