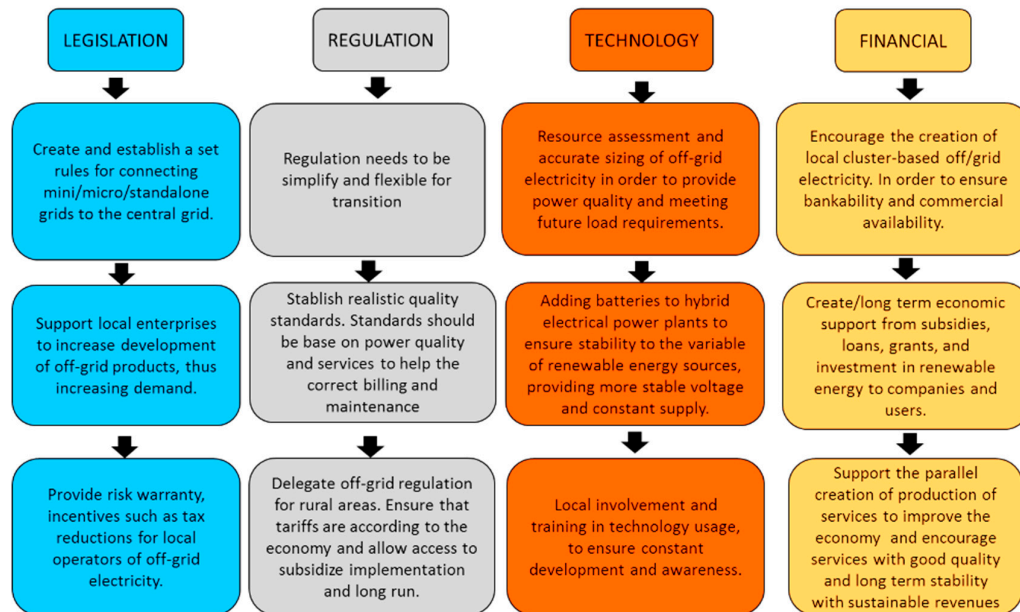


Supplementary material:

**Table S1.** Methods for expanding electricity and utilities, based on [1].

Characteristics	Grid Electricity	Off-grid Electricity		
System type	Centralized	Minigrids	Microgrids	Nanogrids
Size	Large Cities, small cities, regional and multi countries	Communities		Individual houses
Example	Paris(Fr), Amsterdam(NL), Bogotá(COL), México city (MEX), Madrid(SPA), Nairobi(KEN) etc.	American Samoa (US) [2], San Andres Island(COL) [3], Hawaii(USA), Among others	Heeten (NL) [4], Pecan Street TX (US) [5],	Partly implemented yet for all year round
Area that can cover	Lager than 50 km <sup>2</sup>	8 to 49 km <sup>2</sup>	3 to 8 km <sup>2</sup>	<1 km <sup>2</sup>
People benefit	100.000 to millions	10.000 to 100.000	1000 to 10.000	Usually 1 to 1000
Energy capacity	>10 MW	<10 MW	<100 kW	<20 kW
Type of technology use	Power plants in large scale and centralized	Smaller power plants in Medium scale and small scale		Smallest scale
Approximately Required investment in Euro	Billions	Hundreds of Thousands to Billion		Thousands

Measures to facilitate the implementation of off-grid electricity



**Figure S1.** Measures to facilitate the implementation of off-grid electricity, adapted from Energy Access Report and Clean Energy Ministerial 2013 [1,6].

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