TLAFs – Results of Analysis Based on Enhanced Granularity over a Representative Week

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BACKGROUND

The RAs indicated in a decision paper dated 14 February 2011 (and originally circulated to the TSOs as draft in October 2010) that they wanted to investigate the implications of splitting the use of TLAFs in the Market from their use in the actual generation dispatch. The RA's paper specifically highlighted two main activities for the TSOs to investigate:

1. The impact of enhanced TLAF granularity on
    a. Production Costs
    b. Losses
    c. Dispatch balancing costs
2. The system enhancements required to utilise TLAFs in the generation dispatch.

The TLAFs currently in use in SEM are a mechanism that provides a form of locational pricing for generators. The TLAFs take into account the system losses driven by each generator in the price of its energy i.e. the higher the system losses seen by a generator, the higher the price of its energy. In this study it is not the TSOs' intent to change the current TLAF calculation methodology but to modify how they are used.

When an optimised cost of production is calculated the losses are taken into account in that the cost of providing the energy required to service the losses is optimised. Note: there is no attempt at minimising the actual losses only the overall production cost as larger losses at low cost may be more efficient than low losses at high cost.

If the energy prices used in the optimisation process associated with real time generator dispatch are different to the bid prices used in the market the dispatch balancing costs will be different i.e. if the prices are higher in real time dispatch the dispatch balancing costs will also be higher. Again, if the overall production cost has been optimised the dispatch balancing costs likewise will also have been properly accounted for.

TSO PROPOSALS

Item1

The TSOs tabled their initial proposal aimed at addressing item 1 on 30 November 2010. This proposal suggested the calculation of the following TLAFs to facilitate a wide ranging analysis of TLAF splitting:

Monthly day/night TLAFs for a full year (24 TLAFs in total)

Weekly day/night TLAFs (104 TLAFs in total)

2, 4 and 6 TLAFs per day for a single representative week (84 TLAFs in total).

The production costs associated with the above TLAFs groups were to be compared to see if the more granular approach to TLAFs reduces production costs.

The RAs advised us that they believed the proposed scope as outlined above was too wide-ranging for completion in timely fashion, in line with their requirements. The RAs suggested a reduction in scope at a meeting with the TSOs on week beginning 31 January 2011. A letter of understanding detailing exactly what the TSOs would provide along with a timeline was provided to the RAs on 14 Feb 2011. This work can be summarised as follows:

> Monthly day/night TLAFs for tariff year 2011/12 (24 TLAFs to facilitate the RAs' market analysis)
>
> 2, 4 and 6 TLAFs per day for a single representative week (84 TLAFs to facilitate TSO analysis).

In addition, historical TLAFs for the four tariff years 2007/08 to 2010/11 were provided to the RAs for their market analysis. The indicative timeline to complete this was 26 weeks based on non-automated processing. However, it was indicated to the RAs that automation of key elements may be feasible, which would lead to a reduction in the timeframe.

Item 2

In order to ensure that the TSOs would be capable of dealing with the increased granularity of TLAFs it was agreed with the RAs that the proposal for item 2 would be expedited in parallel with work on item 1. Changes to RCUC have been specified that will allow a different TLAF for every trading period and these will be available, assuming a successful conclusion to the currently ongoing Factory Acceptance Tests, in the October 2011 market release (generally this is sometime *during* October).

TLAF PROCESS

The TSO analysis process for a single representative week is shown in Figure 1.

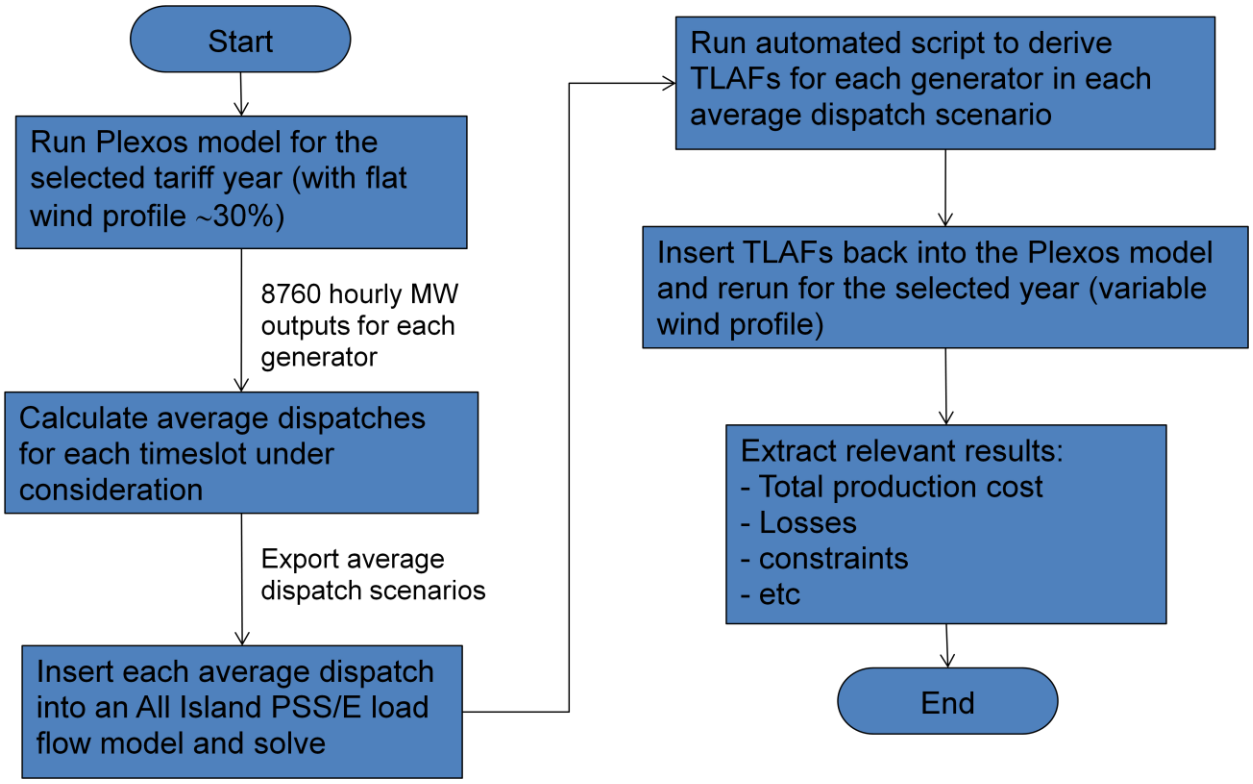

Figure 1: TLAF Splitting Analysis Process

Since the input assumptions are likely to be made several days (up to a month) ahead of real time, certain variables will inevitably be subject to forecast error. The main areas of potential forecast inaccuracies are:

Wind –	In the absence of a forecast the wind assumptions will inevitably be the least accurate assumption. A flat wind profile equivalent to the anticipated average output may be used in lieu),
Generator availability –	A generator may be available in the input assumptions but become unavailable in real-time,
Transmission outages –	Key outages may be rescheduled, leading to a divergence between the input assumptions and actual system operation.

The input assumptions utilised in the TSO analysis assumed a flat wind profile of 30%.

RESULTS

Having calculated a set of locational TLAFs, following the procedure outlined in Figure 1, these where applied to a more realistic Plexos model. This model included a realistic wind profile based on historical performance and the generation availability was aligned with the input assumptions. The model was rerun several times, each time varying the average wind penetration. The results of the analysis are summarised in Figures 2 and 3.

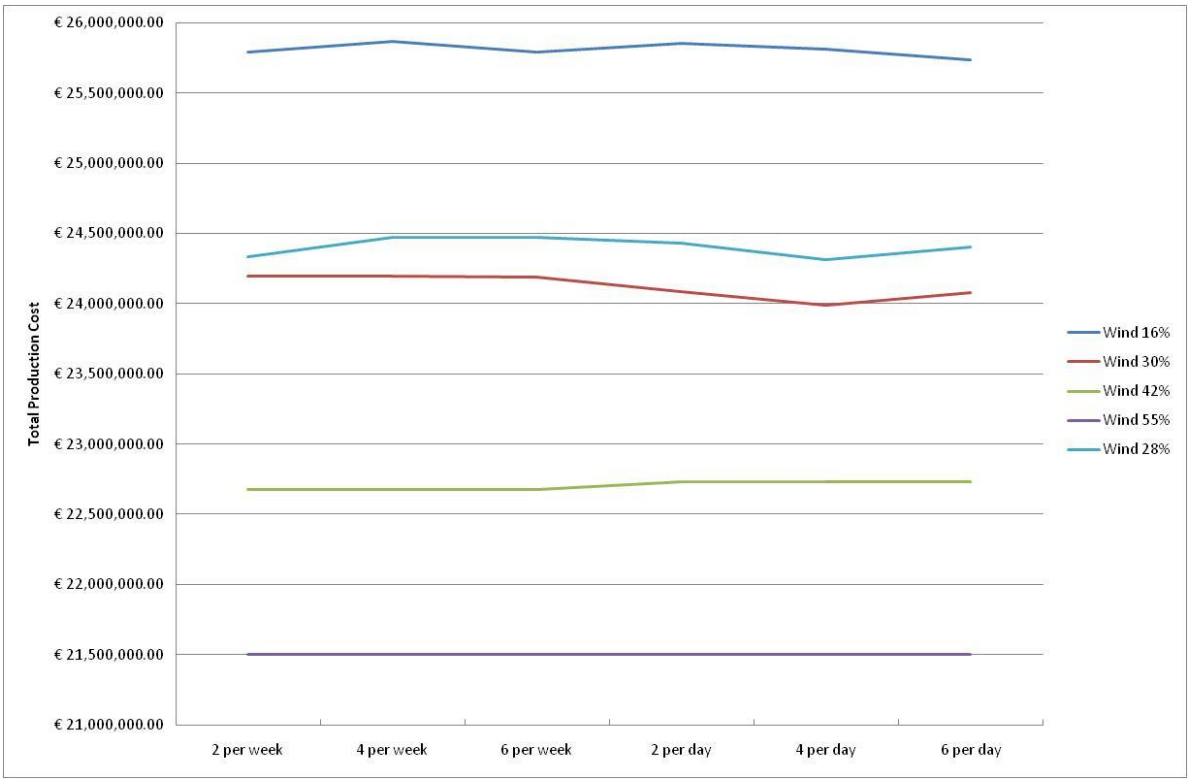

Figure 2: Total Production Costs V's TLAF granularity

Figure 2 shows the total production costs against increasing TLAF granularity. It can be seen that the absolute impact is relatively insignificant. It would also appear that there is no distinct certainty that total production costs are always reduced by increasing the granularity of the TLAFs used. Figure 3 indicates the relative impacts of increasing TLAF granularity against a baseline of 2 TLAFs per week. This clearly indicates that the only case benefitting from increased TLAF granularity is the case with an average 30% wind production, i.e. with an average level of wind penetration equal to the level used for the input assumptions. All scenarios using other levels of wind actual wind penetration did not see a consistent benefit by utilising increased TLAF granularity.

It must be stressed that the example used in this analysis only covered a single week. However, it would seem intuitively correct that the TLAFs used in dispatch are most relevant when they are produced using assumptions reflective of actual system operation. Nonetheless, it cannot necessarily be assumed that a similar pattern of results would be observed in other weeks.

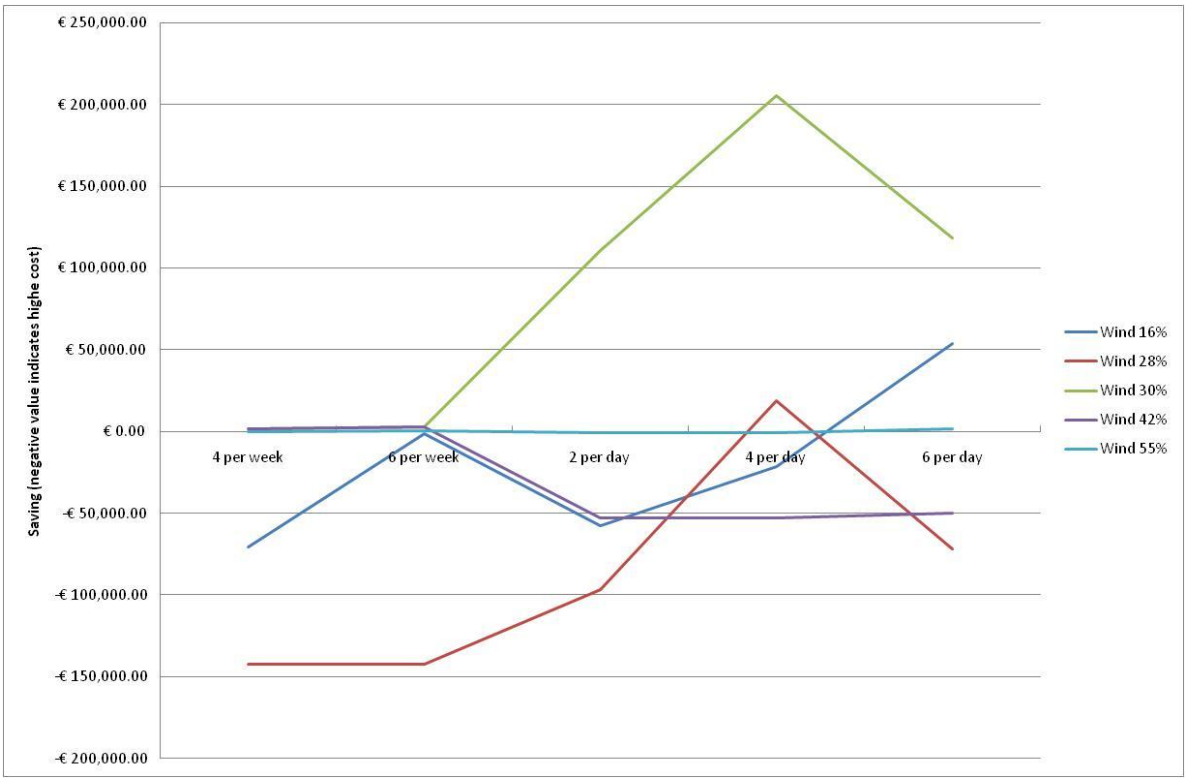

Figure 3: Potential losses/savings in Production costs against a base of 2 TLAFs per week

CONCLUSIONS

The outcomes discussed in this paper are only based on analysis of a single week (further analysis could include various scenarios based on a longer timeframe up to and including an entire year and the use of several different wind profiles). However, from the work undertaken the TSOs would conclude that, with the current TLAF calculation process, the use of more granular TLAFs in dispatch would not be likely to provide any material benefits, for the following reasons:

1. The TLAFs used need to be representative of the actual generation and system conditions at all times.
2. The biggest issue would appear to be around the variability of wind as this affects the generation portfolio which in turn impacts TLAFS – to capture this, TLAFs would have to be calculated very close to real time.

3. The mechanisms/processes required to produce close to real time information and turn this data into TLAFs do not exist and would require a large IT & engineering project with an ongoing resource requirement for production.

Finally, it is worth noting that the use of Security Constrained Unit Commitment and/or Security Constrained Economic Dispatch software in real-time may provide an alternative option for day ahead and in-day production cost optimisation including the cost of supplying transmission losses. These are however very complex (and costly) IT systems and investigating the feasibility of procuring, configuring and integrating them into the real-time environment would be a significant undertaking in and of itself.