

SWT Market overview

Speaker:

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



Montevideo, Uruguay – Octubre 2019



SWT Market overview

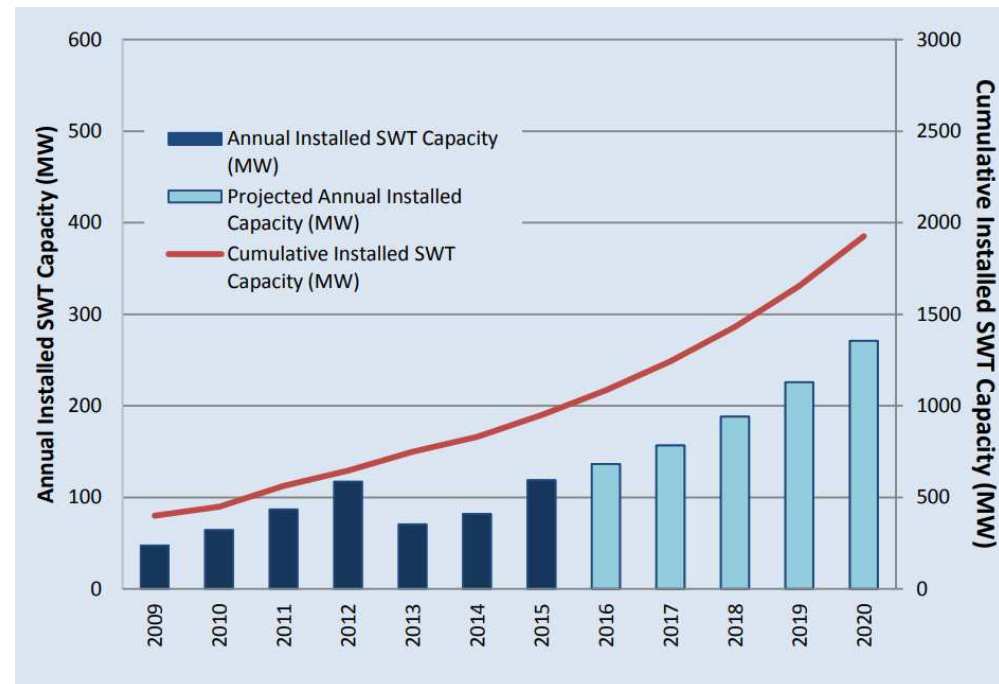
- Previous survey results; different approaches
 1. market deployment assessment,
 2. market suitability assessment,
 3. practical aspects of SWT market,
 4. social aspects of SWT market and
 5. regulatory issues of SWT market.
- Results for SWTOMP countries

1.- Market deployment assessment

Small Wind World Market

- Cumulative:
 - > 990.000 units
 - 948 MW
 - Average size: 0.96 kW

Prevision:



“Small Wind World Report: 2017” Summary, WWEA, 2017

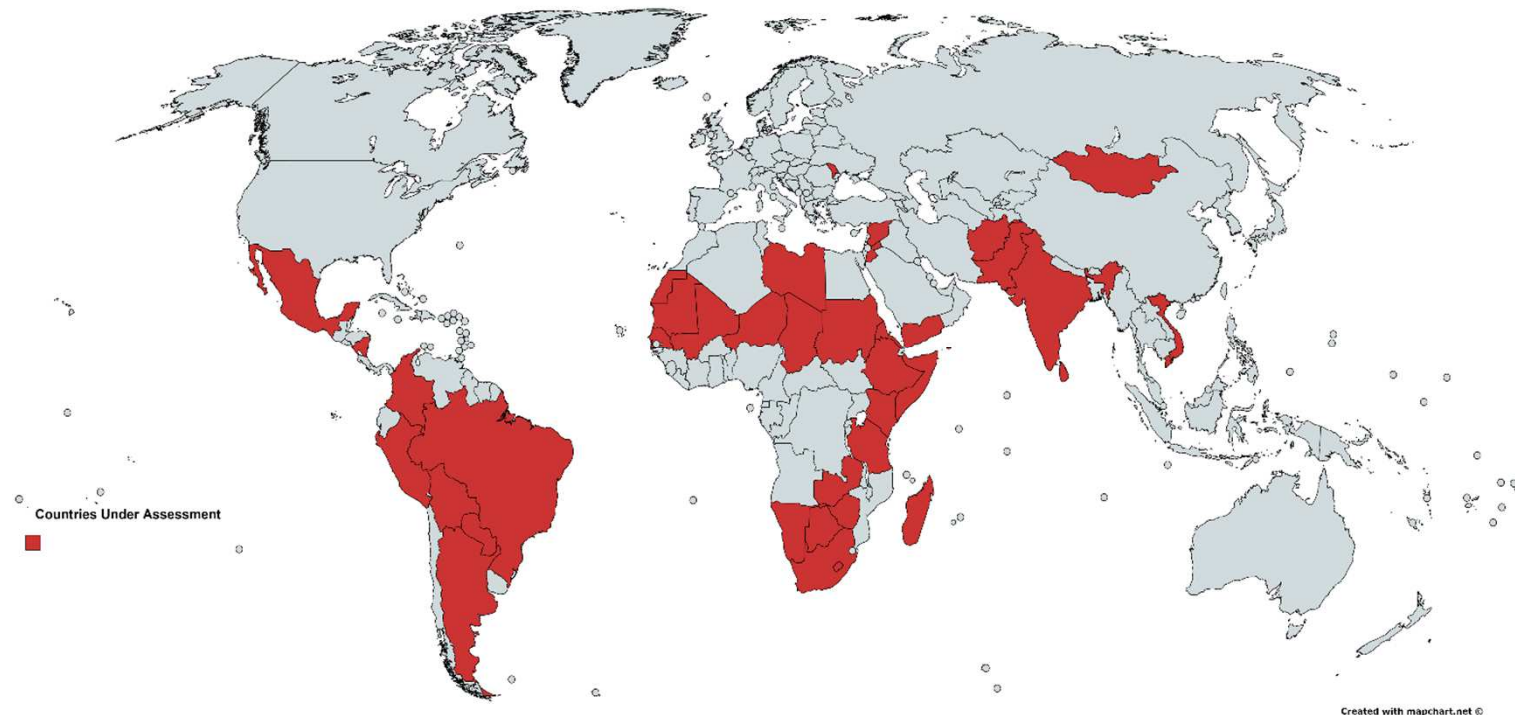
1.- Market deployment assessment

Small Wind World Market

	2013 (MW) Installations	2014 (MW) Installations	2015 (MW) Installations	2016 (MW) Installations	2017 (MW) Installations	Cumulative (MW) Installations	Cumulative Year Range
China	72.25	69.68	48.60	45.00	27.70	532.81	2007-2017
Japan	*	*	0.36	0.95	2.85	8.43	as of 2017
South Korea	0.01	0.06	0.09	0.79	0.08	4.02	as of 2017
UK	14.71	28.53	11.64	7.73	0.39	140.60	as of 2017
Denmark	1.65	1.28	5.84	4.45	0.96	21.88	as of 2017
Germany	0.02	0.24	0.44	2.25	2.25	30.75	as of 2017
Italy	7.00	16.27	9.81	57.90	77.46	189.43	as of 2017
Canada	*	*	*	*	*	13.47	as of 2017
United States	5.60	3.70	4.30	2.40	1.70	148.00	2003-2017
Brazil	0.03	0.02	0.11	0.04	0.11	0.31	2013-2017
Australia	*	0.02	0.03	*	0.02	1.46	2001-2017
New Zealand	*	*	*	*	*	0.19	up through 2015
Global	101.27	119.80	81.22	121.51	113.52	1091.35	

Source: *Distributed Wind Market Report*

2.- Market suitability assessment For rural electrification - Filters

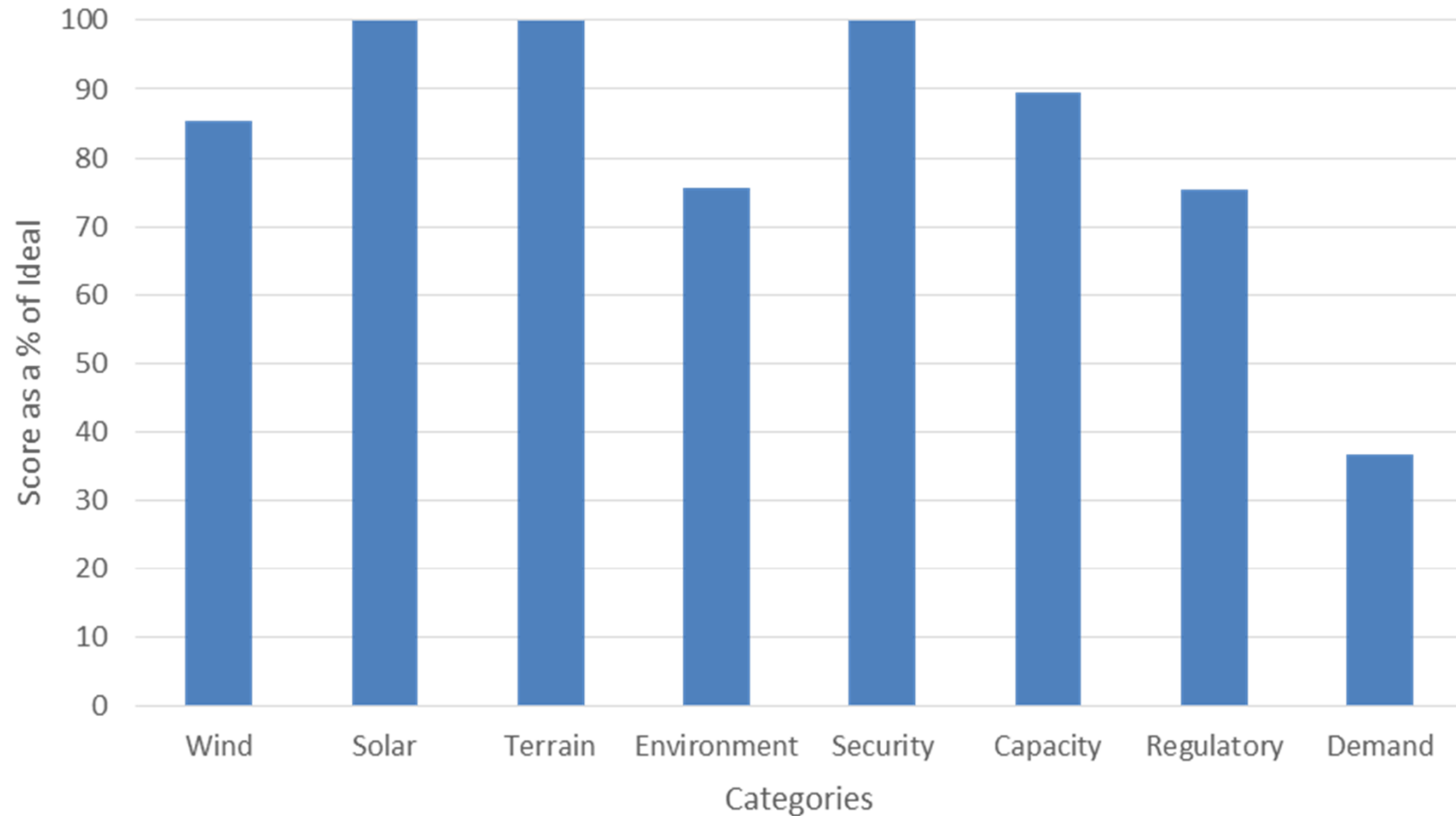


- Average Wind speed,
- GDP per Capita and
- Electrification rate (%)

Source: *Wind Empowerment:*

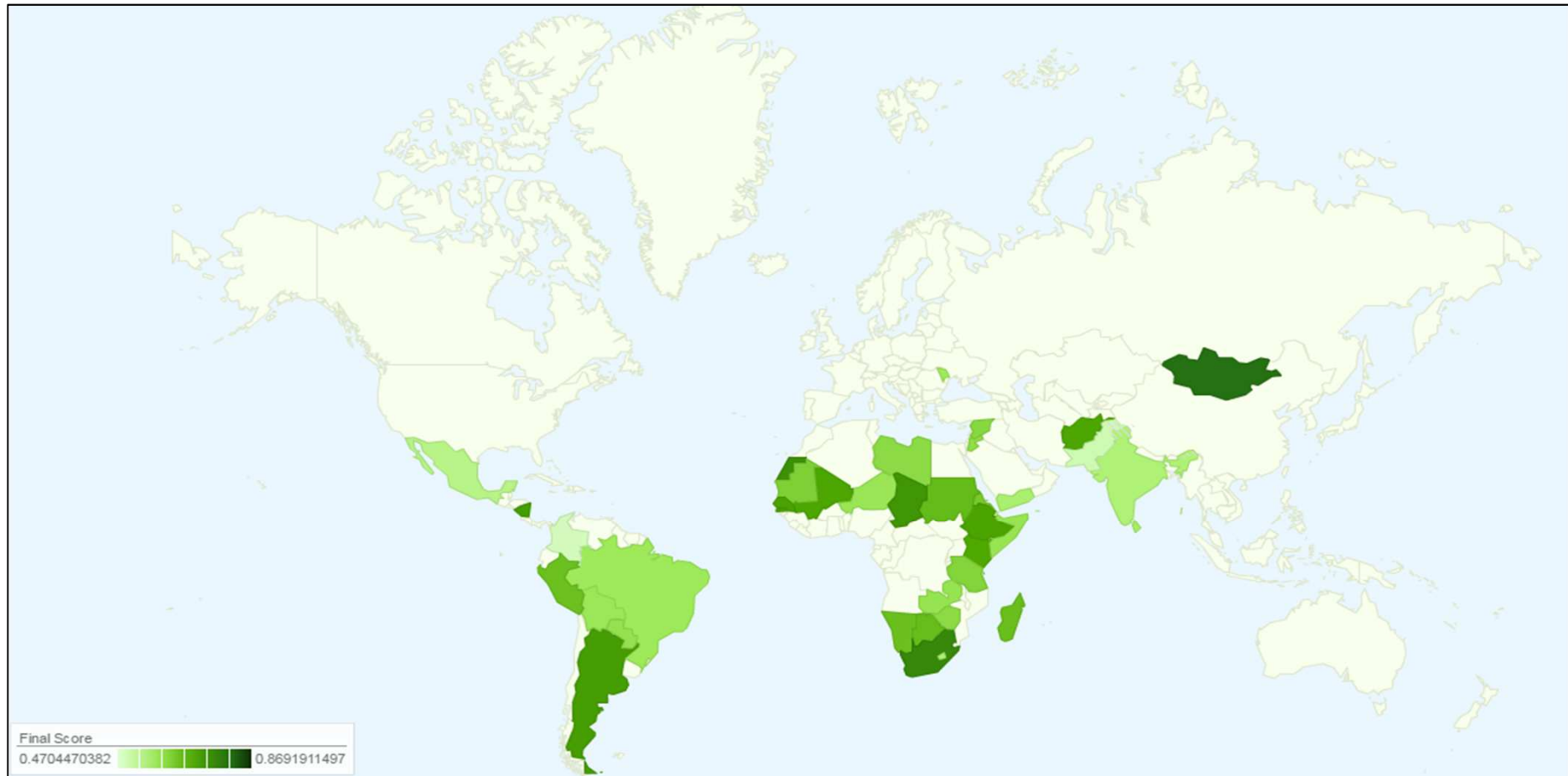
2.- Market suitability assessment

For rural electrification - Indicators: example - Argentina



Source: *Wind Empowerment:*

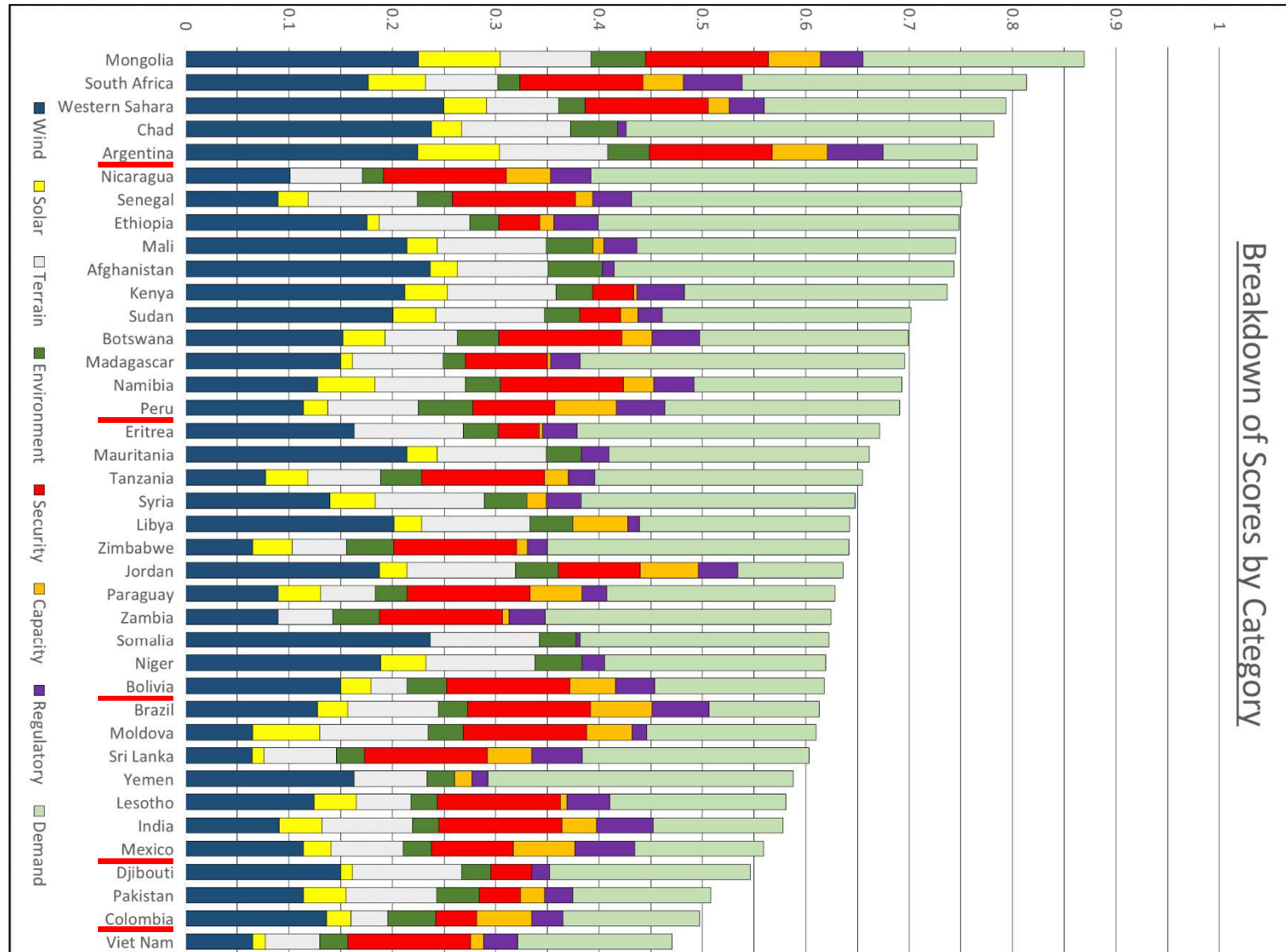
2.- Market suitability assessment For rural electrification - Conclusions: Final score



Source: *Wind Empowerment:*

2.- Market suitability assessment

For rural electrification - Conclusions: Breakdown of Scores



3.- Social aspects

SWIP Project results

- Investment boundaries:
 - Not seen as good investments;
 - Image of poor performance;
 - Lack of awareness.
- Turbines only partly seen as cost competitive and reliable;
- Limited concern about visual impact for SWTs;
- People view prospect of SWTs in their region slightly more favourably than large turbines;
- Preference is for installation of SWTs in industrial sites and on roofs;
- Other energy solutions, e.g. Solar PV, looked upon more favourably.

4.- Practical aspects

Testimonials – SWT in practice (Austria)

- Survey of 22 SWT operators
 - 12 farmers, 8 private people, 1 municipality, 1 company
 - Horizontal axis SWT only
 - 2 building-mounted SWT
 - Rated power: 1x15 kW; 6x10 kW; 7x5 kW; 5x<1 kW
 - Motivations for acquisition:
 - Independency
 - Environmental conservation
 - Contribution to the energy revolution
 - Interest in the Technology
 - Supplement to PV
 - Average of ca. 900 equivalent hours
 - 50 % less for building-mounted SWT
 - Between 50 und 90 % own consumption coverage
 - Investment costs: 4.550- €/kW (incl. taxes)
 - Actual production costs 0,248 €/kWh
 - 19 of 22 operators confirmed that they were satisfied with their SWT
- Critical success factors**
- Efficient, productive, high quality SWT and a site with good wind potential
 - Good support by the manufacturer over the entire project period
 - Realistic expectations of the operator

5.- Regulatory issues

- 15 municipalities (Vermont, US)
- how each municipality regulates and permits various types of wind and solar renewable energy systems in their communities

Does your municipality have any of the following standards for wind powered energy systems (if applicable)?

<i>Setbacks:</i>	7
<i>Structure Height:</i>	7
<i>Visual Impact:</i>	6
<i>Non-Reflective Colors:</i>	6
<i>Lighting:</i>	6
<i>Site Clearing:</i>	5

Results for SWTOMP countries

Argentina – qualitative considerations

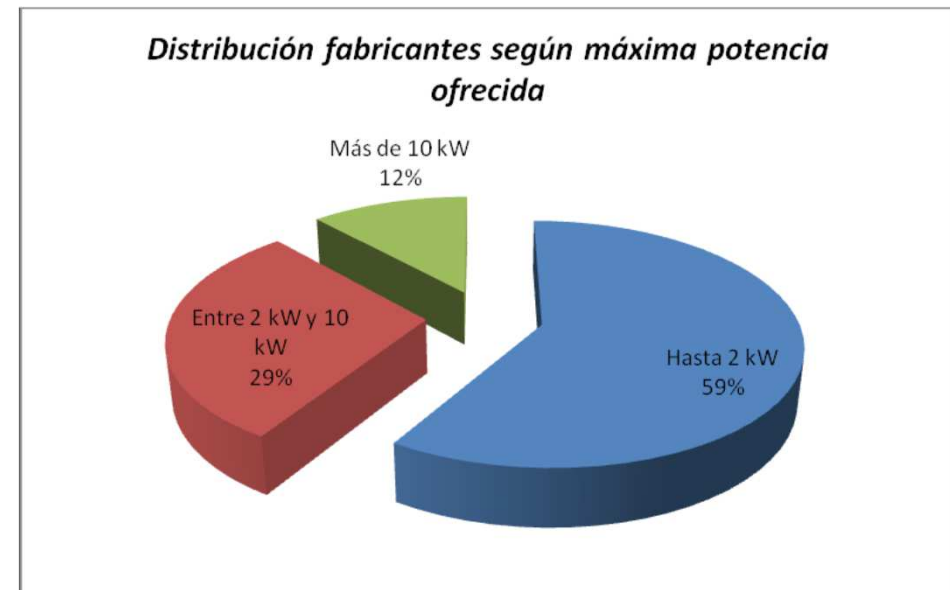
- The websites visited have little design work and little clarity to transmit the information.
- Contact data can not be found easily.
- The documentation sent when contacting is lacking, in most cases, of adequate technical level.
- They do not offer the real power curve of commercialized wind turbines as information.
- They generally offer "turnkey" solutions, including power equipment, battery banks, etc. This includes the provision of independent pumping systems.

Results for SWTOMP countries

Argentina – quantitative considerations

- 16 suppliers that manufacture wind turbines in Argentina. They offer a total of 32 different models of wind turbines.
- 94% of suppliers have their own web page / blog.
- 65% of the suppliers publish on their websites / blogs technical data of the offered wind turbines..

Parameter	Value
Number of people employed directly	67
Approximate total annual billing	AR\$ 6.400.000
Approximate installed total power	5 MW



Results for SWTOMP countries

Dominican Republic

- Different way: Data provided by the Customs Office on Wind Energy imports
- 19 SWT imported in the DR during the 2013-2018 period
- It seems that most of the imported SWT are horizontal axis, but at least one vertical axis can be identified.
- The total budget involved in these imports is around 57000 US\$ through the whole period, with an annual average of nearly 10000 \$
- These SWT have their origin in different countries, mainly China (29000 \$), USA (13500 \$) and Spain (12250 \$).
- When identified, the nominal power of the SWT imports ranges from 400 W to 3500 W

Results for SWTOMP countries

Finland

- Based on interviews with local suppliers and distributors and estimated the market based on their experiences
- Four segments:
 1. privately installed micro turbines (connected to batteries, nominal power $< 1\text{kW}$, for leisure homes or summer cabins): 100 – 200 units
 2. small commercial installations and suburban housing ($< 5\text{kW}$): 10 units/year
 3. large commercial installations and agriculture (5 - 50 kW): only a few
 4. telecom (special cases, size few kilowatts installed on telecom masts): 10 units/year

Results for SWTOMP countries

México

- By 2018, 23 kW have been installed as interconnected systems to the grid and 490.3 kW of installed capacity outside the grid has been identified.
- 48 small/medium wind turbines installed in 2017 without interconnection to the grid, whose capacity oscillates between 1 and 350 kW.
- The projects are installed in states such as: Quintana Roo, Yucatan, Baja California Sur, Hidalgo, Chiapas and Baja California.
- Mexico has wind potential in different states of the country
- Currently, there are 4 manufacturers (2 active), 9 distributors and 12 companies dedicated to the distribution and installation of small wind turbines in Mexico.

Results for SWTOMP countries

Spain

Cumulative units	Cumulative power (MW)
7250	7.40

Estas hipótesis se basan en los modelos comerciales cercanos al límite superior de cada uno de los rangos establecidos, lo que resulta especialmente gravoso para las instalaciones en niveles de potencia menores de 3-5 kW de potencia. Por ello, en este plan se contemplan actuaciones específicas para apoyar estas instalaciones, vía subvenciones –complementarias a la retribución régimen especial–, permitiéndolas alcanzar ratios de rentabilidad técnico-económica razonables.

Propuestas normativas

- Establecimiento de un marco retributivo específico para las instalaciones eólicas de potencia inferior a los 100 kW (ficha código HEL-004).



Comunidad Autónoma	Potencia Instalada (kW)	Potencia contratada (kW)
Canarias	10.350	7.444
Navarra	34	274
País Vasco	100	100
Andalucía	13	160
Total general	10.496	7.978

Results for SWTOMP countries

Uruguay

- The strong development of Wind Power in Uruguay during the last 10 years, has not led to SWT development.
- Even though since 2010 a legal framework that allows for micro power generation connected to the grid is in place
- Affecting reasons:
 - widespread reach of the electrical network within the country extension
 - little attractive for private investment in small scale wind power
- Scarce examples can be found around the country mostly confined to the few individual households and small rural businesses still out of reach from electrical network



Thank you!

Ciemat

