ITEA4

Project Profile



GreenCode

AI automated software optimisation for energy efficiency

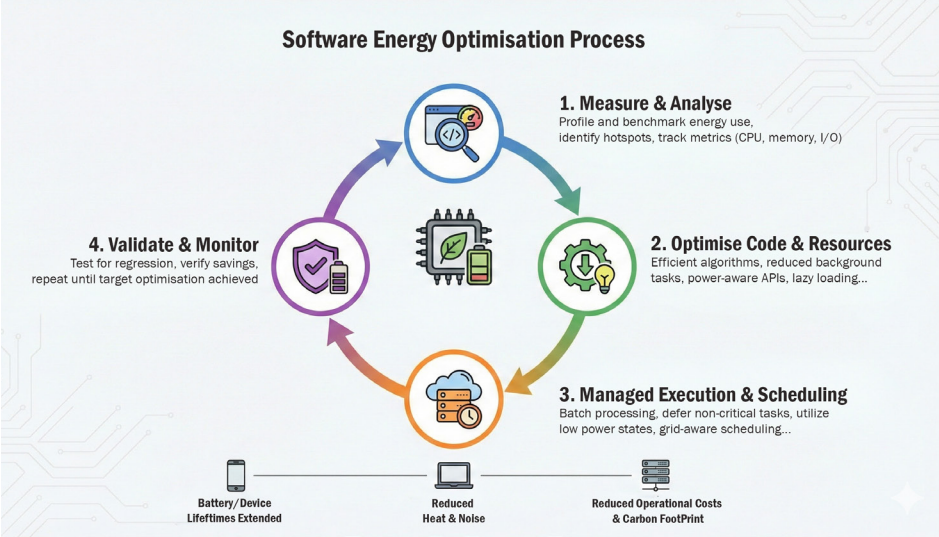
Uniquely combining state-of-the-art Generative AI with detailed software quality, energy expenditure, and performance analysis, the ITEA project GreenCode (Generative Review and Efficiency Enhancement, Networking Code Optimisation, Decarbonisation and Economics) will reduce the cost and carbon footprint of the IT sector at scale, by automating the optimisation and modernisation of inefficient software systems.

Addressing the challenge

The IT sector has a carbon footprint exceeding aviation, with the energy usage of software being a substantial contributor to this. While the energy efficiency of hardware in data centres and corporate server rooms is improving, the root cause of inefficiency remains: the software they are built to run. This issue spans everything from mobile devices and laptops, to servers, vehicles and gaming consoles. The impact of sub-optimal software is thus a high-scale problem that poses a societal risk in times of energy stress.

Proposed solutions

GreenCode will offer an innovative solution: a first of its kind software decarbonisation pipeline leveraging green GenAI techniques to automatically optimise software systems for energy efficiency. This will be achieved by extending the state of the art in natural language processing, AI and machine learning to assess codebases and system infrastructures against sustainability practices, then identify and resolve defects through specialised GenAI. The pipeline will benchmark the software updates it creates versus the source, iterating a cycle of benchmarking, GenAI refactoring and further quality assurance stages that target increased software performance and drive down energy use. When deployed, this will result in a lower net carbon impact over the software's expected lifetime compared to both the original software and the effort expended to optimise it. Simultaneously, GreenCode will provide (GDPR-compliant) aggregated insights into developer behaviours and increase the useful lifetime and maintainability of the codebase, thereby boosting productivity and decreasing time to market for new features.

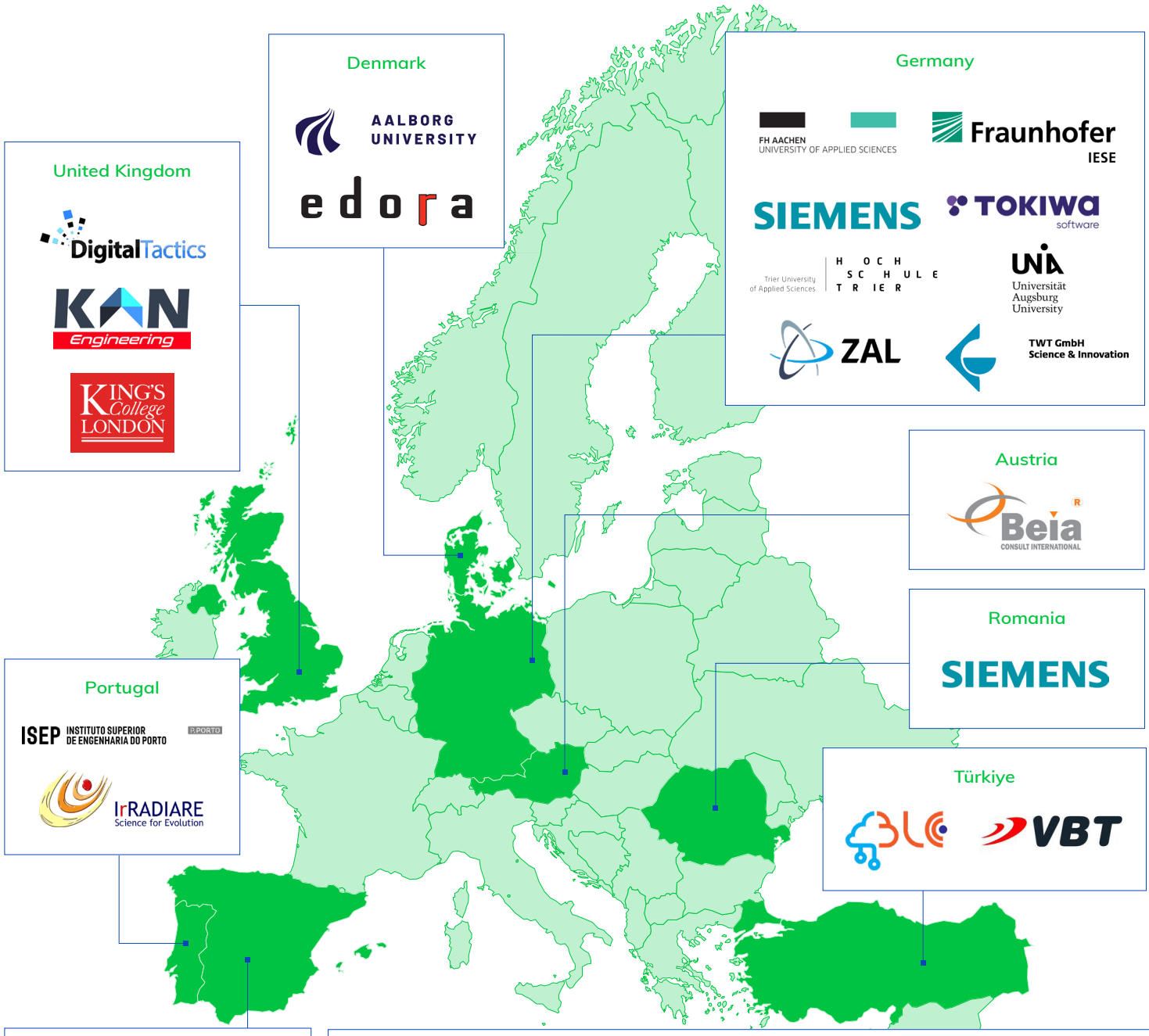


Projected results and impact

The total cost of ownership of software systems is significantly influenced by software quality, and both correspond to operational efficiency and carbon footprint. This is the collective benefit of GreenCode: cost, energy and climate impact reduction achieved while boosting productivity, reliability, maintainability and a variety of other commercially valuable factors. From a commercial perspective, GreenCode will create a flexible system of tools that can rapidly be brought to market by its partners in their sectorial niches, as well as capitalising on growth in the AI market (USD 136 billion in 2022 to USD 3,636 billion by 2030). Users will profit from the automated maintenance, optimisation and decarbonisation of both new and legacy software, through which developers will be upskilled in sustainability concerns and are expected to see a 20-40% increase in their productivity. Finally, real reductions in the climate impact of IT can be achieved when optimised software systems are deployed at scale; GreenCode aims for at least a 15% reduction in energy consumption per system and, in doing so, will help tackle a serious energy and emissions problem in its early stages.

Project partners

GreenCode
23016



Project start
October 2024

Project end
October 2027

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Project website
https://itea4.org/project/greencode.html
https://greencode.ai/

ITEA is the Eureka RD&I Cluster on software innovation, enabling a large international community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society. ITEA is part of the Eureka Clusters Programme (ECP).

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