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Mini-grids of the future: renewables innovation and resiliency

TUESDAY, 9 FEBRUARY 2021 • 14:00-14:30 CET

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SPEAKERS

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India member of the IEC
Standardization Management Board

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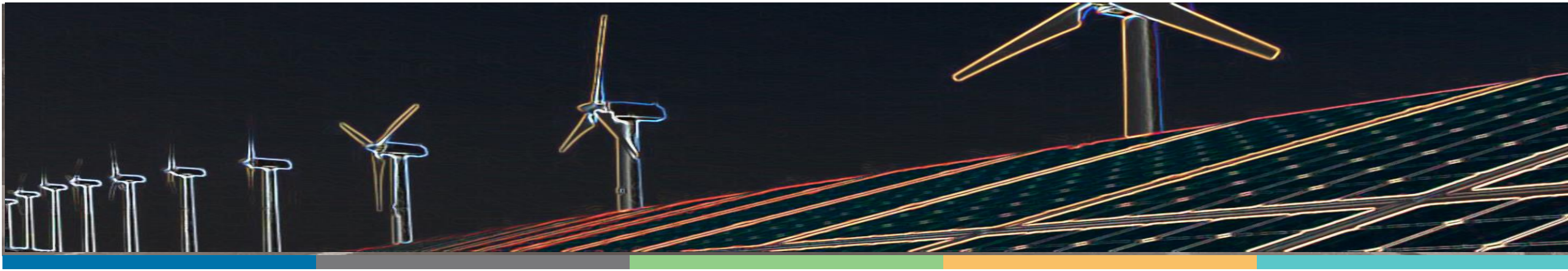

Mini-grids of the future: renewables innovation and resiliency

Francisco Boshell

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Renewable mini-grids market status

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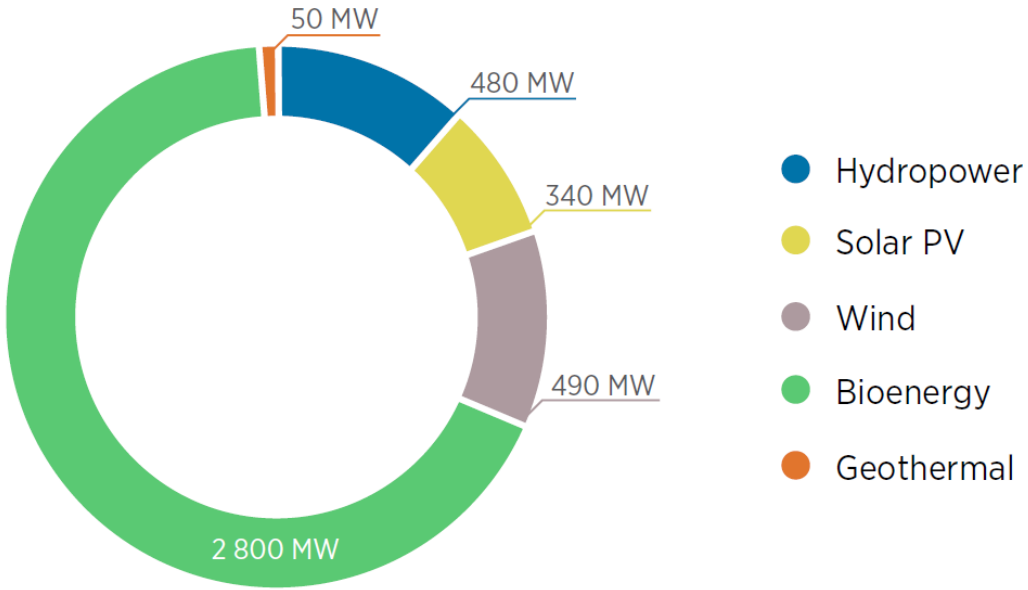
Total installed capacity RE mini-grids > 4.2 GW



Market per region and application

Indicator	Key facts
Regional share of mini-grid capacity	North America: 40% Latin America: 4% Asia-Pacific: 42% Europe: 10% Middle East & Africa: 4%
Mini-grid market share by segment	Remote, enabling energy access: 45% Commercial & industrial: 16% Utility distribution: 15% Community: 10% Institutions: 9% Military: 5%

Source: IRENA (2020), Quality Infrastructure for Smart Mini-Grids

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Innovation and assured quality – making mini grids more competitive

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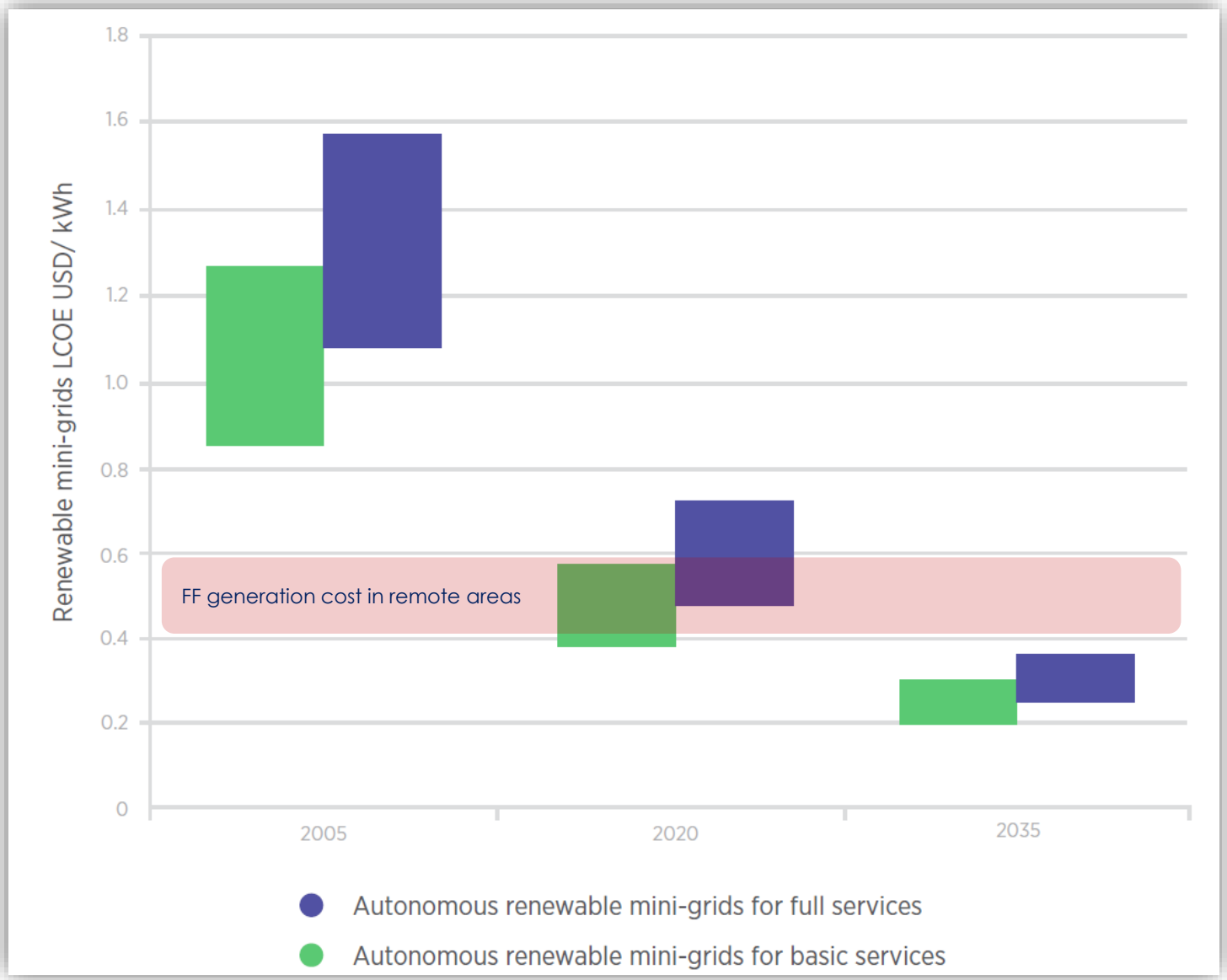

Renewable mini-grids already competitive in remote locations

Source: IRENA (2020), Quality Infrastructure for Smart Mini-Grids

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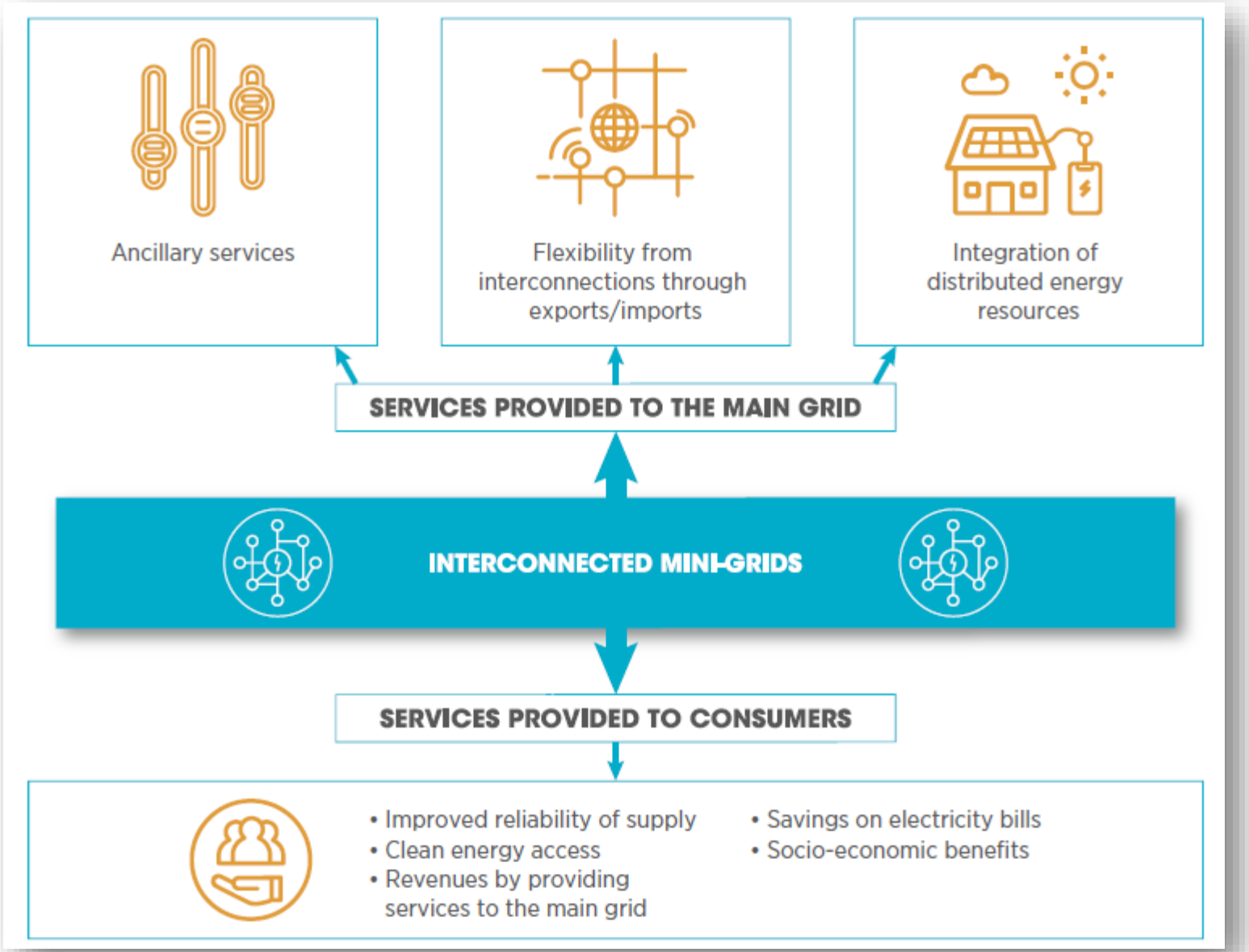
Mini-grids connected to the main grid



- In the Netherlands, pilot projects with renewable mini-grids provide balancing service to the main grid
- In Tanzania, mini-grids achieve 98% reliability, compared with 47% for the national grid
- Global installed capacity for off-grid renewable mini-grids is about 4.2 GW, with high potential for grid connection

Source: IRENA (2019), Innovation landscape brief: Renewable mini-grids

Innovation – mini grid of the future

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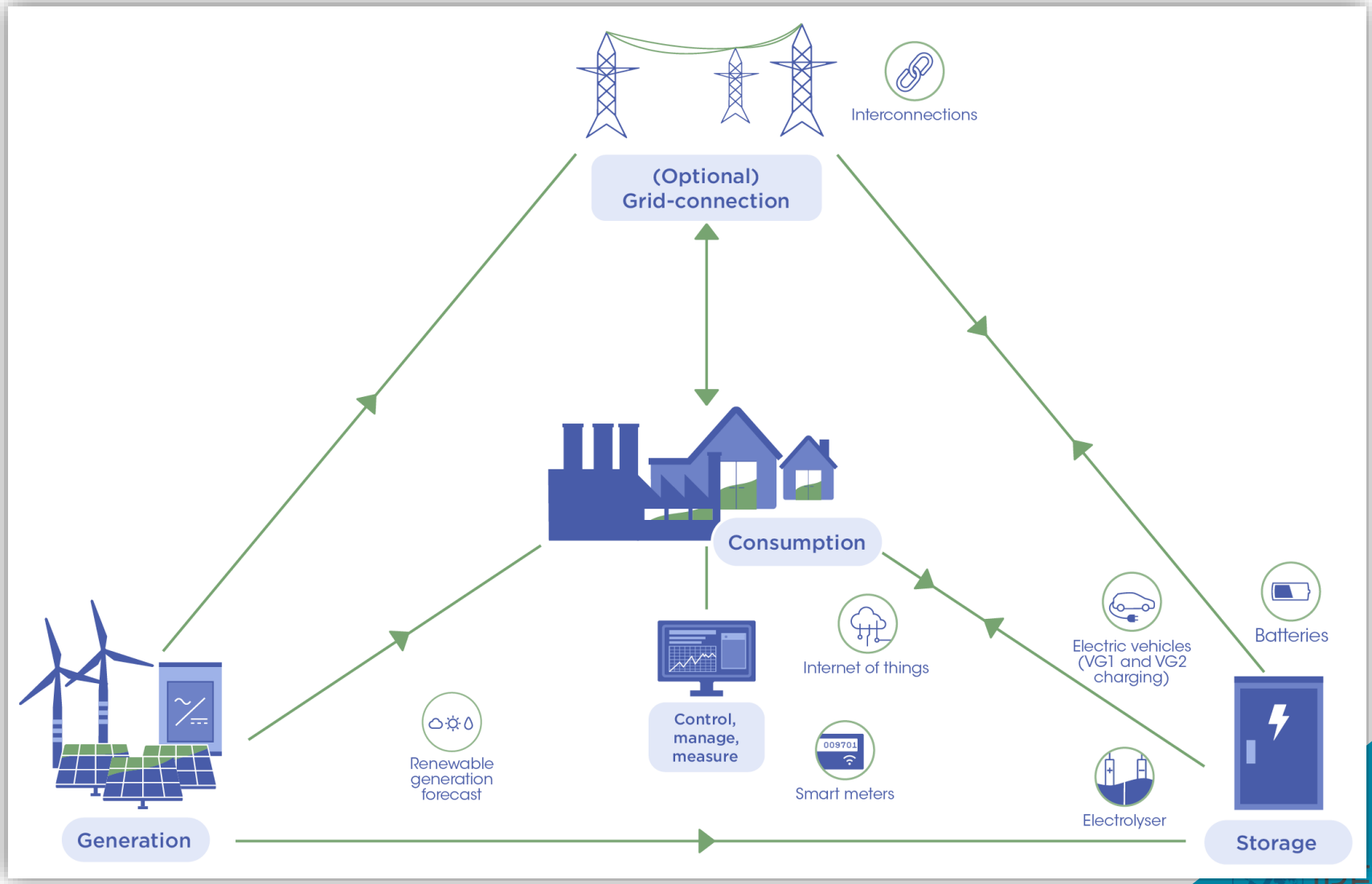
Major role of digital technologies.
Need for:

- Interoperability standards
- Communication protocols
- Low-voltage direct-current standards



Source: IRENA (2020), Quality Infrastructure for Smart Mini-Grids

Mini grids with assured quality = resilient energy systems for small islands

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Puerto Rico Regulation for Mini-grids

After hurricane Maria in 2017, Puerto Rico looked to implement more resilient energy systems in their communities.

The 2018 regulation defines 'renewable microgrids' as those that can generate 75 % of their energy from renewables. It identifies the applicable codes and standards.

Below, the Commission establishes the list of Codes and Standards with which all microgrids must comply. It remains the responsibility of each microgrid owner and operator to ensure that its microgrid system is in compliance with any and all Codes and Standards that may be applicable to it.

1. Latest National Electrical Code;
2. Latest National Electrical Safety Code;
3. IEEE Standard 1547-2014;
4. IEEE P2030.2, P2030.7;
5. IEC 61850-7-420; Power Utility Automation
6. IEC/TS 62898-1 and 62898-2; Guidelines for microgrid projects planning and specification

Source: NFPA, 2018; CEPR, 2018, WRI 2017, Magnaray International, African enterprise investor

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Quality infrastructure – crucial for robust mini-grids markets

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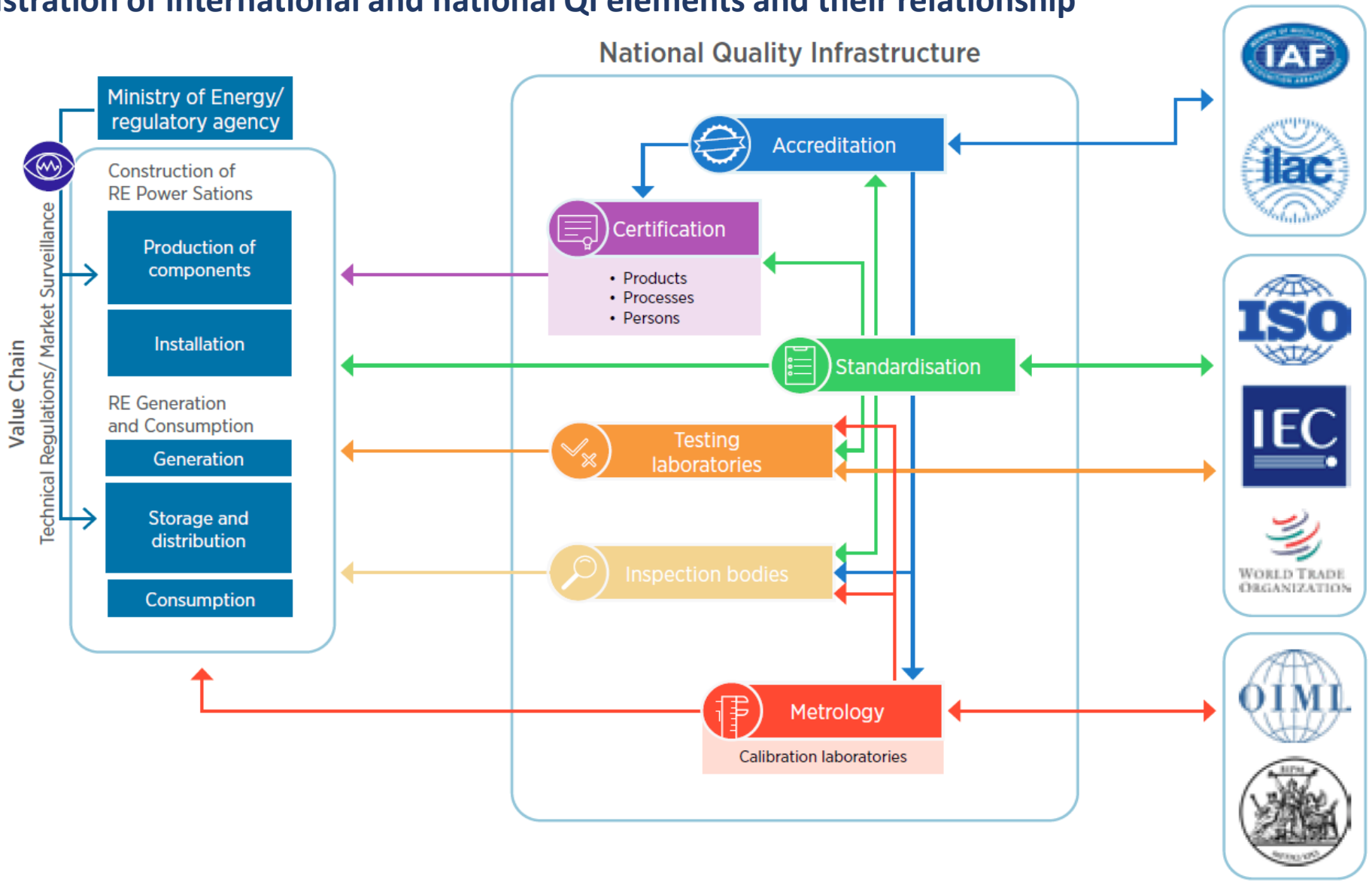
Illustration of international and national QI elements and their relationship



Source: IRENA (2020), Quality Infrastructure for Smart Mini-Grids

Need to anticipate QI needs for the mini-grids of the future

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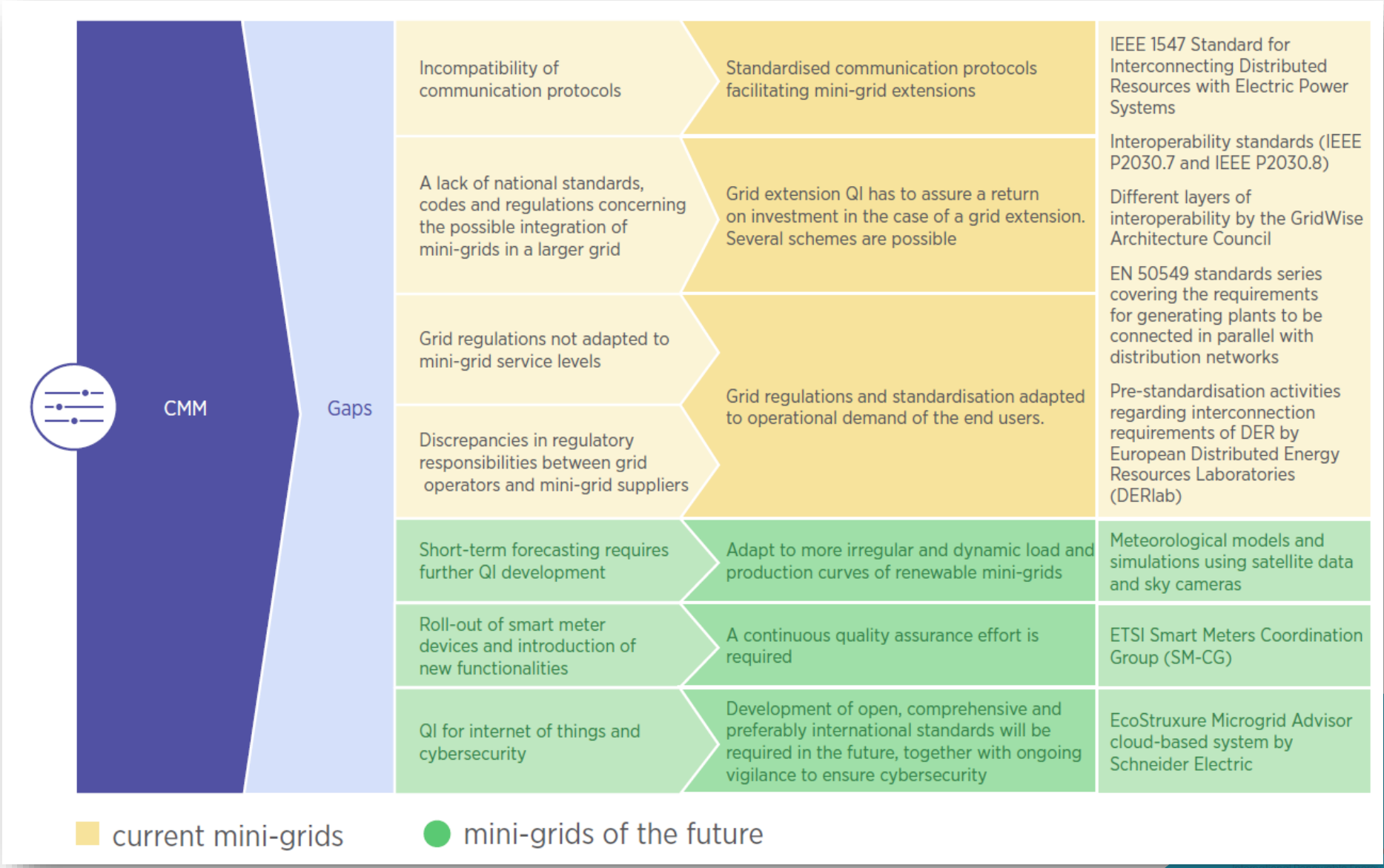
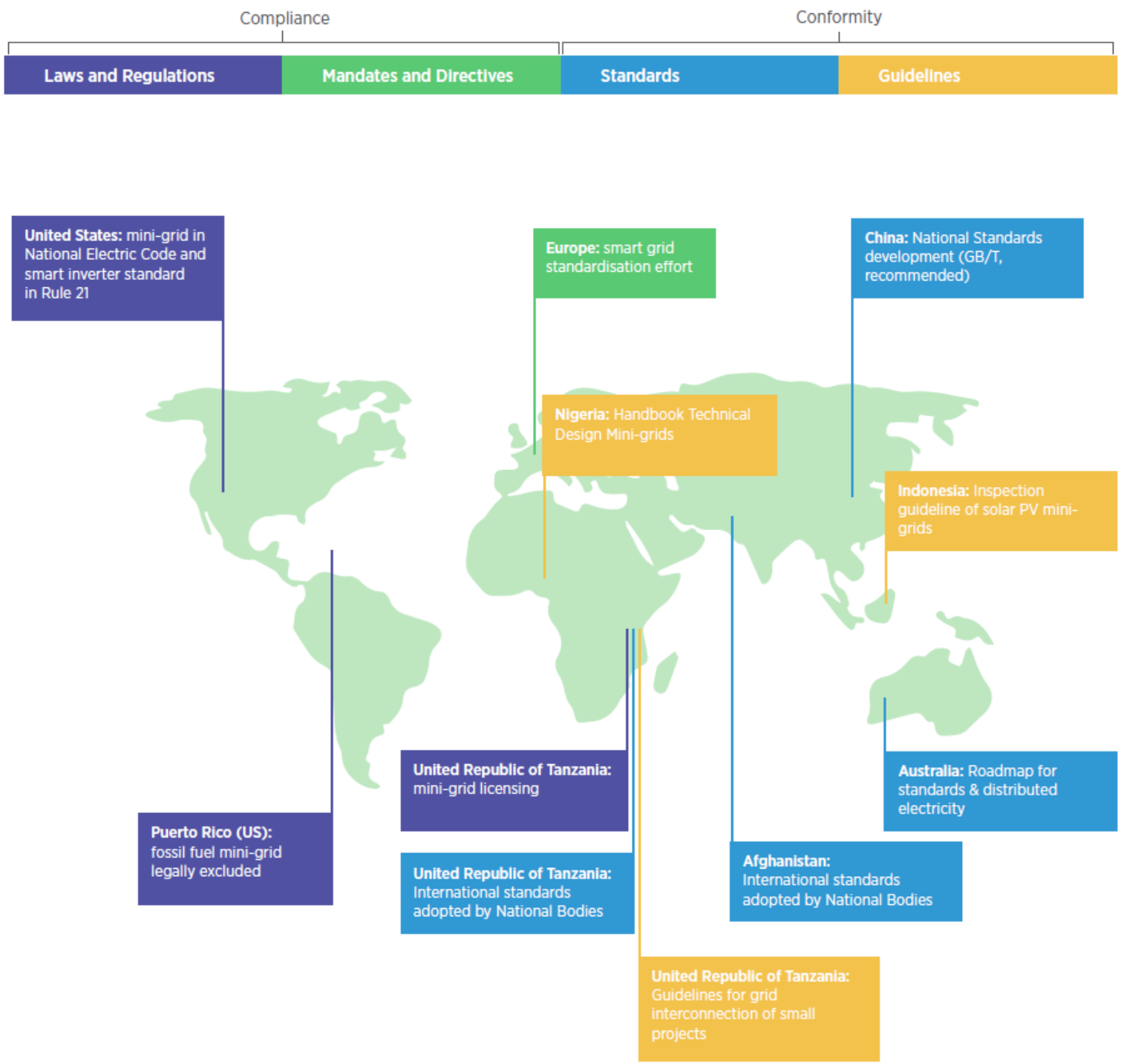
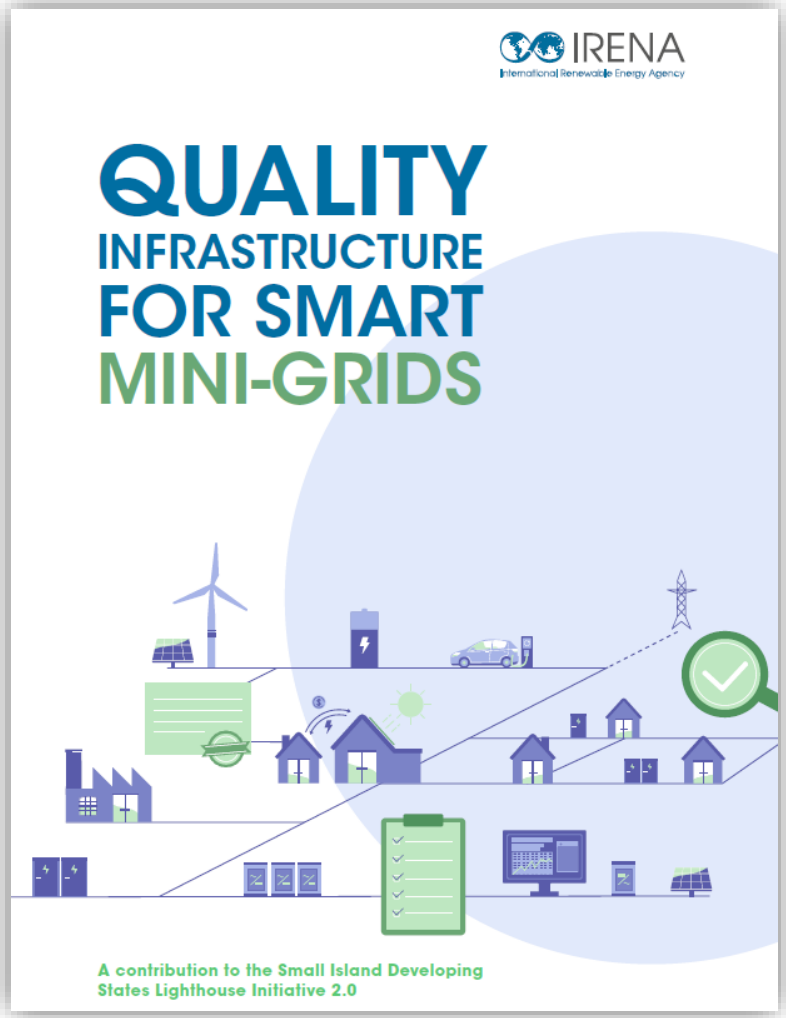


Source: IRENA (2020), Quality Infrastructure for Smart Mini-Grids



QI to be incorporated into policy and regulatory instruments

Source: IRENA (2020), Quality Infrastructure for Smart Mini-Grids



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Role of IEC in Renewable mini-grids of the future

Vimal Mahendru
IEC Ambassador
IRENA Webinar, February 09, 2021

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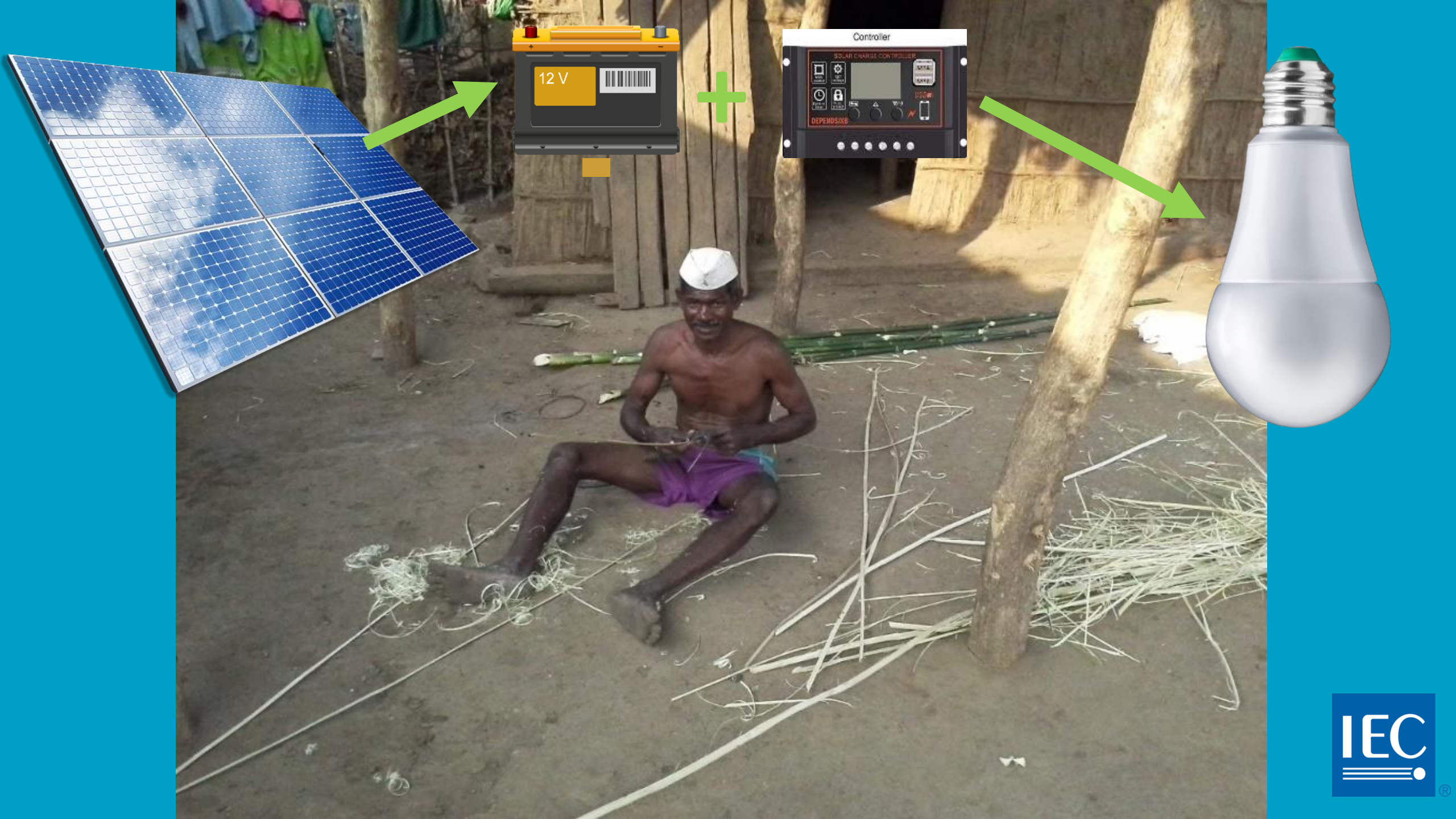
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Measuring energy access: the multi-tiers

World Bank Multitier Framework for Energy Access (https://www.esmap.org/node/55526)

DC Microgrids for healthcare & livelihood

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UNDP estimates this to be biggest demand outside of electricity for rural homes, is **healthcare** and **Irrigation**

Picture courtesy UNDP

DC Installations across India

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Picture courtesy Bureau of Indian Standards, India

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DC Microgrids in urbanscapes

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SUSTAINABLE SUPERCOMPUTING
DC Microgrid Data Center,
Austin, USA

ABN Amro Bank
Amsterdam, Netherlands

DC Grid Greenhouses,
Netherlands

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What is DC? How to define it?

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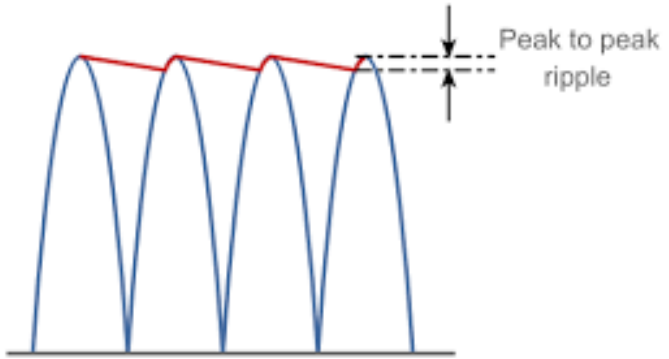

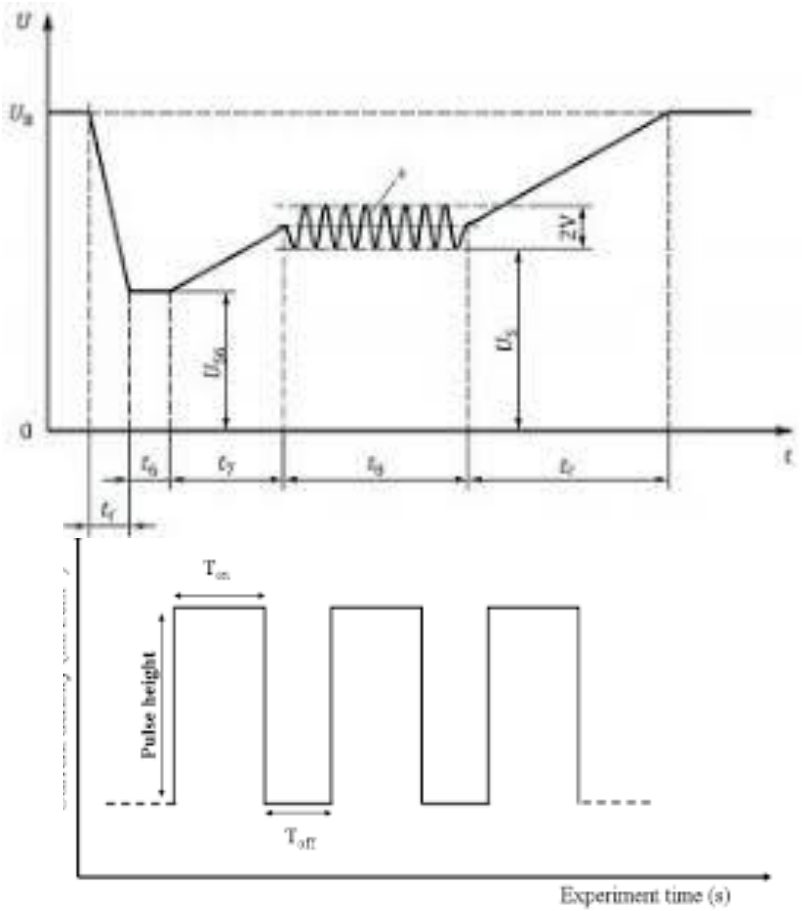

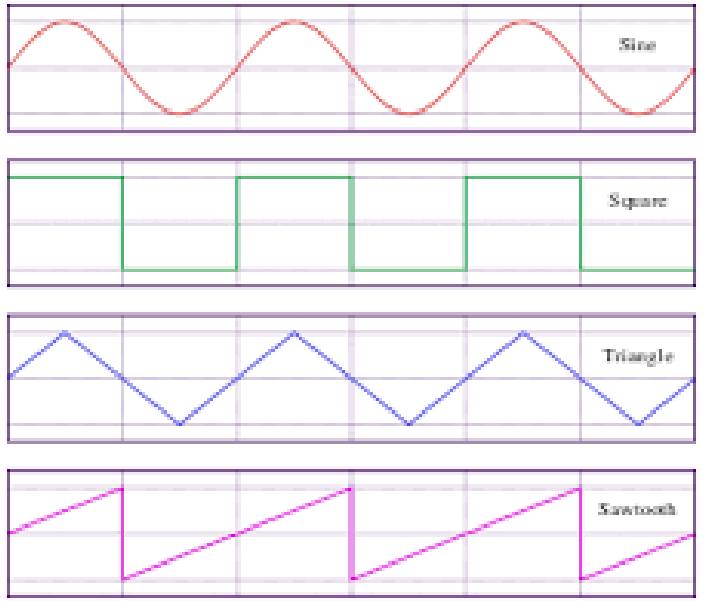

- Direct Current has evolved, thanks to electronics
- Microgrids have evolved, thanks to batteries, varied power sources and LED lighting

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DC microgrid standardization challenge?

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Each microgrid is unique?

- Different sources of power
- Different appliances and purposes
- With and without batteries
- Use skill and knowledge may be lacking

Grid or mini-grid?

- Mini-grid enablers are plenty and affordable,
- Mini-grids are highly scalable,
- Speedier to set-up, scale-up
- Provide resilience, and democratize electricity

At IEC

- Creating use-case repository
- Standardizing terminology
- Developing system level standards

What is IEC doing about it?

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Direct Current: electricity for the 21st Century

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- Demand more from the standardization community
- Join IEC groups
- Save energy, save the environment

Image adapted from https://www.flickr.com/photos/jfgallery/

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  - includes content from past conferences
  - downloads area (brochures, mnemonic, public content)
- IEC LVDC Open Forum
- IEC LVDC LinkedIn Group
- The LVDC Technology Paper:
  LVDC: electricity for the 21st century
- My contact: vimal@iec-ambassador.ch

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Q & A
10 min

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  "Innovations for operating power systems with increasing shares of variable renewables – a regional perspective "

- 23 FEBRUARY 2021 •12:00 CET
  "Skill Building for the Energy Transition"

- 9 MARCH 2021 •10:00 CET
  "Hydrogen series – Part 1: Green hydrogen: A guide to policy making"

- 23 MARCH 2021 •10:00 CET
  "Hydrogen series – Part 2: Green Hydrogen Cost Reduction: Scaling up Electrolysers to Meet the 1.5°C Climate Goal"

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