G99 regulation change April 2019 :- Roll out and implementation overview.

Presented by Alan Guiver, Director – Agren Power and Energy ltd.

REA meeting – 16 July 2019

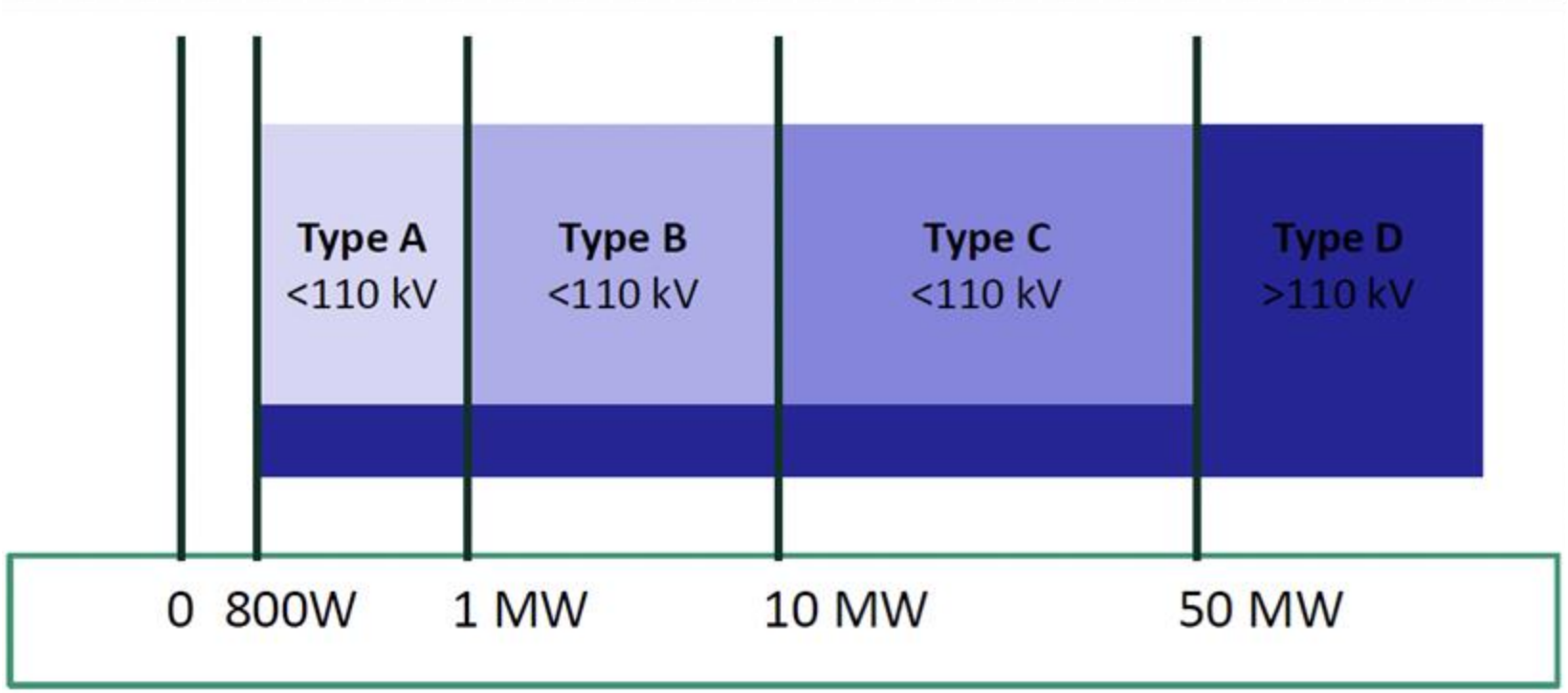
G99? nothing to worry about is it?

- G99 reflects the new reality of power production in the UK. Increasing redundancy of large base load power stations, and more intermittent power generation means the whole Grid and its connectees **MUST** be able to offer more flexibility and assistance to maintain the Grid stability.
- Its Here! G99 became the successor to G59-3 in April 2019.
- There is now a period of uncertainty, not only for potential generators, but also for the DNO ‘s around the country on how to apply it, and how the whole system works.

How does it affect my Business plans?

- All new Generators are given types. Each type will have its own set of characteristics it needs to comply with: this is given briefly on the next slide. Most businesses represented here will be Type A or B.
- In the past, generators had to automatically disconnect if there was a disturbance on the system. Now, under certain scenarios, the generator must remain on line and running.
- All new generation plant need to ensure G99 compliance is applied to all purchases.
- Reuse of older plant is more problematic (details shortly!)

Generation type table.



Generator type capability chart

Technical Requirements	Type A	Type B	Type C	Type D
Operation across a range of frequencies	•	•	•	•
Limits on active power output over frequency range	•	•	•	•
Rate of change of frequency settings applied (likely to be at least 1Hz/sec)	•	•	•	•
Logic interface (input port) to cease active power output within 5 secs	•	•	•	•
Ability to automatically reduce power on instruction		•	•	•
Control schemes, protection and metering		•	•	•
Fault Ride Through requirements		•	•	•
Ability to reconnect		•	•	•
Reactive capability		•	•	•
Reactive current injection		•	•	•
Active power controllability			•	•
Frequency response			•	•
Monitoring			•	•
Automatic disconnection			•	•
Optional Black start			•	•
Stable operation anywhere in operating range			•	•
Pole slipping protection			•	•
Quick resynchronisation capability			•	•
Instrumentation and monitoring requirements			•	•
Ramp rate limits			•	•
Simulation models			•	•
Wider Voltage ranges / longer minimum operating times				•
Synchronisation on instruction				•
Enhanced Fault Ride through				•

AGREN POWER & ENERGY LTD.

Do you move your assets around? Then perhaps we have some good news.

- Agren P&E work with the G99 roll out steering group, alongside the DNO's Ofgem and National Grid.
- A derogation to allow movement G59 to G59 compliant sites is being agreed but is not yet fully embedded in the regulation:

"For the special case where an existing Power Generating Module of less than 10 MW Register Capacity that complies with EREC G59 is being relocated to another existing site where the Power Generating Module(s) on that other site is also existing and EREC G59 compliant, then the relocated Power Generation Module will only need to comply with EREC G59 provided that the relocated Power Generating Module:

has the same Registered Capacity as, or has a smaller Registered Capacity than the Power Generating Module it is replacing.

If an existing Power Generating Module is being relocated to an existing site where it has a larger Registered Capacity than the Power Generating Module it is replacing, or it is being relocated to a new site, then full compliance with EREC G99 will be required in either case".

Now the bad news.

- Reconditioned plant, used on new connections is in the main technically unsupported by the OEM genset providers; some information is classed as “intellectual property” and guarded vigorously.
- If you use this reconditioned plant business model, YOU will be expected to provide all the technical information for each set.
- Older sets then in the main, will not at the moment comply with G99 when used on new connection sites without modifications – some type may even fail to comply.
- Costs will rise, and if we do nothing, the refurbished generator business model will no longer be possible.

AGREN POWER & ENERGY LTD.

Refurbished plant to OEM standards are an important resource. Why?

- Refurbished back to manufacturers standards.
- Often still competitive efficiency figures.
- Retro fitted with MCPD compliance kit for emissions control.
- Lower capital costs make smaller Output sites work financially.
- Utilize existing repurposed assets from other sites.
- Existing proven technology.

A way forward, Please consider participation!

- The industry is presently trying to get together a working group to type test older sets (by testing their own running sets in their fleets) and data will be held in a central location for all participants to benefit from.
- The scope of work is yet to be agreed, but we see this scenario- Company A runs Caterpillar 3516, , they test it. Company B runs Cummins QSV 91, they test it, Company C runs Jenbacher 320, they test it. All data comes to a data holder to be checked, modelled and offered to the ENA as type tests for each generator make.
- This means we will know as a group which engines can be G99 tested, what is involved to upgrade, and which sadly, fail to make economic sense to change.

Don’t be scared. Its only Change!

- The changes from G59-3 to G99 are in depth and fundamental, and if you are not technical, you will need help. The help IS out there.
- The DNO network have their own roll out difficulties, so its not just customers who are struggling.
- Disruption and delay will Happen, (example Viridor Pilsworth site?) allow for this in forecasting cashflow!
- If we participate proactively, we can ensure business models are protected, but it needs to be NOW. Do nothing, or wearing Blinkers will mean rigidity in regulation, and no consideration for some existing business models.

Potential group members / roles for repurposed gensets project.

- Agren P&E – Central data holding and coordination of project, liaison with the ENA and DNO group.
- TBA- system modelling company for fault ride through capability and frequency LFSMO functionality modelling per genset type.
- Viridor, Arevon, Infinis, Conrad Energy have expressed strong interest for Genset testing – but we need more participation to spread the load and cost for testing each genset type.
- Costs? Small compared to having to start using new equipment- Difficult to quantify at this stage, but we feel 10-15k per engine type should be a target figure, plus company time and hire of load banks or specialists.

Advantages for group members

- *Important to note* The ENA are to assist us, and provide a suite of tests for us to work with- so the project will be supported by the ENA and DNO working group.
- The group will share all data, so if you buy used, we should have the appropriate data for the type of generator you procure.
- If you repurpose old machines on a new site- the data should be available.
- The data can also be submitted to the ENA type test register if that's the best place for it- but to do it independently ensures commercial advantage is shared by participants only.

AGREN POWER & ENERGY LTD.

Any queries or questions?

Thank you for your time.

Any questions or queries as a result of todays meeting, please see me afterwards, or contact :

Alan Guiver – 07889 569 272

alan@agrenpower.com

AGREN POWER & ENERGY LTD.