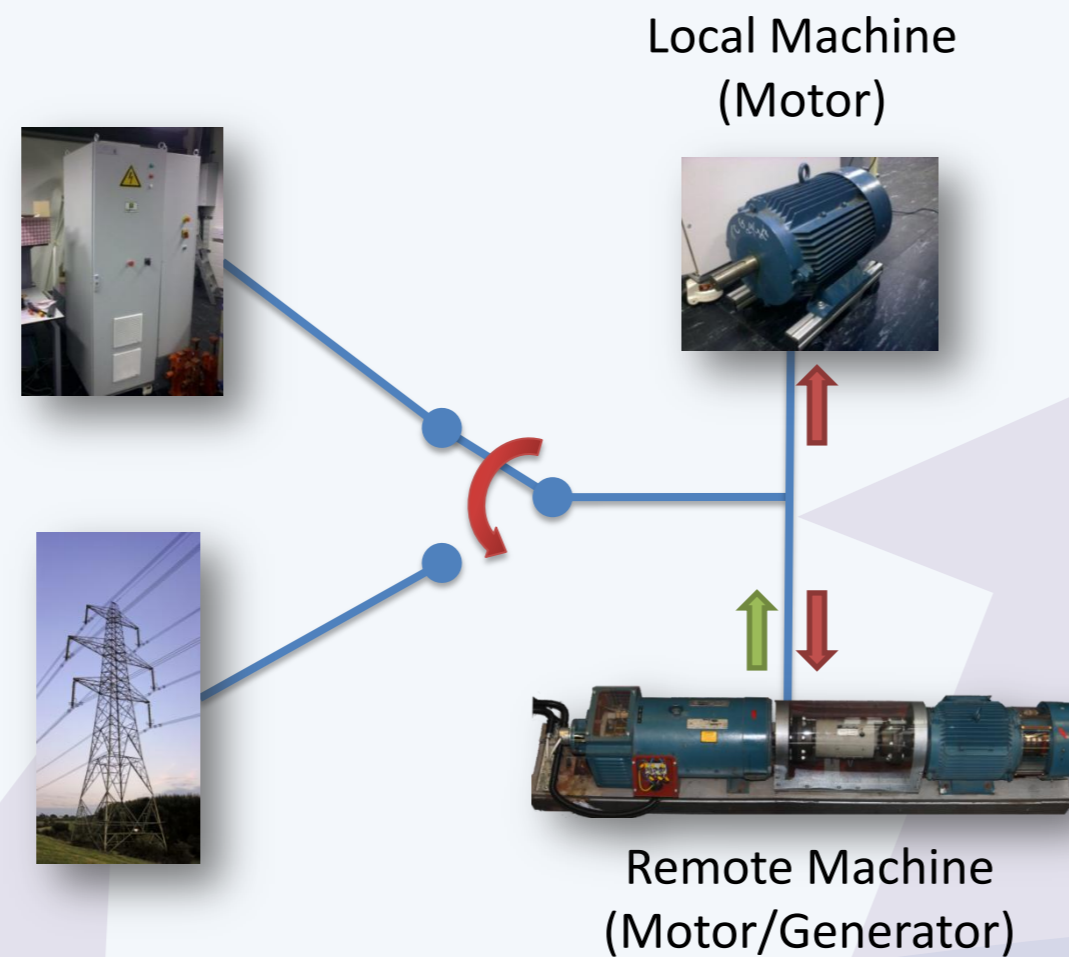


# Rapid Prototyping and Network Reconfiguration

A simple demonstration of the Smart Energy Lab's flexibility...

## Part One

An Triphase inverter unit is programmed to operate as a soft-starter for an induction machine allowing for gentle acceleration from stand-still to the machine's rated operating point. The SELs network is reconfigured to connect the inverter to a local machine and a machine located elsewhere through the main connection panel. After synchronization of the inverter output voltage (supplying the machines) with the grid, the network is reconfigured again such both induction machines are powered completely by the grid. The inverter can then be disconnected and the machines remotely controlled to operate as loads or generators of power.



## Part Three

The solar array simulator is connected to alongside the remote generator and local motor, forming a network of varied devices; the interactions of which can be studied by researchers in the SEL.

Original induction machine brought to speed



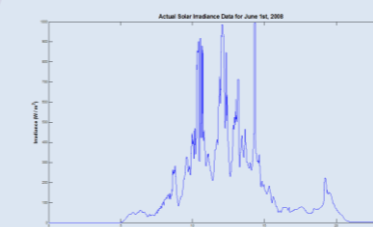
Grid Connection



## Part Two

The programmable Triphase inverter is repurposed to emulate the power output of a photovoltaic (PV) array (solar panel), corresponding to real daily sun exposure data. It is then connected to the grid to emulate the presence of an intermittent renewable/distributed energy source allowing researchers to study the effects of PV interconnection without being tied to current weather.

The Triphase inverter units can be programmed to emulate the presence of any distributed energy source as well as serve as an interface for actual DG units if required.



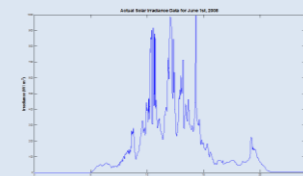
Measured solar irradiance



TRIPHASE Re-programmed inverter



Additional induction machine generating power



The Maurice Hancock Smart Energy Lab has been supported by three partners and their generosity is gratefully acknowledged: