Report D4.1-IE, March 2016

Auctions for Renewable Energy Support in Ireland: Instruments and lessons learnt

Short about the project

Auctions for Renewable Energy Support: Effective use and efficient implementation options (AURES)

This project helps assessing the applicability of different auction types to renewable support under different market conditions. It also explores which auction types and design specifications suit particular requirements and policy goals in European countries. By establishing best practices and a knowledge sharing network, we contribute to informed policy decision-making and to the success of auction implementations across Europe.

Target-oriented analysis: Through analysis of empirical experiences, experiments and simulation, we will create a flexible policy support tool that supports policy makers in deciding on the applicability of auction types and certain design specifications for their specific situation.

Capacity building activities: We undertake specific implementation cases to derive best practices and trigger knowledge sharing amongst Member States. We strive to create a strong network with workshops, webinars, bilateral meetings, newsletters, a website that will serve as capacity building platform for both policy makers and market participants (including project developers, auctioneers, etc.). Wherever required, we can set up specific bilateral and multilateral meetings on specific auction issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals.

Project consortium: eight renowned public institutions and private firms from five European countries and combines some of the leading energy policy experts in Europe, with an impressive track record of successful research and coordination projects.

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Alternative Energy Requirement in Ireland

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Project deliverable:

WP4 – Empirical aspects of auctions for RES-E: learning from real experiences

D4.1 – Country Studies

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1. Characteristics of auctions in Ireland

Table 1. Characterisation of auctions in Ireland

Characteristics	Description
Country characteristics	Ireland's high wind speeds (up to 3,000 annual full load hours for onshore wind) create favourable conditions for the development of wind power installations. The country has a target share of 16% energy from renewable energy sources (RES) in its gross final energy consumption by 2020. Its actual RES share stood at 7.8% in 2013. While its renewable electricity (RES-E) share of 20.9% in 2013 puts the country well on track for the 2020 target, additional efforts are required in the heating and cooling (RES-H&C) sector (eclareon et al., 2014). Ireland applied auctions in the RES sector between 1995-2003, and thus before the 2020 RES target was in place. The relevant policy target for the auction scheme was an additionally installed RES capacity of 75 MW by 1997, which was later extended by a further 100 MW by 1999 (Government of Ireland, 1996) and then to an additional 500 MW by 2005 (Government of Ireland, 1999).
Market characteristics	The Irish RES auctions took place at a time when electricity market liberalisation was in a very early stage. The Electricity Regulation Act of 1999 introduced a regulatory framework for competition in electricity production and distribution. Until then, ESB Customer Supply was the monopoly supplier of electricity in the country. The Act allowed green electricity suppliers full access to all electricity consumer groups, thus giving them preferential treatment over conventional "brown" electricity suppliers who were only allowed to sell to large consumers (>4GWh/a) (Ó Gallachóir et al., 2010). At the time, RES technologies – with the exception of hydro – were still immature and thus characterised by high risks and high investment costs. Demonstration projects had been installed in Ireland before the auction scheme, such as for instance the first large wind installation under the EU-financed VALOREN programme (IRENA, 2012). 6 MW of wind and 227 MW of hydro were installed in Ireland in 1995 (Eurostat). Outside of the auctions, it was also possible for RES demonstration projects to secure financing under the EU THERMIE programme, which offered 10-15 year PPAs (Ó Gallachóir, 2006). A total of 16.13 MW of wind installations and 0.55 MW of hydro installations were supported

Characteristics	Description
	under the THERMIE programme as of 2005. Another 200.5 MW of wind installations chose to sell their electricity on the Liberalised Green Electricity Market. It is worth noting that wind electricity sold to Green electricity suppliers is not subject to a premium rate but is sold at competitive prices. A significant portion of wind capacities installed in Ireland during the auction scheme was thus not incentivised by the auctions.
Name of auction scheme	The auction scheme, called the **Alternative Energy Requirement (AER) programme**, was initiated by the Irish government in 1993. Six rounds of auctions (AER I to AER VI) took place between 1995 and 2003.
Objectives	The main objective of the AER programme was RES deployment at least cost. However, some weight was also given to actor diversity, which was assumed to promote public acceptability, as well as to technology diversification.
Contracting authority	AER I, which took place prior to market liberalisation, was conducted by ESB, who was at the time the monopoly supplier of electricity in Ireland. Independent assessors (ETSU) helped ESB in implementing the auction. Subsequent auction rounds were held by ETSU on behalf of the Department responsible at the time: initially the Department of Public Enterprise, later the Department of Communications, Marine and Natural Resources and, since 2007, the Department of Communications, Energy and Natural Resources. Successful projects signed a PPA with ESB Customer Supply.
Main features	In all auction rounds, PPAs of up to 15 years were provided to successful bidders. Durations varied according to auction round and technology. The six auction rounds differed considerably concerning various auction design elements, including the type of auction (single vs. multiple item), the format of what bidders were competing for (support per kWh vs. capital grants per kW), and eligible technologies.
Year of introduction	The first round of auctions (AER I) was held in 1995.

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>Technology focus and differentiation</td><td>Auctions were technology-specific to varying degrees. The technology focus changed over the years. AER I, III, V, and VI were open to wind, hydro, and biomass technologies, with specific contingents (MW) foreseen for each category within the total deployment target. The importance of wind to the Irish RES sector is reflected in the high contingents foreseen for wind in these auction rounds. AER II was specifically aimed at waste incineration and biomass, while AER IV called for bids from CHP installations.</td></tr>
<tr><td>Lead time before auction</td><td>A few months up to over a year lay between the launch of each auction round and the announcement of the respective winners.
Timing of auction rounds AER I - VI. Source: DMNR, 2003.
<table>
<tr><th>Auction Round</th><th>Launch of auction</th><th>Winner announced</th></tr>
<tr><td>AER I</td><td>1994</td><td>April 1996</td></tr>
<tr><td>AER II</td><td>December 1995</td><td>February 1997</td></tr>
<tr><td>AER III</td><td>March 1997</td><td>April 1998</td></tr>
<tr><td>AER IV</td><td>September 1997</td><td>August 1998</td></tr>
<tr><td>AER V</td><td>May 2001</td><td>February 2002</td></tr>
<tr><td>AER VI</td><td>April 2003</td><td>July 2003</td></tr>
</table></td></tr>
<tr><td>Min. / max. size of project</td><td>Various size caps for single projects and for ownership (total size of all projects owned by one bidder) applied through the auction rounds. Overall size caps for onshore wind were lifted for AER V and AER VI to allow for large-scale wind farms. However, only projects of less than 3 MW (in AER V) or 5 MW (AER VI) could run in the small-scale wind category and thus profit from a higher ceiling price than larger wind projects. Offshore wind projects were capped at 25 MW (DMNR, 2003).</td></tr>
<tr><td>What is auctioned?</td><td>Capacity is auctioned.</td></tr>
<tr><td>Budgetary expenditures per auction and per year</td><td>The prices obtained by winning projects are deemed commercially-sensitive information. They are thus not publicly available. However, assuming that most projects bid at or close to the ceiling price, a rough estimate of annual PPA payments for projects contracted under AER VI is provided below, indicating that annual payments for the fleet of 226.2 MW realised under AER VI by the end of the construction deadline amount to around 35 million €.</td></tr>
</table>

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td></td><td>Estimate of annual PPA payments for projects realised under AER VI by June 2005
<table>
<tr><th>Technology category</th><th>Annual remuneration [€2015]</th></tr>
<tr><td>onshore wind</td><td>30,042,454</td></tr>
<tr><td>offshore wind</td><td>0</td></tr>
<tr><td>hydro</td><td>180,679</td></tr>
<tr><td>biomass</td><td>0</td></tr>
<tr><td>biomass AD</td><td>3,493,939</td></tr>
<tr><td>biomass CHP</td><td>1,295,303</td></tr>
<tr><td>sum</td><td>35,012,375</td></tr>
</table></td></tr>
<tr><td>Frequency of auctions</td><td>No long-term plan was announced for regular auctions over a longer time frame. New auction rounds were held according to the results and experiences gained from previous rounds.</td></tr>
<tr><td>Volume of the tender</td><td>Under AER I, AER III, and AER V, more capacities were contracted than originally aimed for, in order to still achieve the targeted amounts if some projects would not be realised.
Targeted, contracted, and realised volumes under AER I - VI. *overall target and overall projects awarded for AER V and AER VI combined. ** of which 7.5 MW and 167.9 MW still under construction as of June 2005, respectively.275 MW of wind were realised under AER VI eventually. Source: DMNR (2005a,b), Ó Gallachóir et al. (2006), Ó Gallachóir et al. (2010)
<table>
<tr><th>Auction Round</th><th>Target volume [MW] (of which wind [MW])</th><th>Volume awarded [MW]</th><th>Volume realised [MW] (of which wind [MW])</th></tr>
<tr><td>AER I</td><td>75 (30)</td><td>111</td><td>70.6 (46)</td></tr>
<tr><td>AER II</td><td>30</td><td>30</td><td>0</td></tr>
<tr><td>AER III</td><td>100 (90)</td><td>159</td><td>42.11 (38)</td></tr>
<tr><td>AER IV</td><td>35</td><td>52.6</td><td>18.4</td></tr>
<tr><td>AER V</td><td>255 (240)</td><td>365</td><td>50.85** (50.85)</td></tr>
<tr><td>AER VI</td><td>578* + 140 (433)</td><td>578* + 140</td><td>226.2** (214.8)</td></tr>
</table>
Under AER II one specific biomass project in north Dublin was auctioned and contracted, but finally not realised.

A total of 365 MW were contracted under AER V in early 2002, assuming that this would allow a comfortable achievement of the targeted 255 MW for this auction. However, the removal of (non-RES specific) tax incentives in 2003 threatened the realisation of some winning projects which had incorporated the tax incentive into their financing calculations.</td></tr>
</table>

Characteristics	Description
	To address this threat to investor confidence the winners of AER V were therefore allowed to submit a new bid for the same project under AER VI in April 2003 (DMNR, 2005b). The total target capacity of AER VI and AER V was set to be 578 MW. In July 2003, the winners of AER VI were announced, adding up to a total of 365 MW, of which 152 MW were from previous AER V projects. With 213 MW of projects remaining under AER V, the contracted capacities from the two auction rounds added up to the target 578 MW. An additional 140 MW were offered in a second AER VI round later that year specifically to small- and large-scale wind and biomass bidders.
Auction design elements	See Table 2

Design elements for the assessment of auction schemes for RES-E

Table 2. Design elements for the assessment of auction schemes for RES-E

<table>
<tr><th colspan="2">Design elements</th></tr>
<tr><td>Single- or multiple-item auctions</td><td>With the exception of AER II, all auction rounds were multiple-item auctions, with lowest bids accepted up to the required capacity. AER II was a single-item auction for one specific bio waste incineration plant.</td></tr>
<tr><td>Auction procedure</td><td>Auctions were held in a static sealed-bid type format.</td></tr>
<tr><td>Pricing rules</td><td>Pay-as-bid. The lowest prices in each technology category are awarded. The price criterion was the only criterion considered in the auction itself.</td></tr>
<tr><td>Ceiling price</td><td>Specific ceiling prices applied for the various technology categories participating in each auction round. Ceiling prices for AER VI are shown below.

Ceiling prices in AER VI. Source: DMNR, 2003.*indicative ceiling price for offshore wind. Applicants may bid higher but there is no guarantee that the auctioneer will accept a bid above the ceiling price even if it is the lowest bid.
<table>
<tr><th>Technology category</th><th>Price [€c/kWh]</th></tr>
<tr><td>large-scale wind</td><td>5.216</td></tr>
<tr><td>small-scale wind</td><td>5.742</td></tr>
<tr><td>offshore wind</td><td>8.4*</td></tr>
<tr><td>hydro</td><td>7.018</td></tr>
<tr><td>biomass</td><td>6.412</td></tr>
<tr><td>biomass AD</td><td>7</td></tr>
</table>
</td></tr>
</table>

Design elements		
	biomass CHP	7
Qualification criteria	Qualification criteria were added after initial problems in earlier auction rounds, mainly concerning permits and profitability of winning projects. After high non-realisation rates in AER III, bidding projects in AER V were required to have secured planning permission. Later auction rounds also required bidders to hand in an indicative cash flow statement showing that the proposed project could at least break even (DMNR, 2003).	
Penalties	The 15-year PPAs offered under AER V and AER VI will not extend beyond the end of 2018 and 2019 respectively. Projects which came online too late will therefore not be able to make use of the full duration of the contract. Similarly, the 10-year PPAs given to biomass CHP projects cannot exceed the end of 2016 (DMNR, 2003).	
Monitoring of realisation progress	The relevant Ministry continuously monitors progress. Where projects are not realised and the respective PPA is surrendered, the respective capacity is re-allocated to the reserve list of bidders which were not successful in the auction.	
Exceptions from requirements for small plants/developers?	The multi-technology auction rounds foresaw separate contingents for small-scale and large-scale onshore wind, with a higher ceiling price for small-scale installations. This measure is aimed at supporting small-scale developers who are assumed to not realise the same economies of scale as big developers. Big developers (those that have entered a large-scale wind project in the same auction, or have one contracted under a previous AER round) may not enter small projects in the small-scale category unless they bid prices which are below the ceiling price for large-scale wind (DMNR, 2003).	
Support auctioned	Capacity (MW) was auctioned. Successful projects received a PPA over 15 years with the (then monopoly-supplier) ESB Customer Supply. In AER I, bidders bid not for a per-kWh support but for a capital grant. The PPA was fixed at IR£0.04 (€0.051). Bids included capital grants of zero or even negative capital grants (Ó Gallachóir, 2006). In later rounds, bids were expressed as a fixed price per kWh. The price was foreseen to vary both seasonally and during the day, with the time-weighted average equal to the bid price (IRENA 2012, p. 95).), and with annual inflation adjustment over the contract duration. Winning bidders could opt for front loading, with higher payments in the early years of their PPA and lower payments later (DMNR, 2003). A fixed capital grant of IR£65 000 (€82 500)/MW was available to successful bidders from the European Regional Development Fund (Ó Gallachóir, 2006). However, as all bidders had access to the same	

Design elements	
	grant and reduced their bid prices accordingly, this had little effect on the overall support level.
Transferability of support right	No mention is made in auctioning documents on the transferability of support rights.

2. Evaluation criteria for the assessment of auction schemes for RES-E

Actor variety and social acceptability

According to AER VI auction documents, the “primary purpose of the small scale wind category is to increase awareness of and to encourage the deployment of the technology at the local community level thus, potentially, increasing the acceptability of the technology generally into the medium term and beyond. This aim will only succeed with direct local community participation” (DMNR, 2003, p.11). The auction is therefore specifically designed to take this criterion into account, with the regulator willing to pay higher prices to small projects.

Policy effectiveness (effectiveness of auctions)

The main shortcoming of the AER programme was its low effectiveness. In anticipation of non-realisation of some projects, more projects were contracted in most auction rounds than had originally been aimed for. However, this measure was not sufficient to bring realisation rates up to the desired levels. The auction rounds underperformed to varying degrees, but overall, only about a third of all contracted capacities had actually been installed by 2005 (IZES, 2014, DMNR, 2005).

For instance, AER III foresaw 100 MW to be awarded, of which 90 MW should have been from onshore wind. Overall, 159 MW were actually contracted in April 1998, of which 138 MW were wind projects. Especially the wind projects experienced severe delays in the realisation phase which was planned to end in December 1999, mainly due to difficulties in securing planning permissions. Even after having been granted a one-year extension period, only 38 MW of wind capacities were operational (Ó Gallachóir et al., 2006).

One factor hampering the realisation of projects were delays in solving issues related to wind energy grid integration, which constituted a severe barrier to grid connection especially in 2004. Similarly, delays in revising the Department of the Environment, Heritage and Local Government Wind Farm Guidelines, lead to many local authorities providing unclear development plans. Finally, the auctions themselves were partly delayed due to delays in securing State Aid approval from the European Commission (Ó Gallachóir et al., 2006).

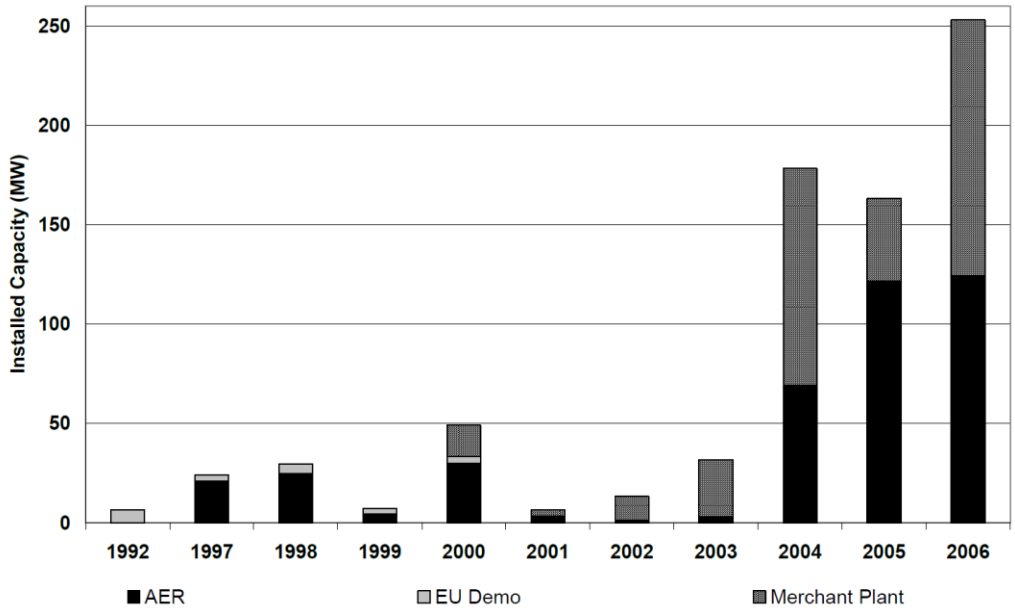

Figure 1: Capacity additions for wind power in Ireland. Source: Ó Gallachóir et al., 2010, p.115

At the same time, Figure 1 indicates that significant amounts of wind were installed outside of the AER scheme, mostly from merchant plants which had signed PPAs with green electricity suppliers.

Static efficiency or cost effectiveness (including transaction and administrative costs)

While static efficiency was one objective of the auction scheme, Irish policy makers followed parallel policy objectives, such as maintaining actor diversity. These presented trade-offs to the least-cost deployment of RES, at least in the short term:

- Technology-specific auctioning lead to not only the lowest-cost technologies being accepted. The largest part of targeted and contracted projects were large-scale onshore wind, which has lower costs relative to the other technologies. Nevertheless, contingencies were held for other, more costly technologies.
- Size- and actor-specific auctioning for onshore wind also causes higher costs in the short term.

Potentially detrimental effects to investor confidence, and thus to financing costs of RES, may have been created by:

- the lack of coordination between grid connection, permitting procedures, and the auctioning process;
- the fact that auctions took place at irregular intervals, with varying technology focus, and without a long-term schedule that would have allowed investors to plan on which auction to enter.
- the lack of coordination with other policies, i.e. the removal of a non-RES-related tax incentive which affected the profitability of RES plants contracted under AER V. A measure aimed at restoring investor confidence was to allow projects to place new bids in AER VI.

Dynamic efficiency

Technology- and size-specific support, mentioned above as reducing static efficiency, may potentially increase dynamic efficiency. Technology-specific support can help reduce deployment costs in the long term by encouraging technology learning, while the promotion of smaller, community-based actors can lead to less public resistance, thus providing better investor security.

Compatibility with market principles and integration

Winning projects signed a PPA covering their full income stream, and thus corresponding to a FIT.

Distributional effects & minimisation of support costs

An assessment of support costs resulting from the AER scheme is difficult to make, as the prices paid to individual contracted projects are deemed sensitive commercial information and are therefore not publicly available. However, a comparison of the last AER round's maximum prices with the guaranteed prices under the REFIT scheme that followed show that especially for large-scale onshore wind the prices paid under AER VI were relatively low. REFIT offers an administratively set guaranteed minimum price to RES power plants for 15 years and was introduced in 2006. The price figures indicate that the AER scheme actually performed well regarding the minimisation of support costs. However, its good performance in this criterion was one factor which negatively influenced effectiveness.

Table 3. Comparison of prices under AER VI and REFIT. Sources: Devitt and Malaguzzi Valeri (2011), DMNR (2003)

Technology category	AER VI ceiling price		REFIT guaranteed price 2006	
	[€$c_{nominal}$/kWh]	[€c_{2015}/kWh]	[€$c_{nominal}$/kWh]	[€c_{2015}/kWh]
large-scale wind	5.216	5.60	5.70	6.20
small-scale wind	5.742	6.16	5.90	6.42
hydro	7.018	7.53	7.20	7.83

3. Lessons learnt: key best practices and pitfalls identified

The main barriers that hindered deployment of the contracted capacities under the AER scheme lay in the surrounding framework conditions rather than in the auction design itself:

- Policy effectiveness, especially for onshore wind was severely reduced because of a misalignment between spatial planning policy and the auction-based AER support scheme. While part of the winning bidders in AER had difficulty obtaining planning permission and were thus not realised, there were at the same time significant potential wind park capacities (155 MW in 1999) holding planning permission but not an AER contract. Alignment with grid connection procedures was also an issue which led to severe delays and failure of projects. While such framework conditions should be

improved directly where they pose unnecessary barriers, they should also be taken into account in the auction design in the form of appropriate prequalification criteria.

- Confusion in the market was also created by the abolishment of the non-RES specific tax exemptions, which bidders under AER V had still taken into account. Care should be taken by policy makers to keep RES-specific and non-RES-specific policies aligned.
- The AER scheme lacked a reliable long-term schedule of when auction rounds were to be held. Its stop-and-go nature further contributed to its low effectiveness.

References

- Devitt, C., and Malaguzzi Valeri, L. (2011) The effect of REFIT on Irish Electricity Prices. Available at https://www.esri.ie/pubs/WP374.pdf
- DMNR (2003) Alternative Energy Requirement (AER VI – 2003) A Competition for Electricity Generation from Biomass, Hydro, and Wind. Available from: http://www.dmnr.ie
- DMNR (2005a) Alternative Energy Requirement Programme
- DMNR (2005b) Alternative Energy Requirement Programme - AER V & VI update
- EAI. Prices. Available at http://eaireland.com/the-single-electricity-market/prices.747.html
- eclareon, Fraunhofer ISI, TU Wien (2013) EU Tracking Roadmap2015 – Keeping track of renewable energy targets towards 2020. Available at http://keepontrack.eu/
- Government of Ireland (1996) Renewable Energy – A Strategy for the Future.
- Government of Ireland (1999) Green Paper on Sustainable Energy
- IZES (2014) Ausschreibungsmodelle für Wind Onshore: Erfahrungen im Ausland. Available at https://www.wind-energie.de/sites/default/files/download/publication/ausschreibungsmodelle-fuer-wind-onshore-erfahrungen-im-ausland/bwe_ausschreibungen_wind_onshore_endbericht_09-2014_final.pdf
- Office of the Information Commissioner, http://www.oic.gov.ie/en/Decisions/Decisions/Mr-Martin-Collins-and-the-Department-of-Communications -Marine-Natural-Resources-.html
- Ó Gallachóir, B.P., Bazilian, M., McKeogh, E.J. (2006). Moving from Competitive Tender to Feed-in Tariff - Wind Energy Policy in Ireland.
- Ó Gallachóir, B.P., Bazilian, M., McKeogh, E.J., Wind-Energy Policy Development in Ireland: A Critical Analysis. In: Strachan, Toke, and Lal (eds.) (2010), Wind Power and Power Politics. Routledge, Abingdon.
- SEI (2004) Renewable Energy in Ireland - Trends and Issues 1990-2002;
- Staudt, L.. Status and Prospects for Wind Energy in Ireland. Available at https://www.google.com/url?q=http://www.iwea.com/index.cfm/page/windenergyinireland%3FtwfId%3D35%26download%3Dtrue&sa=U&ved=0CAcQFjABahUKEwiJs7WeoKvIAhWBuoAKHW3BCYc&client=internal-uds-cse&usg=AFQjCNFLBPHV_21R2K3yM4KVbO4MYyaYcg