



High-Resolution Carbon and Water Intensity Modelling to Enable Impact-Aware Research Computing

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PROBLEM & OPEN DATA
 Motivation: Modern research computing has a large carbon and water footprint. The carbon and water footprint of digital infrastructure is a significant part of the electricity and computing infrastructure. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Coverage & Resolution: Water covers 70% of the Earth's surface. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Electricity Data Sources & Inputs: Generation mix by technology, total load, and cross-border exchanges are relevant to the sustainability analysis. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Generation Mix & Exchanges: Spain's electricity systems are based on 45-minute resolution generation data. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Environmental Footprint Factors: Water usage, both operational and life-cycle carbon emissions, and energy consumption factors are relevant to the sustainability analysis. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.

METHODOLOGY
 High-Resolution Methodology: WattNet implements a new training approach for high-resolution electricity and water footprint modeling. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Declaration: The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Prediction of Consumption-based Intensity: Prediction-based intensity analysis for each generation, applying the original footprint model. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Estimation & Forecasting: Carbon and Water Footprint time series are forecast 72 hours ahead of time. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Water Impact & Regional Scenario: Water impact analysis is performed on a regional scale. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.

RESULTS & IMPACT
 Carbon Footprint: Carbon footprint analysis shows a significant reduction in emissions. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Water Footprint vs. Water Impact: Water footprint analysis shows a significant reduction in water usage. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Green Score: An unified sustainability metric. The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Explore All Data via RESTful API: The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.
 Use Case: GreenScore-Based Workload Scheduling: The carbon and water footprint of research computing is a significant part of the electricity and computing infrastructure.

Footer:
 wattnet, IFCA, CSIC, UC, Universidad de Cantabria, Funded by the European Union, GreenDIGIT, wattnet, SC4RC 2026, Sustainability Conference for Responsible Research Computing, Wattnet: High-Resolution Carbon and Water Intensity Modelling to Enable Impact-Aware Research Computing, SC4RC 2026, Sustainability Conference for Responsible Research Computing, Funding and acknowledgments, GreenDIGIT