



# *Annual Report 2024*



## CRESYM – Annual Report 2024

### Foreword of the President



*End 2024, CRESYM is 2 years old; and in a mere year, the Association about doubled its size and strength.*

*10 new members joined in 2024. The Association is now active in 12 countries, setting foot in North America when Hydro-Quebec became Strategic member. Thanks to our new Observer status, 6 other industry players could participate into the Association's technical discussions.*

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*Staff also almost doubled, from 3 to 7, now present in France, Greece, the Netherlands and Spain.*

*2024 saw the Association structure its "focus groups". Two "DoNets" are now at cruise speed: PSy ("power system stability") and MESTo ("multi-energy systems tools"), each with about 12-15 researchers in four to seven R&I projects. As many industrial experts are involved in the Association's projects. They all met in April for the Association's "cresROADS" three-day seminar.*

*Other chapters are being set up: quantum computing was first discussed in January, grid operators' "control room of the future" challenges were debated in June; PhD topics on batteries and hydrogen economics are on the table and grid asset management initiatives are also on the launchpad.*

*In 2024, the first stone of the Association's "Asset" pillar was laid with the signature of the Asset Licensing Agreement for the Small Signal Stability Toolbox with UP Comillas, inaugurating the CReDIT platform. Our Collaborative Opensource Library for power system components' dynamic models became available, and its population has started.*

*In addition, CRESYM successfully hosted its first training sessions (on power system dynamics, and good coding practices) and partnered up with EES-UETP and Code Refinery to leverage efforts.*

*The Association also advocated its actions through side-events at PSCC, CIGRE and IEEE PES conferences.*

*The main focus in 2024 was, however, our R&I actions. After the launch of nine R&I projects in 2023, our Members went studious to materialise their first results. Only four other common or special projects started in 2024 but CRESYM also submitted, or is part of, three project proposals to the Horizon Europe MSCA and CETP calls.*

*The Association's R&I budget doubled from 1.3 M€ in 2023 to 3.0 M€ in 2024. With our present scope, our "common pot" can now yearly subsidise about 600 k€ of new R&I actions.*

*This gives CRESYM for 2025 the means to launch new, meaningful R&I actions for the energy transition, and convince more organisations to join efforts with us.*

## 1. Introduction

This Annual Report provides an overview of CRESYM's action for its second year, from January to December 2024.

The report highlights in successive sections the Association's mission, the evolution in its membership, its R&I projects, its networking & training activities, its organisation to sustain R&I results and finally corporate matters.

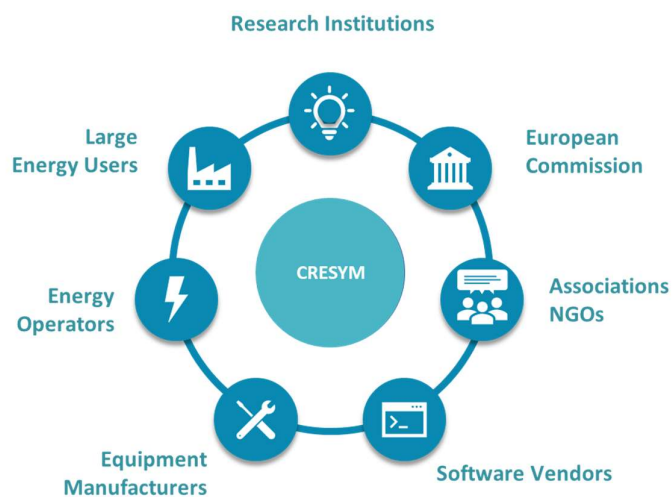
The Association's 2024 goals are wrapped up and reviewed in Appendix 1.

All acronyms are defined in Appendix 2.

## 2. CRESYM in a nutshell

### 2.1. What is CRESYM?

CRESYM (Collaborative Research on Energy System Modelling) is a **non-profit** association, gathering **industry players & research organisations** and aiming at undertaking **research actions** and ultimately solving the coming challenges for the future, fast-evolving European energy system.



### 2.2. CRESYM's ambition

CRESYM aims to **unite** all need-owners and solution-developers and **catalyse** the development of energy system modelling and simulation **opensource**, non-viral bricks required by the energy transition worldwide.

### 2.3. CRESYM's mission

CRESYM fosters collaborative R&I actions to deliver opensource energy system simulation tools on low-TRL R&I issues of general interest (the '**Projects**').

CRESYM maintains useful technological building blocks available for all researchers & engineers (the '**Assets**'). As of 2024, COLib (the Collaborative Opensource Library of power system component models) and CRDIT (Common Results, Data, Information and Tools) are live.

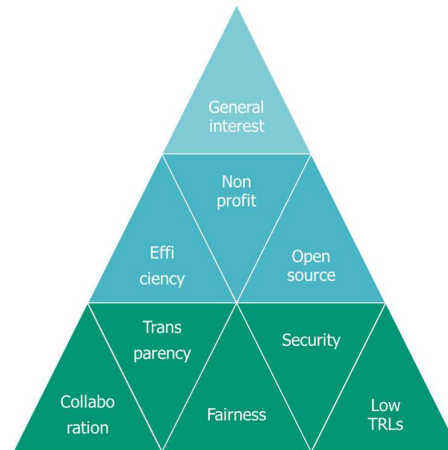
CRESYM manages thematic doctoral networks, be they supported by the EU Horizon Europe program or self-funded by CRESYM, to augment the value of our R&I actions for researchers and fosters serendipity (the '**DoNets**').

## 2.4. CRESYM’s values

CRESYM is **non-profit** and acts **transparently** for the **general interest**, addressing new and/or complex, **low TRL**, technical challenges.

CRESYM reconciles **security** and IPRs when developing **opensource** deliverables. Opensource, non-viral licences are key to ease the dissemination among operators, manufacturers and vendors in a fair, neutral manner.

CRESYM organises **collaborative**, **efficient** R&I works, with practical intermediary outputs. CRESYM builds up on, as well as comfort, support and promote other existing opensource initiatives.



CRESYM is committed to protect **privacy** and promote **diversity & gender equality**.

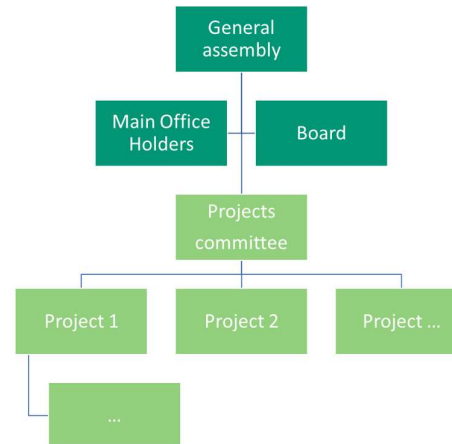
## 2.5. CRESYM’s governance

On behalf of its General Assembly, CRESYM is run by a Board of Directors. The Board appoints a General Manager to manage daily operation.

In 2024, Prof. Antonello Monti and Prof. Peter Palensky have been re-elected as President and Vice President respectively for two-year mandates.

With the support of CRESYM’s Scientific Advisor, CRESYM’s **Project Committee** is in charge of the general organisation of R&I projects: the identification of new topics, the supervision of every project agreement drafting, and the overall consistency of the R&I work program, ensuring that all critical issues are addressed – by CRESYM or other organisations –, efficiently and with **no overlapping** of efforts.

**Every project is independent** from another and is managed by its participants autonomously, though obeying to one same agreement structure as all others launched by the Association.



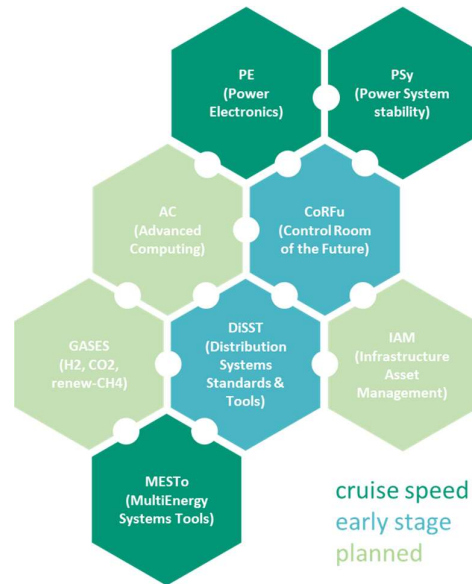
## 2.6. CRESYM’s organisation

With a larger scope of topics than in 2023, and in order to maintain everyone’s interest, **focus groups** (so-called “lounges”) gathering several members each, are set up and animated under the Project Committee:

- Every member staff can elect one or more groups to attend;
- Every focus group debates **pain statements** of industry parties;
- Every focus group debates specific **research opportunities**;
- Every focus group is represented at Project Committee and Board levels.

The Project Committee role was adapted accordingly:

- The Project Committee debates the opportunity to launch new focus groups.
- The Project Committee also consolidates the proposals stemming from the focus groups, and sketch the common budget money allocation options among them.



### 3. Membership & partnerships

3.1. 8 founding fathers end 2022, 12 members end 2023, 22 members end 2024

CRESYM has been founded in 2022 by four research institutions and four industrial players, namely four European Transmission System Operators for electricity:

- Research Institution Members: RWTH Aachen (DE), TU Delft (NL), Uni. Ljubljana (SI), Fraunhofer Gesellschaft (DE);
- Strategic Members: ELES (SI), RTE (FR), swissgrid (CH), TenneT (NL, DE).

Four new members joined the Association in October 2023, with the launch of the MuESSLi project:

- Research Institution Members: UP. Comillas (ES), DTU (DK);
- Strategic Member: GRTgaz (FR);
- Industrial Member: TotalEnergies OneTech (FR).



Ten new members joined the Association in 2024:

- Strategic Member: Hydro-Quebec (CA),
- Industrial Members: Air Liquide (FR), Alliander (NL), HEDNO (GR),
- Research Institution Members: EPRI (IE), NTUA-ICCS (GR), INESC TEC (PT), TU. Cyprus (CY), Uni. Grenoble-Alpes (FR), UP. Catalunya (ES).

### 3.2. 6 other industry players became observers in 2024

CRESYM created in 2024 an “**observer**” status.

For the mere signature of the Association’s Non-Disclosure Agreement, every Observer can join the internal conversations together with other Observers and Members. Confidentiality is ensured for all.

Joining a project however require in practice an organisation to become a member.

In 2024, 6 organisations became Observers to foster their quick participations to expert debates:

- Observers: Austrian Institute of Technology (AT), Energinet (DK), ERCOT (US), SchneiderElectric (FR), Supergrid Institute (FR), Supernode (IE)

### 3.3. An attractive association

CRESYM is all about **leveraging**, aiming to make R&I happen on energy systems.

Thanks to the **fund pooling**, every industrial sponsor gets for every euro spent a value of about **3 to 1**. Research Institutions can balance their membership fees (overall 60 k€/yr) with the ~3 M€/year of R&I expenses.

**Small fees** make every member fully in control about its actual financial involvement.

As of 2024, 70% of the membership fees contribute to the so called “**common pot**”. The common pot can complement common projects’ funding or help them start earlier. It also pays for preparing proposals to external calls and sustain projects’ legacies (“Assets”). During 2024, the common pot sponsored 400 k€ of such actions and about as much remain available end 2024 for upcoming common projects.

The reorganisation into autonomous focus groups eases the quick organisation of ad hoc debates to identify and structure research matters. And thanks to our standard legal framework – and especially our **project agreement** template – and our standard, quarterly invoicing and payment procedure, the Association makes launching a project a mere discussion between engineers and scientists, alleviating the burden on legal and accounting departments.

Beyond projects, members also take advantage of the networking opportunities, especially for researchers, a praised training offer and the Association’s ability to sustain R&I projects legacies.

As a result, the Association grew twice quicker than expected a year ago, and talks are opened with about ten organisations on both side of the North Atlantic Ocean.

New members would however only join if they can take immediate advantage of the Association, also if joining a project at the same time; and provided that the Association’s balance (50% research institutions/50% industrial partners) is ensured.

### 3.4. Partnerships

In 2024, CRESYM consolidated its partnership with the Linux Foundation for Energy (**LFE**).

Both LFE and CRESYM focus on the digitalisation of the energy sector and promote open-source philosophy and methodologies to achieve it; and both have to date two founding fathers and five member organisations in common. The two organisations complete each other, as CRESYM's business is to foster, organise and implement collaborations on research works at lower TRL level; while LFE provides a framework for otherwise set-up collaborations to develop their action at higher TRL level, according to the best development standards.

CRESYM and LFE now coordinate efforts monthly. 2024 was a preparation time, and 2025 should see the launch of new projects, such as the upcoming **GridFM / data4grids** initiative (foundation models for grids), a possible push to LFE's **PowSyBI** (with **DC-BI**) or the revamping of **COLib** as an LFE project.



CRESYM also joined efforts with the Global Power System Transformation Partnership (**GPST**) community, on Control Room of the Future matters and again with the integration of COLib with GPST's pillar 5 data & tool portal in 2025.

In February 2024, CRESYM became a member of **EES-UETP**, in order to coordinate efforts on developing training on power systems. Conversely, **EPRI-Europe** became member of CRESYM in June.

CRESYM also supports **Openmod**, the worldwide open energy modelling initiative, loosely gathering researchers on energy system modelling and simulations, promoting and implementing open access and opensource principles for data, methods and tools. In March 2024, CRESYM organised and sponsored the Openmod workshop in Grenoble, with about 90 participants.



The passionate discussions during that event resulted in the crystallisation of the CREAM proposal submitted to the Horizon Europe MSCA program end November. The CREAM proposal setup itself gave opportunities to liaise with, and advocate CRESYM's case to, European or national institutions, such as **ACER**, **ENTSO-E**, or NGOs, such as **EU SL**.

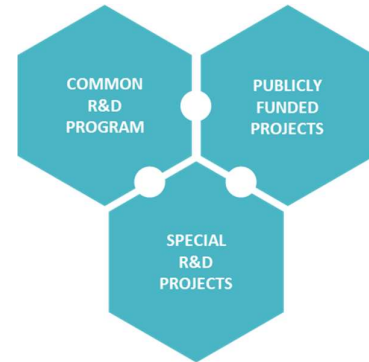
## 4. R&I projects

### 4.1. A light but effective organisation to launch R&I actions

CRESYM’s first objective is to catalyse research on disregarded energy system modelling and simulation issues and hence to launch research projects.

A project can be out of three kinds:

- Common project: sponsored by its industrial participants, as well as CRESYM, provided that the General Assembly agrees to it
- Special project: 100% funded by the project’ participants.
- External project: answering a call for project by one (or more) European or national agency(ies) and sponsored by such third party(ies).



**Every project is independent** from another and is managed by its participants autonomously, though every common and special project obeys one same agreement structure as all others launched by the Association. Such a standard simplifies the decision-making, limiting it to technical issues and alleviating the burden on legal and accounting departments.

CRESYM is party to such project agreement, in charge of managing the quarterly invoicing and payment procedure and often to act as PMO. Every project reports at least on a quarterly basis.

The project **results shall be opensource**, in a non-contaminating manner, either based on Apache 2.0 or Mozilla Public License v2, depending on their nature. Common (resp. special) project results are owned in equal shares by all CRESYM members (resp. by all project participants), except CRESYM. The project participants mandate CRESYM to maintain and make publicly available the results on the web on a long-term basis as “**Assets**”.

Research needs and solution proposals are debated in the related thematic **focus groups** on an ad hoc basis. The Project Committee and CRESYM’s scientific advisors coordinate all this action and foster ever more meshing in the organised collaborations.

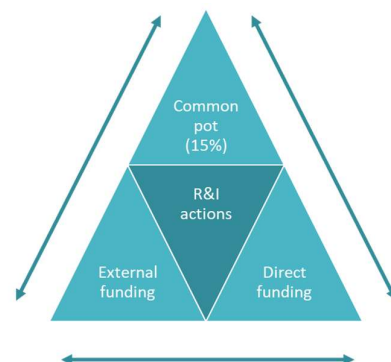
Our Code of Conduct, and especially our ‘Antitrust’ guidelines for meetings apply to expert discussions and R&I projects. And software pieces development abides by our ‘Good Coding’ guidelines.

### 4.2. Pragmatic financial leverages

Members’s **direct funding** of project is key to demonstrate the Association’s will and ascertain its **credibility**.

The Association however optimises the use of Members direct funding and external opportunities to maximise the amount of relevant, funded R&I actions and avoid the duplication of efforts.

Especially the Association resort to two leverages for funding, or funding complementation of longer-term, low-TRL actions:



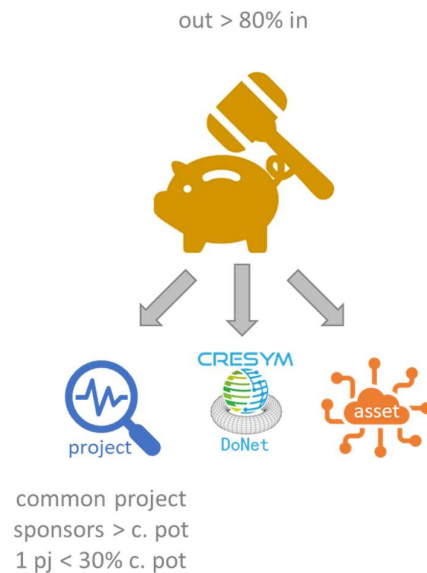


- The “**common pot**” money, especially to develop MVPs or initialise a modular action;
- **Public funding**, when a project ambition exceeds the Association’s means to get started.

The **CREAM** proposal submitted as HE MSCA end 2024 is a good example of recourse to public funding for an ambitious action that exceeds the Association’s financial means. CREAM is a 4-year, 6-M€, 17-PhD interdisciplinary doctoral network proposal about “risks for multi-energy systems” calling for European public funding; complementing the privately-funded actions of CRESYM, either already funded (8 PhDs in MuESSLi, ER-PG+, etc.), or upcoming (4 PhD on batteries and hydrogen economics in 2025); and supplemented by a side-project (CREAM-staple), aiming at developing a training & education program to raise critical thinking for a more effective energy transition.

The **common pot** is the other, internal leverage of the Association, to catalyse projects and provide flexibility to the Association, complying with the following principles:

- Only common projects (and assets & DoNets) can be funded by the common pot (**community**). All the Association members then share the developed IPRs.
- Direct funding must represent at least 50% of a project’s funding; conversely the common pot share is at best 50% of a project (**industrial pull**).
- A single project cannot swallow more than 30% of the common pot income (**diversity**).
- The common pot can serve as cash management tool (**flexibility**).
- Any member can directly fund a project to limit the recourse to the common pot and make it available for other actions (**substitution**).
- At least 80% of the common pot income is spent year on year to fund projects, DoNets or Assets (**liquidity**).



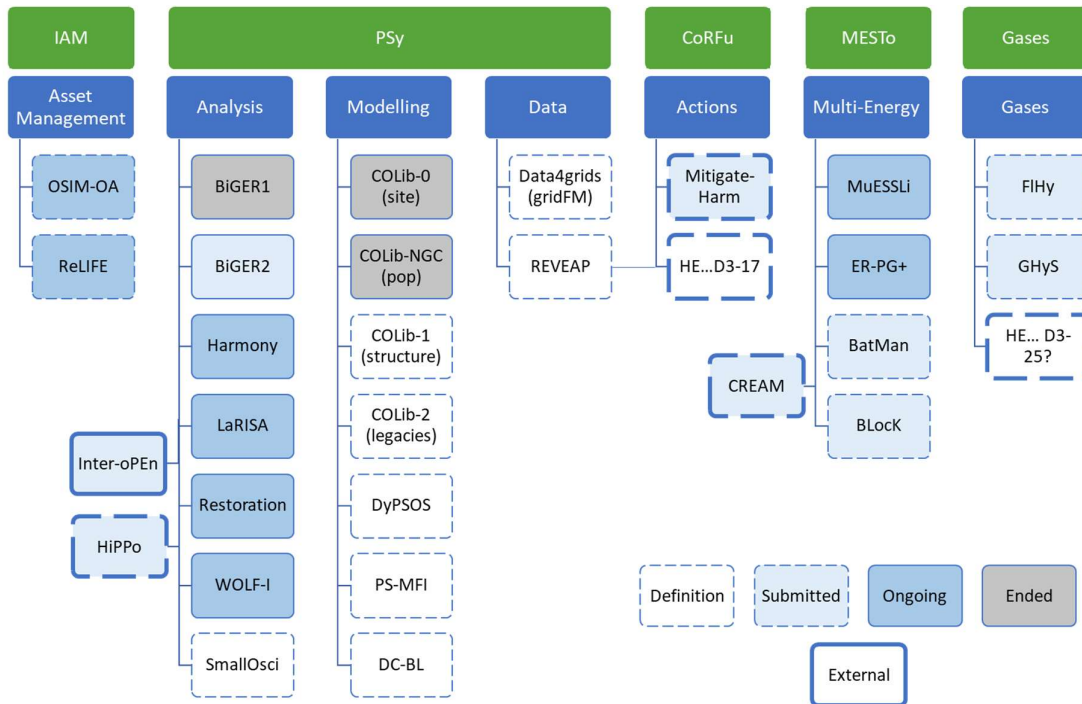
#### 4.3. 30 R&I initiatives & more on the agenda

After the launch of nine R&I projects in 2023, the main focus was their **undertaking**, to materialise their first results. Every project complies with an autonomous governance. CRESYM supported however the researcher teams with training, especially to improve coding practices and make the algorithm principles or prototypes easier to later industrialise. The Association also centralised and shared a quarterly reporting to decision makers.

In 2024, CRESYM **started** four common or special projects and submitted, or is part of, three project proposals to the Horizon Europe MSCA and CETP calls. Twelve other ideas were debated in six focus group meetings. Eight are still debated and prioritised (e.g. about quantum computing at this early stage of the Association).

Overall, end 2024, CRESYM deals with about **thirty named R&I initiatives**, either ongoing actions or would-be projects, but not accounting for about ten more mere ideas (and yet to be named).

They are grouped in **seven topical chapters**, three of them dealing with different facets (analysis, modelling, data) of power system stability (PSy). They represent two third of all named initiatives. Every other chapter corresponds to a dedicated focus group.



#### 4.4. Power system stability (PSy)

“Power System stability” (PSy) is a large focus group, now divided into three chapters but still mostly focusing on dynamic simulation tools, split into six projects:

- **BiGER**, is about bridging the gap between EMT and RMS modelling, for stability studies and daily operation of fast, active components-dominated power systems. A preliminary action was dedicated to literature review, identification of use cases and the construction of the related tests cases. The main project is launched end 2024, sponsored by RTE and Hydro-Quebec.
- **Harmony** is a 4-year project developing a toolkit for easy *harmonic* analyses of (local EMT), to assess multi-terminal HVDC power systems, TSO-DSO interface, controller interoperability and HVDC protection. The three work packages progress in parallel, and as planned. Programmers have been hired to code and join the first developed bricks.
- **LaRISA** stands for Large RES Integration Stability Analysis, focusing first on the development of 1 GW of photovoltaic generation on the Slovenian ground. The project is half through and delivered as expected en 2024. The methodological issues feed BiGER and Harmony and conversely LaRISA is a trial test for both projects developed solutions.
- **Restoration** explores the potential benefits of BESS within the actuation of power system restoration plans relying on generic and detailed validation models of electrical grids. The various expected models have been developed as planned during the first of the three years of the project duration.
- **WOLF-I** (Wide-area Oscillations of Low Frequency with presence of IBRs) is a PhD work, aiming to gain a deeper understanding of the role of IBRs in the damping of inter-area oscillations and develop methods and tools to design POD controllers for new devices and develop guidelines for TSOs. The first year compiled the state of the art on both research directions: power system

damping controller tuning methods and the impact of IBRs on inter-area oscillations. A conference paper is being submitted. The associated website shares didactic information about inter-area oscillations.

These research projects are completed by the development of **COLib**, a web library of opensource, verified power network component models for power system stability analyses and related test cases. Its proof of concept went live end 2023 and was populated in 2024, with basic component models supplied by e-Roots Analytics, detailed power electronics devices' models from TU Delft, and new models from RTE and Fraunhofer Gesellschaft IEE (**COLib-ngc**).

#### 4.5. Control Room of the future (CoRFu)

“Control Room of the Future” (CoRFu) is a wide chapter, yet to be further refined. In practice it coordinates CRESYM members' action in three projects:

- The HE-funded **TwinEU** project, which started in January 2024, gather 77 partners to make the European power system digital twin real.  
*NB: CRESYM is only in charge of coordinating some of its members' action in the project (TwinEU as a whole is coordinated by Fraunhofer IIT)*
- Building on the expected outcomes of TwinEU, CRESYM launched in parallel **TraiSim**, an AI-based control room operators' Training Simulator. Technical discussions have aligned all partners, the general architecture of the system has been developed, and the proof of concept is being developed.
- **OptGrid** is a PhD work at TU Delft about the optimisation of the power grid configuration (topology) in operation procedures to ensure an acceptable level of reliability of the electricity supply using machine learning techniques. A Risk-based MILP model of the TNR problem has been developed this Summer with a first article early 2025 for the IEEE PowerTech conference.

The focus group “Control Room of the Future” was however formally structured in June 2024, around two events: its inaugural meeting about “**pain-sharing**” starring five TSOs (RTE, TenneT, swissgrid, Enginet, NESO); and its G-PST counterpart, i.e. G-PST's “Control Room of the Future” workshop that CRESYM and several common members attended.

Research topics identification and structuring has developed since, with **voltage control** as most likely first step.

#### 4.6. Multinenergy (MESTo)

“Multi-Energy Systems Tools” (MESTo) is focused on the development of Energy System Optimisation Models (ESOMs) and the related economic research.

CRESYM's flagship project in this chapter is **MuESSLi** (Multi Energy System Smart Linking). MuESSLi aims at “smart-linking” simulation tools to perform cross-sector, actually scalable, simulations of multi-energy systems and enable the optimal development and operation of a holistic “energy system” (power, heat, transportation, etc.) with electricity and hydrogen as main carriers.

The MuESSLi project is moving full speed now with all five PhDs on track. Progresses are tangible, including a first pre-literature review report. With monthly individual and common (including all other MESTo partners, esp. from the PlaneTerr projects) meetings, the environment is set for fruitful collaborations.

**ERPG+** is a PhD work about Economics & regulation of integrated power and gas systems (renewable methane, hydrogen) at CentraleSupélec, with co-supervision at DTU.

Further economic works scheduled in 2025 shall give momentum to this domain, about hydrogen systems and batteries. If awarded, the CREAM proposal – HE MSCA doctoral network of 17 PhD students about risks for future energy systems will lift MESTo to a whole new level.

#### 4.7. Publicly funded projects

CRESYM is party to two projects funded by the European Commission’s Horizon Europe program, that started in 2024:

- **Inter-oPEn** is a Horizon Europe MSCA doctoral network about interoperability of HVDC equipment with open models (2.7 M€, 2024-2026, 8 beneficiaries and 13 associated partners, including 3 CRESYM members).
- **TwinEU** is about the development of a digital twin generic platform for the European power system (HORIZON-CL5-2023-D3-01, 20 M€, 2024-2026, 77 partners, including 7 CRESYM members).

CRESYM **leverages** the value of each of these publicly funded projects by supplementing their action. E.g. TraiSim further develops complementary modules to TwinEU. And the doctoral candidates or inter-oPEn further network with other researchers of the PSy DoNet or can interact with CRESYM members beyond the sole associated partners of the project. In addition, as for in-house projects, CRESYM shall take over both projects’ open-source results and ensure their long-term maintenance and public availability, through COLib or CREdit.

In November 2024, CRESYM contributed to drafting and submitting three proposals to public calls:

- **HiPPo**, a HE MSCA doctoral network application (4.6 M€) about High Performance Computing;
- **CREAM**, a HE MSCA doctoral network application (5.7 M€) on risks for future energy systems;
- **Mitigate-Harm**, a CETP pre-application (1.1 M€) developing the remedial actions’ side of the Harmony project.

Discussions around proposals for 2025 public calls for projects have already started, especially to answer **TSO-DSO** inter-twinned matters.

## 5. Training, education & networking

### 5.1. Training offer

CRESYM pools its **academic members’ offer** and teamed up in February 2024 with **EES-UETP**, and possibly other alliances as the case may be, to further develop the possibility for its own members to access cutting-edge training offer for its members’ staff.

CRESYM also inaugurated with success in 2024 its first training sessions:

- Ten experienced engineers from RTE, Swissgrid, Fraunhofer, TenneT praised the “Power system dynamics” workshop end January. Two other sessions are opened in January and February 2025 for twenty-four others.

- In September, twenty trainees involved in all CRESYM projects gathered in Aachen for the first three-day training session on “Good coding practices” derived from Code Refinery opensource material. The session was completed by a visit of Amprion’s Oberzier 400/110 kV substation and Alegro HVDC equipment.



The training sessions are proposed at cost rate for members. Beyond the taught material, they prove good networking opportunities across member organisations.

## 5.2. CRESYM DoNets

CRESYM’s own common and special projects gather more than twenty PhD students or researchers end 2024. They are grouped into three thematic doctoral networks – our so-called **DoNets**: one about power system stability (**PSy**); another about multi-energy matters (**MESTo**); the last about control room of the future matters (**CoRFu**).

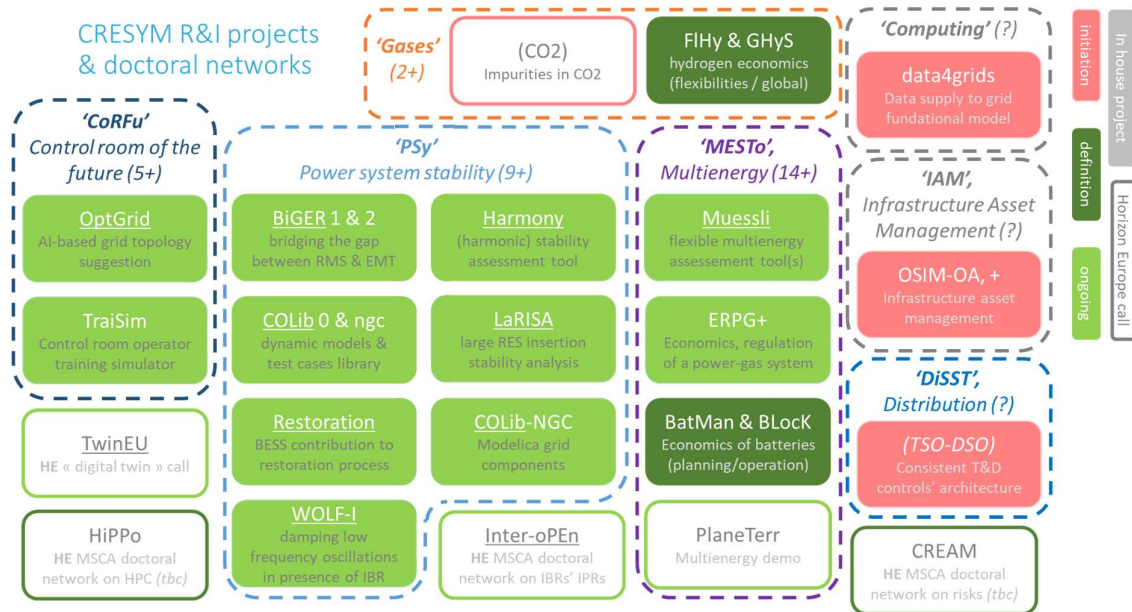
As for a HE MSCA, the objective of a DoNet is to provide opportunities for **networking** and emulation, more efficient **dissemination**, **training** and education, and a strong interface to **industry**. A DoNet is as **transverse** as possible (international, transdisciplinary, cross-sector, cross-projects, with multiple partners, both academic and industrial) and shall ease the **recruitment** of highly skilled people by industry. A DoNet is the implementation side of a focus group.

The DoNets also welcome sole doctoral fellows hired independently by our members for other research actions: e.g. the PlaneTerr project (with four PhD students, sponsored by the French agency ADEME, gathering three of CRESYM’s members and starting end 2023) is a component of MESTo.

CoRFu also associate members’ experts involved in the HE **TwinEU** project, and PSy the PhD students of the **HE MSCA** doctoral network inter-OPEN. If awarded, the fifteen PhD students of the HE MSCA doctoral network HiPPo will add up to PSy, as would the seventeen of CREAM to MESTo.

Two other PhD students about the economics of batteries will complement the scope of MESTo.

And with new focus groups emerging early 2025 (about molecules (CO<sub>2</sub>, H<sub>2</sub>), distribution matters or infrastructure asset management), with either privately funded research actions or coordination of proposals to Horizon Europe project calls, further topical, cross-organisation and international **networks of young researchers** will be set up.



## 6. Assets

### 6.1. Common opensource IT Assets

CRESYM addresses **low-TRL** R&I matters, that competitors have a joint interest to solve jointly and would disregard separately. Every project's results are due to **opensource** and **non-viral**, either based on Apache 2.0 or Mozilla Public License v2, depending on their nature. And CRESYM is meant to **sustain** and make **publicly available** such results on the **long-run**, as common **Assets** of general interest for the scientific community.

Such IT assets would be mostly methodologies, algorithms, prototypes, possibly basic tools for modelling and simulation of energy systems.

Beyond its own projects, CRESYM may also be mandated by any third-party owning a research asset, in order to take care of it on their behalf, alleviating the maintenance burden from the inventing institution, provided that the asset is made available opensource.

Researchers or organisations willing to use any asset must agree with its attached opensource license; and have access to a series of standard **services**, as defined by the related Asset Terms of Reference (**AToR**).

To make this happen, CRESYM has started the **ComOn** project. The project aims to test the Association's ability to welcome third-party invented assets, of different kind (source code, running prototypes, etc.) with a different span of services attached.

**Twelve services** have been defined in 2024 (from mere promotion to hosting, basic maintenance, and possibly debugging or documentation) and have been subscribed to date by 4 organisations, for 7 Assets.

## 6.2. CReDIT

CReDIT (Common Results, Data, Information & Tools) shall be the primary **portal** for opensource R&I results on energy systems. It shall host CRESYM's own projects' results, but also gives access to, and interconnect with, existing or past initiatives (e.g. the European Open Science Cloud).

CReDIT intends to complement, for **yet-to-industrialise research results**, what is developed for ready-to-use tools by other initiatives, such as G-PST for power system simulation tools or Openmod for energy system tools.

The concept is developed in the ComOn project and the CReDIT portal is available and showcases its first Assets since mid-2024.

## 6.3. COLib

**COLib** (Collaborative Opensource Library) is a web library of opensource, verified power network component models for power system stability analyses and related test cases.

It is an example of the various resources CReDIT can contain.

Its proof of concept went live end 2023 and was populated in 2024, with basic component models supplied by e-Roots Analytics, detailed power electronics devices' models from TU Delft, and new models from RTE and Fraunhofer Gesellschaft IEE (**COLib-ngc**).

In 2025, its structure shall be developed to ease sorting, searching and verification of content. It shall also enable the move to the library of older R&I project legacies to sustain them on the long-run.



# 7. Corporate matters & general administration

## 7.1. Corporate

In April 2024, Prof. Antonello Monti and Prof. Peter Palensky have been re-elected as President and Vice-President respectively for two-year mandates by the General Assembly. **Administrators** representing Strategic Members and Research Institutions Members have also been appointed for the 2024-2026 mandates. Industrial Members' representatives shall be appointed by the General Assembly in April 2025.

The Association's starting period, with exceptional rules for its general budget management also came to an end two years earlier than expected, while maintaining low membership fees. As of 2024, 70% of the **membership fees** are allotted to the "common pot" and common project funding rather than overheads.

The General Assembly also established the new **Observer status**, signed by six organisations from five countries.

The Association also published its twelve-service offer to **sustain R&I** results.

Last but not least, with the perspective of a trial testing it in 2025, **independent advisers** to the Association are envisaged to challenge and appraise the Association's action. A basic charter is now drafted that shall be submitted to the next General Assembly in April 2025

## 7.2. General Management

The Association’s **contractual framework** (i.e. our Project, Service or Supplier Agreements templates) proved robust in 2024 after one more year of implementation. The first Asset Licensing Agreement has been signed, completing the scheme.

The **IT development guidelines** have been updated end 2024, based on the Code Refinery recommendations and the “Good coding practices” workshop in September 2024.

In addition, the Association’s governance and organisation principles were completed with rules for the common pot management is concerned and with the setup of the focus groups, giving flexibility to the **Project Committee**.

## 7.3. Finances

In 2023, CRESYM’s **turnover** is 2998 k€, including 255 k€ of membership fees.

General budget expenses (staff, offices & IT, corporate...) are 820 k€, of which 730 k€ (80%) are earmarked to support R&I activities, leaving 90 k€ of net general **expenses**. Covering at least 80% of the general expenses, especially staff through projects or commercial activities is a KPI of the Association (94% in 2024). As in 2023, corporate & meeting expenses in 2024 are lower (60%) than 30% of the membership fees (i.e. the share of the membership fees remaining for the general budget).

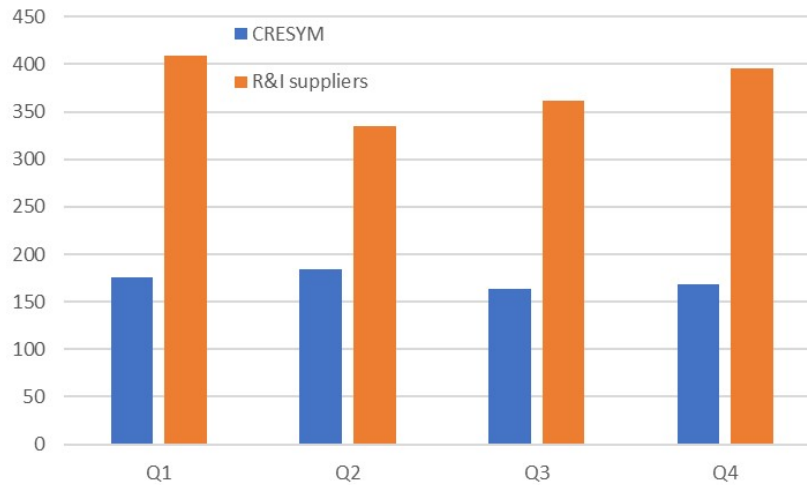
The **net balance** in 2023 is 606 k€, accounting for 327 k€ of anticipated income (covering expenses in 2025-2028). The **common pot** contributes for more than 200 k€ to this positive net balance, though an Association’s KPI is to have it 100% balanced year on year (only 53% of its income are spent in 2024).

	total budget	R&I projects	common pot	comments
<b>incomes</b>	<b>2998</b> a	<b>2575</b> q	<b>564</b> w	a=b+c+d+e+f
membership fees	255 b		179 x	x=70%.b 70%
projects direct funding	2264 c	2264 c		q=c+r+e
common pot contribution	385 d	227 r	385 -d	r=-(n+u)
ext funding & subsidies	84 e	84 e		w=x-d
(non project related) sales	10 f			
<b>expenses</b>	<b>-2393</b> g	<b>-2291</b> s	<b>-300</b> y	g=l+m+n+o
staff	-727 h			l=h+i+j+k
office & IT	-47 i			s=t+m+n+u
corporate	-20 j			y=n+o+u
events & meetings	-26 k			
<b>general budget</b>	<b>-820</b> l			y/w (~100%) 53%
general budget > projects		-730 t		t/(h+i) (>80%) 94%
dir. funding > R&I suppliers	-1334 m	-1334 m		(j+k)/(0.3*b) 60%
common pot > R&I suppliers	-167 n	-167 n	-167 n	
common pot > applications		-60 u	-60 u	
common pot > assets/donets	-73 o		-73 o	
<b>balance</b>	<b>606</b> p	<b>285</b> v	<b>264</b> z	p=a+g, v=q+s
incl. anticipated 2025-2028	-327	-285	-42	z=w+y
<b>balance 2024 stricto sensu</b>	<b>279</b>	<b>0</b>	<b>222</b>	

2024 Profit & Losses, simplified



The total **project budget** is 2575 k€ (summing up the directly collected funding, external subsidies and the contribution from the common pot). 285 k€ are actually anticipated income covering expenses planned over 2025-2028. 1501 k€ are directly hired from research institutions. 395 k€ are seconded personnel from industrial members to research institutions to undertake a PhD work, via CRESYM’s budget. 335 k€ are PMO support to projects plus in-house prototyping of COLib and CReDIT and 60 k€ are spent to prepare applications to public calls for projects or in support to the inter-oPEn MSCA.



2024 CRESYM R&I project expenses (k€/quarter)

#### 7.4. Human resources

CRESYM is **seven staff** end 2024.

Beyond the general manager, recruits are dedicated to steering projects and maintaining R&D assets live and ready for business. In addition, their costs shall be **sponsored** by projects.

In particular, two PhD students, each seconded by CRESYM on behalf of an industrial member to undertake their research with a research institution member.

In January 2024, CRESYM’s IT Assets & Projects manager has been hired to set up the Association’s Asset framework (with COLib, CReDIT and ComOn and support the TwinEU and TraiSim projects). And in September 2024, a second Scientific Advisor has been hired to accommodate the Association’s rapid growth.

CRESYM staff is quasi-**gender-balanced** (see our diversity & gender equality plan).

#### 7.5. Communication

CRESYM’s communication is bound to be limited to its research efforts and related advocacy.

Its **website** advertises its projects and shall develop into a portal for opensource resources on energy system modelling and simulation.

CRESYM publishes a **newsletter**, with three or four issues per year, and is present on Linked In.

In March 2024, CRESYM sponsored the **Openmod** community workshop in Grenoble, with about 90 participants. The passionate discussions resulted in the crystallisation of the CREAM proposal submitted to the Horizon Europe MSCA program end November.

CRESYM also advocated its action through side-events at the **PSCC**, **CIGRE** and **IEEE PES** conferences.

## Appendix 1: 2024-2025 goals review

The Annual Strategy Note 2024-2025 sets the following goals.

The status is provided alongside.

<i>Goal</i>	<i>Comments</i>
<b>Membership &amp; Partnership</b>	
Define & test the membership target process	Process defined ... though opportunistic applications prevailed 😊
Enlarge CRESYM to DSOs and industrial suppliers	ELES, HEDNO, Alliander are DSO members 😊 Hydro-Quebec, Air Liquide became members 😊 Schneider Electric, Supernode are observers 😊
Propose thematic, free, open focus groups	PSy, MESTO are active 😊 CoRFu, DiSST, Gas, Adv. computing had each their first meeting 😊 IAM shall start in 2025 😊
Update governance guidelines to involve members and preserve CRESYM's pillars	Governance guidelines updated, approved and implemented 😊
<b>R&amp;I Projects</b>	
Define & test the Association's roadmap process	Process defined but yet to be implemented 😊
Leverage the value of members' funding	Submission to 3 external calls
Get the best results out of the 2023 projects	5/6 of the 2023 projects deliver quality results 😊
Have the CREAM MSCA posted in Nov/2023	3 external call applications submitted 😊 (CREAM, HiPPo, Mitigate-Harm)
<b>Activities</b>	
Structure, implement & showcase the technical ability of the Association to manage assets	COLib populated 😊 CReDIT initiated 😊
Develop a sound business proposal to manage asset management solicitations	First Asset Licensing Agreement signed 😊
Kick off successfully the cross-project DoNets	4 DoNeT exploratory meetings in 2024 😊 (AC, PSy, MESTo, CoRFu) cresROADs PSy, MESTo in April 😊
Partner up to ensure the required training offer	First Good coding practices with CodeRefinery (opensource material & trainer) in September 😊

.../...

<b>Logistics</b>	
Link all CRESYM events to the EU Sustainable Energy Week umbrella	CRESYM events went in practice unadvertised 😞
Implement a pragmatic communication policy	CRESYM showcased at PSCC 2024, CIGRE 2024 😊 4 newsletter released / year 😊
Continuously adapt CRESYM's legal framework	Multiple implementation of stable versions of Master-NDA, Project Agreement in 2024 😊

## Appendix 2: glossary & abbreviations

AI	Artificial Intelligence
<a href="#">BiGER</a>	Bridging the Gap between EMT and RMS modelling ( <i>common project</i> )
CETP	Clean Energy Transition Partnership
CCUS	Carbone Capture, Use & Storage
<a href="#">COLib</a>	Collaborative Opensource Library of power system component dynamic models and related test cases ( <i>part of CReDIT</i> )
CREAM	Comprehensive Resilience of Energy Systems – Assessing & Mitigating Risks // Cross-disciplinarity for decision Robustness & Epistemology for Apter Models (HE MSCA doctoral network – <i>external project proposal</i> )
CReDIT	Common Results, Data, Information & Tools – portal to all “common” assets
cresCENDO	CRESYM’s Common Education, Networking, Dissemination Opportunities (advocacy events)
CreSem	Creative Seminars ( <i>internal workshop sessions of the Association</i> )
cresROADS	CRESYM’s Research Opportunities And Dissemination Sessions ( <i>public workshops of the Association</i> )
Common pot	70% of the annual membership fees + additional contribution (15%) from projects sponsors. Available to fund common projects and cross-activities (DoNets, asset management)
Common project	Sponsored by CRESYM as well as other industrial participants, subject to the General Assembly’s labelling. IPR’s are equally shared by CRESYM members
<a href="#">CRESYM</a>	Collaborative Research on Energy System Modelling
<a href="#">DiSST</a>	Distribution Systems Standards & Tools ( <i>research chapter</i> )
<a href="#">DoNet</a>	Doctoral network of CRESYMs, with a strong interface to industry
EC	European Commission
<a href="#">EES-UETP</a>	Electric Energy System – University Entrepise Training Partnership
ER-PG+	Economics & Regulation of integrated Power & Gas systems ( <i>special project</i> )
ESOM	Energy System Optimisation Model(ling)
<a href="#">EU SL</a>	EU SL – European Social Labor
External project	Answering a call for projects and 100% sponsored by the related grant
FTE	Full-time equivalent
<a href="#">G-PST</a>	Global Power System transformation consortium
<a href="#">Harmony</a>	Open-source power system stability assessment tool ( <i>common project</i> )

HE	European Commission’s Horizon Europe research program
HiPPo	High Performance Computing for Power systems ( <i>HE MSCA doctoral network – external project proposal</i> )
HPC	High Performance Computing
IAM	Integrated Assessment Model(ling)
IBR	Inverter Based Resources (see PE)
<a href="#">Inter-oPEn</a>	Interoperability of Power Electronic dominated grid by openness ( <i>HE MSCA doctoral network – external project, granted</i> )
IPR	Intellectual Property Right
KPI	Key Performance Indicator
<a href="#">LaRISA</a>	Large RES Integration Stability Analysis ( <i>common project</i> )
<a href="#">LFE</a>	Linux Foundation for Energy
Mitigate-Harm	Harmonics mitigation ( <i>CETP application – external project proposal complementing Harmony</i> )
ML	Machine Learning
<a href="#">MSCA</a>	Horizon Europe Marie-Sklodowska-Curie Actions
<a href="#">MUESSLi</a>	MultiEnergy System Smart Linking Integration ( <i>special project</i> )
MVP	Minimum Viable Product
NGO	Non-Governmental Organisation
<a href="#">OptGrid</a>	Power system topology optimisation ( <i>special project</i> )
<a href="#">Openmod</a>	Open Energy Modelling Initiative
PE	Power electronics (see IBRs)
PMO	Project Management Office
POC	Proof of Concept
Project agreement	Standard MLA framework joining willing project participants, all industrial sponsors and/or research institutions, plus CRESYM as serving party
QC	Quantum computing
<a href="#">Restoration</a>	Use of batteries to restore power systems after black-out ( <i>common project</i> )
R&I	Research & Innovation
Special project	Sponsored 100% by industrial participants. IPR’s are equally shared by the project’s participants (rather than by all the Association’s members)
TSO	Transmission System Operator
TraiSim	AI-based control room operators’ Training Simulator ( <i>special project, complementing TwinEU</i> )

<a href="#">TwinEU</a>	Power system digital twin ( <i>HORIZON-CL5-2023-D3-01 – external project, granted</i> )
<a href="#">WOLF-I</a>	Wide-area Oscillations of Low Frequency with presence of IBRs ( <i>special project</i> )

## Appendix 3: CRESYM in a nutshell

### WHO WE ARE

CRESYM is a **non-profit** association, gathering **industry players & research organisations** and aiming at undertaking **research actions** and ultimately solving the coming challenges for the future, fast-evolving European energy system.

After its incorporation in September 2022, CRESYM started operation in January 2023, launched its first projects in April 2023, started self-funding R&I actions as of July 2023 and expanded to 12 members in October 2023. In 2024, 10 more Members and 6 Observers joined the Association.

CRESYM runs about 12 R&I actions for about 3000 M€/year and supports two doctoral networks and about 20 PhD works with 7 permanent staff.

### OUR AMBITION

CRESYM aims at **uniting** all need-owners and solution-developers to **catalyse** the development of energy system modelling and simulation **opensource**, non-viral bricks in order to meet the energy transition challenges.

### OUR VALUES

CRESYM is **non-profit** and acts **transparently** for the **general interest**, addressing new and/or complex, **low TRL**, technical challenges.

CRESYM reconciles **security** and IPRs when developing **opensource** deliverables. Opensource, non-viral licences are key to ease the dissemination among operators, manufacturers and vendors in a fair, neutral manner.

CRESYM organises **collaborative, efficient** R&I works, with practical intermediary outputs. CRESYM builds up on, as well as comfort, support and promote other existing opensource initiatives.

CRESYM is committed to protect **privacy** and promote **diversity & gender equality**.

### OUR MISSION

CRESYM fosters collaborative R&I actions to deliver opensource energy system simulation tools on low-TRL R&I issues of general interest (the **'Projects'**).

CRESYM shall maintain useful technological building blocks available for all researchers & engineers (the **"Assets"**). As of 2024, COLib (the Collaborative Opensource Library of power system component models) and CReDIT (Common Results, Data, Information and Tools) shall start operation.

CRESYM manages thematic doctoral networks, be they supported by the EU Horizon Europe program or self-funded by CRESYM, to augment the value of our R&I actions for researchers and fosters serendipity (the **"DoNets"**).

### OUR ORGANISATION



On behalf of its General Assembly, CRESYM is run by a Board of Directors. The Board appoints a General Manager to manage daily operation.

With the support of CRESYM's Scientific Advisor, CRESYM's Project Committee is in charge of the general organisation of R&I Projects: the identification of new topics, the supervision of every project agreement drafting, and the overall consistency of the R&I work program, ensuring that all critical issues are addressed – by CRESYM or other organisations –, efficiently and with no overlapping of efforts.

Every project is independent from another and is managed by its participants autonomously, though obeying to one same agreement structure as all others launched by the Association.

CRESYM is represented by its President, Prof. Antonello Monti, and Vice-President, Prof. Peter Palensky.

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