

# Enabling energy efficiency in urban planning

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Credit: AI-generated image ([disclaimer](#))

A training network has enabled young Europeans to develop urban decision-making tools capable of minimising non-renewable energy use in cities.

The EU-funded CI-ENERGY project – which was trialled in the cities of Geneva and Vienna – successfully created software tools for simulating renewable [energy](#) and urban [energy efficiency](#) scenarios. The project

demonstrated how decision makers can approach this issue at the urban district level rather than for just each individual building, and underlined the importance of equipping scientists of the future with multiple skills.

## Planning ahead

At the moment, energy efficiency simulation tools tend to focus on individual buildings rather than whole urban quarters. This makes it difficult for [urban planners](#) to take energy efficiency into account and to devise low carbon energy supplies when designing and planning refurbishment actions or new city developments.

The lack of quantitative information to seriously evaluate CO<sub>2</sub> savings, or the cost and impact of retrofitting, renewable energy options, cogeneration or district heating extensions, was a key motivation for the CI-ENERGY project.

"The starting point was the application of geoinformation 3-D models to energy planning," says CI-ENERGY project coordinator Prof Ursula Eicker from the Hochschule für Technik Stuttgart, Germany. "The cities of Vienna and Geneva were used as case studies to develop prototype applications that could help urban planners prioritise decisions and identify where investment should be made. Many cities have good masterplans about where they want to be in, say, 2050, but what they lack is detailed know-how how to best get there."

The first software prototype, designed for a new-build area in Geneva, sought to evaluate the cost and energy efficiency of constructing new buildings across a myriad of configurations. This enabled developers to generate a variety of scenarios to assess energy efficiency at the urban scale.

In Vienna, modelling tools were developed to assess the impact of

extending an existing district heating network, providing full cost analyses across a range of scenarios. In both cases, the software tools enable planners to evaluate the cost-benefits of certain strategies and to simulate how best to move forward.

"Work on this has not yet finished," notes Eicker. "These tools can tell planners what is feasible and at what cost, but now the issue is identifying which actors need to be involved and what issues should be tackled first. But at the very least, we now know what the technical and economic potential is for each scenario."

## **Sustainable lessons**

The CI-ENERGY project has played an important role in filling the knowledge gap that exists in the urban energy research field. This gap is primarily due to the wide range of fragmented disciplines that this field contains, from building physics and energy supply technologies through to software engineering and information technology. CI-ENERGY helped to bring all these elements together within one common modelling framework, with training carried out through the close collaboration of six research centres and four energy and software companies.

"From an academic perspective this is one of the best graduate experiences that young scientists can get," says Eicker. "Regular meetings took place across all the partner countries and feedback came from all supervisors involved. Ph.D. students tend to focus on just one issue, so having this much broader perspective should be good for their careers."

The next step is to bring this research from the academic prototype stage to the product level. "The interest is clearly there," says Eicker. "I could imagine providing modelling services to, say, an energy company in Stuttgart, to help them identify which future energy systems are best or

how much flexibility and storage might be required to integrate more renewable energies. This work is ongoing, and these tools will now be developed further."

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