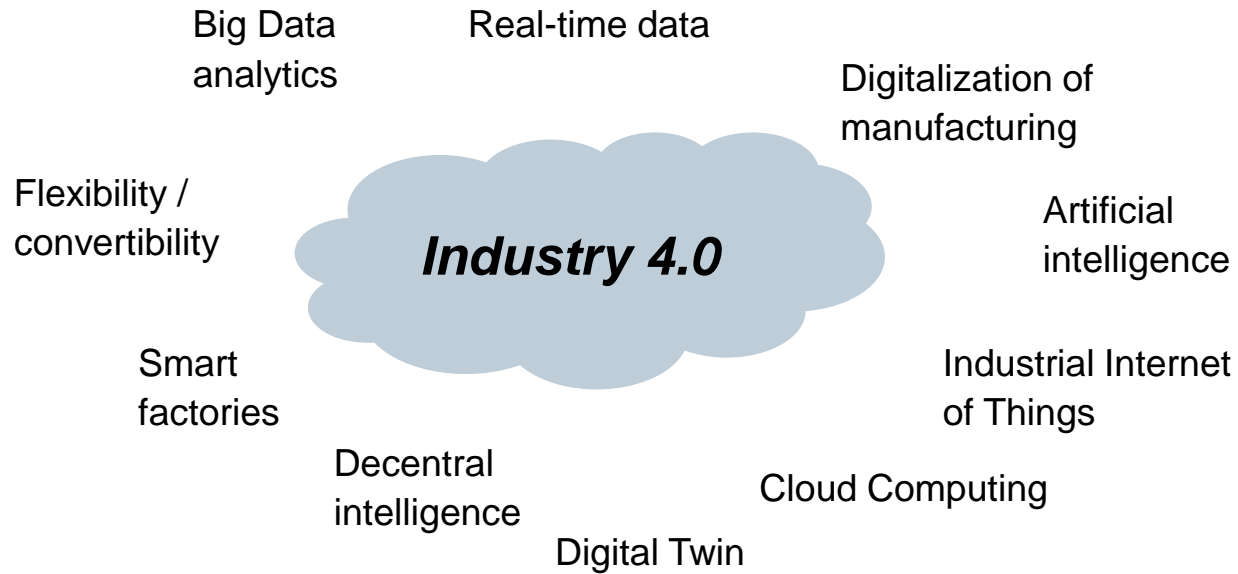


The Challenges of Power Systems in the era of Industry 4.0

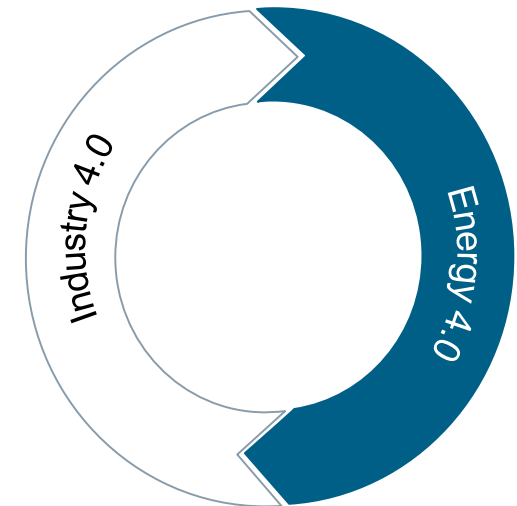
74th National Electricity Day – Jakarta
Plenary Session 03

From Industry 4.0 to Energy 4.0



- ⇒ Direct grid requirements
- ⇒ Technological synergies
- ⇒ **ENERGY 4.0**

Data-driven, AI-powered, networked smart factories



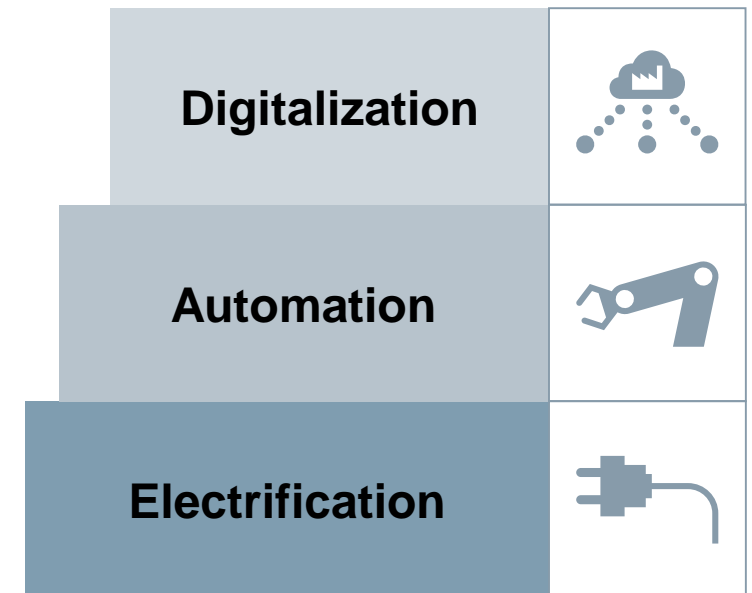
Energy 4.0

Drivers - trends

- *Energy Transitions – e.g. strong growth of renewables*
- *Sector reform*
- *Sector coupling*
- *Energy efficiency*

Technological enablers

- Advanced metering
- Distributed generation
- Virtual power plants
- Blockchain / peer-to-peer transactions
- Digital twin
 - Planning
 - Construction
 - Operation
- Wide-area monitoring, control and protection
- Cyber security
- Cloud computing
- Energy storage
- E-mobility
- Artificial Intelligence



Energy 4.0 for Indonesia – main challenges

- Sustainable energy mix
 - Capitalize on hydro potential
 - Develop PV and wind
- Decrease dependency on fossil fuels - diversification
 - Oil (import)
 - Coal
- Increase reliability
 - Impact on industry goes further than SAIDI and SAIFI
- Increase electrification rate
 - Grid densification in urban areas
 - Local solutions in rural areas (micro-hydro, microgrids,...)
- Lower costs, minimize subsidies
 - Increase efficiency



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