

## A Case Study: Developing Digital Twin VR Visualization Tool for Learning about Different Heating Methods for Buildings

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### Abstract

Learning about renewable energy systems, comparing them, and learning their maintenance is important when learning about the sustainable energy solutions. We present how a digital twin for learning about different heating methods can be implemented by using VR (virtual reality) visualizations. As part of the DUKE-project Digital Twin of a District Heating Hybrid (DHH) was developed. DUKE is a collaboration project between Lapland University of Applied Sciences (Lapland UAS) and Lapland Education Centre (REDU). The idea of DUKE is to examine how digital twins' VR solutions can be implemented in educational purpose while leveraging renewable energy. Purpose was to create immersive visualization tool to educate HVAC students about renewable energy as well as help to decide between ways of heating. Development of DHH showed that use of a game engine helps to make digital twin easily interactable and visually show real-life data in VR environment. VR implemented digital twin brings new emerging technologies to the field of education in renewable energy education as well as it is a tool that can be used to teach housing decision makers and general public about different heating solutions accompanied with district heating and their effects over time. Interaction with input values in DHH gives possibility to compare different decisions and allows user to have their own realization of how different heating systems compare based on calculated data.

**Keywords:** digital twin, learning experience, VR, hybrid heating system, data visualization