



### SWTOMP Project presentation Speaker: Luis Arribas

#### SWTOMP Workshop at the course Minieólica para autoconsumo: Sistemas eólicos distribuidos y aislados









## **SWTOMP Project**

- The main objective of the SWTOMP project is the promotion, development and implementation of the utilization of small and medium size wind turbines for isolated applications and for connection to weak grids, including the optimization of small/medium-scale wind turbines to meet local wind regimes and regional infrastructure requirements
- Total duration of the project is three years (2016 2019)

## **SWTOMP Project**

- It is a project organized under the umbrella of the ERANET\_LAC European Program that was approved in November 2016
  - > Each partner has its own national funding
  - Each partner has a different time schedule
  - ➤ Total estimated cost: 1.14 M€ (0.64 M€ requested funding)

## **SWTOMP Project**

#### The main expected results are:

•Closer inter-regional links between R&D institutions, wind turbine manufacturers, policy makers and end-users.

 Increased awareness of small/medium-scale wind turbines

•Development of new wind turbines designed specifically for tropical and cool environments

## **SWTOMP – Consortium members**

The following institutions participate in the project:

- CIEMAT Spain Coordinator
- **INEEL** (Instituto Nacional de Electricidad y Energías Límpias) Mexico
- **INTEC** (Instituto Tecnológico de Santo Domingo) Dominican Republic
- INTI (Instituto Nacional de Tecnología Industrial) Neuquén Argentina
- **IZTECH** (Izmir Institute of Technology) Turkey
- UdelaR (Universidad de la República) Uruguay
- UTCN (Universitatea Tehnica din Cluj-Napoa) Romania
- VTT (Technical Research Centre of Finland Ltd) Finland



## **Working Packages structure**

WP Number	Work Package Title	TASK Number	Task Name
WP0	Project Management	Task 0.1	Management of the Project
		Task 1.1	Analysis of the market of SMWT
WP1	Promotion of SWT Market	Task 1.2	Workshops for Market Promotion
	Market	Task 1.3	Preparation of material for education
WP2	Wind Resources for	Task 2.1	Assessment of the wind resources in six locations
	SWT	Task 2.2	Methodology for easy assessment of local resources
		Task 3.1	Selection of SWTs to be optimised
		Task 3.2	Redesing of the SWT
WP3	Wind Turbines Optimization	task 3.3	Manufacture and installation of prototypes
	optimization	Task 3.4	Testing and Certification of SWT
		Task 3.5	Analysis of results
WP4	Standard for SWT	Task 4.1	Identification of standards improvements
VVF4		Task 4.2	Proposal for IEC 61400/2 Modification

## **Gantt Diagram**

WP Number	Work Package Title	TASK	Task Name		YEA	R 1			YE	AR 2			YEA	NR 3	
Wi Number	work rackage mile	Number	Task Name	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP0	Project Management	Task 0.1	Management of the Project											_	
		Task 1.1	Analysis of the market of SMWT												
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	Optimization	Task 3.4	Testing and Certification of SWT												
		Task 3.5	Analysis of results												
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## **WPO. Project Management**

#### WP Leader: CIEMAT

The WP0 is related with the general financial and scientific issues of project management including aspects concerning the cooperation between ERANET\_LAC officers and the project consortium.

#### Main Deliverables:

- Web creation: <u>http://swtomp.ciemat.es/</u>
  Annual Progress Reports
- •Final Report





SWTOMP PROJECT

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018 annual meeting in Mexic

WP Leader: CIEMAT

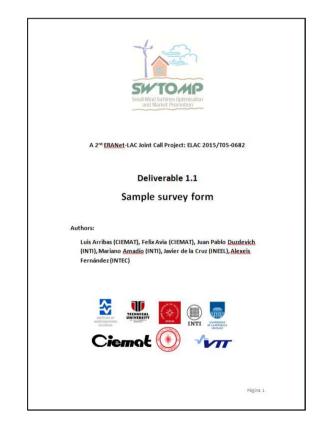
# The objective is the promotion, development and implementation of the utilization of small and medium size wind turbines

- Task 1.1 Analysis of the market
- Task 1.2 Workshops
- Task 1.3 Preparation of material for education of researches, technical and users

#### Task 1.1 Analysis of the market

#### **Deliverable 1:** Sample survey form

- Five scopes have been identified in relation to the characterization of the market of SWT:
  - o the market deployment assessment,
  - $\circ$  the market suitability assessment,
  - $\circ\,$  the practical aspects of SWT market,
  - $\,\circ\,$  the social aspects of SWT market and
  - $\,\circ\,$  the regulatory issues of SWT market.
- SWTOMP: not one, but several sample survey forms (INTI, INEEL, CIEMAT)



#### Task 1.1 Analysis of the market

#### **Deliverable 2:** Sample survey results

- Existing results coming out from previous surveys
- Results for SWTOMP countries
  - Different levels of detail
    - o México and Argentina, detailed
    - o Finland, Spain, Dominican Republic, more general
  - Different levels of deployment:
    - o Uruguay, very low
    - Finland, Spain, middle
    - o Argentina, quite high
  - Different level of accomplishment
    - o México, Finland and Argentina, finished
    - Spain, on-going

## WP1. Promotion of the Potential Market <u>Task 1.2 Workshops</u>

#### **Deliverables:** Workshops for information

6/2018: Huatulco, Mexico http://projects.ciemat.es/web/swtomp/cont\_dest4



10/2018: Soria, Spain, in REGEDIS week

http://projects.ciemat.es/web/swtomp/cont\_dest5

10/2019: Montevideo, Uruguay ¡¡HOY!!



## Task 1.3 Preparation of material for education of researches, technical and users

**Deliverable:** Educational material edition

- Different materials for different target audiences
  - Available resources mapping
    - Elaboration of a guide to navigate through these resources
  - > New educational material: technically oriented

## WP2. Development of methodology for evaluation of wind resources for SWT

WP Leader: IZTECH

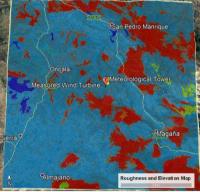
#### The objective is to develop a methodology for easy assessment of the wind resources in potential locations for the use of SWT

Task 2.1 Use of existing codes for assessment of the wind resources in four locations and verification of the results

Task 2.2 Description of the methodology for easy assessment of local resources using the available information (data bases, etc.) WP2. Development of methodology for evaluation of wind resources for SWT <u>Task 2.1 Use of existing codes for assessment of the wind</u> resources in four locations and verification of the results

- 2 sites comparition (in Turkey and Spain)
- 4 technical visits (Turkey)

#### Conclusions

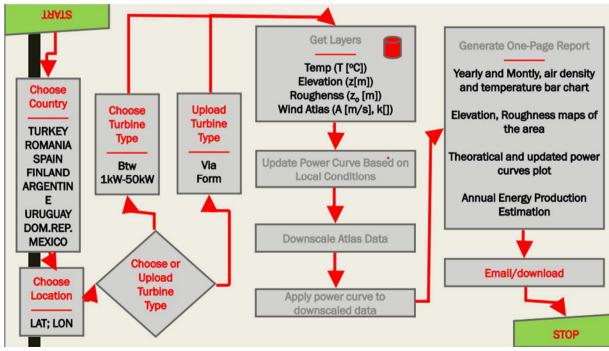


- Models are good enough for AEP calculations but not good enough to model obstacles. Small turbines gets effected from local roughness significantly (<u>A simplified method on</u> <u>estimation of forest roughness by use of aerial LIDAR data</u>)
- Problems for the SWT users are
  - Site assessment; due to cost, accessibility
  - Regulations and standards; changes all the time, not helpful
  - İnitial cost and unexpected lower production.

# WP2. Development of methodology for evaluation of wind resources for SWT

Task 2.2 Description of the methodology for easy assessment of local resources using the available information (data bases, etc.)

- Structure for an Easy Assessment Tool (EAT)
- A fence modeling experiment
- A building integrated experiment



## **WP3. Optimization of SWT**

WP Leaders: INEEL and INTI Neuquén The objective is the optimization of two small turbines to meet local wind regimes and regional infrastructure requirements

Task 3.1 Selection of the SWTs to be optimized for cool sites and tropical sites

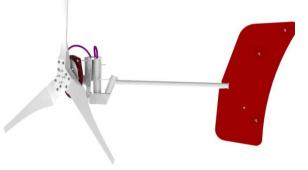
Task3.2 Redesign of the SWT

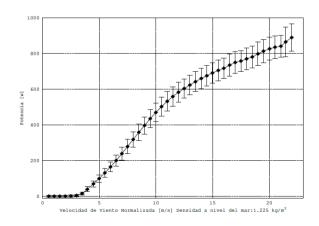
Task3.3 Manufacture and installation of the prototypes

Task 3.4 Testing and certification of the SWT

## WP3. Optimization of SWT. SWTs to be optimized for cool sites Eolocal Wind Turbine

- Argentinian manufacturer
- Based on Hugh Piggot's design
- 1000 W
- Battery charging model tested at INTI
- Interest in grid tied model:
  - PV Grid Inverter (1kW)
  - Chinese made
  - Matching to the SWT





## WP3. Optimization of SWT. SWTs to be optimized for tropical sites Aeroluz Wind Turbine

- Mexican manufacturer
- Tower:
  - 18 meters
  - 3 sections
  - Galvanized steel
- Grid Inverter (6kW)
  - Range input operating: 50-580 V
  - Max. Input Current 36 A
  - Input voltage at full power: 200-580
  - Max. Continuous output power: 6000W@ 50°C
  - Frequency range: 59.3-60.5 Hz
  - Power factor: >0.995
  - Nominal output voltage: 277 V/240 V/208 V





## WP3. Optimization of SWT. SWTs to be optimized for tropical sites Aeroluz Wind Turbine

- Leader: INEEL (México)
- Components under study:
- 1. Electric Generator (INEEL)
  - New design
  - Patent application (Dec 18, 2018)
  - Vibration analysis study
- 2. Blades (UNISTMO)
- 3. Control system (CENIDET)
- 4. Tower (INEEL)

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## WP4. Standards for SWT

WP Leader: CIEMAT The objective is to improve the existing standards for design of SWT

Task 4.1 Identification of Standards Improvement.

Task 4.2 Proposal for IEC 61400/2 Modification.

**Deliverables:** Summary of the improvements identified / Proposal for IEC 61400/2 Modification



## Thank you!











