

Blockchains and Power Grids

Peter Palensky
Chair Intelligent Electrical Power Grids
TU Delft



What's up in the power system?

- Renewable sources, de-carbonization, efficiency goals, new markets, deregulation, electric mobility, hosting capacity, storage, etc.
- → Digitization will save us all :-)
 - Smart grid, IEDs, real-time markets, IoT,
 - blockchain, share-platforms, apps, smart home,
- Questions
 - Trust of IEDs, cyber-security, resiliency

Example Activities

- PowerLedger (AU), Sun Exchange (ZA), Conjoule (DE), Electron (UK), etc.
 - Peer-to-peer solar trading, investment, retail, etc.
- Netherlands
 - Jouliette (Alliander): sharing token
 - sonnen (TenneT): grid services (stabilization)
 - Energy Web Foundation (STEDIN): automation
 - Dutch Blockchain Coalition (Enexis): gov
 - ElaadNL (all): smart car charging

IEPGs interest in blockchain

- (Socio-Economic-Institutional) Cyber-Physical Energy Systems (CPES)
 - Models, simulation, validation, limits, optimization
 - Explicit and statistical methods
 - Multi-player/agent settings
 - Value/use of (trusted) blockchain
- Rise of Data in Grids
 - Origin? Trust? Ownership/privacy?
 - Distributed storage?

IEPGs interest in blockchain

- Controls
 - Rolling-horizon smart contracts?
 - Distributed trust, IoT engineering effort
 - Conditional agreements (e.g. backup power)
 - Contracting/reimbursing grid services
- Cyber-resilient power systems
 - CPES-resiliency, cyber-attacks, etc.
 - Sanity/consensus on switching actions