

# Webinar: Development and Evolution of a Sustainable City and Community

## *Nanogrid and its use in Cities*

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Remarks: This material/event is funded by the Professional Services Advancement Support Scheme of the Government of the Hong Kong Special Administrative Region. Any opinions, findings, conclusions or recommendations expressed in this material/any event organised under this project do not reflect the views of the Government of the Hong Kong Special Administrative Region or the Vetting Committee of the Professional Services Advancement Support Scheme.



19 November 2020

# Nanogrid and its application in city and country

Seminar on  
Development and Evolution of a Sustainable City and Community

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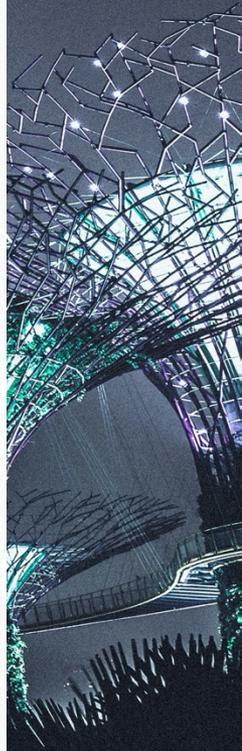
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# About RAP

The Regulatory Assistance Project (RAP)<sup>®</sup> 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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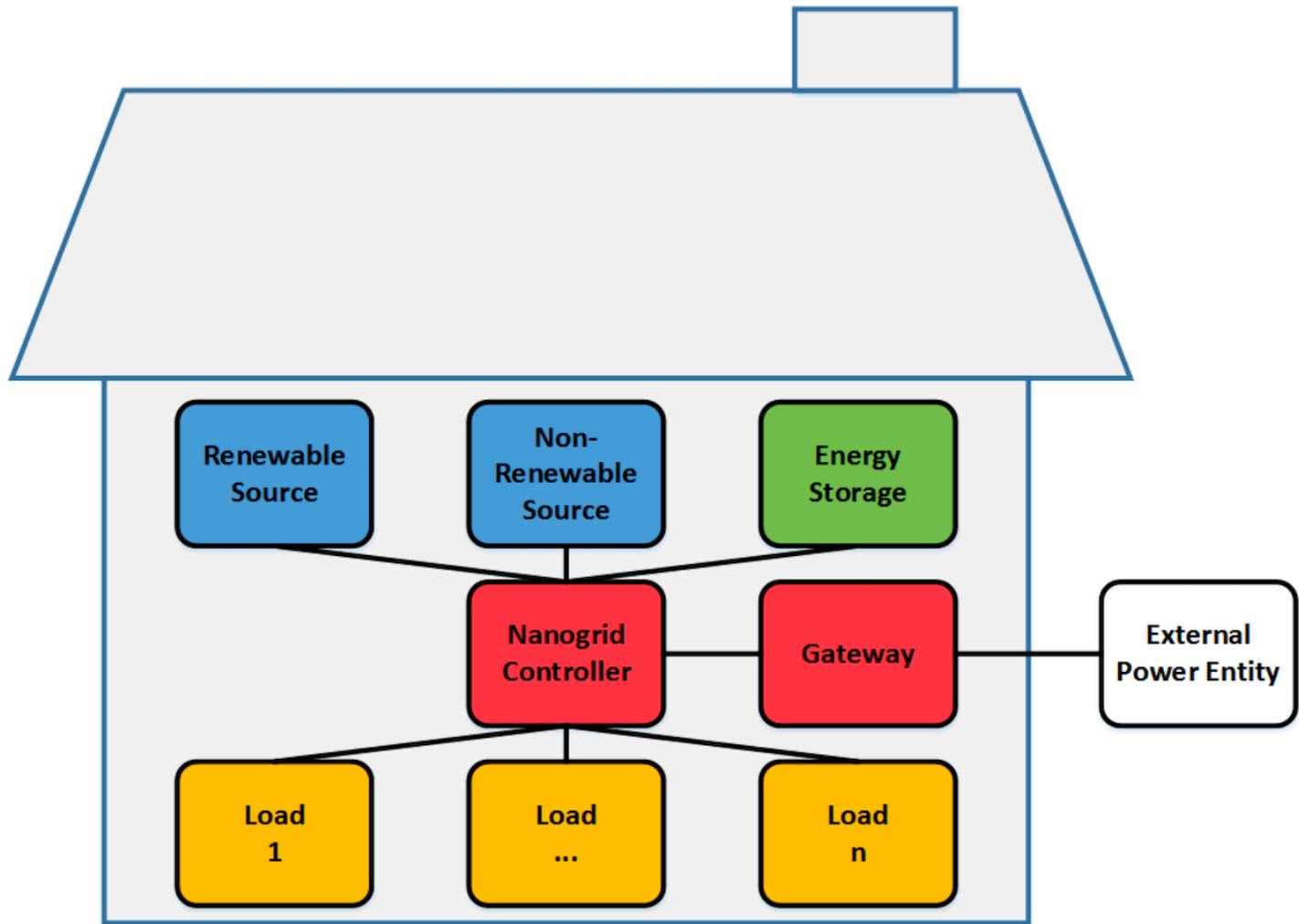
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# Nanogrid: A Definition

***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)*



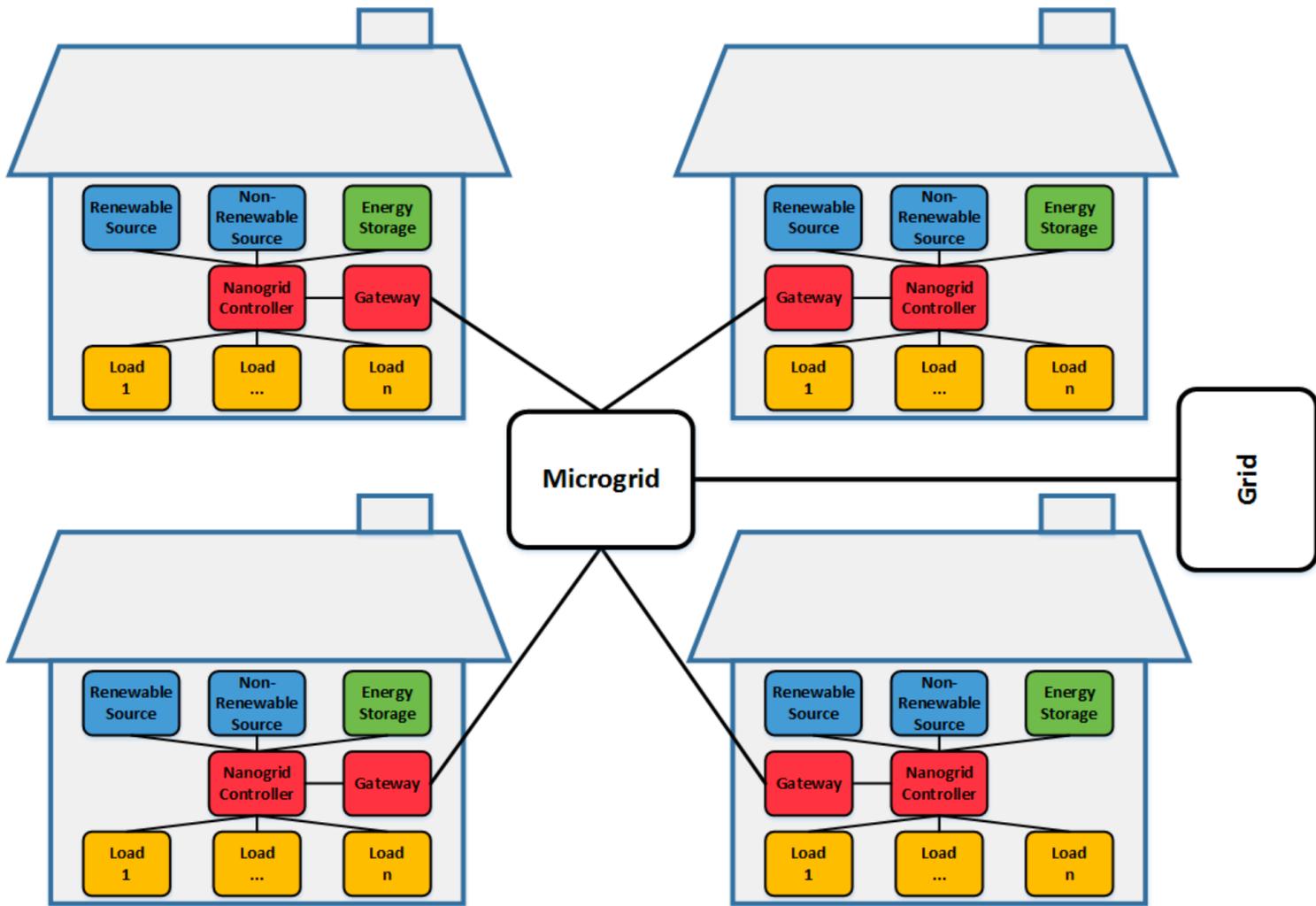
Nanogrid block diagram

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



Microgrid made up of multiple Nanogrids

*(Burmester et al., 2017)*

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# 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 Bangladash and Kenya  
 (Jon, 2017); [www.songproject.co.uk](http://www.songproject.co.uk)



Mobile solar nanogrid in natural disasters  
[www.sesame.solar/blog/nanogrids-resiliency-wildfire](http://www.sesame.solar/blog/nanogrids-resiliency-wildfire)



### Green Energy Supply Depot

[www.cnenergynews.cn/csny/2020/10/02/detail\\_2020100279358.html](http://www.cnenergynews.cn/csny/2020/10/02/detail_2020100279358.html)

### PV Container Barracks

[www.sohu.com/a/278323247\\_620915](http://www.sohu.com/a/278323247_620915)

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# 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

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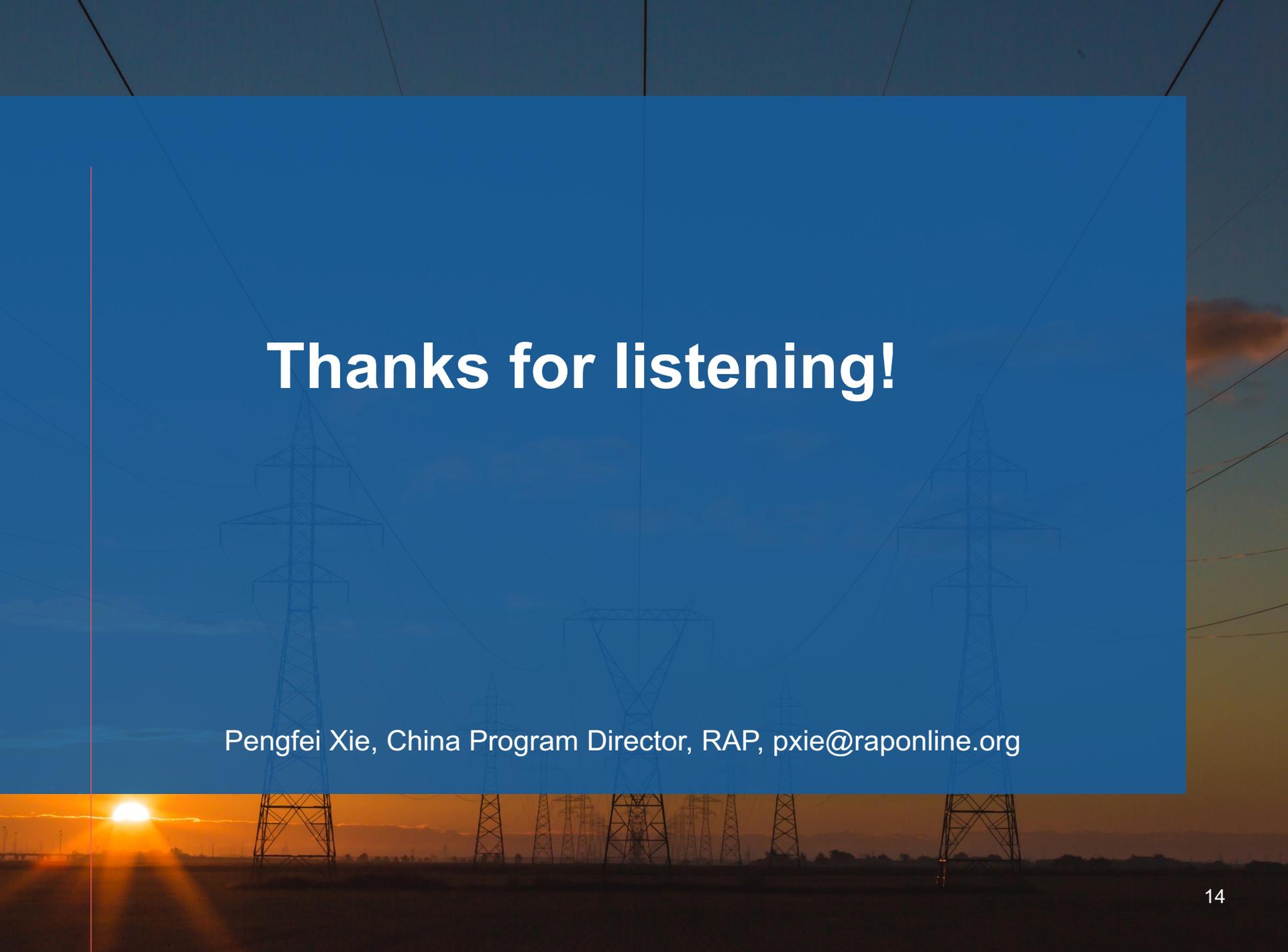
# Conclusions

- 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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# Bibliography

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# Thanks for listening!

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