

How can we make residential neighborhoods more sustainable by 2050?

December 19 2019, by Sandrine Perroud

If the aim of a 2,000 Watt Society is to be achieved, peri-urban residential neighborhoods—where the average single-family home consumes 6.5 times more power than that target—must adapt. An EPFL thesis, which has just been awarded a scholarly distinction, explores ways of hitting the target in Vaud canton, but which could also be applied to the whole of Switzerland.

"Switzerland's Spatial Planning Act states that land should be used more intensively in built-up areas, particularly those already well-served by [public transport](#)," according to the thesis recently completed by Judith Drouilles, who holds a Ph.D. in architecture and works at EPFL's Laboratory of Architecture and Sustainable Technologies (LAST). "This research shows that peri-urban residential [neighborhoods](#) consisting of single-family homes, although they are not a priority in terms of spatial planning, also have a lot of scope for improvement in terms of sustainability."

To find solutions that are acceptable for owners of [single-family homes](#), Drouilles spoke to local stakeholders and sent questionnaires to people living in residential neighborhoods in the Lausanne region, i.e. Chavornay, Assens, Echichens, Savigny and Jorat-Mézières. "Buying a single-family house in Switzerland is often the culmination of a life-long project or the realization of a dream. That's why it was important to factor in the aspirations of these kinds of owners, to take into account their various viewpoints," she explains.

Numerous solutions

After the initial fact-finding phase and after formulating several possible scenarios, Drouilles concluded that a wide range of solutions and awareness-raising initiatives are needed to make these neighborhoods more sustainable, for example through car-pooling and car-sharing, community gardens and shared services. If smaller homes were built for retired people, they would not have the burden of maintaining a plot of land and would be able to maintain their social contacts, while single-family houses would become more densely populated as new families move in.

Non-renewable fuel prices are also expected to rise in the future, which could seriously affect people in these areas, who depend on their cars to get around and whose energy systems are outdated, particularly when they retire.

Thinking about neighborhoods as systems

If these neighborhoods are to become more sustainable, we must therefore stop thinking about them as individual plots of land and start viewing them as interdependent systems interacting within the municipal territory. Also, attracting more people to live in these regions in the next few years is not necessarily the answer, because that would lead to an increase in individual transportation. "From the sustainability point of view, it would be wrong to impose intensive land use uniformly across all areas," warns Drouilles.

In her thesis, Drouilles used BIM, or Building Information Modeling, a collaborative 3-D software program that allowed her to factor in numerous parameters at the building and neighborhood level. With BIM, she could apply various development scenarios to her case studies by

making simulations over 35 years.

Insufficient turnover

Drouilles found that the crux of the matter is the slow turnover of single-family houses, which is hindering progress towards a more sustainable situation. "In Switzerland, half of all single-family houses are currently occupied by retired couples, who don't have the money or inclination to refurbish their homes and install more sustainable energy systems. So as things stand, the peak annual emissions in these neighborhoods will exceed 2,000 Watt Society targets by more than five tons of CO₂ per inhabitant by 2030," explains Drouilles, who has been studying these issues for the past ten years. To avoid that situation, she is encouraging local authorities to make greater efforts to raise residents' awareness of them and adopt their own initiatives, in order to drive change within neighborhoods.

According to 2015 figures from the Swiss Federal Statistical Office, 10 percent of Switzerland's population currently lives in a peri-urban residential neighborhood in which more than 80 percent of residential buildings are single-family houses. Most people's day-to-day traveling is done by car, and each inhabitant travels more than 40 km per day on average. The environmental impact of that lifestyle is almost 6.5 times greater than the intermediate targets set by Switzerland as part of its aim of achieving a 2,000 Watt Society by 2050. Given the current climate emergency, achieving change in these neighborhoods is an important goal and a considerable challenge.

Novel method

Drouilles wrote her Ph.D. thesis as part of the LIVING PERIPHERIES research project led by LAST with the support of the Swiss National

Science Foundation. "Judith's doctoral research took a novel approach, proposing a range of scenarios for 2050. This allowed her to explore, in a dynamic way, the processes involved in peri-urban renewal and to estimate, using a novel and rigorous methodology, the possibilities and limitations with a view to achieving greater sustainability," says Emmanuel Rey, the director of LAST, who supervised her thesis

More information: Peri-urban residential neighborhoods in transition: multi-criteria comparison of scenarios for 2050, PhD thesis supervised by Emmanuel Rey, EPFL, 27 August 2019.

infoscience.epfl.ch/record/269159?ln=en

Provided by Ecole Polytechnique Federale de Lausanne

Citation: How can we make residential neighborhoods more sustainable by 2050? (2019, December 19) retrieved 25 April 2024 from <https://phys.org/news/2019-12-residential-neighborhoods-sustainable.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.