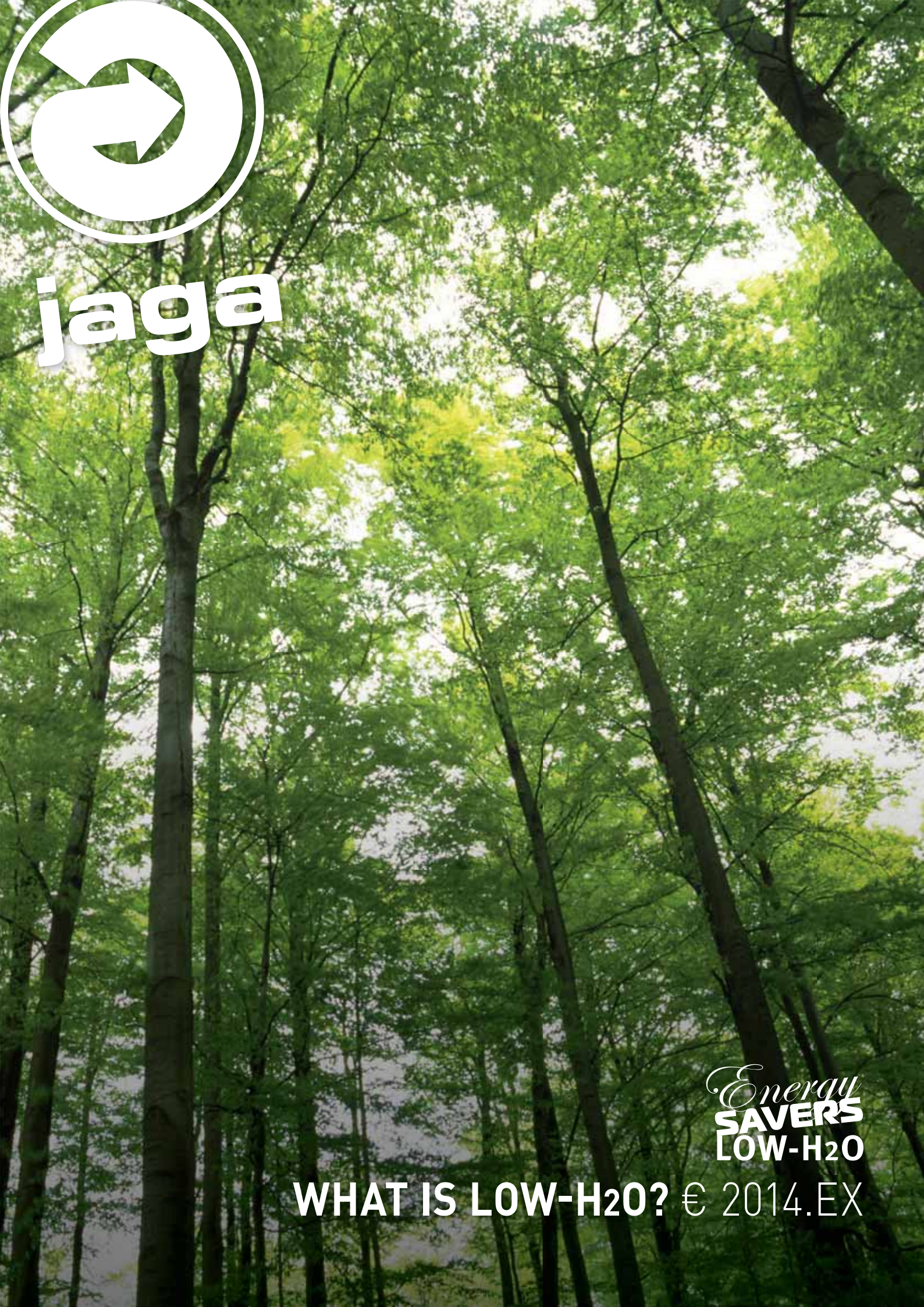
jaga
Energy
SAVERS
LOW-H2O
WHAT IS LOW-H2O? € 2014.EX

Energy SAVERS
LOW-H2O

THE "LOW MASS" RADIATOR WITH SUPER FAST HEAT CONDUCTIVITY

Energy SAVERS LOW-H2O MAXIMUM HEAT FOR LOW WATER TEMPERATURES

"Low-H2O radiators provide measurable heat to the ambient air with water temperature of only 28°C."

THE RADIATOR WITH SUPER **FAST HEAT CONDUCTIVITY**

The Jaga Low-H2O heat exchanger is not made of steel, but of super - fast conducting copper and aluminium, which immediately transfers its heat to the room. The advantage of this excellent conductivity increases as the water temperature falls! The serial matrix irrigation with up to 16 copper tubes and the optimised corrugated shape of the aluminium fins maximises heat transfer from the central heating water to the air. As soon as the thermostatic valve opens, the heat is quickly, evenly and accurately distributed throughout the room.

EXAMPLE START UP ENERGY CONSUMPTION
for a 10 kW heating system, 45/35/20°C temperature profile

	underfloor heating	cast iron radiator	steel panel radiator	Jaga Low-H2O radiator
Start up energy (m³ gas)*	3.9	1.9	0.7	0.05
CO2 Emission (g)	7577	3698	1446	110
Stored heat (kWh)	35.1	17.1	6.7	0.5

** Energy to heat up the system, before the system starts to emit heat into the building.*

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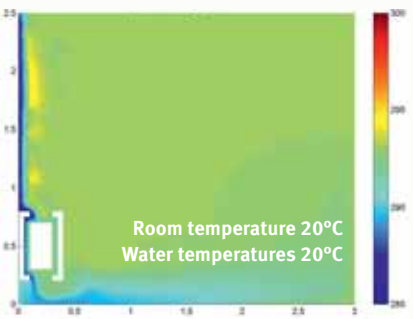
FAQ: LOW-H_2O FOR HEAT PUMPS AND CONDENSING BOILERS

What flow water temperature does a Low-H_2O radiator require?
The Low-H_2O radiator will provide measurable heat to the ambient air with a flow temperature of only 28°C.
Measurements of the heat output of Jaga Low-H_2O radiators according to the temperature difference between the ambient air and the average water temperature confirm proper operation at an over-temperature of only 5°C.

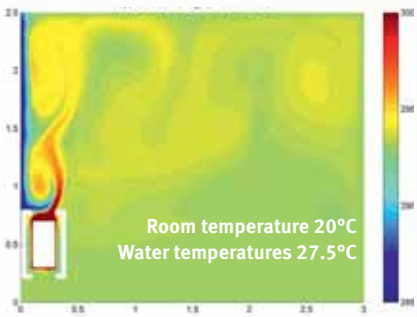
A totally independent investigation commissioned by Novem (Dutch Organisation for Energy and Environment), conducted by the Technical University of Eindhoven (Prof J. Van Schijndel).
Research is being conducted on how Low-H_2O radiators can be used as low temperature heating (LTH) systems in new buildings and existing homes. The focus of the research has been on the total heat output and the compensation of cold downdraught.
Full Test report on heating-studies.org.

Size options
A heating system designed for an external temperature of -10°C only requires about 2/3rd of its transmission capacity when it is 0°C outside. Thus with normal dimensioning, for 90% of the heating season, the boiler temperature is lowered to below the condensation point, and the heating system with Low-H_2O radiators will work with maximum efficiency.

NO EXCESS TEMPERATURE



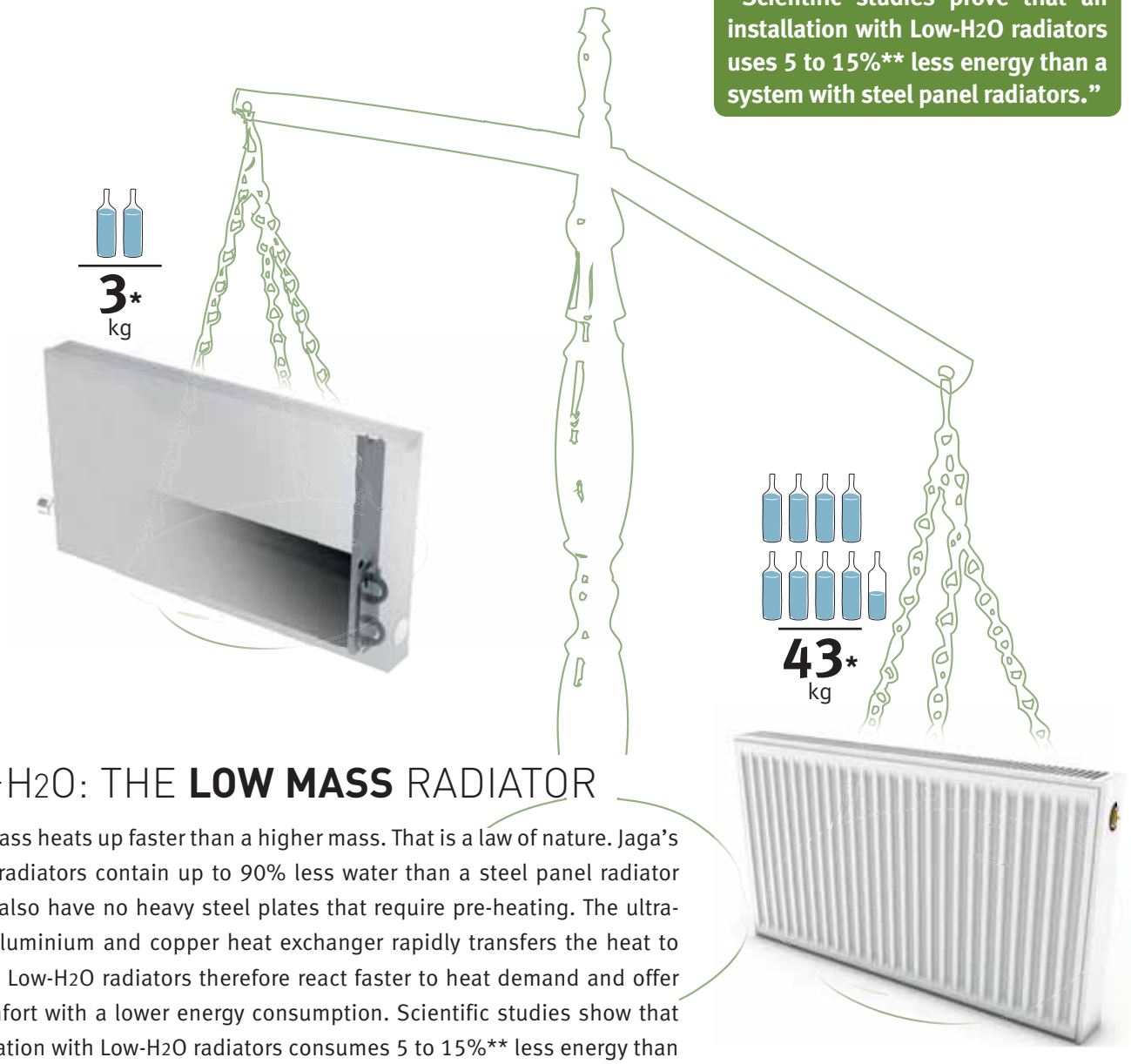
EXCESS TEMPERATURE OF 7.5 °C



Energy SAVERS LOW-H2O

LOWER ENERGY CONSUMPTION THROUGH LOWER WEIGHT AND WATER CONTENT

"Scientific studies prove that an installation with Low-H2O radiators uses 5 to 15% less energy than a system with steel panel radiators."**



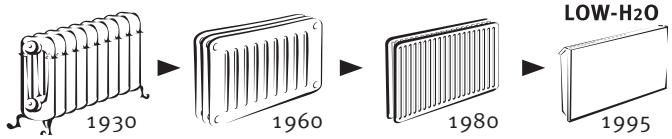
LOW-H2O: THE **LOW MASS** RADIATOR

A lower mass heats up faster than a higher mass. That is a law of nature. Jaga's Low-H2O radiators contain up to 90% less water than a steel panel radiator and they also have no heavy steel plates that require pre-heating. The ultra-modern aluminium and copper heat exchanger rapidly transfers the heat to the room. Low-H2O radiators therefore react faster to heat demand and offer more comfort with a lower energy consumption. Scientific studies show that an installation with Low-H2O radiators consumes 5 to 15%** less energy than a system with steel panel radiators. This is because they achieve the desired temperature more rapidly, and less heat is wasted through the unnecessary over - heating that is a feature of heavier radiators.

** The specified weight comprises the total water and thermal mass of a radiator of 1000 Watts at 75/65/20.*

*** Savings irrespective of the construction method of the building, the climate, and the behaviour of the occupants.*
Tested by BRE (Building Research Establishment), Technical University of Eindhoven and the Russian Academy of Architecture.
See also www.heating-studies.org.

TREND TOWARDS LOWER MASS



Water content	25 L	12 L	7 L	1.5 L
Total weight	80 kg	40 kg	30 kg	10 kg
Reaction time	slow	slow	slow	fast

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EVOLUTION IN DESIGN OF JAGA HEAT EXCHANGERS TOWARDS MUCH LOWER WATER TEMPERATURES

Jaga launched the Low-H_2O heat exchanger in 1962. Since then, we have constantly invested in new technologies and production methods to continuously improve this technology. Through fundamental scientific research, the Low-H_2O heat exchanger has been made perfectly suitable for low temperature heating, and delivers the fastest reaction times. The current generation Low-H_2O radiators were developed in collaboration with leading universities, such as the Universiteit Hasselt. The result: lower mass , less water , fast response , efficient heat transfer.

Microscopic view of the aluminium fins attached to the copper tube

Energy SAVERS LOW-H2O FASTEST RESPONSE TIME FOR MAXIMUM COMFORT

"Low-H2O radiators optimise the operation of the entire installation, including that of the central heating boiler."

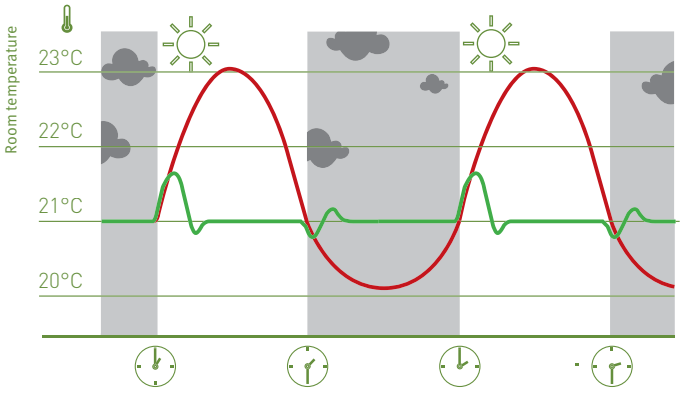
GREATER COMFORT

A fast acting radiator ensures a perfectly controlled room temperature.
A window or door opens , cold air enters the room. Low-H2O immediately springs into action. The sun shines, the room warms up. Low-H2O immediately switches itself off. The result, better temperature control, keeping the room temperature where it needs to be.

LOWER CONSUMPTION

A Low-H2O radiator **heats up much faster.**
The high-tech copper/aluminium heat exchanger immediately transfers its heat to the room. So your boiler can be set to switch on **20 minutes later than with steel panel radiators** .
But low mass means that your Low-H2O radiator **cools down faster** too.
The sun suddenly starts shining? Are home appliances or electrical equipment being used? Are there more people in the house? The temperature will begin to rise and the thermostats will respond. Heavy steel panel radiators still pump out wasted heat for 20 minutes, overheating the room. But Low-H2O responds immediately because of its low mass and low water content. So there is **no wasteful over-heating.**

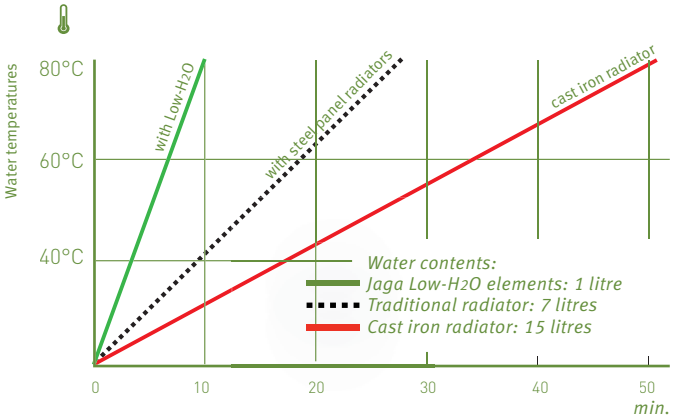
COMPARISON OF RESPONSE TIME TO TEMPERATURE CHANGES



A steel panel radiator of 1000 watts buffers 650 Wh energy with a 55/45/20 regime. This heat cannot be controlled by the thermostat. It becomes excessively hot when the sun suddenly starts shining. The heat exchanger of a comparable Low-H2O radiator buffers only 60 Wh energy. The energy delivered by the central heating boiler is immediately delivered to the room and there is no energy-wasting post-heating. Heat is only transmitted when it is required.

Steel panel radiator
Low-H2O radiator

COMPARISON OF WARMING UP TIME FROM START UP



Thanks to the low water content and the better thermal conductivity, units with Low-H2O radiators reach their full capacity very quickly. Ordinary radiators take 3 times longer.

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HOW LOW-H_2O RADIATORS ALSO IMPROVE THE OPERATION OF THE CENTRAL HEATING SYSTEM

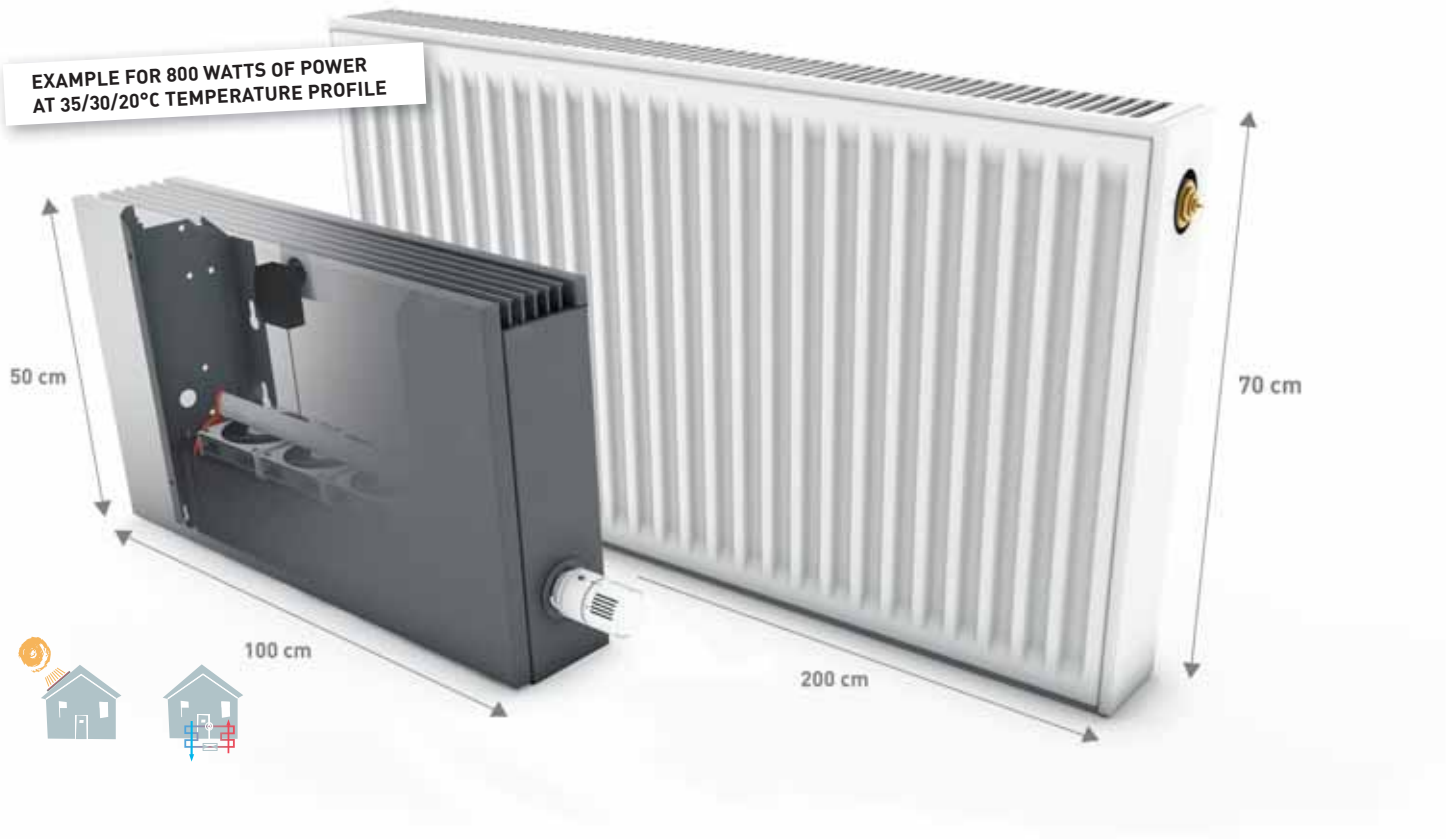
The smaller mass and the faster reaction time of Low-H_2O radiators ensures that the return water to the boiler heats up faster. There is less difference between the flow and return temperatures, allowing the boiler to heat up faster without thermal stress in its heat exchanger. The entire system, including heat emmision as well as heat generation will respond better and faster to any heat demand. Also, boilers will be able to modulate flow temperatures downwards more quickly, reducing energy consumption.

Energy SAVERS LOW-H2O LOW-H2O WITH DBE: THE MOST COMPACT RADIATOR

"The lower the water temperature, the larger the radiators. But with DBE, almost no over-dimensioning is necessary. Low-H2O with DBE is the perfect radiator for heat pumps."

UP TO 3 TIMES THE HEATING OUTPUT

Heat pumps and solar energy systems require considerably larger radiators, since they operate with very low water temperatures that often do not exceed 35°C. Low-H2O radiators however do not have to be increased in size , since with the Dynamic Boost Effect (DBE), they provide two to three times more output. The DBE Pro version is also suitable for passive, environmentally-friendly cooling, a feature of many heat pump systems. DBE brings you the benefits of new environmentally friendly systems without sacrificing aesthetics!



THE BEST OF BOTH WORLDS: STATIC AND DYNAMIC

DBE is not a fan or an air conditioner that can only work with active fans. Even with DBE in standby mode (static, or no fans), Low-H2O radiators deliver exceptional performance. DBE is a perfect solution to avoid over-dimensioning for low temperatures.

For modern low temperature systems like these powered by heat pumps or solar energy, DBE provides the extra capacity when it's needed, without oversizing.

With the added intelligence of DBE, the Low-H2O radiator is the system of the future!

DBE ensures that modulating condensing boilers can operate with water temperatures below the condensation point , even on the coldest days.

DBE
Dynamic Boost Effect

FAQ: DYNAMIC BOOST EFFECT **DBE**

What is DBE?
DBE Dynamic Boost Effect is an option especially developed to boost the power of Low-H_2O radiators by 2 or 3 times.

Why use DBE?
The increased heat capacity can be used in 3 ways:

- if you install a heat pump in a renovation project, you can maximise efficiency by moving from very high to very low water temperature without having to install bigger radiators
- to let condensing boilers operate in condensing mode during the entire heating season, even on the coldest days.
- to install a smaller radiator to save space or simply to look good

How to install DBE?
The DBE set consists of:

- one or more activators (depending on the length of the set) that must be clicked to the heat exchanger
- a 220Vac to 12Vdc power supply (not to be used if a 12 Vdc supply is available).
- control unit to click on to the end of the heat exchanger.
- control panel with on/off and boost function, to be integrated in the grille.

For more information see
www.theradiatorfactory.com

How does DBE work?
DBE continuously measures the room temperature and water temperature and works entirely autonomously. For most of the heating season the Low-H_2O heat exchanger will be sufficient to keep you comfortably warm, but the system will automatically switch to comfort mode to provide heat far more quickly any time there is a very high demand for heat, for example when switching from night to day mode, when suddenly starting to use an unheated room or at times of extreme cold. The system modulates whisper-quiet according to the need for heating. With the Boost function the power is even higher, but the noise level is a little higher. The Boost function switches off automatically after approximately 15 minutes.

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FROM 100% WASTE TO 100% DESIGN

Jaga at World Creativity Forum 2012: Low-H_2O heat-exchanger trees made from recovered aluminium symbolise the new life of this material.

Energy SAVERS LOW-H2O AN EXAMPLE OF ECODESIGN

"Low-H2O radiators reduce the CO2 emissions of an average house by about 1000 kg."

Jaga Low-H2O radiators consume less energy. But it is not only during their life that they are more environmentally friendly. Since a Jaga Low-H2O radiator is much lighter and smaller than an equivalent capacity of a steel panel radiator, the raw material requirement in manufacturing is also significantly reduced. Furthermore, Low-H2O radiators last longer, they have a 30-year guarantee, and are also fully recyclable at the end of their life cycle. Compared to other heating systems, the Low-H2O radiator scores remarkably better in LCA measures , which compare the environmental impact of a variety of products.

EFFICIENT ENERGY USE

At the risk of repeating ourselves, we would like to state that Low-H2O radiators heat up and cool down much faster. Low-H2O reacts instantly to any temperature change and saves on average 10% in energy consumption.

HIGH LIFE EXPECTANCY

The heat exchanger consists of aluminium heating fins, copper and brass irrigation tubes and brass collectors. Totally rust-free, resistant to very high working pressures and with a 30-year guarantee. A long life means lower environmental impact.

EFFICIENT USE OF MATERIALS

Since copper and aluminium are such efficient heat conductors, only a relatively small quantity of these materials is required , even including the casing. A Low-H2O radiator weights much less than a steel panel radiator.

FULLY RECYCLABLE

At first sight, the choice for copper and aluminium may seem ecologically less sound, but due to its high efficiency, long life, and the fact that these valuable materials are always fully recycled, they ultimately result in an improved LCA score!

JAGA LOW-H2O RADIATORS SAVE WASTE

BEST LCA - SCORE

Life cycle analysis (LCA) according to the Ovam Ecolizer database and weight.
Example for a 10 kW heating system, 45/35/20 temperature profile.

	underfloor heating	cast iron radiator	steel panel radiator	Jaga Low-H2O radiator
LCA Score	248700	248744	185853	66517
Total weight incl. water (kg)	6252	360	216.7	48.8

What is an LCA score?
LCA or 'Life Cycle Assessment' is a system designed to compare products and to improve their environmental profile. Governments are trying to standardise LCA systems and to integrate them into the legislation. Jaga uses Ovam's Ecoliser 2.0 based on the Eco-Indicator EI-99 database. The lower the LCA score, the less the adverse impact on the environment. Jaga Low-H2O radiators score significantly better than other radiators or heating systems.

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Energy SAVERS LOW-H2O

LOW-H2O AS A PERFECT PARTNER FOR UNDERFLOOR HEATING: MORE COMFORT, LESS CONSUMPTION

Many new and renovated houses have underfloor heating. But this system also has a major drawback, underfloor heating reacts slowly to temperature fluctuations and needs more time to adjust the temperature. While it is adjusting , the building has poor thermal comfort. It is too cold or too hot. If it's too hot, it's wasting energy. Combine the underfloor heating with small and fast Low-H2O radiators and the problem is solved!

"Low-H2O radiators operate at the same temperature as an underfloor heating system. A simple LTHW system with zone control is sufficient."

OPTIMAL CONTROL

Underfloor heating in combination with Jaga's small Low-H2O radiators provide greater heating comfort with lower energy consumption. Adjust the underfloor heating for a constant base temperature of 17 or 18°C. The Low-H2O radiators help produce a perfectly controlled, stable comfort temperature. This combination is more economical and efficient, and satisfies the actual heat demand, not merely the heat demand of the system.

Low-H2O wall radiators or trench heating for ultra fast heating, perfect temperature control – and as the main heating system between seasons!

Underfloor heating for a constant base temperature of 17° or 18°C during the cold period.

Jaga offers a floor solution that is only 6 cm high and 13 cm wide!

COMFORT BETWEEN SEASONS

Temperatures tend to fluctuate between seasons. This gives rise to a need to quickly absorb sudden cold or heat. A heavy, slow-reacting underfloor heating system alone cannot achieve this. In the autumn, for example, it is often too early to switch on the underfloor heating system, and at night it can even be a little chilly. Low-H2O radiators respond faster and immediately provide thermal comfort. They achieve this with a much lower consumption than the heavy and slow underfloor heating.

A COMBINED, ENERGY-EFFICIENT COMFORT SYSTEM

For the control of the comfort temperature, the smallest Low-H2O radiators will be sufficient. A small capacity is adequate even between seasons. Low-H2O radiators can also be installed on upper floors or rooms without underfloor heating. The advantage they offer is that with the DBE option, no over-dimensioning is required, while the entire system operates at one temperature.

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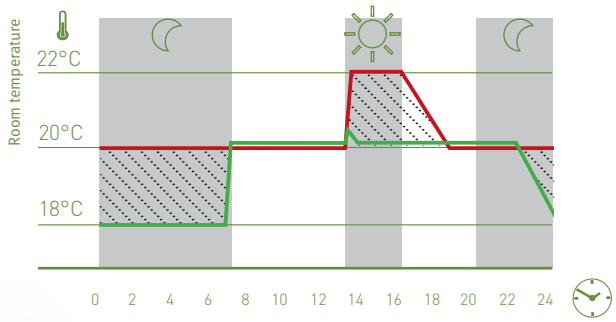
COMPARISON BETWEEN HEATING WITH/WITHOUT LOW-H_2O



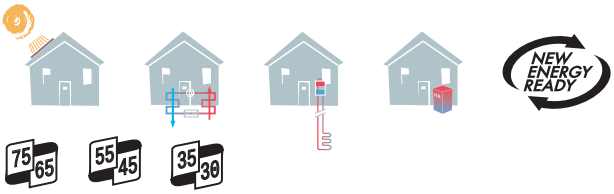
Underfloor heating: *room temperature 20°C*

Low-H_2O in combination with underfloor heating: *the underfloor heating provides a base temperature of 18°C, while the responsive DBE radiators ensure a perfectly regulated and stable comfort temperature of 20°C. With this combination, energy savings of over 30% are achieved, compared to an equivalent system without DBE! Test conducted in the Jaga Experience Lab (www.heating-studies.org).*

Energy saving

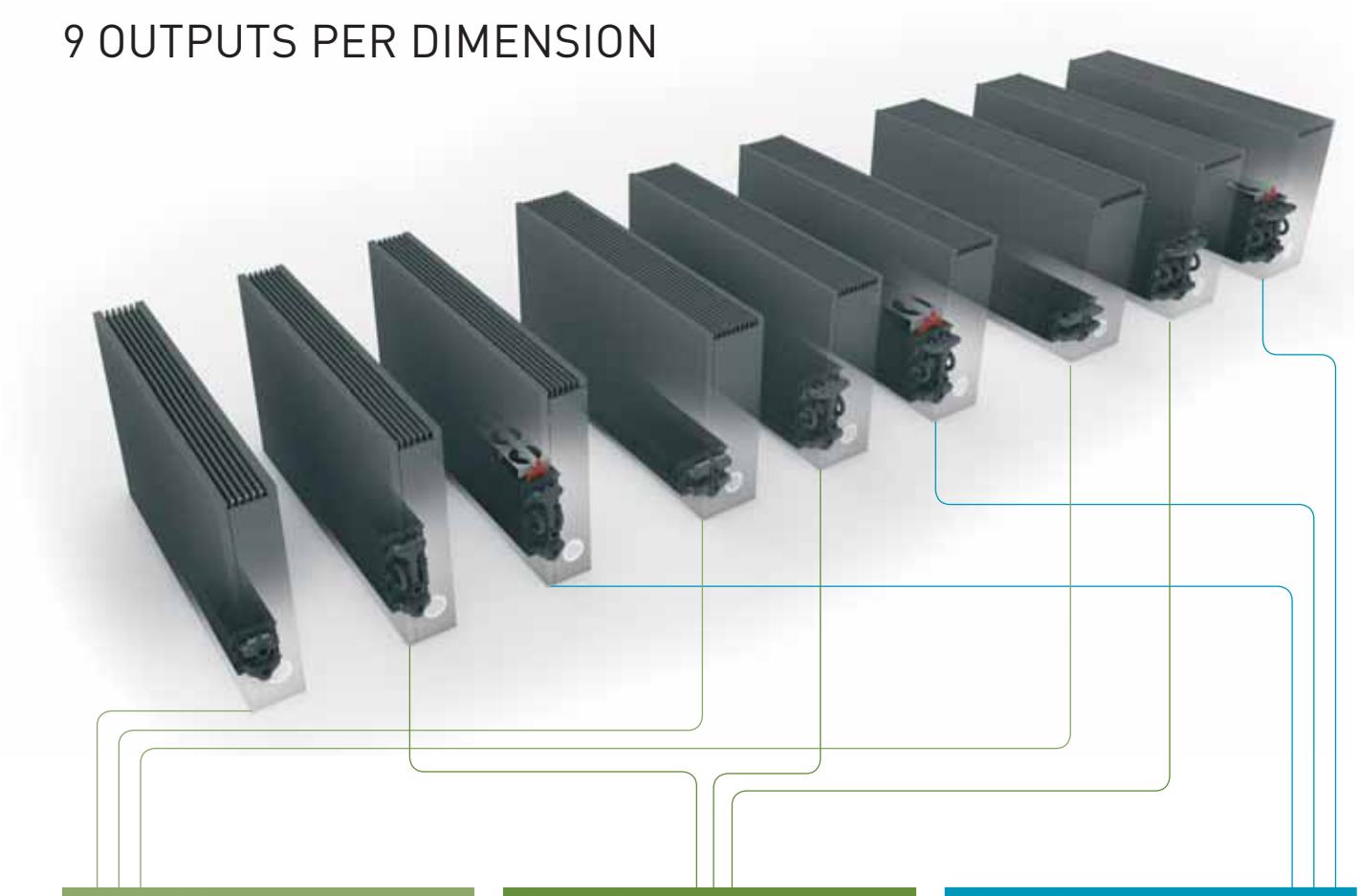
Energy SAVERS LOW-H2O DESIGN SOLUTIONS FOR ANY RENOVATION

Don't let the positioning of your heating system affect your (re)construction plans. Jaga solutions allow you to give your creativity free rein. Wall and freestanding radiators in all sizes and colours, innovative build-in solutions and super-compact floor elements allow for any type of architecture without the need for aesthetic compromises



"With Low-H2O radiators, conversions to lower water temperatures and lower energy consumption become possible without the need for any significant over-dimensioning."

9 OUTPUTS PER DIMENSION



LOW-H2O STANDARD

For maximum efficiency and low energy use.

LOW-H2O TWIN

For a higher output air temperature for quick compensation of cold downdraught from glazed facades or air vents.

LOW-H2O TWIN DBE

For maximum heat output with super low flow temperatures.

NO COMPROMISES IN ENERGY SAVINGS

The same size will provide you with the required heat output for any power source and water temperature. This allows you to opt for the most compact radiator, even for heat pumps with a 35/30 temperature profile. This unique option provides the architect or designer complete freedom to realise any architectural project without having to make any compromises for the heating system.

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Energy SAVERS LOW-H2O ENERGY SAVINGS - PROVEN IN THE LABORATORY AND IN PRACTICE

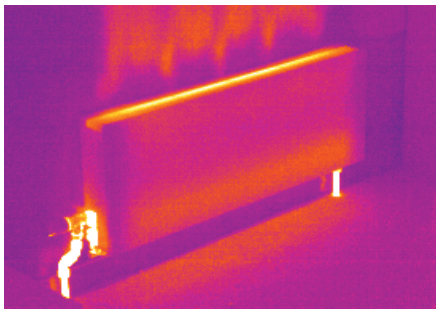
"There is a clear correlation between the weight of a radiator, its speed of response and its energy efficiency."

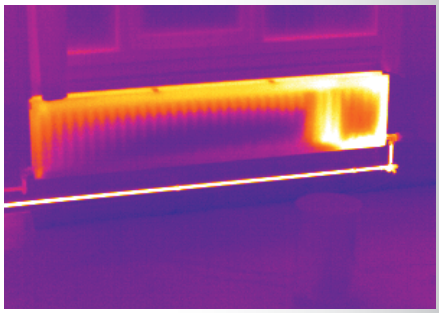
RESPONSE VISUALISED

All climate appliances can be measured and compared in the Jaga Experience Lab. Infrared images provide a clear picture of the thermal properties. The Low-H2O radiator starts spreading heat in the room within just 2 minutes. These pictures, 4 minutes after the start of heating, clearly show that both the supply and return pipes of the Low-H2O radiator have heated up. The return pipe from the steel panel radiator is still cold, the radiator is still accumulating heat. This will continue up to the 20th minute before it reaches its full output.
For more information, please visit www.heating-studies.org

STANDARD LOW-H2O RADIATORS (WITHOUT DBE) AFTER 4 MINUTES

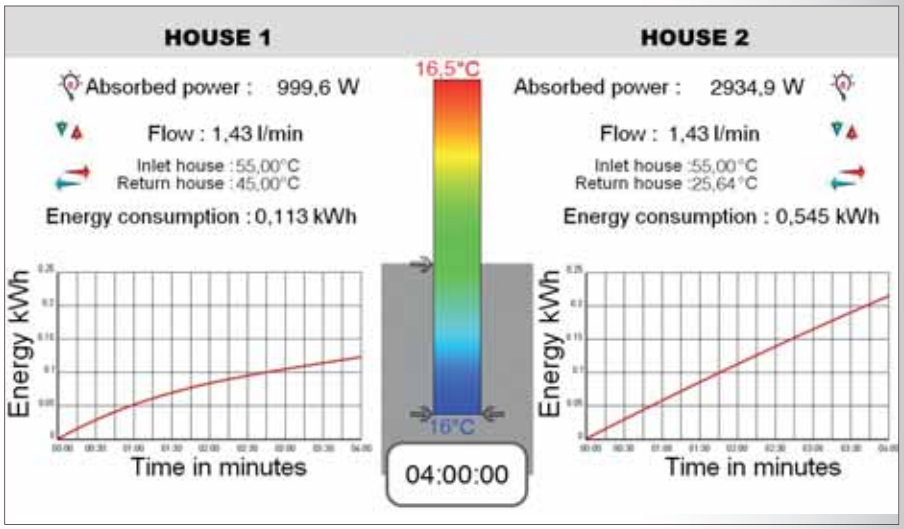
STEEL PANEL RADIATOR AFTER 4 MINUTES





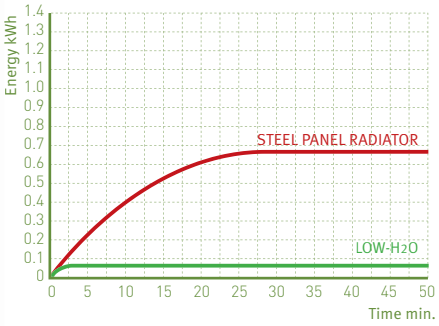
Infrared pictures clearly show that Low-H2O radiators bring the room temperature to the required level much faster. The Low-H2O radiator is fully heated up, while the return line of the steel panel radiator is still cold, and heat is still not being transmitted.
Test carried out by the British BRE (Building Research Establishment) and in the Jaga Experience Lab.

Monitoring by the climate logger of the Jaga Experience Lab.



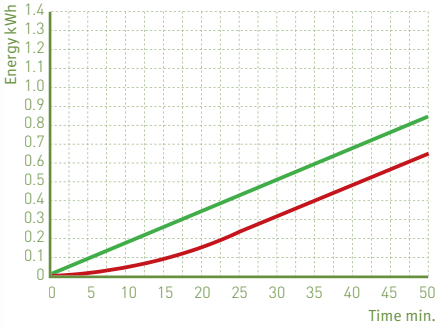
EN 442 EURONORM

Stored energy in the radiator



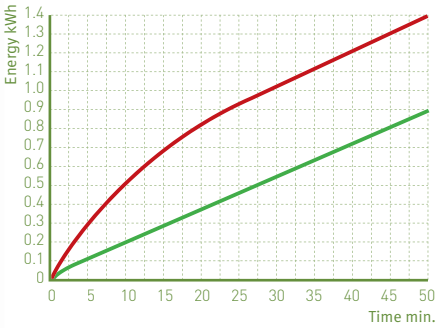
Both deliver 1000 watts output at 55/45/20. The steel panel radiator stores 0.65 kWh in heating up the water and the steel. The Low-H2O stores less than 10%: around 0.06 kWh.

Energy emitted by the radiator



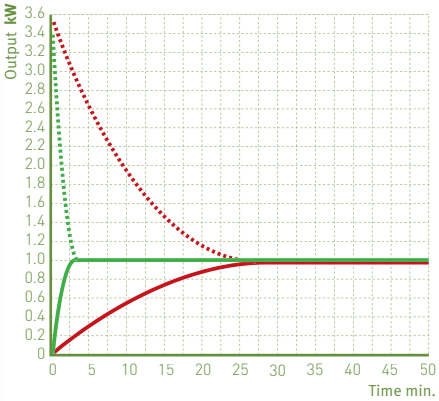
The Low-H2O radiator almost instantaneously delivers all the supplied energy to the room. The steel panel radiator fully heats up only after 20 minutes, after which it delivers its full power to the room

Total energy consumption radiator



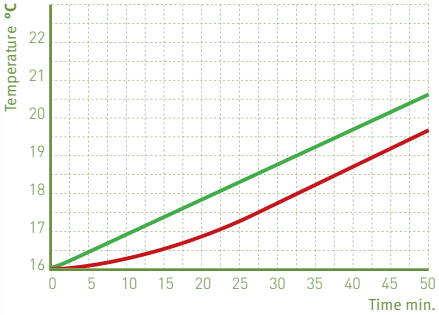
The steel panel radiator consumes much more energy than the Low-H2O radiator during the first 20 minutes. This energy accumulates inside the water and the steel. The steel panel radiator will only release this energy to the room when the room cools slowly outside the heating period. The difference in consumption between the two systems is the difference in the amount of stored energy, around 0.6 kWh.

Output / input power



Both appliances deliver 1000 Watts power to the environment after they have been fully heated with the Low-H2O radiator, this happens after 2 minutes with the steel panel radiator, this only happens after 20 minutes.

Rise in room temperature

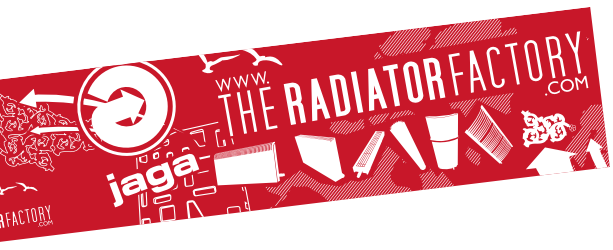


The Low-H2O heats the room up much faster and responds very efficiently to changes in heat demand. The rise in room temperature and the energy transmitted by the radiator are proportional to each other.
In this graph, this increase is approximatly 5°C/kWh, similar to that of the houses in the Jaga Experience Lab.
In practice, this largely depends on the architectural construction.

CASE STUDIES SHOW 10% ENERGY SAVING

Perfect practical comparisons can be made using home blocks that are calibrated with respect to each other, simulating two identical houses, fitted on the one hand with Low-H2O radiators and with steel panel radiators on the other. Regardless of weather conditions, architecture, or the habits of the home users, the results show that Jaga Low-H2O radiators save around 5% energy in very dull cold weather, but in changeable weather, this saving is up to 15%! This proves the importance of the fast response of Low-H2O radiators to changing circumstances. Throughout the winter, the average savings were 10%!

A totally independent investigation carried out by BRE (former Building Research Establishment), shows an average saving of 10%!
Full test report on heating-studies.org.



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Replaces all existing price lists.

161213 - JAGA N.V.