

What is Energy Internet? Concepts, Technologies, and Future Directions

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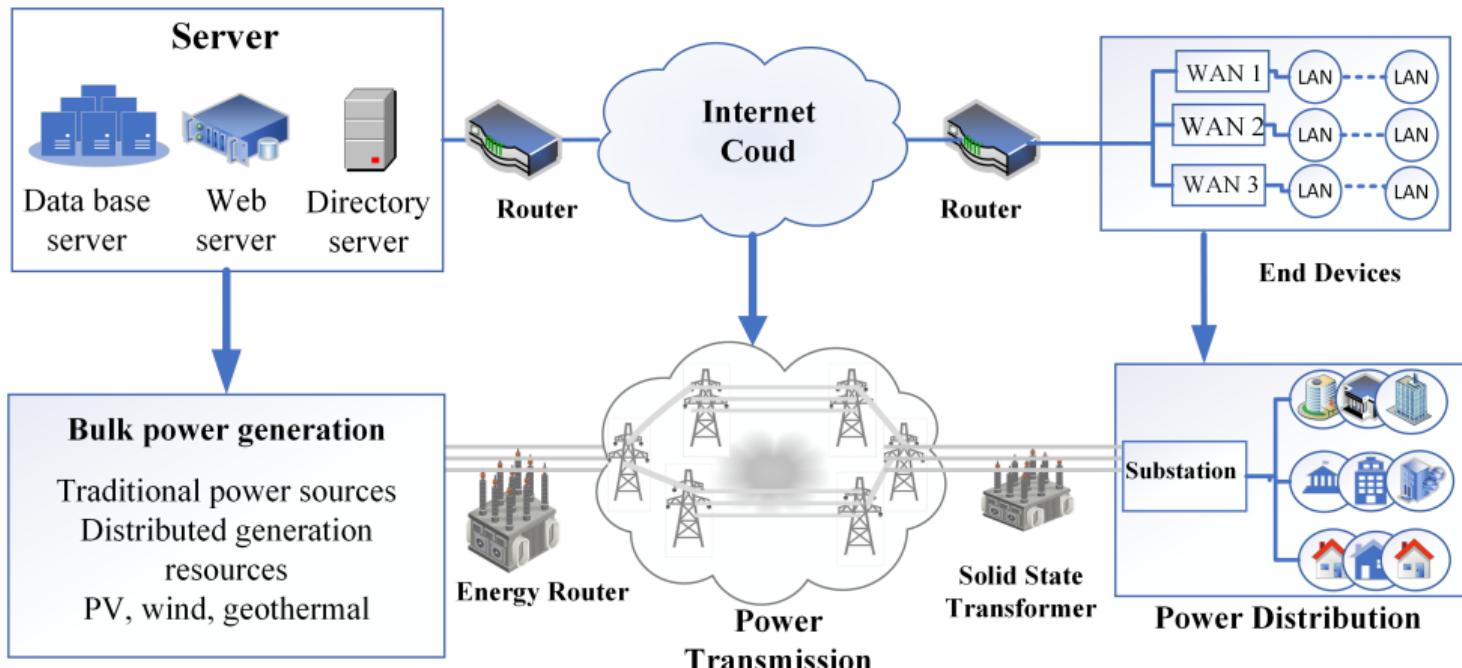


Energy evolution

- Traditional power grid
- Smart grid
- Energy internet (EI)

Later on EI is viewed as strong smart grid, global EI, and quantum grid.

Comparison of energy flows in internet and power system networks

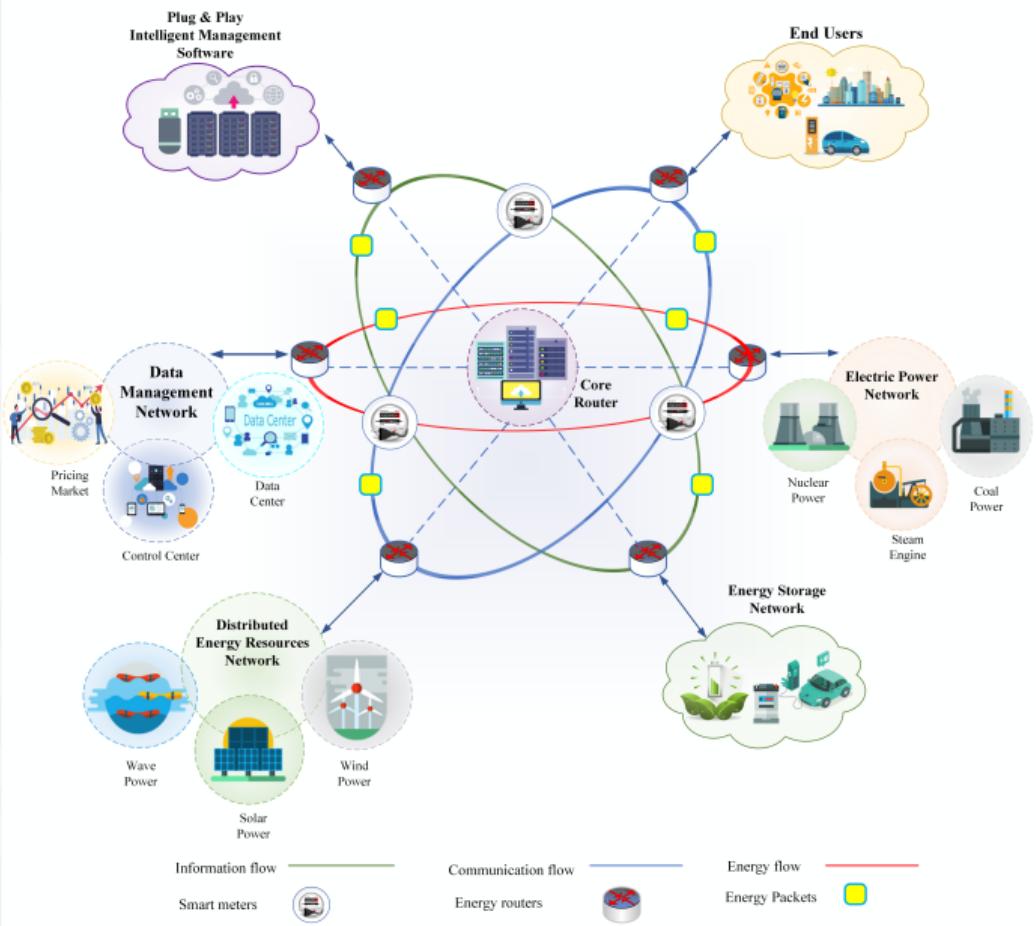


Definition

A cyber-physical system in which physical energy infrastructures and physical distributed renewable energy resources are interconnected and managed via a software-defined cyber energy network using packetized energy management techniques.

Cutting-edge technologies

Real-time communication technologies, control systems, information processing, smart metering infrastructure, and software-defined network



Supporting key technologies for EI

Energy router, energy hub, energy internet access equipment, distributed energy resources, intelligent energy management, smart metering infrastructure, peer-to-peer energy trading, software-defined network.

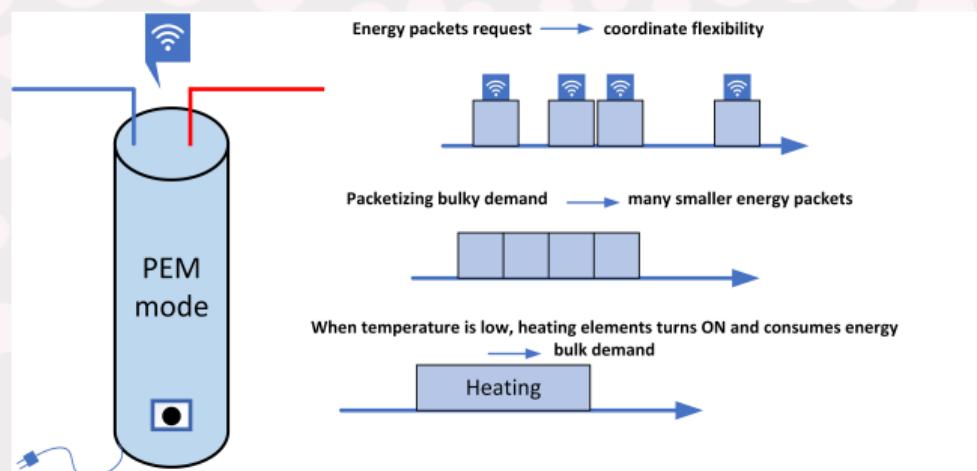
Coordination control and management

- Coordination and control schemes
- Management and optimization models
- Packetized energy management

Packetized energy management (PEM)

The PEM concept is analogous to data transmission in a communication network; just like data is broken into packets, energy can also be broken into discrete packets.

Energy packet = constant power consumed over fixed epoch



Future perspective



Conclusion

The EI is a broader concept that requires attention from quite a few disciplines, however, as indicated several challenges need to be addressed before the EI becomes a reality. The key challenges can be summarized as follows:

- Technological challenges
- Policy challenges
- Social challenges

Questions

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