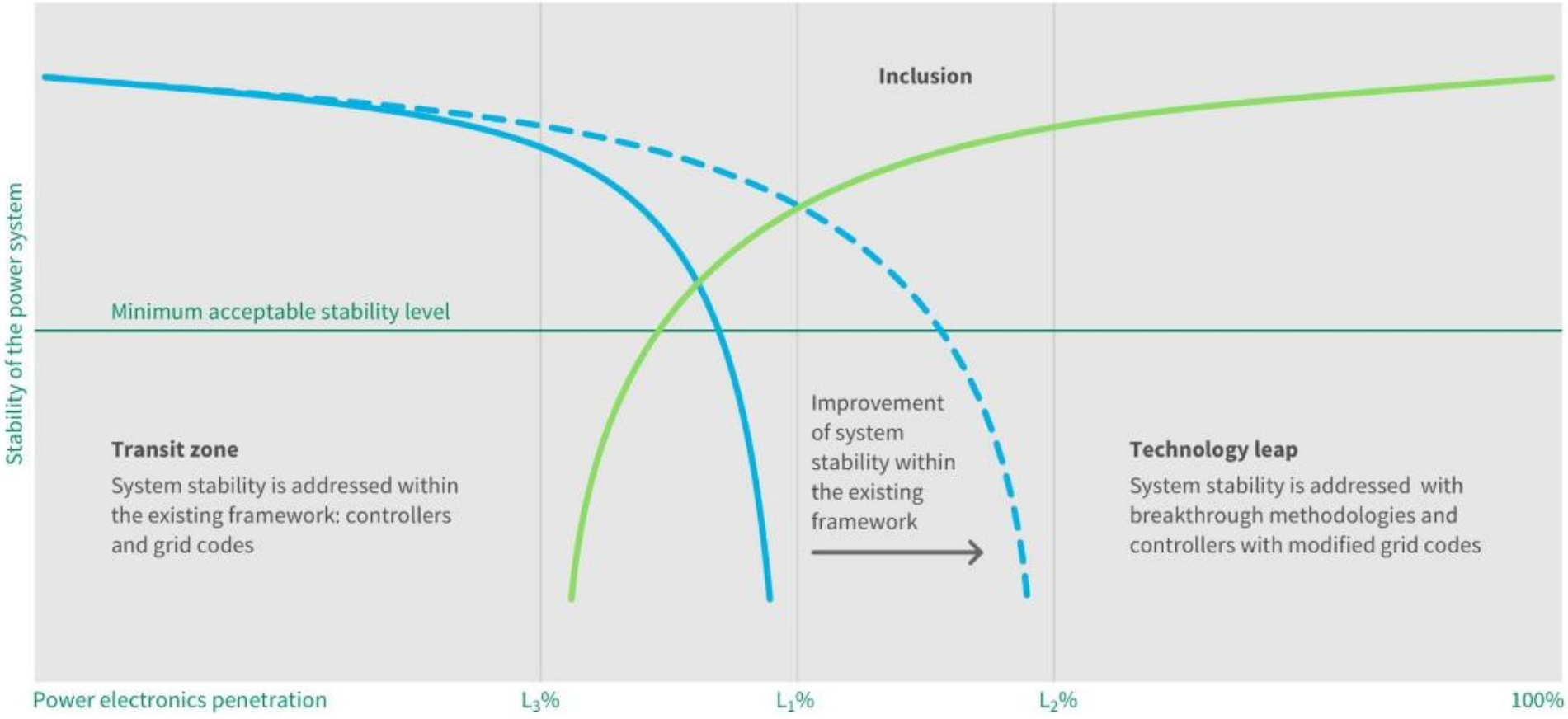
# Proliferation of power electronics into the grid:

## *ENABLING THE OPERATION OF A TRANSMISSION SYSTEM WITH ONLY POWER ELECTRONIC BASED GENERATION, A EUROPEAN PERSPECTIVE*

IRED 2018 Vienna: Session 6

# OVERARCHING GOAL

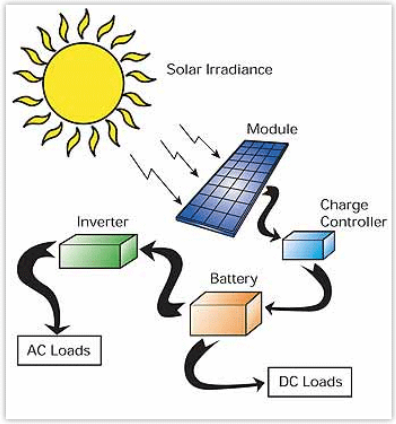


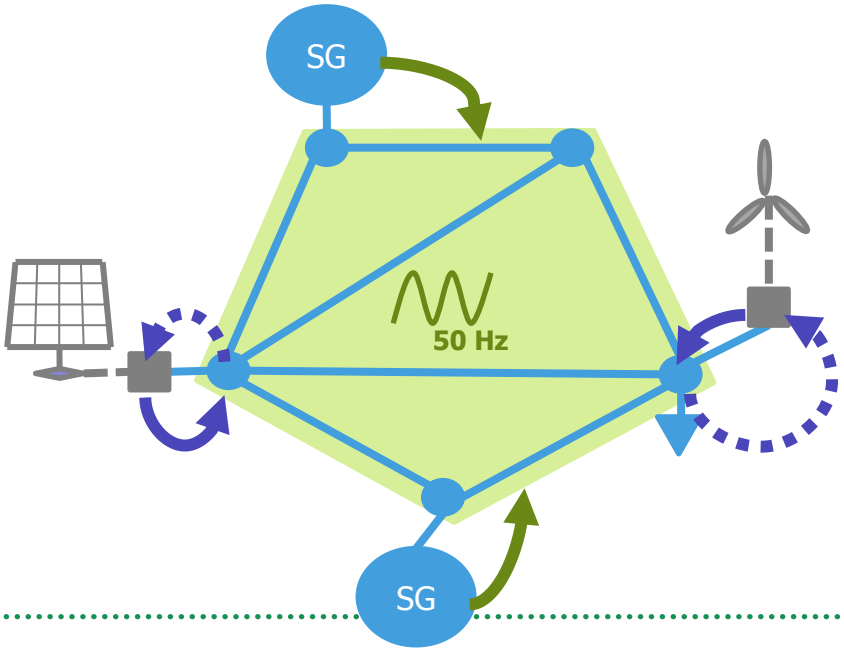
# INTRODUCTION

**A system with 100% renewable is easy to operate (Icelandic system)**

**But A system with 100% power electronic based renewable is very challenging.**

**Is inertia a real need? And what is inertia?**




**We need grid forming inverters**

Such an inverter needs :

- to behave **as close as possible** from a voltage source
- to have **enough** energy storage
- to **stably** synchronize with other voltage source (if any)
- to behave **properly** in islanded mode (do not rely on direct frequency measurement)
- to **take care** of overcurrent limitation while keeping stable connection
- to be **compatible** with synchronous machines and grid following inverters

# WORK ACHIEVED

Several controls have been developed

- 3 grid forming controls
- Specific current limitation controls

Methods

- for assessing the need and performance of inertia and damping from inverters
- for reducing inverters models in order to achieve large simulation.

Hardware tests

- started with individual controllers

# THE WORK PACKAGES AND THEIR LEADERS