Open Geographic Information System for Energy Transition : citiwatts.eu

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Keywords: Geographic Information System, Open-Source, DevSecOps, GDPR, Electric Vehicles, District-Cooling

Abstract The OpenGIS4ET project successfully delivered the Citiwatts 3.0 platform, a comprehensive open-source energy planning tool that advances the green transition across heating, cooling, mobility, and sector coupling domains. Building on the former H2020 Hotmaps foundation, the project achieved its core objective of creating an accessible, interoperable platform for public authorities and energy planners operating from local to national scales.The project established a robust DevSecOps development framework ensuring security throughout the development lifecycle, with SonarQube integration for continuous code quality monitoring. The platform features responsive design compatibility across desktop and mobile devices, advanced session management enabling users to maintain multiple calculation results per module, and comprehensive two-factor authentication through Keycloak services. A secure public API also enables external system integration. Sophisticated calculation modules were developed and validated through real-world case studies:The EV-Mobility tool provides Vehicle Kilometer Travelled mapping with charging behavior modeling across four scenarios including home, workplace, points of interest, and home office charging, coupled with photovoltaic production potential analysis. The District Heating and Cooling tool addresses temperature-level optimization requirements with economic feasibility assessment tools. The Sector Coupling tool integrates electrical, heating, and transport systems through connection with EnergyPLAN, enabling comprehensive flexibility analysis for multi-sector energy planning. The project delivered a comprehensive CO2 impact assessment and quality control processes applicable to future energy planning initiatives. Open dataset repositories with automated quality validation ensure data integrity, while GDPR risk analysis templates provide reusable compliance frameworks for similar European energy planning tools. Export capabilities, which include PDF reports with indicators and charts, ZIP packages, and Excel format compatibility for external analysis, extended the original platform capabilities. The platform's open-source architecture reduces market entry barriers. A usability analysis has been conducted and was followed by the implementation of release 3.0 with UX improvements. Training programs delivered to energy planning professionals across partner countries established new competency frameworks, while comprehensive documentation and tutorial materials support ongoing knowledge transfer. Case studies across

Denmark, Austria, Switzerland, and Germany confirmed the platform's effectiveness in diverse regulatory and technical contexts. Derived projects such as CoolLIFE and SAPHEA also display the adaptability of the current platform, which demonstrates its adaptability to diverse geographical and technical contexts.