

ESR Operational Metering, Commissioning Assessment and Testing Guidance

Operational Metering Requirements

- Frequency (Hz);
- Voltage (kV);
- Availability (Available/Unavailable);
- Active Power Output (MW);
- Reactive Power Output (MVar);
- For Contracted Top Up Plant comprising wind turbines, wind speed forecasts and observations (ms⁻¹) and wind direction forecasts and observations (degrees);
- For Contracted Top Up Plant comprising hydro-electric plant, the upper reservoir limits.

The Commissioning Assessment

This will aim to demonstrate that with and without external power supplies to all or part of the ESR Service Provider, the restoration Auxiliary Unit(s) can be independently started and in turn allow the reliable start-up of the Main Unit(s) in the manner (including without limitation within the timescales) required by the technical parameters.

Part A – Auxiliary Unit(s) – Demonstration of Capability (where applicable)

1. 3 Consecutive starts/shutdowns
2. Start sequence initiated and interrupted before Full Speed No Load (FSNL)
3. Start sequence initiated and interrupted at FSNL
4. Start sequence initiated and allowed to complete
5. Prove that the Main Unit(s) can revert to normal operation and the Auxiliary Unit(s) removed from service.
6. Safe shutdown of the Auxiliary Unit(s): No external supplies are to be provided to the Auxiliary Unit(s) during the Commissioning Assessment and activities shall be conducted consecutively and without delay between shutdowns and restarts.

The above shall also apply for Contracted Top Up Plant, with the difference of auxiliary supplies being from the TO/DNO supply.

Part B – Demonstration of Electricity System Restoration (ESR) Capability (where applicable)

1. Remove all external supplies from the ESR Service Provider.
2. Re-start the power generating module/facility.
3. Energise a pre-isolated bus bar at point of connection onto to the Network (example: isolated bus bar 400kV substation) by dead bar close of the relevant Circuit Breaker.
4. Energise a pre-isolated circuit of the network out of the relevant substation.
5. Synchronise to an adjacent power island.



For Contracted Top Up Plant:

1. Remove all external supplies from the Contracted Top Up Plant.
2. Restart the Contracted Top Up Plant LV supplies and its related monitor, control and other relevant equipment, needed for the Contracted Top Up Plant to reach a position of readiness to connect to the Network or power island.
3. Simulate the restoration of external supplies by energising the station busbar at the point of connection onto to the Network, from the upstream Network side.
4. Synchronise the Contracted Top Up Plant to the Network or power island. Total time to restore supplies, start up and synchronise to the Network shall not exceed 2h.

Part C – Electricity System Restoration Telephony Systems

Check the resilience of internal communication systems across the power generating module/facility (example: radio system from the local Control Room to field staff); Part C requirements shall also apply for Contracted Top Up Plant.

Part D – Local Joint Restoration Plan (LJRP) –

Desktop Exercise Plan agreed between the Power Station, System Operator and Transmission Owner. A Contracted Top Up Plant does not form part of an LJRP; it is instead part of the regional ESR strategy, applicable to the area where the given Contracted Top Up Plant is located, and any adjacent areas planned to receive generation by the Contracted Top Up Plant, under an ESR event.

A separate document, similar to an LJRP, to outline comms between all parties and internal processes, will also be drafted for each Contracted Top Up Plant.

Further Guidance Around Testing:

Approach followed by NESO on Dead Line Charge (DLC) and Remote Synchronisation (RST) tests. These tests shall not apply for Contracted Top Up Plant, see Part B above for Contracted Top Up Plant testing.

1. A DLC and a RST will always happen in conjunction with a ESR Capability Assessment(s);
2. A test will with a “normal” Electricity System Restoration (ESR) capability assessment: all electrical external supplies removed, and Provider expected to be ready to re-energise part of the network within 2h post blackout event;
3. DLC Test: re-energisation of part of the network, either via a soft energisation with part of the Network already pre-switched or via a step-by-step approach with one circuit breaker switched at a time.
4. RST Test: re-synchronisation of the power island created by the ESR Service Provider onto GB via a PSS, equipment similar to a Unit’s synchroniser but located at a remote substation, owned and operated by the relevant Transmission Owner (TO).

A. Timings for each test:

1. ESR Capability Assessment: period of time needed by the ESR Service Provider to restart its equipment after a blackout event and reach a position where it can re-energise (@0MW) part of a dead Network. Expected to take up to 2 hours.

2. DLC Test: period of time needed to re-energise part of the Network. The moment a ESR Service Provider successfully energises a dead bar at the local Network substation is the moment ESR capability test ends and the DLC Test starts. Expected to take up to 1/2 hour.
3. RST Test: once the DLC is completed, period of time needed to re-synchronise the power island created by the ESR Service Provider onto GB. Expected to take up to 1/2 hour;
4. **Total time needed:** $\geq 3h$ (2h+1/2h+1/2h).

B. Comments:

- When progressing with a DLC and RST test, NESO will typically pursue the re-energisation of the preferred restoration route agreed under the relevant Local Joint Restoration Plan (LJRP);
- Providers are expected to run on their Auxiliary Generation for the entire duration of the tests: ESR Capability Assessment, DLC and RST;
- If the Provider has multiple Units contracted for the provision of the Service but can reach the contracted figures with just one, NESO will pursue a DLC and the RST with just one unit. All other contracted Units shall progress with a ESR capability assessment only.
- NESO is expecting to progress with two DLC and RST tests throughout the Contract Term, always in combination/at the same time as the ESR Capability Assessment:
 - Test 1 (Commissioning Assessment): 1 or more ESR Capability Tests (depending on the number of Units contracted, and considering the comments above) + 1 DLC + 1 RST;
 - Test 2 (three years later): 1 or more ESR Capability Tests (depending on the number of Units contracted, and considering the comments above) + 1 DLC + 1 RST;

Notes:

*if you can deliver against the contracted figures with just one Unit and have multiple Units contracted for the Service, you have the option to progress with the "other" related ESR Capability Assessment(s) on the same day or on different days, with the comments above in mind and following the guidance shared previously around the expected **Testing Regime**. Confirmation of time of day shall align with the expected Testing Regime.*

Testing Regime

The Commissioning Assessment and Capability Assessment to be progressed at a date, or dates, suggested by the Electricity System Restoration (ESR) Service Provider. The testing regime requirement is applicable to all ESR service providers connected to either transmission or distribution networks. The below Testing Regime requirements shall also apply for Contracted Top Up Plant.

Dates:

Commissioning Assessment:

- i. To be progressed on Year 0 and ahead of the service commencement.
- ii. ESR Service Provider to suggest/submit a minimum of 3 sets of dates to NESO, each set consisting of 2 consecutive days (day 1/preferred, day 2/backup).
- iii. NESO to choose one of the sets.

Capability Assessment on Year 3 (n) of the contract:

- i. ESR Service Provider to suggest/submit to NESO, between weeks 35 and 38 on Year 2 (n-1), a minimum of 3 sets of dates for the Capability Assessment to be progressed sometime within Year 3 (n).
- ii. Each set of dates consisting of up to 7 consecutive days.
- iii. NESO to choose one of the sets.
- iv. At least 7 calendar days ahead of the first day of the set chosen by NESO to progress with the ESR Capability Assessment, the ESR Service Provider to inform (firm) preferred & backup test dates (consecutive days);
- v. If the test needs to be postponed due to any unforeseen system issue a new date shall be agreed within the 10 working days immediately after the backup test date between NESO and the Provider.

NESO's expectations around the dates suggested by each ESR Service Provider:

- Any day of the week/weekends.
- Test Period: ≥ 3 hours between 10:00 – 16:00 (this time-period with the option of being reviewed/adjusted by NESO and/or Provider to accommodate any potential uncertainty. If any dispute arises, 10:00 – 16:00 will withstand).

Commissioning Assessment (Example, assuming contracted capability able to be delivered by just Unit 1)	TYPE OF TEST		TYPE OF TEST		TYPE OF TEST		
	ESR Cap. Assess.	$\leq 2h$	ESR Cap. Assess.	2h		ESR Cap. Assess.	$\leq 2h$
	DLC	$\leq 1/2h$					
	RST (@S/S3)	$\leq 1/2h$					
Test Date/ Period	01Jul, 10:00 - 13:00		01Jul, 13:00- 16:00		04 July, 12:30 - 15:30		

Test 3 years later (Example, assuming contracted capability able to be delivered by just Unit 4)	TYPE OF TEST		TYPE OF TEST		TYPE OF TEST		
	ESR Cap. Assess.	$\leq 2h$	ESR Cap. Assess.	$\leq 2h$		ESR Cap. Assess.	$\leq 2h$
						DLC	$\leq 1/2h$
						RST (@S/S2)	$\leq 1/2h$
Test Dates / Period	10Jun, 10:00 - 13:00		10Jun 13:00 - 16:00		15Jun, 12:00 - 16:00		

EXAMPLE / Potential Testing Plan for a BS Service Provider with 4 Units, 3 of which contracted for the provision of the Service.

