Workshop: Small Wind Turbines

Plenary Session 8:

Actions of the Mexican Center for Innovation in Wind Energy (CEMIE-Eólico).

Dr. José Manuel Franco Nava

Instituto Nacional de Electricidad y Energías Limpias (INEEL)

June 25-27, 2018 *Huatulco, Oaxaca, México*

FONDO DE SUSTENTABILIDAD ENERGÉTICA

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The Mexican Wind Energy Innovation Center (CEMIE-Eólico) has the support of the Energy Sustainability Fund created by the Energy Secretariat (SENER) and the National Council of Science and Technology (CONACYT), within the framework of the Law of Science and Technology.

CEMIE-Eólico is led by the National Institute of Electricity and Clean Energies (INEEL).

Members of CEMIE-Eólico	
Public research centres	6
Universities / Technological Institutes	16
Private companies	7
Foreign research centres	1
Foreign universities	2
State governments	1
Members	**33**

International partners	
CIEMAT	Spain
University of Strathclyde	UK
Danish Technical University	Denmark
Gamesa Eólica	Spain

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CIATEQ

INSTITUTO TECNOLOGICO de la laguna

POSTENSA WIND STRUCTURES

UNISTMO

MACIMEX

Potencia Industrial

TECNOLÓGICO DE MONTERREY

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BREMS Rubestec Friktion Technik

UACH

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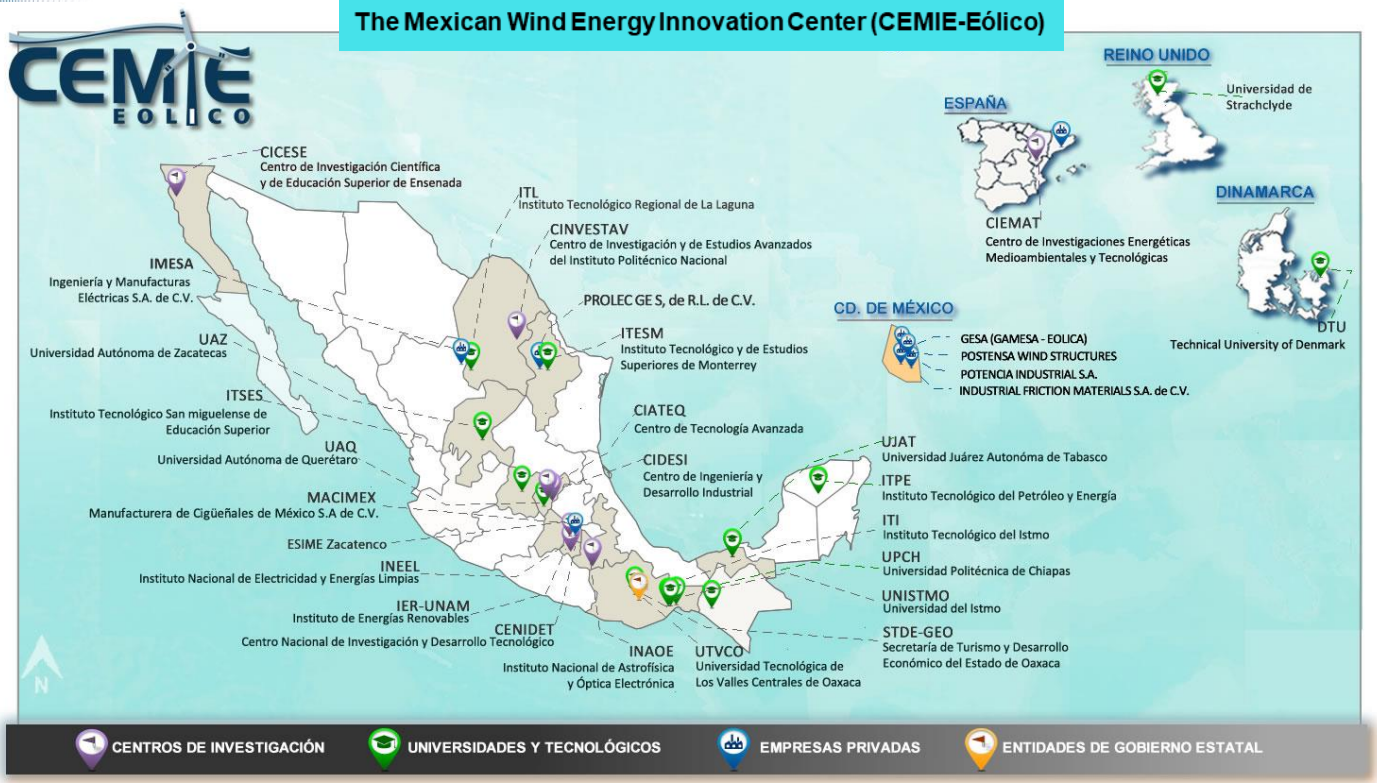
The Mexican Wind Energy Innovation Center (CEMIE-Eólico)



Mission

To strengthen national capabilities for creating synergy at the international level so that, the deployment of wind energy in Mexico promotes benefits at the national level including the incorporation of domestic components into the value chain, and employment creation.

Vision

To be the national reference centre for R+D+i in the Wind Energy field. All members of the CEMIE-Eólico will contribute to the sustainable deployment and smart utilization of wind energy.

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Objetivos estratégicos

- To strengthen national capabilities of wind energy with the aim of removing technological barriers.
- To implement strategic projects to increase the knowledge and use of wind technology.
- To promote technological development of the Mexican wind energy industry.
- To develop specialized human resources for encourage Mexican wind energy industry.

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Main lines of research and technological development

Development of smart systems for distributed generation compatibles with smart grids.

Development of smart solutions to improve methods for operation and maintenance of wind turbines and wind farms .

Improvement of human and technological resources for incorporating national components in the value chain.

Development of projects to promote and support the deployment of wind power generation in México.

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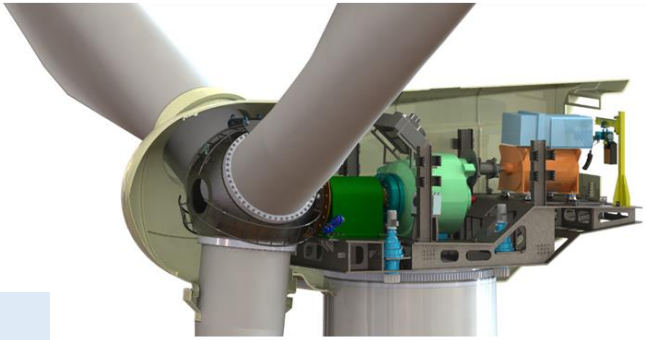
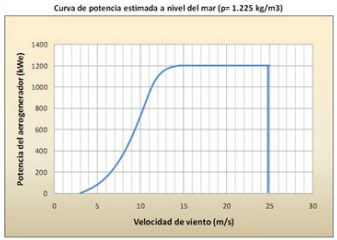
Construction, testing and certification of a medium capacity wind turbine prototype, grid friendly concept (phase 2)

Modular Design

Rated Power	1.2 MW	4 m/s	Initial velocity
Rotor Diameter	60 m	25 m/s	Output speed
Hub height	60 m.	Class	IEC: IA



- Orientation winds up, three blades with active control of the pitch angle.
- Three stage gearbox.
- Synchronous generator of permanent magnets.
- Connection to the network by means of electronic converter of complete power and step-up transformer.
- Three-section steel trunk-conical tubular tower.



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Construction and testing of a prototype of post-tensioned concrete tower of 100 meters height, integrated to 1.5 MW wind turbine.

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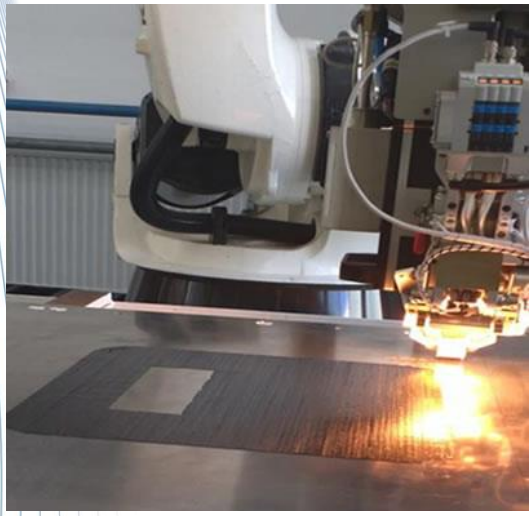
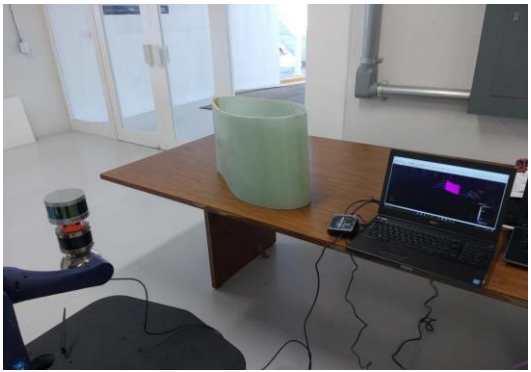
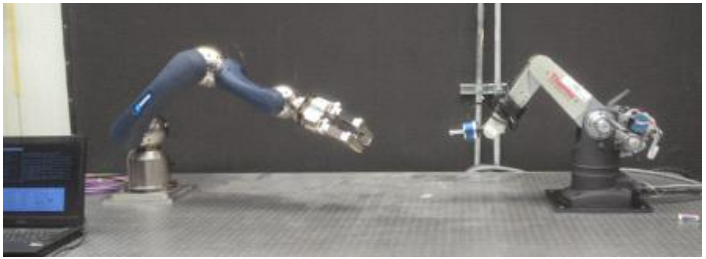
Research and development of automated methods for the use of composite material layers applied to the manufacture of wind turbine blades.







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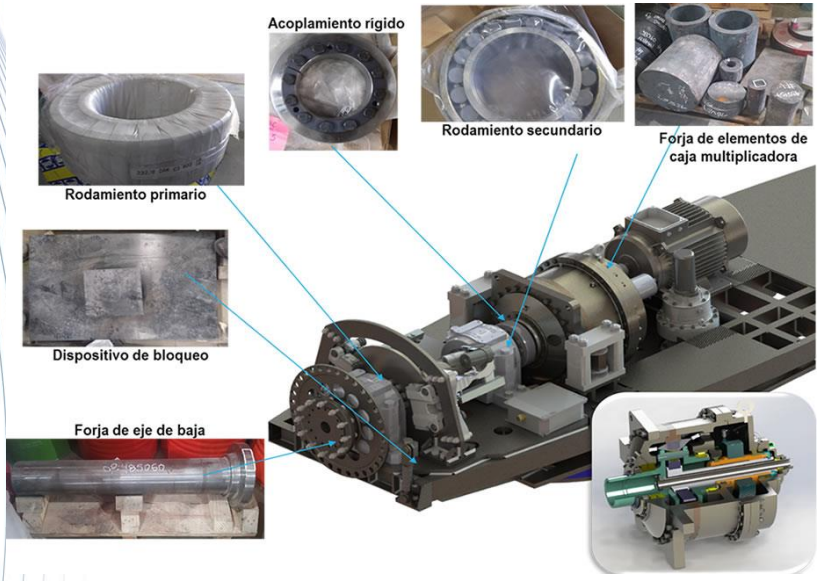
Integration and consolidation of national capabilities for the development of small wind turbines by means of designing, manufacturing and testing a 30 kW wind turbine.



Ensamble de sistema de control principal

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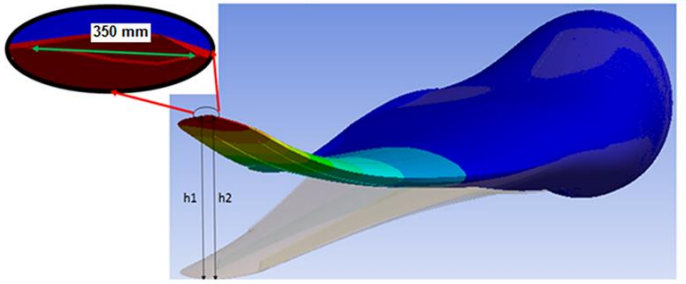
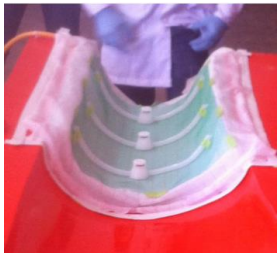
Development of wind turbine blades for HWT up to 50 kW.

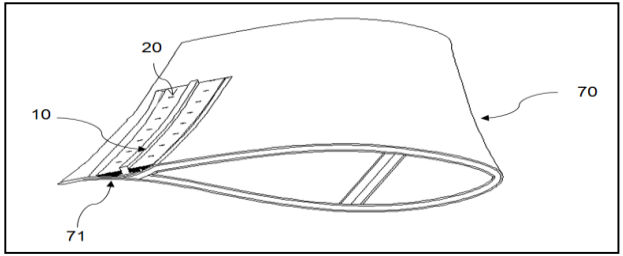
Rotor design for HWT, incorporating one of the three aero-elastic innovation options, including the construction and testing of a prototype

Cuerda (mm)	punto 1 Desplazamiento	punto 2 Desplazamiento	Torsión (°)
350	5328	5358.3	4.9



MODELACIÓN CAD Y DE ELEMENTO FINITO PARA EL CALCULO DE LA RIGIDEZ DE LAS PALAS CON AEROLASTIC TAILORING





9m blade with flexion/torsion coupling

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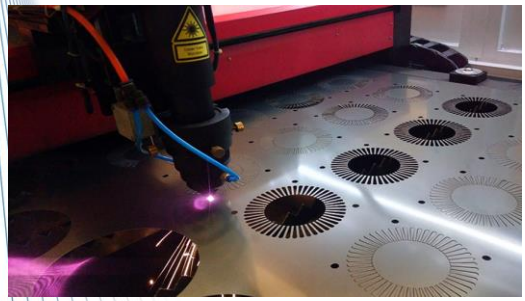
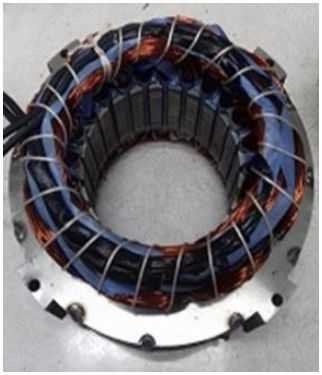
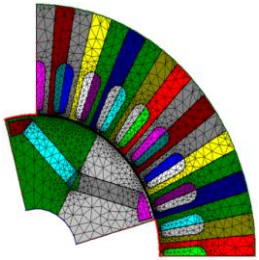
Diseño, Análisis y Construcción de Generadores Eléctricos Síncronos de Imanes Permanentes y de Inducción Doblemente Alimentados para Plantas Eólicas.







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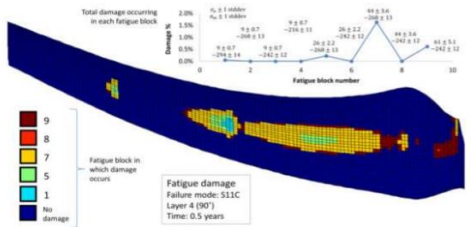
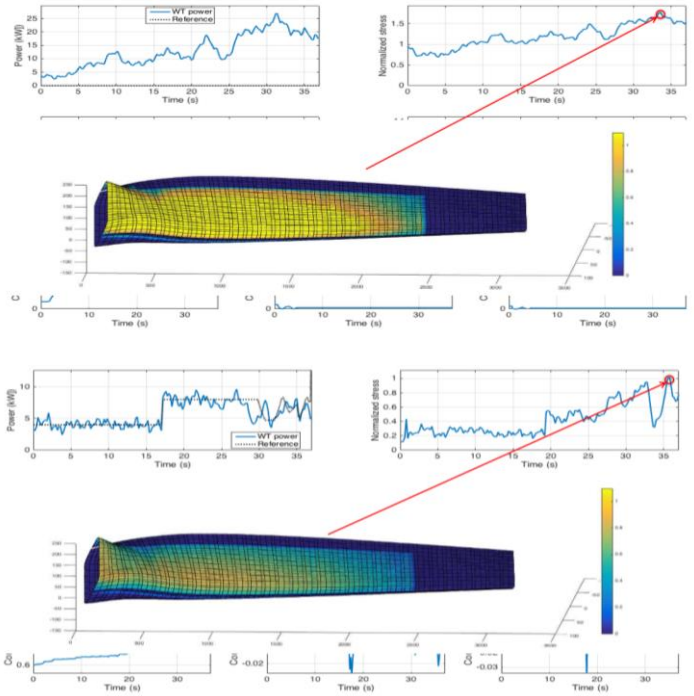
Design and evaluation of control systems for small-scale wind turbines focused on reliability and safety.



Representación espacial del progreso de daño por fatiga después de 6 meses de operación



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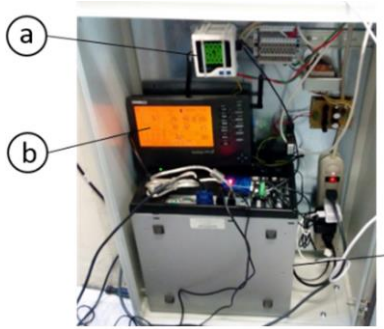
Embedded Telematic System for Monitoring and Diagnosis of Transmissions in Wind Turbines



a) dispositivo AcuDC 240
b) enviados al módulo central de comunicaciones (PC)
c) estación meteorológica Vantage Pro2

Modulo sensorial para el monitoreo de energía eléctrica generada

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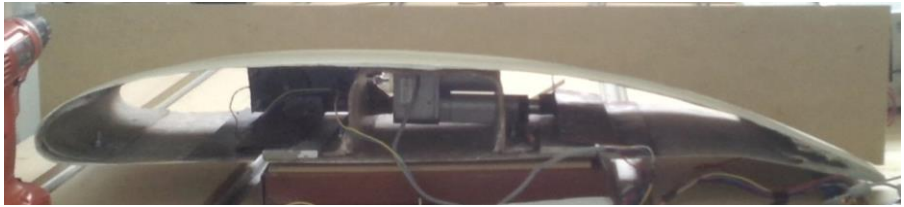
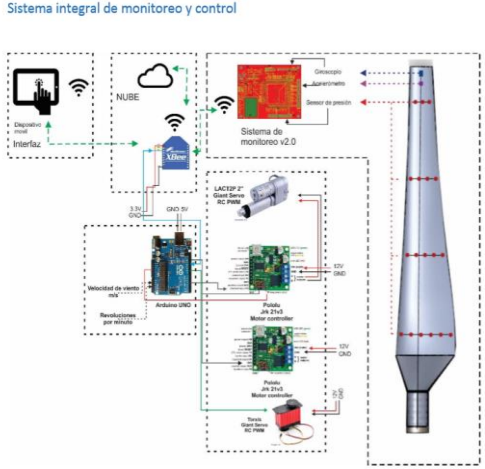
Desarrollo de un Sistema de Control para Modificar el Perfil Aerodinámico de las Aspas de Generadores Eólico





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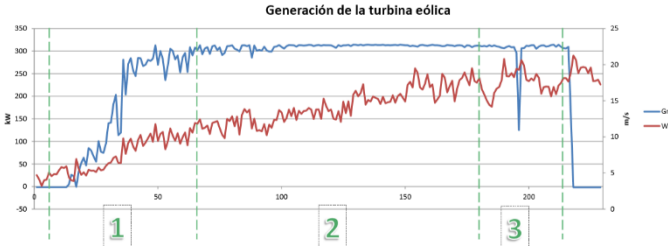
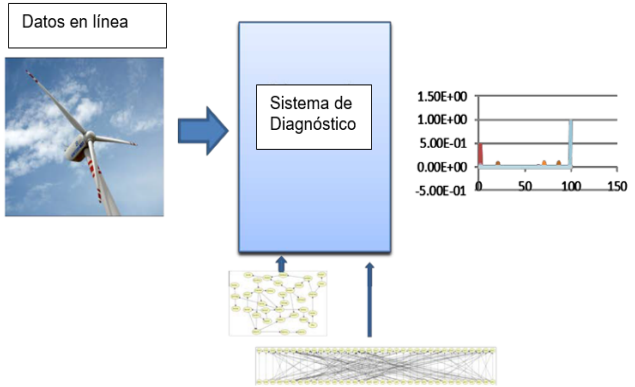
Development of technology based on artificial intelligence and mechatronics, to integrate a wind farm into an intelligent network.

Resultados de la inferencia en modelos





Para cada variable en el modelo, estima su valor con inferencia en la red Bayesiana y compara con el valor real medido, usando el paquete Hugin,

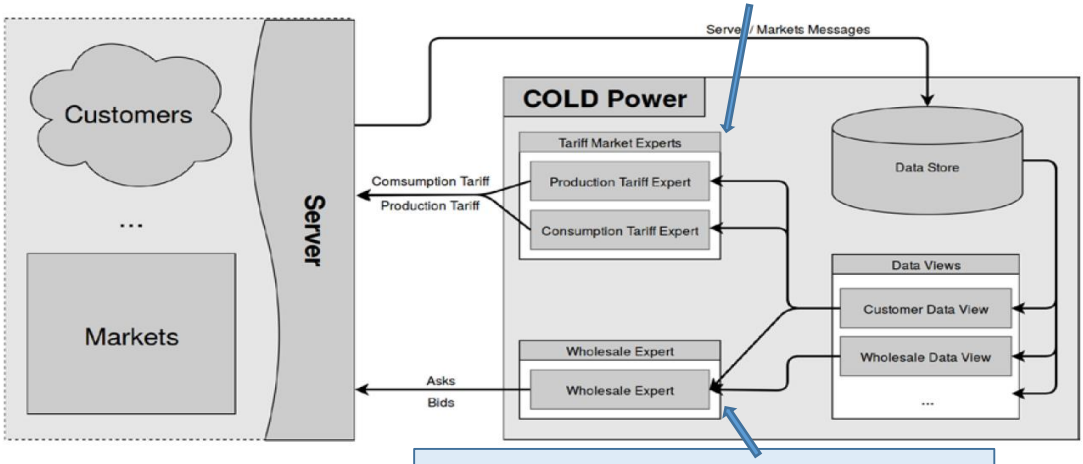
Identifica la falla real y las fallas aparentes,

Muestra el patrón de fallas reales detectadas.

Smart Trade Energy market simulator that represents almost all the attributes of a real energy market.

Expert agents in specific types of markets and clients that contribute local strategies to a global strategy to maximize profits.

The module of the retail market includes agents who are experts in production and consumption rates. The local strategy of each expert rate agent uses reinforcement learning on a Markov decision process model.

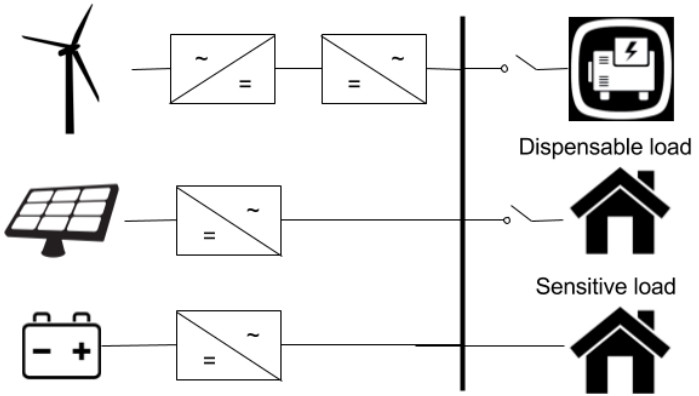


The wholesale market agent estimates the future prices of energy and the amount of energy that can be traded, decides whether it is time to buy, sell or not trade, and also decides the amount of energy to trade.

Intelligent control system for hybrid micro networks.

This new system complements the commercial systems with more sophisticated decisions to control the diesel generator, the storage of the battery and the expendable charges.

The client's burden in this approach is modeled as two types of charges: sensitive and expendable. Sensitive loads must always be connected to the microgrid, the control system can disconnect the expendable loads in specific non-critical conditions.



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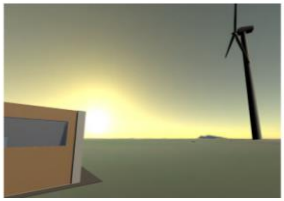
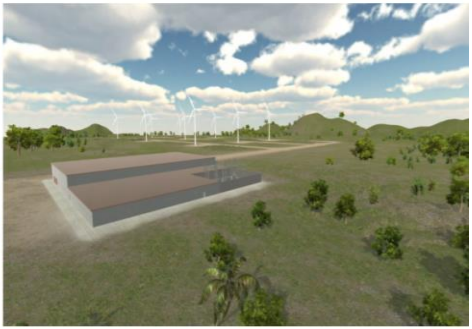
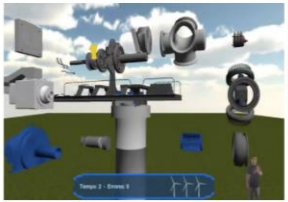
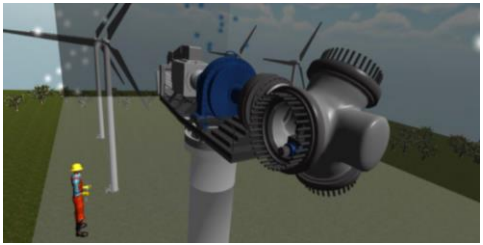
Design and construction of an experimental wind turbine with 3 kW capacity and development of simulation software in virtual reality, with didactic purposes.









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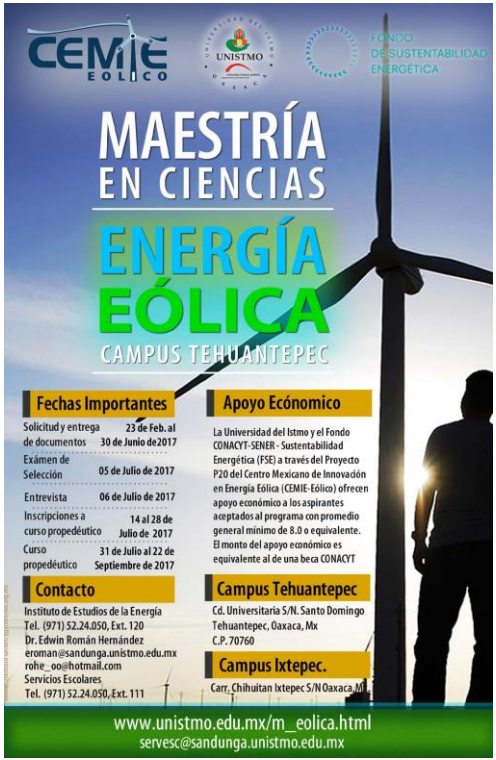
Graduate Program in Wind Energy from CEMIE-Eólico



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Wind Test Centre in La Ventosa, Oaxaca.

- Regional Centre of Wind Technology, CERTE.

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Participation of CEMIE-Wind in the Wind Energy Technology Collaboration Program of the International Energy Agency (IEA)

Task 25 of the IEA Wind TCP.

From November 7 to 9, 2017 the research meeting number 24 of Task 25 of the IEA Wind TCP "Design and operation of power systems with large amounts of wind power" was carried out,

The meeting took place at the facilities of the National Institute of Electricity and Clean Energy and was attended by 13 researchers from seven countries: Denmark, Finland, Ireland, Sweden, United Kingdom, United States of America (USA) and Mexico.

Task 11 of the IEA Wind TCP.

On November 10, 2017, the second phase of the 89th expert meeting on the Great Vision for Wind Energy (Topical Expert Meeting # 89 on Grand Vision for Wind Energy) corresponding to Task 11 of the IEA Wind TCP took place. "Base Technology Information Exchange", which aims to promote and disseminate knowledge through cooperation activities and exchange of information on R & D issues of common interest to the members of the Task Force.

The meeting took place at the facilities of the National Institute of Electricity and Clean Energy.

It was attended by 13 researchers from six countries: Denmark, Finland, Sweden, United Kingdom, United States of America (USA) and Mexico.

Meeting of the Executive Committee, IEA Wind TCP ExCo 80.

From November 13 to 16, 2017, the Eighth Meeting of the Executive Committee of the Wind Technology Collaboration Program of the International Energy Agency (IEA Wind TCP Executive Committee - 80th Meeting) was held.

The meeting took place in Huatulco and Juchitán, Oaxaca and was attended by 30 researchers from 13 countries (Austria, Germany, Finland, Ireland, Japan, Holland, Norway, Spain, Sweden, Switzerland, United Kingdom, United States of America) and Mexico.

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iea wind

IEA Wind TCP Celebrates 40 Years of Collaborative Research

IEA Wind Newsletter, January 2018

Key Takeaways from IEA Wind ExCo 80 in Mexico – Nov 2017

The Centro Mexicano de Innovación en Energía Eólica (CEMIE Eólico) hosted the IEA Wind Technology Collaboration Programme (TCP) Executive Committee meeting in Huatulco, Mexico. The meeting focused on national R&D efforts and included presentations from 14 member countries and 16 research Tasks. Building on Topical Expert Meeting (TEM) 89: A Grand Vision for Wind Energy, participants identified long-term research needs through 2050 in preparation for updating the organization's strategic plan (to be published in 2018).

Wind Power Markets Thriving in Mexico

México had 3.5 GW wind power capacity installed at the end of 2016, and an ambitious target of nearly 10 GW is expected by 2020.

México's R&D focus is on small- and medium-size turbines, such as efforts to develop a 1.2-MW scale wind turbine, as well as exciting innovations in automatized blade manufacturing, virtual reality for O&M staff training, and smart blade concepts for load control.

The Instituto Nacional de Electricidad y Energías Limpias' (INEEL) CERTE wind test facility is situated on 32 hectares near La Ventosa, in Oaxaca, México. La Ventosa hosts nearly 70% of the total installed wind power capacity in México (2,360 MW). (Photo credit: CEMIE-Eólico)

IEA Wind TCP Upcoming Task Meetings

Task 11 Topical Expert Meetings (TEMs)
- Strategic Dialog for Community and Distributed Wind: hosted by DTU on March 27-28 in collaboration with NREL
- Durability and Damage Tolerant Design of Wind Turbine Blades: hosted by the Montana State University June 5-7 2018, in collaboration with Sandia National Laboratories and VTT

Task 19 Cold Climates Task Meeting
- February 12-13, 2018, Andermatt, Switzerland

Task 27 Small Wind Task Meeting
- April 2018 in Minnesota, United States

Task 28 Social Acceptance Task Meeting
- March 26-28, 2018, in conjunction with the Community and Distributed Wind TEM, DTU, Denmark

Task 29 Aerodynamics Phase 4 Kick-off Meeting
- March 2018, Location TBD in Europe

Task 30 OC5 Task Meeting
- January 19, 2018 in Norway

Task 31 WAKEBENCH Task Meeting
- May 8-10, 2018, Japan

Task 32 Lidar Workshop #8 Certification of Lidar Assisted Control Applications
- January 30-31, 2018 at DNV GL, Hamburg, Germany

Task 34 WREN Task Meeting
- Late May or early June 2018 in the Netherlands

Task 36 Forecasting Task Meeting
- May 2018, Location TBD

Task 37 Systems Engineering
- Interim meeting Jan. 2018, Kissimmee, FL, US
- Annual meeting: June 2018, Milan, Italy

participants with a centralized space to foster exchanges, share content, and stay informed on what's going on at the TCP level

You are invited be a member of our online community, through which you can post questions, respond to discussions, and view documents pertinent to your research activities. Check out the website by visiting www.ieawind.org.

IEA Wind TCP 2018 ExCo Leadership

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INSTITUTO NACIONAL DE ELECTRICIDAD Y ENERGÍAS LIMPIAS

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¡Thank you!