

EURO-AFRICA FEBRUARY 4, 2010
ADDIS ABABA, ETHIOPIA
COOPERATION FORUM ON ICT RESEARCH



ICT for Environmental Sustainability and Energy Efficiency

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MIT-Portugal Program**

Addis Abeba, February 4th 2010

MIT-Portugal Program



Engineering systems focus: gives emphasis to **complex systems** that not only have critical **technological components**, but also have significant **economical** and **socio-technical level interactions**, going beyond traditionally defined engineering disciplines.

The following specific fields were identified as the initial focus areas, on top of which an **integrative anchor program** will be developed:

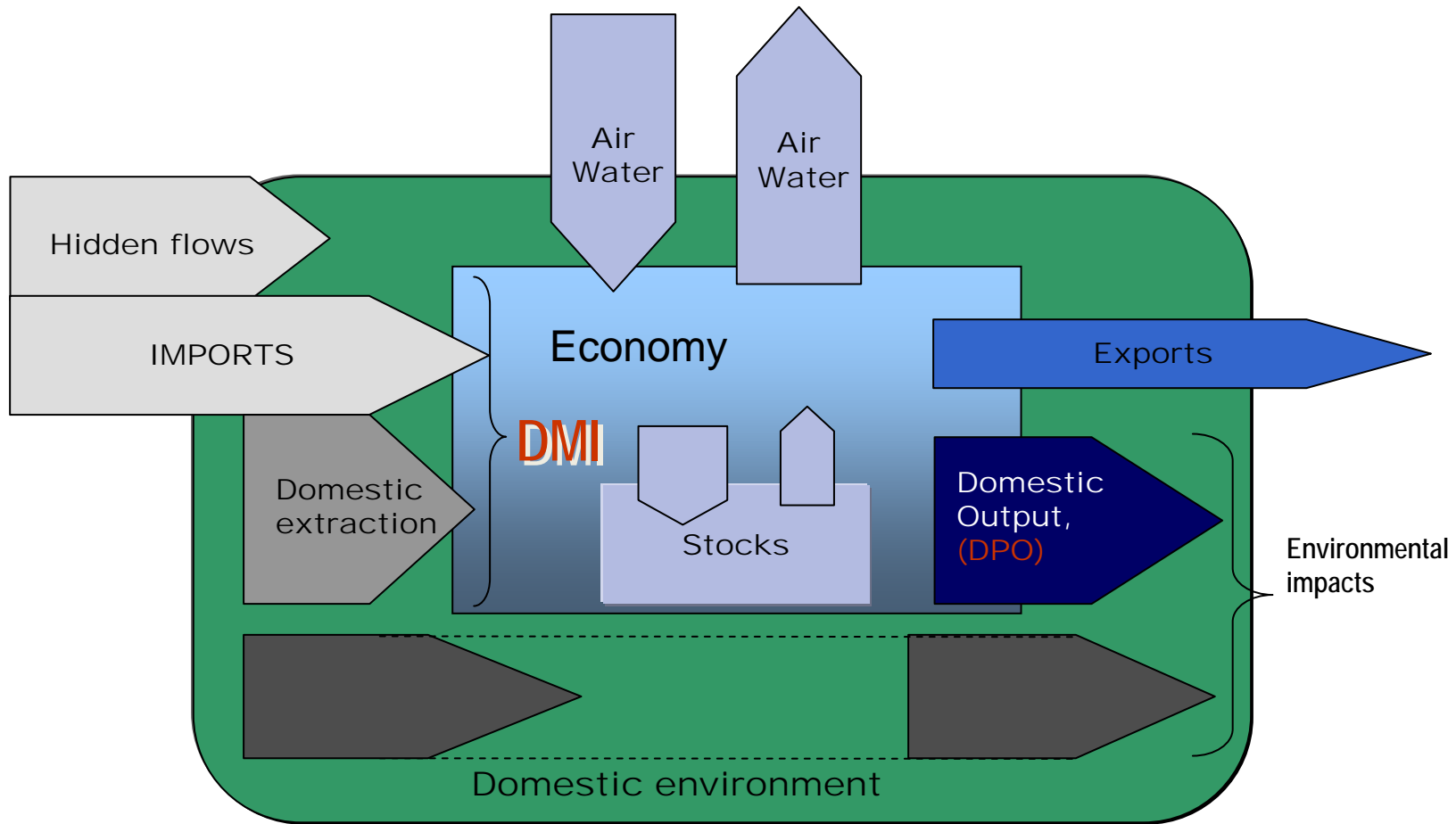
- Engineering Design and Advanced Manufacturing
- Transportation Systems
- Sustainable Energy Systems
- Bio-Engineering Systems



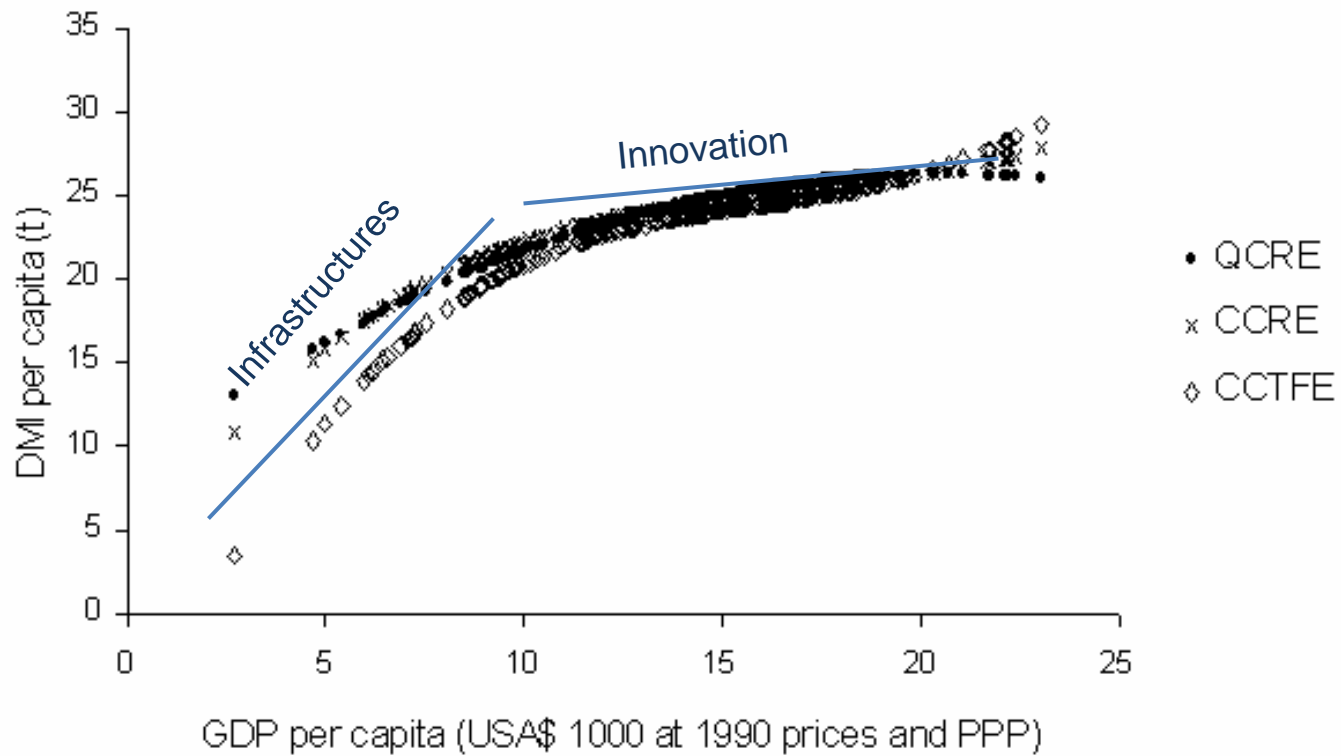
OUR CURRENT PARADIGM

THE METABOLISM OF A CRISIS

THE ECONOMY METABOLISM



A NEW KUZNETS CURVE ?

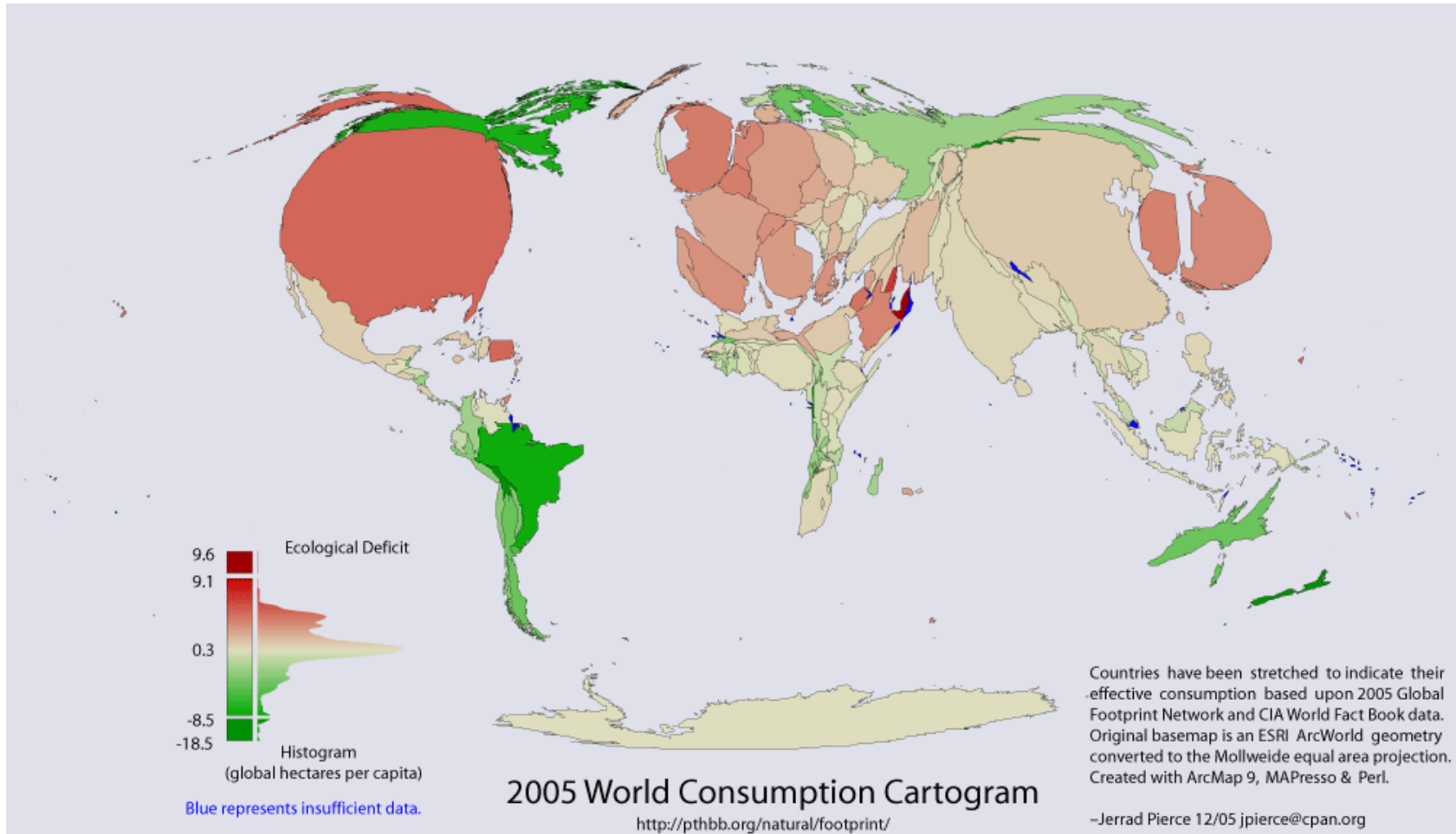


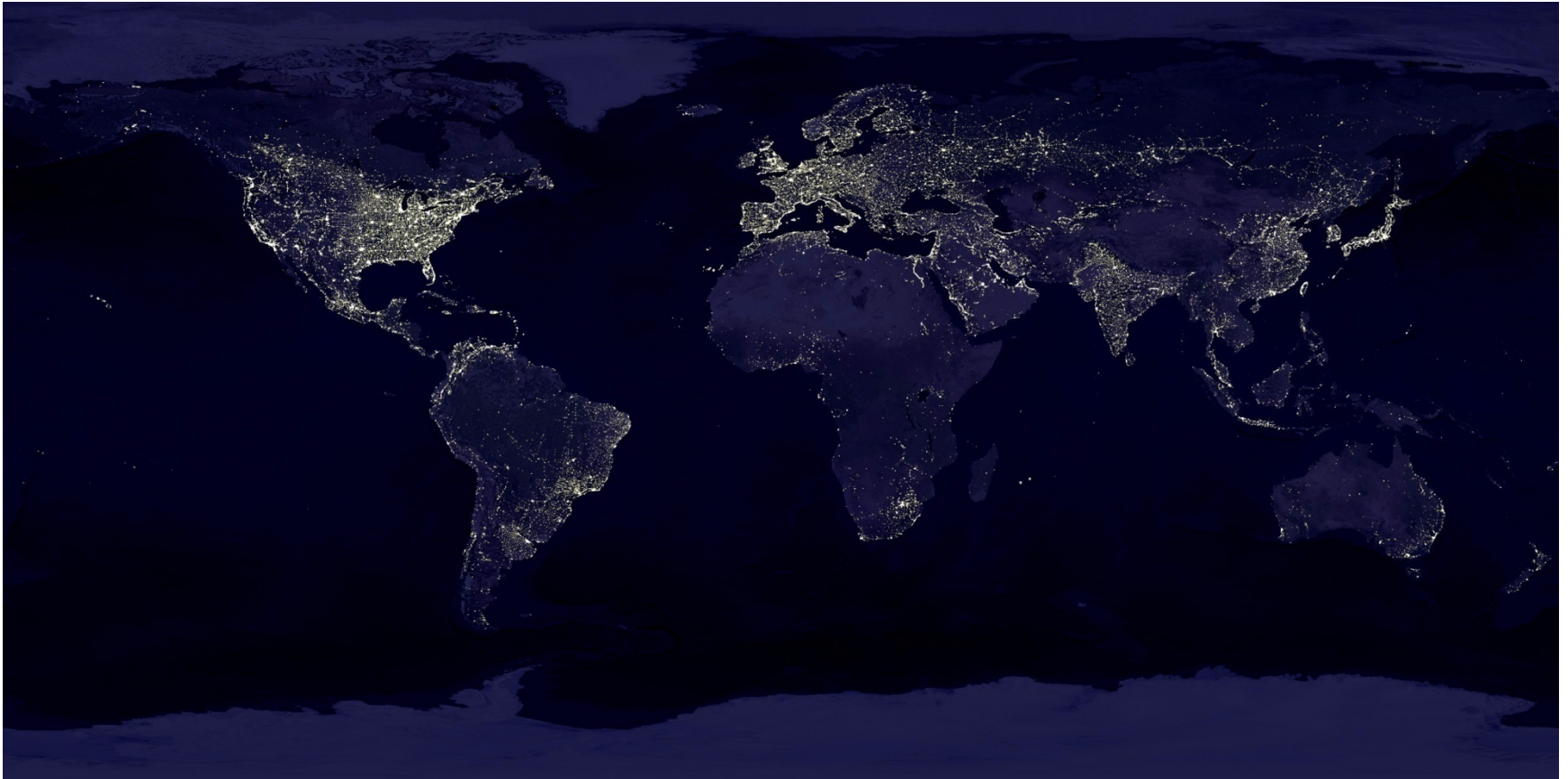
CONSEQUENCES ECOLOGICAL FOOTPRINT



Available in: <http://www.footprintnetwork.org>

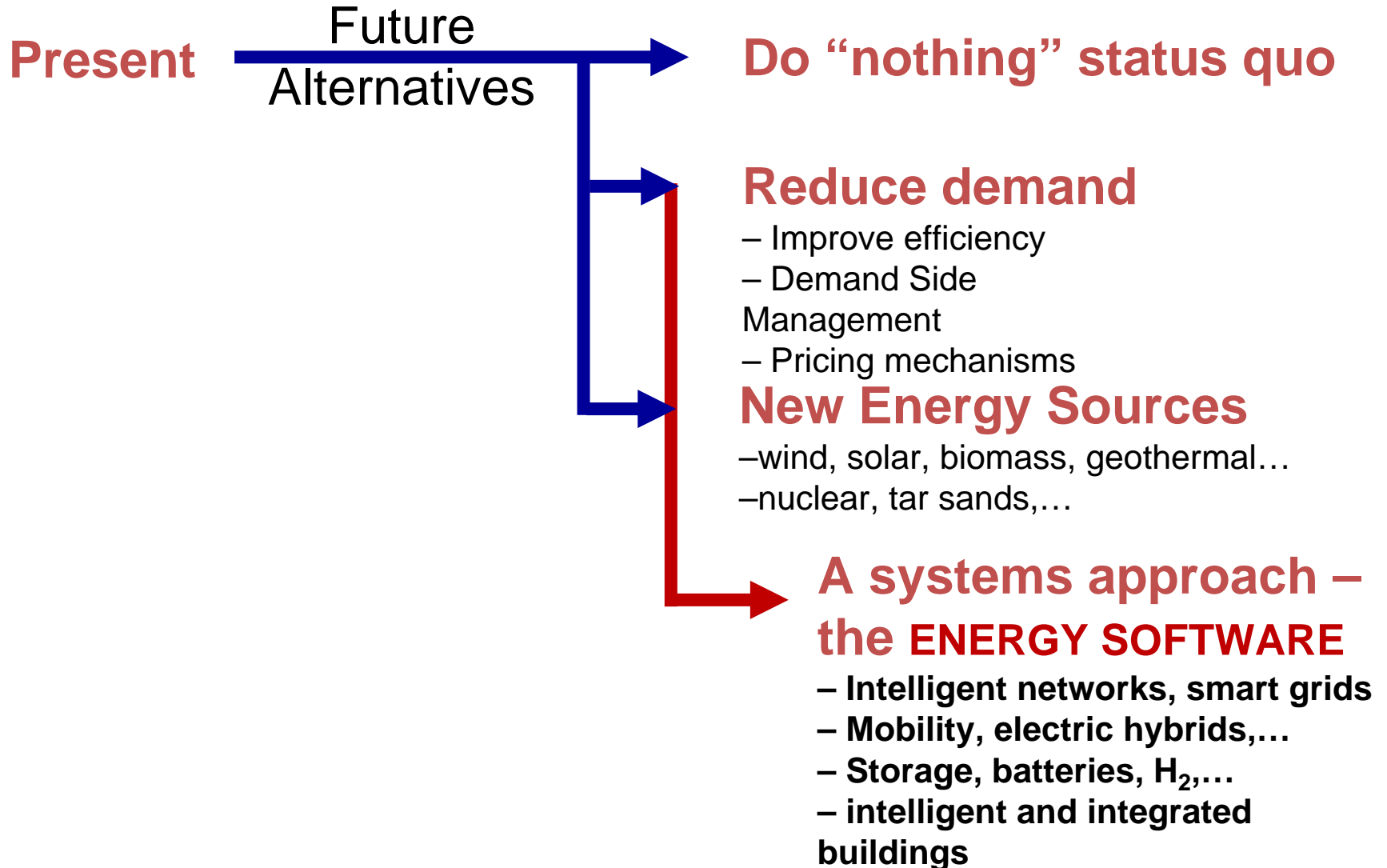
Ecological Footprint





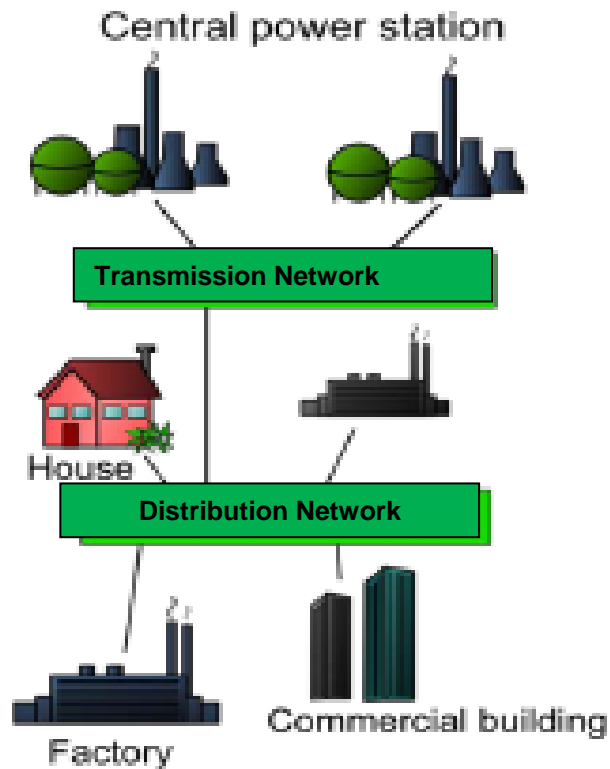
How can the new trends in Europe be helpful to avoid painful progress in Africa?

Opportunities for Innovation

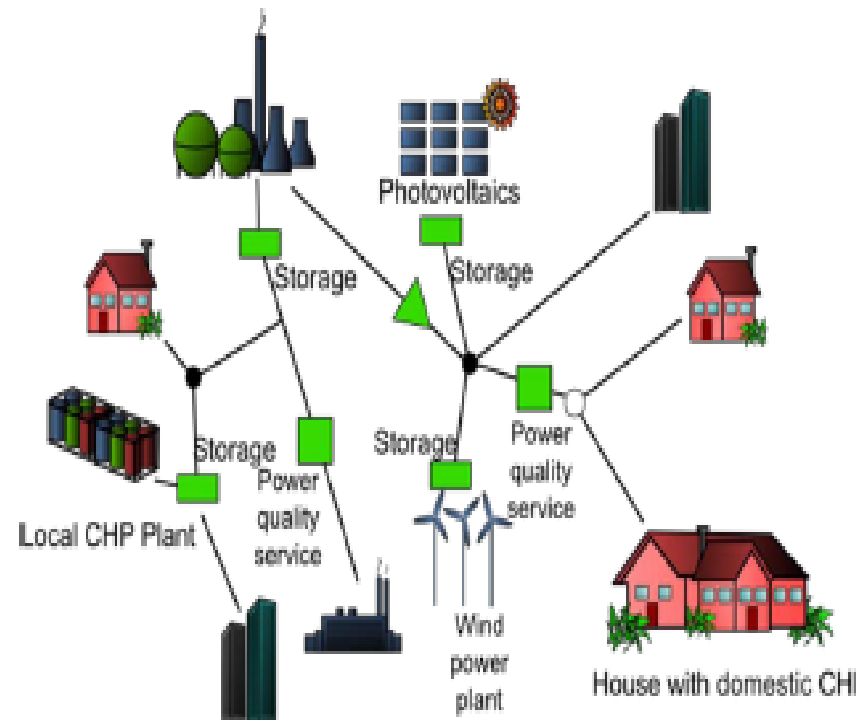


THE ENERGY INTERNET

THE NEXT REVOLUTION



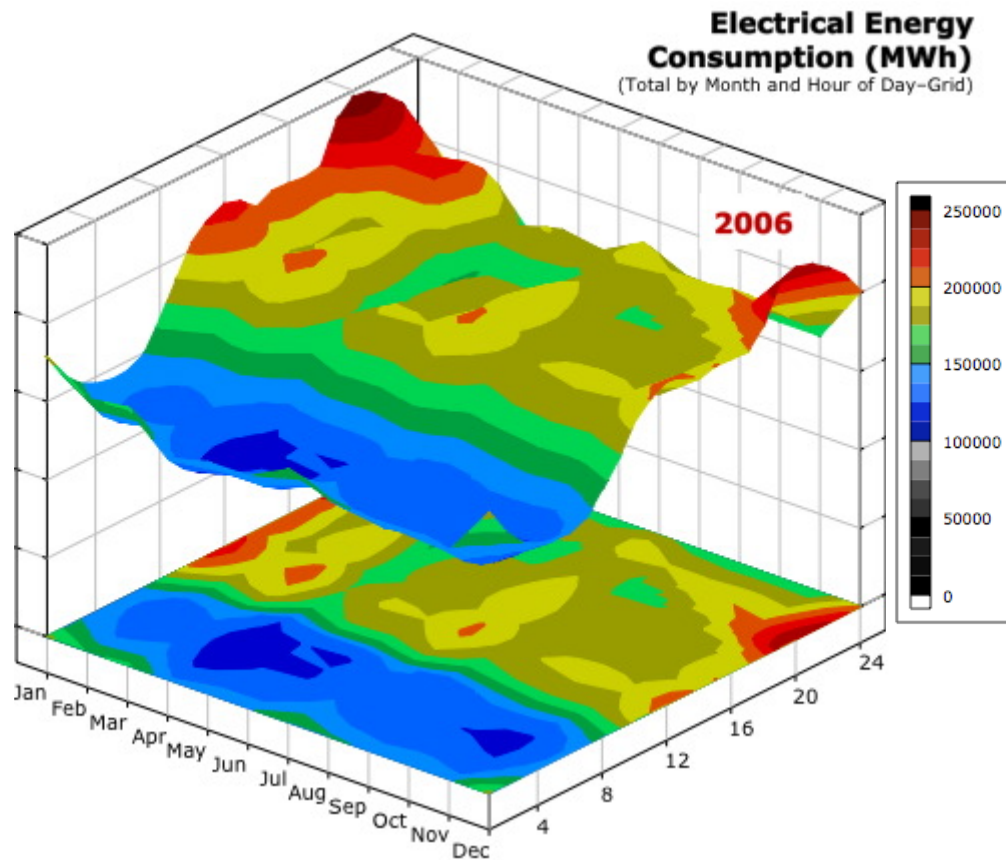
CENTRALIZED PRODUCTION



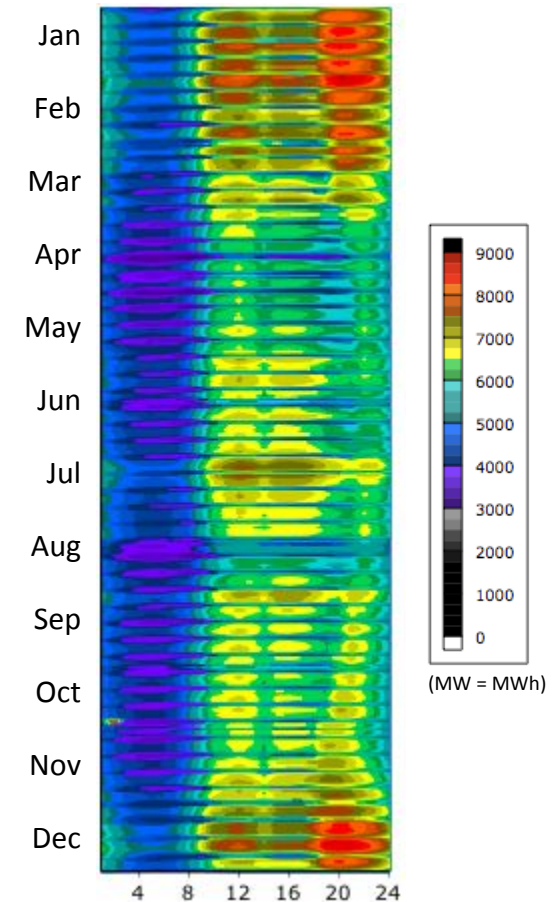
DECENTRALIZED PRODUCTION

The difficulty...

Higher resolution for a better design

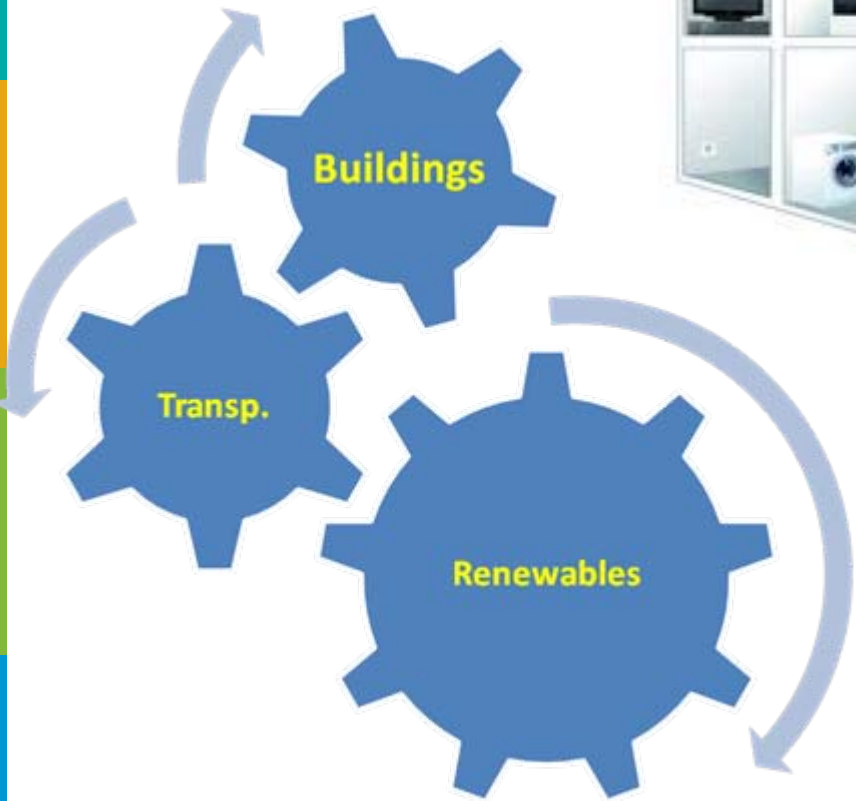


Electricity Demand 2006 (REN Data)



Hourly Electric Demand

The challenge



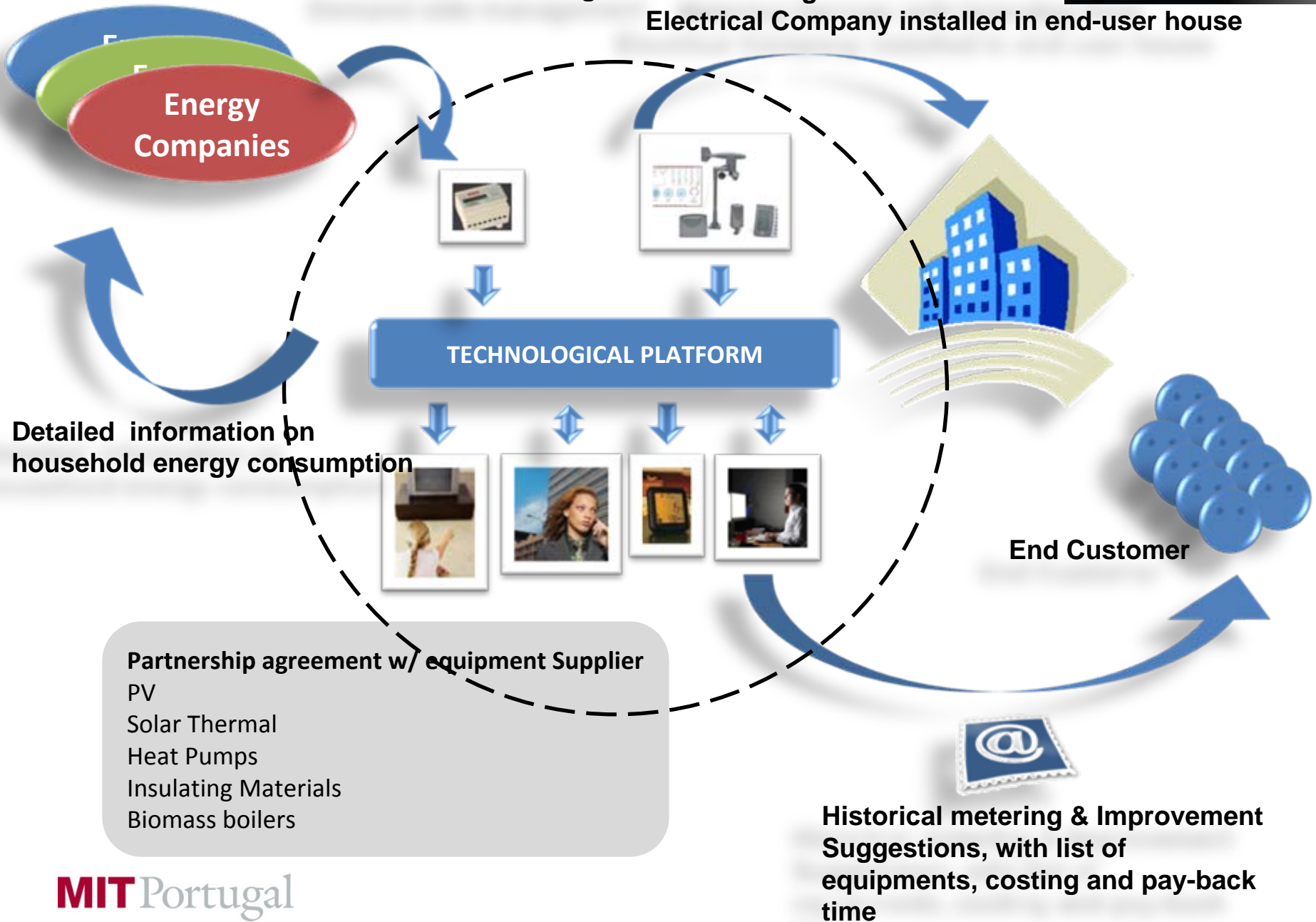
The “secret” is that they need to cooperate, they are not working alone



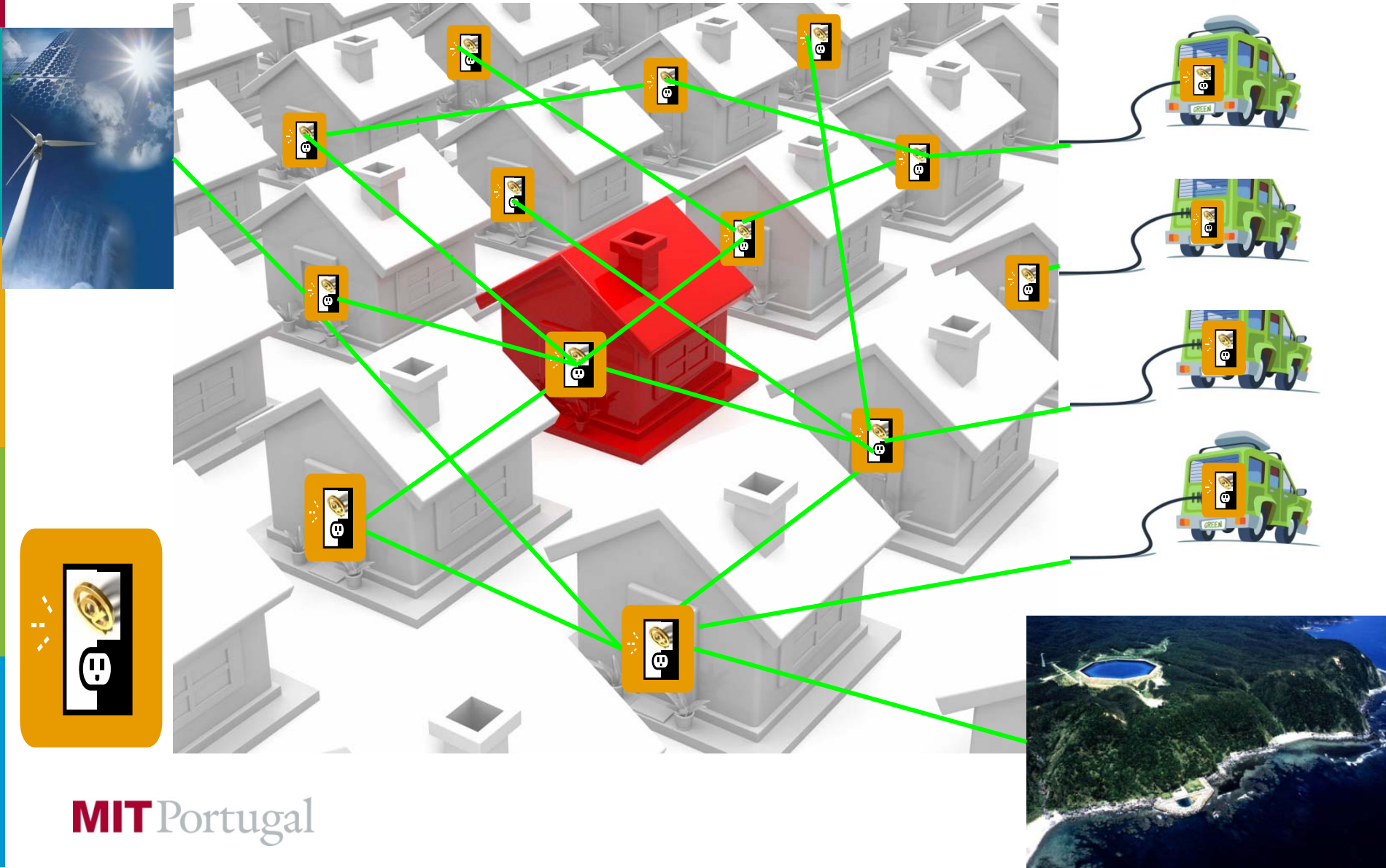
The future – Intelligent Energy Networks, the energy software revolution



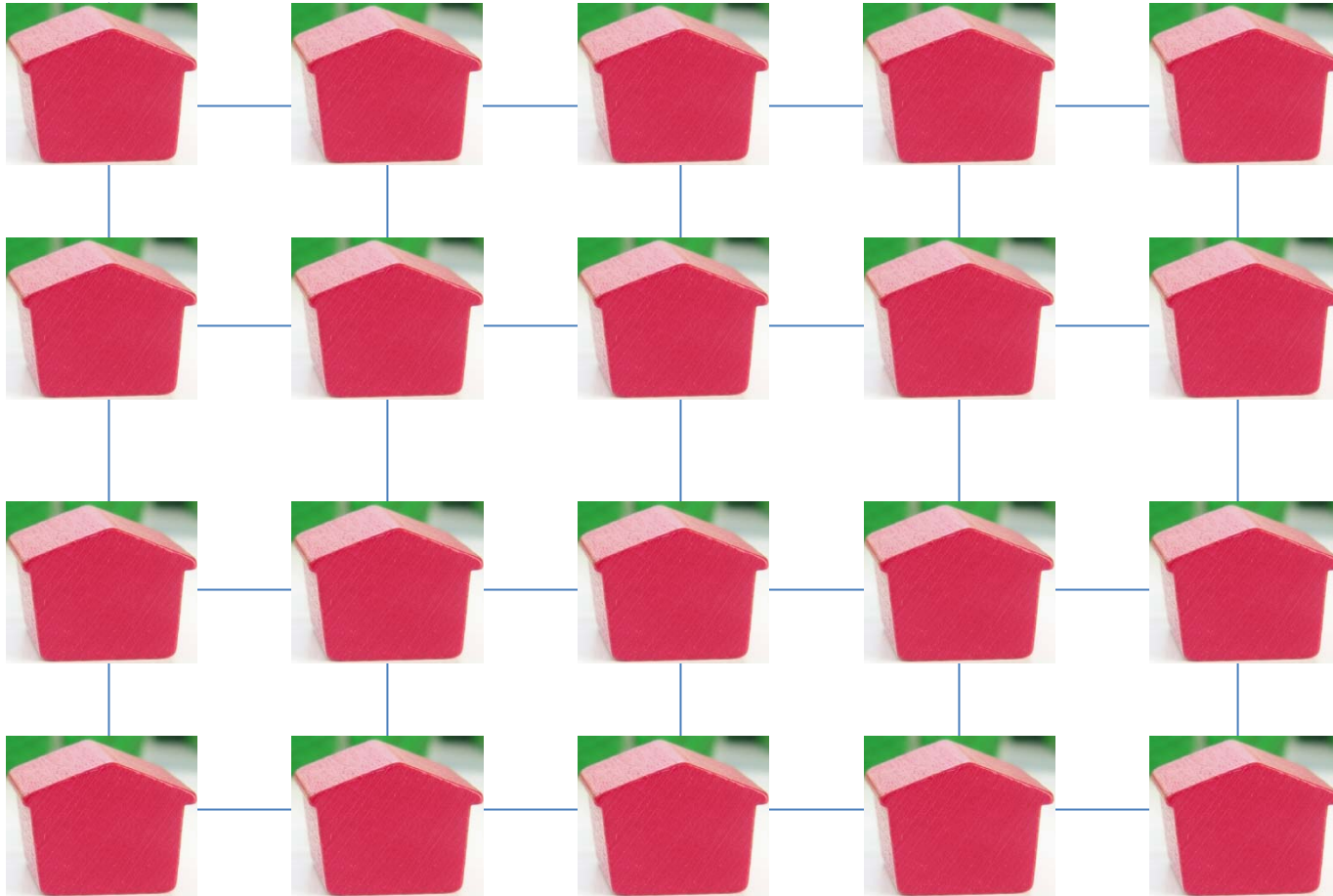
Demand side management Metering Devices with brand
Electrical Company installed in end-user house



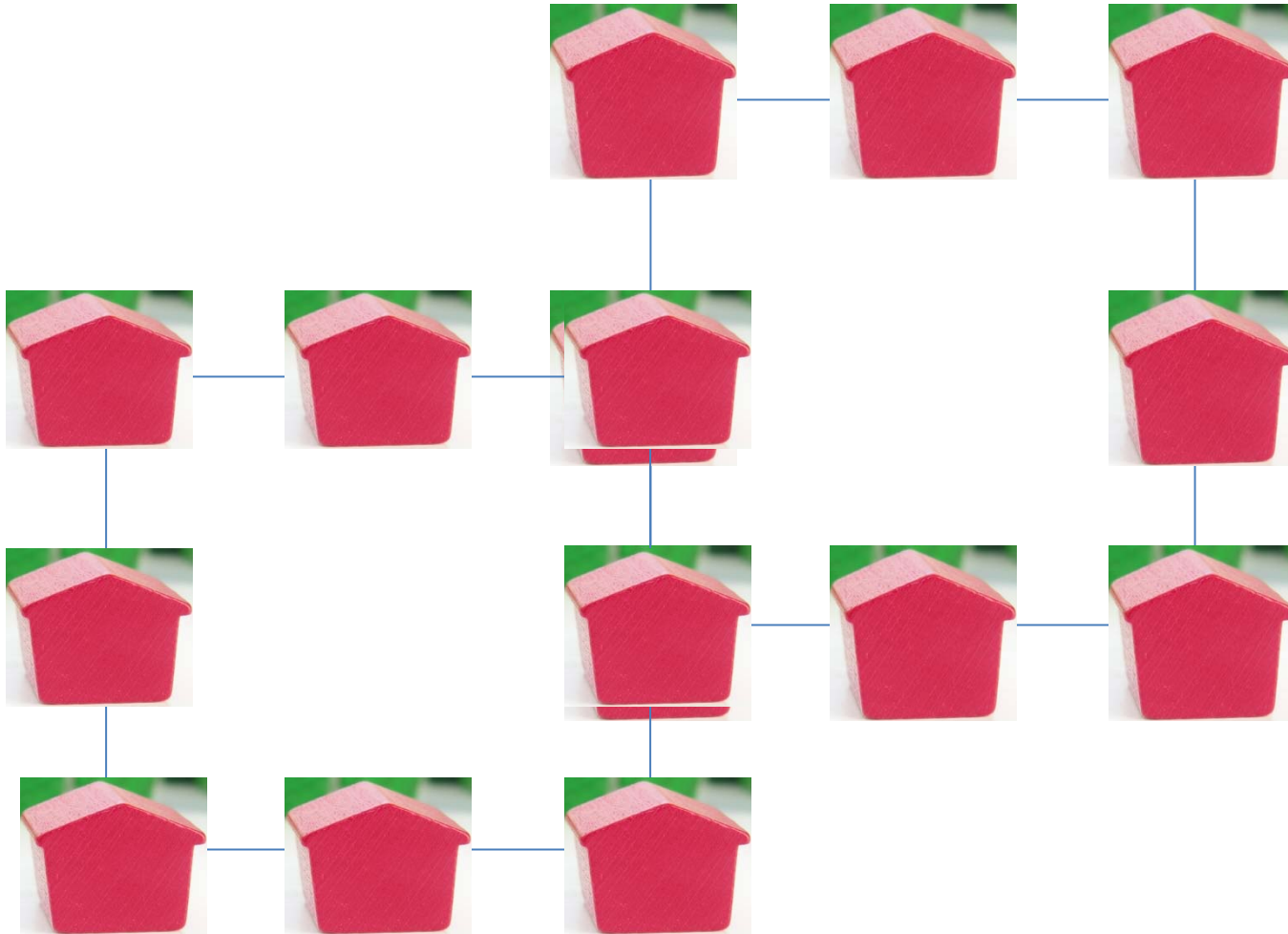
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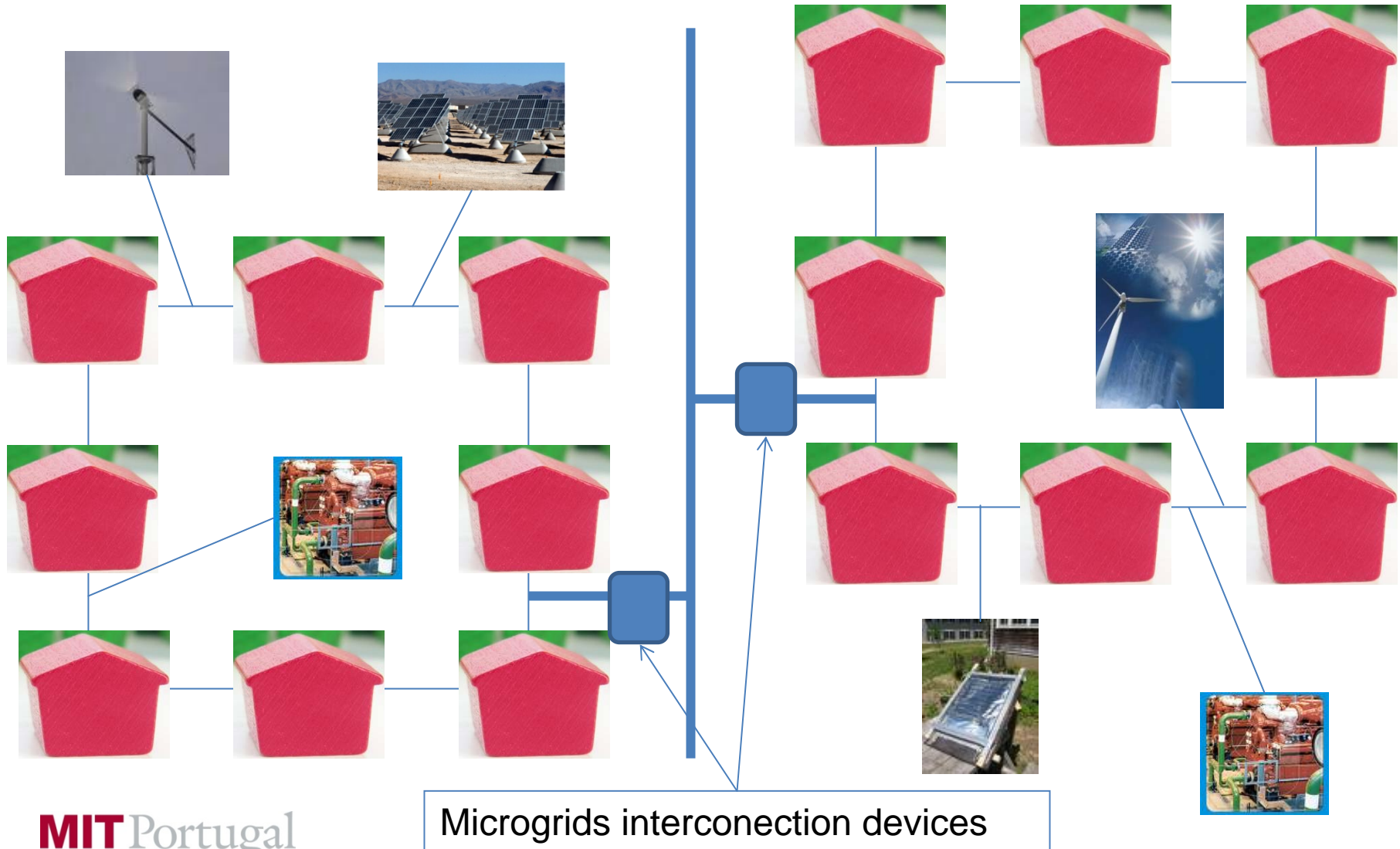
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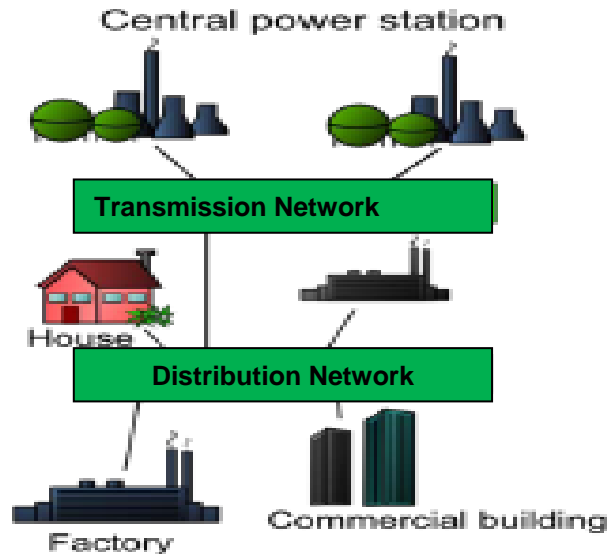


Africa- Intelligent and interconnected microgrids



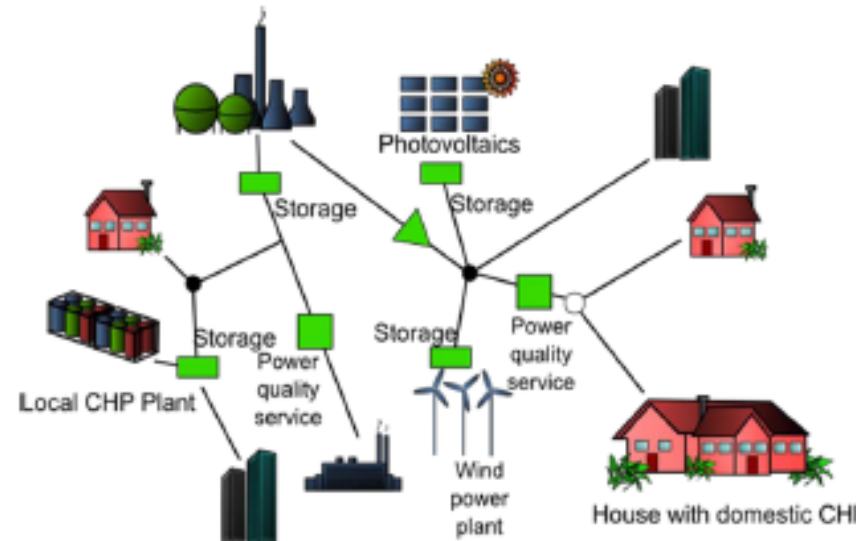
THE ENERGY INTERNET

THE NEXT REVOLUTION



CENTRALIZED PRODUCTION

- One-directional power-flow
- Generation follows demand
- Limited grid access for new energy converters
- Operation based on historic consumption data



DECENTRALIZED PRODUCTION

- Intermittent renewable energy injection
- Consumers become producers
- Full and smart grid accessibility
- Operation based on real time data :
 - **CRITICAL ROLE FOR ICT**

Sustainable Energy Systems Require integration through ICT

