

DSO Entity views on Aggregation of PGMs

Under NC RfG 2.0 revision

ESC - Discussion Document

As a follow-up on the ESC GC Meeting held on 12 March 2024

Preamble on Power Generating Modules (on Aggregation) discussions

- 1 These slides attempt to show the difference between (most) DSOs' interpretation of the existing NC RfG and the proposed interpretation of PPMs in NC RfG 2.0
- 2 There appears to be scope for confusion about what constitutes a generating unit for aggregation, especially if different technologies are coupled with direct current
- 3 As EU DSO Entity, we are not saying that any of the implications shown on the slides are a correct interpretation, only that we do not see clarity in the NC RfG 2.0 to be certain one way or the other
- 4 It would be a good outcome to show that our uncertainty is misplaced, and the NC RfG 2.0 does actually provide sufficient clarity
- 5 Our DSO Entity examples (*in the slides below*) do not attempt to be exhaustive

Articles under discussion, namely Recital 11 and Article 2.17

Need for further clarification under NC RfG 2.0

Rec 11 -Moreover, to ensure an appropriate harmonisation or rules for mass-market products, capacities of units of different underlying technology, for instance, photovoltaic, electricity storage, combined heat and power installations, or V2G electric vehicles, should not necessarily be aggregated for the purpose of the determination of significance unless so agreed between the relevant system operator and the power-generating facility owner, or determined by other appropriate means, where an agreement is not required.....Electricity storage integrated to a power-generating module used solely for the purpose of meeting the respective requirements of this Regulation should be considered as part of such module while its capacity should not count towards the power-generating module capacity

2.17 ‘power park module’ or ‘PPM’ means a unit or ensemble of units that can generate electricity, which is not a synchronous power-generating module and which is either non-synchronously connected to the network or connected through power electronics, and that also has a single connection point to a transmission system, distribution system including closed distribution system or HVDC system;

Arguably there is a conflict between Recital 11 and Article 2.17

DSO Entity Examples on PGM Aggregation

Discussion Document
(6 examples in the slides below)



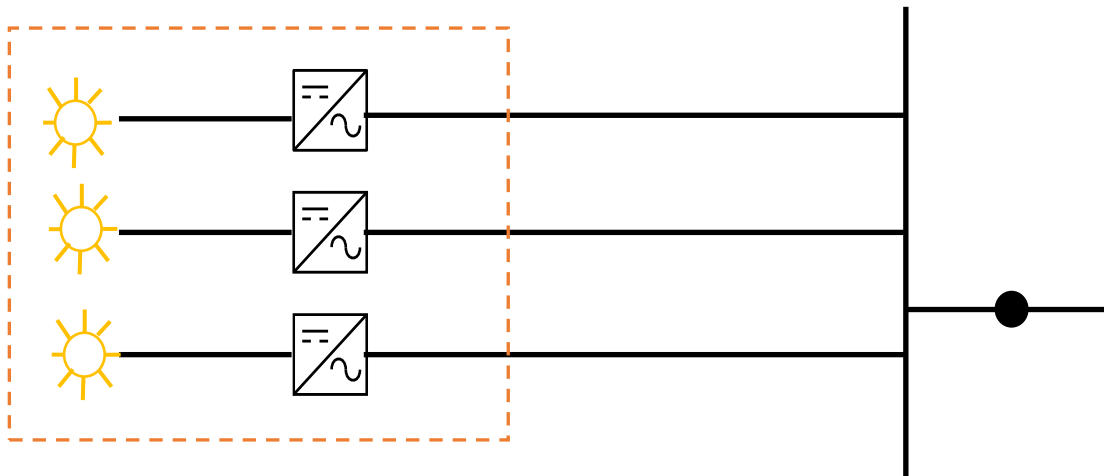
Example 1

Technology	Single Technology	Multiple Technologies
Solar PV	✓	
Wind		
ESM		
ESM DC Coupled		
Synchronous ESM		

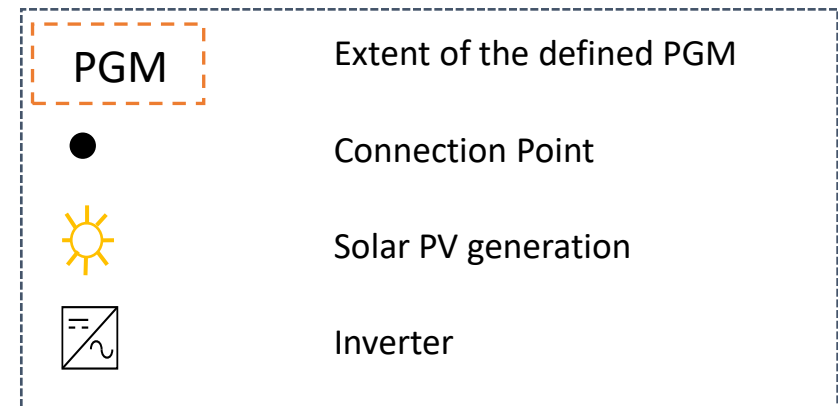
Remarks/Reasoning:

- All generating units are single technology, so the future interpretation remains a single PPM

Graph illustration



Legend



Current interpretation
Future interpretation

1 PGM (ie 1 PPM)
1 PGM (ie 1 PPM)

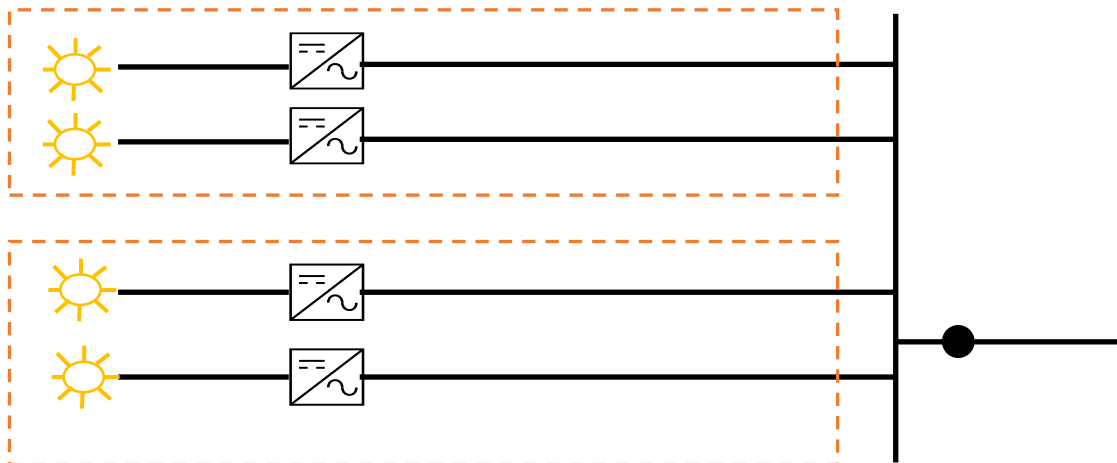
Example 2

Technology	Single Technology	Multiple Technologies
Solar PV		✓
Wind		
ESM		
ESM DC Coupled		
Synchronous ESM		

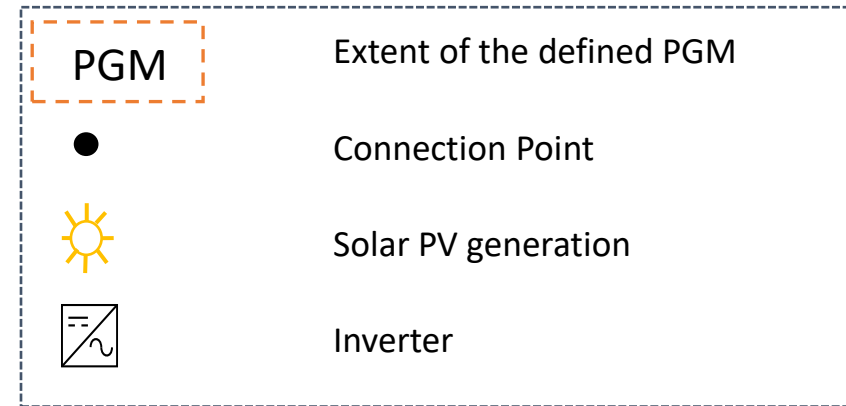
Remarks/Reasoning:

- Assuming there are 2 distinct technologies, are there 2 PGMs for NC RfG 2.0?
- What criteria differentiate one technology from another?
- What if one PPM is grid forming and the other not? Is this the only sufficient distinction?

Graph illustration



Legend



Current interpretation
Future interpretation

1 PGM (ie a single PPM)
2 PGMs (ie two separate PPMs)

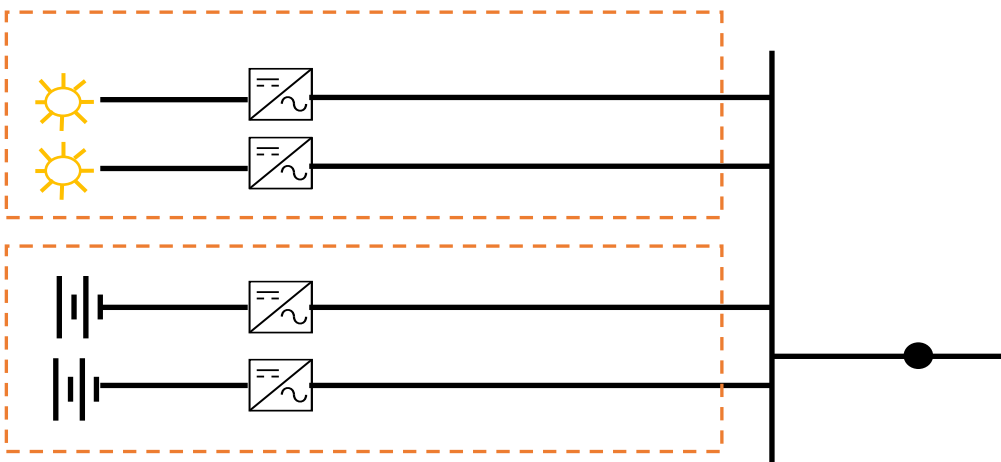
Example 3

Technology	Single Technology	Multiple Technologies
Solar PV	✓	
Wind		
ESM	✓	
ESM DC Coupled		
Synchronous ESM		

Remarks/Reasoning:

- Solar PV and Battery electricity storage are clearly different technologies

Graph illustration



Legend

PGM	Extent of the defined PGM
●	Connection Point
☀	Solar PV generation
🔋	Battery Storage
⏚	Inverter

Current interpretation
Future interpretation

1 PGM
2 PGMs (ie 1 PPM and 1 ESM)

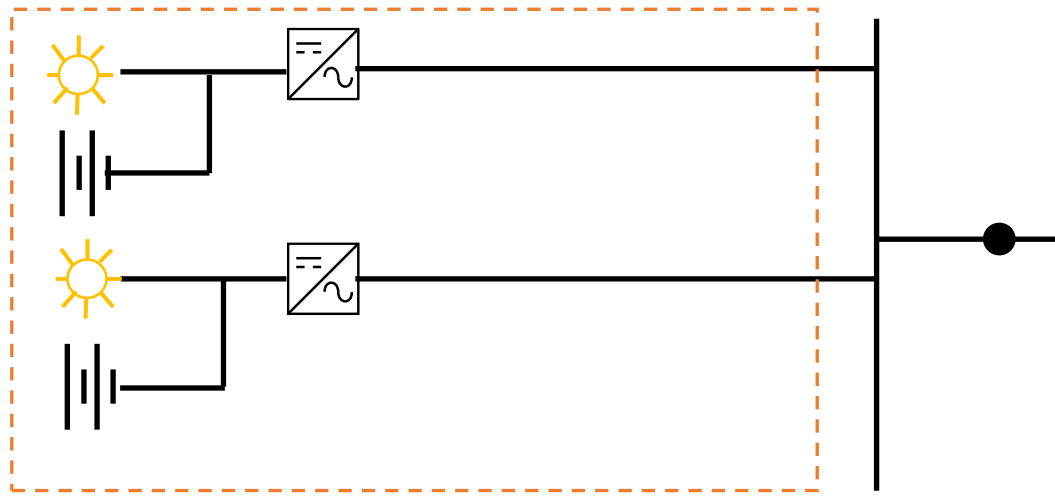
Example 4

Technology	Single Technology	Multiple Technologies
Solar PV		
Wind		
ESM		
ESM DC Coupled	✓	
Synchronous ESM		









Remarks/Reasoning:

- PV and battery are comparable size; the battery does not exist to supplement PV for compliance purposes (ie capable of independent modulation)
- So the battery is not there to complement the other generating unit's compliance.
- The inverter rating decides the type of the PPM (not the solar PV array or battery capacity)
- We think the battery and solar have to be treated as an ESM because otherwise the ESM provisions of the NC RfG 2.0 (Art 13.3(h), 13.7, 13.11) would not apply

Graph illustration



Legend

	PGM	Extent of the defined PGM
	●	Connection Point
		Solar PV generation
		Battery Storage
		Inverter

Current interpretation
Future interpretation

1 PGM
1 PGM (ie 1 ESM)

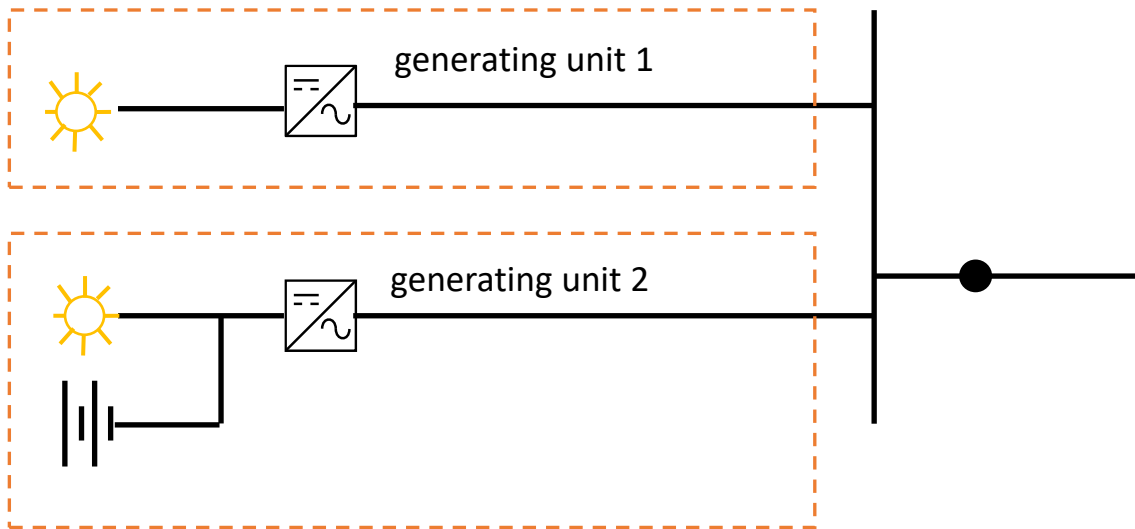
Example 5

Technology	Single Technology	Multiple Technologies
Solar PV	✓	
Wind		
ESM		
ESM DC Coupled	✓	
Synchronous ESM		

Remarks/Reasoning:

- PV and battery are comparable size; the battery does not exist to supplement PV for compliance purposes
- What criteria differentiate one technology from another?
- Is generating unit 2 an ESM or a PPM? See note on slide 8 - example 4

Graph illustration



Legend

PGM	Extent of the defined PGM
●	Connection Point
☀	Solar PV generation
⌚	Battery Storage
⏚	Inverter

Current interpretation
Future interpretation

1 PGM
2 PGMs (ie 1 PPM - generating unit 1) & 1 ESM (generating unit 2)

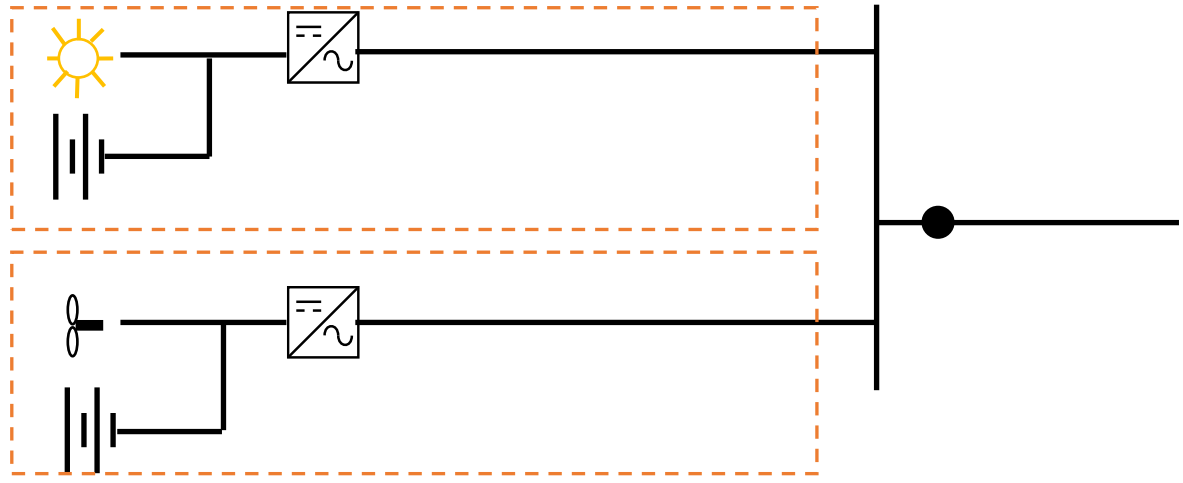
Example 6

Technology	Single Technology	Multiple Technologies
Solar PV		
Wind		
ESM		
ESM DC Coupled		✓
Synchronous ESM		

Remarks/Reasoning:

- PV/wind and battery are comparable size; the battery does not exist to supplement the PPU (PV/Wind) for compliance purposes
- What criteria differentiate one technology from another? Wind versus solar?
- Are these ESMs or PPMs? ESMs – see note on slide 8 - example 4

Graph illustration



Legend

PGM	Extent of the defined PGM
●	Connection Point
☀	Solar PV generation
⚙	Wind generation
🔋	Battery Storage
⏚	Inverter

Current interpretation
Future interpretation

1 PGM
2 PGMs (ie two separate ESMs)

Further issues with multiple PPMs

1

Where the non-synchronous power generating units (PGU) share a common transformer between them and the connection point, if the PGUs are split into discrete PPMs, then each may struggle to comply with the reactive power requirements at the connection point

2

In other words, a common transformer will be oversized for the PPMs individually, and they will struggle to provide sufficient reactive power, taking into account the single transformer's reactance

3

There is no concept of reactive compliance on a pro-rata basis in the NC RfG 2.0

Summary of the discussion document

- 1 The EU DSO entity would welcome views on the issues we see in these examples
- 2 We see two possible solutions:
 - a To remove the part of recital 11 which expects multiple PPMs; or
 - b The ESC should commission an appropriate expert group to develop guidelines to ensure all stakeholders are clear on what differentiates one PPM from another.