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INTERNATIONAL SMART GRID ACTION NETWORK

Blockchain in the Energy Domain – Regulatory Perspectives

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CLEAN ENERGY MINISTERIAL
Advancing Clean Energy Together

ISGAN in a Nutshell

Created under the auspices of:

iea Energy Technology Network

the Implementing Agreement for a Co-operative Programme on Smart Grids

CLEAN ENERGY MINISTERIAL
Accelerating the Transition to Clean Energy Technologies

An initiative of the Clean Energy Ministerial (CEM)

Strategic platform to support high-level government knowledge transfer and action for the accelerated development and deployment of smarter, cleaner electricity grids around the world

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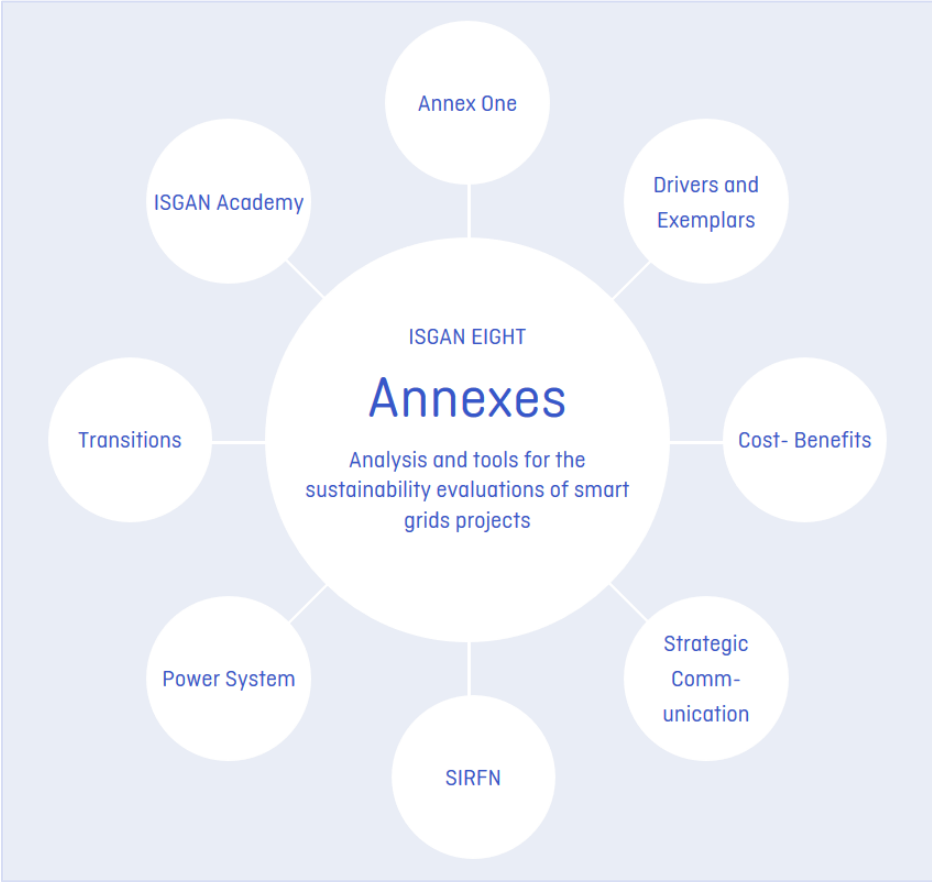
International Smart Grid Action Network is the only global government-to-government forum on smart grids.



ISGAN's worldwide presence

Value proposition

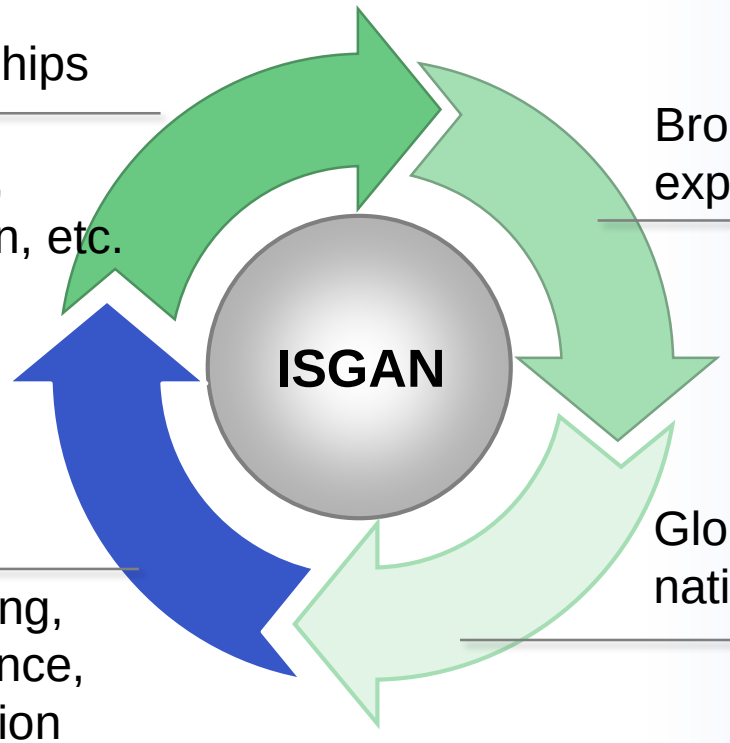
Strategic partnerships

IEA, CEM, GSGF,
Mission Innovation, etc.

Broad international
expert network

Global, regional &
national policy support

Knowledge sharing,
technical assistance,
project coordination



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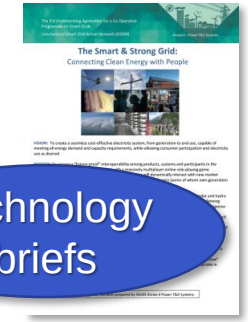
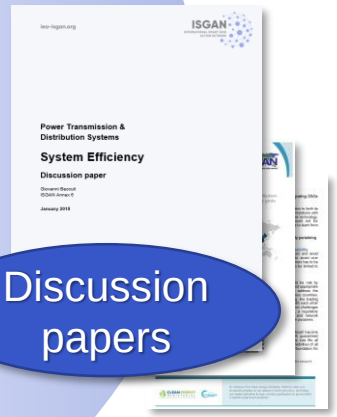
Conference presentations

Policy briefs



Technology briefs

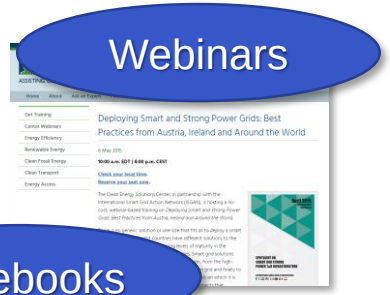


Discussion papers

Technical papers

Workshops

Casebooks



Webinars

How significant is blockchain to the development of smart grid?

- Smart grid deployment is supported by the digitalization of the electricity system for achievement of goals on the “grid edge” (e.g., integration of EVs, RE, energy storage, and DSM). This development is dependent on
  - an efficient data infrastructure that can not be compromised by any single entity and supports authenticity, customer privacy and commercial secrecy
  - a reliable ecosystem of smart meters, controls, sensors etc.
  - minimized transaction costs in decentralized services and use of new products
- Blockchain and smart contracts provide novel solutions in relation to these needs
  - Decentralized ledger of all transactions
  - No need for a trusted third party as intermediary
  - Efficient and secure documentation

How can blockchain help to solve key energy sector challenges?

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- What role can blockchain play in decarbonizing the energy sector?
- How can blockchain enable a distributed energy future?

- Is blockchain a key to customer empowerment?
- What policy and regulatory barriers need to be addressed?

Supporting decarbonization of the energy sector

EV Charging	• Customers are given full access to charging infrastructure • Easier and cheaper than todays roaming services • Applicable to network in many countries and to many partners
Certificate of Origin	• Possibility to provide uniform and more transparent CoOs • Adequate monitoring and verification of renewable and local production through smart contracts
Maximize use of local, decentralized generation	• Depending on availability of small scale local production • Production and consumption needs to match if you don't store • Avoiding curtailment of RES - locational price signals needed
Flexibility Markets	• Common flexibility platform aggregating available flexibility resources • Open distributed network

Supporting local transactive energy systems

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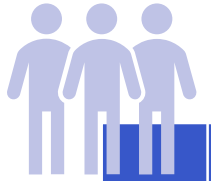


Peer 2 Peer trading

- Local small scale P2P trading
- Share storage and sell local production to your neighbors

Peer 2 Peer trading

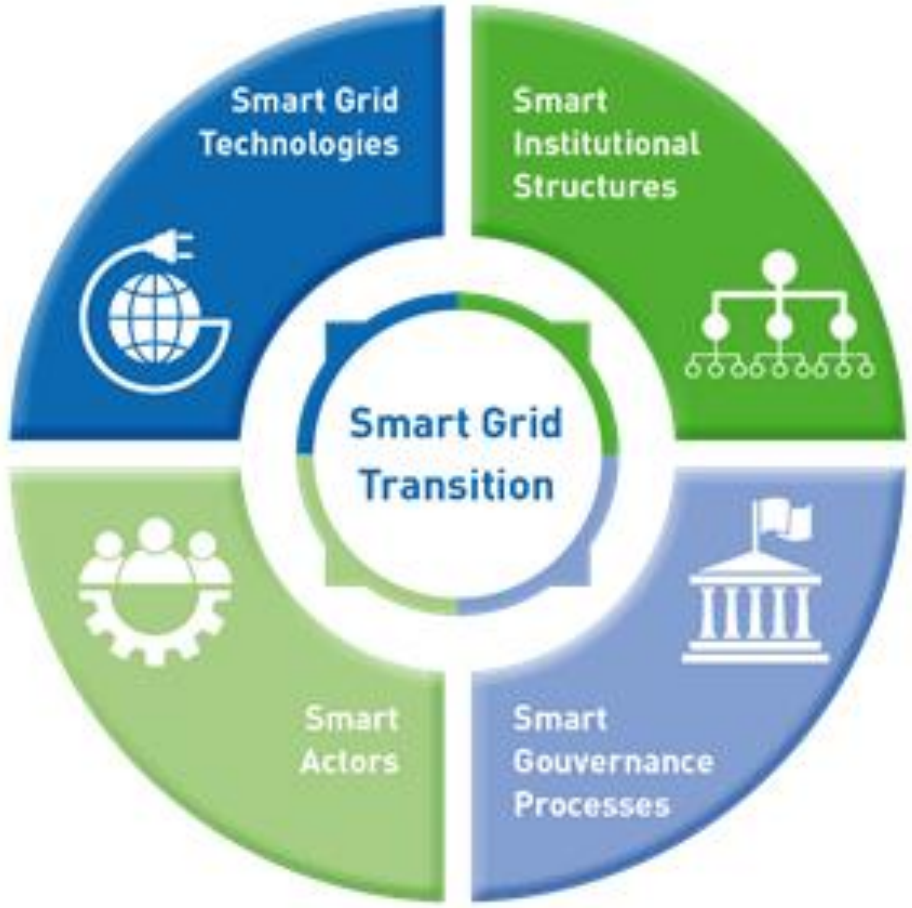
- Local Energy Communities matching energy supply, storage and consumption
- Managing independent microgrids
- Opportunities for energy system coupling

Flexibility platform

- Optimizing between local network benefits and market value of flexibility resources
- New possibilities for automated small scale flexibility verified by smart contracts

Customer empowerment and market transition

- Design transactive energy schemes to maximize consumer engagement
- Identify social, psychological and financial value to consumers
- Use the same platform to delivers multiple value streams for consumers
- Deliver automated Demand Response or P2P schemes which are transparent and clearly understood by consumers
- Share common costs fairly between engaged and passive customers



Regulatory Challenges

- Blockchain and smart contracts can facilitate peer-to-peer (transactive) market mechanisms between energy producers and end-users at small scale, but might challenge prevailing market rules and regulation including
  - Regulators' traditional approach to data exchange, centralized at DSO and market operator levels will probably not be feasible in the future
  - Cybersecurity, including electric grid security and privacy issues. All technologies are hackable!
  - Regulators ability to monitor transactions in the energy sector (e.g. REMIT within EU) – blockchain is based on trust through decentralization and not through central authorities
  - Regulation of the role of network operators (DSOs and DNOs) including tariff structure
  - Customer protection rules including rules related to information sharing between market actor (supplier to DSO, DSO to service providers etc.)
  - Governance in public an permissioned blockchains – proof of authority

Regulators need to….

- Understand the technology, its capability and risks
- Work along with other relevant authorities, and possibly other organizations, on cybersecurity, data privacy, interoperability and monitoring
- Adapt current electricity market design through engagement with market actors – regulatory sand-boxes
- In the framework of technology neutrality adapt regulation to the new opportunities, seeking the best outcomes for consumers, e.g.
  - Restructure network tariffs and possibly taxes to safeguard a fair distribution of network costs among end users
  - Clarify the status of prosumers and P2P trading – rules in relation to multiple suppliers, trading products, balancing and settlement etc.
  - Develop charging infrastructure rules ensuring competition and customer protection

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Thank you!

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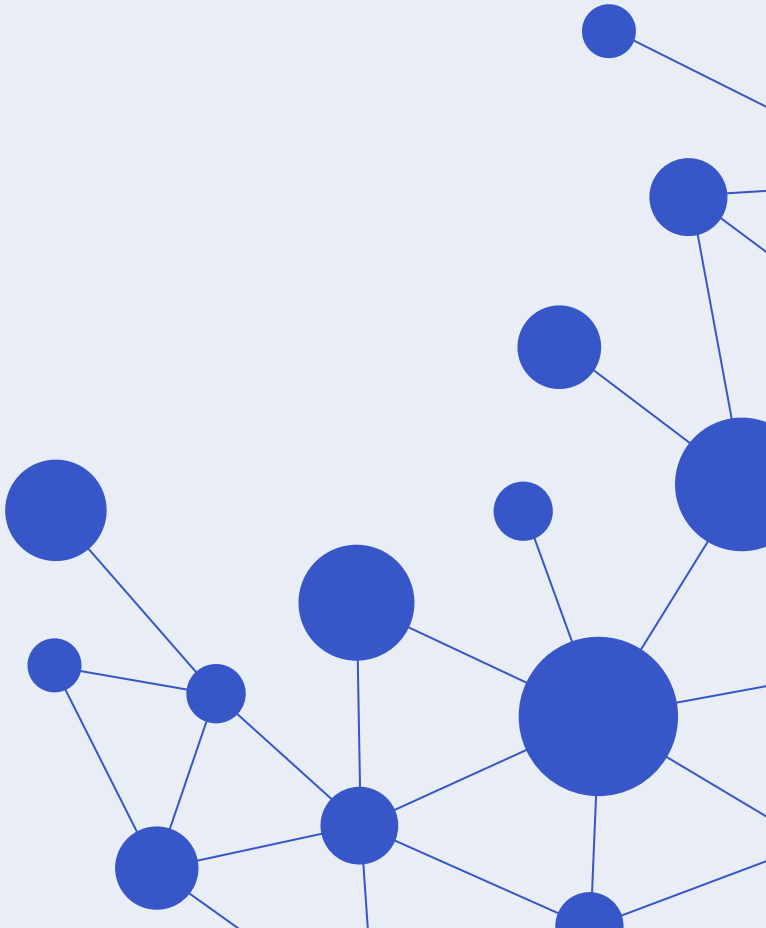

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