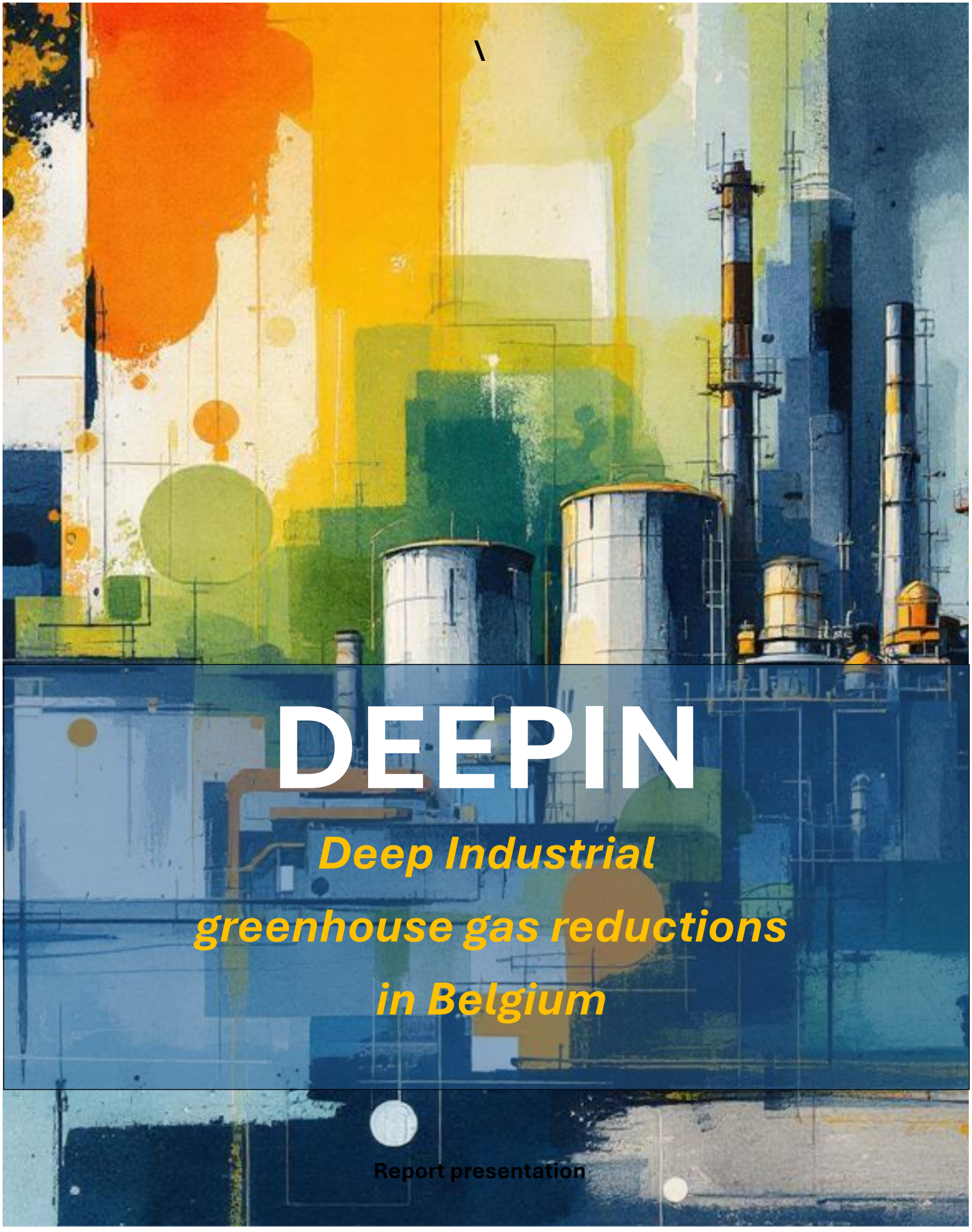
belspo

Science 4 Policy

VUB

BRUSSELS SCHOOL OF GOVERNANCE



DEEPIN

Deep Industrial greenhouse gas reductions in Belgium

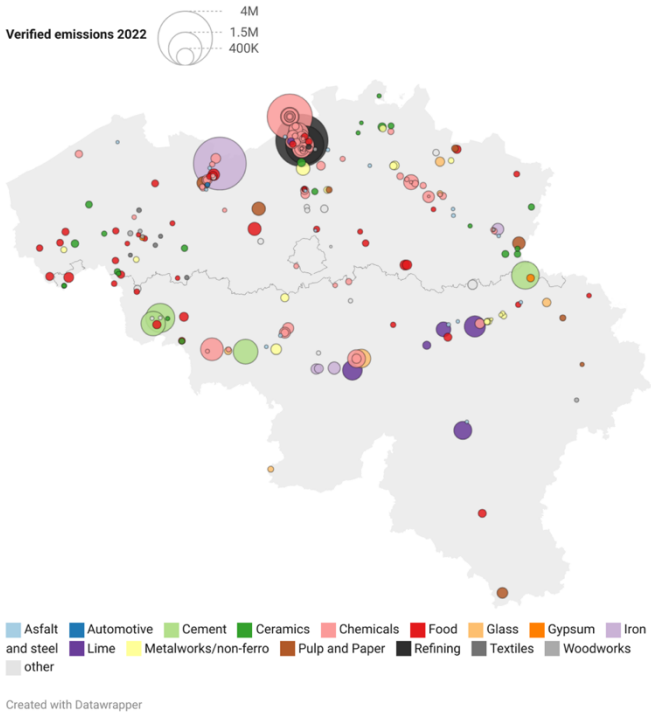
Report presentation

PRESS BRIEF – Embargo until 18.09.25 07:00h

Brussels, 11 September 2025 – The DEEPIN project, a Science4Policy initiative funded by BELSPO, has released a comprehensive study assessing the pathway to decarbonise Belgian industry. The report identifies over 180 technological options, providing a rigorous, assessment of solutions that can deliver deep industrial greenhouse gas (GHG) reductions in Belgium by 2040–2050.

Belgium's Industrial Emissions: A Snapshot

The report highlights that industry accounts for **28% of national GHG emissions**, totalling approximately **30 million tonnes of CO_2-equivalent (Mt CO_2-eq)** annually. Emissions are heavily concentrated in three sectors: Chemicals (~33%), Steel (~28%), Cement & Lime (~21%). Geographically, emissions are concentrated in the Antwerp, Ghent clusters, the Albert Canal and the industrial corridor in the Walloon region.



Key Findings: A Technically Feasible but Challenging Transition

Out of all the technologies assessed more than 100 are likely to reaching commercial readiness (TRL 9) by 2040 and many of them are or will be available sooner.

The study concludes that a **90% reduction in industrial emissions** versus 2005 levels is, in theory, possible by 2040–2050 with technologies that are currently available or will be available by 2040 at the latest.

Major contributions are expected from:

- **Electrification of industrial heat**: industrial heat-pumps are becoming a game-changer (cost-efficient). High temperature industrial heat needs more time. 90-99% of industrial heat can in theory be electrified.
- **Carbon capture (and storage):** Essential for process emissions in cement, lime, chemicals and steel. Potential to capture 90% or more of industrial process emissions.
- **Efficient materials use and circular materials**: not only from GHG mitigation viewpoint but also lessen dependency on (imported) materials and fuels.

Sector-Specific Decarbonisation options:

Chemicals: The largest and most complex sector. Mitigation hinges on carbon capture at high-concentration sources, electrification of heat, scaling advanced plastics recycling, and strategic alternative olefins production (e.g. via bio- or CCUS-based methanol). Full electrification of the CO_2 intensive steam cracking is promising but highly sensitive to electricity price and grid carbon intensity.

Steel: Combines near-term blast furnace retrofits (bio-carbon/H_2 injection, top-gas recycling, CCU) with a structural shift to Hydrogen-Based Direct Reduced Iron (DRI) and Electric Arc Furnaces (EAF). Scrap-based EAF remains the most CO_2 efficient route.

Cement & Lime: No credible net-zero pathway exists without large-scale carbon capture for process emissions. A full toolset includes clinker substitution, novel binders, alternative fuels, and electrification coupled with capture.

Cross-Sectoral Heat: Electrification of low- and even medium-temperature heat via industrial heat pumps is *almost* a "no-regret" measure, offering large emission reductions at low abatement costs, even with current grid CO_2 intensity. Essential to ensure that electricity is less than 3 times more expensive than natural gas for industrial consumers.

Critical Enabling Conditions:

The report underscores that achieving deep reductions is contingent on strict conditions:

Infrastructure: Two time-critical networks are essential**:** a CO_2 transport and storage backbone ~2035, and a step-change in clean power capacity and grid reinforcement**.**

Investment: Most decarbonisation options face cost premiums. Carbon Contracts for Difference (CfDs), reforming energy taxation to narrow the electricity-gas price gap, and green public procurement are vital to de-risk investments.

Innovation: Focus must be on pulling late-stage innovation to market readiness and on pushing game-changing early stage innovation (e.g. electrochemical olefins, steel and ammonia).

Governance: Belgium's split competences require coordinated planning across federal and regional levels to enable the industrial transition. This can include coordination on energy taxation, infrastructure investments and planning and regulatory streamlining. Cooperation on infrastructure with neigbouring countries (incl. North-sea) will be critical to reduce overall costs.

Conclusion: The Quinquennium of Decision

The next 5 years are critical for enabling decisions in the above mentioned areas. This period must initiate large-scale deployment of mature technologies and finalise investment decisions for CO_2 and power infrastructures. With decisive policy on infrastructure, investment de-risking, and system integration, Belgium can deliver deep industrial decarbonisation while preserving its strategic industrial base.

About the Brussels School of Governance (BSoG):

The Brussels School of Governance is an alliance between the Institute for European Studies (VUB) and Vesalius College. It is a leading hub for interdisciplinary teaching and innovative research, striving to understand and help address the major societal challenges of our time.

For further information, please contact:

Tomas Wyns (Corresponding Author)

Brussels School of Governance

Email: tomas.wyns@vub.be