HORIZON 2020

Advanced Tools Towards cost-efficient decarbonisation of future reliable Energy SysTems

Results in Brief

A modular open-source toolbox to streamline energy system operation and planning

A novel platform creates a digital environment where transmission and distribution system operators can access advanced tools. These tools enable them to gather, interpret and use their data to efficiently manage networks' operation, maintenance and planning.

CLIMATE CHANGE AND ENVIRONMENT

ENERGY

© millenius/stock.adobe.com

The EU-funded ATTEST project has developed tools to address upcoming challenges in the decarbonisation of the energy sector. These include managing the increased demand for electrification from various sectors, integrating more renewable electricity and gas into the existing infrastructure and accommodating the anticipated rise in storage devices.

"Our ICT platform offers an integrated study environment for transmission and distribution system operators. It serves as a single access point to a suite of tools designed to enhance network planning, operation and maintenance," notes project coordinator Filipe Joel Soares.

Being open-source, the platform offers improved interoperability with other software

systems and ensures a reliable interaction between operation, planning and asset management tools. Its functions can also be customised and expanded to adapt to specific scenarios of distributed energy resources integration, such as storage devices, PV panels or electric vehicles. Furthermore, new tools can easily be integrated, and existing interface components can be reused to visualise outputs.

Planning module

The planning module features a specialised optimisation tool that enhances distribution network planning by using path-dependent network reinforcement strategies. It creates diverse investment portfolios, considering both asset- and non-asset-based solutions.

There is also a strategy optimisation tool designed to adaptively upgrade the transmission network, accommodating new sources of uncertainty and flexibility that could arise from different network areas. These could include distributed renewable energy sources, storage solutions and multi-energy systems.

Operation module

Within the operation module, one tool focuses on procuring ancillary services for day-ahead operation planning of the distribution network. Another tool activates the procured ancillary services, aiming to minimise deviations from the day-ahead decisions by activating distributed energy resources.

A different tool enhances the conventional Deterministic Security Constrained Optimal Power Flow to procure ancillary services (for congestion management, voltage control and frequency control) on a 24-hour ahead basis under forecast uncertainty. It ensures smooth coordination with distribution and transmission system operators to prevent conflicting ancillary service procurement.

Ultimately, a tool for online dynamic security assessment implements a machine learning approach to assess the safety of power systems that heavily use renewable energy.

Asset management module

The asset management module encompasses three tools. The first one characterises asset conditions groups assets based on similar characteristics considering various aspects: lifespan, health condition, maintenance needs, and their economic and environmental impact.

The second assigns unique indicators to each asset based on its specific cluster

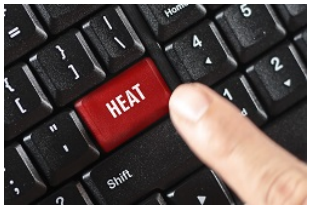
dimensions, helping to prioritise assets that need close attention. A third tool formulates smart strategies for asset management, offering action recommendations based on health indicators. It also projects asset conditions and assesses future impacts – enabling proactive decision-making.

“ATTEST advanced tools and approaches to electricity grid planning, monitoring and maintenance are better suited to future power systems,” states Joel Soares. “These developments foster the digitalisation of the energy sector, reduce environmental impact and improve reliability and quality of service. They also help prepare the electricity network for increased electrification in the energy systems, while also enabling the integration of various energy vectors.”

Keywords

ATTEST | tools | energy system | platform | distribution system operators | open-source | network planning

Discover other articles in the same domain of application



Smart software for more sustainable heating

5 October 2018

A data portal for standardised energy efficiency mortgages

29 September 2020

Country-specific financing mechanisms for viable energy efficiency investments

23 December 2021

Reducing the risk and capital associated with deep energy efficiency renovations

23 December 2021

Project Information

ATTEST

Grant agreement ID: 864298

Project website

DOI
10.3030/864298

Project closed

EC signature date
20 January 2020

Start date
1 March 2020

End date
31 August 2023

Funded under
SOCIETAL CHALLENGES - Secure, clean and efficient energy

Total cost
€ 3 998 658,75

EU contribution
€ 3 998 658,75

Coordinated by
INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA
Portugal

Related articles

NEWS

SCIENTIFIC ADVANCES

Transatlantic Cooperation: European and Canadian Marine Stakeholders Discuss Sustaining Ocean Ecosystems

25 May 2018

Last update: 19 January 2024

Permalink: https://cordis.europa.eu/article/id/448493-a-modular-open-source-toolbox-to-streamline-energy-system-operation-and-planning