# I TURN A HOUSE INTO A **HOME**

**As an installer, you have to know what the planner wants: you need to get to the actual needs of their client's project, as well as their demands. Because it's not just about efficiency, it's also about comfort. And different people are always going to use their home in different ways, so it's essential to get the facts right before the project starts. Similarly, if it's an office project, it's important to know how the business intends to divide and organise its interior and working spaces.**

When planning a well balanced, efficient heating system, you need to know which room will be used for what purpose, and who's going to be using it. As an installer you also have to find out about the insulation and ventilation of the areas involved. Without these facts, you're not going to be able to advise a planner or customer properly, and there's a chance you're not going to do the kind of job you know you can.

I've been an installer for many years, so I know how to choose the right kind of heating source and heat emitter(s). My knowledge is based on training, experience and, these days, more and more on the hard facts. When my father started this business, people still lived in draughty houses with high temperature radiators. These days it's impossible to talk about heating without mentioning efficiency. And it's impossible to talk about efficiency without mentioning low temperature radiators.

I use a checklist to advise my customers to select the right heating system. The checklist contains detailed questions about specific heating needs. Having all the answers in one place really helps to convince customers of the benefits of installing radiators in low temperature heating systems. As I install only Radson radiators, I am sure to have 100% customer satisfaction from my clients. I know now how to turn a house into a home.

**David Haas**,
owner / director of Haas Install

## **10 REASONS** WHY YOU SHOULD CHOOSE LOW TEMPERATURE RADIATORS

- Able to adjust quickly to temperature changes
- Meeting varying climate demands for each room
- Well-placed radiators prevent cold draughts from windows
- Rapid reaction to indoor heat gains
- Minimal heat losses compared to other heat emitters
- Ready for renewable energy sources
- Practically maintenance-free
- Life cycle of several decades
- Radiators are 100% recyclable
- Save up to **15%** on energy costs

If you want to know more about Radson radiators for low temperature heating systems, order your free copy of the **Heating Guide** at: www.radson.com/re/clever



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# HOW TO **SAVE 15%** ON ENERGY IN LOW TEMPERATURE HEATING SYSTEMS



°CLEVER LOW TEMPERATURE RADIATORS

RADSON clever heating solutions

°CLEVER LOW TEMPERATURE RADIATORS

RADSON clever heating solutions

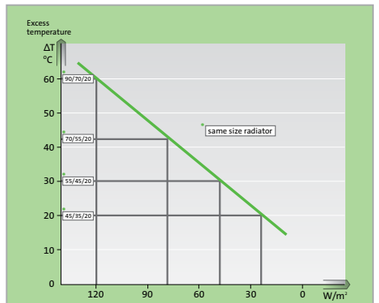
*As Director of R&D, Research and technical standards at Rettig ICC, I am responsible for providing all our markets with new answers, insights, innovations, products and results. All our efforts are based on realistic and independent research conducted in close co-operation with leading industry figures and academics. This has recently included Prof. Dr. Jarek Kurnitski (Helsinki University of Technology - Finland), Prof. Christer Harrysson (Örebro University - Sweden), Prof. Dr. Leen Peeters (Brussels University - Belgium), Prof. Dr. Dietrich Schmidt (Fraunhofer Institut - Germany) and many others. With their help, research and insight, I turn figures into results.*



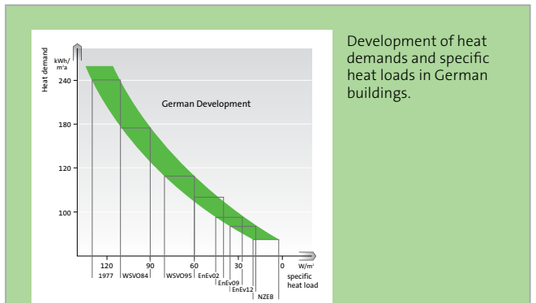
**M. Sc. (Tech) Mikko Iivonen**
Director R&D, Research and technical standards Rettig ICC

# I TURN FIGURES INTO **RESULTS**

By investing heavily in research and development, we live up to our promise to provide you with clever heating solutions. Solutions that really make a difference in terms of costs, comfort, indoor climate and energy consumption. Solutions that make it possible to save up to 15% on energy. With that in mind, I would like to share with you the results of an extensive one-year study done by Professor Harrysson. The study involved 130 Swedish single- and multi-family houses and shows that the heating energy consumption of underfloor heated buildings is 15-25% higher than in radiator heated buildings. That's not surprising, but it also shows that the increased energy efficiency of modern buildings has once again put low temperature heating systems firmly in the spotlight.




Radiator design temperatures have fallen in accordance with the lowered heat loads of buildings.




Development of heat demands and specific heat loads in German buildings.

Space heating demand - specific heat load diagram for approximation purposes

The charts show how the design temperatures of radiators have decreased over the years while still providing the same room temperature. As building and insulation requirements have become stricter across Europe, the building envelope becomes easier to heat, since less heat escapes. And with the excellent responsiveness of a radiator system, it is now more practical than ever to make the most of heat gains in the home and office.

It's time to change our way of thinking. European member states are already on a fixed deadline to create and enforce regulations to meet Energy Efficiency Goals for 2020 (Directive 20/20/20). This involves reaching a primary energy saving target of 20% below 2007 levels, reducing greenhouse gases by 20%, and a determination that 20% of gross final energy has to come from renewable energies. For building owners tasked with providing ever more impressive Energy Performance Certificates, there is more reason than ever to choose a heating system that offers proven improvements in energy efficiency - radiators in a low temperature system. This creates new opportunities and chances for you as the direct contact with the end user.

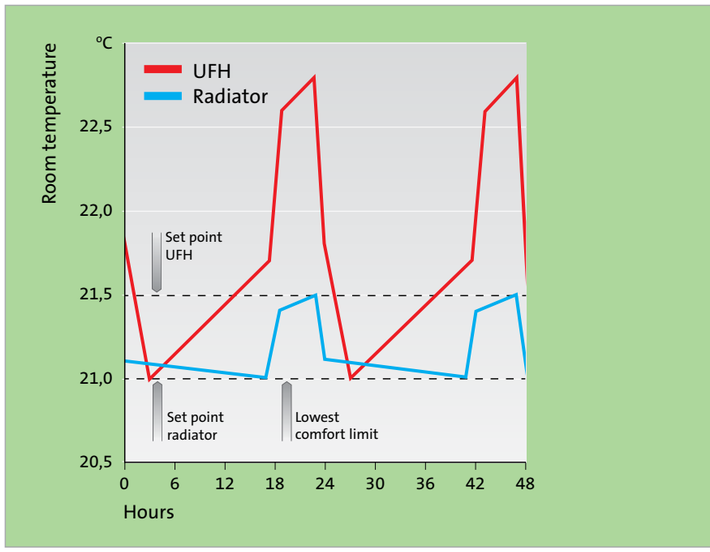
**Professor D.Sc. Jarek Kurnitski,**
Helsinki University of technology

# I TURN SCIENCE INTO **PRACTICE**

**Within the heating industry there is still the myth that within low temperature heating systems you need bigger radiators. Bigger , however, is certainly not better. During my comparative research into heat emitters, I found that even during the coldest winter period, rapidly changing heat output is needed to keep room temperature in the optimal comfort range. Both systems were set at 21°C, the lowest comfort limit and ideal indoor temperature. As you can see in the chart here, when internal heat gains of not more than 0.5°C were detected, the radiator system with its small thermal mass reacted quickly and kept the room temperature close to the set point.**

However, with the high thermal mass of underfloor heating, reaction time was much slower when heat gains were detected. This meant that under floor heating kept emitting heat, taking the temperature far above the optimal, with strong uncomfortable fluctuations. In fact, in order to keep the room temperature closer to the optimal 21°C, my research shows that the only solution is to increase the setpoint for underfloor systems at 21.5°C.

For a lot of people 0.5°C may seem a small number. But when you apply that per hour, daily, across a whole Winter heating period, the numbers soon start to multiply and any hope for energy efficiency soon fades. Fast response to heat gains and low system losses are key elements of energy efficient heating systems. Central control leads to overheating in some rooms with a consequent energy penalty, which is why my research recommends the use of low temperature systems to reduce system losses, as well as the use of heat emitters that can be individually controlled. This makes radiators the obvious choice.




Room temperature response to thermal mass of the heat emitter in the Winter season when heat gains typically do not exceed 1/3 of the heating demand.

**Professor Dr. Jarek Kurnitski,**
lectures at the Helsinki University of Technology (Finland)

**David Haas**,
Owner / director of Haas Install

# Conversion

PANEL RADIATORS - CONVERSION TABLE EN 442 - APPROXIMATE EMISSIONS

| ST | ROT | RT 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | 24 | 4,56 | 2,45 | 1,88 | 1,57 | 1,36 | 1,21 | 1,10 | 1,01 | 0,93 | 0,87 | 0,82 | 0,77 | 0,73 |
| | 22 | 3,11 | 2,11 | 1,69 | 1,44 | 1,27 | 1,14 | 1,04 | 0,96 | 0,89 | 0,83 | 0,78 | 0,74 | 0,70 |
| | 20 | 2,50 | 1,87 | 1,54 | 1,33 | 1,19 | 1,07 | 0,98 | 0,91 | 0,85 | 0,80 | 0,75 | 0,71 | 0,67 |
| | 18 | 2,13 | 1,68 | 1,42 | 1,24 | 1,11 | 1,01 | 0,93 | 0,87 | 0,81 | 0,76 | 0,72 | 0,68 | 0,65 |
| | 15 | 1,76 | 1,46 | 1,26 | 1,13 | 1,02 | 0,93 | 0,87 | 0,81 | 0,76 | 0,72 | 0,68 | 0,64 | 0,61 |
| | 12 | 1,51 | 1,29 | 1,14 | 1,03 | 0,94 | 0,87 | 0,81 | 0,76 | 0,71 | 0,67 | 0,64 | 0,61 | 0,58 |
| 85 | 24 | 1,93 | 2,63 | 2,00 | 1,67 | 1,45 | 1,29 | 1,16 | 1,07 | 0,99 | 0,92 | 0,86 | 0,81 | |
| | 22 | 3,34 | 2,26 | 1,80 | 1,53 | 1,34 | 1,21 | 1,10 | 1,01 | 0,94 | 0,88 | 0,82 | 0,78 | |
| | 20 | 2,67 | 1,99 | 1,64 | 1,41 | 1,25 | 1,13 | 1,04 | 0,96 | 0,89 | 0,84 | 0,79 | 0,75 | |
| | 18 | 2,27 | 1,78 | 1,50 | 1,31 | 1,18 | 1,07 | 0,98 | 0,91 | 0,85 | 0,80 | 0,75 | 0,72 | |
| | 15 | 1,87 | 1,54 | 1,33 | 1,19 | 1,07 | 0,98 | 0,91 | 0,85 | 0,80 | 0,75 | 0,71 | 0,67 | |
| | 12 | 1,60 | 1,36 | 1,20 | 1,08 | 0,99 | 0,91 | 0,85 | 0,79 | 0,75 | 0,70 | 0,67 | 0,64 | |
| 80 | 24 | 5,38 | 2,83 | 2,15 | 1,78 | 1,54 | 1,37 | 1,24 | 1,13 | 1,05 | 0,97 | 0,91 | | |
| | 22 | 3,61 | 2,42 | 1,93 | 1,63 | 1,43 | 1,28 | 1,16 | 1,07 | 0,99 | 0,93 | 0,87 | | |
| | 20 | 2,87 | 2,12 | 1,75 | 1,50 | 1,33 | 1,20 | 1,10 | 1,01 | 0,94 | 0,88 | 0,83 | | |
| | 18 | 2,42 | 1,90 | 1,60 | 1,39 | 1,24 | 1,13 | 1,04 | 0,96 | 0,90 | 0,84 | 0,79 | | |
| | 15 | 1,99 | 1,64 | 1,41 | 1,25 | 1,13 | 1,04 | 0,96 | 0,89 | 0,84 | 0,79 | 0,75 | | |
| | 12 | 1,69 | 1,44 | 1,27 | 1,14 | 1,04 | 0,96 | 0,89 | 0,83 | 0,78 | 0,74 | 0,70 | | |
| 75 | 24 | 5,90 | 3,07 | 2,32 | 1,92 | 1,66 | 1,47 | 1,32 | 1,21 | 1,12 | 1,04 | | | |
| | 22 | 3,92 | 2,61 | 2,07 | 1,75 | 1,53 | 1,37 | 1,24 | 1,14 | 1,05 | 0,98 | | | |
| | 20 | 3,10 | 2,28 | 1,87 | 1,61 | 1,42 | 1,28 | 1,17 | 1,08 | 1,00 | 0,94 | | | |
| | 18 | 2,61 | 2,03 | 1,70 | 1,48 | 1,32 | 1,20 | 1,10 | 1,02 | 0,95 | 0,89 | | | |
| | 15 | 2,12 | 1,75 | 1,50 | 1,33 | 1,20 | 1,10 | 1,01 | 0,94 | 0,88 | 0,83 | | | |
| | 12 | 1,80 | 1,53 | 1,34 | 1,21 | 1,10 | 1,01 | 0,94 | 0,88 | 0,82 | 0,78 | | | |
| 70 | 24 | 6,54 | 3,36 | 2,52 | 2,08 | 1,79 | 1,58 | 1,42 | 1,30 | 1,19 | | | | |
| | 22 | 4,30 | 2,84 | 2,24 | 1,89 | 1,64 | 1,47 | 1,33 | 1,22 | 1,13 | | | | |
| | 20 | 3,38 | 2,47 | 2,01 | 1,73 | 1,52 | 1,37 | 1,25 | 1,15 | 1,07 | | | | |
| | 18 | 2,82 | 2,19 | 1,83 | 1,59 | 1,42 | 1,28 | 1,17 | 1,08 | 1,01 | | | | |
| | 15 | 2,28 | 1,87 | 1,61 | 1,42 | 1,28 | 1,17 | 1,08 | 1,00 | 0,94 | | | | |
| | 12 | 1,93 | 1,63 | 1,43 | 1,28 | 1,16 | 1,07 | 0,99 | 0,93 | 0,87 | | | | |
| 65 | 24 | 7,32 | 3,70 | 2,76 | 2,27 | 1,94 | 1,71 | 1,54 | 1,40 | | | | | |
| | 22 | 4,75 | 3,11 | 2,44 | 2,05 | 1,78 | 1,58 | 1,43 | 1,31 | | | | | |
| | 20 | 3,70 | 2,69 | 2,19 | 1,87 | 1,64 | 1,47 | 1,34 | 1,23 | | | | | |
| | 18 | 3,07 | 2,37 | 1,98 | 1,17 | 1,52 | 1,37 | 1,26 | 1,16 | | | | | |
| | 15 | 2,47 | 2,01 | 1,73 | 1,52 | 1,37 | 1,25 | 1,15 | 1,07 | | | | | |
| | 12 | 2,07 | 1,75 | 1,53 | 1,37 | 1,24 | 1,14 | 1,05 | 0,98 | | | | | |
| 60 | 24 | 8,32 | 4,13 | 3,06 | 2,50 | 2,13 | 1,87 | 1,68 | | | | | | |
| | 22 | 5,32 | 3,44 | 2,69 | 2,24 | 1,94 | 1,73 | 1,56 | | | | | | |
| | 20 | 4,10 | 2,96 | 2,39 | 2,03 | 1,78 | 1,60 | 1,45 | | | | | | |
| | 18 | 3,38 | 2,59 | 2,15 | 1,86 | 1,65 | 1,48 | 1,35 | | | | | | |
| | 15 | 2,69 | 2,19 | 1,87 | 1,64 | 1,47 | 1,34 | 1,23 | | | | | | |
| | 12 | 2,24 | 1,89 | 1,64 | 1,47 | 1,33 | 1,22 | 1,13 | | | | | | |
| 55 | 24 | 9,62 | 4,67 | 3,43 | 2,78 | 2,37 | 2,07 | | | | | | | |
| | 22 | 6,03 | 3,87 | 2,99 | 2,48 | 2,15 | 1,90 | | | | | | | |
| | 20 | 4,60 | 3,29 | 2,64 | 2,24 | 1,96 | 1,75 | | | | | | | |
| | 18 | 3,75 | 2,86 | 2,36 | 2,03 | 1,80 | 1,62 | | | | | | | |
| | 15 | 2,96 | 2,39 | 2,03 | 1,78 | 1,60 | 1,45 | | | | | | | |
| | 12 | 2,44 | 2,05 | 1,78 | 1,58 | 1,43 | 1,31 | | | | | | | |
| 50 | 24 | 11,38 | 5,39 | 3,92 | 3,15 | 2,67 | | | | | | | | |
| | 22 | 6,97 | 4,39 | 3,37 | 2,79 | 2,40 | | | | | | | | |
| | 20 | 5,23 | 3,70 | 2,96 | 2,50 | 2,17 | | | | | | | | |
| | 18 | 4,22 | 3,19 | 2,63 | 2,25 | 1,98 | | | | | | | | |
| | 15 | 3,29 | 2,64 | 2,24 | 1,96 | 1,75 | | | | | | | | |
| | 12 | 2,69 | 2,24 | 1,94 | 1,73 | 1,56 | | | | | | | | |
| 45 | 24 | 13,93 | 6,38 | 4,58 | 3,65 | | | | | | | | | |
| | 22 | 8,26 | 5,11 | 3,89 | 3,19 | | | | | | | | | |
| | 20 | 6,08 | 4,25 | 3,37 | 2,83 | | | | | | | | | |
| | 18 | 4,84 | 3,63 | 2,96 | 2,53 | | | | | | | | | |
| | 15 | 3,70 | 2,96 | 2,50 | 2,17 | | | | | | | | | |
| | 12 | 2,99 | 2,48 | 2,15 | 1,90 | | | | | | | | | |
| 40 | 24 | 17,93 | 7,87 | 5,54 | | | | | | | | | | |
| | 22 | 10,16 | 6,14 | 4,62 | | | | | | | | | | |
| | 20 | 7,28 | 5,01 | 3,93 | | | | | | | | | | |
| | 18 | 5,68 | 4,21 | 3,41 | | | | | | | | | | |
| | 15 | 4,25 | 3,37 | 2,83 | | | | | | | | | | |
| | 12 | 3,37 | 2,79 | 2,40 | | | | | | | | | | |
| 35 | 24 | 25,15 | 10,36 | | | | | | | | | | | |
| | 22 | 13,27 | 7,76 | | | | | | | | | | | |
| | 20 | 9,12 | 6,14 | | | | | | | | | | | |
| | 18 | 6,91 | 5,04 | | | | | | | | | | | |
| | 15 | 5,01 | 3,93 | | | | | | | | | | | |
| | 12 | 3,89 | 3,19 | | | | | | | | | | | |
| 30 | 24 | 42,40 | | | | | | | | | | | | |
| | 22 | 19,37 | | | | | | | | | | | | |
| | 20 | 12,34 | | | | | | | | | | | | |
| | 18 | 8,89 | | | | | | | | | | | | |
| | 15 | 6,14 | | | | | | | | | | | | |
| | 12 | 4,62 | | | | | | | | | | | | |

approximate N-value = 1,30

**ST:** supply temperature (°C) | **ROT:** room temperature (°C) | **RT:** return temperature (°C)

**example of a conversion to another system than ΔT 50**

You require 505 Watt for a living room at 20 °C in 50/30. In the table you see 50/30/20 - 3,70. You look in the price list for ΔT 50 with a radiator in the vicinity of 1869 W.

**possible solutions**

| | | | 75/65/20 | 50/30/20 |
|---|---|---|---|---|
| 11 | 750 | 1650 | 1959 W | 529 W |
| 21S | 600 | 1350 | 1821 W | 492 W |
| 22 | 400 | 1350 | 1804 W | 488 W |
| 33 | 450 | 900 | 1904 W | 515 W |

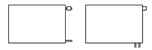
## COMPACT

**HEIGHT** 300, 400, 450, 500, 600, 750, 900 mm
**LENGTH** 450 - 3000 mm
**TYPE** KMP 11, 21S, 22, 33
**COLOURS** RAL 9016 White. Other colours on request.

## INTEGRA

**HEIGHT** 300, 400, 450, 500, 600, 750, 900 mm
**LENGTH** 450 - 3000 mm
**TYPE** INT 11, 21S, 22, 33
**COLOURS** RAL 9016 White. Other colours on request.

## PLANORA



**HEIGHT** 300, 400, 500, 600, 900 mm
**LENGTH** 500 - 3000 mm
**TYPE** PLAN 11, 21S, 22, 33
**COLOURS** RAL 9016 White. Other colours on request.

## PARADA

**HEIGHT** 300, 400, 500, 600, 750, 900 mm
**LENGTH** 450 - 1650 mm (+ longer lengths depending on type)
**TYPE** PAR 11, 21S, 22, 33
**COLOURS** RAL 9016 White. Other RAL colours and metallic colours on request.

## RAMO

**HEIGHT** 300, 400, 500, 600, 750, 900 mm
**LENGTH** 450 - 1650 mm (+ longer lengths depending on type)
**TYPE** RA 11, 21S, 22, 33
**COLOURS** RAL 9016 White. Other RAL colours and metallic colours on request.

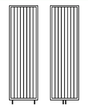
## KOS H

**HEIGHT** 400, 600, 750, 900 mm
**LENGTH** 450 - 1950 mm
**TYPE** KOH 20, 21, 22, 33
**COLOURS** RAL 9016 White. Other RAL colours and metallic colours on request.

## FARO H

**HEIGHT** 400, 600, 750, 900 mm
**LENGTH** 450 - 1950 mm
**TYPE** FAH 20, 21, 22, 33
**COLOURS** RAL 9016 White. Other RAL colours and metallic colours on request.

## VERTICAL



**HEIGHT** 1500, 1800, 1950, 2100, 2300 mm
**LENGTH** 300, 450, 600, 750 mm
**TYPE** VR 10, 20, 21, 22
**COLOURS** RAL 9016 White. Other colours on request.