



APPLIED
ENERGY PLANNING

Heatmapping Wastewater Networks

Energy Treasure Maps for Cities

10 Things to know about wastewater heat recycling

Heatpumps which recycle wastewater heat are roughly 100% more efficient than air source heatpumps (i.e. WW heat pumps only need ½ the electricity to do the same heating and/or cooling job as an air source heat pump).

The first wastewater heat recycling systems were used in Europe and Japan in the 1980's. There are now estimated to be over 1000 systems in operation globally and the number is rapidly growing.

The wastewater infrastructure is already there!

Wastewater is 99.9% water. The water might be dirty but the heat energy in it is clean!

The supply of heat available in wastewater networks is entirely reliable and predictable. Great for planning purposes!

Cities can sell this heat and earn new revenue from something they are currently flushing away.

Wastewater heat recycling systems don't pollute the air. Cities need cleaner air for healthy citizens.

Wastewater can also be used for cooling! This can reduce heat island and save precious drinking water.

Wastewater heat recycling systems are smaller than air source systems. Important in cities where space is valuable.

Wastewater heat recycling systems are quieter than air source systems. Also important in cities where noise pollution is an increasing problem.

Introduction

Using wastewater for heating and/or cooling buildings is one of the most exciting opportunities available for cities to easily take big steps in stopping fossil fuel use and reducing carbon emissions, saving precious drinking water, improving air quality, reducing noise pollution and do all this very quickly.

Wastewater heat recycling is achieved by simply using infrastructure and energy that cities already have but using them in a different way. It's not new. Europe and Japan started doing this in the 1980's and there are now estimated to be more than 1000 wastewater heat recycling systems in operation around the world.

Applied Energy is a consulting company based in New Zealand but working globally, and we are recognised as global experts in the topic of wastewater heat recycling and energy planning. We started heatmapping wastewater networks in 2016 and we have now totally or partly heatmapped over 10 cities.

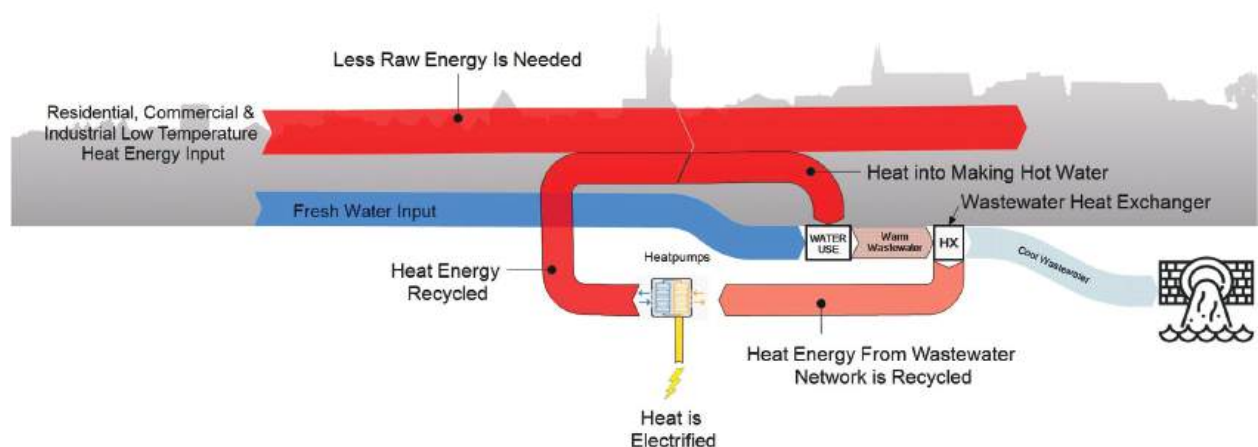
We have also undertaken many energy option studies; wastewater heating/cooling feasibility studies; concept and detailed designs; and provided procurement assistance. We are so passionate about wastewater heat recycling, we also love providing capacity building, training and education courses for local government organisations.

Did you know?

20%-30% of a home's energy is used to make hot water, and this water mostly flows 'down the drain' after use, carrying all this heat energy with it. This heat energy is donated into the sewers by citizens every day, for free!

Values by region:

USA	– 20%
UK	– 20%
EU (average)	– 20%
China	– 25%
New Zealand	– 30%
Australia	– 30%



Why do Wastewater Network Heatmapping?

Wastewater networks are collection systems for all the free waste heat that citizens everyday send 'down their drains'.

Wastewater utilities have this heat, but it is just flushed away. Our buildings and industries can use heat energy, but these sectors don't know where or how much wastewater heat is available within the city, and policy planners typically don't know about wastewater heat recycling, so they simply ignore it in their planning processes.

For a sustainable world, we need to stop this massive heat energy waste and recycle wastewater heat via heatpumps to replace fossil fuels which are currently being burnt to generate heat.

Our experience has shown that once wastewater network heatmap information is freely available, good things happen.

Wastewater heat recycling projects pop up because people working at locations needing heat can easily look to see if wastewater could maybe be an alternative heat supply option for them. If they think it might, then the gap between the wastewater authorities and the heat users is bridged and these people from different sectors can start talking to each other.

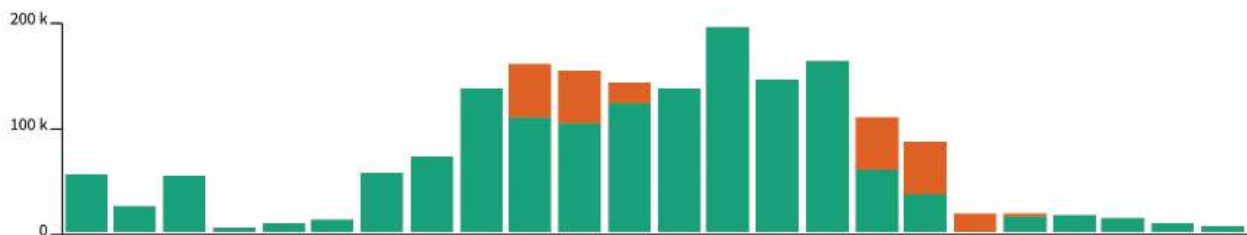
The key to recycling this heat energy: bringing people together and getting them talking. Wastewater network heat maps are like energy treasure maps for a city and are the information bridge between the sectors.

Did you know?

Citizens love wastewater heat recycling!
72% of Thames Water customers support wastewater district heating after hearing what it means for them and their community.
23% were neutral.
Only 5% opposed it.

Wastewater Heatmaps are the information bridge needed between the sectors to allow energy planning of low carbon cities

Heat production



Normal weekday — 159.3 kWp, 1.56 MWh — WW Heat pump 10,000 litre storage Curtailment



The Value of a Wastewater Network Heatmap in Energy Planning

Applied Energy recently worked on a project to identify all large heat users (i.e. over 500kW) within a large area of New Zealand. This project covered approximately 40 towns and cities.

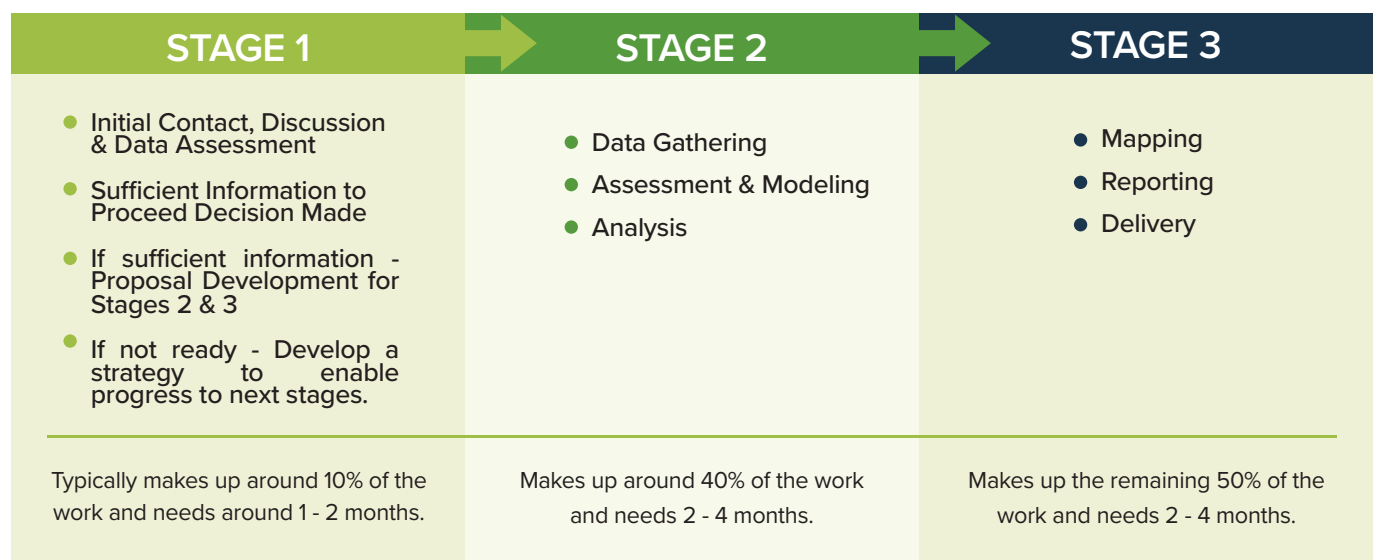
Two of the cities concerned had wastewater network heatmaps previously prepared by Applied Energy, and so we could integrate this information into the planning process.

For city A – there were 68 large heat users identified, and from the wastewater network heatmap we could quickly identify that 16 of these sites could be using wastewater heat recycling (=23%)

For city B – there were 38 large heat users identified, and from the wastewater network heatmap we could quickly identify that 10 of these sites could be using wastewater heat recycling (=26%)

This is the value of having a wastewater network heatmap. In these two cities we could see that purely by coincidence, about 1 in every 4 existing large heat users would be able to utilise wastewater heat to transition off fossil fuels and efficiently electrify their heat needs. We consider this to be a very good ‘strike rate’ and this is why we say every city should have a wastewater network heatmap.

Our Heatmapping Process



Unlock the hidden energy treasure in your city
Contact us today to discuss how a heatmapping study can help you

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Case Study 1 Ōtautahi Christchurch

Christchurch City Wastewater Network Heatmapping

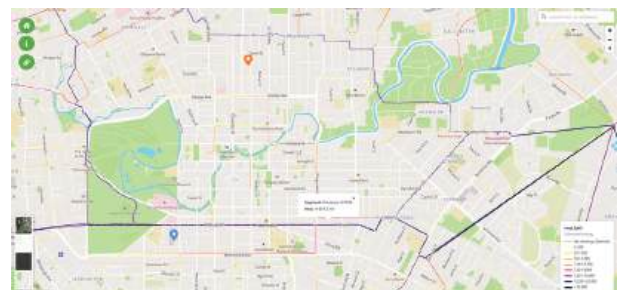
We have undertaken a heat mapping study for Christchurch City Council, to assess and visualise the thermal energy available within the network so this information can be made available, both inside and outside of the Council.

The study concluded that there is around 80MW of heat available and this would be sufficient to heat around 10,000 typical houses in the city.

“To date Christchurch City Council have engaged Nick Meeten to undertake two commissions, both related to using wastewater as a source of thermal energy. He has undertaken a feasibility study for an aquatic center and an energy study and energy mapping study for the whole of Christchurch City.

We have been very happy with the service provided. He has delivered the projects on time and on budget. The advice received is of the highest standard. The deliverables are of a high quality and his communication and has been excellent. We intend to continue our working relationship with Nick & Applied Energy Ltd and have no hesitation in recommending him to others.”

Mike Bourke | Senior Planning Engineer





Case Study 2 Ōtepoti Dunedin

Dunedin City Wastewater Network Heatmapping

We have undertaken a heat mapping study for Dunedin City Council, to assess and visualise the thermal energy available within one of their three wastewater networks (The Dunedin Central Network) so this information can be made available, both inside and outside of the Council.

The study concluded that within this network there is around 7MW of heat available and this would increase to around 10MW of heat for periods of the day.

The project was widely covered in trade magazines such as LG Magazine and Water Magazine. The project was also selected as a finalist in the 2017 Deloitte Energy Excellence awards.





Case Study 3 Whakatū Nelson

Nelson City Wastewater Network Heatmapping

We have undertaken a heat mapping study for Nelson City Council, to assess and visualise the thermal energy available within both of their wastewater networks so this information can be made available, both inside and outside of the Council.

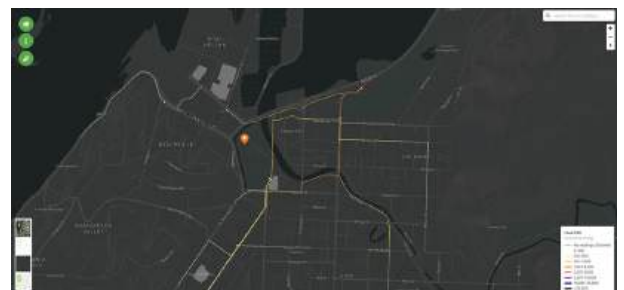
The study concluded that within the Nelson North network there is around 1.7 - 2MW of heat available.

Within the Nelson South network there would be also around 1.7 - 2MW, although this would be supplemented by the flow from the neighbouring area of Richmond which is estimated to be in the range of an additional 1-2MW. Richmond is controlled by a different Council and so this was excluded from the scope of the study.

“Applied Energy undertook a wastewater heat mapping project for Nelson City Council during 2021. The output was a quality report delivered on time and to budget that has considerably improved out understanding, and ability to take advantage, of the energy conveyed within wastewater. The output has proven to be of significant interest to the wider Council team.

Nick and his team were proactive and collaborative. In particular I felt there was a strong effort to find solutions to issues such as data gaps as a team, and to ensure clear upfront communication. Would happily engage Applied Energy where there was a need in the future.”

Warren Biggs | Activity Engineer - Wastewater



“The advice received is of the highest standard.
The deliverables are of a high quality and his
communication has been excellent”

Mike Bourke | Senior Planning Engineer



Nick



Mike



Ina



Rob

The Value of Experience

The people involved in our wastewater network heatmapping studies have got different backgrounds and different skills, but they ALL have also got one thing in common: **EXPERIENCE, LOTS OF EXPERIENCE.**

Nick | Mechanical engineer, building HVAC designer, passionate wastewater heat recycling advocate and project leader. He brings over 30 years' experience covering all disciplines and spanning the globe.

Mike | Wastewater guru with over 40 years' experience leading a city water authority. He led the complete rebuild of Ōtautahi Christchurch city's water & wastewater networks & treatment plants after the devastating 2011 earthquakes. This experience is unique on a world scale.

Ina | Our backroom powerhouse, looking after data management, programme management and project administration.

Rob | The managing director of Geoinsight, Rob and his team are our genius mapping partners. They produce hard copy maps for the reports and easy to use web-maps.

Their expertise is amazing!

“Nick Meeten reported on the feasibility of using wastewater as a heat source for an Auckland Council leisure center and potential residential development. Nick’s work exceeded our expectations. It was delivered on time and as per our scope while being clear and easy to understand. In addition, the way he presented his work, along with his track record and widespread knowledge of the industry provided confidence in his work. We look forward to working with Nick again.”

Kirk Archibald | Energy Efficiency and Sustainability Manager



All Our Services

Design

- Heating, Ventilation & Air Conditioning (HVAC) designs
- Heating energy options studies
- Heating/cooling feasibility studies
- Internal Environment & Air Quality Assessment
- Commercial Kitchen ventilation design
- Wastewater Heat Recycling designs
- Heating options scenario modelling for multiple buildings, campuses & district heating networks.
- Wastewater flow & temperature measurement & data logging
- Wastewater thermal capacity assessments
- Fire reports (New Zealand only)

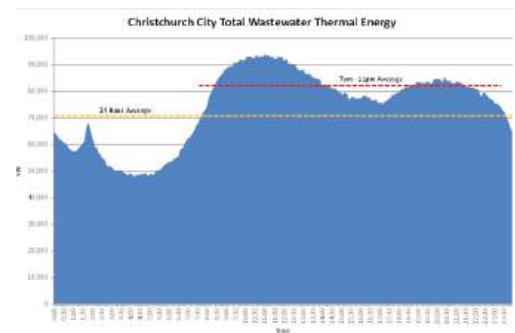
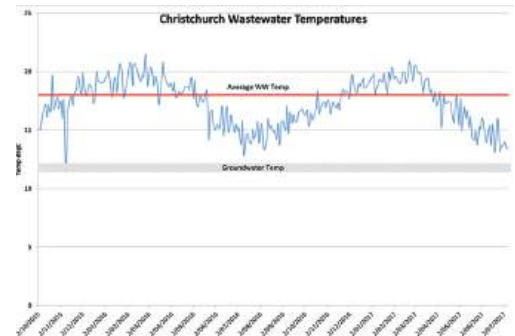
Energy Planning

- Wastewater Network Heat Mapping
- Heating options scenario modelling for multiple buildings, campuses, district heating networks
- Wastewater flow & temperature measurement & data logging
- Wastewater thermal capacity assessments
- Energy assessments for site selection studies

Contact us today - we'd love to hear from you ...
+64 27 251 9033 info@appliedenergyplanning.com

“Our investment in Applied Energy’s fee was one of the best investments we have ever made!”

Susie Wickham | CFO, Ormond Nurseries Ltd



“We have found Applied Energy a pleasure to deal with. Their communication is excellent and the reports provided are clear and easy to understand. We also value the innovative advice that has been provided”

David Langford

| Group Manager Planning & Infrastructure



Te Kaunihera-ā-Rohe o Ngāmotu
**New Plymouth
District Council**



APPLIED ENERGY PLANNING

Our Logo

Blue represents cooling

Red represents heating

The curving arrows represent
energy flows in Sankey diagrams

The energy flows interlink in circular paths to represent connected infrastructure networks, connected sectors and circular resource flows (circular economy) and a variation on our New Zealand Māori 'Pikorua' which represents 'the path of life' and 'strong relationships'

Our Vision

To be known for thought leadership
and creating brilliant environments

Our Mission

We provide clever solutions that incorporate our expertise, our experience and a good dose of common sense to maximise value and sustainability

Our Purpose

We do this to have happy clients and a happy earth.
'Using the least to achieve the most'



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