

# Chapter 9: Technical Offer Data

# Technical Offer Data – 1/8

- Validation Technical Offer Data (VTOD) is data which represents how a unit can physically operate:
  - This data also needs to comply with Grid Code requirements on reflecting the real capabilities of the unit.
- VTOD is used for:
  - Scheduling and dispatch (in order to model units in a way which reflects how they can operate so that unit schedules and dispatch instructions are physically feasible according to TOD); and
  - Instruction profiling (calculate the Dispatch Quantity minute-by-minute profile which reflects the generation that the unit should have done to meet its dispatch instruction according to what it stated it could do, used to calculate Balancing Market quantities).
- Up to 6 sets of VTOD can be submitted for a unit through a Validation Technical Offer Data Transaction, with the set to be used for a particular Trading Day being submitted through a Validation Data Set Number Transaction;
- These transactions have different timelines required for validation.

## Technical Offer Data – 2/8

- Validation Technical Offer Data (VTOD) Set transaction:
  - Less-regular, submission of a set of all discrete data items to give an updated, or a new alternative, representation of how the unit can physically operate;
  - Requires in-depth validation to ensure the unit can physically operate in this way, including TSO approval time up to 10 Working Days from the date of submission;
  - MO approval time up to 1 Working Day following notification of SO response;
  - Up to 6 Validation Data Sets can be submitted per unit;
  - Each set needs to be reviewed and updated as necessary at least once every three months;
  - Data must be net of Unit Load but not scaled by any Distribution Loss Adjustment Factor.

## Technical Offer Data – 3/8

- Validation Data Set (VDS) Number transaction accommodated up to 10 minutes prior to GC1:
  - Discrete data items already validated and approved: this transaction is the more regular submission to the MO and TSOs to state which approved VTOD set to use for a Trading Day;
  - 10 minutes required, like today, to allow for requirements in the system to stagger events to allow for sufficient time for all processes relating to this data in advance of Gate Closure;
  - Some allowances to submit after that for Emergency Communications, e.g. if Day-ahead Market Fallback Procedures are initiated because the Participant could not know their ex-ante trading results until after GC1;
  - Transaction is only submitting the set number from 1 to 6 depending on how many VDS' submitted for the Unit;
  - VDS Number 1 is the “default” set, used if no others chosen for Trading Day.

# Technical Offer Data – 4/8

TOD element submission by unit type:

Data Element	Battery/Pump Storage Unit	Demand Side Unit	Other Dispatchable Units
Min On / Off Time, Max On Time.	Must Submit	Does not Submit	Must Submit
Hot / Warm / Cold Start Up Times, Costs, and Boundaries.	Must Submit	Does not Submit	Must Submit
Hot / Warm / Cold Block Load and Flag.	Must Submit	Does not Submit	Must Submit
Deload Rates and Break Points.	Must Submit	Does not Submit	Must Submit
Dwell Time Up and Down Duration and Trigger Points.	Must Submit	Does not Submit	Must Submit
End Point of Start Up Period.	Must Submit	Does not Submit	Must Submit
Hot / Warm / Cold Load Up Rates and Break Points.	Must Submit	Does not Submit	Must Submit
Ramp Up and Down Rates and Break Points.	Must Submit	Does not Submit	Must Submit
Hot / Warm / Cold Soak Time Durations and Trigger Points.	Must Submit	Does not Submit	Must Submit
Restricted Range.	Must Submit	Does not Submit	Must Submit
Hot / Warm / Cold Block Load and Flag.	Must Submit	Does not Submit	Must Submit
Short Term Maximisation Capability and Time.	Must Submit	Does not Submit	Must Submit
Registered Minimum Stable Generation.	Must Submit	Does not Submit	Must Submit
Registered Minimum Output.	Must Submit	Does not Submit	Must Submit
Storage Efficiency and Capacity	Must Submit	Does not Submit	Does not Submit
Pump Storage Timings.	Pump, not Battery	Does not Submit	Does not Submit
	Validation Registration Data	Does not Submit	Does not Submit
Max / Min Storage Quantity.	Does not Submit	Must Submit	Does not Submit
Max Ramp Up and Down Rate.	Does not Submit	Must Submit	Does not Submit
Max and Min Down Time.	Does not Submit	Must Submit	Does not Submit

 **Must Submit**  
 **Does not Submit**

# Technical Offer Data – 5/8

TOD element physical meaning:

Data Element	Physical Phenomenon Represented
Hot / Warm / Cold Start Up Times, Costs, and Boundaries.	The number of hours the unit must be off to move between warmth states, and for each warmth state the cost of starting up the unit, and the number of hours notice between the instruction issue and instruction effective time in the synchronise instruction to start up.
Hot / Warm / Cold Block Load and Flag.	For each warmth state, whether or not the unit synchronises at a MW output level other than zero, and if so, the MW output at which the unit is running when it synchronises to the grid.
Deload Rates and Break Points.	When a unit is generating less over time after being issued an instruction to desynchronise, for the output range of the unit between its Minimum Stable Generation level and zero, the rate at which it can decrease its generation over time, and the MW output points at which this rate changes.
End Point of Start Up Period.	The time after which the rate of change of the Generating Unit Output is not dependent upon the initial Warmth of the Generating Unit.
Hot / Warm / Cold Load Up Rates and Break Points.	When a unit is generating more over time after being issued an instruction to synchronise, for the output range of the unit between zero and its Minimum Stable Generation level, the rate at which it can increase its generation over time, and the MW output points at which this rate changes.
Hot / Warm / Cold Soak Time Durations and Trigger Points.	At certain MW output points for the output range between zero and its Minimum Stable Generation level, a unit may not be able to continue increasing their generation, needing to stay at a constant output level for a duration (for example to allow equipment to warm up), these are the MW trigger points at which this needs to happen and the period of time for which output needs to be maintained at this MW output level.

# Technical Offer Data – 6/8

TOD element physical meaning:

Data Element	Physical Phenomenon Represented
Min On Time, Min Off Time, Max On Time.	Minimum time a unit must be kept dispatched on (synchronised) before they can have their dispatch ended (i.e. be desynchronised), starting from the time they are synchronised. Minimum time a unit must be kept dispatched off (desynchronised) before they can be dispatched on again (i.e. be synchronised), starting from the time they are desynchronised. Maximum Time a unit can be kept dispatched on (synchronised) before they must be dispatched off (desynchronised), starting from the time they are synchronised and ending at the time they are desynchronised.
Dwell Time Up and Down Duration and Trigger Points.	At certain MW output points for the output range between its Minimum Stable Generation level and Maximum Capacity, a unit may not be able to continue increasing (for dwell time up) or decreasing (for dwell time down) their generation, needing to stay at a constant output level for a duration (for example to allow equipment to warm up or cool down), these are the MW trigger points at which this needs to happen and the period of time for which output needs to be maintained at this MW output level.
Ramp Up and Down Rates and Break Points.	When a unit is generating more/less over time after being issued an instruction to change its output level, for the output range of the unit between its Minimum Stable Generation level and its Maximum Capacity, the rate at which it can increase /decrease its generation over time, and the MW output points at which this rate changes.
Restricted Range.	A part of a unit's output range where they can ramp up or down through, but within which they cannot be dispatched to sustain a MW output level ,for example for operational safety or mechanical reasons.
Max Ramp Up and Down Rate.	Simplified ramping model for DSUs, with a single rate to be met up or down.
Max and Min Down Time.	Minimum / maximum time DSUs can be dispatched down before they can / must have their dispatch ended.

# Technical Offer Data – 7/8

TOD element physical meaning:

Data Element	Physical Phenomenon Represented
Short Term Maximisation Capability and Time.	In rare situations a unit may be issued a Maximisation Instruction, where the unit may be asked to generate above their maximum capacity for a period of time. These variables allow the unit to state to what level can they generate above their stated sustainable maximum, and the time period over which they can sustain it, to feed into the dispatch and instruction profiling when these instructions are needed and issued.
Registered Minimum Stable Generation.	The minimum generation output level which can be sustained by the unit, this value is used as the minimum output level required of a unit when they are committed to synchronise to the system.
Registered Minimum Output.	The minimum possible level of output for the unit, which for most units must be zero unless they are storage units, in which case they can operate in the negative output range when pumping or charging.
Storage Efficiency, Capacity and Max/Min Quantity.	Represent the maximum and minimum storage capacities, and instantaneous output capacities, to prevent scheduling and dispatch to output levels and the increase or decrease in stored energy amounts over time which cannot be safely physically accommodated, e.g. reservoir levels; Efficiency values to reflect the energy amounts lost between the unit storing (through pumping or charging) and generating, allowing the TSO to more accurately track the energy storage remaining in the unit – more energy is needed in pumping or charging to store the water or electric charge than will be available in generation through the discharge that water or electric charge, and this efficiency gives the relationship between those storage and generation energy amounts.
Pump Storage Timings.	Times required to wait between certain events to allow for pumped storage units to be operated correctly



# Technical Offer Data – 8/8

- Specific TOD for Battery and Pumped Storage Units:
  - In general, Battery Storage Units are modelled in systems as a Pumped Storage Unit, with the same terminology in the Technical Specification, but in the TSC they are a separate unit category and separate terminology mirroring Pumped Storage Unit data is used;
  - Submit data which represent the maximum / minimum stored energy requirements, and maximum / minimum instantaneous output capacity requirements.
  - The scheduling optimisation takes this data into account by not scheduling the unit to charge or discharge to the extent that it would exceed its energy storage requirements (for example if reservoir levels need to be safely physically accommodated), and not scheduling the unit to instantaneous power generation output or storage consumption levels which are not physically possible;
  - If multiple units use the same storage source, the max storage quantity needs to be submitted as the same value for each unit (all units must have the same value for min storage quantity also);
  - Efficiency values to reflect the energy amounts lost between the unit storing (through pumping or charging) and generating, allowing the SOs to more accurately track the energy storage remaining in the unit, so that they do not discharge the units for more than the actual energy available following the amount of energy lost in the process;
  - For Pumped only, “Off to Generating Time”, “Off to Spin Pump Time” and “Spin Pump to Pumping Energy Time” used in scheduling and dispatch, not in calculation of market quantities.
- Specific TOD for Demand Side Units:
  - More simplified representation of ramping;
  - “Down” time modelled rather than “On” time.