

Webinar: Development and Evolution of a Sustainable City and Community

Nanogrid and its use in Cities

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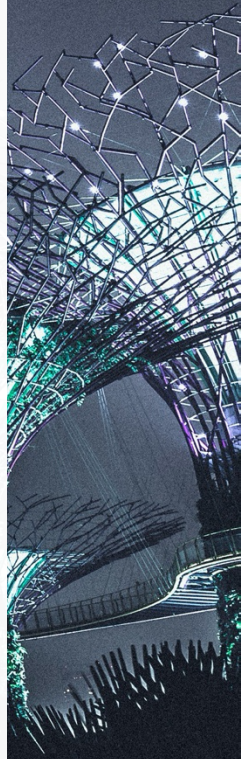
Nanogrid and its application in city and country

Seminar on
Development and Evolution of a Sustainable City and Community

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About RAP

The Regulatory Assistance Project (RAP)[®] is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

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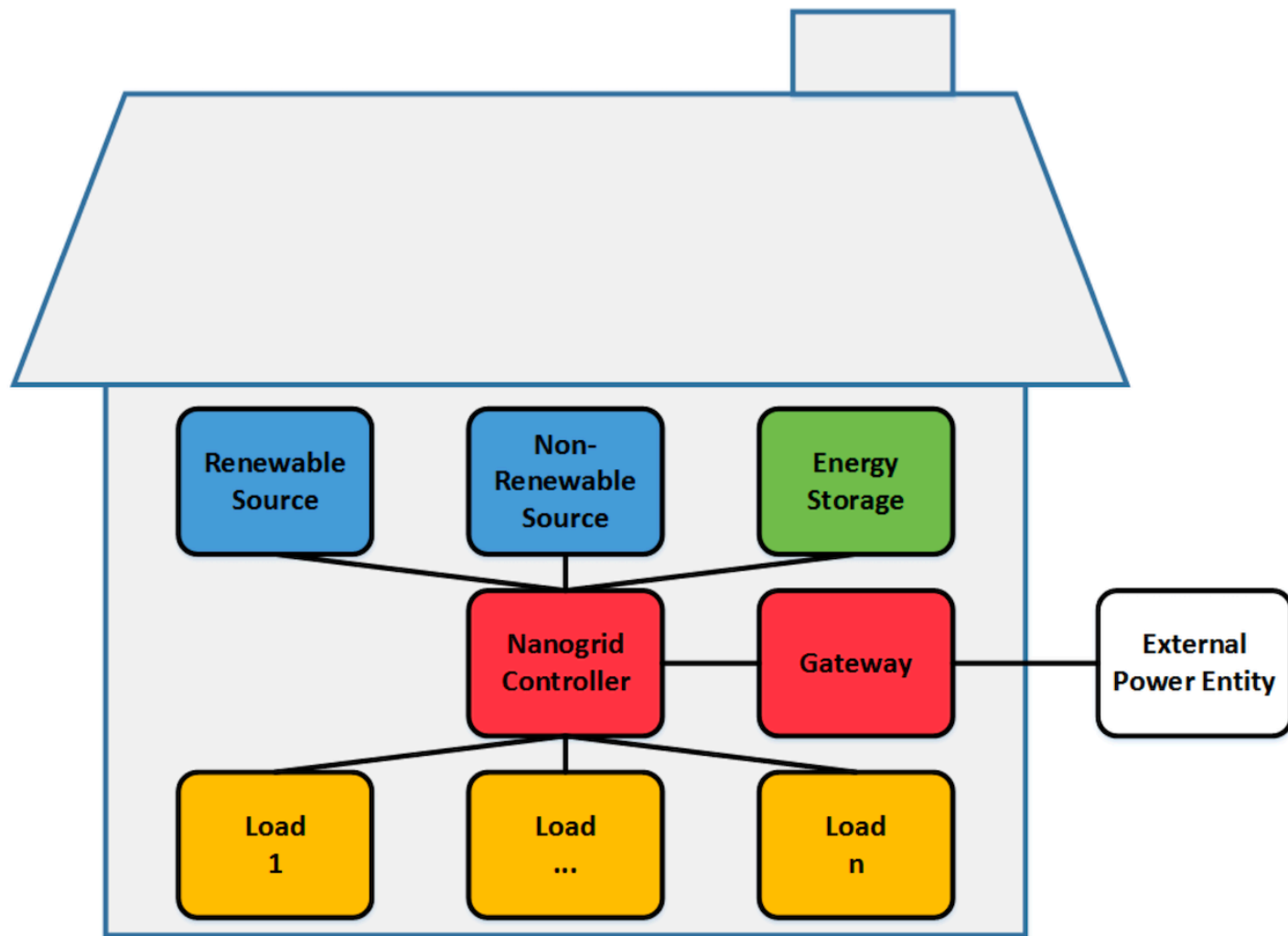
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Nanogrid: A Definition

A power distribution system for a single house/small building, consists of local power production, local loads, a gateway, energy storage and controller.

(Burmester, 2018)



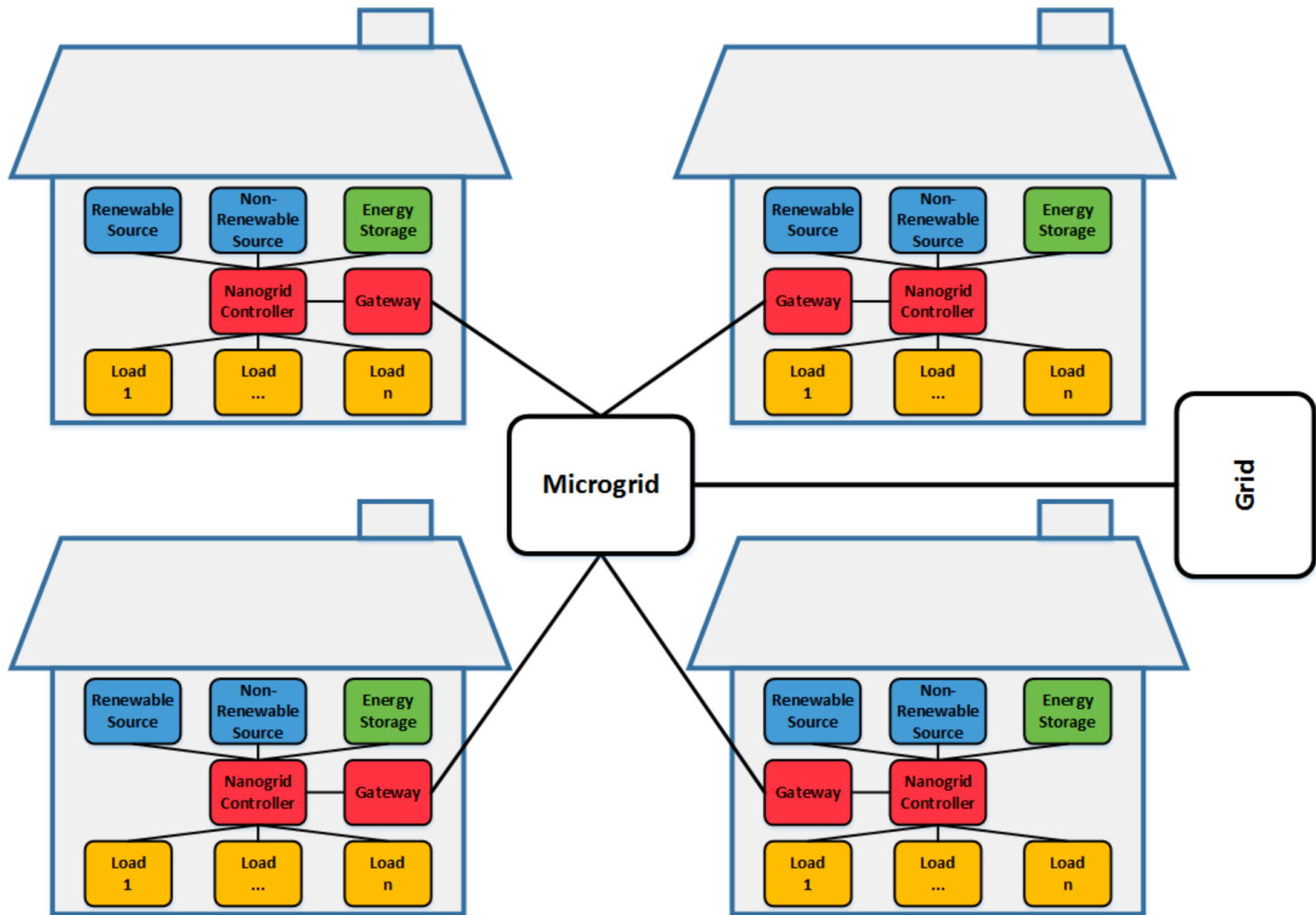
Nanogrid block diagram

(Burmester et al., 2017)

Comparision between Nanogrid and Microgrid

(IRENA, 2015)

Grid System	Size (kW)	Application	Complexity
Nanogrid	0-5	<ul style="list-style-type: none">-Lighting, appliances, emergency power,-Single building (residential and commercial)	<ul style="list-style-type: none">-Less complex than Microgrid (typically single Building, single load, single administrator) ,-able to Connect or disconnect from other power entities,-Preference for DC systems
Microgrid	5-100	<ul style="list-style-type: none">-All uses,-Building and community (residential, commeicial and industry)	<ul style="list-style-type: none">-Multiple buildings and loads, higher requirement,-Usually connected with the main grid system,-AC/DC



Microgrid made up of multiple Nanogrids

(Burmester et al., 2017)

Practical Application

Off-grid areas

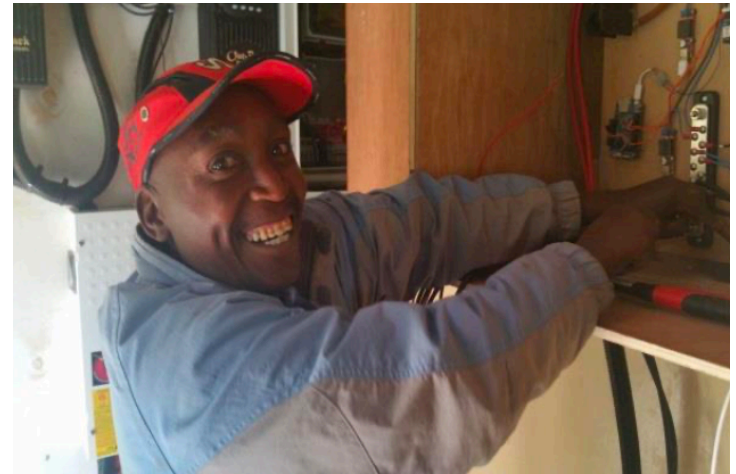
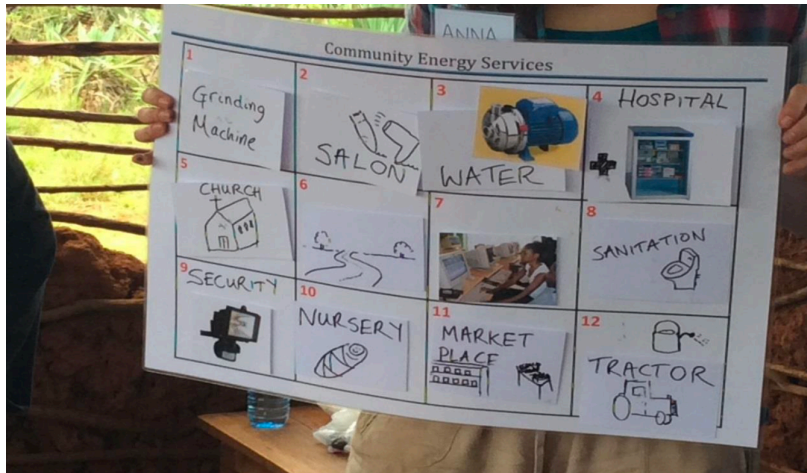
Peri urban, rural, tourist destinations, areas in island, mountain, prairie, etc.

In Disasters

Natural and man-made disasters: e.g. hurricane/typhoon, wildfire, flooding, earthquake, war, terrorist attack, etc.

Special purpose

Military bases
Hospitals
Nanogrid +



The SONG Project in Bangladesh and Kenya

(Jon, 2017); www.songproject.co.uk



Mobile solar nanogrid in natural disasters
www.sesame.solar/blog/nanogrids-resiliency-wildfire



Green Energy Supply Depot

www.cnenergynews.cn/csny/2020/10/02/detail_2020100279358.html



PV Container Barracks

www.sohu.com/a/278323247_620915

Barriers

Financial

Lack of financial capital and investment

Lack of market-oriented operation model

Technical

Intermittency of power output

Limited lifetime of battery

DC incompatible with AC appliances

Institutional

Lack of top-level design , norms and standard

Regulatory issues

Conclusions

- Nanogrid has great development prospect
- Explore market-oriented business models (e.g. PPA\PACE)
- DC building pilot with energy storage, multiple and complementary renewable sources
- Effective regulatory mechanism

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The background of the slide features a photograph of several high-voltage power line towers stretching across a landscape at sunset. The sun is low on the horizon, creating a bright orange glow and lens flare effects. The sky transitions from a deep orange near the horizon to a darker blue at the top. A semi-transparent blue rectangular box is overlaid on the upper portion of the image, serving as a background for the text.

Thanks for listening!

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