# Wind Micro-Generation

Teagasc Conference
6rh December 2012

Ivan Sproule, SEAI

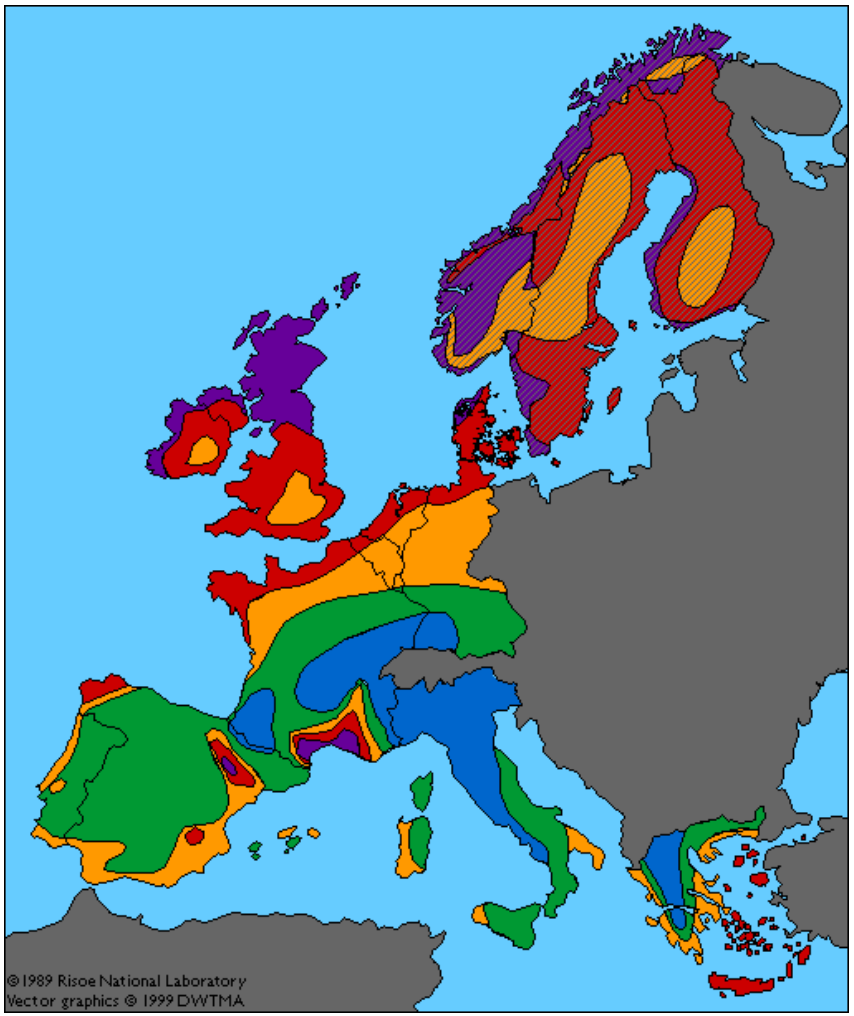
- SEAI Pilot Field Trials – Policy Context and Trial Overview
- Supporting Measures
- Interim Results
- Conclusions and Recommendations

# Ireland: Key Statistics and Key Targets

| | |
|---|---|
| Peak Electricity Demand to Date: | 5,090 MW |
| Installed Wind Capacity @ April 2011: | 1,628 MW |
| Maximum Wind Output to Date: | 1,474 MW |
| Wind's Contribution to Electricity in 2011: | 15.6% |
| Renewable Contribution to Electricity in 2011: | 16.7% |
| Wind TWh 2011: | 4.38 TWh |
| *2020 Targets* | |
| EU RES Directive Target – Total Energy | 16% |
| RES-E | 40% |

Sources: EirGrid & Energy in Ireland 1990-2010, SEAI

# Ireland's Wind and Solar Resources




| | m/s | W/m² | m/s | W/m² | m/s | W/m² | m/s | W/m² | m/s | W/m² |
|---|---|---|---|---|---|---|---|---|---|---|
| | >6.0 | >250 | >7.5 | >500 | >8.5 | >700 | >9.0 | >800 | >11.5 | >1800 |
| | 5.0-6.0 | 150-250 | 6.5-7.5 | 300-500 | 7.0-8.5 | 400-700 | 8.0-9.0 | 600-800 | 10.0-11.5 | 1200-1800 |
| | 4.5-5.0 | 100-150 | 5.5-6.5 | 200-300 | 6.0-7.0 | 250-400 | 7.0-8.0 | 400-600 | 8.5-10.0 | 700-1200 |
| | 3.5-4.5 | 50-100 | 4.5-5.5 | 100-200 | 5.0-6.0 | 150-250 | 5.5-7.0 | 200-400 | 7.0-8.5 | 400-700 |
| | <3.5 | <50 | <4.5 | <100 | <5.0 | <150 | <5.5 | <200 | <7.0 | <400 |
| | | | >7.5 | | | | | | | |
| | | | 5.5-7.5 | | | | | | | |
| | | | <5.5 | | | | | | | |

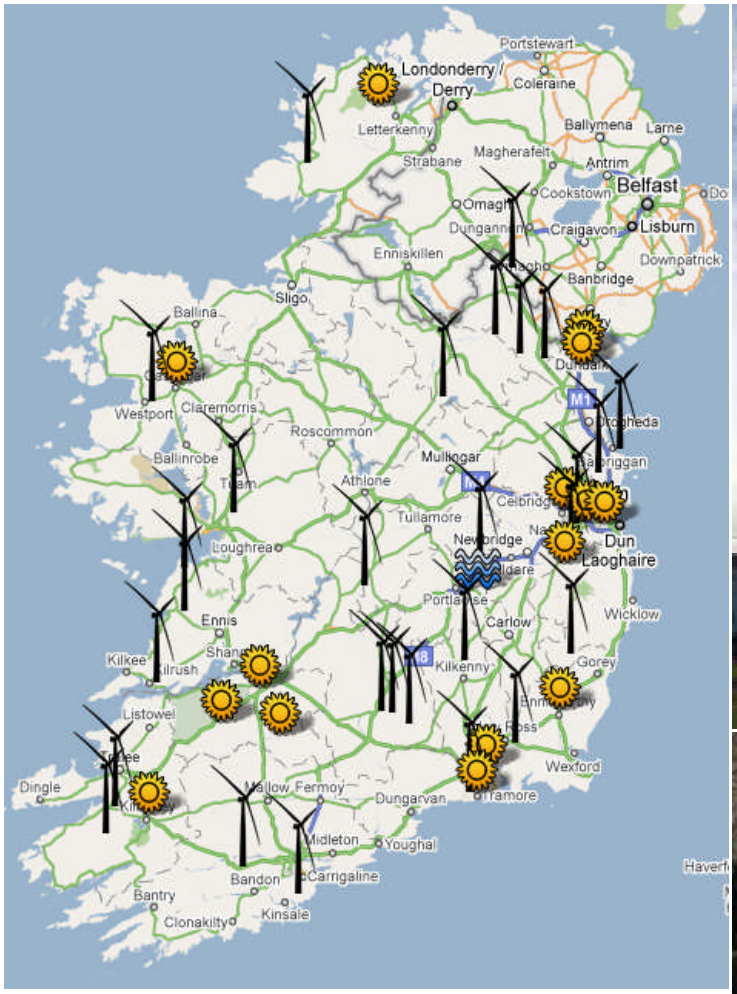
# SEAI Small- and Micro-Scale Generation Programme Objectives

- Define & establish installer qualification/certification/training
- Review legal and regulatory issues
- Study market potential
- Study impacts on distribution network
- Implement product certification/standards
- Implement Pilot field trials

# Pilot Field Trial Objectives

- Verify the installation and ongoing costs for good quality installations;
- Establish the technology performance under typical local operational conditions;
- Assess technology maturity, reliability and compatibility with typical user groups;
- Evaluate quality assurance requirements to ensure projected performance;
- Assess installer capabilities and training and accreditation needs;
- Verify small and micro-scale renewable generation technology economics under criteria such as payback and levelised cost of energy.

# National Geographic Dispersion of SEAI-Funded Pilot Installations




# Profile of Pilot Wind Technologies

| Rated Power | No | Rotor Type | No | Generator Type | No | Site Type | No | Manufacturer | No |
|---|---|---|---|---|---|---|---|---|---|
| 0-6 kW | 25 | HAWT Upwind | 15 | P.M.G. | 28 | Domestic | 11 | Proven | 11 |
| 6-11 kW | 1 | HAWT Downwind | 14 | Induction | 1 | Public | 0 | Fortis | 2 |
| 11-20 kW | 2 | VAWT | 0 | | | Commercial | 6 | Iskra | 6 |
| 20-50 kW | 1 | | | | | Agricultural | 12 | Sinus | 1 |
| 50-100 kW | 0 | | | | | | | Aircon | 1 |
| | | | | | | | | Skystream | 2 |
| | | | | | | | | Westwind | 1 |
| | | | | | | | | Eoltec | 2 |
| | | | | | | | | Ampair | 1 |
| | | | | | | | | AOC | 1 |
| | | | | | | | | C&F Wind Energy | 1 |

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# Microgeneration Information

- SEAI Web Pages, Brochures and FAQ's on Micro-Generation
- Guide to Connecting Renewable and CHP Electricity Generators to the Electricity Network
  - CER, ESB Networks & Eirgrid participation in specification, tender evaluation and review
  - Documents complete connection process for RE & CHP generators
  - User-Friendly Brochure for Micro-Generators
  - Web information & links

# Define & establish installer qualification/certification/training

- SEAI formed a Standards Development Group (SDG) to develop FETAC micro-generation award standards
- Final award specifications provided to FETAC for awards, which are now FETAC accredited:
  - Implementation of micro solar PV systems
  - Implementation of small scale wind systems
  - Electrical Installation of Micro-generators

# Implement product certification/ standards – SEAI Triple E

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**Triple E Product Register**
Product List

**Product Details**

Export to Excel »

| Triple E Code | Manufacturer | Product Name | Product Code | Short Description | Link To Tech. Description | Suppliers | Valid From | Valid To |
|---|---|---|---|---|---|---|---|---|
| WTU29248 | Fortis Wind Energy Ireland | Montana | Montana | Wind turbine 5 m span 6 kW | | Suppliers | 10/05/2010 | 10/11/2011 |

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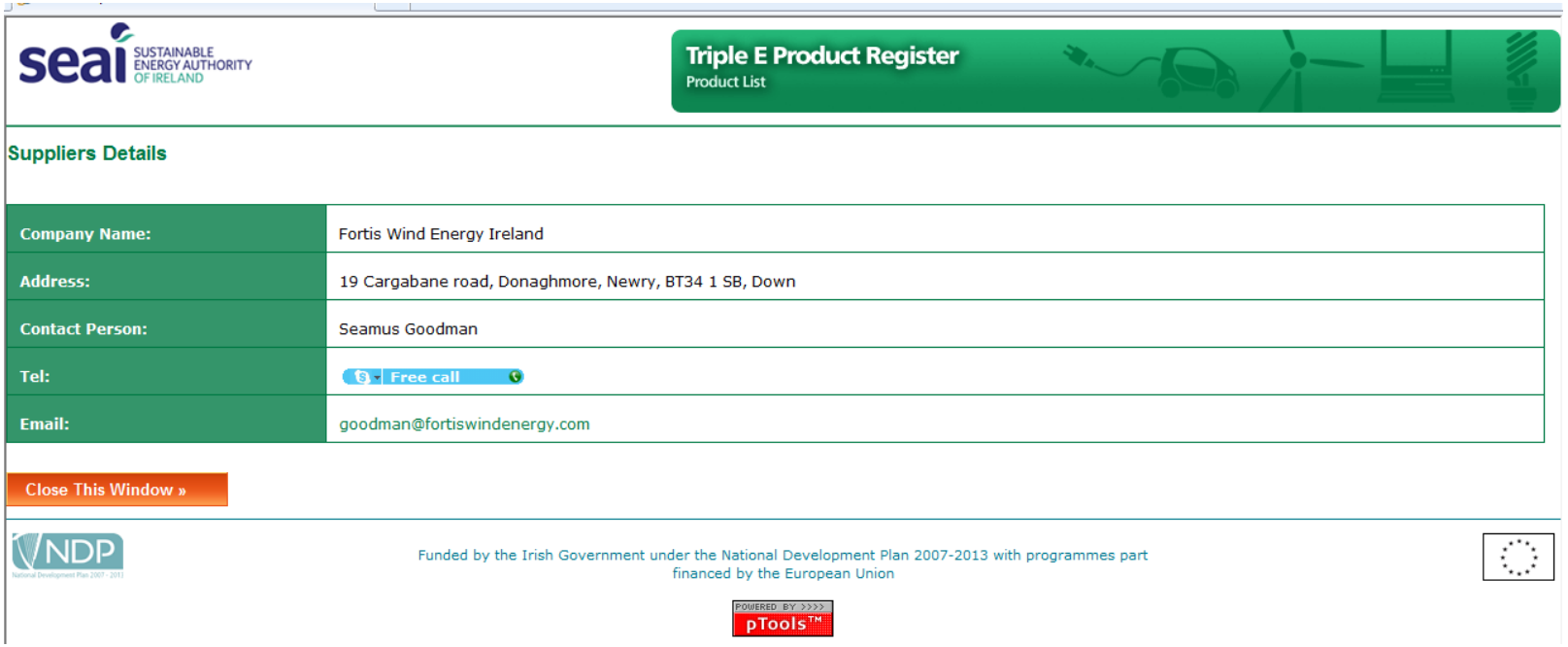

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

**Triple E Product Register**
Product List

**Suppliers Details**

| | |
|---|---|
| **Company Name:** | Fortis Wind Energy Ireland |
| **Address:** | 19 Cargabane road, Donaghmore, Newry, BT34 1 SB, Down |
| **Contact Person:** | Seamus Goodman |
| **Tel:** | Free call |
| **Email:** | goodman@fortiswindenergy.com |

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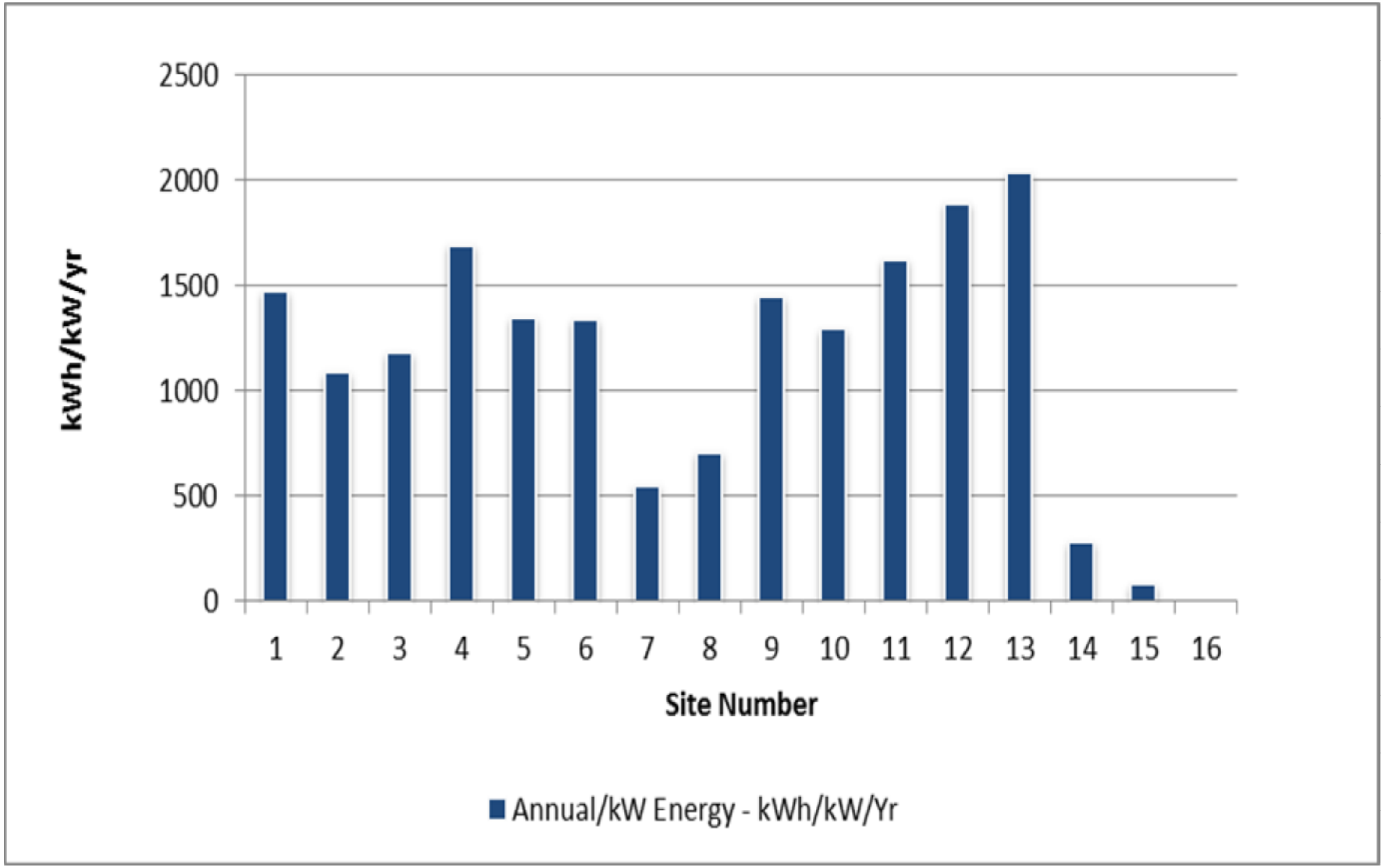
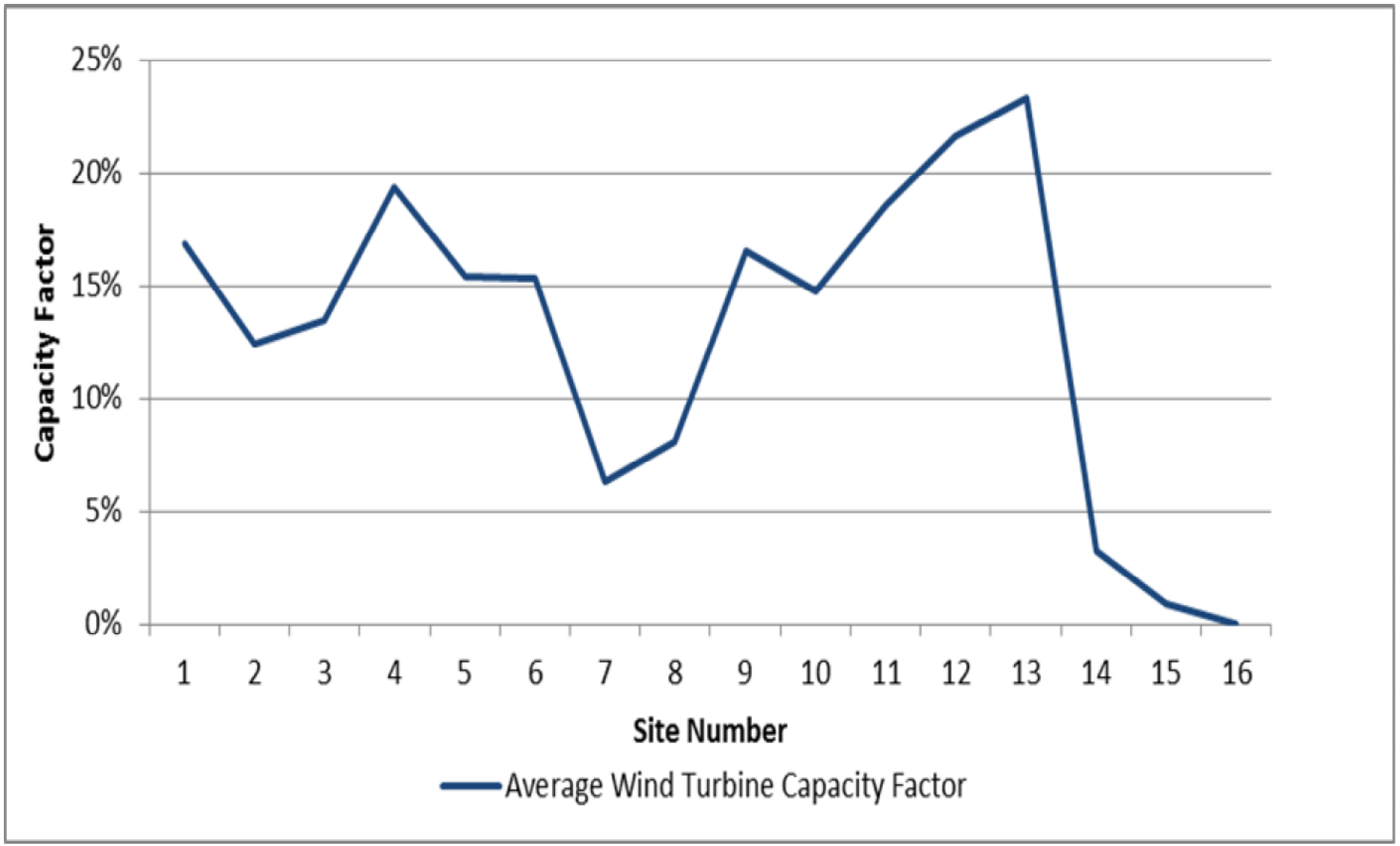
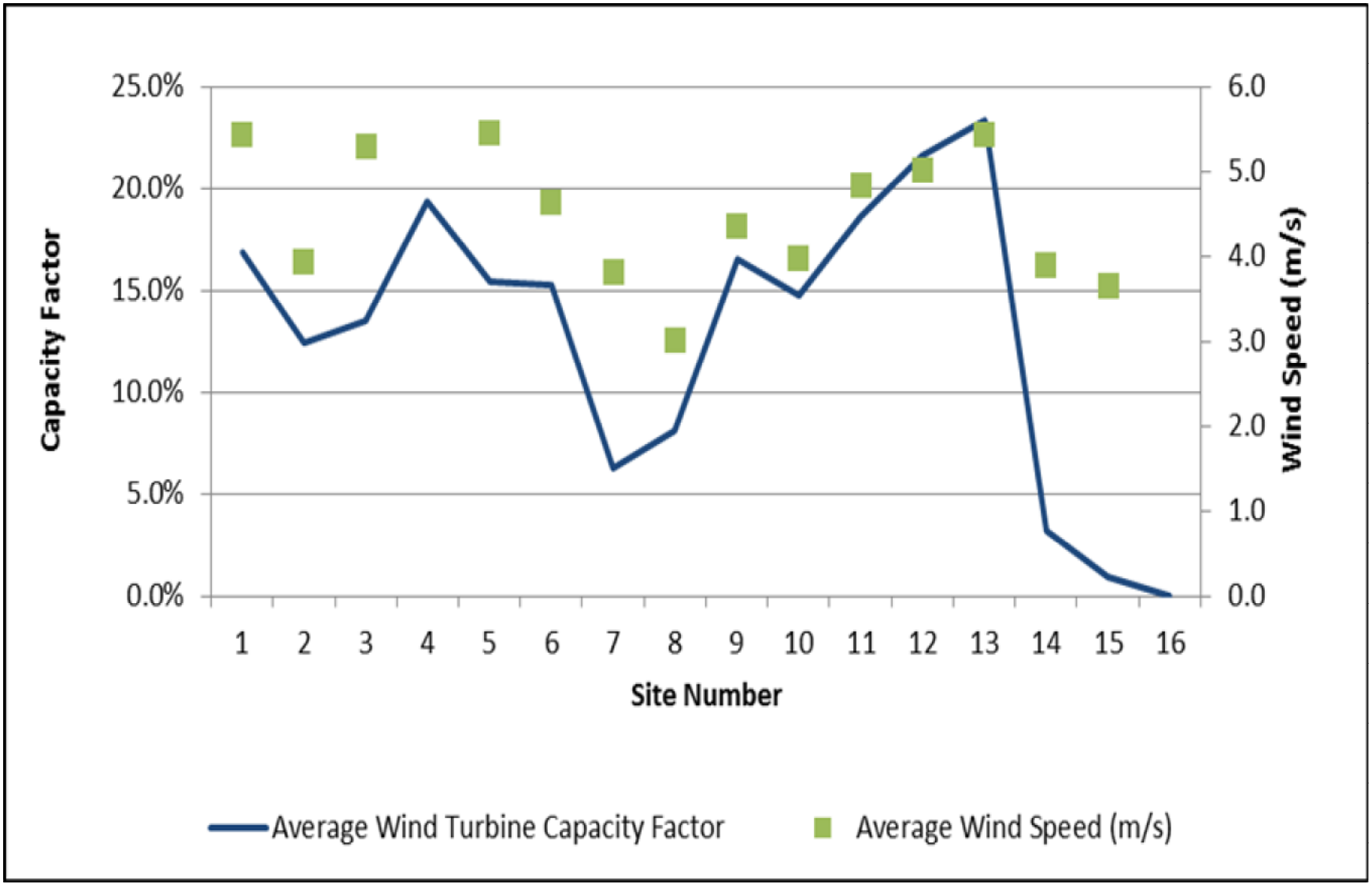
# Wind Energy Generated/kW Installed Capacity



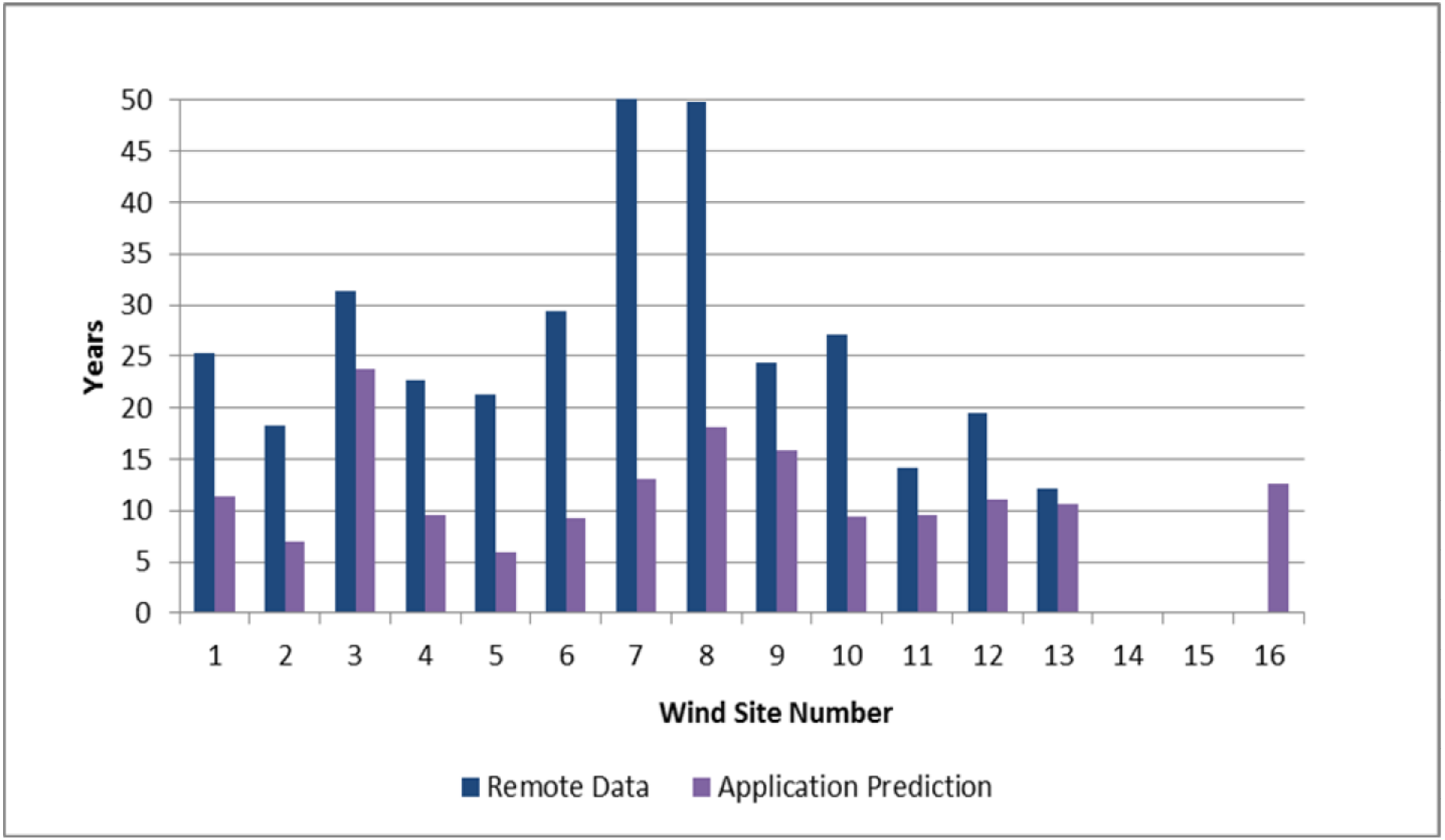
# Wind Turbine Capacity Factors



# Capacity Factor and Wind Speed



# Wind Turbine Project Payback




[1]

[1] Where the payback exceeds 50 years (in just one case) it is shown as 50 years on the graph.

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# Pilot Field Trial Interim Findings

- Quality measures implemented in grant scheme were largely successful in averting equipment failures
- Technology performance for both wind and PV was variable, primarily due to site specific considerations
- Supplier predictions of output were consistently overoptimistic, extremely so for some wind installations
- Payback times for wind 14 yrs to > 50yrs
- Average wind turbine availability was poor at 70% or 80% excluding shut down sites

# Further Work

- Complete monitoring campaign
- Analyze pilot field trial data
- Particularly focus on site and turbine specific factors affecting performance
- Publish field trials final report
- Continue implementation of quality measures to support robust sector development
- Investigate tools for site assessment
- Support formation of Small Wind Turbine User Forum

# Microgeneration

- Defined by ESB Networks and EN50438 as:
  - <6kW connected at single phase (230V)
  - <11kW connected at 3-phase (400V)
- Streamlined connection process for microgeneration (form NC6)
- Units up to 50kW assessed case by case
- Units >50Kw are assessed as per large

Units Wind, PV, micro-hydro, micro-CHP

# Ideal site for small/micro scale wind

- W/SW of Ireland
- W/SW open aspect
- Altitude/ No obstructions
- Constant demand for electricity
- Energy efficiency measures maximised
- However:
  - Can still be viable in less than ideal site
  - Case by case

# Site assessment

- Altitude
  - The higher the better
- Aspect
  - SW ideal, coast,
- Obstructions/Vegetation
  - Buildings, trees, in all directions
- Space/Proximity to dwellings
  - Noise, room to erect and maintain, cable run, planning regs
- Access
  - For erection, maintenance
- Demand profile
  - Load factor, timing of demand, minimum demand

# Some Microgen FAQ's

Is there a grant available?

No grant programmes for wind turbines

Will I get paid for exporting excess?

If you are a domestic customer of ESBCS you may obtain 9c/kWh for all exported units

Can I reclaim VAT on a micro-wind turbine even if not registered?

Yes. For wind turbines on the SEAI Triple E Register

Can I put a turbine on my roof or gable end?

Limited energy gain, structural hazard and planning permission required

How long will a good quality turbine last?

If well maintained >15 years with some parts replaced

Should I add batteries if I have a grid connection?

Export tariff available or planned so may not be viable

Environmentally dubious

Option to heat water

# Planning Exemptions

Domestic

- Up to 13m total height
- 6m blade diameter
- [Total height + 1m] = clearance required
- 43db(A) or +5db(A) at nearest dwelling
- One per house, to the rear or side
- Matt finish, no advertising
- Tower mounted
- Building mounted not exempt

***SI 83 of 2007***

# Planning Exemptions

Business or industrial site

- Up to 20m total height
- 8m blade diameter
- Boundary clearance = [Total height + 5m]
- Line clearance: 5m - 20m - 30m
- 43db(A) at party boundary
- IAA permission within 5km of airport
- Not within architectural conservation area
- Mast/tower mounted only

***SI 235 of 2008***

# Planning Exemptions

Agricultural holding

- Up to 20m total height
- 8m blade diameter
- Boundary clearance = [Total height x 1.5] + 1m
- Line clearance: 5m - 20m - 30m
- 43db(A) at party boundary
- IAA permission within 5km of airport
- 100m clearance to existing turbine
- Mast/tower mounted only

***SI 235 of 2008***

# Restrictions on Exemptions

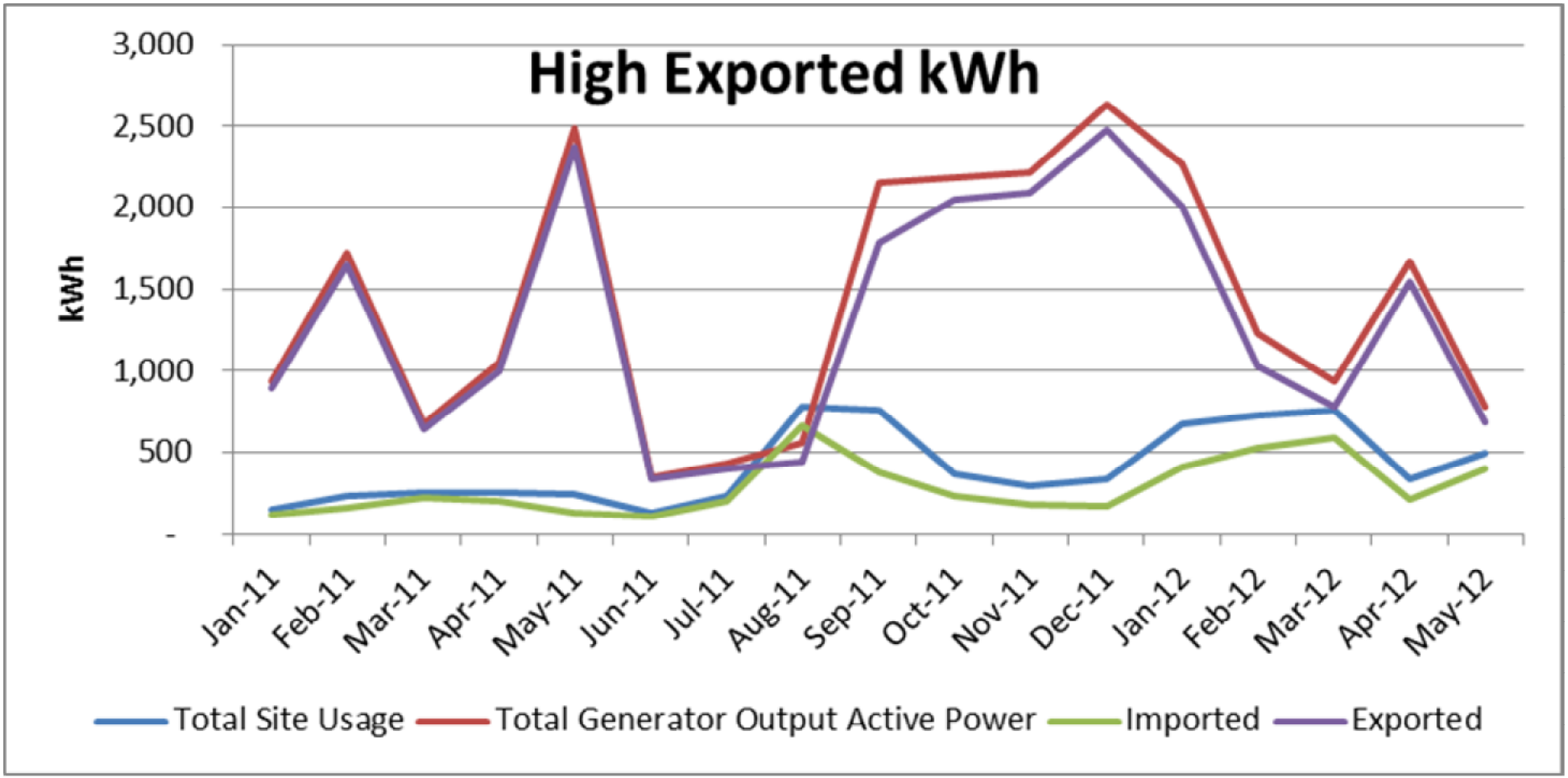
There are situations where the exemptions do not apply

- Even if the conditions appear to be satisfied
- Don’t assume the exemptions are satisfied
- Section 5 declaration should be sought for all small scale wind turbine installations

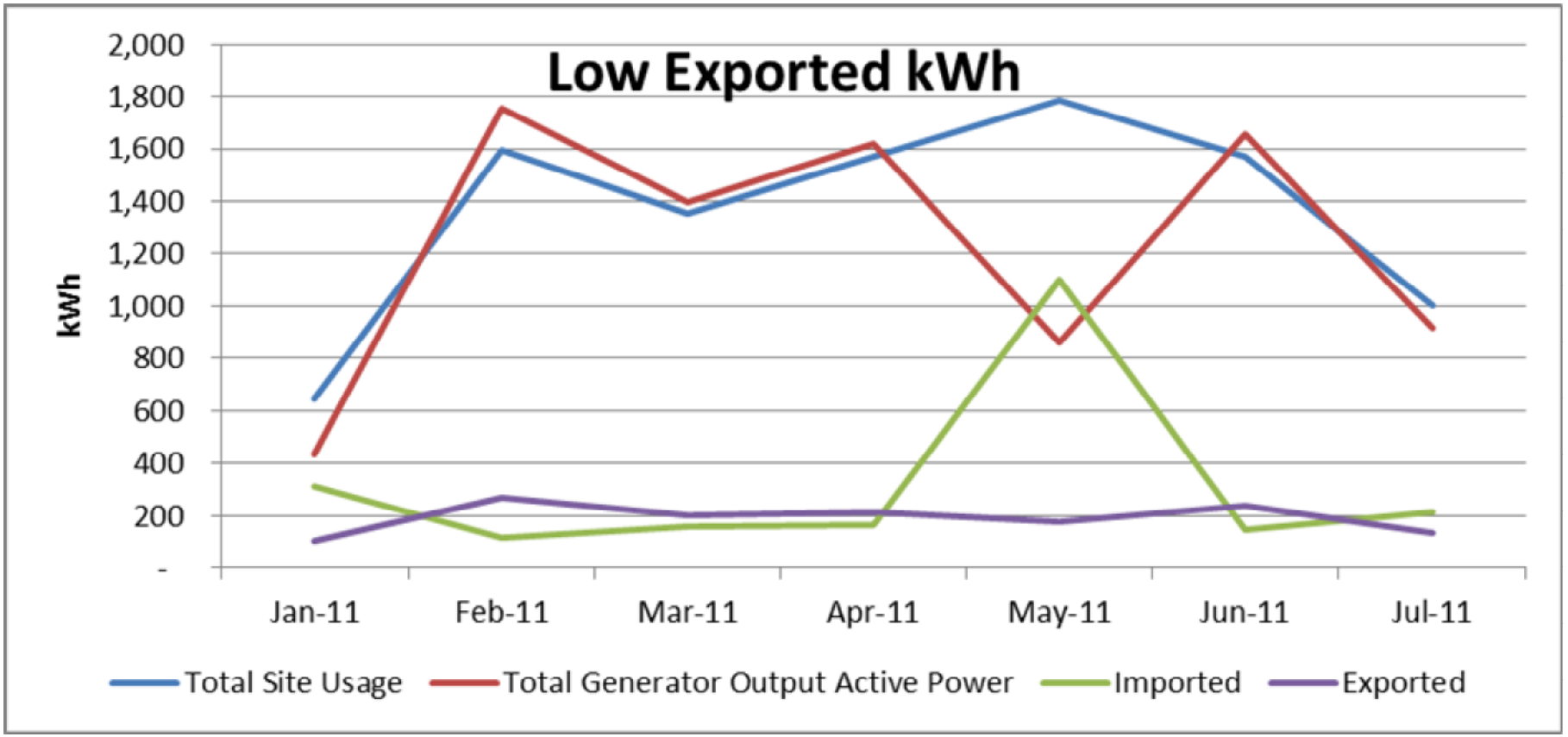
Areas of special amenity, architectural heritage, archaeological heritage, ecological interest, interference in character of landscape or view

***SI 600 of 2001***

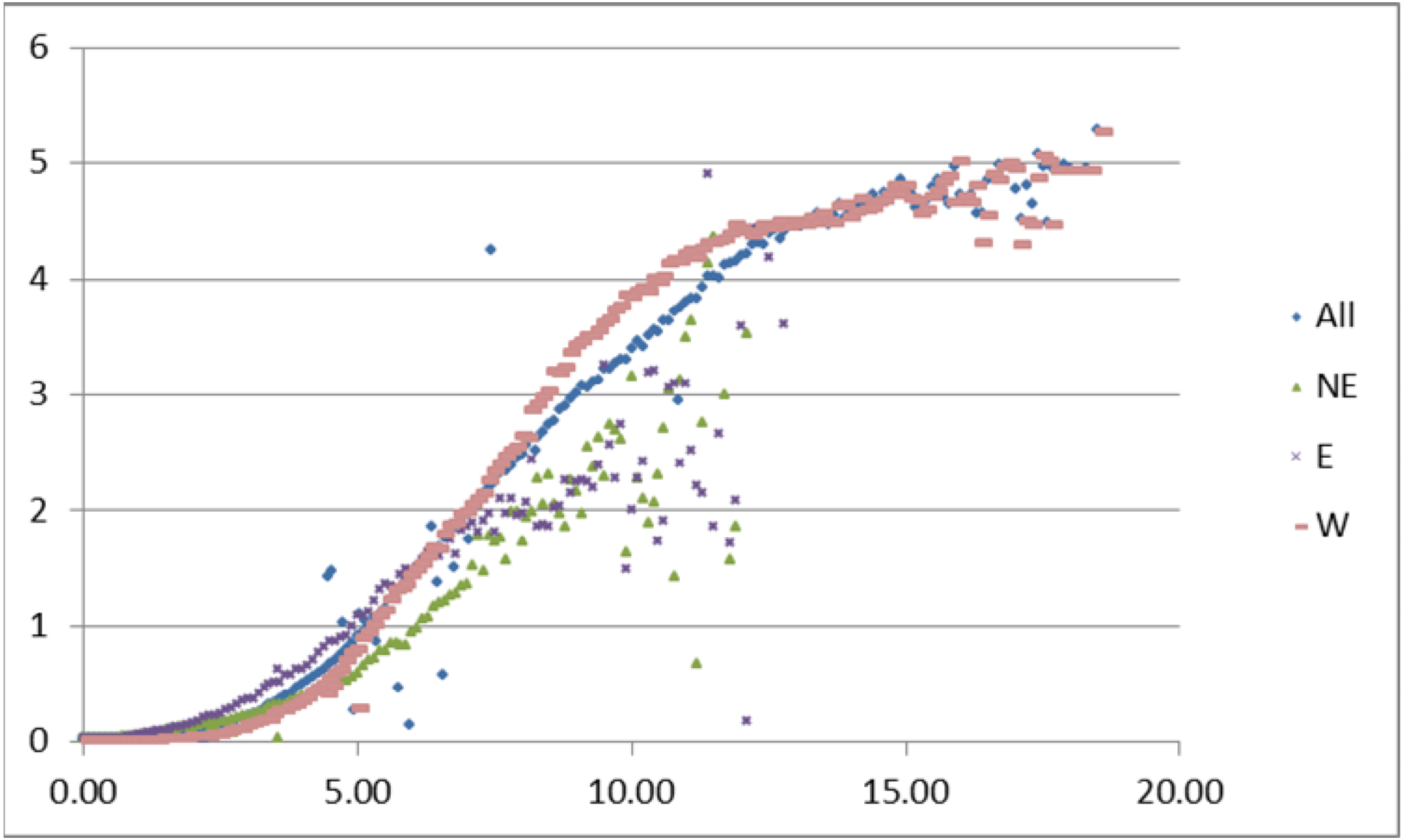
# Inappropriate Application
# Low Site Load



# Appropriate Application
# Steady Site Load



# Effects of Turbulence
# Departure from Power Curve



Thank you
www.seai.ie