40% of the world’s energy is consumed by buildings
and yet, how often have you experienced discomfort?
Taking a test in a room with high $\text{CO}_2$ results in 50% increase in mistakes.
and it affects businesses’ bottom line

In a mall, when dwell time doubles, sales increase by 130%

Time is Money. Shoppers buy more when they stay longer. Pathintelligence
most HVAC systems are not up to the task

- Do not monitor T, Co2 and humidity in real time
- Require constant supervision by trained staff
- Proprietary and expensive upgrades and maintenance
... High level of energy costs
... Low level of comfort
... Strong dependency from system producers
... Difficult management of building portfolio

So what?
Enerbrain turns wasteful buildings into sustainable ones

**EFFICIENCY**
30% energy savings and significant CO₂ emissions reduction

**COMFORT**
Productivity increase & less sick hours

**ENGAGEMENT**
Promote Social Corporate Responsibility

Savings calculated according to UNI EN 15603
Energy Cloud: our **HVAC IoT retrofit** solution

**Self-learning Algorithms**
Dynamically fine tunes the best parameters for comfort & savings

**Environmental Sensors**
Monitor occupancy, CO₂, T, humidity & air quality

**HVAC Actuators**
Connected to the cloud and installed on any HVAC system

**Mobile App**
Remote management from any mobile device
Sensor - eSense

- T, RH, CO₂ every 10’
- 4 Year Battery Life
- Sigfox connectivity
- Already configured
Algorithms – Energy Cloud

Integration through API

PID + fuzzy logic

Input from indoor, weather & historical

EU patent pending
Actuators - eNode

- Remotely controls valves & air gates
- Encrypted communication
- 3G connectivity
- SW & HW bypass, electrically failsafe
Reports, Dashboards and App

- Detailed reports
- Portfolio Management
- Real time monitoring
- Remote access
Enerbrain in three key points

**Flexible**
Suitable for any system:
- 100% compatible with any HVAC system
- Non invasive 2 days installation

**Advanced**
Self-learning algorithms with automatic actuation of hardware systems

**Profitable**
High redditivity rate
- NPV and IRR
- WIN-WIN solution
target building spends > 100k €/yr in heating & cooling
seeking partnerships with real estate companies and utilities
Enerbrain’s Customers
Case Study – 8 Gallery

Mall
Torino, Italy

35% Energy Saving
30,000 sqm
2 Days installation
100% Comfort
High level of air quality degradation due to visitors

During peak hours in the food court CO₂ levels reached 2,000ppm because of manual management of air circulation.
Air quality improvement thanks to Enerbrain

Air circulation is automatically managed below law limits by Enerbrain

Indoor temperature variations during lunch are offset by Enerbrain

Limit 900 [ppm]
Over 35% energy savings, all seasons

Thermal energy consumption before and after Enerbrain

Savings calculated according to UNI EN 15603
Case Study – Autogrill

Restaurant + Retail
Ceriale, Italy

31% Energy Saving
1,000 sqm
4 Hours installation
100% Comfort
No more waste due to manual HVAC management

Pre Enerbrain

Post Enerbrain

Hourly T measurements during one week
Improved air circulation during peak hour

Daily and weekly CO₂ measurements

Pre Enerbrain

Post Enerbrain
Improved time in comfort thanks to Enerbrain

Hourly comfort monitoring during a week (7 days x 24h, T and CO₂)

- *Comfort zone: 21°+/- 2 < 900ppm*

Pre Enerbrain

Post Enerbrain

* 19% time in comfort
* 99% time in comfort
Enerbrain: Team, Partners, Press & Awards

TEAM

PARTNERS

PRESS

AWARDS
Your innovation partner for a sustainable future
Technical details
Plug & Play integration with any HVAC system

THE ENERBRAIN SYSTEM

1. Algorythms and Enerbrain Cloud
2. Energy Node by Enerbrain
3. Sensors by Enerbrain
4. Existing heat generation
5. Existing water heaters
6. Existing thermostats
7. Existing 3-way valve
8. Air HVAC Unit
9. Existing Chiller
10. Existing outgoing air-ducts
11. Existing incoming air-ducts
12. 3-way HVAC valves (hot-cold)
13. 3-way HVAC valves (gates)
14. App to control set-points
Safety first: why we are different

TESTED
• CE and ROHS compliant
• Each device passes 3 different tests in different locations
• Each SW release is thoroughly tested live before rollout

FAILSAFE
• eNode is **electrically bypassed** by a built-in switch in case of failure or maintenance: HVAC **still works without** Enerbrain
• Our cloud and services rely on leading service providers for safety, reliability & performance

ENCRYPTED
• End-to-end encrypted communication via LTE/3G using any provider available
• Thanks to private connection services our IoT system is **not exposing data to the Internet**
How seasonal temperature affects energy usage

Heating Degree Days measure the $T$ difference between outdoor and the indoor target of 20°C

- $< 20°C$ Outdoor Avg $T$: Heating needed
- $\approx 20°C$ Outdoor Avg $T$: Very Low Energy Usage
- $> 20°C$ Outdoor Avg $T$: Cooling needed

Summer Indoor Target is 26°C. Reference values vary from countries.
Savings calculated according with UNI EN 15603

Savings = Consumption from Baseline – Actual Consumption

Baseline = average of Past Consumption
Past Degree Days

Example of Savings and Baseline calculation based on two years of past consumptions

If actual HDD= 2500, and actual consumptions = 70000 kWh
Consumption from Baseline = 40,2 kWh/HDD * 2500 HDD = 100.500 kWh

Savings = 100.500-70.000= 30.500 kWh  ~30%
From global consumption to HVAC

Bill auditing & seasonal weather allow us to identify the energy used for HVAC

The baseline is always approved by the client and can be updated if there are changes to the building or its use by switching Energy Cloud on/off for a few days.
Compatibility: why we are different

What’s missing: truly smart HVAC control

Replacing your equipment or hacking the BMS is not the way to go because:

- BMS communication protocols are unsafe, closed and many. It’s expensive and lengthy
- The BMS collects little data from old sensors

We integrate to your HVAC with IoT devices

By making your HVAC actuators connected, Energy Cloud can control them in real time to set temperature, humidity, ventilation while monitoring energy usage and system status.

The actuators - still connected to the BMS - will take the input from Energy Cloud anytime it's possible to maximize savings and comfort.
## Winning vs competition

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<thead>
<tr>
<th>Feature</th>
<th>Big Companies</th>
<th>Small Companies</th>
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<tbody>
<tr>
<td>100% compatible</td>
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<td>Quick Installation</td>
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<td>No changes to the system</td>
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<td>Reports and maintenance SW and HW</td>
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<td>Portfolio buildings management</td>
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Enerbrain Step by Step

An agreement founded on EPC model of sharing benefits

1. Technical inspection, data collection and bill and portfolio audit
2. 24 months Energy Performance Contract, installation in 45 days → Immediate saving
3. Installation on site and remote commissioning
4. Automatic renewal from Y3

Enerbrain Investments:
Assessment + Hardware + Installation + Energy Cloud License + Connectivity + System Management + Maintenance + Insurance + Upgrades
Your innovation partner for a sustainable future