Basilicata region, Italy	The microgrids: a case study for the Basilicata region	2013

This study, jointly carried out with CNR-IMAA of Potenza, concerns the achievable benefits in term of energy efficiency deriving from the use of micro-grids technologies in the Basilicata region interested by a noticeable increase of distributed renewable energy sources. This increasing supply of intermittent sources in the electrical power system has important consequences on the electric system management. In particular, electrical systems must be enabled to manage and balance the discontinuous power production (such as Wind and PV) with fossil production and storages.

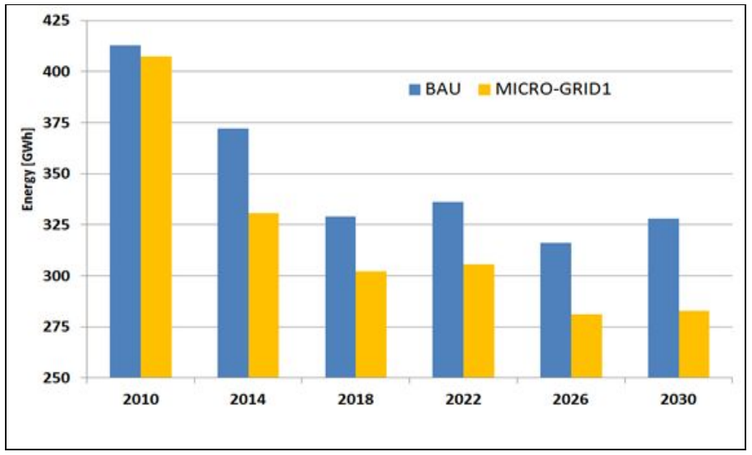
In this framework the micro-grids can play a key role in the transition towards smart and active energy systems, providing more efficient energy systems through an engagement with consumers and businesses and the valorisation of territorial peculiarities and renewable resources.

The study based on the TIMES Basilicata model developed by CNR-IMAA and able to represent the energy system of Basilicata Region over a 33-year time period (from 2007, the reference base year, to 2030) both in term of the generation side, considering for different fossil and renewable energy sources the energy efficiency, the related investments and O&M costs, and of demand sectors (residential, commercial, industry and agriculture). The electricity distribution network is modeled considering four voltage lines: HV, MV and LV, each one characterized by different parameters in terms of transmission efficiency, investment and O&M costs.

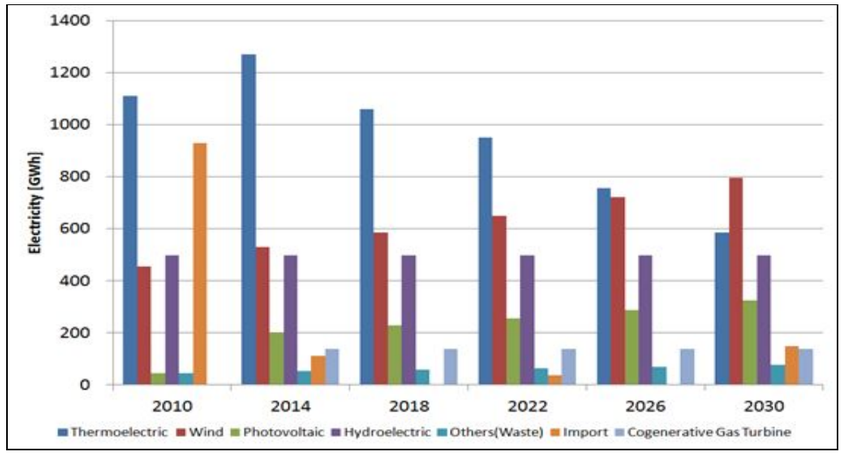
The study investigated the reduction of the electrical losses in the transmission and distribution networks by implementing microgrids on the territory, as one of the achievable benefit related to the use of electricity nearby the generation sites. Three different scenarios was considered:

- the Business As Usual scenario, characterized by present trends of energy resources and current policies, determining an increase of generation from renewable sources equal to 500 GWh in 2010 year and 1020 GWh in 2030 year;
- in the first alternative scenario MICRO-GRID1 all the existing photovoltaic plants are considered operating in microgrids, involving from 11% in 2010 year to 17% in 2030 year of the total forecasted electricity generation: accordingly, net losses in the year 2030 are 13 % lower than in the beginning of the investigated period;
- in a second scenario MICRO-GRID2 it has also assumed that cogenerative gas turbines for a total generation of 138,1 GWh/year was established and operated in micro-grids, in so replacing the imported electricity from neighboring regions: network losses was reduced in the year 2030 by 20 % corresponding to 65 GWh/year.

The results of the study was presented at the 3rd International Exergy , Life Cycle Assessment and Sustainability Workshop & Symposium (ELCAS 3), July 2013.



Comparison of the total electricity losses in network between BAU e MICRO-GRID1 scenario



MICRO-GRID2 scenario: Energy planning