

NIRIG Paper on Over-installation

12th February 2016

The Northern Ireland Renewables Industry Group (NIRIG) is a joint collaboration between the Irish Wind Energy Association and RenewableUK. NIRIG represents the views of the large and small scale renewable electricity industry in Northern Ireland, providing a conduit for knowledge exchange, policy development support and consensus on best practice between all stakeholders in renewable electricity. Our membership has built, developed or owns the vast majority of renewables development in Northern Ireland.

Introduction

SONI and NIE do not permit over-installation in Wind Farm Power Stations (WFPS) and instead only allow the connection of WFPS with installed capacity up to but not exceeding the Maximum Export Capacity (MEC). Over-installation, in this context, is the installation of wind turbine generation units whose sum of rated capacities is greater than MEC. Over-installation presumes the installation of a control facility to prevent exported power from exceeding the contracted MEC. Over-installation leads to greater utilisation of new connection assets (i.e. more efficient investment) and more efficient use of the capacities of existing network assets which results in generation at lower cost to the mutual benefit of developers, network operators and consumers. Its prohibition restricts generator design which is contrary to Conditions 16 and 27 of the SONI Transmission and NIE Distribution licence obligations respectively to facilitate competition and efficient, co-ordinated and economical networks. There have been suggestions to adopt a policy of 120% over-installation (as a percentage of MEC) similar to Republic of Ireland's but NIRIG's view is that there is no necessity to put a limit on over-installation, which is a matter for the individual generators to consider. In GB there are no limits to the generating capacity which can be installed behind a connection point provided that the MEC is respected (and short circuit contribution is acceptable).

Reasons and Benefits of Over-installation

Over-installation means that when Available Active Power is greater than the MEC then power output is constrained to MEC by the generator's control facility. This results in lost output for the generator (when compared to an unconstrained connection), whose cost is assessed against the benefits arising from lower connection costs (compared with larger MEC = sum of unit rated capacities) and greater capacity factor (compared with lower no. of generating units to match MEC) which leads to greater export revenue.

An appropriate level of over-installation (as determined by the developer at his own risk) achieves cost-effectiveness through more efficient use of network assets. The developer is better placed to determine such cost-effectiveness than NIE or SONI because the developer has knowledge of his capex, opex and cost of capital. NIE and SONI do not have this information and so cannot determine what is efficient. The costs of network assets associated with a generation connection are based on the generator's MEC; the higher the MEC the higher the size/capacity/cost of network assets required. The costs of connection assets are fully funded by the generator and naturally he would like them to be fully utilised in the interest of efficient investment. The generator also pays Transmission Use of System (TUoS) charges based on its MEC and this is fair since the higher the MEC the higher the size/capacity/cost of transmission network assets required to manage the expected power flows. As the funder of the network assets the generator is entitled to pursue the least cost technically acceptable methods of connection and over-installation is one way of achieving this. Moreover, this results in mutual benefit to generators, network operators and consumers as it leads to lower costs for all parties. Beyond a certain level of over-installation the generator faces diminishing return due to increased output reduction compared to grid connection cost savings. For this reason, NIRIG does not see a need to set a limit on the level of over-installation which would be at the generators risk.

Practical Considerations for Developers

Projects seeking connection to the distribution network can now make grid connection applications and accept connection offers well before the planning permission consent and crucially, before finalisation of turbine selection. This process can give rise to a need to over-install. For instance, a grid connection application can be made on the basis of certain turbine (e.g. 2MW) in early development phase and before planning consent. Turbine selection is made much later in development cycle, at which stage planning constraints, known site data, new grid code requirements, unavailability of originally proposed wind turbines, availability of new better value turbines and other cost considerations can rule out the suitability of the originally proposed turbine and lead to a new turbine being selected (e.g. 2.2MW). In this case, rather than the generator applying for additional MEC or surrendering some MEC by reducing the number of turbines (thus reducing revenue), the generator could opt to over-install but limit the MEC to the contracted value.

Another practical consideration is that, due to cable and transformer electrical power losses between the turbine generator terminals and the connection point (which can be up to several percentage points of the generation capacity), the power export (measured at connection point) will be less than the total generation capacity (as measured at generator terminals), thus at the very least a developer is entitled to have a total generation capacity equal to the MEC plus an appropriate calculated power loss figure.

Hybrid Stations and Photovoltaic Generation Stations

Over-installation is necessary for hybrid generation stations, which can consist of different combinations of wind, photovoltaic (PV) and electrical storage modules connected to the grid via a single connection point. As the peak available active powers of the different technologies do not necessarily coincide in time, it does not make economic sense to set the MEC equal to the sum of the electrical power ratings of the modules of the different technologies. In fact the very reason why energy storage could be added is to help manage the export of the hybrid, wind or PV generation station such that a particular MEC (that is lower than the sum of ratings of the power modules installed) is not exceeded.

It is also common practice for PV generators in many parts of the world to set the capacity of PV modules (at Standard Test Conditions) greater than the inverter capacity, which is equivalent to over-installation and is done to optimise the return on investment. Clearly in such cases, it is not reasonable for SONI and NIE to insist that the total generation capacity of PV modules be no more than the MEC as this would be financially inefficient, to the detriment of consumers.

Network Operator Objections

There is a counter argument that has been used by network operators that over-installing the WFPS is unfairly increasing its capacity factor at the expense of other system users. NIRIG does not agree with this argument because there is nothing that binds a generator (including a WFPS) to operating at a pre-defined capacity factor. The generator pays for the network capacity regardless of his capacity factor and is entitled to extract maximum use the capacity. By over-installing, the WFPS is seeking to increase capacity utilisation, within the limits of its MEC. Conventional generators are free to increase their capacity utilisation (to the extent that it is subject to merit-order dispatch) without restriction. Demand customers face no restrictions on their capacity utilisation or installed capacity as long as they keep within their contracted import capacity. Preventing WFPS from increasing their capacity utilisation therefore appears to discriminate against wind technology. In addition, by limiting generation the capacity of renewable generators to less than or equal to MEC this is building in a structural constraint to the benefit of conventional generators, which is potentially inconsistent with Article 16 of the EU Directive 2009/EC/28 to minimise curtailment of renewable electricity.

Summary

NIRIG is of the view that a cap on installed capacity is inappropriate, unnecessary and hinders best practice engineering, reduces renewable investment potential and prevents the achievement of renewable energy targets at lowest cost. Over-installation allows more generation capacity for the same network assets facilitating grid connections at less cost to the benefit of the renewable energy industry, the system operators and the end users. Prohibition of over-installation is therefore contrary to SONI Transmission and NIE Distribution licence obligations to facilitate competition and efficient, co-ordinated and economical networks. Given the proposed termination of renewable support, it is imperative that renewable energy developers are allowed, rather than hindered, to consider options that allow them to achieve viable investment and over-installation is one such key option. Due to important practical considerations during development phase, wind farm, PV or hybrid generation (with the possibility of energy storage to be added to each of these) MEC cannot always match generator capacity thus making over-installation a necessary tool. Conventional generation and demand connectees do not face restrictions in terms of their installed capacity and capacity utilisation, thus any policy that prevents over-installation amounts to discrimination against renewable generation technologies, contrary to EU law and SONI Transmission and NIE Distribution licence obligations.

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