



The results of the studies carried out as part of the Low-Carbon Industrial Zones (ZIBaC) programme reflect above all the collective vision of the involved industrial stakeholders. These pathways provide a structuring contribution to the development of national decarbonisation strategies, but do not constitute an established or official vision of those strategies.

The DECLYC project aims to define decarbonisation strategies to reduce CO₂ emissions and the environmental footprint of the Chemistry Valley and neighbouring areas, to establish governance models for potential shared solutions that may emerge, and thereby to maintain the competitiveness and long-term sustainability of industrial and R&D centers.



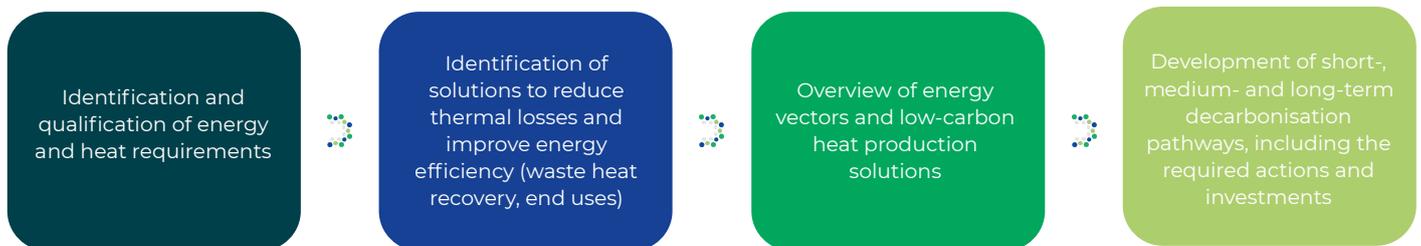
Work Package 4 Low-carbon steam

• Context and Objectives

This work package study is focused on steam infrastructure to meet the industrial process and buildings heating needs. Industrial stakeholders are already partially interconnected through an existing steam distribution network. The ambition is to identify the technical and organisational conditions enabling the gradual substitution of current fossil-based sources (notably natural gas boilers) with low-carbon solutions, while ensuring steam distribution network the various industrial sites. To build this pathway, the analysis is based on a set of assumptions, including the relative stability of energy demand, the anticipated evolution of energy costs, and the progressive availability of mature low-carbon technologies.

• Methodology

The study is based on an use-driven approach, moving from demand to production solutions. Steam and heat requirements are analysed in terms of quantities, pressure levels, consumption profiles, etc. This assessment makes it possible to redefine the energy vectors that are truly required, before selecting the most relevant technologies to meet these needs. This use-centred approach ensures that production choices are neither oversized nor inappropriate, but fully aligned with actual industrial constraints.



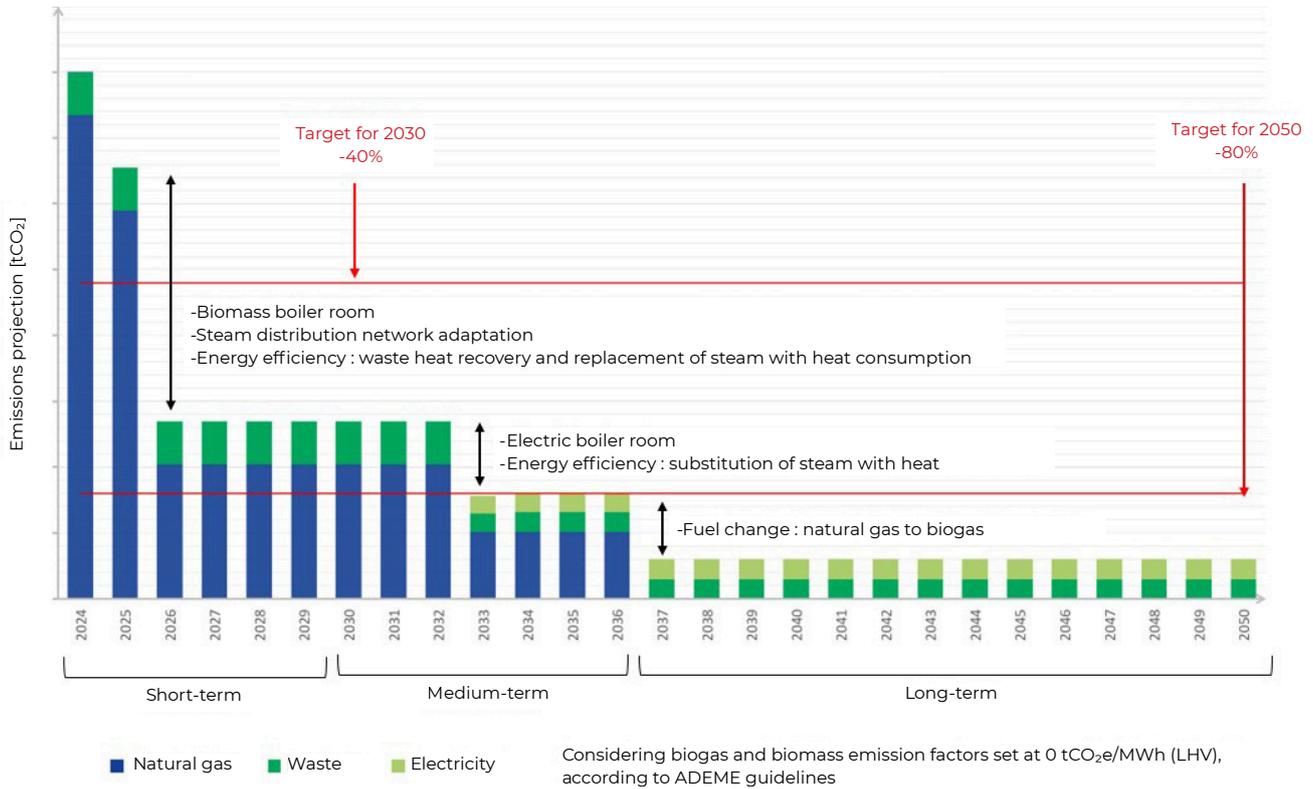
• Results

From an energy efficiency perspective, some steam demand could be met through alternative energy vectors such as hot water, which is easier to produce and less energy-intensive. Currently underexploited, waste heat potential has been identified and could be harnessed to cover internal needs or shared at the territorial level. Targeted actions to reduce thermal losses and optimise industrial processes are also expected to help achieve a certain level of demand-side sobriety.

In the short and medium term, biomass- or electricity-based boiler plants provide operational solutions to ensure continuity of service, improve energy efficiency and decarbonise steam production. The existing steam distribution network represents a solid foundation, but requires adaptation. Designed for legacy configurations, it no longer fully meets current pressure levels and usage patterns. Partial redesign would make it possible to better support ongoing industrial and environmental transitions. In the longer term, other technologies such as nuclear SMRs or thermal energy storage could become relevant, subject to their technological maturity and to favourable regulatory and economic frameworks.

Finally, the study highlights the need for a dedicated governance framework among industrial stakeholders. Establishing collective coordination involving all relevant parties is essential to align investments, share resources and embed the initiative within a cooperative, territory-wide approach across the Chemistry Valley.

CO₂ emissions trajectory to 2050



● Perspectives

In light of the study, several perspectives emerge, but they raise major challenges:

Technical

- Comprehensive energy audits and waste heat studies as levers for demand reduction and energy efficiency.
- Maturation of complementary technologies such as next-generation small modular nuclear reactors (SMRs) or thermal energy storage.

Economic and regulatory context

- Challenge of ensuring the long-term viability of industrial sites whose future remains uncertain within a transforming industrial landscape.
- Carbon pricing as a key factor influencing operating costs and overall competitiveness.
- Limited investment capacity of industrial sites, with expectations of rapid returns on investment or reliance on third-party investors.

Collective mobilisation: governance and training

- Territory-wide governance as an essential dimension to ensure effective and flexible coordination among stakeholders.
- Mobilisation of human resources through training, awareness-raising and organisational actions to foster ownership of energy-related challenges.

Lead



Co-lead



Co-financing partners



Engineering consultancy



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