



Best practices about
how SMEs utilize AI and Green practices.

>>> BEST PRACTICES <<<



Transforming Tomorrow, Today

Cheh Plast Ltd.

Sector: Construction materials and building solutions (aluminium and PVC joinery, facades, glazing, roofing).

Area of Impact: Energy efficiency, heating & cooling optimization, CO₂ reduction, smart building management.

Location: Vratsa, Bulgaria

<https://chehplast.eu/> 



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Smart Energy Reengineering: Green Industrial Floor Heating with AI Potential at Cheh Plast Ltd.

Cheh Plast Ltd., founded in 2000, is a certified manufacturer and authorized Rehau partner with 67 employees, producing aluminum and PVC joinery, ventilated facades, glass constructions, and roofing for clients in Bulgaria and abroad. The company faced high energy demand and uneven heating in its production halls, as traditional systems caused temperature imbalances and inefficiency. In 2016 it introduced an industrial floor heating system with optimized insulation and is now exploring AI-based monitoring to further enhance energy performance.

Outcomes and Impact >>

- Uniform heating at 16°C across the hall, ensuring comfort and compliance with machinery automation requirements.
- Elimination of heat stratification (no heat trapped under the roof).
- Annual heating energy consumption: **123.6 kWh/m²** (166,307 kWh/a).
- Primary energy from gas: **135.96 kWh/m²**; circulation pump and boiler electricity: **1.2 kWh/m²**.
- Carbon footprint: **33.59 tons CO₂/year (gas) + 1.22 tons CO₂/year (electricity)**.
- System successfully operating for 7 years, demonstrating reliability and long-term sustainability.
- AI potential: Adding sensors and machine learning models could further cut energy use by predicting demand, optimizing system response, and integrating renewables.

Objectives

- Ensure even and comfortable heating throughout the hall.
- Optimize the use of natural gas and electricity, lowering energy consumption.
- Improve working conditions for employees and machinery requirements.
- Reduce CO₂ emissions through more efficient heating technologies.
- Lay the foundation for AI-enabled smart energy management for predictive optimization and integration with renewable sources.

Innovation Level

System innovation in industrial heating through the application of surface-based low-temperature floor heating in a large production hall. The integration of construction, equipment, and insulation measures ensures higher efficiency and sustainability. The next innovation step involves AI applications for predictive maintenance, smart scheduling of heating/cooling cycles, and optimized boiler/heat pump performance.



Evidence of Effectiveness

- Consistent energy performance data over 7 years of operation.
- Reduced operating costs due to lower energy use and optimized heating distribution.
- Demonstrated technical feasibility for AI integration (sensors, smart controllers, predictive algorithms).

Scalability and Replicability

- Replicable in industrial halls where uniform heating and energy efficiency are required.
- Scalable to include renewable sources such as heat pumps for heating and cooling.
- With AI integration, the system could **continuously self-optimize** and serve as a model for other SMEs in manufacturing.

Activities and Approach

- Replaced warm-air and wall heating with industrial underfloor heating (Pex-A pipes, collector groups in concrete floor).
- Operates with low-temperature source (45°C) and VIESSMANN condensing boiler; ready for AI-controlled heat pumps.
- Improved insulation: 12 cm mineral wool panels and high-performance glazing.
- Planned AI-driven sensors for predictive monitoring and energy optimization.

Alignment with International Standards

- **SDG 7: Affordable and Clean Energy** (target: improve energy efficiency).
- **SDG 9: Industry, Innovation and Infrastructure** (target: upgrade infrastructure for sustainability and smart solutions).
- **SDG 13: Climate Action** (target: integrate climate-change

Partnerships / collaborations

Collaboration with suppliers of specialized materials: REHAU (pipes and fittings), KAN STEEL (distribution network), VIESSMANN (boiler). Future opportunities for collaboration with **AI solution providers and IoT integrators** to add data-driven intelligence to the system.

Lessons Learned <<

Early integration of energy efficiency measures in new construction is more cost-effective than retrofitting later.

Surface heating systems improve both comfort and efficiency compared to conventional industrial heating.

The **next step** is digital: adding AI to manage energy demand will multiply the impact of the existing green practice.

>> Challenges / Lessons Learned

- Integration of the heating system required precise planning during construction.
- Effective insulation is equally important as heating system design.
- Transitioning from traditional monitoring to AI-driven monitoring requires **investment in IoT sensors, data collection, and staff training**.

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