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WP8

Dissemination, Communication and Exploitation

Final report on
dissemination,
communication and
exploitation results

D8.5



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Abbreviations and Acronyms

CTR	Click-through Rate
D	Deliverable
DSO	Distribution System Operator
KPI	Key Performance Indicator
OR	Open Rate
PR	Press-release
R&D	Research and Development
TSO	Transmission System Operator
WP	Work Package
<i>TLR</i>	Technological Readiness Level

1. Executive Summary

Work Package 8 (WP8) is dedicated to the communication, dissemination, and utilization of all solutions and outcomes generated throughout the ATTEST project.

This is the final deliverable of the ATTEST project, aiming to serve as a comprehensive final evaluation report of all activities conducted, with a focus on the achievement of defined KPIs. It should be noted that the completion of various activities was occasionally postponed, and certain initially defined KPIs had to be adjusted due to the project's unique characteristics and target audience.

The fifth deliverable complements other documents within this theme that were developed during the project, and it specifically focuses on key milestones achieved in dissemination and communication activities during the recent months of the project, particularly following the previous mid-term report on dissemination and communication.

In this sense, the document starts by giving an initial overview of the dissemination results, that can be summarized with the following numbers:

- Two press releases were already disseminated, that results in five news pieces published on the media. Another one will be disseminated when the project ends.
- Project book: is being developed to be delivered at the final event of the project.
- Website: 4.173 unique visitors received during the three years of the project and 1.365 files downloaded.
- Social media channels: LinkedIn, YouTube and Twitter reached 56.587 users, had 3.314 reactions and 1.631 video visualizations.
- Scientific Publications: 32 (17 conference papers and 15 journal articles) and 6 PhD Theses
- Newsletters: seven newsletters launched, with 30,9% OR (average) and 9% CTR (average).
- Events: 30 presenting the project (15 conferences, 1 media, 1 meeting, 1 poster, 1 short course, 1 symposium, 5 webinars and 5 workshops).

Then, a general overview of the communication strategy is presented, followed by an individual presentation of each one of the communication channels that were used under the scope of the project.

A summary of the exploitation results is provided in chapter 5 (each partner's role is presented and, then, the key exploitable results achieved by the project are listed and explained), followed by an overview of the KPIs achieved in WP8 and ending with some conclusions.

2. Introduction

The evaluation of results stands as a pivotal component within any communication and dissemination plan. It serves as a critical measure by which we can assess the plan's appropriateness and determine whether the outcomes align with our expectations, both in terms of meeting set objectives and effectively conveying the project's message.

This marks the fifth deliverable following four previous ones, each with a focus on delineating and executing specific activities: D8.1 - Dissemination Plan, D8.2 - Communication Plan, D8.3 - Exploitation Plan, and D8.4 - Follow-up on Dissemination, Communication, and Exploitation Results. The primary focus of this document centers on performance indicators and outcomes, particularly over the past two years since the delivery of the last deliverable.

In this report, we will delve into each area separately, taking into account their unique goals, challenges, and results. First, we will explore dissemination activities. A matrix detailing these activities and their target groups will illustrate how they align with the objectives outlined in D8.1. Furthermore, we will provide an in-depth analysis of our achievement of the requisite Key Performance Indicators (KPIs). Subsequently, we will shift our attention to communication activities. Again, we will establish a direct correlation between the activities implemented and the topics and channels proposed in D8.2. The exploration strategy aims to extend the project's outcomes as far as possible into the future. In general, its activities will focus on four main objectives: (1) promoting market adoption, (2) facilitating technological integration, (3) supporting advanced research, and (4) contributing to policy definition.

Regarding the exploration project, ATTEST has generated several foreground exploitable outcomes, some of which have been described in the data management plan (D2.1). The exploration plan primarily centres on the tangible results of the project - in the case of ATTEST, the 12 optimization tools for energy system operators.

The exploration of tangible outcomes largely depends on their characteristics and objectives, as well as their level of technological readiness (TRL).

3. Dissemination results

In this section, we present the dissemination results achieved by the project since its beginning. Before, we present the results achieved, there is a need of reminding the objectives that have been established, since the beginning of the project, in the dissemination strategy: 1) to share knowledge by disclosing project results; 2) to assist in the application of project results; 3) to support further research; 4) to encourage continuous improvement of prototypes.

Ten main target groups have been identified as fundamental to achieve the dissemination objectives: energy regulators, local authorities, DSOs, TSOs, academic institutions, smart grids community, ICT community, European Commission and other EU-funded projects, end users and media outlets.

A strategy has been outlined considering the dissemination objectives and the target groups. Figure 1 represents a general overview of that dissemination strategy.

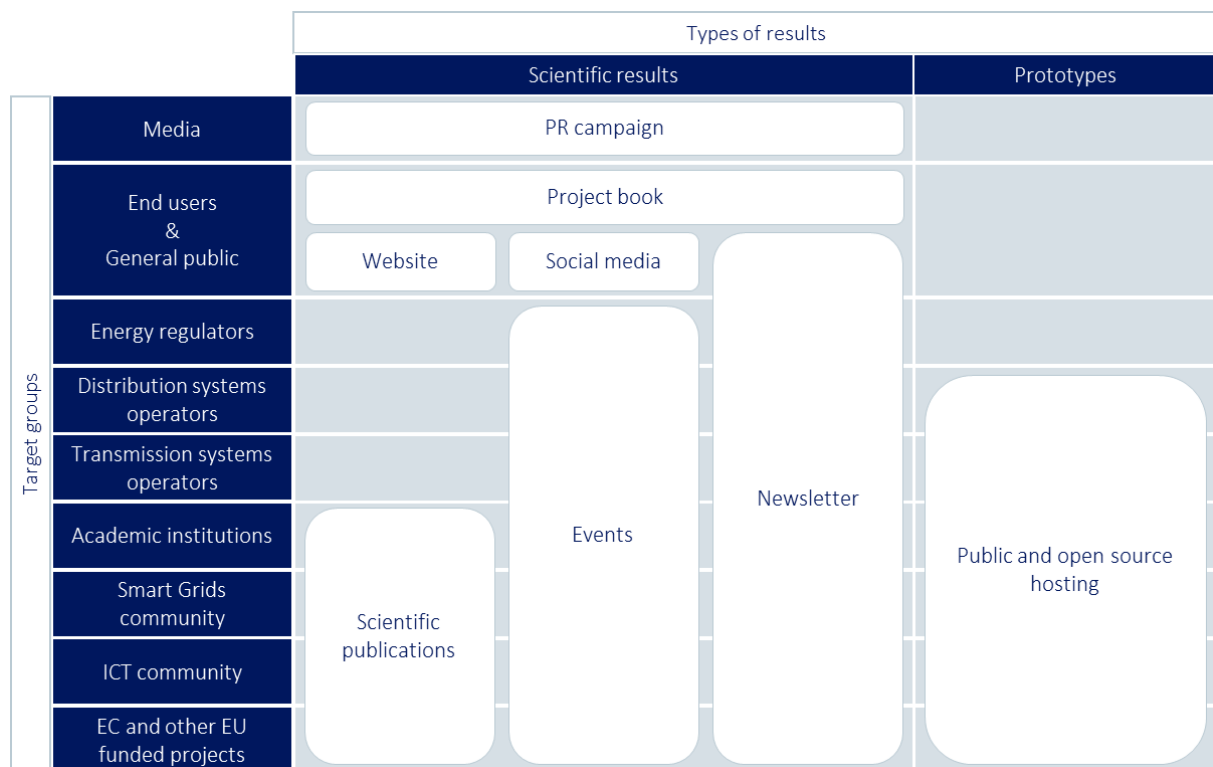


FIGURE 1: OVERVIEW OF THE DISSEMINATION STRATEGY (D8.1)

The ATTEST project has achieved the following dissemination results:

- Two press releases were already disseminated, that results in five news pieces published on the media. Another one will be disseminated when the project ends.
- Project book: is being developed to be delivered at the final event of the project.
- Website: 4.173 unique visitors received during the three years of the project and 1.365 files downloaded.
- Social media channels: LinkedIn, YouTube and Twitter reached 56.587 users, had 3.314 reactions and 1.631 video visualizations.
- Scientific Publications: 32 (17 conference papers and 15 journal articles) and 6 PhD Theses.

- Newsletters: seven newsletters launched, with 30,9% OR (average) and 9% CTR (average).
- Events: 30 presenting the project (15 conferences, 1 media, 1 meeting, 1 poster, 1 short course, 1 symposium, 5 webinars and 5 workshops).

4. Communication results

In this section, a detailed presentation of the communication results is made. Before presenting the results individually, it is important to remember the communication strategy that was outlined for the ATTEST project (Figure 2). Again, the strategy considered the target groups of the project. Taking into consideration the target groups and the dissemination strategy (section 3 of this document), several communication channels have been defined as the most adequate to achieve the established goals.

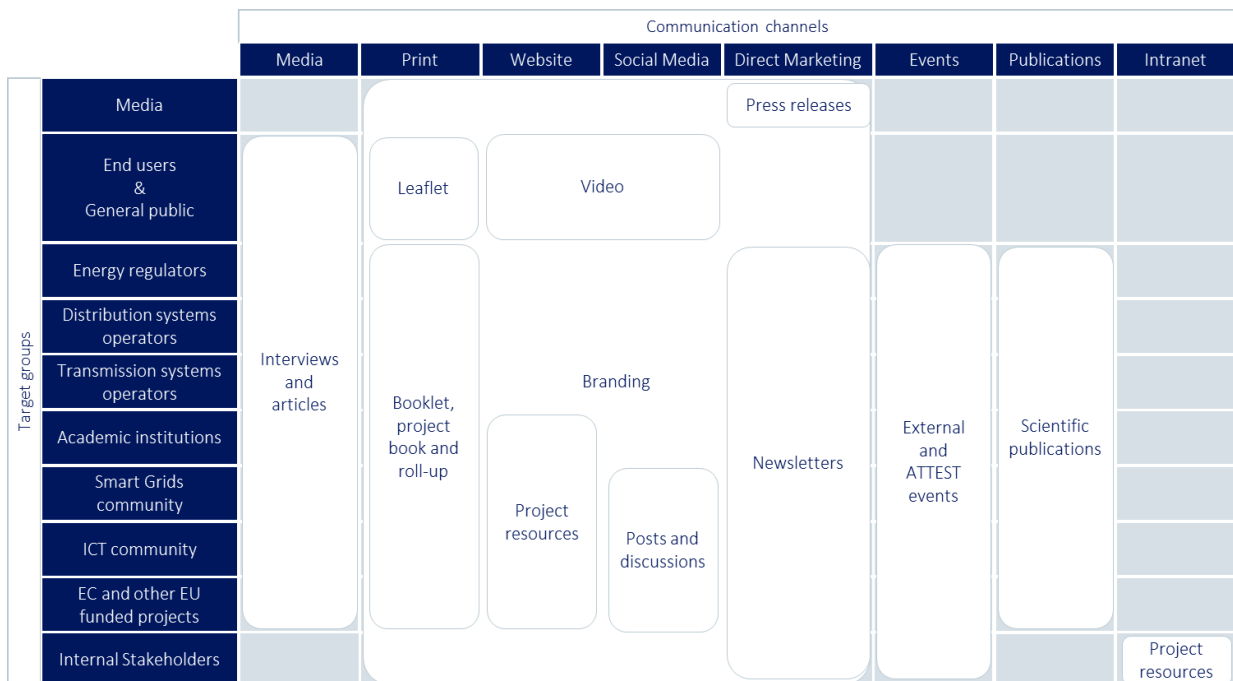


FIGURE 2: OVERVIEW OF THE COMMUNICATION STRATEGY (D8.2)

4.1. Media

Two press releases have been issued thus far, targeting both local and international media outlets. The release of a final press release regarding the 12 tools developed within the project is currently planned to be launched after the final event of ATTEST project. Table 1 presents the five news pieces that have been published in the Portuguese media, after the launch of the press releases.

TABLE 1: RESULTS OF THE FIRST PRESS-RELEASE

TYPE	COUNTRY	PUBLICATION	TITLE
Article	PT	Edifícios e Energia	INESC TEC lidera projecto europeu para construir plataforma de gestão energética inteligente
Article	PT	Mundo Português	Instituto do Porto lidera projeto para criar ferramentas inovadoras para redes elétricas
Article	PT	Ambiente Magazine	Portugal lidera projeto de 4 milhões que responde ao plano europeu de estímulo à economia
Article	PT	Lusa	Porto tech institute leads project to manage electricity grids, reduce wastage
Article	PT	O Instalador	Projeto europeu ATTEST abre caminho para as redes elétricas europeias do futuro

4.2. Print

The communication strategy for the printed materials involved: leaflet, booklet, book and roll up. The project book is being developed to be distributed during the final event of the project (printed and online). The other materials have been developed, but a note must be made. Considering our primary focus on digital communication, we have limited the production of printed materials. Nevertheless, we have digitally created and are distributing one project flyer (Figure 3) and one roll-up banner (Figure 4) online. Additionally, the presentations and infographics we have prepared remain in digital format, as we have opted to allocate the budget initially intended for printing towards the creation of additional project-supporting infographics.



FIGURE 3: ATTEST FLYER



FIGURE 4: ATTEST ROLL-UP

4.3. Website campaign

ATTEST has consistently made its published papers, infographics, presentations, deliverables, and other scientific results (as depicted in

Figure 5) available on the project's website (<https://attest-project.eu/scientific-communication/>). Recognizing the diverse levels of expertise within our target audience, these materials are crafted to encompass varying degrees of complexity, ensuring inclusivity and accessibility for all.

Each of these documents can be downloaded from the website for in-depth reference and examination.

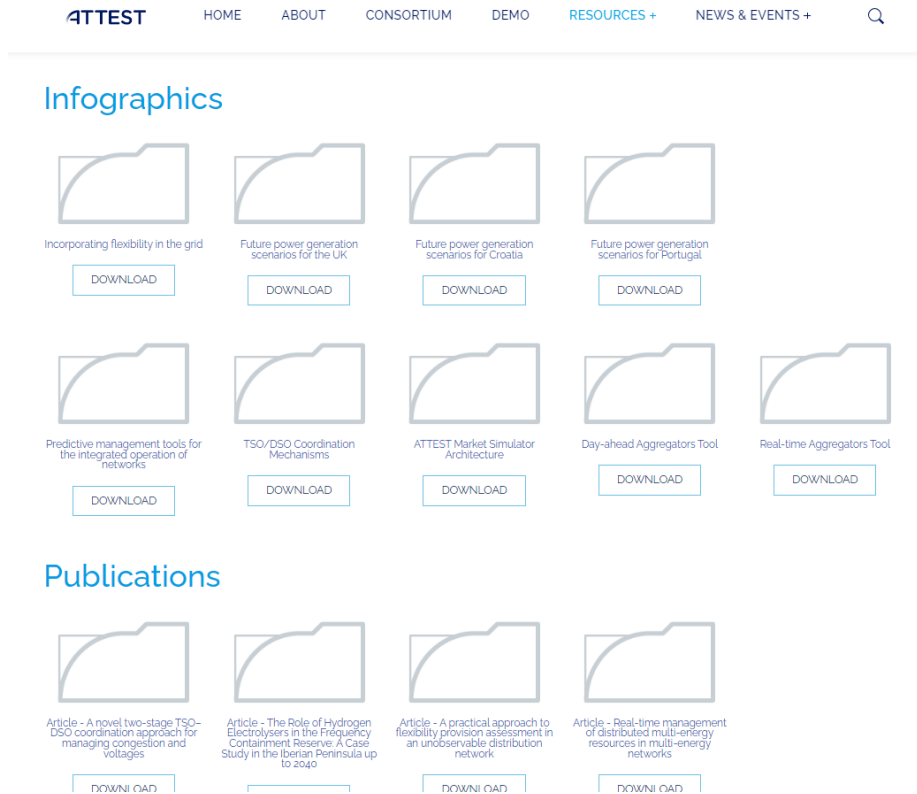


FIGURE 5: WEBSITE RESOURCES PAGE

4.4. Social Media campaign

Three social media channels have feed with information about ATTEST during the three years of the project: LinkedIn (<https://www.linkedin.com/company/attest-project/>), Twitter (https://twitter.com/ATTEST_energy) and YouTube (https://www.youtube.com/channel/UCWhihlgHtnjaAsC_4T2ZZUg). These three channels, together, reached 55.454 users, had 3.216 reactions and 1.989 video visualizations.

Table 2: shows the individual numbers of each social media.

	TWITTER	LINKEDIN
Number of posts	177	147
Reached users	10.362	50.938
Reactions	265	3.352

Several publications on LinkedIn and Twitter have informed the audiences about new findings from the ATTEST consortium (see examples in Figure 6). As proposed in D8.1, each publication included a direct link to the mentioned resource – whether it was a paper, an infographic, a video, or an article.

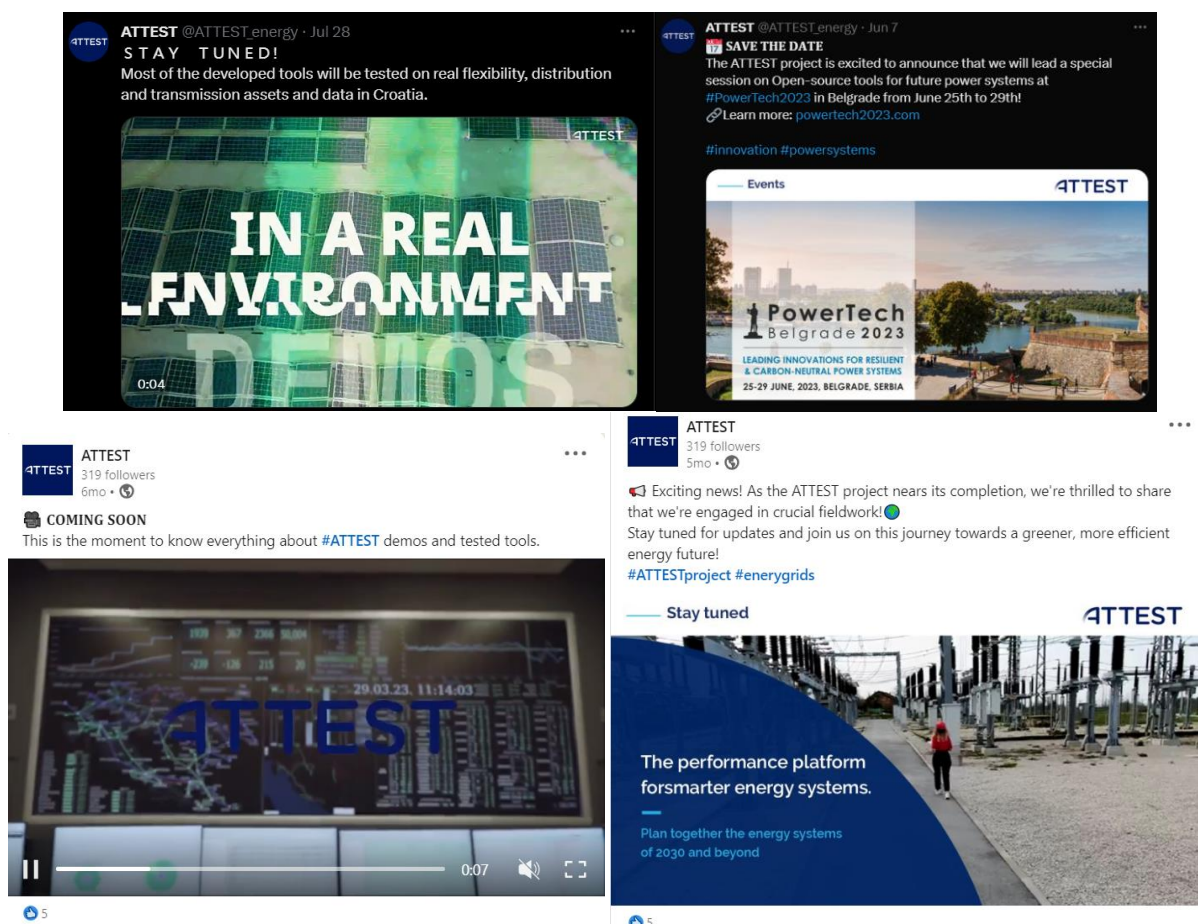


FIGURE 6: SOCIAL MEDIA RESULTS DISSEMINATION POSTS

The YouTube channel of the project was feed with five videos, as we can see in Figure 7.

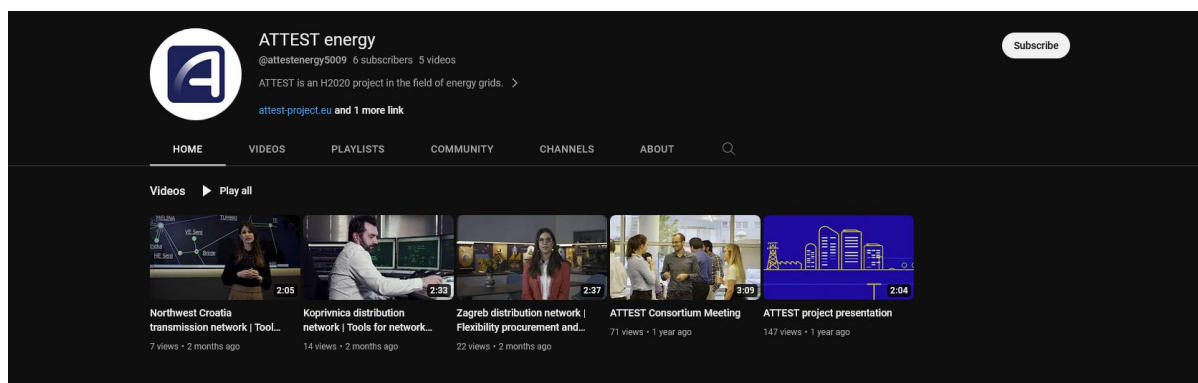


FIGURE 7: YOUTUBE CHANNEL OF THE PROJECT

4.5. Newsletters

The dissemination of newsletters (Figure 5) has been instrumental in keeping our target audiences regularly informed about the project's activities and available results. Throughout the project's duration, we sent out a total of 8 newsletters, with our subscriber count reaching a peak of 80 individuals.

These newsletters were thoughtfully organized into different sections, including news updates, publications, event highlights, and multimedia content (such as videos, galleries, or infographics). Over time, they have featured comprehensive information about the project's activities, outcomes, and initiatives, along with select news snippets and links to pertinent resources.

Given the versatility of newsletters, they provide us with the opportunity to tailor messages for specific audiences, allowing for exclusivity in certain versions for target groups. ATTEST employs a MailChimp account to manage mailing lists and facilitate message distribution.

The KPIs set for CTR and OR were not entirely achieved, primarily because they were set at very high levels. Ensuring a consistent CTR and OR across all newsletters can be extremely challenging. Furthermore, considering the number of subscribers and their specific interests, it is known that they often seek more direct information on the project's website and other channels, rendering the newsletter somewhat redundant in many instances.

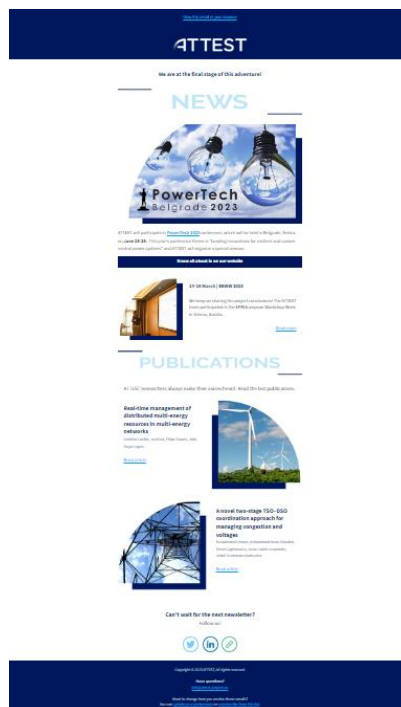


FIGURE 8: ATTEST DISSEMINATION NEWSLETTERS

4.6. Participation in events

Members of the ATTEST consortium have participated in 30 events throughout the project's duration. These events served communication purposes, but also allowed researchers to disseminate project results while discussing them with peers.

Altogether, ATTEST presentations reached a diverse audience of R&D and industry professionals. Details of each event are presented in Table 3.

TABLE 3: EVENTS ATTENDED BY ATTEST MEMBERS AS SPEAKERS

TYPE OF EVENT	SPEAKERS	TITLE
Conference	E. A. Martinez Cesena, P. Mancarella	Tutorial Part 02: Integrated Energy Network Analysis
Webinar	André Guimarães Madureira	INTERPRETER – Local flexibility solutions leveraged by RD&I projects as system stability solutions
Workshop	Tomislav Capuder	PPL Sessions Development of energy infrastructure: transmission and distribution grids and energy storage
Webinar	E. A. Martinez Cesena, P. Mancarella	Techno-economic Analysis of Microgrids: From off-grid to smart grid applications
Webinar	E. A. Martinez Cesena	Resilience of Grid
Symposium	Florin Capitanescu	Academia versus real-world in optimizing power system operation: the case of security-constrained optimal power flow
Workshop	Florin Capitanescu	Challenges to maintain static security in future sustainable power systems
Conference	Muhammad Usman	A Stochastic Multi-period AC Optimal Power Flow for Provision of Flexibility Services in Smart Grids
Meeting	E. A. Martinez Cesena	Sector Integration Cluster meeting
Short course	Pierluigi Mancarella	DER Flexibility and Techno-Economic Modelling
Conference	Karlo Šepetanc	Transmission Expansion Planning Using a Highly Accurate AC Optimal Power Flow Approximation
Conference	Mirna Gržanić, Tomislav Capuder, Florin Capitanescu, Martin Bolefek	A review of practical aspects of existing TSO-DSO coordination mechanisms in Europe and proposal of an innovative hybrid model in ATTEST project
Media	Dora Šteher	"HEP ODS is implementing the ATTEST project co-financed by EU funds"
Conference	Tomislav Capuder	Challenges in the smart networks application
Workshop	Mirna Gržanić, Karlo Šepetanc, Muhammad Usman	Conceptual framework of the TSO/DSO coordination in ATTEST project
Conference	Mirna Gržanić, Karlo Šepetanc, Dajana Vrbičić Tenđera	Projekt ATTEST
Conference	Mirna Gržanić, Karlo Šepetanc, Tomislav Capuder, Muhammad	ATTEST project: Tools for Ancillary Service Procurement in Day Ahead Operation and Real-Time Activation in Distribution Grid

	Usman, Florin Capitanescu	
Poster	Martin Bolfek	A convex-approximation approach to provide ancillary services based on optimal power flow problem in distribution networks
Conference	P. Mancarella, E. A. Martínez Ceseña	Flexibility and Resilience in Future Low-Carbon Energy Systems
Conference	Fernando J. Ribeiro, João A. Peças Lopes, Francisco S. Fernandes, Filipe J. Soares, André G. Madureira	The Role of Hydrogen Electrolysers in the Frequency Containment Reserve - A Case Study in the Iberian Peninsula up to 2040
Conference	Dora Šteher, Martin Bolfek, Ivan Periša	Iskustvo prijave i provedbe EU projekta ATTEST (engl. Application and execution of ATTEST EU project)
Wokshop	Tomislav Capuder	Low Voltage Distribution Networks - from reality to research and back: experience from Croatian power system
Conference	Muhammad Usman, Florin Capitanescu	A Novel Two-Stage Tractable Approach to Multi-Period Optimal Power Flow in Smart Grids
Conference	Dajana Vrbičić Tenđera, Petra Sagrestano Štambuk, Nikolina Zovko, Dino Žanić	Projekt ATTEST
Webinar	Filipe Joel Soares, Florin Capitanescu, Eduardo Martinez-Cesena	Open-source tools for future power systems
Webinar	Filipe Joel Soares, Tomislav Capuder, Micael Simões	Open-source tools for TSO-DSO coordination
Workshop	Micael Simões	Advanced Tools Towards cost-efficient decarbonisation of future reliable Energy SysTems
Conference	Tomislav Antić, Frederik Geth, Tomislav Capuder	The Importance of Technical Distribution Network Limits in Dynamic Operating Envelopes
Conference	Mirna Gržanić, Dajana Vrbičić Tenđera	Projekt ATTEST
Conference	Dajana Vrbičić Tenđera, Petra Sagrestano Štambuk, Nikolina Zovko	Demonstracija razvijenih alata u sklopu projekta attest

4.7. Scientific publications

Table 4 showcases all the publications in journals and conference papers released throughout the project. In total, there were 32 publications with nearly 4,000 full document reads, in cases where views could be tracked.

TABLE 4: PUBLICATIONS OF ATTEST MEMBERS

TYPE OF PUBLICATION	AUTHORS	TITLE
Publication in journal	Zora Luburić, Hrvoje Pandžić, and Miguel Carrión	Transmission Expansion Planning Model Considering Battery Energy Storage, TCSC and Lines Using AC OPF
Publication in journal	K. Šepetanc, H. Pandžić	Convex Polar Second-Order Taylor Approximation of AC Power Flows: A Unit Commitment Study
Publication in journal	Muhammad Usman, Florin Capitanescu	A Stochastic Multi-period AC Optimal Power Flow for Provision of Flexibility Services in Smart Grids
Conference paper	Mirna Gržanić, Tomislav Capuder, Martin Bolfek, Florin Capitanescu	A review of practical aspects of existing TSO-DSO coordination mechanisms in Europe and proposal of an innovative hybrid model in ATTEST project
Publication in journal	António Coelho, José Iria, Filipe Soares	Network-secure bidding optimization of aggregators of multi-energy systems in electricity, gas, and carbon markets
Publication in journal	Mohammad Iman Alizadeh, Muhammad Usman, Florin Capitanescu	Envisioning security control in renewable dominated power systems through stochastic multi-period AC security constrained optimal power flow
Conference paper	Mirna Gržanić, Karlo Šepetanc, Tomislav Capuder, Muhammad Usman, Florin Capitanescu	ATTEST project: Tools for Ancillary Service Procurement in Day Ahead Operation and Real-Time Activation in Distribution Grid
Conference paper	Mohammad Iman Alizadeh, Muhammad Usman, Florin Capitanescu	Toward Stochastic Multi-period AC Security Constrained Optimal Power Flow to Procure Flexibility for Managing Congestion and Voltages
Conference paper	Muhammad Usman, Florin Capitanescu	A New Second Order Linear Approximation to AC OPF Managing Fleibility Provision in Smart Grds
Conference paper	Mohammad Iman Alizadeh, Muhammad Usman, Florin Capitanescu & Andre Guimares Madureira	A Novel TSO-DSO Ancillary Service Procurement Coordination Approach for Congestion Management
Conference paper	Muhammad Usman, Florin Capitanescu	A Novel Two-Stage Tractable Approach to Multi-Period AC OPTimal Power Flow in Smart Grids
Conference paper	Mirna Gržanić, Tomislav Capuder, Karlo Šepetanc, Mohammad Usman, Florin Capitanescu	Attest project: tools for ancillary service procurement in day-ahead operation and real-time activation in distribution grids
Publication in journal	Muhammad Usman, Florin Capitanescu	Three Solution Approaches to Stochastic Multi-Period AC Optimal Power Flow in Active Distribution Systems
Publication in journal	Muhammad Usman, Florin Capitanescu	A Novel Tractable Methodology to Stochastic Multi-Period AC OPF in Active Distribution Systems using Sequential Linearization Algorithm
Publication in journal	Martin Bolfek, Tomislav Capuder	A Practical Approach to Flexibility Provision Assessment in an Unobservable Distribution Network

Conference paper	Otto Heide, Karlo Šepetanc, Hrvoje Pandžić	Transmission Expansion Planning using a Highly Accurate AC Optimal Power Flow Approximation
Conference paper	Mirna Gržanić, Tomislav Capuder, Martin Bolfek, Florin Capitanescu	A review of practical aspects of existing TSO-DSO coordination mechanisms in Europe and proposal of an innovative hybrid model in ATTEST project
Publication in journal	Karlo Šepetanc, Hrvoje Pandžić, Tomislav Capuder	Solving Bilevel AC OPF Problems by Smoothing the Complementary Conditions – Part I: Model Description and the Algorithm
Publication in journal	Karlo Šepetanc, Hrvoje Pandžić, Tomislav Capuder	Solving Bilevel AC OPF Problems by Smoothing the Complementary Conditions – Part II: Solution Techniques and Case Study
Conference paper	Fernando J. Ribeiro, João A. Peças Lopes, Francisco S. Fernandes, Filipe J. Soares, André G. Madureira	The Role of Hydrogen Electrolysers in the Frequency Containment Reserve - A Case Study in the Iberian Peninsula up to 2040
Conference paper	Gopal Lal Rajora, Pablo Calvo Bascónes, Carlos Mateo Domingo, Miguel A. Sanz-Bobi, Rafael Palacios Hielscher, Martin Martin, Dajana Vrbčić Tenđera, Hrvoje Keko	Application of Machine Learning Techniques for Asset Management and Proactive Analysis in Power Systems
Publication in journal	Muhammad Usman, Mohammad Iman Alizadeh, Florin Capitanescu, Iason Avramidis & Andre Guimares Madureira	A Novel Two-Stage TSO-DSO Coordination Approach for Managing Congestion and Voltages
Publication in journal	Mohammad Iman Alizadeh, Florin Capitanescu	A Tractable Linearization-Based Approximated Solution Methodology to Stochastic Multi-Period AC Security-Constrained Optimal Power Flow
Publication in journal	Domagoj Vlah, Karlo Šepetanc, Hrvoje Pandžić	Solving Bilevel Optimal Bidding Problems Using Deep Convolutional Neural Networks
Publication in journal	A Churkin, W Kong, JNM Gutierrez, EAM Ceseña, P Mancarella	Tracing, Ranking and Valuation of Aggregated DER Flexibility in Active Distribution Networks
Publication in journal	António Coelho, José Iria, Filipe Soares, João Peças Lopes	Real-time management of distributed multi-energy resources in multi-energy networks
Conference paper	A Churkin, W Kong, JNM Gutierrez, P Mancarella, EAM Ceseña	Assessing Distribution Network Flexibility via Reliability-based P-Q Area Segmentation
Conference paper	Andrey Churkin, Miguel Sanchez-Lopez, Mohammad Iman Alizadeh, Florin Capitanescu, Eduardo A Martínez Ceseña, Pierluigi Mancarella	Impacts of Distribution Network Reconfiguration on Aggregated DER Flexibility
Conference paper	Nuno Fonseca, José Iria, Filipe Soares, António Coelho	DSO framework to handle high participation of DER in electricity markets
Conference paper	Tomislav Antic, Frederik Geth, Tomislav Capuder	The Importance of Technical Distribution Network Limits in Dynamic Operating Envelopes

Conference paper	Karlo Šepetanc; Hrvoje Pandžić; Tomislav Plavšić; Vladimir Valentić; Renata Rubeša	Benefits of an Advanced AC OPF Model in the Croatian Transmission Network
Publication in journal	Tomislav Antic, Tomislav Capuder	A geographic information system-based modelling, analysing and visualising of low voltage networks: The potential of demand time-shifting in the power quality improvement

4.8. Branding

The ATTEST identity was created at the very beginning of the project, so that visual coherence was ensured in all project materials.

Branding has since then been completed with a set of document templates (Figure 6) that were shared with all consortium partners. Additionally, an institutional presentation of the project (Figure 7) was made available to internal stakeholders, ensuring coherence in visuals, tone, and structure throughout consortium activities.

All promotional materials have been designed in alignment with the brand developed and the envisioned image within the scope of the project.



FIGURE 9: ATTEST DOCUMENT TEMPLATES



FIGURE 10: ATTEST INSTITUTIONAL PRESENTATION

4.9. Video

In addition to the project presentation video, three videos showcasing the project's three demonstrations have also been created. They can be accessed on the project website at <https://attest-project.eu/demo/> and are available on the project's YouTube channel at <https://www.youtube.com/@attestenergy5009>.

4.10. Intranet

The ATTEST consortium has one private channel on Microsoft Teams where confidential topics can be securely discussed among researchers. Project documents are also being uploaded to a secure OneDrive folder to which only ATTEST members have authorized access.

Additionally, internal mailing lists are being used to support one-to-all and team-restricted communications, ensuring that different levels of confidentiality are respected.

These are the main internal communication channels that the project used to manage the ongoing work.

5. Exploitation

Four objectives were identified regarding the Exploitation Plan: 1) promote market adoption, 2) facilitate technology integration, 3) support advanced research; 4) contribute to policy making. Since these objectives and its impacts were already presented in D8.3, in this document we will focus on two main aspects that are relevant to project and to guarantee its sustainability after its end, namely: the role of each partner and the exploitable results.

5.1. Partner's role

5.1.1. INESC TEC

Being an R&D institution with strong links to academia, INESC TEC is using the ATTEST project to host Ph.D. theses and release several articles in top scientific publications (such as IEEE, Elsevier, or Wiley) and conferences (such as IEEE Powertech or Medpower).

This partner will also include the project results in its portfolio of advanced training for regulators, TSOs, and DSOs.

5.1.2. UNIMAN

UNIMAN is particularly interested in the future exploitation of the tools within the “planning module” category (i.e., optimization tool for distribution and transmission networks and TSO/DSO shared technologies). The different tools and studies associated with the development and use of these tools are being disseminated in the top conference and journal publications (e.g., IEEE transactions on smart grid), as well as various workshops and seminars.

This partner's activities will target academics and industrial partners, particularly the Greater Manchester Combined Authority, and local network companies, i.e., Electricity Northwest, National Grid System Operator, and National Grid Electricity Transmission.

5.1.3. ICENT

ICENT is developing a series of Ph.D. theses in the topic of ATTEST and exploit project results for future project applications. It will publish a set of papers and is also using the project to strengthen collaboration with the energy industry (particularly DSOs and TSOs) and investing in the further development and upgrading of the ATTEST tools and models.

Finally, ICENT will work on presenting the concepts, ideas, results, and benefits of the project to regional and national regulatory authorities (In Croatia Hrvatska Regulatorna Agencija – HERA).

5.1.4.LIST

LIST is investing in further expanding and leveraging the two tools developed in ATTEST in the coming years on the TRL scale from 3 to 9. To achieve this goal, the partner will seek other funding sources through the submission of continuity projects to national (e.g. FNR Luxembourg) and international schemes (Horizon Europe), aiming to produce fully functional, market-ready tools by 2025. LIST committed to publishing several articles in top scientific journals (e.g. IEEE, Elsevier) and top conferences (IEEE Powertech, PSCC, etc.).

LIST will present three tools as well as relevant project results to local stakeholders in Luxembourg such as the TSO/DSO CREOS.

5.1.5.Comillas

Comillas has a particular interest in the innovative tools that are part of the “Asset management module” of the open-source toolbox of ATTEST. It will use the results of the project for attracting new Ph.D. students and submit several publications to high impact international journals in the energy field.

5.1.6.Softlab

Softlab will deepen its industry knowledge with the ATTEST project so that to be able to participate in European tenders and extend its customer base in other European countries. The partner will also invest in the commercial exploitation of the tools, both as an integrated set and individually.

The ATTEST project will also set the ground for the development of augmented-reality interfaces that could be exploited in different markets, for example, environment monitoring, where Softlab is working with an Italian Public Administration.

5.1.7.HEP ODS

Regarding the planning tools module, HEP ODS will focus on optimization tools for distribution network planning to change the current practice of determining the limitations on the allowable amount of DG that can be introduced to a specific part of the network.

Besides, the aforementioned tool, in combination with the tool for state estimation of distribution networks from the operation tools module, will also be used to determine cost-effective network enhancement solutions to mitigate power quality issues and include the influence of DG into planning, which is currently not the case.

The state estimation tool will also be used as a starting point for developing a cost-benefit analysis regarding the implementation of a state estimator as a prerequisite for reducing losses and detecting voltage issues in the distribution network.

Upon a successful technology demonstration within the project, HEP ODS will, together with the partnering TSO and invested third parties, comprise an economic and regulatory study, based on the results obtained in ATTEST and, if necessary, propose a redefinition of the regulatory framework in order to exploit benefits of TSO-DSO cooperation.

5.1.8.HOPS

HOPS will use the ATTEST tools to maximize flexibility assets usage in the TSO-DSO environment. The partner will aim at the introduction of a common approach for improved planning/investment signals for assets in the TSO-DSO grid, the implementation of online visualization tools, and possible multiplication on the complete TSO-DSO environment.

Finally, the partner will use the demos for future flexibility market development as well as for the development of tools and procedures.

5.1.9. Končar-Digital

As a long-time development and integration partner for the TSOs and DSOs, ATTEST results are in line with the business of Končar-Digital. The partner will, therefore, exploit the ATTEST results to provide flagship software solutions and services beyond the year 2030.

Končar-Digital’s future services and solutions will be compatible with ATTEST tools. The partner will continue the development of the software solutions and include them in its portfolio of services and solutions tailored for the system operator of the future.

Furthermore, following up on previous successful experiences from H2020-funded projects, Končar-Digital's experts plan to utilize knowledge and experience gathered through the ATTEST project in their participation in IEC standardization working groups.

5.2. Project results

ATTEST produced several exploitable foreground results, some of which have been described in the data management plan (D2.1). The exploitation plan focuses on tangible project outcomes – in the case of ATTEST, optimization tools for energy systems operators.

The exploitation of tangible outcomes depends heavily on their characteristics and goals, but also on their technology readiness level (TRL).

TABLE 5 - TRL SCORE OVERVIEW

LEVEL	DEFINITION
1	Basic principles observed
2	Technology concept formulated
3	Experimental proof of concept
4	Technology validated in lab
5	Technology validated in a relevant environment
6	Technology demonstrated in a relevant environment
7	System prototype demonstrated in an operational environment
8	System complete and qualified
9	The actual system proved in an operational environment

The ATTEST toolbox comprises three modules that articulate as a whole. Nevertheless, the optimization tools will be individually considered for exploitation, allowing users to customize their systems with whichever applications they need.

5.2.1. Planning module

The planning module of the open-source toolbox will incorporate three distinct network planning tools, all of them aiming at minimizing CAPEX, increasing reliability, and reducing environmental impacts.

TABLE 6 - EXPLOITABILITY ANALYSIS: OPTIMIZATION TOOL FOR DISTRIBUTION NETWORK PLANNING

OPTIMIZATION TOOL FOR DISTRIBUTION NETWORK PLANNING	
TYPE OF RESULT	Application (SW)
OWNER	UNIMAN
DESCRIPTION	This tool produces a flexible, adaptive network investment strategy that takes advantage of demand-side flexibility for the provision of network support (i.e., procured by the DSO in ancillary services markets) as a means to maximize network capacity, also considering environmental (e.g., increased losses) and economic impacts (e.g., network support for customers to partake in the markets).
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 7 - EXPLOITABILITY ANALYSIS: OPTIMIZATION TOOL FOR TRANSMISSION NETWORK PLANNING

OPTIMIZATION TOOL FOR TRANSMISSION NETWORK PLANNING	
TYPE OF RESULT	Application (SW)
OWNER	UNIMAN
DESCRIPTION	This tool develops optimized strategies for the transmission network to be adaptively upgraded in consideration of the new sources of uncertainty and flexibility that may emerge in different areas of the network, e.g., distributed RES, storage, and MES at the demand side.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 8 - EXPLOITATION ANALYSIS: OPTIMIZATION TOOL FOR PLANNING TSO/DSO SHARED TECHNOLOGIES

OPTIMIZATION TOOL FOR PLANNING TSO/DSO SHARED TECHNOLOGIES	
TYPE OF RESULT	Application (SW)
OWNER	INESC TEC
DESCRIPTION	This tool assesses the benefits from the installation of TSO/DSO shared technologies (e.g. storage devices) to be managed in a coordinated way to simultaneously provide flexibility to both distribution and transmission networks, thus contributing to postpone investments in assets replacement/reinforcement.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

5.2.2.Operation module

The operation module is subdivided into two subgroups of tools, one for distribution and the other for transmission networks. These tools will consider the functioning of future electricity markets, including the constraints and uncertainty of variable renewable generation and the optimal utilization of networks’ assets.

TABLE 9 - EXPLOITATION ANALYSIS: TOOL FOR AS PROCUREMENT IN DA OPERATION PLANNING FOR THE DISTRIBUTION NETWORK

TOOL FOR ANCILLARY SERVICES PROCUREMENT IN DAY-AHEAD OPERATION PLANNING FOR THE DISTRIBUTION NETWORK	
TYPE OF RESULT	Application (SW)
OWNER	LIST
DESCRIPTION	This tool supports the DSO on the procurement of ancillary services (for voltage control and congestion management) to mitigate the uncertainty of renewables and ensure that the network capacity is never exceeded during the real-time operation stage. The outputs of the TSO/DSO coordination mechanisms define constraints for this tool to avoid that TSOs and DSOs procure conflicting ancillary services in the markets.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 10 - EXPLOITATION ANALYSIS: TOOL FOR AS ACTIVATION IN RT OPERATION OF THE DISTRIBUTION NETWORK

TOOL FOR ANCILLARY SERVICES ACTIVATION IN REAL-TIME OPERATION OF THE DISTRIBUTION NETWORK	
TYPE OF RESULT	Application (SW)
OWNER	ICENT
DESCRIPTION	This tool optimizes the activation of flexibility provided by DSO assets (e.g. stationary storage and OLTC) and procured by the DSO in the ancillary services market using the day-ahead operation planning tool. The goal is to maintain the distribution network operating in a safe mode when forecasting errors occur while minimizing OPEX and reducing environmental impacts.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 11 - EXPLOITATION ANALYSIS: TOOL FOR STATE ESTIMATION OF DISTRIBUTION NETWORKS

TOOL FOR STATE ESTIMATION OF DISTRIBUTION NETWORKS	
TYPE OF RESULT	Application (SW)
OWNER	KONČAR-DIGITAL
DESCRIPTION	This tool allows estimating the operating state of the network with minimal available information (by estimating the net load in each node of the grid), thus allowing all the developed tools for network operation management to work even when there is a lack of data.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 12 - EXPLOITATION ANALYSIS: TOOL FOR AS PROCUREMENT IN DA OPERATION PLANNING FOR THE TRANSMISSION NETWORK

TOOL FOR ANCILLARY SERVICES PROCUREMENT IN DAY-AHEAD OPERATION PLANNING FOR THE TRANSMISSION NETWORK	
TYPE OF RESULT	Application (SW)
OWNER	LIST
DESCRIPTION	This tool is an evolution of the conventional deterministic Security Constrained Optimal Power Flow (SCOPF), which was enhanced to be a multi-temporal SCOPF under uncertainty forecasting. The tool enables TSOs to procure ancillary services (congestion management, voltage control, and frequency control) on a 24-h ahead basis. Additionally, the TSO/DSO coordination mechanisms are used within this tool to avoid that TSOs and DSOs procure conflicting ancillary services in the ancillary services markets.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 13 - EXPLOITATION ANALYSIS: TOOL FOR AS ACTIVATION IN RT OPERATION OF THE TRANSMISSION NETWORK

TOOL FOR ANCILLARY SERVICES ACTIVATION IN REAL-TIME OPERATION OF THE TRANSMISSION NETWORK	
TYPE OF RESULT	Application (SW)
OWNER	ICENT
DESCRIPTION	This tool optimizes the activation of flexibility provided by TSO assets (e.g. stationary storage and capacitors banks) and procured by the TSO in the ancillary services market using the day-ahead operation planning tool. The goal is to keep the transmission network operating in a safe mode when forecasting errors occur while minimizing OPEX and reducing environmental impacts.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 14 - EXPLOITATION ANALYSIS: TOOL FOR ON-LINE DYNAMIC SECURITY ASSESSMENT

TOOL FOR ON-LINE DYNAMIC SECURITY ASSESSMENT	
TYPE OF RESULT	Application (SW)
OWNER	INESC TEC
DESCRIPTION	This tool performs a security assessment of transmission networks considering both static (i.e. voltages and currents) and dynamic constraints (i.e. stability) violations caused by N-1 contingency analysis.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	4

5.2.3.Asset management module

The asset management module will incorporate three distinct tools to help the management of assets in the distribution and transmission networks. By providing information about assets’ remaining useful life, it supports the anticipation of changing conditions of operation.

TABLE 15 - EXPLOITATION ANALYSIS: TOOL FOR CHARACTERIZATION OF THE CONDITION OF ASSETS

TOOL FOR THE CHARACTERIZATION OF THE CONDITION OF ASSETS	
TYPE OF RESULT	Application (SW)
OWNER	COMILLAS
DESCRIPTION	This tool characterizes and models the life of important network assets. It uses the fault history to support the characterization of asset reliability and the history of maintenance actions to support the characterization of the mean repair time. It also considers patterns in data extracted from sensors and utilization rates to predict component behavior and condition.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 16 - EXPLOITATION ANALYSIS: TOOL FOR THE DEFINITION OF CONDITION INDICATORS BASED ON HETEROGENEOUS INFORMATION SOURCES

TOOL FOR THE DEFINITION OF CONDITION INDICATORS BASED ON HETEROGENEOUS INFORMATION SOURCES	
TYPE OF RESULT	Application (SW)
OWNER	COMILLAS
DESCRIPTION	This tool incorporates an innovative approach to translate the results obtained from the previous tool into a set of harmonized, easily measurable, and comparable life indicators for different types of assets. These indicators facilitate the determination of the remaining useful life and the underlying sensitivities of assets towards different operation conditions.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	4

TABLE 17 - EXPLOITATION ANALYSIS: TOOL FOR THE DEFINITION OF SMART ASSET MANAGEMENT STRATEGIES

TOOL FOR THE DEFINITION OF SMART ASSET MANAGEMENT STRATEGIES	
TYPE OF RESULT	Application (SW)
OWNER	COMILLAS
DESCRIPTION	This tool defines common approaches to evaluate assets under different perspectives (operation, maintenance, cost, impact) and establish asset priority lists. Smart strategies for asset management based on indicators produced by the previous tool were also developed.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	4

5.2.4. Other exploitable results

The ATTEST ICT platform will also integrate a set of interactive visualization tools (graphical user interfaces) tailored according to the purpose and requirements of each component in the toolbox. The objective of the visualization tools is to enable enhanced and straightforward collaboration between TSOs and DSOs and facilitate their network operation, maintenance, and planning tasks.

TABLE 18 - EXPLOITATION ANALYSIS: DA AND RT OPTIMIZATION TOOLS TO SUPPORT MES AGGREGATORS

DAY-AHEAD AND REAL-TIME OPTIMIZATION TOOLS TO SUPPORT MES AGGREGATORS	
TYPE OF RESULT	Application (SW)
OWNER	INESC TEC
DESCRIPTION	This tool defines optimal bidding strategies for eligible clients and aggregators which participate in energy and ancillary services markets by intelligently using flexibility from MES, including electricity and thermal storage, RES, combined heat and power, etc.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	6

TABLE 19 - EXPLOITATION ANALYSIS: MARKET SIMULATOR

MARKET SIMULATOR	
TYPE OF RESULT	Application (SW)
OWNER	INESC TEC
DESCRIPTION	The market simulator allows defining network operating states for future scenarios of grid development, which enable a more effective network planning taking into account the foreseen existence of DER flexibility and its optimal utilization.
EXPLOITATION STRATEGY	Free open-source tool under a European Union Public License v1.2. Services of integration support, updating and fitting the tool to potential users can be exploited separately.
TRL	4

Over 30 publications were released during the period of the ATTEST project, based on its results, thus simultaneously serving the objectives of dissemination and exploration.

Furthermore, six doctoral theses were conducted as part of the project. As a direct outcome of ATTEST research, these theses were initially proposed as an exploration Key Performance Indicator (KPI) and represent the first measurable results of the execution of the exploration plan. Details on this topic can be found in Table 4.

TABLE 20: KPI ASSESSMENT FOR PUBLISHED WORKS

KPI	STATUS	TARGET
Ph.D. theses	6	6
Publications in journals	15	15
Conference papers	17	20

All open-access project results are available on the ATTEST website. Additionally, a Zenodo account has been set up so that all project publications can be easily found by the R&D community even after the end of the project.

As for the ATTEST tools, source codes are being uploaded to a Github organization account - which is also connected to Zenodo.

These were the exploitation mode used to explore the results of the project.

6. KPI assessment

Dissemination, Communication and Exploitation KPI were defined for the whole duration of ATTEST.

Many of the activities across different areas of the plan overlap, but here we have attempted to summarize all the achieved KPIs.

In accordance with the consortium agreement, all the Key Performance Indicators have been achieved. Table 6 details all the KPIs throughout the project.

TABLE 21: KPI ASSESSMENT FOR DISSEMINATION, COMMUNICATION AND EXPLOITATION

KPI	TARGET	STATUS
Number of unique visitors on the project website	3.500	4.173
Number of downloads of material from the website	1.000	1.365
Number of reactions of the project social media channels	2.000	3.216
Number of project video visualizations on YouTube	1.000	1.361
Number of press releases launched to the media	2	2 press release and 1 to be sent
Number of communication materials (flyers, brochures, posters) distributed to the targeted stakeholders	1.000	1.000
Number of publications	15	15
Number of Energy and ICT conference papers and presentations	20	17 conference papers 30 participations on events

7. Conclusions

This final deliverable serves as a comprehensive evaluation report, with a focus on achieving defined Key Performance Indicators. It is important to note that due to project-specific characteristics and the target audience, some activities were occasionally postponed, and certain KPIs had to be adjusted.

Dissemination and communication played a crucial role in deploying research and innovation actions throughout the project's life cycle. The fifth deliverable highlighted key milestones achieved in these activities, particularly in the months following the mid-term report on dissemination and communication.

The report delves into each area separately, assessing performance indicators and outcomes. While most KPIs were nearly achieved, there were challenges in meeting KPIs for newsletter open rates (OR) and click-through rates (CTR) as well as printed material impressions. These challenges were primarily due to high set targets and evolving subscriber interests.

Overall, the ATTEST project effectively disseminated its findings through various channels such as the website, social media, newsletters, participation in events, scientific publications, and more. The exploration strategy aimed to extend the project's outcomes into the future, focusing on market adoption, technological integration, advanced research, and policy contributions.

In the realm of exploitation, ATTEST generated over 50 publications and six doctoral theses, serving both dissemination and exploration objectives. These tangible outcomes varied in readiness levels and objectives, with a specific focus on 12 optimization tools for energy system operators.

In summary, the ATTEST project successfully communicated its research outcomes, overcoming challenges in certain KPIs. It achieved significant milestones in both dissemination and exploration, contributing to the broader goals of advancing energy system optimization and innovation.