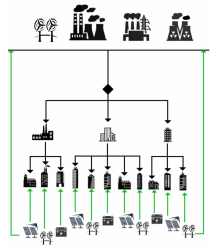
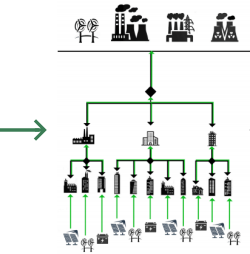
Hanna Lepperød



Grand Central Optimization
the transmission system operator (TSO)
interacts directly with all grid players

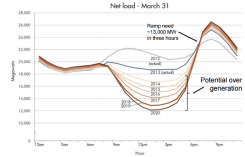


Layered Decentralized Optimization
distribution system operator (DSO)
Require sensors and controls for each level
Responsibilities for reliability transferred down the chain

Electrical Grid Infrastructure & Hierarchy

Disincentives to solar

- High initial installation costs
- Weather reliability
- Aesthetics
- Uncertainty for utility companies
- Government Policy
- Outdated grid infrastructure





PV policy in Spain

Spanish Photovoltaic Solar Energy: Institutional Change, Financial Effects, and the Business Sector (2020) // Raquel Fernández-González, Andrés Suárez-García, Miguel Ángel Álvarez-Feijoo, Elena Arce and Montserrat Díez-Mediavilla

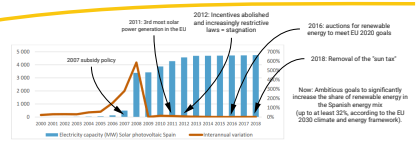


Figure 2. Photovoltaic solar power generated in Spain. Own elaboration with the data of [16].

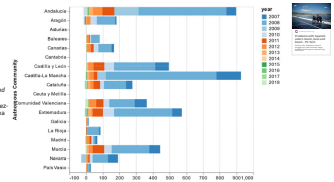
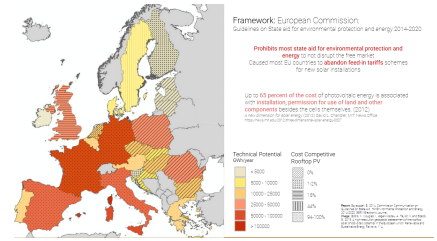
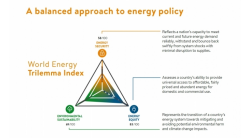


Figure 3. Evolution of Photovoltaic Power Installed in Spain by Autonomous Communities (CCAA).







foreignpolicy.com

The Limits of Clean Energy

If the world isn't careful, renewable energy could become as destructive as fossil fuels.

THE TERAWATT CHALLENGE

Global energy demand is expected to grow from 15 to 30 TW from 2007 to 2050.

By 2525 an estimated 75.44 billion devices will be connected to the IoT, a fivefold increase in ten years

Sales of electric cars have registered a 40% year-on-year increase and topped 2.1 million globally in 2019