

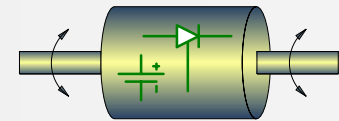
SIXTH FRAMEWORK PROGRAMME
PRIORITY 6.1, Sustainable energy systems

=

Project VSYNC - Contract no: FP6 – 038584

VSYNC-Integral field test

- Draft proposal -

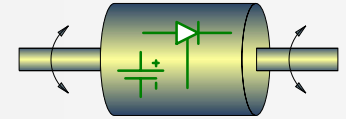


Klaas Visscher – Project manager

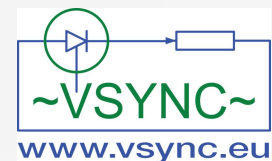
Visscher@ecn.nl

Energy research Centre of the Netherlands (ECN)

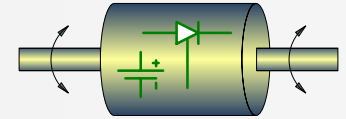
Overview



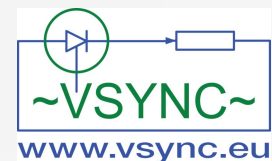
- Essence of VSG operation
- Standalone VSG in micro grid
- Micro grid operation
VSG and SDM need each other
- ECN contribution
- Integral contribution
- Synergetic benefits
- Conditions (for Agreement)



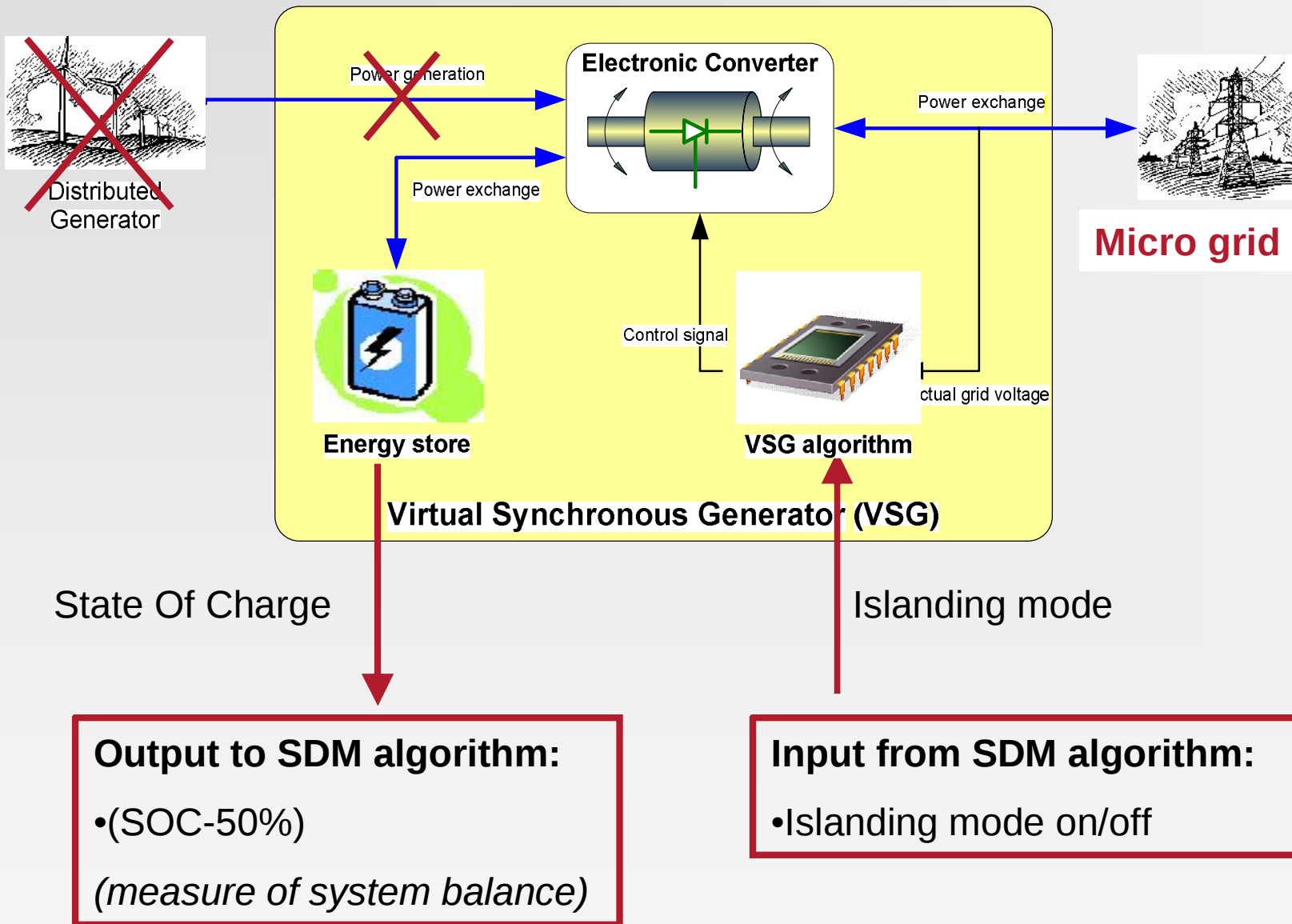
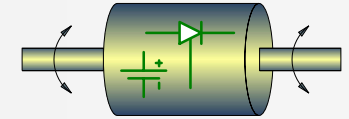
ESSENCE OF VSG OPERATION



- Virtual Synchronous Generators **emulate rotating inertia** for limited time intervals,
- with the aid of complementary control algorithms to **sustain operation** in case of faults or contingencies,
- thereby giving balancing algorithms, control and protection devices **ample time to restore normal operation** in the system.



Standalone VSG in micro grid



Services to micro grid

Normal operation:

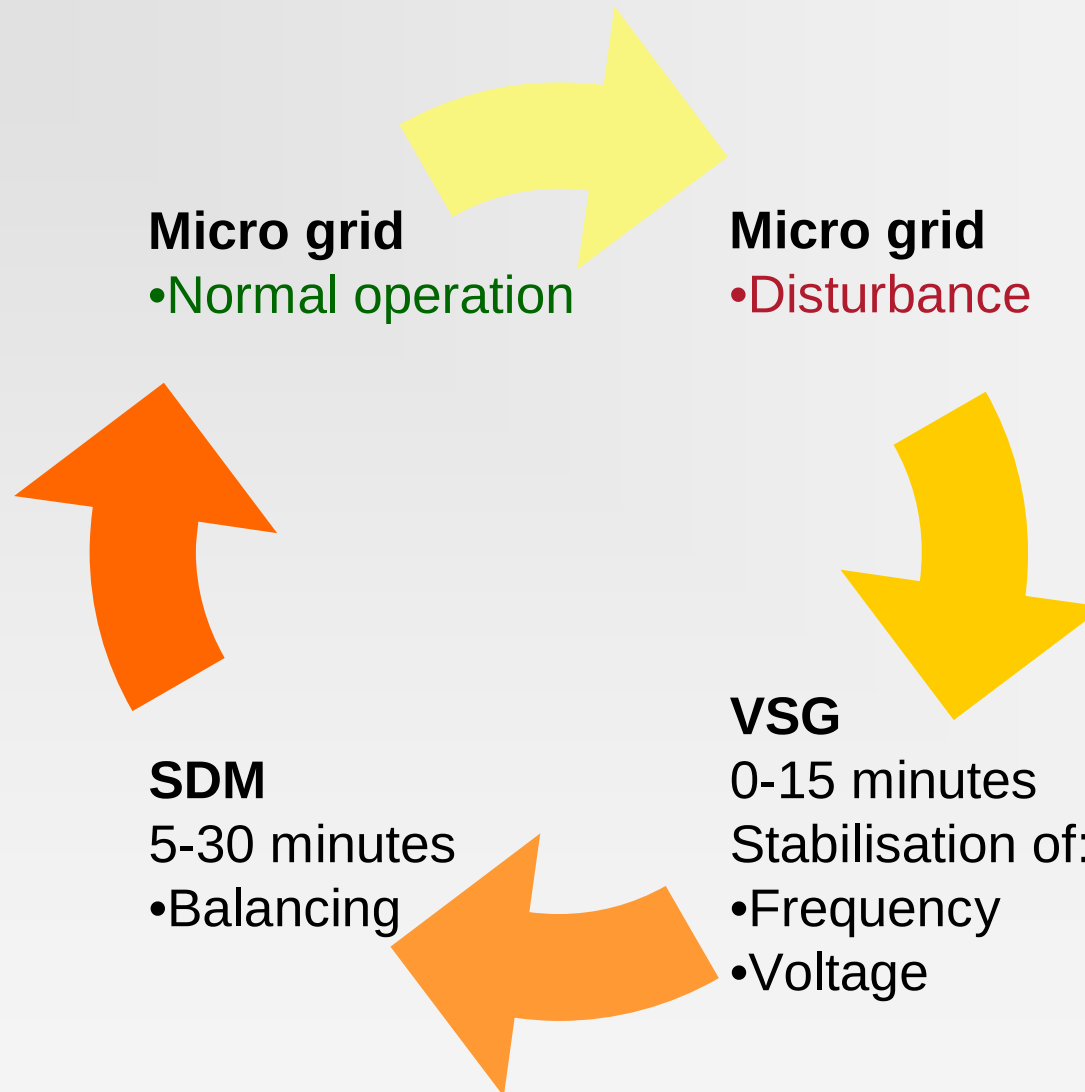
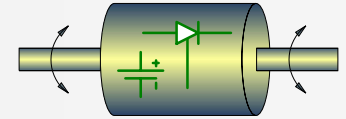
- Frequency stabilisation (by inertia emulation)

Plus in islanding mode:

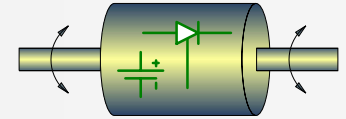
- Frequency control
- Voltage control

Micro grid operation

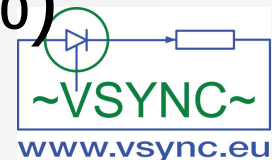
VSG and SDM need each other



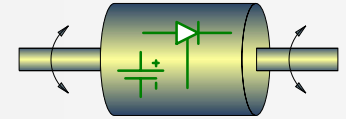
ECN contribution



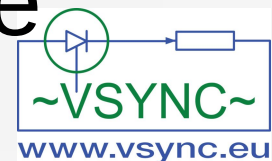
- VSG converter platform (40 kEuro)
 - E.g. 20 kVA, 1 phase
 - Controlled by industrial computer
 - With UPS for black start
- Remote VSG programming and monitoring
 - Saves 40 kEuro of Matlab-Simulink software
- Provide VSG output signals suited to the needs of the SDM algorithm
 - e.g. measure of system balance (SOC-50%)



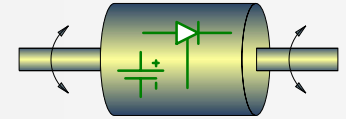
Integral contribution



- Battery set (15-25 kEuro)
 - No car batteries; these will fail within weeks
- Proper installation and housing at test site
- Continuous internet connection with the VSG control computer
- Occasional on-site assistance when things go really wrong
- Provide SDM signals for islanding mode



Synergetic benefits



ECN:

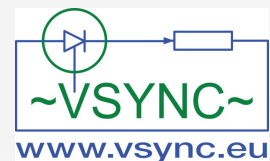
- Field-test of VSG in micro grid
- SDM algorithm restores long-term system balance continuously

Integral:

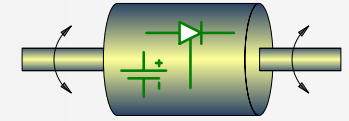
- Micro grid continues stable operation up to 15 minutes under unbalanced conditions
- Low bandwidth SDM system

Together:

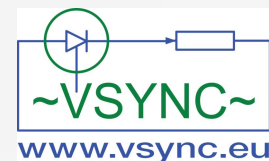
- Build VSG+SDM business case for micro grids

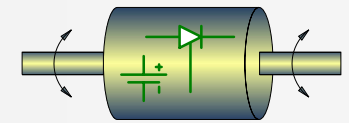


Conditions (for Agreement)



- Written consent of all parties involved
- Proper test plan considering both SDM and VSG
- Full and open exchange of measured data and results
- ECN likes to have the VSG-converter platform returned “in once piece” after the tests.
- (...)





Thank you for your attention

