Improving Access to the WP Network

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Submission on Technical Paper by Kenneth Clark, 2nd Sept 2018

Summary

The technical paper recommends that the operational mode of all power suppliers (without exception) be changed to 'constrained' mode rather than 'unconstrained', For historical reasons, many large coal and gas-fired power stations are currently allowed to operate in 'unconstrained' modem which limits network capacity to other generators and reduced system flexibility.

The goals include the provision of better access to the SWIS grid (including for renewable suppliers) and the reduction of the need to upgrade the existing network. All existing unconstrained suppliers would be compensated for loss of this feature and all new suppliers would operate in constrained mode.

The paper touches on the desirability of more renewable energy but barely considers any steps required to make renewable energy projects viable. While the cost of power produced by a coal or gas power station is mainly made up of fuel costs with capital servicing costs amounting to as low as 10% of the total power cost, the cost of power for a solar or wind power station is almost entirely due to the capital cost of the equipment and system. This means that such stations must operate completely unconstrained to be viable. Also, long term power prices must be arranged before any such project can be justified.

Because of the different power cost structure of coal and gas power stations these can operate in constrained mode with much lower downside, as, when such a power station must be operated at reduced load, only the capital service costs and fixed operating costs need to be compensated for. These are lower (on a unit basis) than the costs for a renewable energy power station.

The main objective is seen as the minimisation of any new transmission upgrades on the SWIS network, as the costs of any such upgrade are very high. This assumption does to equate with actual experience of new transmission systems in recent years as costs of such systems have fallen world-wide.

Recommendations

1. Renewable Energy power stations, including wind, solar and biogas stations should operate fully unconstrained.
2. WP should be proactive in determining suitable locations and ratings of new renewable energy power stations rather than operating in a purely reactive mode.
3. The computer model for the SWIS network should be made available to any potential power station developers to allow them to analyse the network and determine the viability of such new projects. This is common practice with the power authorities of many other countries and no commercial confidentiality issues are seen. (If Recommendation 2 is carried out, this recommendation becomes less significant). WP

would still carry the ultimate responsibility for the approval of new power projects, but considerable time and cost can be saved by this approach.

4. Load shedding techniques should be developed whereby non-essential domestic and industrial loads are shed by remote control when spinning reserves become inadequate.

Discussion

Operation of Renewable Energy Power Stations

The world-wide costs of fuel such as coal, oil and gas are very low at this time for several reasons, but we cannot assume that these conditions will continue. Already there are indications that fuel prices are increasing. As fuel costs make up around 70% of the costs of electricity production from a thermal power station it can be expected that power costs to the consumer will continue to escalate. This is a valid reason for encouraging the construction of new renewable power stations, apart from international commitments and the general desirability of reducing greenhouse gases.

Even when some form of energy storage is installed, such power stations are only economic when every kWh is utilised usefully. Maintenance and operating costs are small but capital serving costs are large so these power stations must be operated continuously and any form of restriction such as that proposed in the technical paper should be avoided.

Site Selection of Renewable Energy Power Stations

At present,it is incumbent on the power station developer to analyse the economics of a particular location, taking into account wind speed, solar radiation and the capacity of the SWIS transmission system at the selected location. This involve considerable work and cost which can be made valueless if WP determine that the local transmission system is inadequate or that the transmission network must be upgraded as part of the project. A new HV substation would have a considerable cost which may make the project unviable.

Under the existing approval system, WP acts in a reactive mode and does not offer guidance on appropriate renewable energy power station sites.but responds to proposals from project developers which may be based on inadequate information.

In the light of the fact that WP has considerable inhouse information about solar and wind resources and has all of the information on transmission system capacities, it seems desirable that WP takes the lead in the determination of the best sites and makes this information available to any developers. These can then carry the site analysis further as necessary to create a viable project. As well as descriptions of each site, data as to the capacity restrictions on the SWIS network should be published. This will eliminate a considerable amount of work for the developers and will speed up each renewable energy project.

Provision of DigSilent SWIS Model

A time-saving measure would be for WP to make the SWIS computerised system model available to project developers This would enable each developer to analyse the SWIS network themselves and hence to determine the viability of each location. This is done in

other countries with success and appears to have no downside. However, if WP takes the lead in analysing potential power station locations, this proposal would have less value.

Non-Essential Load Shedding.

Commonly, load shedding by power utility companies is carried out using underfrequency relays which remove power from wide areas of a network when generators are overloaded and the network frequency falls. This is generally considered to be a last resort and power authorities avoid this technique whenever possible. However, there are some loads which may be shed with little or no ill effect such as domestic water heating. Remotely controlled switches can be installed which allow the disconnection of water heaters when spinning reserves become inadequate, and in this case, the rating of the water heater can be added to the spinning reserve. The cost of such a system would be low, and techniques and equipment for carrying out such a scheme are widely available. In particular, a system of this nature would have considerable value in conjunction with renewable energy power generation systems, where generation capacity is reduced when, for instance, a cloud passes over the sun at a solar power station.