

One of the greatest challenges of the 21st century is satisfying our energy needs. The traditional fossil energy however cannot be the solution in many cases due to strict environmental and other legal regulations or simply because employing it would be too expensive. The key is using alternative energy sources and technologies!

Heat pumps are today's favourite example for technologies based on alternative energy sources and are already widely known for providing heat energy for buildings. The technological efficiency of these devices depends to a great extent on the temperature of the heat source.

Below the surface, inside the sewer there is a hidden and rarely used energy source to be found. This is the communal, household and industrial wastewater. The temperature of communal wastewater (collected and channelled through the sewage system) is stable and in average between 10-20°C, whilst that of industrial wastewater can get even higher, therefore it is one of the most ideal heat sources to feed heat pumps is wastewater.

Utilizing wastewater as an energy source is not a completely new idea, however until now, there has not been a technology developed to harness it economically.



The Thermowatt Technology

The Hungarian Thermowatt Ltd. has developed a technological solution to harness and utilize energy resided in wastewater to air-condition (cool and/or heat) buildings in a modern, environmental friendly and economical fashion. The "Method and Circuit Arrangement for Recovering Heat from Wastewaters" has been granted a Hungarian Patent and therefore is under patent protection since 2010 – international patenting processes are ongoing in the EU, USA, Ukraine, Russia and China since 2011.

The main point of the Thermowatt Technology is to take out wastewater from the sewer line, direct it to a heat exchanger in mechanically filtered form and then lead it back to the sewer line along with the separated solid particles. The heat energy recovered by heat exchangers is transferred into utility heating or cooling via water/water heat pumps. Special advantage of the system is that the same heating system is applied for both cooling and heating. In order to operate in the most efficient and energy saving way,

the system elements are carefully designed, optimised and harmonised. The technology has also been tested in extremely low and high outside temperatures (-17 °C - +37°C) and under fluctuating quantity and quality wastewater conditions.

Available energy efficiency values with wastewater utilizing system are the following:

- Heating mode: COP = 5,5-6,5
- Cooling mode: EER = 6,0 - 7,0



To cover the heating or cooling demand of a building through the utilization of wastewater as a heat source a sufficient amount of wastewater has to be available. To recover 1MW of heating energy there is a need for 3000 m³/day of wastewater available. This amount is vitally dependent upon the temperature of the wastewater and the technical efficiency of the system.

Deployment and operational advantages of the system

- The system can be used in both cooling and heating mode – even simultaneously!: great savings can be achieved, since the same heating system is applied for both cooling and heating
- Fast and easy installation: in relation to geothermal systems the deployment acquires far less space and thermal probe or establishment of a collector field is not necessary, therefore space, time and money can be saved
- City centre installation is possible
- Easily accessible and maintainable (especially important consideration for the operator)
- Integrated control system ensures simple and easy supervision (even remotely)
- Low operational costs
- Generating additional income for wastewater utility.

Additional advantages of the system are that there is no CO₂ or other greenhouse gas (GHG) emission on the spot (zero emission) and by employing alternative energy supports with meeting Energy Directives which require an ever growing percentage of energy used to come from renewable energy sources. Thermowatt also generates a significant competitive edge on corporate as well as on industrial level.

Achievements

The Thermowatt Technology has received the international **Aqualia Award for Innovation** at the WEX Global – Water Energy Exchange in 2013.

INSTALLATIONS:

- MOM Cultural Centre (size: 1 MW, operating since April 2011)
- Budapest Sewage Works headquarter (size: 1 MW, operating since November 2012)
- Medical Centre of Hungarian Defence Forces (Budapest) – currently under construction. Its size is exceptional 3.8 MW and operation will start in March 2014.



THERMOWATT LTD.

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Our products and services

Heating and cooling from wastewater.

“Reduction in heating and cooling costs from wastewater heat utilization.”

Our value proposition

Our company entered the renewable energy sector with a new solution, unknown in the global market, which uses waste heat recovered from wastewater as a new source of energy generation.

Utilizing wastewater heat comes with several advantages:

- Due to its virtually constant temperature, wastewater heat offers much better energy efficiency than soil heat or groundwater.
- The system can be used both in heating and cooling modes and connects easily to the existing heating/cooling systems.
- Low operational costs even with urban city centre installation, is possible.
- Does not consume water unlike other heat exchange systems.
- No size limit in scale as the only limit is the volume of available wastewater streams.

Who we are

Our company was established in 2007 to implement, manage and operate systems based on its proprietary invention. The “Method and Circuit Agreement for Recovering Heat from Wastewaters” has been patented in Hungary and filed globally.

Our technology was first recognized with the Spanish Aqualia Award for Innovation in 2013 and has received the Abu Dhabi based Water & Energy Award in 2014. It has also received the Abu Dhabi based First Place Innovator in the Water for Real Estate Sector award in 2015.

Our work

Thermowatt serves clients in Europe, Latin America, the Middle East and Russia. In Hungary we have several reference projects including:

- Budapest Sewage Works
- Hungarian Armed Forces Medical Centre – Military Hospital
- MOM Cultural Centre heating and cooling system
- University of Szeged

We are currently have patents in Hungary, Russia and the Ukraine with patents pending in the EU, USA and China for our “Method and Circuit Arrangement for Recovering Heat from Wastewaters.”

HUNGARIAN MILITARY HOSPITAL HEATING SYSTEM

Outstanding performance

Before August 2014, the Hungarian Military Hospital in the city centre was using extensive natural gas resources for heating, because of an outdated and inefficient heating and cooling system.

Thermowatt was hired to design a wastewater heat recovery solution – adapting its invention to the special structural needs of the facility. We achieved 100% underground installation, kept the old system online as an operation and security measure and navigated around a collector 70m away in the middle of a road and in the middle of a tram line.



The outcome? Once the new Thermowatt system was operational, the hospital was able to save \$310,000 each year. This system has been operating with outstanding performance and efficiency in both heating and cooling since that time.

THE “GREENEST” HUNGARIAN UNIVERSITY

Re-purposing for a cause The University of Szeged hoped to become the “greenest Hungarian University.” They applied for and received a grant to build a wastewater-heat recovery system.

The University selected Thermowatt to implement the project. It had a unique challenge. In order to access enough wastewater to meet cooling and heating capacity, waste water had to be transported from the Alsotelepi pumping station over a 700m long pipeline, to the university. Thermowatt answered the call and was able to execute the project. The University of Szeged is now a contender for the “greenest Hungarian University!”



<http://thermowatt-global.com>



INTERNATIONAL AWARD WINNER

The Thermowatt solution won the

- Aqualia Award for Innovation (WEX Global, 2013) and
- Water and Energy Award (WEX Global, 2014)
- First Place Innovator in the Water for Real Estate Sector (Innovate@IWS, International Water Summit - Abu Dhabi, 2015)



REFERENCE PROJECTS

Already operating reference projects of wastewater heat utilization:

- Budapest Sewage Works premises (1 MW)
- MOM Cultural Centre (1 MW)
- Medical Centre, Hungarian Defence Forces (3.8 MW)
- Budapest Sewage Works – Ferencváros pumping station (1.2 MW)
- University of Szeged – JATIK building (1.4 MW)



WASTEWATER

Below the surface, inside the sewer there is a hidden and rarely used energy source to be found: the wastewater. The temperature of communal wastewater is in average between 10-20°C, therefore it is considered to be a great heat source that permits of economical operation of heat pumps.

THERMOWATT Energy and Building Ltd.

Árpád Fejedelem útja 26.-28., Budapest, H-1023

Tel.: (+36) 1 430-3643

Fax: (+36) 1 430-3641

info@thermowatt.hu

www.thermowatt-global.com

Agent in UK: Wise HVAC Ltd.
office@wisehvac.co.uk

Agent in USA: EMCO Systems Solution Inc.
design@emcosystems.net

Agent in France: ILTAgence S.A.R.L.
tamas.rupp@iltagence.fr

Agent in Italy: E.L.I.S.A.S. Ambiente
elisasambiente@gmail.com

Agent in Singapore: Earthfusion Pte Ltd.
business@earthfusion.sg

Co-operating partners:



It is known, that one of the greatest challenges of the XXI. st century is satisfying our energy-needs. The ever growing exploitation of the traditional natural resources, the excessive use of electricity and precious water as well as the long term expected climate change urges more efficient use of energy and further development of affordable alternative (renewable) energy sources.

THERMOWATT Ltd. with its unique technology – under patent protection in Hungary since September 2010 – is engaged in recovering energy from communal wastewater in order to use it not only for heating but also cooling.

This solution for retrieving energy combines all the advantages of alternative energy-sources without any of the backside coming forward, that is to say it is an

- energy-efficient and innovative solution;
- there is no hazardous waste or toxic emission;
- no complicated shipping, transportation or dosage;
- nor expensive installation;
- moreover it can be deployed economically especially in case of greater power-demand.



TECHNOLOGY

Thermowatt Ltd. has developed a technological solution to harness and utilize energy residing in wastewater to heat and/or cool buildings in a modern, environmentally friendly and economical fashion. The basis of the system is a heat pump, which is today's most modern and environmentally friendly device used to serve buildings with heat-energy.

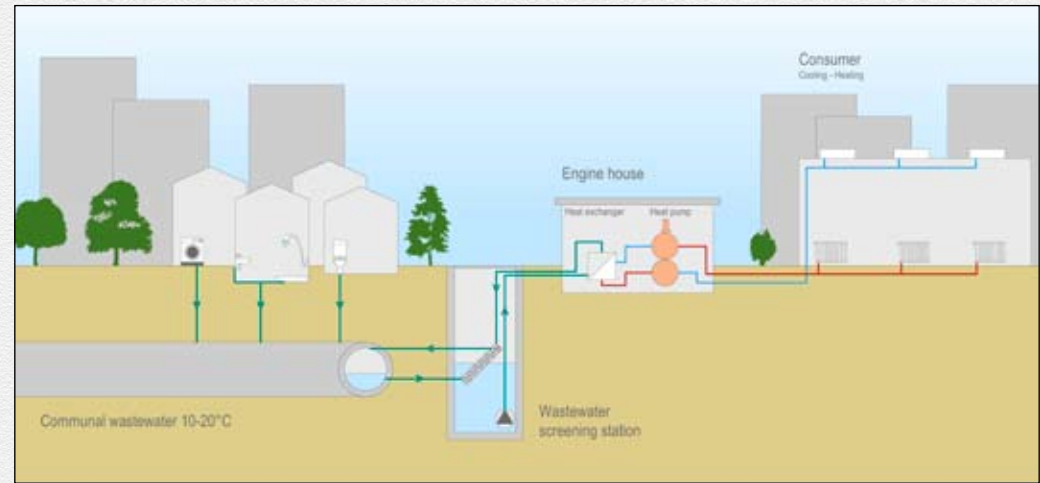
BUDAPEST SEWAGEWORKS



MEDICAL CENTRE

ENVIRONMENT FRIENDLY

Recovering heat from wastewater is in every respect a very prosperous kind of affordable alternative energy in favour of cutting back on usage of primer energy sources (meaning also strengthening of energy supply security) and eliminating CO2 emission on the spot.



LOWER OPERATIONAL COSTS

One of today's ever growing issues is significantly increasing maintenance costs of buildings because of elevated energy prices. We see it as our mission to find solutions especially where energy consumption is high but payable income cannot be further raised, thus only through lowering costs can a more efficient operation be achieved.

FAST AND EASY INSTALLATION, SIMPLE SUPERVISION

The proposed wastewater utilizing system does not require installation of heat-exchangers inside the pipes, so it allows fast construction, even to satisfy high heat-demand.

Given its compact size it has small territorial demand, thus it is an ideal solution in city centres.

MOM CULTURAL CENTRE

