

## European 50.2 Hz Frequency Problem

Regarding the 50.2 Hz frequency problem, attached are two official links describing the problem:

<http://www.vde.com/en/fnn/Pages/50-2-hz.aspx>

and the current answer to that problem:

<http://www.vde.com/en/fnn/pages/n4105.aspx>

To summarize: In Germany, the number of photovoltaic energy generators has reached a significant amount which is higher than the control energy (which can be switched on and off rather quickly to solve quick deviations in energy in the power grid). Until mid to end of last year, the regulation rules to install a PV power generator defines to switch off energy production or feeding into the grid immediately if the frequency rises beyond 50.2 Hz. Due to the significant amount of energy that could be switched off in that case, the control energy could not be sufficient to buffer that loss of energy in the grid. As a consequence, the technical note AR-N 4105 describes a controlled degradation of power feeding of the inverters in terms of a P(f) curve.

The solution is already covered by the IEC 61850-90-7 frequency-watt models which are more or less identically modeled in the SunSpec inverter control models.

There is another story regarding Italy. They introduced a new version of the CEI 0-21 regulation which defines the need for a command interface to remotely (power grid provider controlled) switch off/on the feeding of PV generated power, as well as a frequency-monitored power off/on described in the following table:

frequency monitoring	value/range	resolution	default value for CEI 0-21
lower max threshold	50 Hz ... 52 Hz	0,01 Hz	51,5 Hz
lower max threshold resolution	50 ms ... 5000 ms	1 ms	100 ms
upper min threshold	47 Hz ... 50 Hz	0,01 Hz	47,5 Hz
upper min threshold resolution	50 ms ... 5000 ms	1 ms	100 ms
source of frequency limiting via communication	automatic, 61850 GOOSE, Off, Power control module	-	automatic
switchable max threshold	50 Hz ... 52 Hz	0,01 Hz	50,5 Hz
switchable max threshold release time	50 ms ... 5000 ms	1 ms	100 ms
switchable min threshold	47 Hz ... 50 Hz	0,01 Hz	49,5 Hz
switchable min threshold release time	50 ms ... 5000 ms	1 ms	100 ms