



Cut your water and energy costs with
Aguardio digital pipe and shower sensors

FAQs

- + Is this session being recorded? Yes, we will send a link to watch and share after the session.
- + Can I get a copy of the slides? Yes, we will send a link to download them after the session.
- + How can I ask questions? All lines are muted so please use the Q&A function, if we run out of time we will follow up with you separately.

Agenda

- Introductions
- What are Aguardio sensors and how do they work?
- How Aguardio pipe sensors both identify leaks and enable you to comply with regulations for temperature surveillance
- How Aguardio shower sensors nudge users towards shorter shower times, reducing both your energy and water costs
- Case studies showing how quickly organisations achieve payback on the installation costs
- How Aguardio pipe sensors both identify leaks and enable you to comply with regulations for temperature surveillance, for the prevention of Legionella
- Questions

Introductions

Rachel Clinton



Paul Musgrove



Marcus Rose



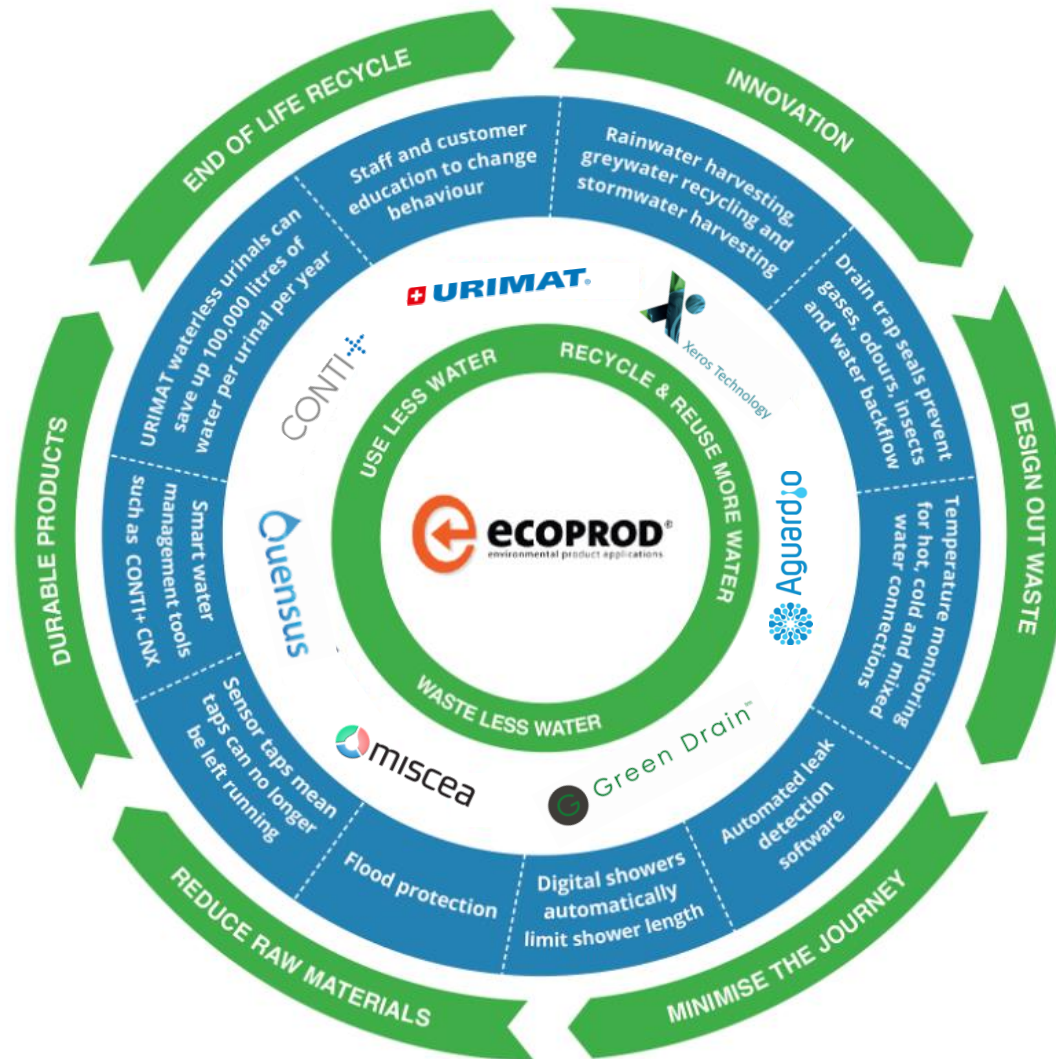
Thomas Munch-Laursen



Water Saving - Ecoprod centres around 3 pillars:

- + Use less water
- + Waste less water
- + Reuse more of the water you have

Ecoprod can help you significantly cut your water use, use less energy and reduce your carbon footprint



Ecoprod clients



**SCIENCE
MUSEUM
GROUP**



SKANSKA



SOPHOS



**UNIVERSITY OF
GREENWICH**



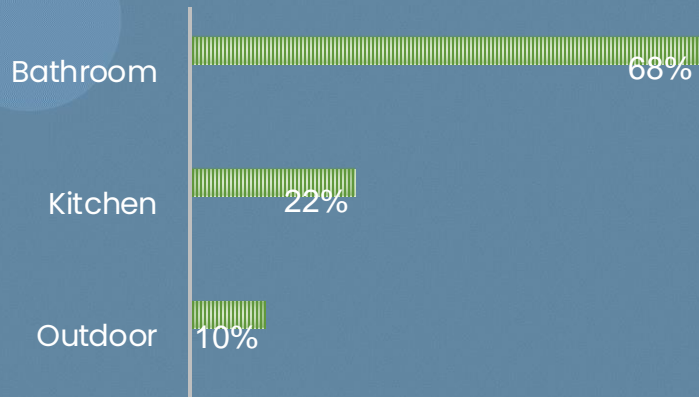


Digitalize Pipes and Bathrooms in Minutes

An instant green and efficient upgrade with
easy to place interactive IoT sensors

“The greatest opportunities for saving water & energy can be found in the bathroom”*

Proportion of water usage in the home



*Source: Energy Saving Trust, "At home with water"

Aguardio's patented solution

1. Direct water & energy savings plus operational efficiency with short payback.
2. Unique pipe and showering data with insights into both user behaviour & change of patterns and building operation & facility management optimisation.
3. Interactive and a proven positive sustainability user experience. Behaviour changes through data & nudging.

Enhance sustainability, generate savings, and attain building certifications



Aguardio Shower Sensor



30%
reduced shower time

Aguardio Pipe Sensor



20%
of toilets leak. Detect!
Based on US sources

Transform bathrooms & water usage with



With the patented interactive IoT sensor solutions

1. Aguardio provides an instant green upgrade to standard bathrooms & toilets and digitalizes them in minutes

No need to renovate or change bathroom fixtures. Making it possible for you to save up to 30% of hot shower water & detect the many leaking toilets (20% leak according to US sources),

2. Sensors placed in minutes & can be done DIY. Online immediately via mobile phone network or integrated in smart systems



rb.gy/cgt2r

rb.gy/yx7cl



Click to see how easy it is!

3. Clever data

Use bathroom and water pipe data for building operations & maintenance plus renovation decisions (e.g., how many toilets?), temperatures, prevention of mould, monitoring of leaking toilets and estimating the number of toilet flushes for several purposes.

4. Positive nudging & enhanced bathroom experience

Aguardio's innovative sensors provide an engaging and positive user experience by utilising nudging techniques and interactive data, which strengthens customer's sustainability experience

5. Enables you to improve the sustainability of buildings and earn points towards building certifications. Short payback time, often within 3-10 months (North/West Europe & UK).



Aguardio Shower Sensor

Save water & energy and access unique data for O&M



- 30% shorter showers in homes
- 21% in hospitality & tourism
- Third-party documented effect – read more: www.showeringsmartly.com

How it works

- Placed in less than 60 seconds using double-sided tape with no changes to current bathroom fixtures
- Automatically online via mobile phone or Aguardio gateway
- The sensor detects showering via movement, frequencies of water noise, temperature, humidity and unique algorithms.

Collects unique bathroom data

- Collects data on shower timing (start and duration) along with insights into user behavior such as pausing water flow while soaping/shampooing
- Monitors risk of mould using humidity and temperature data
- Can be combined with other data to be used for predictive analysis of the need for hot water

Nudging & interactive experience

- Displays shower time during showering as part of nudging users interactively to shorten showering time. And provides nudging to pause the water while soaping/shampooing to save an extra 20% in water
- Positive motivational psychology with scientific-based nudging creates a feeling of positive sustainability experience for users & can increase customer satisfaction

Effects on water savings with Aguardio Shower Sensor

- Normal average shower time is often 6-8 minutes.
- Average shower flow rate: often 12 litres per minute (the interval of 8-20 litres/minute is often relevant for shower heads)
- Aguardio Shower sensor often can save $\approx 20-36$ litres/shower
- Showering 2-3 minutes shorter each day with Aguardio has huge potential: Saving e.g., 5,200 to 9,360 litres of water per person per year also means saving a lot of energy and CO₂! (0.4g of CO₂/litre)

Aguardio Pipe Sensor Solutions

One sensor, many versions and use cases



FUNCTIONS OF PIPE SENSORING

- **Flow** in pipes: When, where and how long?
- **Flush** count/'water incidents'
- **Leak** analysis and insights
- **Temperature**: Pipe and ambient

EXAMPLES OF USE CASES

- Toilets and sinks
- Stagnant water (incl. Legionella)
- General leak monitoring in households
- Aircon and heating systems
- Industry/factories



Leak Sensor (often toilets)

- Special software algorithms & analyses for toilets which can have various leak patterns (e.g. "on/off", possibly leaking 2-4 hours after last use)
- Flush estimations for several purposes

Hygiene Sensor

- Special Legionella software design for monitoring stagnant water to prevent Legionnaire's disease
- Remote monitoring to comply with regulations for temperature surveillance



Aguardio Leak Sensor

Toilets use case: Avoid unexpected utility cost, optimise building O&M



- **20% of toilets leak** (US sources)
- **Leaks up to 275 litres per day rarely can be seen or heard**

How it works

- Placed in minutes as a clamp-on solution, fixed with a plastic tie. Approx. 60 seconds on a free-standing toilet and typically 3-6 minutes on wall mounted toilets behind the push plate
- Automatically online via mobile phone networks or gateway
- Sound alert option: Detects toilet leaks from approx. 3 litres of water per hour as standard, based on temperature differences and algorithms.

Collects unique toilet data

- Gathers data on number of toilet flushes, temperatures both ambient and on inlet pipe and allows to conduct detailed analysis to improve building maintenance & operations as well as renovation decisions
- Gathers leak data and monitors development of leak situation to allow for in-depth analysis (e.g., "on/off" leaking).

Leak sensor variants

- Sound alert variant: A "stand-alone" sensor, that beeps once a leak is detected. No data connectivity (upgrade is possible)
- Connected sensor, that gathers and transmits toilet data
- Combined variant – a mix of the above variations.

Can be used with either Gateway (max 10 sensors) or the Aguardio APP

Effects on water saving with Aguardio Leak Sensor

Facts on leaky toilets:

- *Toilets often leak between 200 and 400 litres of water a day (approx. 26,280 to 146,000 litres per year)*
- *Toilets leaking up to 275 litres/day most often cannot be seen or heard (source: Energistyrelsen / The Danish Energy Agency)*
- *Approx. 50% of water leaks in homes are caused by toilets*
- *Toilets leaks are often "on/off" and hence difficult to detect without data*
- *Unheated water is also energy! For Denmark, the CO2 emissions grams per m3 is 216 g*

Aguardio Hygiene Sensor

Legionella risk management & water temperature monitoring



- Remote water temperature recording
- Sensor status with risk indicator
- Surveillance of stagnant pipework

How it works

- The Aguardio Hygiene Sensor data reveals whether **water in pipes has been stagnant for too long** in a temperature range that poses an increased risk for development of Legionella bacteria, and identifies whether any pipe **water flow** has been sufficient (given duration & temperature) to reduce the risk.
- Essential measuring features, including ambient and pipe temperature monitoring & water usage frequency tracking.
- The sensor monitors water activity in water outlets like sinks, washbasins, and toilets to identify usage patterns and detect stagnant water.
- The Aguardio Hygiene Sensor is strategically placed on hot or cold taps/water outlets to record temperature readings. Any deviations from the norm will enable organisations to take timely action.

Cloud-based platform for analysing data

- By identifying number & frequency of flushes*, Aguardio HUB helps you identify water outlets, that should be flushed immediately at highest/lowest temperatures to minimise Legionella disease risk in dead pipe ends.

** This is applicable only if the sensor(s) have been registered in Aguardio Hub with this extra feature. Can only be used with gateway (max 10 sensors per gateway).*

Aguardio Hygiene Sensor

Cloud-based platform for analysing data: Aguardio HUB

Remote water temperature recording:
Identify norm deviations for clear overview of risks

Number of days since sensor last met target temperature within 2 minutes



GREEN: The last activity was performed less than 24 days ago



YELLOW: the last activity was performed more than 24 days but less than 30



RED: More than 30 days have passed since the last activity



BLUE: The tap has never been left running for at least one minute (no activities were registered, that met the criteria)

Name & Serial Number	Reports	Location	Organization	Department	Max. temp.	Min. temp.	Last Data Collection	Days Without Usage
Cold tap 0184001073		Cold tap	Gary McCarty		25.4	14.6	04-06-2024	78
Hot tap 0184000961		Hot tap	Gary McCarty		56.3	17.7	04-06-2024	78
COLD_TAP 10008854		COLD_TAP	Aguardio TEST		32.9	12.8	03-06-2024	-1
HOT_TAP 10008852		HOT_TAP	Aguardio TEST		40.6	14.8	03-06-2024	-1

Sensor status is visualised by **colour indicators**. Each colour represents the number of **days since the water outlet was last used**, with the cold tap reaching $\leq 20^{\circ}\text{C}$ and the hot tap achieving a minimum of 45°C within 2 minutes.



By identifying **number & frequency*** of flushes, Aguardio HUB helps you identify water outlets, that **should be flushed immediately** at highest/lowest temperatures to **minimise Legionella disease risk in dead pipe ends**.

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Aguardio Hygiene Sensor

Case stories for legionella monitoring



FIRE STATION CASE, UK



Background

- Legislation in the UK mandates regular checks and maintenance to minimise the risk of Legionella, which traditionally involves manual testing of water systems - a labour-intensive and time-consuming process.

Challenge

- The manual approach to monitor water systems for Legionella was proving costly for Fire stations in Dorset & Wiltshire.
- Regular, manual checks were prone to human error, potentially leaving Firemen exposed to health risks and the fire stations to regulatory fines.
- Ensuring consistent and accurate monitoring across the counties was a significant logistical challenge.

Solution

- In the summer of 2023, the Aguardio sensor solution was installed on all water outlets to continuously monitor the building's water systems. Shortly after installation, significant irregularities were discovered in the existing manual testing process.
- In addition to correcting these issues and ensuring compliance with legislation, it significantly reduced the costs associated with regular inspection visits.

SCHOOL CASE, DK



Background

- Schools often have several water outlets that are not frequently used, such as showers, taps etc. Stagnant water in pipes pose a risk after holidays and school breaks.

Challenge

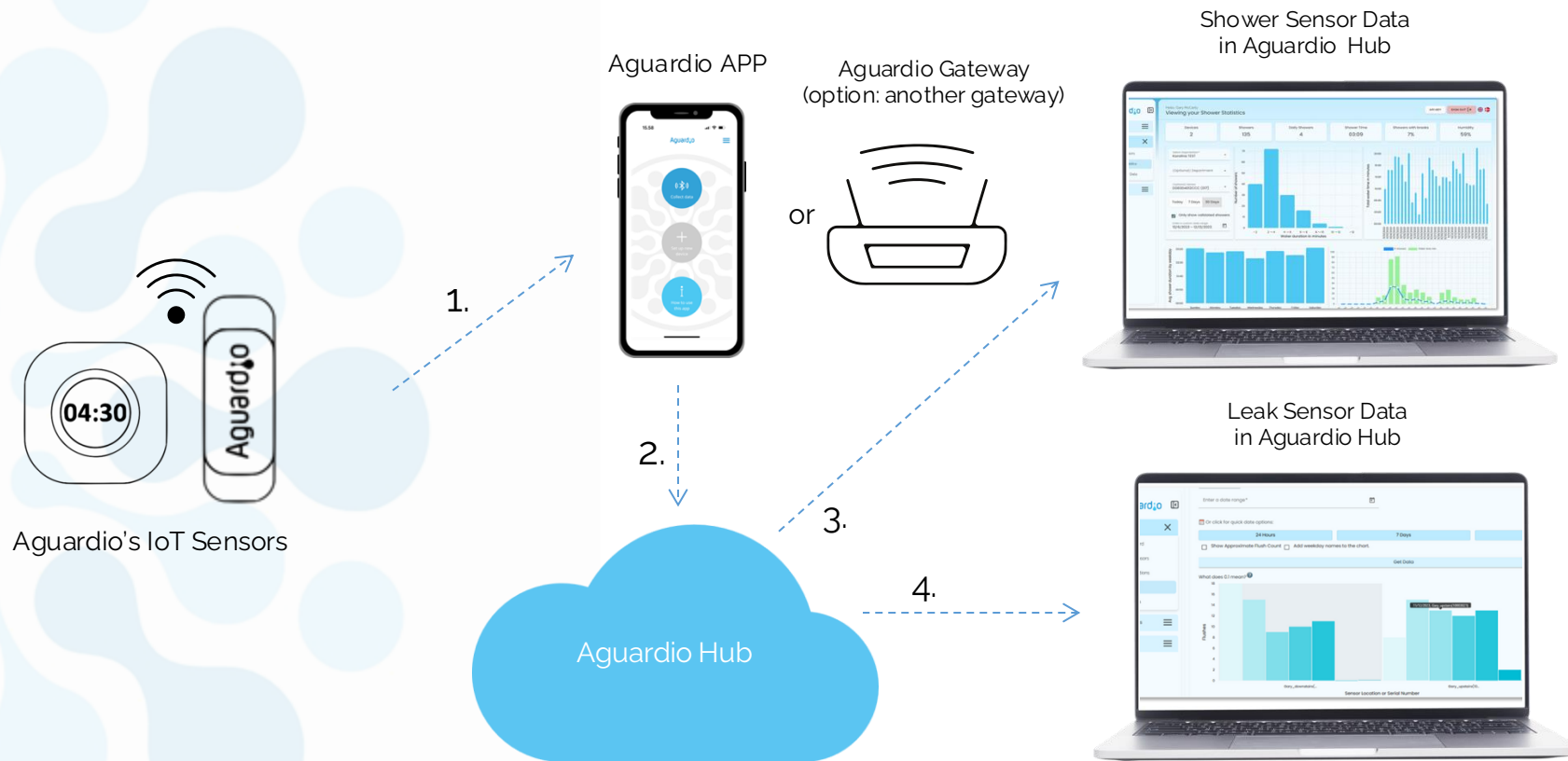
- Legionella cases are on the rise in Denmark. Danish municipalities and housing organisations recognise this challenge and e.g. manual methods to de-risk Legionella are often not implemented well.
- Even though some buildings have automated systems to “flush” water pipes, then “dead pipe ends” can be an issue.
- The Municipality of Kolding has been in the higher end of legionella cases in Denmark.

Solution

- In July 2024, the Aguardio sensor solution was applied in the first school in Kolding, namely the Kolding Friskole. This school has some remote bathrooms incl. showers where the risk of legionella is deemed high.
- The school now benefits from a central overview of water pipes that pose a risk, and action can be taken against legionella.

Easy access to bathroom data

Use data to improve facility management, streamline renovations & enhance sustainability experiences



- Data can be accessed and analysed on Aguardio's Hub
- Raw data can also be easily exported to other systems via open API

- Integration: Aguardio's sensors and data can be also integrated into other smart systems (can be via Bluetooth or other system)

Collects & analyses actionable data on:

- **Shower patterns**
 - Average shower times
 - When showers occur
 - Do users pause while soaping/ shampooing? (20% water can be saved if pausing the water!)
- **Humidity**
- **Temperature**
- Info: Data is stored for up to 4 weeks on the sensor

Collects & analyses actionable data on:

- **Leak alerts** (normally with an algorithm based including a parameter of 1.25 Celsius difference between pipe and ambient given customer requests of conservative alert setting)
- **Detailed leak analysis.** To identify more leaks given the conditions in the given building and installations. Also, the development over time (normally more and more toilets start leaking due to e.g., minerals building up, mechanical parts and rubber seals deteriorating etc.)
- **Number of toilet flushes estimates.** For several analytic and building optimization purposes.
- **Temperatures both ambient and on inlet pipe**
- Info: The data is stored for up to 10-12 days on the sensor

Aguard:o selected customers & partners

Since sensors are compatible with most standard bathrooms & toilets worldwide, the customers base is diverse



Hospitality & Tourism



Highlights

- Reduce shower times 21%, see www.showeringsmartly.com
- Optimise capacity and operations, e.g., how many bathrooms needed?
- Transform bathrooms to a green interactive experience
- Cleaning staff often flush 5 times per room – use data to change it



Offices & Public buildings



Highlights

- Often >15-20% of toilets leak → detect & fix
- Usage patterns via number of flushes for optimization of operations & maintenance
- E.g.: how many toilets needed? Big saving potential before renovation!



Homes & Accommodations



Highlights

- 30% shorter showers achievable
- Often >15% of toilets leak
- Cut costs of water & energy
- Avoid huge extraordinary water bills to residents
- Enhance sustainability perception of homes

Other partners & customer Examples



Saint-Gobain within the building sector, wholesale & IoT smart water solutions.



Multiple water utilities in the UK are working to lower in-home water consumption from 142 litres per person per day to 110 litres.

L'ORÉAL

Focus on developing more sustainable showering behaviour & solutions through data insights.

Earn valuable building certification points with Aguardio



A leading Danish consultancy company within sustainable buildings, certifications and EU taxonomy has reviewed Aguardio's solutions*:

Across certification schemes, the positive contributions can be summarized as follows. Aguardio's solutions contribute...:

1. ... to strategic planning through documented reduction of water consumption.
2. ... with operation and maintenance information for use in O&M planning.
3. ... by easy implementation of reduction measures.
4. ... with monitoring, documentation, and data for reduction measures.
5. ... with flexible system solutions for operations and users.
6. ... to cost reduction due to consumption reduction.
7. ... to energy reduction for buildings with hot water tanks, by reducing hot water and thus energy for heating water.
8. ... by monitoring temperature and humidity.

***Note:** This is just a short example on how Aguardio can help your organization, please contact the Aguardio or the consultants at Lagerberg.com to receive full information on this topic. Aguardio chose Lagerberg.com based on recommendations from WeBuildDenmark.

The following certification schemes have been reviewed:

- DGNB for building in use, manual 2020 incl. surcharge for EU Taxonomy compliance
- DGNB for new Construction and renovations manual 2023 1.0.0
- BREEAM In-Use international V. 6.0.0
- LEED V4 for Construction

Value for Money and Short Payback

Often 3-10 months ROI on water & energy alone

- Data utilization can further improve business cases via operation & maintenance optimization!
- ROI based on cases and calculations with customers, water organisations, universities and water & energy costs in UK & NW Europe. ROI can vary a lot given water & energy costs!
- Example: Showering cases build on +5 years of research at UK universities like Surrey and Cranfield and showering data from Energy Saving Trust UK (e.g., see "At home with water").
- Hotels should expect longer ROI on water & energy, could be 6-30 months
- Aguardio can support in detailed business cases



Aguardio's solutions are verified by the SOLAR IMPULSE FOUNDATION as clean, efficient & profitable solutions.

<https://solarimpulse.com/>

Aguardio improves the impression of sustainability for users & guests

Transform the bathroom to an interactive sustainability experience:

- Aguardio's interactive IoT-sensors
- The scientific nudging messages
- Data used, also as info and follow-up
- Gamification is an option
- Inform and motivate!
- Inspiration via Aguardio's hotel concept
- All also part of improving certification like DGNB / LEED / BREEAM



UNIVERSITY OF SURREY

Mr. Xavier Font, Professor of Sustainability Marketing

“...Aguardio sensors lead to positive guest experiences and hence higher customer satisfaction within hospitality...”



Water is essential to life! A quick shower here has the water running for **3:30 minutes**. The clock will pause if you turn the water off while soaping / shampooing.

Will you beat the clock? Water conservation starts with you. Make a difference !

Example (to the left) of the most efficient scientific nudging identified by UK scientists from the University of Surrey

*Sticker next to the shower sensor - nudge

*Toilet - nudge



*Shower - nudge



*Bathroom door - nudge

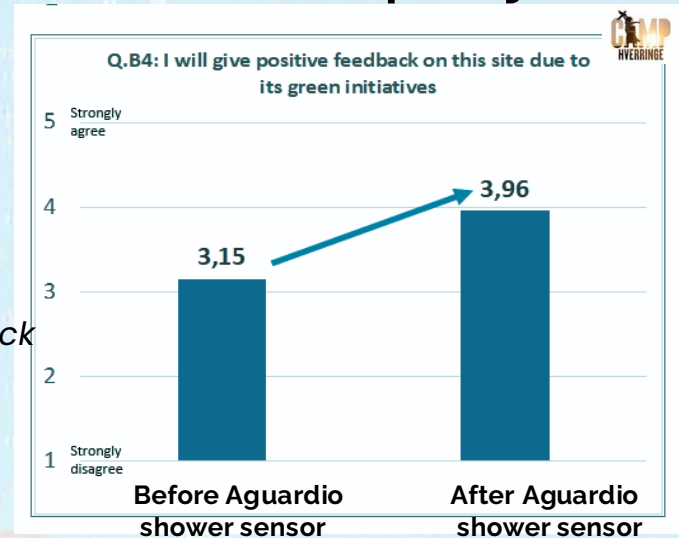


Example: A large Danish hospitality & tourism project



EXAMPLE from study
Question B4:

“I will give positive feedback on this site due to its green initiatives”



Guest ratings on 1-5 Likert scale (place of study - Camp Hverringe and Tranum Klit)

COASTAL TOURISM
IN DENMARK



Heidi K. Dahl Larsen,
Project Manager and
Innovation Consultant at
Danish Coastal Tourism in
Denmark



“The Danish tourist industry had difficulties in finding products, which truly both saves resources but at the same time also give tourists a significant experience of focus on green solutions. Aguardio's solutions delivered that in our projects!”



Thank you

Contact us :

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Or visit:

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Recognition & Awards

Bathroom efficiency



UK

IoT solution



Nordic

Innovation award



US

Sustainable cities



Nordic

Profitable solution



Climate action

Hospitality & Tourism Awards



Questions?

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