IRENA INNOVATION WEEK 2025

Bottom-up solutions:

Energy communities

Organised in partnership with:

WWEA
World Wind Energy Association

IRENA coalition FOR ACTION

11 June 2025 | 15:30-17:00

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IRENA INNOVATION WEEK 2025

Scene Setting

Arina Anisie

Analyst Renewable Energy Innovation
IRENA

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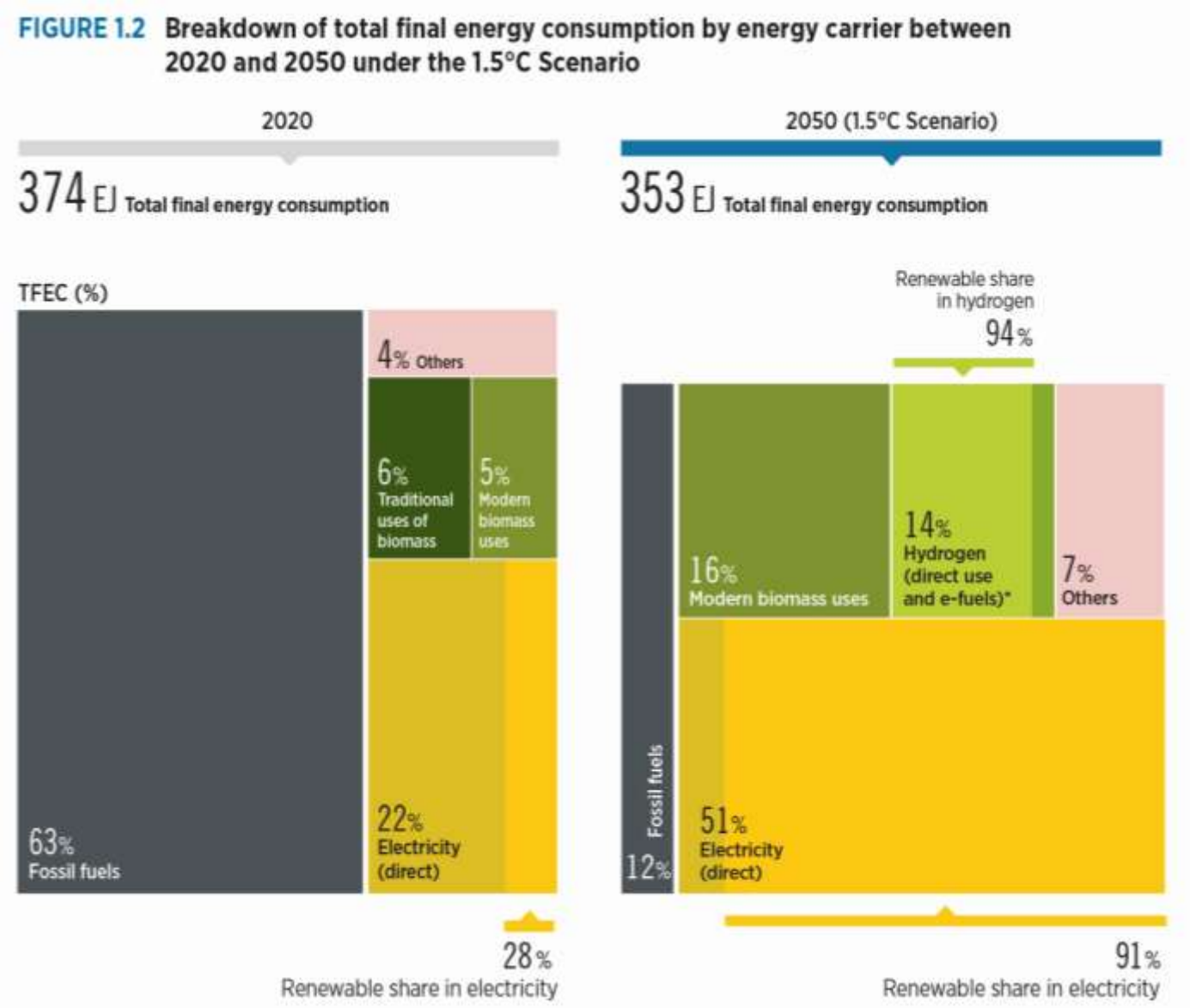
Renewable electricity is powering the energy transition



- Renewable energy deployment is the core of the energy transition.
- Improvements in energy efficiency and the electrification of end-use sectors contribute to this shift.
- Total final energy consumption decreases by 6% from 2020 to 2050

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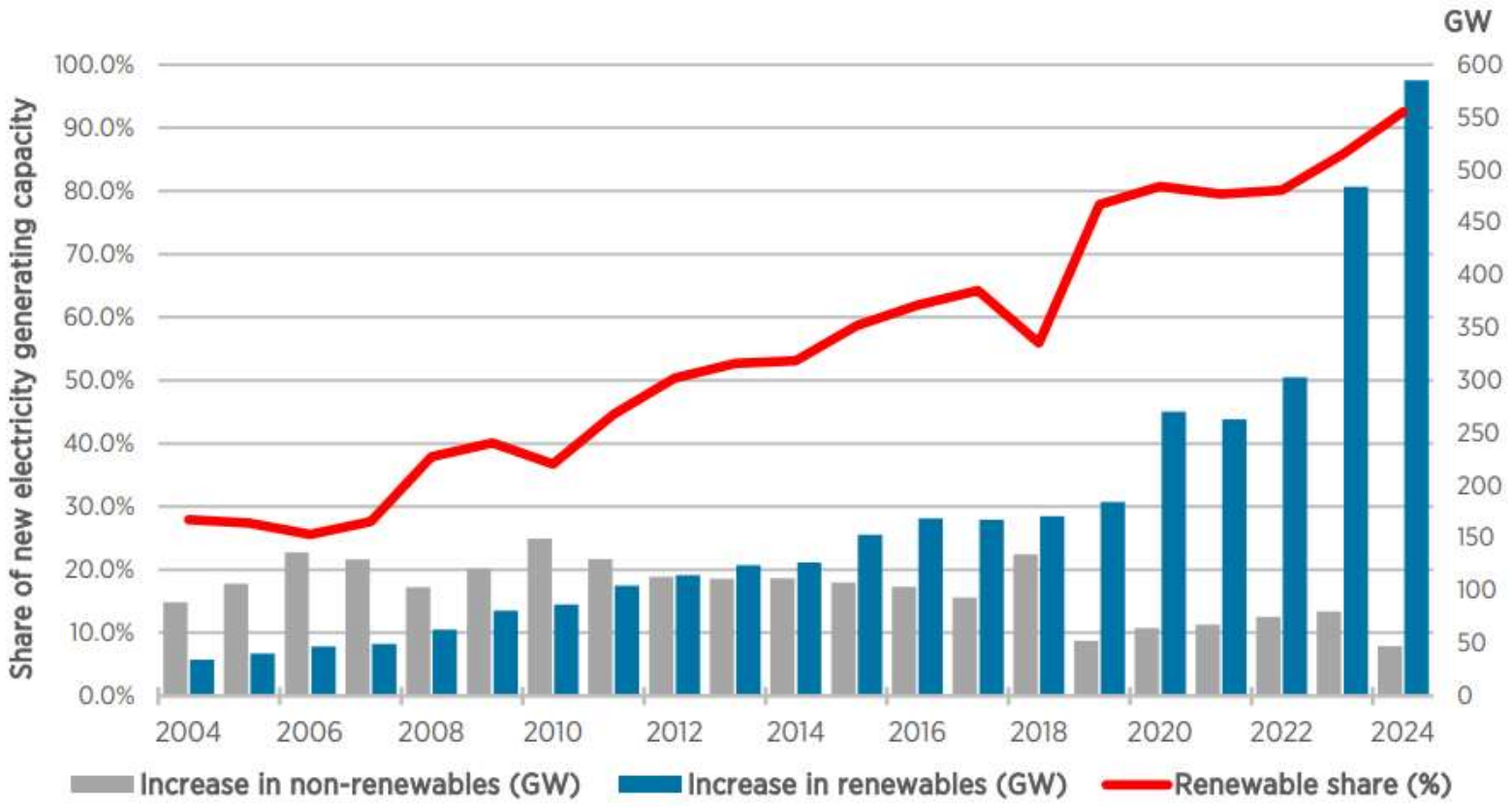
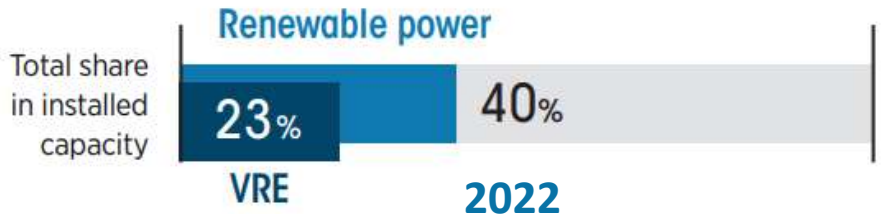
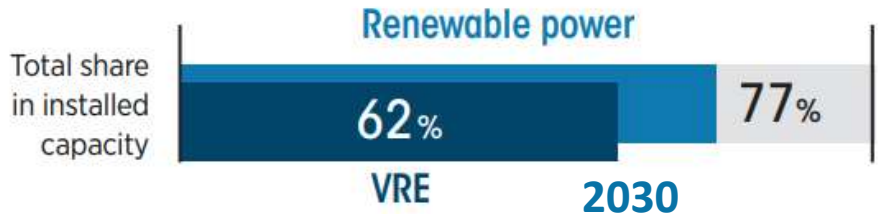
Renewable electricity is leading global capacity growth at a record pace



But much more renewable capacity is needed





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Energy transition and innovation can drive sustainable growth

- The transition presents enormous opportunities to transform and modernise energy systems across the globe.
- All regions have much to gain from this transition, making it possible to create **resilient, secure and affordable low-carbon energy systems, and provide universal access to electricity.**
- The development of renewables can be a catalyst for ensuring a fair, just, efficient, and equitable transition for all, and moreover for powering sustainable economic development.

For innovative renewable solutions to thrive and be scaled efficiently, policymakers should focus on creating an enabling environment:

Clear vision:
energy transition roadmap for long-term predictability and stability

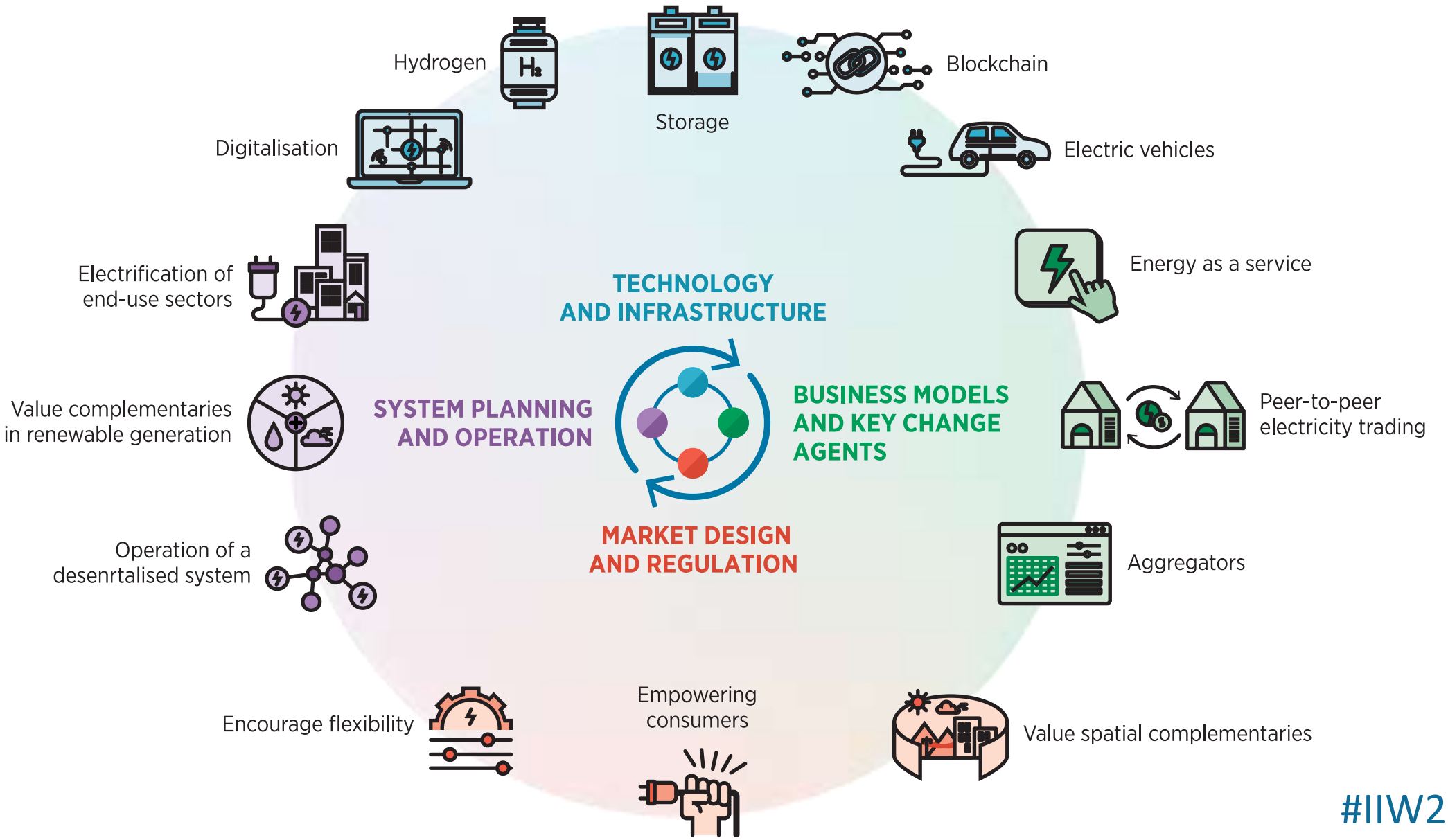
Value creation locally:
develop local industries and value supply chains

Increase ownership:
design inclusive participatory decision-making process

Finance the transition:
affordable access to finance and innovative funding models

Collaborate and leverage insights:
with a stronger focus on South-South and regional cooperation to identify synergies and share replicable success stories

Systemic innovation is key for successful solutions



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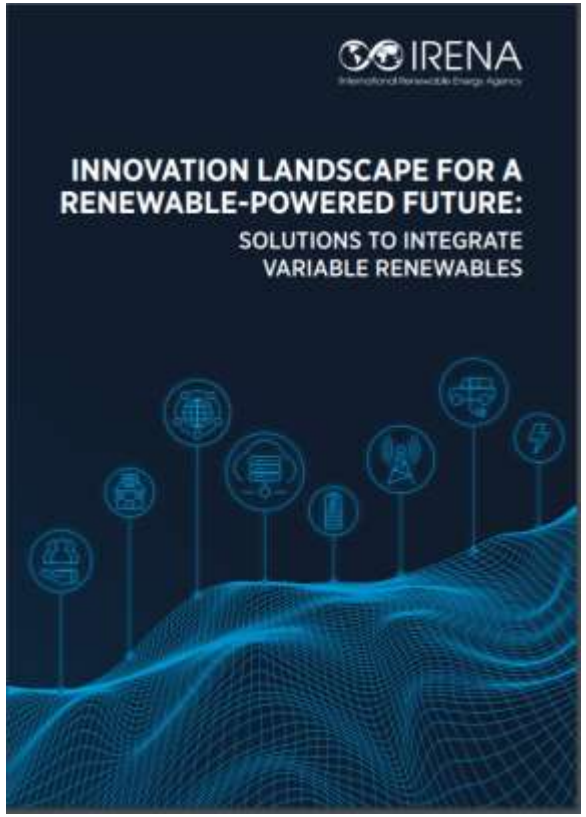
IRENA Innovation Landscape provides implementable toolboxes

There is no “one-size-fits-all” solution



Link

Solutions to increase flexibility in power systems

Link

Solutions to smart electrify end-use sectors

Solutions to achieve sustainable growth powered by renewables

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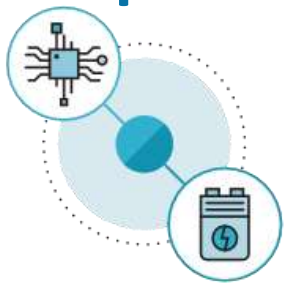
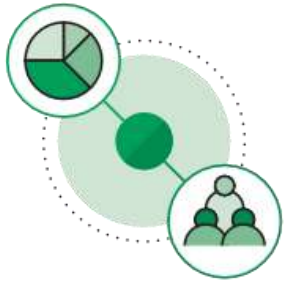
The Innovation Toolbox is designed to build solutions for resilient power systems



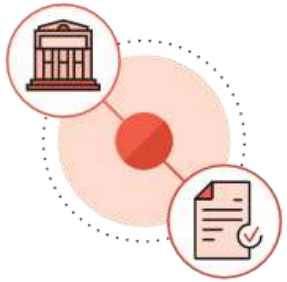
TECHNOLOGY AND INFRASTRUCTURE

- Increased flexibility in existing generation batteries
- Data acquisition and management
- Advanced monitoring systems
- Smart and autonomous systems
- Renewable mini-grids
- Supergrids
- Electrification of end-use sectors
- Energy efficiency



BUSINESS MODELS AND KEY CHANGE AGENTS

- Key change agents to support renewable development
- Crowdfunding
- Corporate renewable sourcing
- Aggregators
- Storage as a service



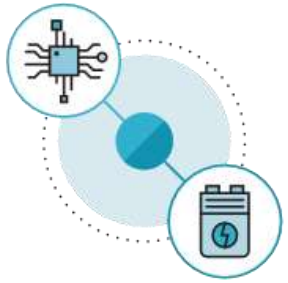
MARKET DESIGN AND REGULATION

- Fiscal instruments
- RE Auctions
- RE portfolio standards
- Regional markets
- Grid connection codes
- Innovative ancillary services
- Time of use tariffs

SYSTEM PLANNING AND OPERATION

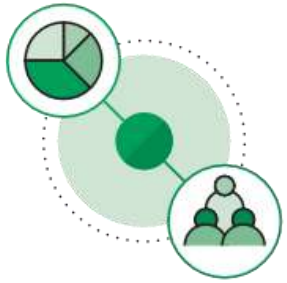
- Storage as virtual power line
- Dynamic line rating
- Installing compensation devices
- Enhance forecast of VRE
- Electricity losses reduction
- Planning for regional interconnections

.. and solutions for rural development through decentralised productive uses



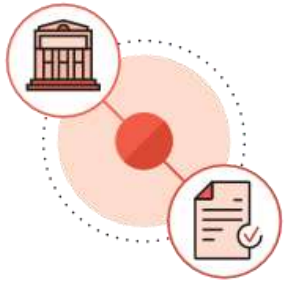
TECHNOLOGY AND INFRASTRUCTURE

- Renewable mini-grids
- Small scale batteries
- Digitalisation
- Smart and autonomous systems
- Energy efficient appliances
- RE based electrification of heating, cooling and cooking
- Electric Vehicles



BUSINESS MODELS AND KEY CHANGE AGENTS

- Key change agents to support renewable development
- Powering a green health and education ecosystem
- RE for agriculture and farming
- Energy community
- Decentralised productive uses
- Peer to peer trading
- Pay as you go
- Crowdfunding and financial funding



MARKET DESIGN AND REGULATION

- Regulation for mini-grids

SYSTEM PLANNING AND OPERATION

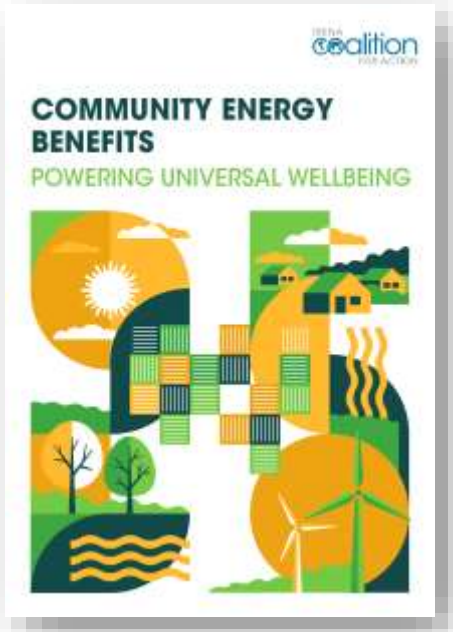
- Harmonizing grid and off-grid development

Energy community model aims to empower communities

Voting control rests with a community-based organisation

Local stakeholders own a majority or all of a renewable energy project

The majority of social and economic benefits are distributed locally



- Building public acceptance
- Maximising well-being
- Empowering citizens and enhancing social cohesion
- Improving gender equality

- Enhancing climate adaptation and resilience of energy systems
- Protecting nature and biodiversity

- Enabling energy access and local development
- Providing energy in fragile and conflict-affected areas
- Achieving local energy security

..while also advancing the energy transition

Community ownership models

Benefits for the main grid

- Increased flexibility of the main grid
- Increased grid resilience
- Increased deployment of distributed renewable generation
- Improved renewable energy access
- Lower energy cost for the community

Power sector transformation in the community

KEY ENABLING FACTORS

- Enabling policy and regulatory frameworks
- Simplification of administrative processes
- Access to finance
- Capacity building within community

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Innovative bottom-up solutions can drive sustainable growth

Priorities to create an environment for innovative solutions for renewables

Clear vision:
energy transition roadmap for long-term predictability and stability

Increase ownership:
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Innovative solutions driving the energy transition and sustainable development

TWO-WAY STREET

TECHNOLOGY AND INFRASTRUCTURE

- Digitalisation
- Hydrogen
- Storage
- Electric vehicles
- Blockchain

BUSINESS MODELS AND KEY CHANGE AGENTS

- Aggregators
- Energy as a service
- Peer-to-peer electricity trading

MARKET DESIGN AND REGULATION

- Encourage flexibility
- Empowering consumers
- Value spatial complementaries

SYSTEM PLANNING AND OPERATION

- Operation of a desenrtalised system
- Value complementaries in renewable generation
- Electrification of end-use sectors

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Scene Setting

Ayu Abdullah

Managing Director
Community Energy Toolkit (COMET)

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From The Ground Up: Rethinking Community Energy Through Practice

Ayu Abdullah

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Bridging Practice and Participation: ENACT & COMET

ENERGY ACTION PARTNERS

Founded in 2014 as a nonprofit organization to promote community development through collaborative energy access.

COMMUNITY-BASED ENERGY ACCESS

Design and implement decentralised energy systems with rural and Indigenous communities to improve infrastructure, well-being, and livelihoods.

TOOLS, TRAINING & LOCAL CAPACITY

Develop participatory tools and deliver technical training and productive use programs to build lasting local capacity.

POLICY, RESEARCH & SYSTEMS CHANGE

Inform inclusive energy policy and planning through field-based research, advisory support, and knowledge exchange.

COMET

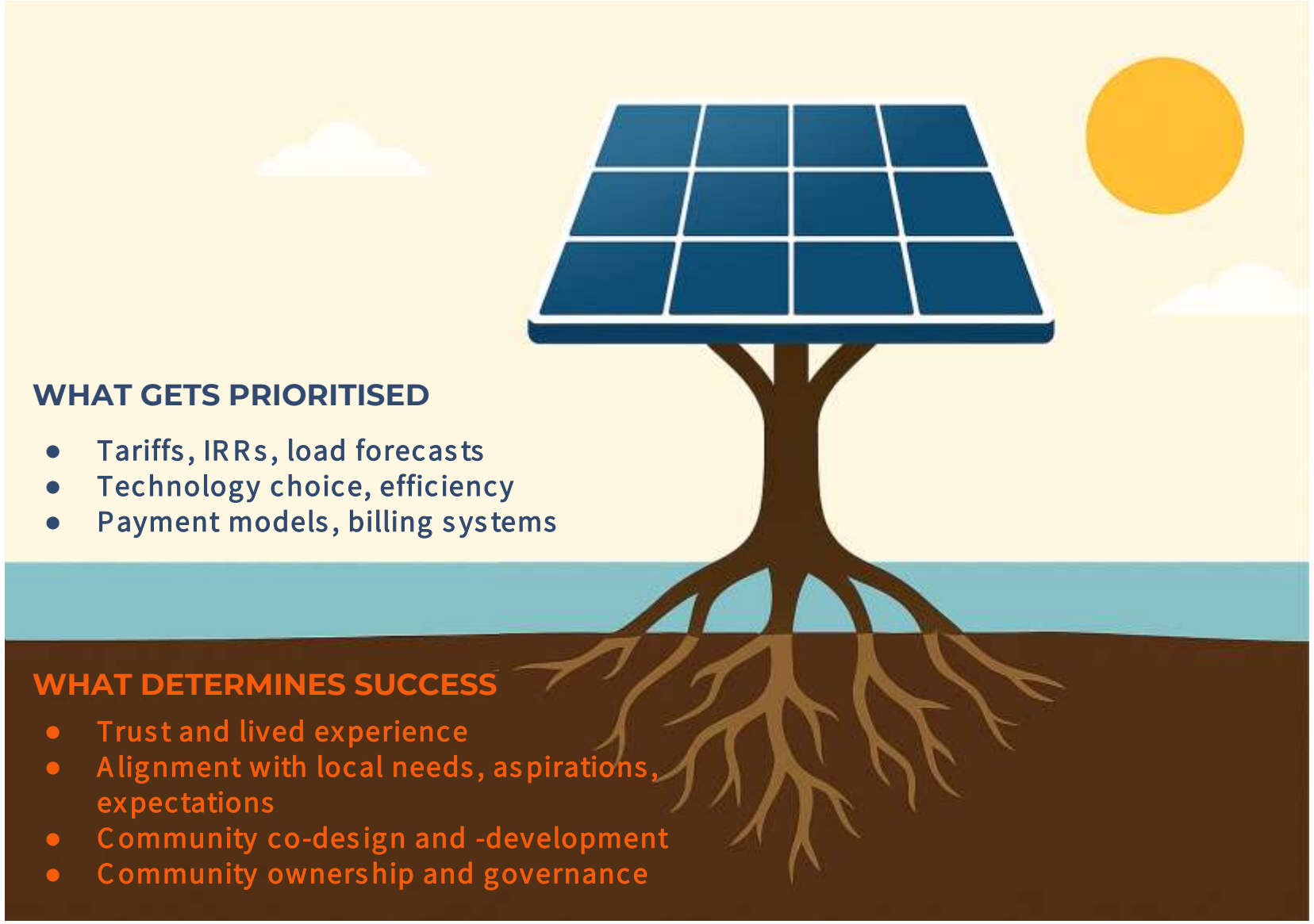
Mini-grid community engagement software for exploring electricity demand, value and cost.

BUILD CUSTOMER UNDERSTANDING of complex technical concepts e.g. electricity costs, capacity constraints, benefits & value of electricity

VALIDATE COMMUNITY LOAD PROFILES and align community expectations and mini-grid design to build trust and increase adoption

ASSESS WILLINGNESS-TO-PAY & PROJECT RISK to reduce demand-side risk through improved understanding and forecasting

(Off-Grid) Community Energy ≠ Just Technology



GAPS IN DISCOURSE:

- ✗ Technological systems are **messy, complex, socially constructed** and **society shaping.** (Hughes 1987)
- ✗ Innovation, tools, methods focus on supply and distribution of electricity, and **not end user or demand-side solutions**.

What is Community Engagement?

Ownership & self-mobilization
Communities have the capacity, leadership, and institutional space to manage and adapt their own systems - local capacity, authority and institutions make a system more resilient to challenges.
e.g. Community-led planning, governance through local institutions (e.g. VECs)

Collaborative engagement
Communities and implementers exchange knowledge, explore trade-offs, cooperate and design together - enhances ability and motivation to manage systems
e.g. Co-design workshops, tools and approaches like COMET

Transactional engagement
Information flows from community to project, with limited participation in decisions - used in system planning & validation
e.g. Surveys, needs assessment, consultation

Effective community engagement has been shown to reduce system costs by up to 20% and mitigate key socio-technical risks, including undersized systems, poor maintenance, and unmet demand.

Community Engagement Across Project Lifecycle

Scoping	Feasibility & Design	Implementation	Operations & Governance	Handover/Long -term
Identify sites and priorities	Load estimation, system sizing, tariff	Install system, set up billing	Billing, maintenance & conflict resolution	Monitoring, exit, scaling
Communities share priorities, historical experiences, local needs	Use participatory tools (eg COMET), facilitate co-design workshops	Communities help organize, support logistics, train and monitor	Local committees lead governance, set rules, manage service	Communities take ownership, external roles become light-touch

Community engagement becomes the system's foundation.

ENACT Projects in Malaysia

Energy Access as Foundation
Co-designed systems using a clustered solar rooftop model - combining household-level reliability with community-level coordination, in Pos Titom in Pahang, Malaysia. Indigenous communities of Kemiyan, Cerewes, Sempar & Cincin (~600 people)

Governance & Participation
Community-led decision-making through community-wide consultations, then established Village Energy Committees (VECs); trust built through long-term engagement. Communities pay into community fund to maintain & operate.

Business & Livelihood Support
New productive-use businesses supported with local CSOs/institutional partners contributing resources and follow-on support.

Innovative Financing: D-RECs
Kampung Sempar is Malaysia's first project signed up for D-RECs; community receives generation-based revenue with ENACT as non-profit aggregator.

Technology Innovation: Clustered Solar Rooftop Model
Piloting flexible, modular 3kW solar systems that connect 2–3 households, bridging the gap between standalone SHS, mesh-grids and full mini-grids.

Motivation & Ownership
Sustained by trust, relevance, and proof of long-term benefits — not just technology, but social and institutional grounding.

COMET - Amplifying, Not Replacing Community Engagement

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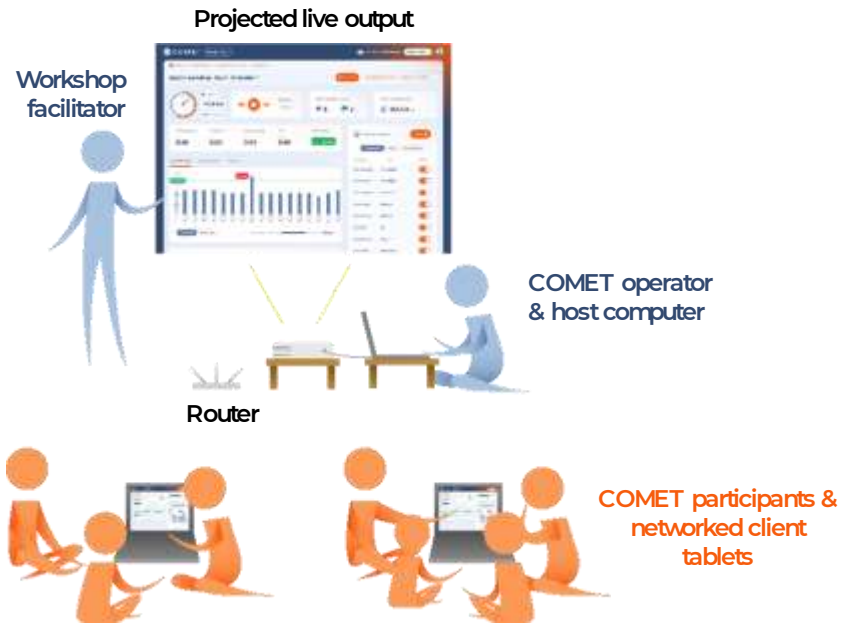
COMET in Action



A Call to Rethink Community Energy

The best solutions grow from the ground up - when communities lead with purpose.

COMET
COMMUNITY ENERGY TOOLKIT

ABOUT COMET
www.cometapp.net
info@cometapp.net

Thank you!

Energy Action Partners

ABOUT ENACT
www.enactpartners.org
info@enactpartners.org

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Panel discussion

Moderator

Stefan Gsänger

World Wind Energy Association

Panellists

Simbini Tichakunda

African Union Development Agency AUDA NEPAD

Manoj Gupta

Tata Power Renewable Microgrid Limited, India

Ayu Abdullah

Community Energy Toolkit (COMET), Malaysia

Jose Vega

Stockholm Environment Institute, Colombia

Peng Zhang

Energy Bureau Government of Qinghai, China

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Audience Q&A

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Renewables and Digitalisation for a Sustainable Energy Future

Thank you!

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Networking Dinner

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