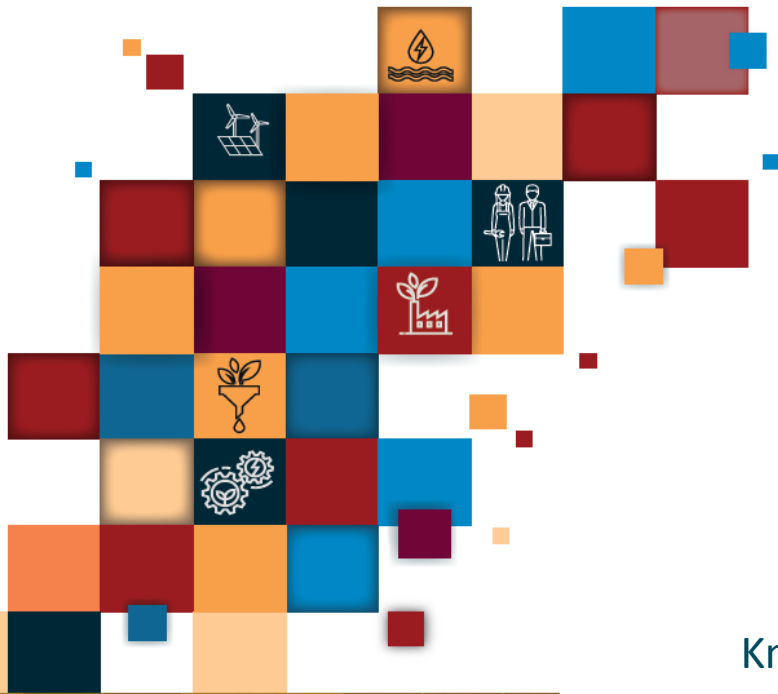


Power system organizational structures for the Renewable Energy era



Xavier Garcia Casals
Knowledge, Policy and Finance Centre, IRENA

IRENA's Work on Market Design and Socio-economic footprint of Renewables

2013

2014

2015

2016

2017

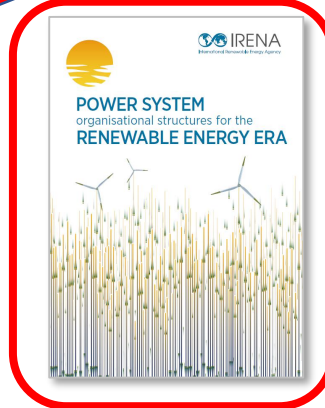
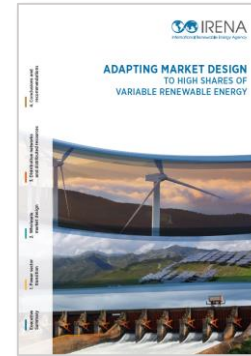
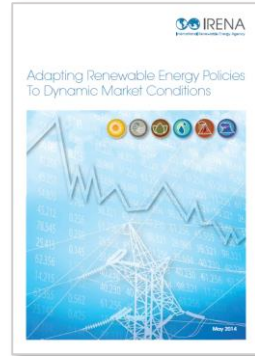
2018

2019

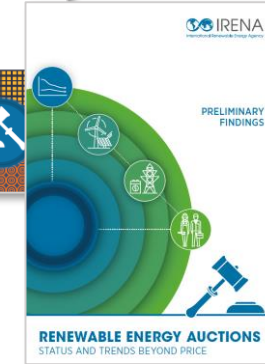
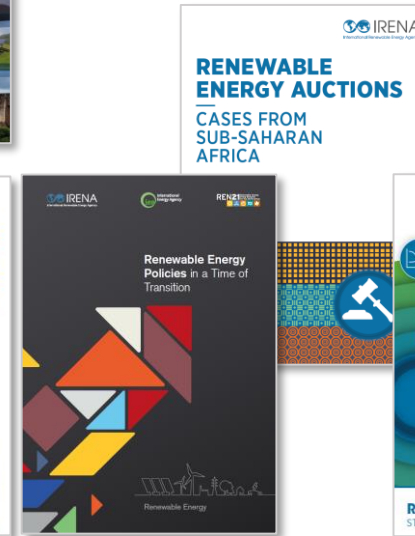
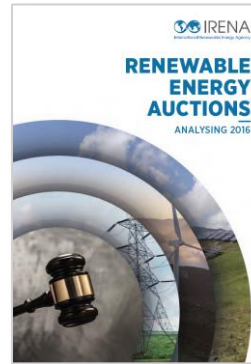
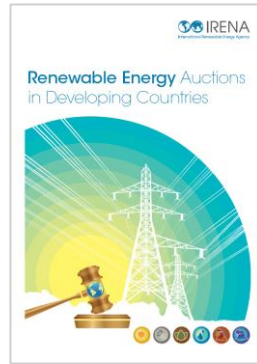


2020

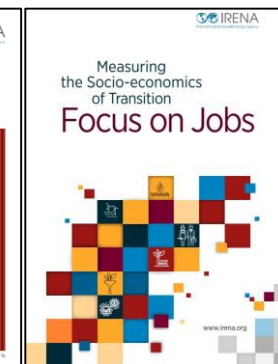
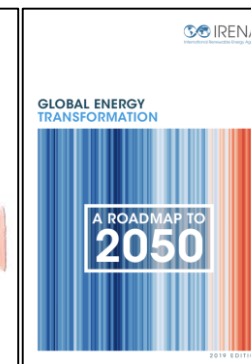
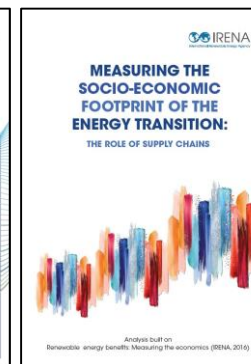
★ Power Market design



★ Auctions and Policies



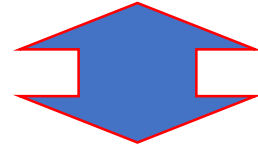
★ Measuring the Socio-economic footprint



Power systems are embedded into wider systems

wider systemic links and feedbacks

- Earth and Climate
- Economy



Energy Transition

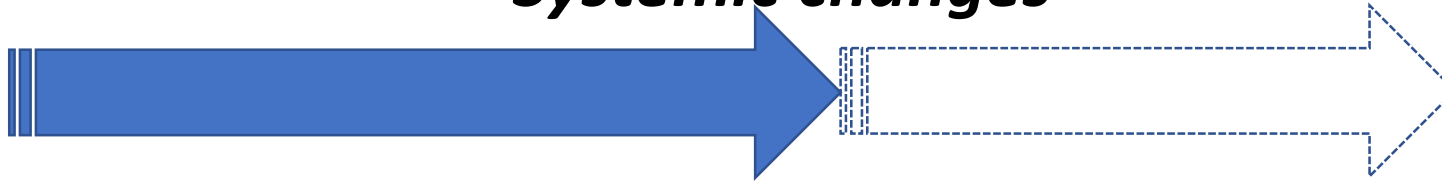
- FF



- RE
- EE
- EF

Systemic changes

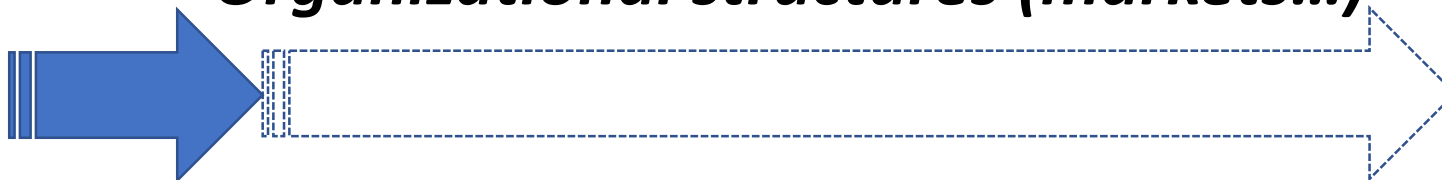
- non-integrated
- few stakeholders
- centralized
- unidirectional
- democratization



- integration
- participation
- bidirectional
- distributed
- democratization

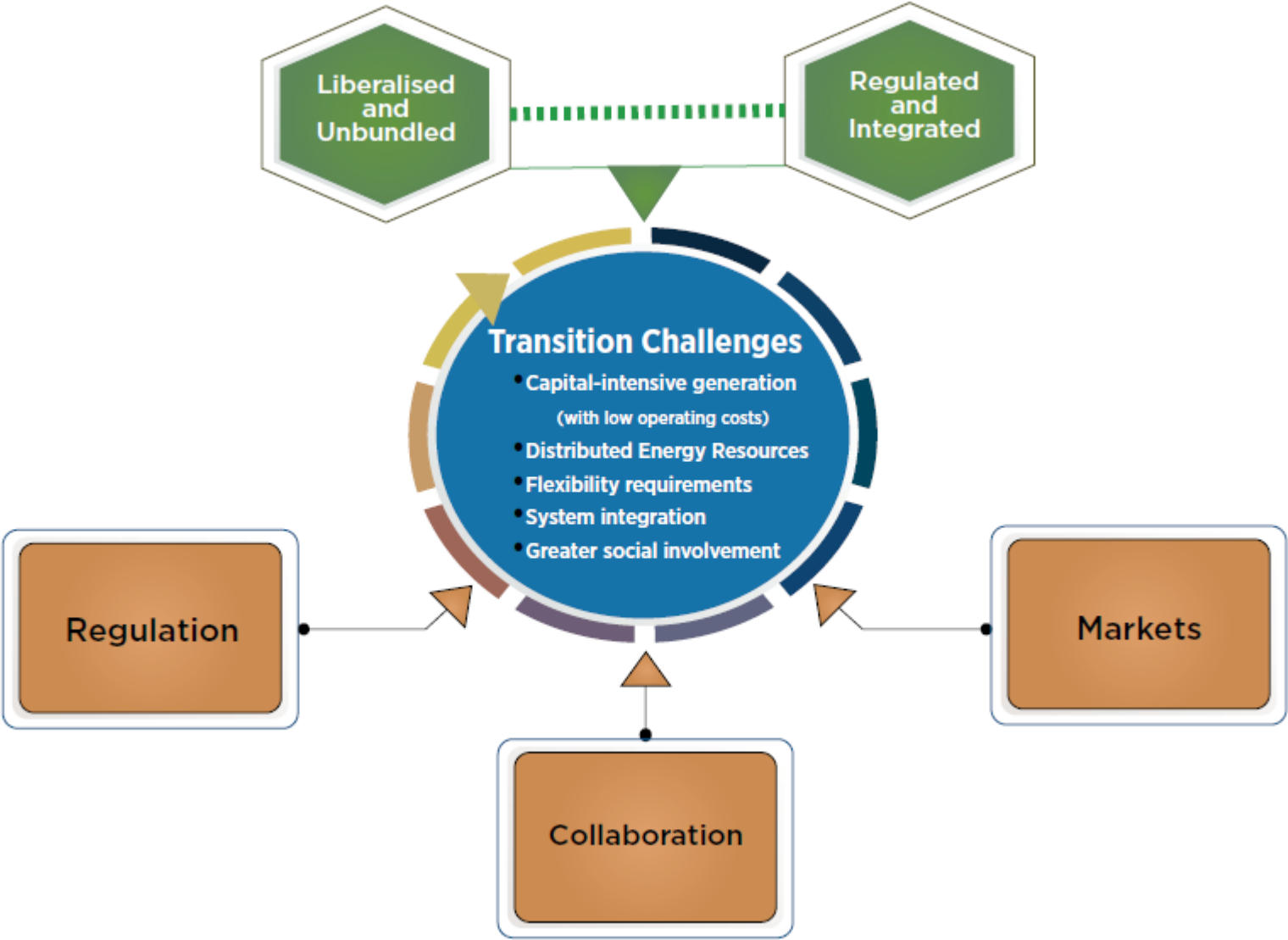
Organizational structures (markets...)

- FF Era

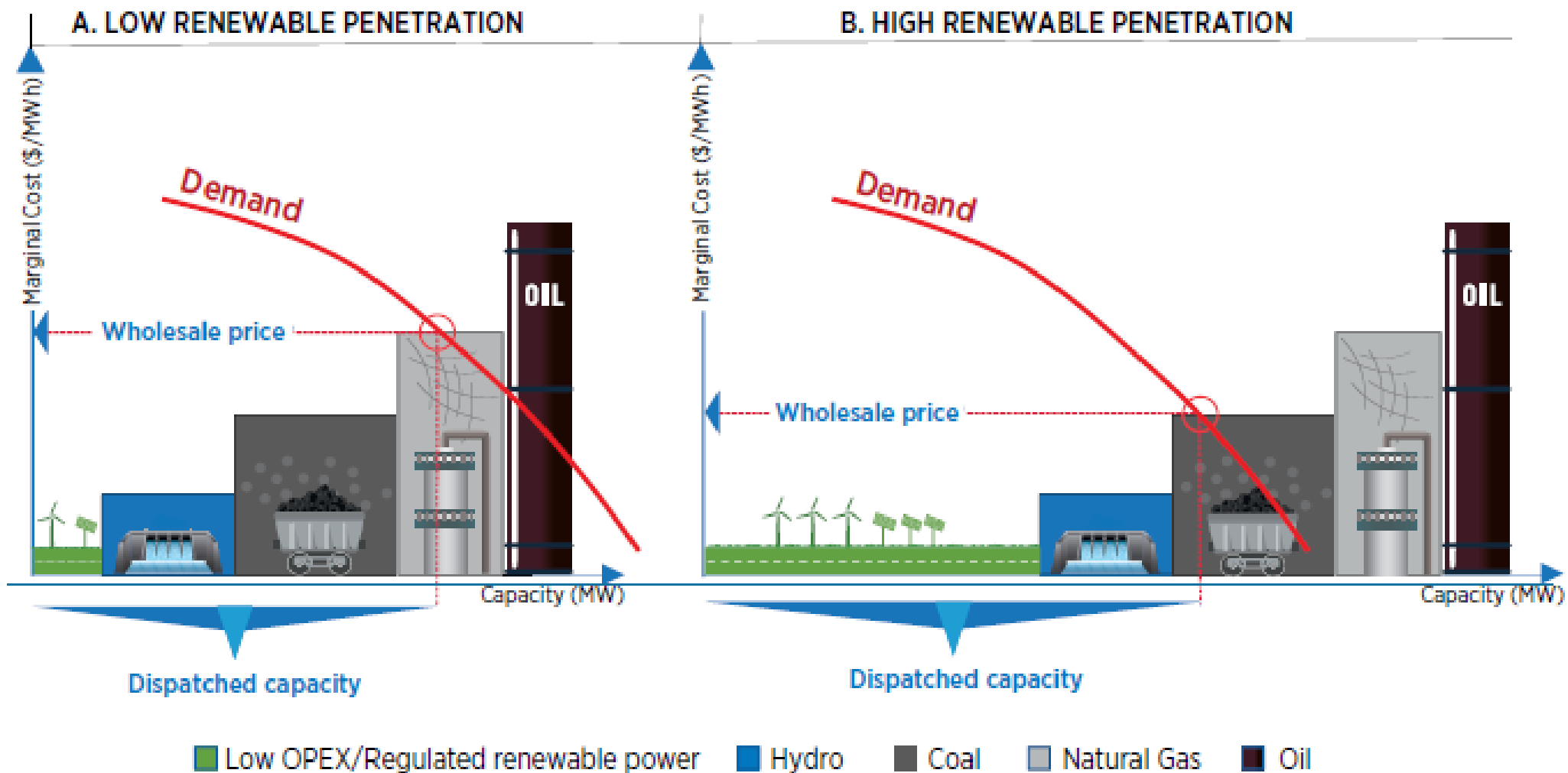


- RE Era

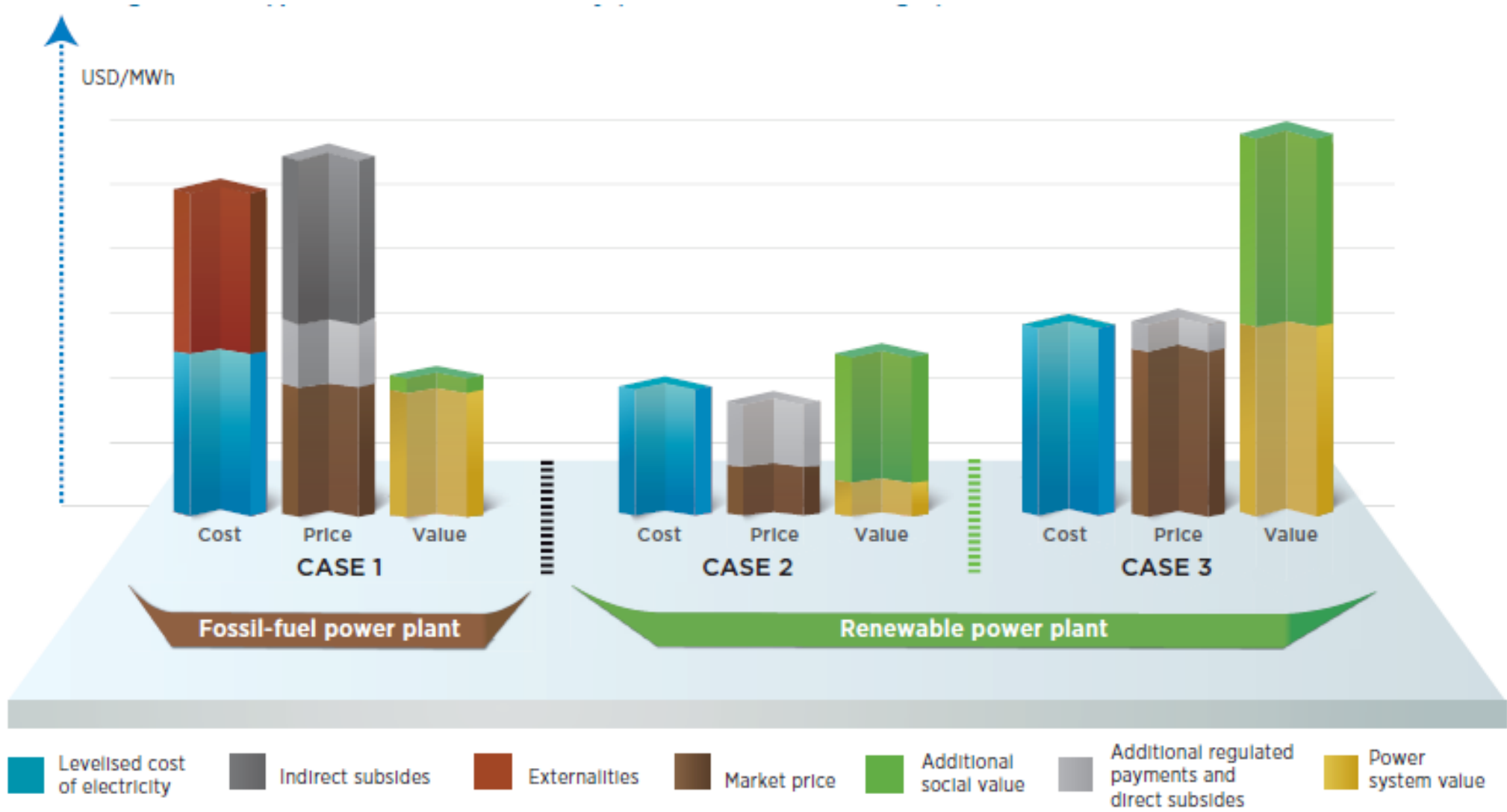
Transition challenges common to all system structures



Wholesale market misalignments

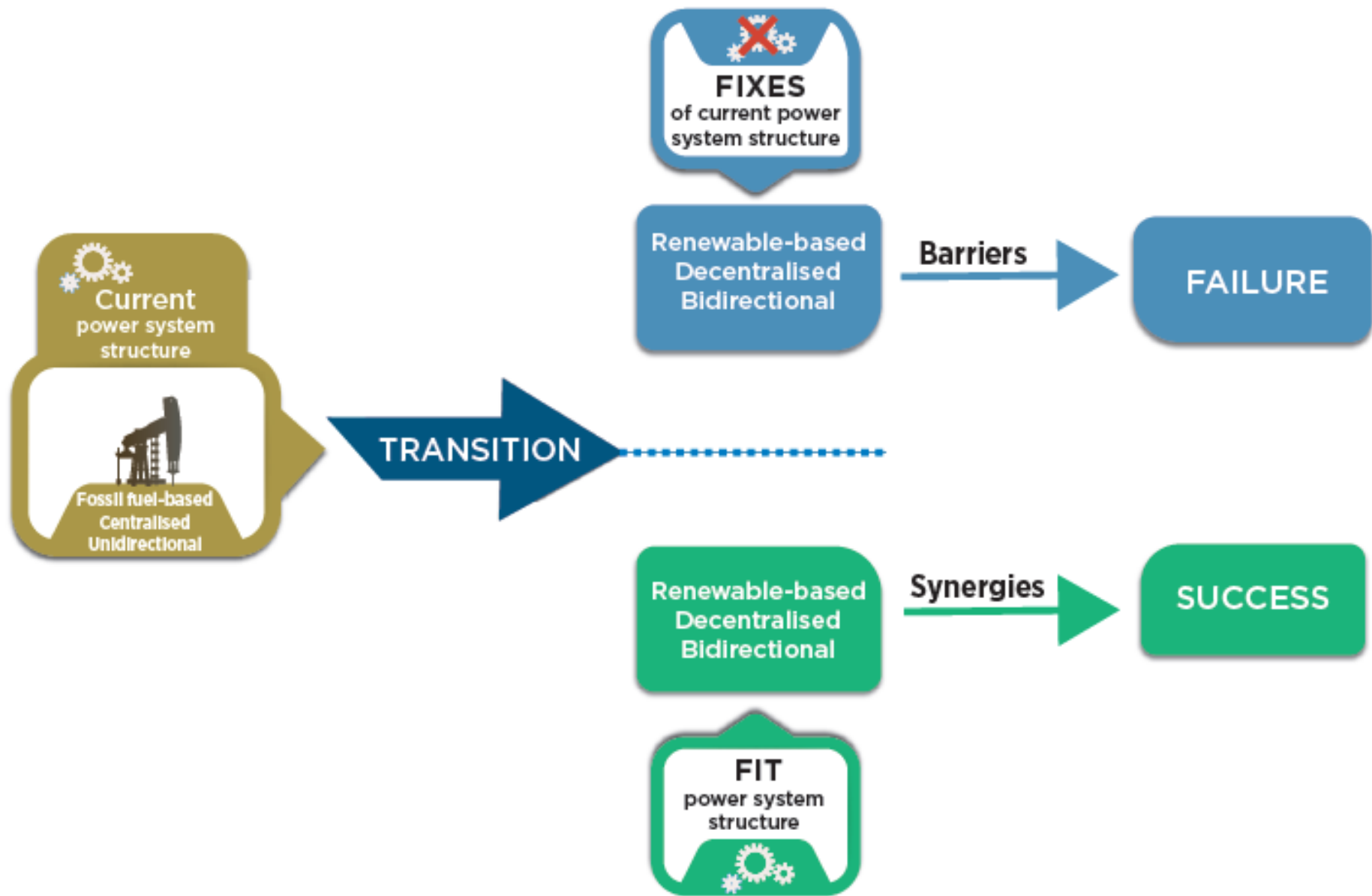


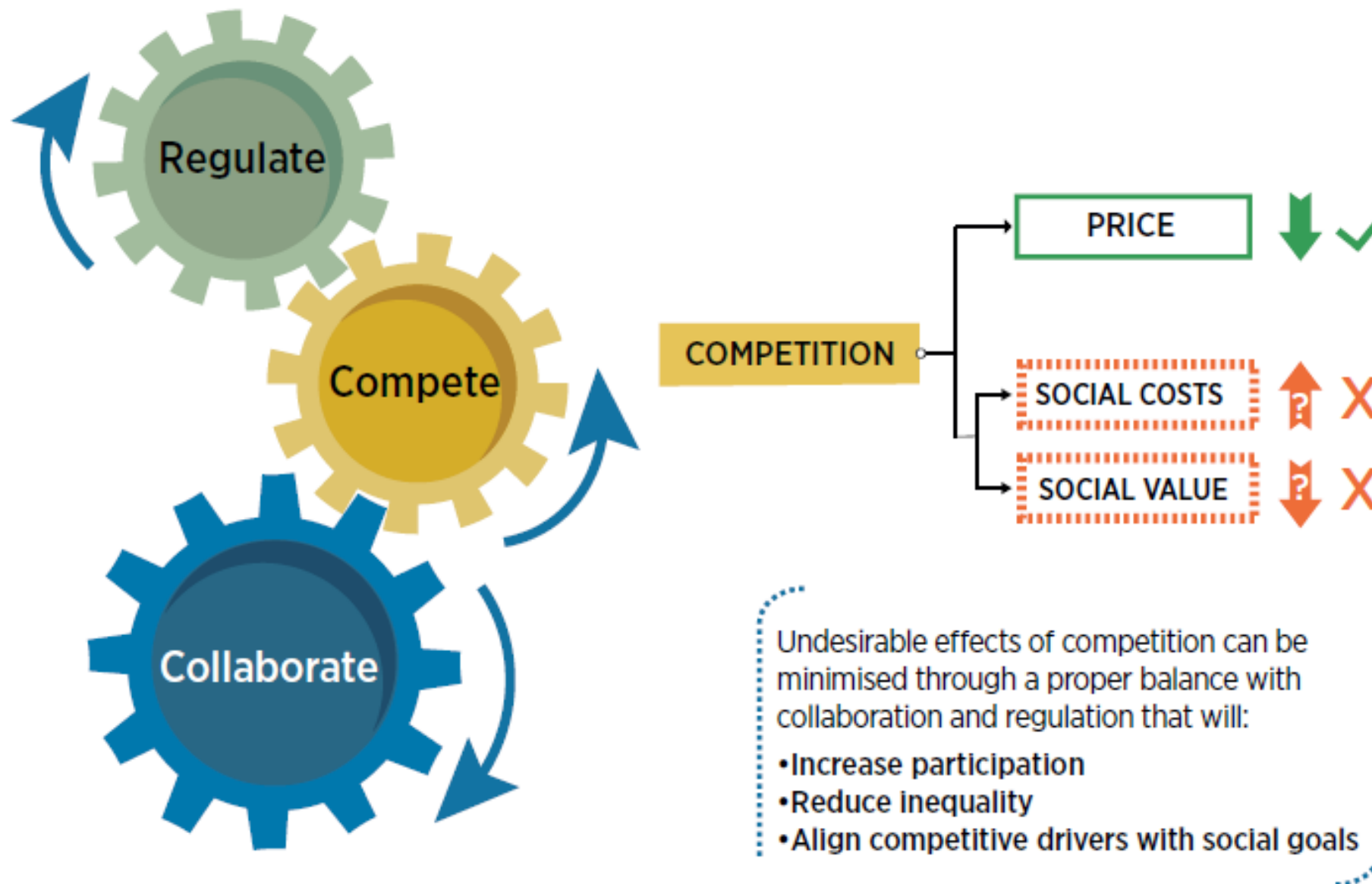
The value-price-cost misalignments

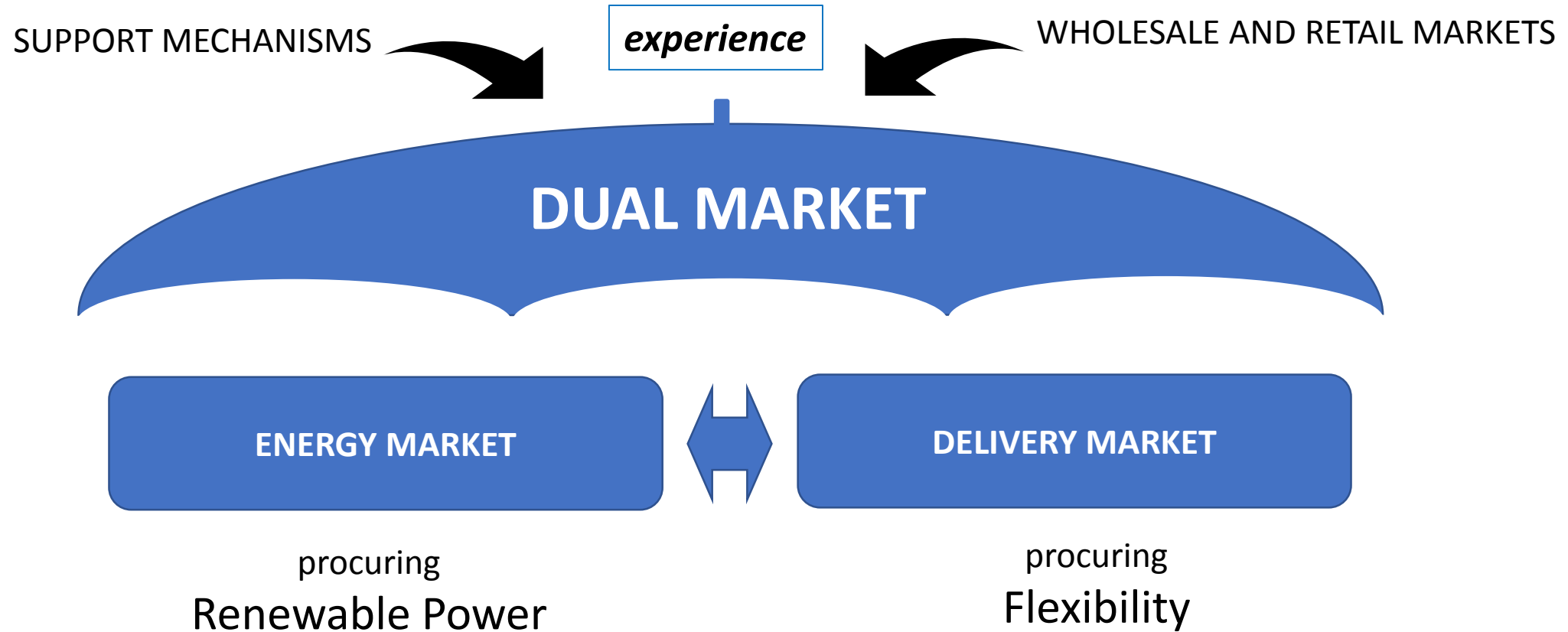


Note: FF = fossil fuel; LCOE = levelised cost of electricity; RE = renewable energy; MWh = megawatt hour.

Fixes versus redesigning to be fit

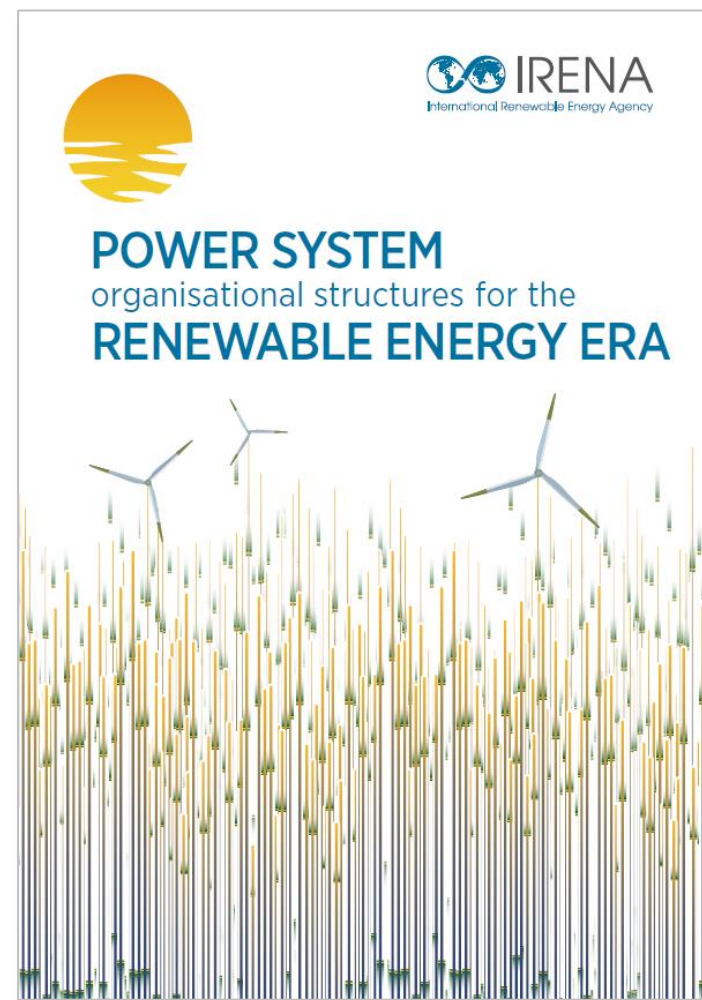








Thank you!



<https://www.irena.org/publications/2020/Jan/IRENA-Power-system-structures>