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UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

IIT
INSTITUTO DE
INVESTIGACIÓN
TECNOLÓGICA

WELCOME TO IIT

Institute for Research in Technology
Instituto de Investigación Tecnológica (IIT)

iit.comillas.edu

1. IIT Mission & Vision Open to the world
2. Five key points about IIT
3. IIT in numbers 2022/2023
4. Structure and Organization
5. Research groups
   - Energy Economics & Regulation
   - Smart and Sustainable Grids
   - Energy Systems Models
   - Electric Power Systems
   - Intelligent Systems
   - Fire Safety, Thermal and Fluids Engineering
   - Railway Systems
   - Bioengineering
   - Smart Management for Sustainability
7. Products and Services
8. Relevant European Projects
9. Relevant partners

1. IIT Mision & Vision
Open to the world

International activity is at the core of IIT life. We are a committed member of the international research community.

IIT participates in a variety of **European Commission Research Projects** in the fields of **smart grids, renewable energy integration, electric vehicles, energy system models, cybersecurity, hydrogen and others**.

Countries where IIT has had projects

2. Five key points about IIT

was founded **in 1984** ago and is a university-based research center which belongs to the ICAI School of Engineering of Universidad Pontificia Comillas.

places academic excellence at the core of its activities, **participating fully in the international research community**. Strong cooperation with the Massachusetts Institute of Technology in research & teaching activities. IIT also participates in international networks: Electric Energy Systems-University Enterprise Training Partnership (EES-UETP), Climate Friendly Materials Platform (CFMP), international professional associations such as IEEE, CIGRE, CIRED, ISGAN, among others.

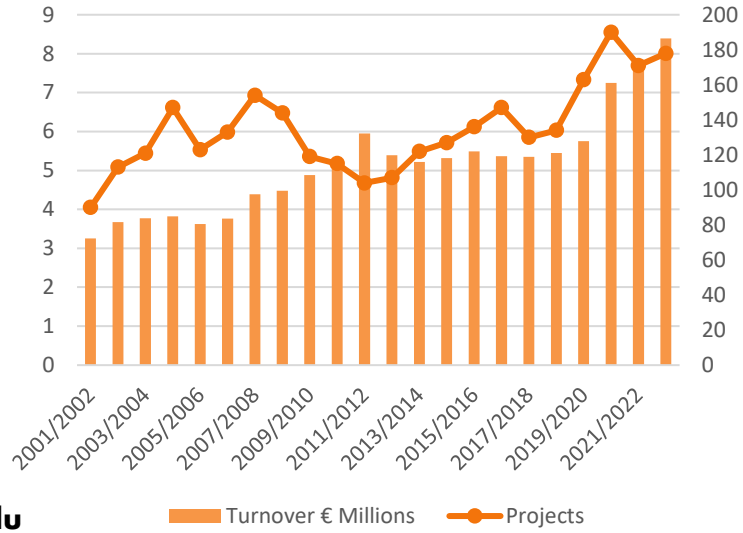
is dedicated to **applied research**, doctoral and postgraduate education and the transfer of technology and knowledge to society. IIT researchers have had relevant positions at regulatory authorities and expert groups in Spain, Ireland and at the European Association of Energy Regulators

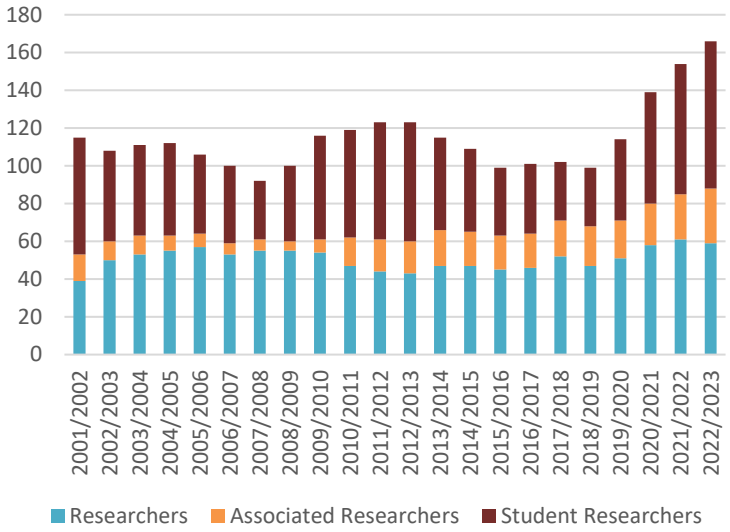
is **self-financed** and most of its work is carried out in collaboration with industry.

has more than 175 researchers and academic staff from 4 continents. Among them, **recognized researchers** included in the 2% of the most influential researchers worldwide according to Stanford University: Tomás Gómez, Luis Rouco, Pedro Linares, Javier García y Carlos Batlle.

3.IIT in numbers 2022/2023

175	8.39	178	102	13	11
Staff 78 research assistants 89 senior researchers 8 admin	M€ **Turnover**	**Projects** funded by industry and institutions	**Papers** published in JCR journal	**Thesis** submitted, 56 ongoing	**Courses** training and specialized offered to external entities





4. Structure and Organization

Board of Directors

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Deputy Director for Research Development
Dr. José Pablo Chaves Ávila

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5. Research groups

- Energy Economics & Regulation
- Smart and Sustainable Grids
- Energy System Models
- Electric Power Systems
- Intelligent Systems
- Fire Safety, Thermal and Fluids Engineering
- Railway Systems
- Bioengineering
- Smart Management for Sustainability

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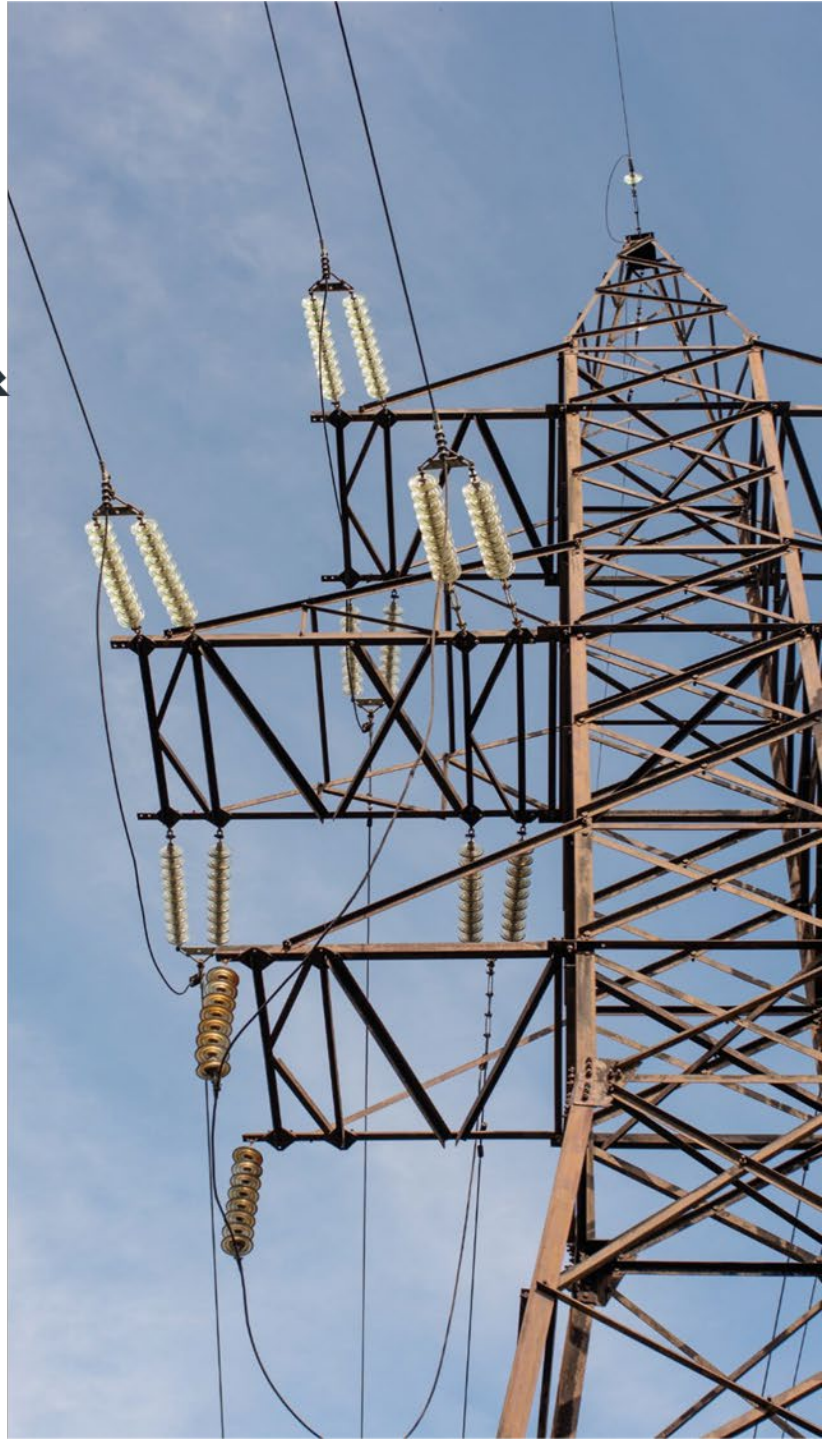
5. Energy Economics & Regulation

- Regulatory design of energy markets: capacity markets, wholesale energy markets, ancillary service markets
- Economic instruments for environmental and climate change policy
- Regulation of transmission and distribution networks
- Multicarrier systems integration
- Demand response and flexibility
- New business models
- Energy storage integration



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5. Smart and Sustainable Grids

- Smart Grids
- Planning and operation of Distributed Energy Resources
- Green energy integration
- Universal energy access & rural electrification
- Information and Communication Technologies & data exchange protocols
- Smart Grid Data modelling

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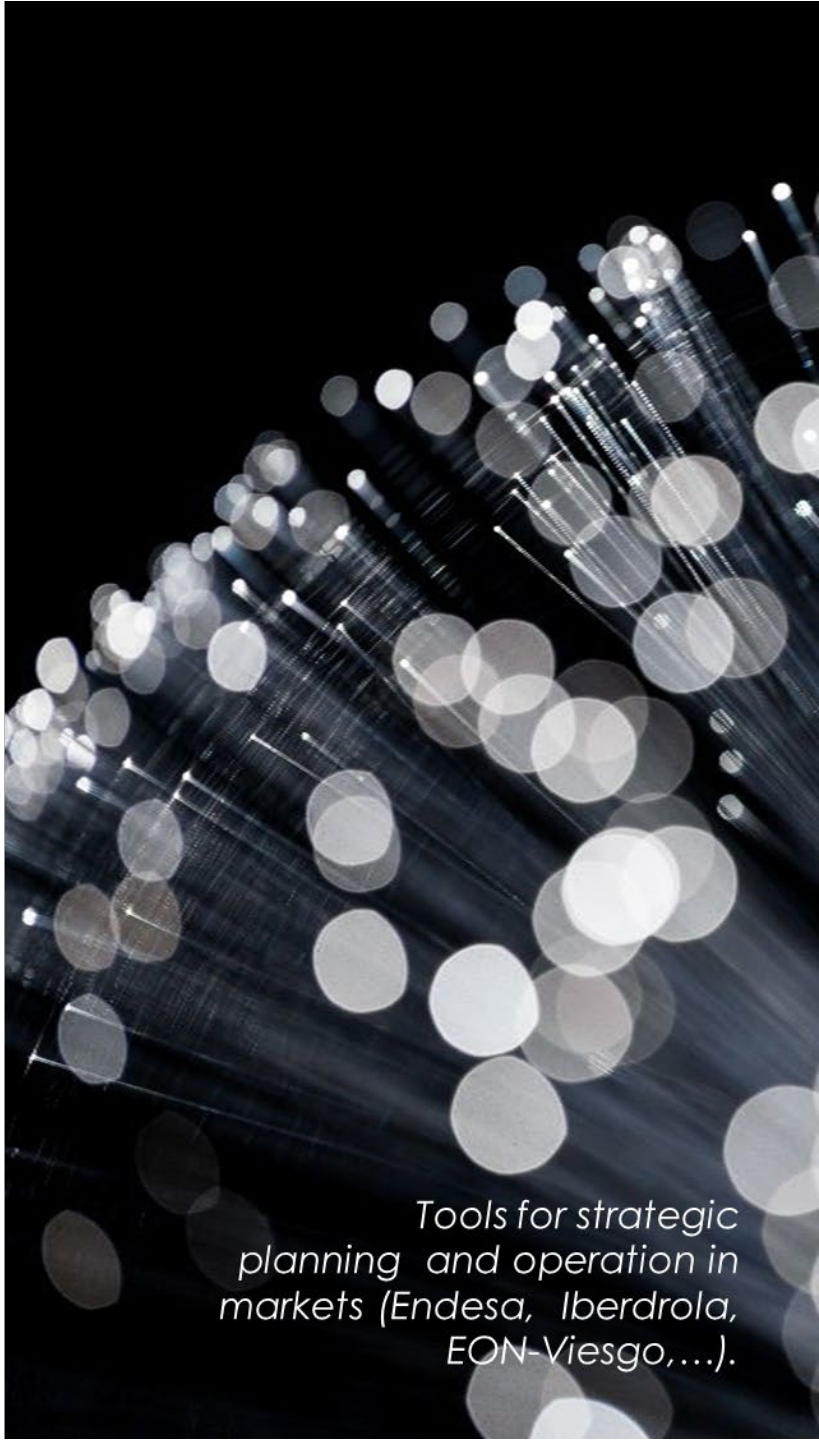
5. Energy Systems Models

- Short-term operation and market bids
- Medium-term planning studies
- Long-term strategic analysis



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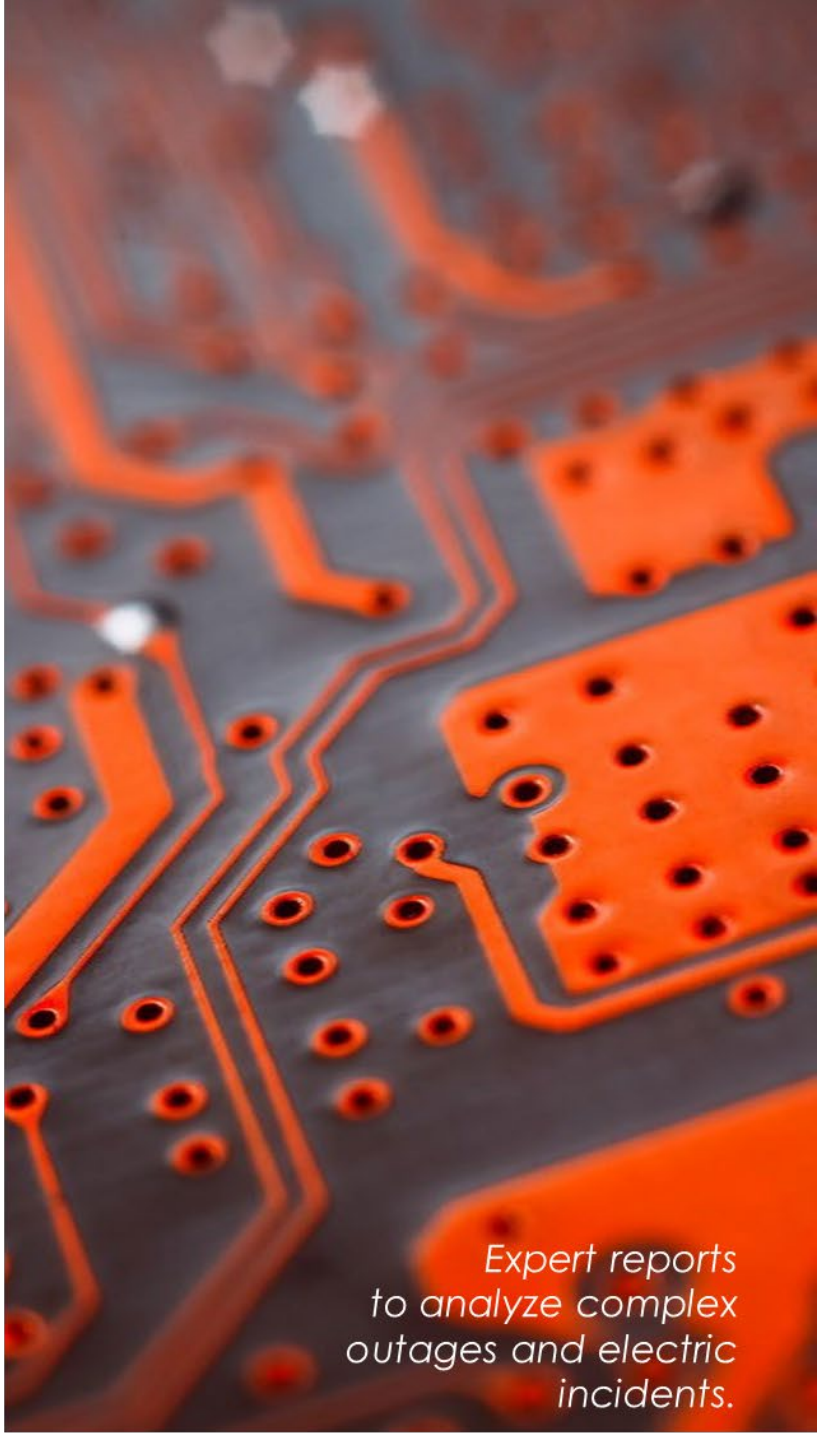
5. Electric Power Systems

- Steady-state
- Dynamic analysis & stability
- Automatic Generation Control
- Power electronics
- High Voltage Direct Current
- Power Quality / Electromagnetic transients



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5. Intelligent Systems

- Smart buildings
- Forecasting and data mining
- Smart cities
- Reliability, maintenance and diagnosis
- Mobile robotics and artificial vision
- Helping accessibility using Information and Communication Technologies
- Smart Industry
- Artificial intelligence applied to industrial robotics

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5. Fire Safety, Thermal and Fluids Engineering

- Numerical modelling
- Structural analysis
- Experimental analysis
- Adhesives

Fractional Factorial Design for Atrium Fire Prediction.

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5. Railway Systems

- Optimal design of signaling and railway capacity
- Railway power supply systems
- Safety analysis, specification and demonstration of RAMS (Reliability, Availability, Maintainability and Safety), quality control and assurance
- Communication and control in railway power systems
- Mechanical design of overhead contact lines

Centralized Regulation System for Madrid-Barcelona High Speed Train.

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5. Bioengineering

- Electronic Instrumentation
- Digital communications
- Embedded digital systems
- Biomaterials
- Biomechanics
- Biomedical metrology

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5. Smart Management for Sustainability

- Managerial transitions to sustainability (SDG) and disruptive business models
- Social inclusion, vulnerability, longevity and wellbeing
- Management and measurement of stakeholder satisfaction
- Adoption of green technologies and consumer engagement
- Socioeconomic indicators and Environmental, social and corporate governance
- Circular economy
- Deep reality analysis

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CHAIR FOR LOW CARBON HYDROGEN STUDIES

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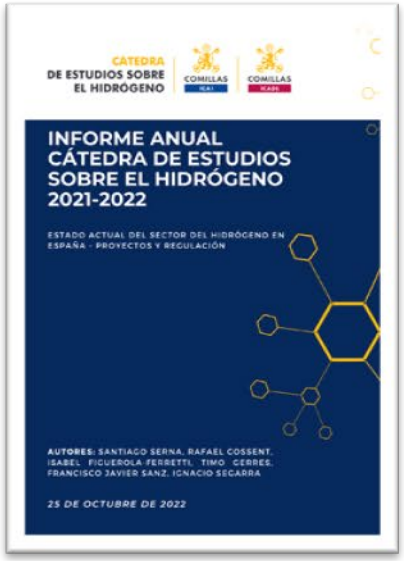
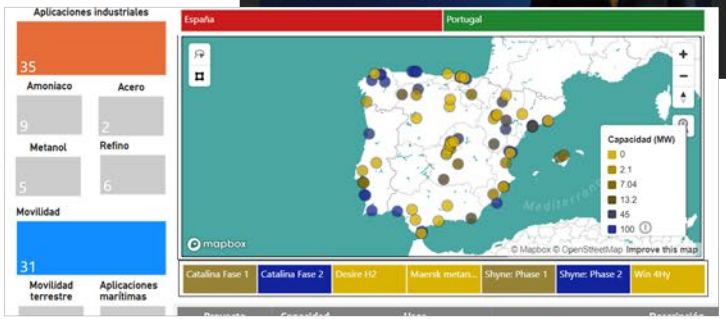
- Areas of interest:
  - ✓ **H_2 value chain** (production, transport, storage and utilization across sectors)
  - ✓ Financial instruments, **regulation** and business models
  - ✓ Prospective studies and **infrastructure planning**
  - ✓ Clean hydrogen as a **commodity**
- Meeting place and **debate**: events, data-based analysis and sector prospective in Spain
- **Knowledge** creation: doctoral dissertations, studies, master/bachelor theses





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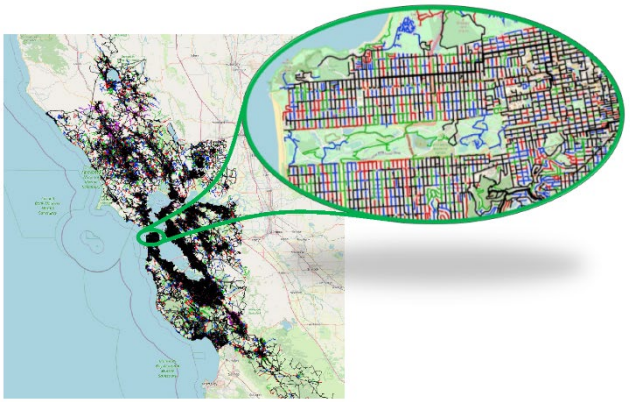
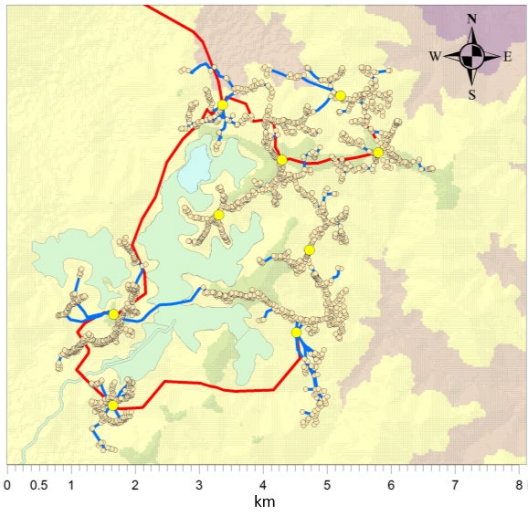
6. Products and Services

Smart and sustainable grids

- **RNM** Reference Network Model



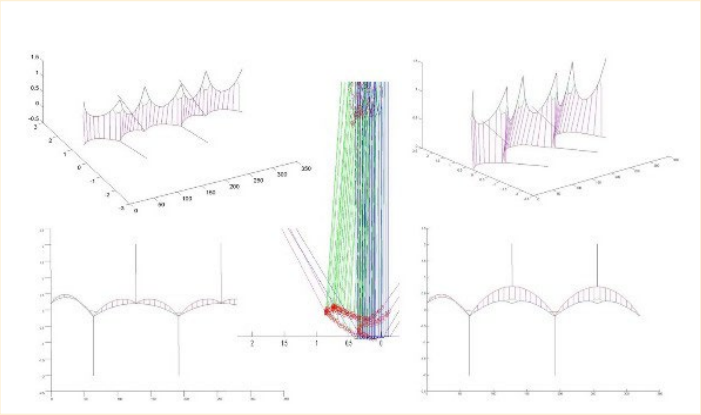
- **REM** The Reference Electrification Model



6. Products and Services

Computational mechanics and advanced materials

- **CANDY** Catenary Non-linear Dynamics

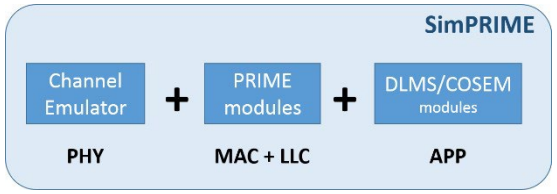


Intelligent systems

- **SPLODER**: Smart Planning Operation DER

Power electronics and telecom

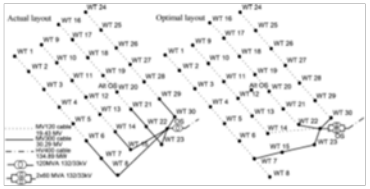
- **SIMPRIME**



6. Products and Services

Energy Systems Modeling

- OWL Offshore Windfarm Layout



- CEVESA Dynamic Generation Expansion

- openTEPES Open Expansion

- TEPES Long-Term TN Expansion
- ROM RES Reliability Operation
- STARNET Bulk Gen Cost
- FLOP GenSys Reliability

7. Relevant European Projects

Horizon 2020

ATTEST

Bio-FlexGen

coordinet

EUniversal UMEI

IElectrix

integrid bridging the gap

IndustRE

ONENET one network for Europe

open ENTRANCE

POSYTYF

RAYUELA a fun way to fight cybercrime

ReDREAM change your energy

RESPONSE

SET-Nav Strategic Energy Roadmap

FLEXIBLE

DIAMOND

EUROPEAN CLIMATE+ENERGY MODELLING FORUM

7. Relevant European Projects

Seventh framework programme

SEVENTH FRAMEWORK PROGRAMME

address interactive energy

GRID4EU INNOVATION FOR ENERGY NETWORKS

Best Paths TRANSMISSION FOR SUSTAINABILITY

ADVANCED Active Demand Value ANd Consumers Experience Discovery

UP GRID

erge

GridTECH.EU

Market RES

PV GRID

SUSPLAN

SOLID-DER

IM PRO GRES Improvement of the Social Optimal Outcome of Market Integration of DG/RES in European Electricity Markets

20 20 20 Twenties Transmitting wind

8. Relevant partners

Our main customer list includes Spanish and international companies and institutions in sectors like Energy, Transportation or Communications.

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THANK YOU

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