

Small Shot of Spanish SWT Market

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**Small Wind
Conference 2018**

a gathering of the small wind industry

www.smallwindconference.com



Content

- Current regulations for smallwind.
- Small Wind industry situation.
- SWT Certification.
- Spanish SWT Labelling initiative.
- Market uptake.
- Self-consumption case studies

Current regulation for smallwind (1/2)

Law RD 1669/2011 of 18th of November 2011

Stablish simplified grid connection rules for small power generating facilities

Power production facilities with a rated power not exceeding 100 kW have been excluded from the administrative authorization procedure

Self-production is encouraged.

Regulation for produced power supply within the internal network of a consumer has been established

Promotion of distributed generation, providing system benefits such as reduction of grid losses, lower investment needs in grid networks and, ultimately, a minimization of the environmental impact of electrical installations.

Current regulation for smallwind (2/2)

Law RD 900/2015 for self-consumption was approved in October 2015

- ✓ This new RD gives the technical and economical conditions for self-consumption.
- ✓ Defines two types of self-consumption:

SWT rated power below 10 kW

- ✓ an electrical system toll has to be paid for the total electricity generated
- ✓ Electricity injection to the grid is not allowed

Turbines with rated power between 10 kW and 100 kW

- ✓ All installations must be registered and Electricity injection to the grid is allowed

Small wind industry situation

New designs:

- ENAIR Two new models of 4kW and 40 kW
- BORNAY New Wind +
- ENNERA New 4 kW

ECIWIND Project



Under test for certification

Under test for certification



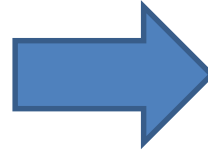
4 kW

40 kW

Both Pitch regulated
Both variable speed

Bornay Wind +

- 16 models
- 7 controls
- 3 applications



- 3 models
- 2 controls
- Multiple applications

**Unique generator
220 VAC**

+

MPPT charge controller

OR

Interface Wind +

+

Wind 13+	1.5 kW @ 12 m/s
Wind 25.2 +	3 kW @ 12 m/s
Wind 25.3 +	5 kW @ 12 m/s

- Standard PV Inverter for grid connection.
- Direct connection for Telecom applications
- Direct connection for Water pumping

WINDERA 4.0



Under Test for certification

Target: $C_{pmax} = 0.42$

Technical details:

Type: Upwind grid connected

Generator: High efficiency permanent magnet

Speed range: 50-280 rpm

Grid connection: Monophasic - AC 230 V 50 Hz

Rated wind power: 4 kW

Temperature range: -15°C/+45°C

Cut-in wind speed: 3 m/s

Cut-out wind speed: 2.5 m/s

Rated wind speed: 10 m/s

Maximum operation wind speed: 20 m/s

Emergency braking system: Electric and centrifugal braking

Blades: 3 - reinforced thermoplastic

Tower: 12 m

Rotor diameter: 4.6 m

Orientation system: Passive with tail (vane)

Speed control: Electrically controlled variable speed

<http://www.ennera.com/en>

SWIP Project small wind turbine



Developed by CIRCE and SOLUTE

<http://swipproject.eu/>

Certification -> Testing: Blades



CEDER-CIEMAT SWT Blade Test Facilities

According to IEC 61400-23

Full-scale structural testing of rotor blades

Certification -> Testing: Blades



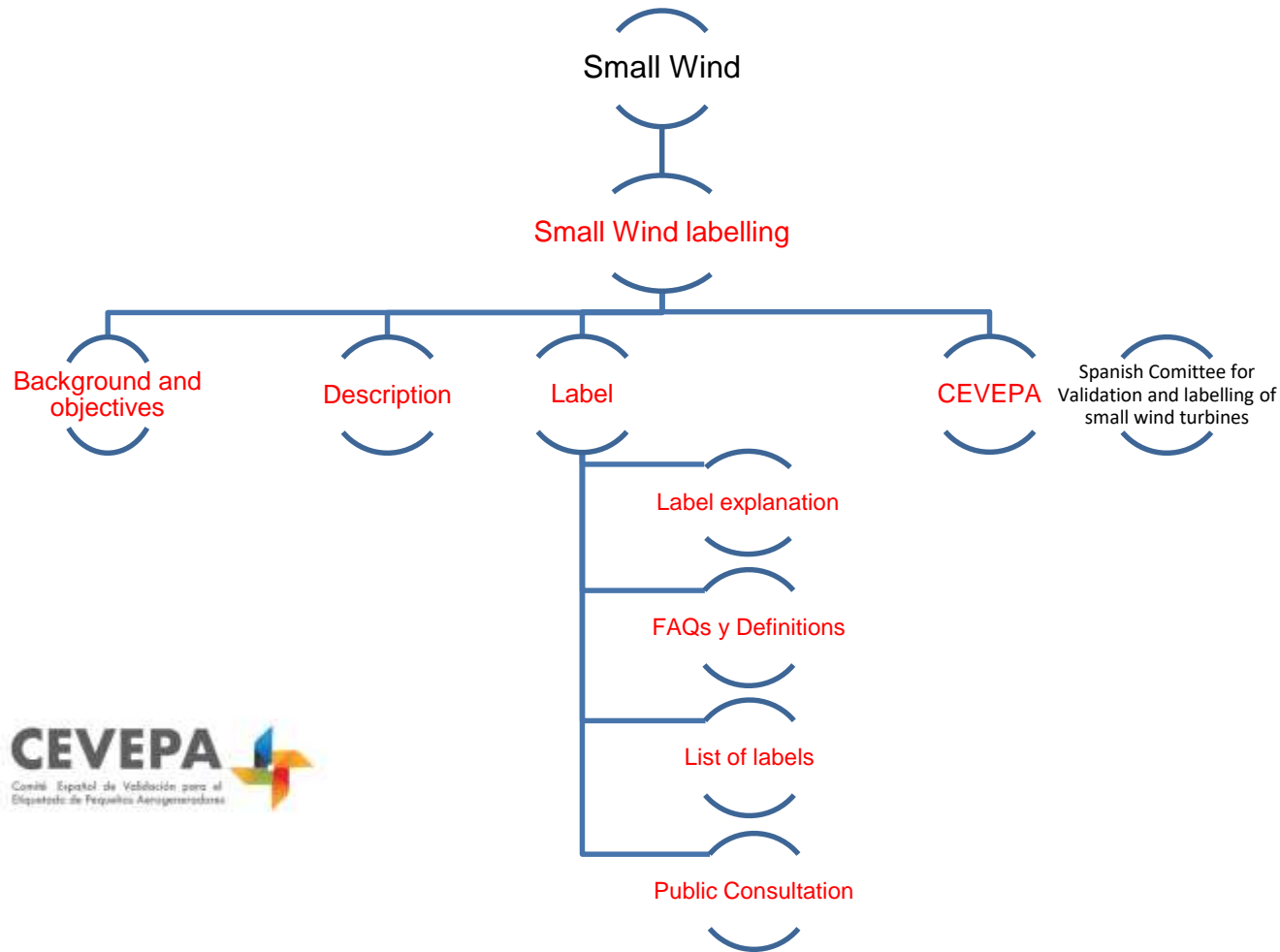
Static load test



Centrifugal load test

Fatigue load test

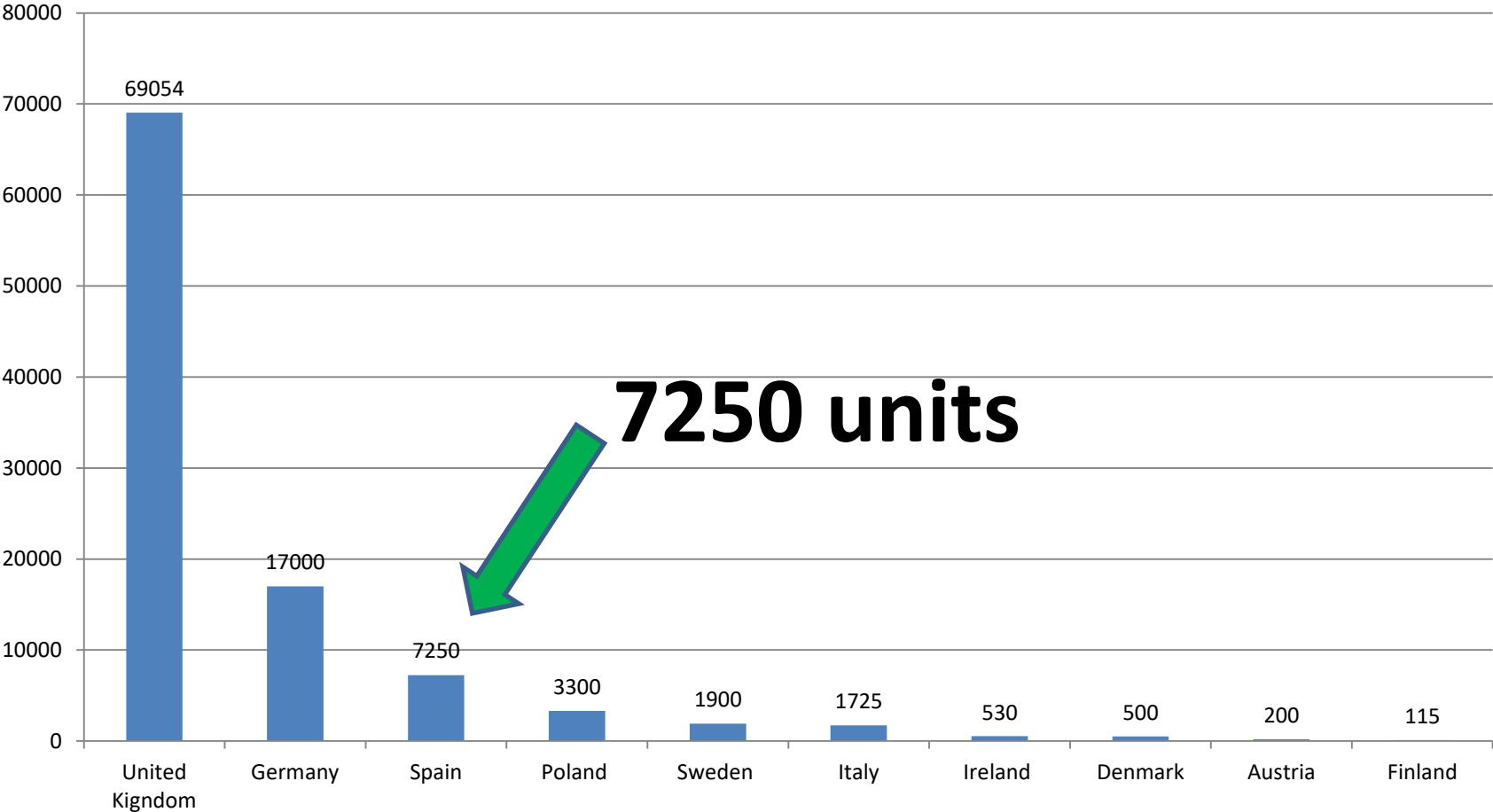
SWT Labelling initiative in Spain (1/2)



SWT Labelling initiative in Spain (2/2)

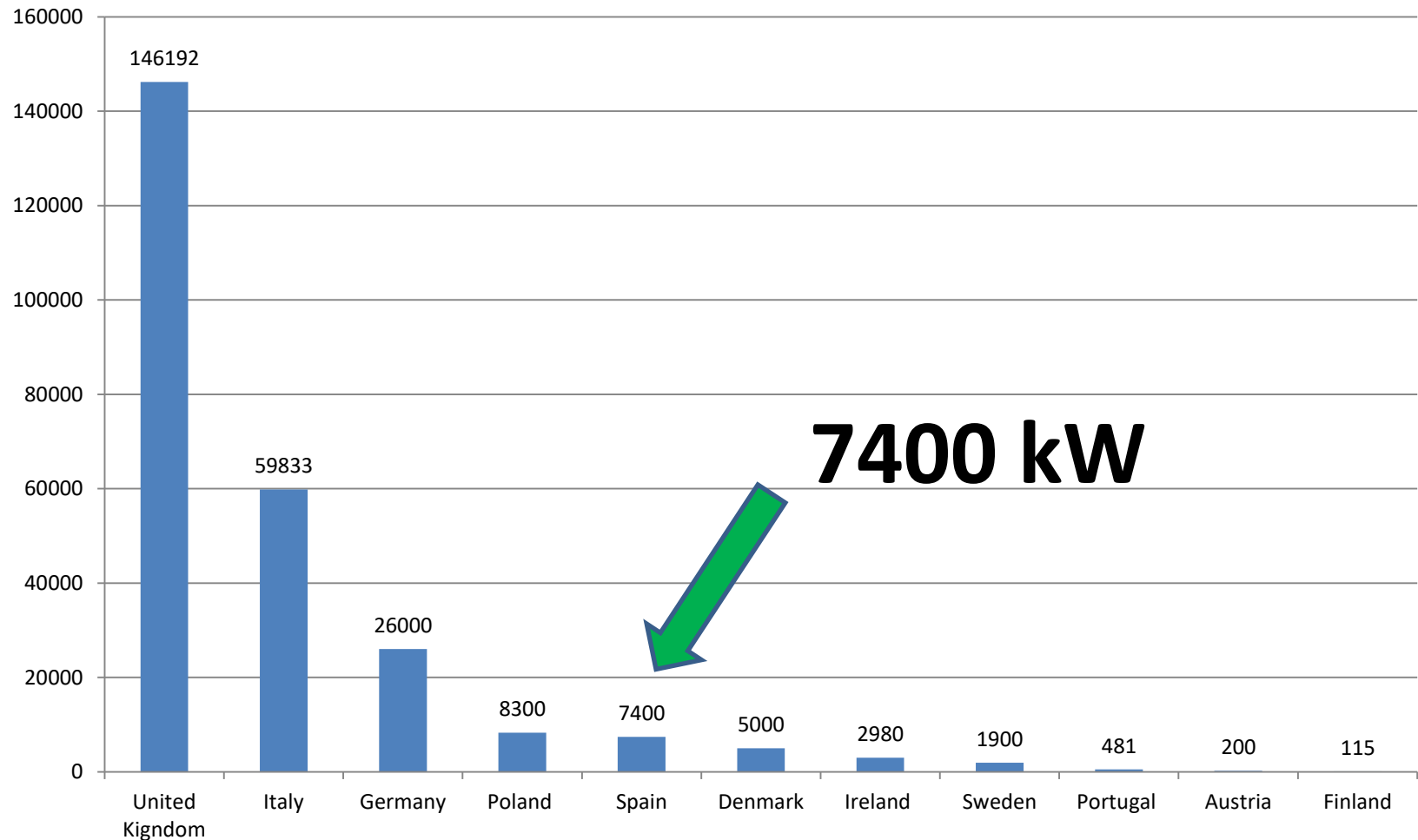
Resultados de ensayos Test Results	
Fabricante Manufacturer	Fabricante Manufacturer
Aerogenerador Model	Modelo y versión Model and version
Energía anual de referencia A una velocidad de viento media de 5 m/s La producción actual puede variar dependiendo de las condiciones del lugar Reference anual Energy At 5 m/s average wind speed, Actual production will vary depending on site conditions	XXX kWh/año XXX kWh/year
Nivel de ruido acústico declarado A 8 m/s Declared Sound Power Level At 8 m/s	XX dB(A)
Clase de ensayos de turbina (I-IV o S para Especial) Turbine test class (I-IV or S for Special)	II
Ensayos realizador por Tested by	Organismo (más sello) Test organisation
Fecha de emisión: Date of issue:	DD/MM/AAAA DD/MM/YYYY
Fecha de expiración de la validez: Expiration Date:	DD/MM/AAAA DD/MM/YYYY
	Nº Etiqueta: Label number: AAAA/NNN
Para más información: For more information:	www.idae.es

Total cumulative installed units in Spain



Source: WWEA “2017 Small Wind World Report Summary”

Total cumulative installed capacity in Spain (kW)



Source: WWEA "2017 Small Wind World Report Summary"

Market uptake

New government program for SWT market deployment (Up to 100 kW)

- Small wind turbine grants for public entities (EU Funds)
- POCS (Operative Programme for Sustainable Growth) 2014-2020 for local entities:
 - Axis 4: Low Carbon Economy LCE
 - Line: Small Wind Self-consumption applications:
 - OE441 Increase the RES share in the final electricity consumption: 339,3 M€
 - **OE432 Increase the use of RES for power n heat production in buildings and public infrastructures: 152 M€**
 - OE461 Promotion of the R&D&i and the adoption of low carbon technologies: 10,7 M€
- For singular projects promoted by local entities: 480 M€ (EFDER)
- Eligible cost: Up to 6 €/W

Self-consumption case study

- Mid size cellar power supply (Ave power consumption: 25 kW).
- Location: Rioja region. Spain
- Wind turbine manufacturer: Argolabe
- WT Rated power: 100 kW
- Pitch regulated/variable speed.
- Total cost installed: 220,000€



**Fernández de Piérola winery
Rioja (Spain)**

<http://www.argolabe.es/100kw-windturbine.html>

Self-consumption case study

- Zero emissions building
- CINE-Centre of Innovation Norvento Energy.
- Site: Lugo (Spain)
- Only RES power supply
- (wind, solar PV, LE. geothermal, recycled veg oil co-generation system and Ion-Li batteries.
- Mid Wind turbine NED100-100 kW
- Combined electrical power and thermal power micro-grid



www.norvento.com/en/

Norvento NED 100



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**Thank you very
much for your
attention**

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