



INSTITUTO NACIONAL
DE ELECTRICIDAD Y
ENERGÍAS LIMPIAS

**Comprehensive tailored
solutions for your
company's needs**

National Institute of Electricity and Clean Energy



INSTITUTO NACIONAL
DE ELECTRICIDAD Y
ENERGÍAS LIMPIAS

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INSTITUTO NACIONAL
DE ELECTRICIDAD Y
ENERGÍAS LIMPIAS

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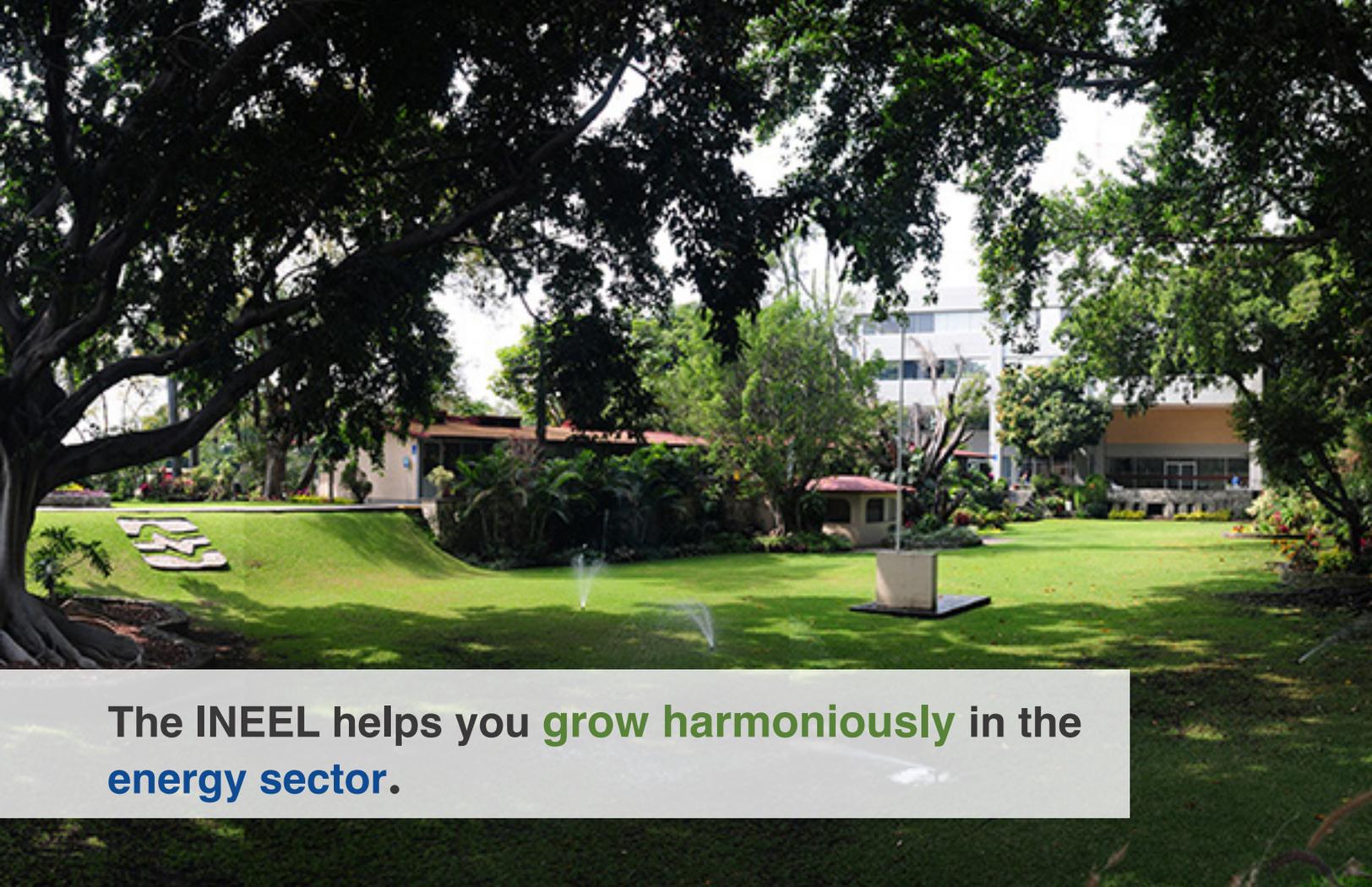
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AND CLEAN ENERGY (INEEL).





The INEEL helps you **grow harmoniously** in the **energy sector**.

About us

We are a public research center created by presidential decree in 1975 and our first office began operations in Morelos, Mexico. Dedicated mainly to the energy sector of our country, our focus is on providing applied research services in order for your company to be competitive in the energy sector. Additionally, we carry out the commercialization and technological transfer of our developments.

Our modalities

- ⚡ Applied research
- ⚡ Technological development
- ⚡ Specialized technical services

We offer you the opportunity to achieve **energy and economic efficiency** through **innovation**.

Mission:

Promote sustainable development of the energy industry through innovation.

Vision:

We credit our unique contributions to the competitiveness of the industry by the formation of innovative and value created ecosystems (government, industry and academia) that encourage and promote the sustainability of the energy industry.

Policy:

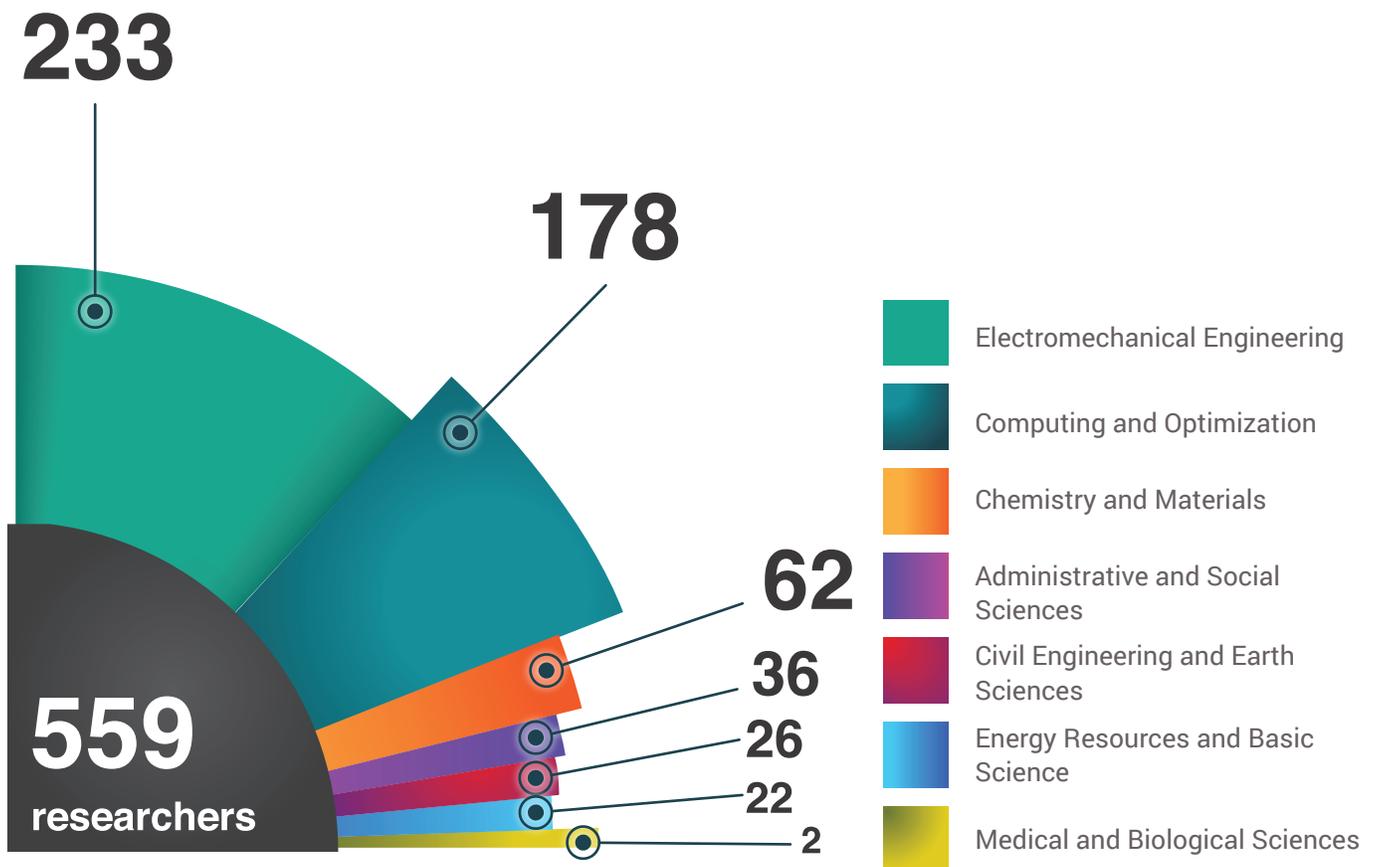
The National Institute of Electricity and Clean Energy is committed to meeting customer needs and exceeding their expectations through innovation, efficiency and continuous improvement of its processes within the regulatory, legal and regulatory framework applicable in the field of quality management, sustainable development, workplace equality, environmental management, safety and health at work.

Every year, we publish between **35** and **55 scientific and research articles** in peer-reviewed journals.

Our multidisciplinary team, with more than **500 professionals**, develops **comprehensive solutions** for your company.

Our staff

We have consolidated ourselves one of the leading institutions in research and technological development in Mexico and Latin America, based on our main pillar: the technological capacity of our human capital. We have specialized interdisciplinary groups, and national and international representatives.



243 with a bachelor's degree

316 with postgraduate degrees

We participate in over **50** national and international **technical committees.**

Some of them are:

- ⚡ Administrative Technical Committee of the Thematic Network of Electric Power Systems and Smart Grids (RedSEP-RI)
- ⚡ Committee of Specialists of CFE and PEMEX
- ⚡ Reliability Committee of CENACE
- ⚡ Smart Grid Workgroup (GTREI), of the Subdepartment of Electricity of SENER
- ⚡ Technical Groups for the Evaluation of the PEMEX Reference Standard
- ⚡ Standardization Committee of ANCE
- ⚡ National Standardization Committee for Electrical Installations (CCNNIE)
- ⚡ Program Evaluation Committees of CONACYT
- ⚡ National Standardization Advisory Committee for Electrical Installations (CCNNIE)
- ⚡ International Council on Large Electric Systems (CIGRE)
- ⚡ Institute of Electrical and Electronics Engineers (IEEE)
- ⚡ Board of Directors of International Electrical Research Exchange (IERE)
- ⚡ International Energy Agency (AIE)
- ⚡ World Energy Council (WEC)



We provide **solutions for your needs** and improve your processes through our **experience and technological capacity**.



Our Business

We work on four impact axes aligned with the National Development Plan and National Energy Strategy:

- Reduce costs in the sector
- Technological Innovation
- Development of human capital excellence
- Social Innovation

We collaborate with productive government companies and the sector's industry in the reduction of costs, thus making their processes more efficient through comprehensive solutions that add value to the processes and increase productivity.

We materialize our knowledge and experience in technological innovations, development of new technologies, processes and methodologies integrated to the industry to optimize performance and encourage the competitiveness of the energy sector.

Renewable energy and **smart grids** are some of the **strategic lines** we use to provide R+D+I to your company.



Renewable energy



Efficiency, energy saving and sustainability



Smart grids



Asset management



Materials



Advanced training

Strategic Research Lines

Our scientific research activities, technological development and innovation are sorted in six main strategic lines:

1. Renewable energy
2. Efficiency, energy saving and sustainability
3. Smart grids
4. Asset management
5. Materials
6. Advanced training

With our strategic lines in R+D+I we contribute value to the energy sector, by solving our clients' critical problems and facing new technological challenges.

Strategic Research Lines



Renewable energy

We provide experimental projects for research and development of clean technologies, to contribute to meeting the goal of generating 35% of electric power from renewable energy sources by 2024, by studying the application of technologies and their impact on the environment.



Efficiency, energy saving and sustainability

We reduce losses in generation, transmission and distribution systems, to improve performance and reliability of the electricity market, saving and efficient use of electricity, and thus contribute to the mitigation of environmental emissions.



Smart grids

We support the development of more reliable, safe and flexible power grids, to contribute to a more economical and efficient operation in their generation, transmission, distribution and commercialization processes.



Asset management

We develop strategies and technology to properly manage the lifecycle of essential technological assets through the design and optimization of their operation and the definition of maintenance programs, according to the priority of their performance within the system and their timely replacement.



Materials

We research and develop new materials, their applications and new diagnostic methods that improve the operational performance of the energy industry and environmental sustainability.



Advanced training

We develop platforms for advanced training that speed up learning and specialization of human capital, by meeting the knowledge needs that the energy sector's market demands in regard to safety, reliability and timely response to operation contingencies.

We offer quality services and products, thanks to our staff's strengths.

Services

	Strategic research lines					
						
Characterization and evaluation of renewable energy resources	●		●			
Design of generation system based on renewable energy	●		●			
Development of photovoltaic applications	●					
Design of organic waste management systems	●	●	●			
Characterization of formations and geothermal wells	●				●	
Development of conceptual models of the reservoir	●				●	
Studies for the exploration of reservoirs	●				●	
Evaluation of energy efficiency programs		●				
Energy diagnostics		●				
Analysis of efficient energy use		●				
Studies of energy quality	●	●	●	●		
Cogeneration studies		●				
Optimization, automation processes and electrical systems		●	●	●		●
Studies of energy, economic and environmental impact	●	●				
Capture and use of CO ₂ studies		●			●	
Studies for control of SOx and NOx		●			●	
Automation and control of electrical grids	●	●	●	●	●	

 Renewable energy

 Efficiency, energy saving and sustainability

 Materials

 Smart grids

 Asset management

 Advanced training

Services

	Strategic research lines					
						
Data and operational safety management		●	●			
Studies on integrating distributed generation	●	●	●			
Studies for the conceptualization of microgrids			●			
Expansion planning for the electrical grid	●	●	●			
Energy demand management	●	●	●			
Design of electrical substations through virtual reality			●	●		●
Design and structural analysis of civil works				●		
Design of safety instrumented systems				●		
Safety studies and analysis of industrial processes				●		
Online and offline diagnostics for electromechanical equipment and electrical substations	●	●	●	●		●
Risk analysis in strategic installations				●		
Updating, maintenance and estimation of residual life of equipment				●	●	
Reality: virtual (immersive, non-immersive) and augmented				●		●
Development, evaluation and characterization of materials					●	
Improvement of high temperature materials for power plants		●		●	●	
Material replacement in transmission towers			●		●	
Nondestructive testing (ultrasound)				●	●	
Studies of petrophysical and mechanical properties in drilling cores					●	
Development of simulators	●	●	●	●		●

 Renewable energy

 Efficiency, energy saving and sustainability

 Materials

 Smart grids

 Asset management

 Advanced training

Products



Renewable energy

- National Atlas of Wind and Solar Resources.
- Solar thermal equipment.
- Low capacity wind turbines.
- Hybrid renewable systems.
- Fuel cells.
- Filters and anaerobic digesters.



Smart grids

- Electronic devices for grid interconnection.
- Remote protection monitoring.
- SCADA for substations.
- Expansion planning model for generation and transmission.



Efficiency, energy saving and sustainability

- Energy saving simulator.
- Smart assistance system for the operation of thermoelectric plants.
- Comprehensive Information System for Industrial Processes.
- Smart switch to reduce stand-by power consumption.
- Comprehensive Electric Power Measurement System.
- Simulator of Electrical Distribution Systems.



Asset management

- Expert systems for the design of structures for earthquake and wind.
- Specialized technologies for inspection of generation, transmission and distribution systems.
- Mobile and remote systems for evaluation of protections and electrical equipment.



Materials

- Insulating vegetable oils for transformers.
- Improved materials with nanotechnology for electrical insulators.
- Soil improvers for grounding systems with nanoparticles.



Advanced training

- Simulators for operator training.
- Simulator for testing generator excitation systems.
- Graphic Environment of Simulation Model Development.
- Virtual reality for training on risk maneuvers.
- Real-time emulators of industrial processes.
- Courses based on reusable learning objects.

By investing with the INEEL, you obtain **high-quality technological development and innovation.**



Experience

We are leaders in research and technological development for the energy sector in Mexico and Latin America. We are committed to the energy sector to provide high added-value solutions:

- ✦ We contribute to increasing our clients' competitiveness
- ✦ We promote applied research and technology development with innovation
- ✦ We participate in the development of human capital excellence
- ✦ We are committed to society welfare

Projects that distinguish us



Renewable energy

- Coordination of the Mexican Center for Innovation in Wind Energy (CEMIE-Wind for its Spanish acronym).
- Active participation in CEMIEs, Geothermal and Solar.
- Development of the National Atlas of Wind and Solar Resources.
- Research in exploration and exploitation of geothermal resources.
- Use of biofuels for power generation.
- Fuel cells.



Efficiency, energy saving and sustainability

- Definition of public policies and energy efficiency standards, both for household appliances, and for the commercial and industrial sector.
- Evaluation and monitoring of daylight saving time changes (CHV for its Spanish acronym) in Mexico.
- Conceptualization of cogeneration projects for the energy sector.



- Support for CFE in expansion planning of the national electric system and power dispatch.
- Development of the Manual of Civil Works Design for Earthquake and Wind of CFE.
- Monitoring and diagnostics of electric power generation, transmission and distribution facilities.
- Development of technology for measurement and diagnostics of the condition of electromechanical equipment and systems.
- Risk analysis in nuclear power plants.



Advanced training

- Simulator of the Laguna Verde Nuclear Power Plant.
- Simulators for geothermal generation and thermoelectric plants (Operators Training Center of CFE-Ixtapantongo).
- Simulator for Mexico City's Public Transport Subway System (STC for its Spanish acronym).



Renewable energy



Smart grids



Asset management



We count with our own **specialized laboratories** for the development of your projects.

Scientific and technological infrastructure

Research laboratories

- ✦ Fuel analysis
- ✦ Combustion chamber
- ✦ Regional Wind Technology Center (CERTE)
- ✦ Corrosion and metallography
- ✦ Electric high voltage
- ✦ Electronics and control
- ✦ Electrical equipment
- ✦ Physicochemical
- ✦ Photovoltaic hybrid systems platform
- ✦ Geochemistry of fluids
- ✦ Micrometeorology and air pollution
- ✦ Mechanical
- ✦ Soil mechanics
- ✦ Microthermometry deposits
- ✦ Polymers and nanotechnology
- ✦ Chemical
- ✦ X-rays and emission
- ✦ Laminar flow reactor
- ✦ Virtual reality
- ✦ Turbomachinery
- ✦ Isotopy



We commit ourselves to solving *your* project needs.

Professional support

Certificates and awards

We reinforce our commitment through our Comprehensive Management System (SGI for its Spanish acronym), which complies with the following standards:

- ✦ ISO 9001:2008
- ✦ ISO 14001:2004
- ✦ NMX-SAST-001-IMNC-2008

In 2010 we received The National Award for Technology and Innovation, which represents the highest recognition for organizations that are a model to follow in R+D+i. We are reliable suppliers of PEMEX; CFE's Laguna Verde Nuclear Power Plant (CNLV) in the 10CFR50 Standard, SIEMENS, IBERDROLA, and Alstom-GE, among others.

Some of our customers and national and international partners.

Public and private industry	Government agencies	Academy and research centers	International
CFE	SENER	IMP	AIE
PEMEX	CENACE	ININ	ICE (Costa Rica)
CANAME	CONUEE	IMTA	Enel Green Power (Italy)
CANACINTRA	CAPUFE	CIATEQ	INER (Ecuador)
Iberdrola	CONACYT	CIDESI	PNUD
SIEMENS	FUMEC	CIDETEC	Cluster Energía: Basque Energy Cluster (Spain)
Schneider Electric	FIDE	IER	KIM Global
Vitro	CRE	UNAM	NRE
Protecsa	STC Metro	IPN	Komalhaltecl.Inc (Japan)
Prolec	State Governments	The Monterrey Institute of Technology and Higher Education	BID

Knowledge Transfer Office (OTC for it’s Spanish acronym)

It allows transparent interaction, by increasing opportunities for liaison between the INEEL, as a knowledge generating institution, and the private sector, through the offering of services that will facilitate knowledge transfer, by making use of consultancy, licensing and the creation of technology-based companies.

