



# Financing RE – transitioning to market-based remuneration?

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# “SUBSIDY-FREE RENEWABLES” – BUZZWORD OR A NEW TREND?

The Voice of Renewables

China approves 20.76 GW of subsidy-free solar and wind projects.



FINANCIAL TIMES

Outlook improves but offshore wind is not yet subsidy-free

Danish wind nearly subsidy free

Bloomberg

Subsidy-Free Green Power May Be Closer Than You Think in Germany

RECHARGE

Global news and intelligence for the Energy Transition

'Getting this right is a big deal – subsidy-free renewables could hit 60GW in NW Europe'

Renewables 2.0: Subsidy-free revolution



SUBSIDY-FREE SOLAR FUTURE



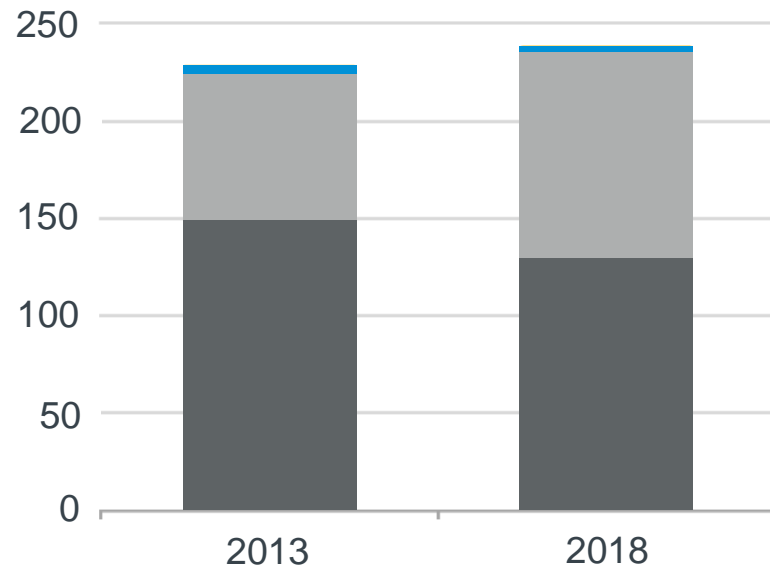
Institute for Energy Economics and Financial Analysis  
IEEFA.org

Subsidy-free renewable projects spreading across Europe

# “SUBSIDY-FREE RENEWABLES” – NOT (YET) HAPPENING AT SCALE

But renewable interest of corporates is increasing

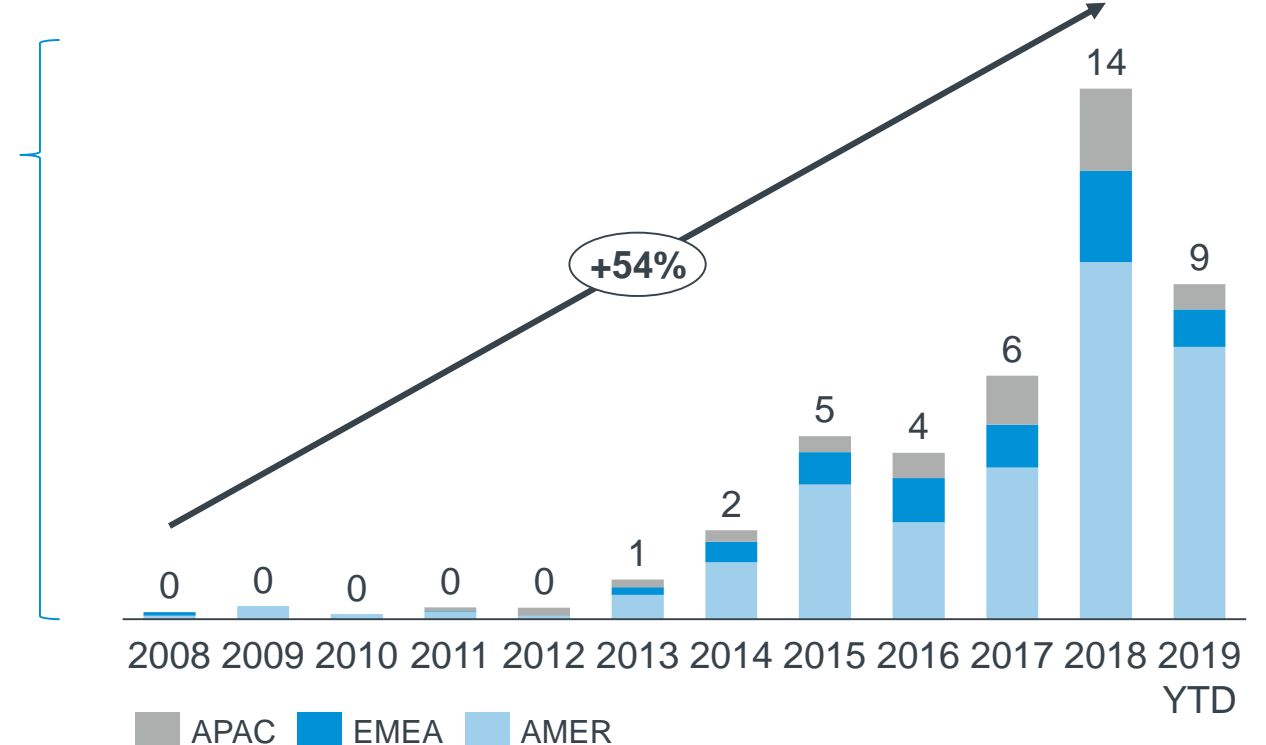
**Utility-scale renewable energy investment by remuneration mechanism**  
(in 2018 bn\$)



- Wholesale market pricing or other market pricing (e.g. corporate PPAs)
- Contracted pricing based on competitive mechanisms
- Contracted pricing based on administrative mechanisms

Source: IEA, World Energy Investment 2019, 05/2019

**Contracted corporate PPAs, by year and region (2008 – 2019 YTD)**  
(in TWh)

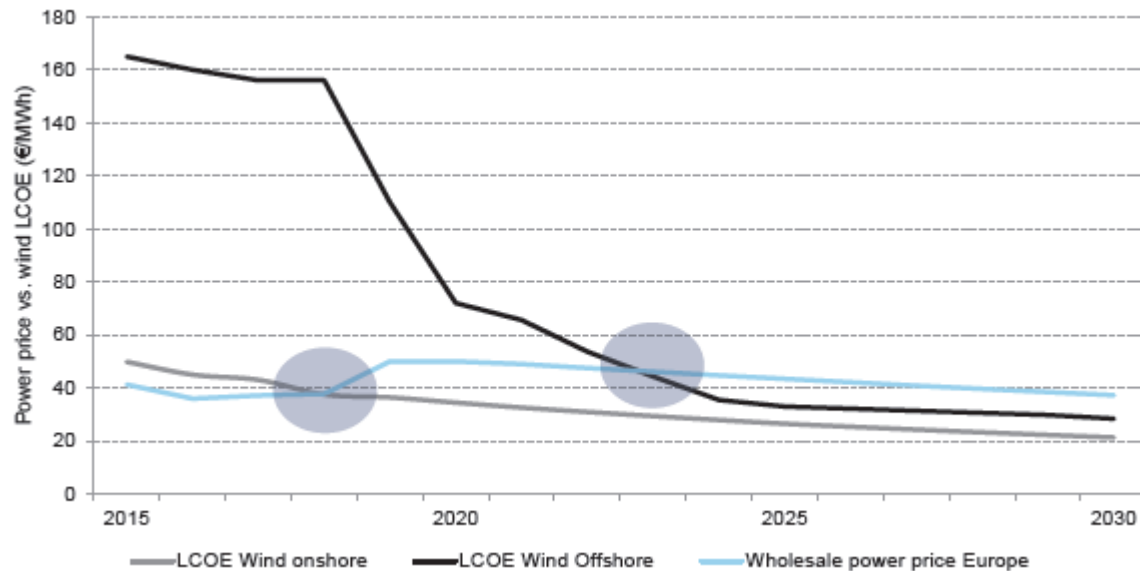


Source: Based on data from BNEF, 2H 2019 Corporate Energy Market Outlook, A U.S. story, 08/2019

# “SUBSIDY-FREE RENEWABLES” – POORLY UNDERSTOOD

The myth of grid parity is persisting

**Levelized cost of electricity (LCOE) and average wholesale prices (2015-2030)**  
(in €/MWh)



Source: Pivosky, A., Wind & Solar Energy. Rivalry Or Collaboration, 03/2019,  
<https://investhandbook.com/wind-solar-energy/>

- In most liberalized power markets, wholesale power prices are set by marginal costs and **vary e.g. in function of time, region, power mix** on the grid.
- A theoretical power plant running at full capacity 24/7 all year around would capture the average power price – but no power plant, fossil fuel based or renewable, generates at 100% all the time (because of maintenance, curtailment, no wind or no sunshine, etc.).
- Over time, wholesale power prices furthermore tend to decrease in markets with increasing share of variable renewable energy (**merit order effect**).
- **Grid parity**, often defined as the point when the LCOE falls below average wholesale power prices, **is thus flawed**: average wholesale power prices and LCOE don't compare

# FROM LCOE TO MARKET AND SYSTEM VALUE

New metrics are required



## LCOE

- Average **cost** per unit of electricity output

## Market value and value factor

- Average **revenue** per unit of electricity output
- Shows, if divided by the average wholesale power price (**value factor**), how much of the average price can be captured by a power plant or a power generating technology

## System value

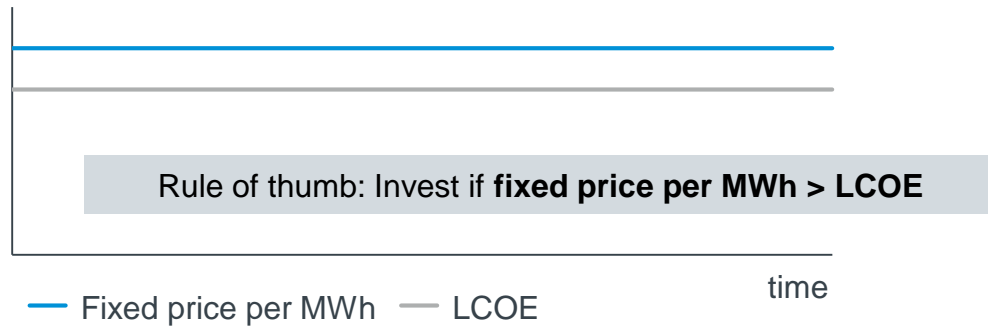
- Interplay of **positive** (e.g. lower carbon emissions, high market value, reduced fuel costs etc.) and **negative effects** (e.g. additional grid infrastructure costs, re-dispatch costs/curtailment etc.) of a power generating technology on the **system**

# CHANGING INVESTMENT RATIONALE

## From certainty to embracing uncertainty

### Fixed payment per MWh versus LCOE

€/MWh



- Level of fixed price per MWh determines revenues
- Project profitable if fixed price per kWh above LCOE – the lower the LCOE the higher the profitability
- Produce & forget: generator doesn't need to care about fluctuating power prices (and has hence no incentive to produce when power is most needed as he cannot capture higher power prices)

### Market value versus LCOE

€/MWh



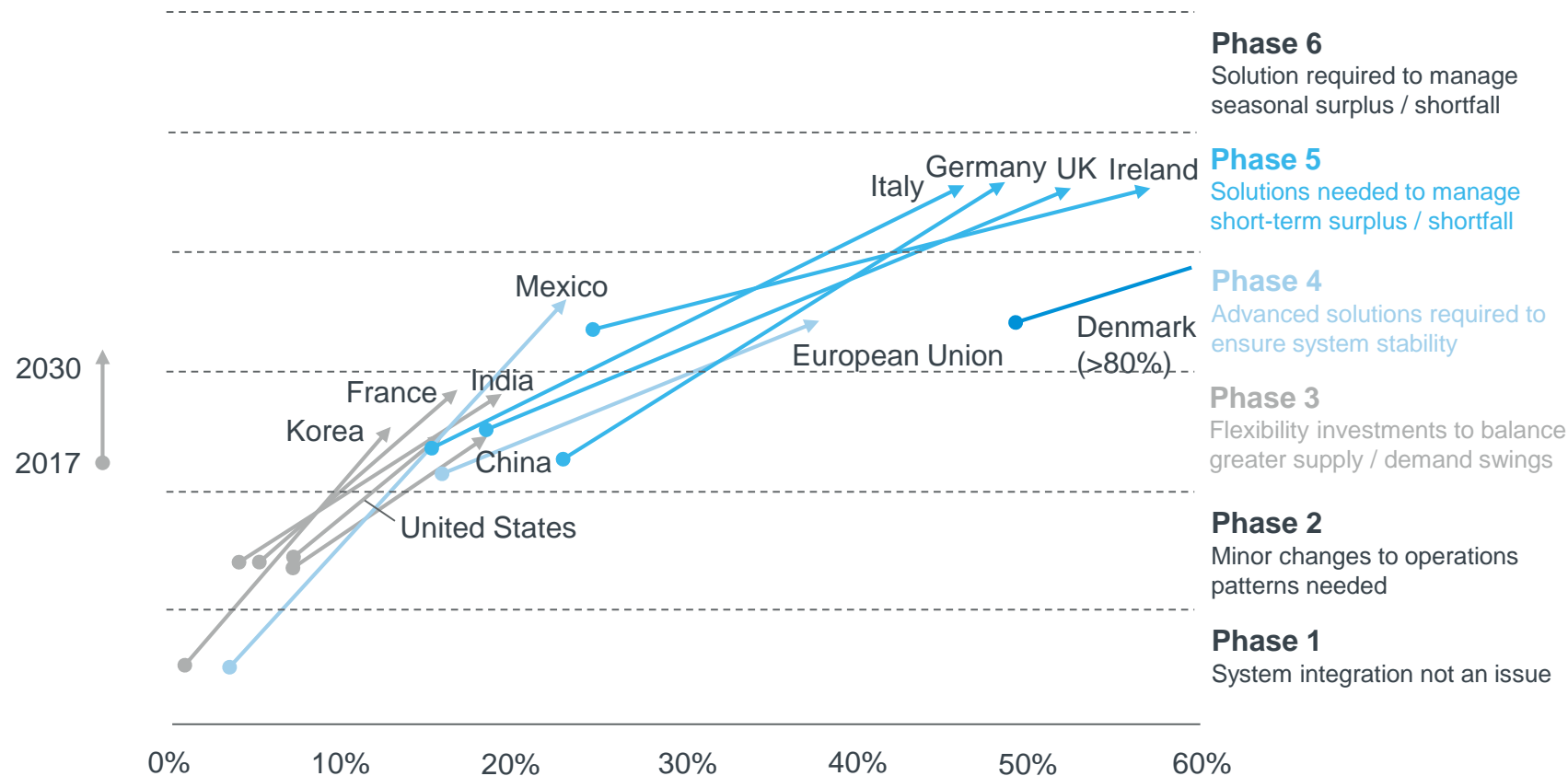
- Under full price risk exposure, the market value captured over the lifetime of the power plant determines the main chunk of revenues of the generator
- Revenues can be topped up by additional revenues streams (and (partially) secured with various instruments)
- A project is profitable when the market value + potential additional revenues over project lifetime exceed the LCOE

# WHY SYSTEM VALUE IS AS IMPORTANT AS THE MARKET VALUE FOCUS

## Increasing share of variable renewables: self-cannibalization & integration challenges

### Countries/regions moving higher levels of integrating variable renewable energy (2017-2030)

Annual share of variable renewable energy generation (%)

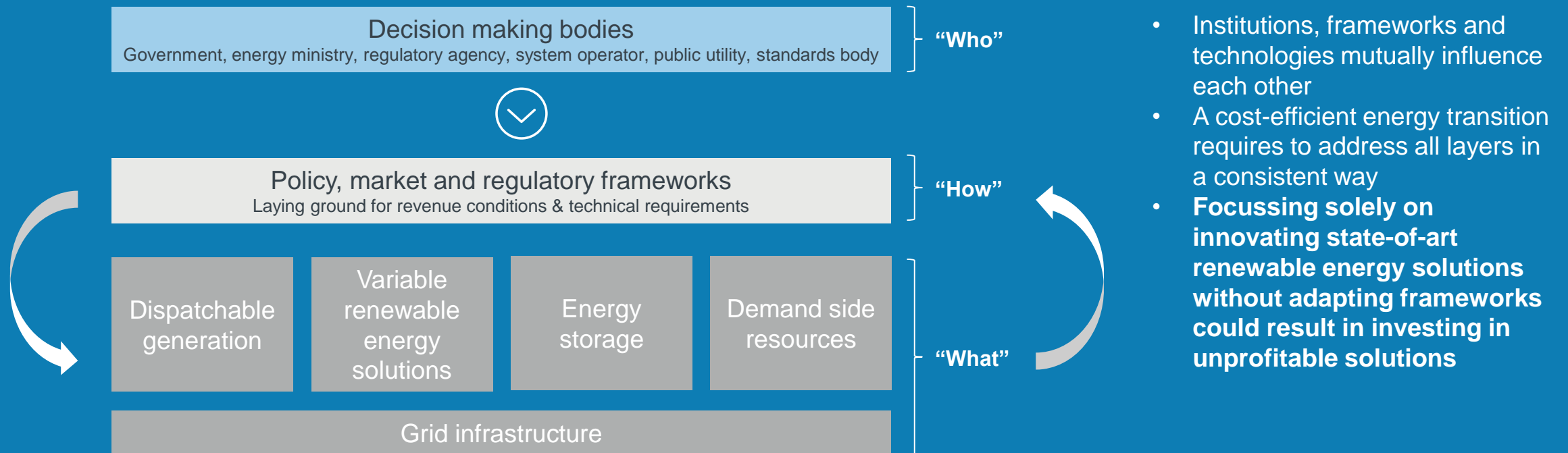


- Individual market characteristics count
- Increasing flexibility needs impacted by size of power system, its interconnectivity, the degree of flexibility of thermal generation, shape of demand profile etc.
- **But all markets will need to evolve to cost-efficiently integrate high shares of variable renewable energy**



# INCREASING MARKET AND SYSTEM VALUE GOES HAND IN HAND

## System-friendly renewable energy solutions need renewable-friendly systems





# TRANSITIONING TOWARDS COMPETITIVE RE ENERGY SYSTEMS

## Safe bets and open research areas

### No-regret options

- Phase-out of fossil fuel subsidies & greenhouse gas pricing
- Long-term energy planning (RE targets, infrastructure)
- Zoning plans for RE build-out to consider generation profile
- Increase flexibility of existing thermal plants
- Adapting and upgrading grid infrastructure and operations
- Phase-out plan for coal power plants and aim at decarbonization of gas plants
- Move market price settlements as close to generation time as possible & restore price signals
- Remove barriers to alternative revenue stabilization mechanisms (e.g. corporate PPAs)
- Ease access to low cost financing
- Re-design ancillary services products and trading conditions based on the characteristics of RE
- Incentives to speed up economies of scale of demand flexibilization (e.g. storage, power-to-X, demand side management)

### More research needed

- Promoting focus shift from cost to value – how to spread the word?
- Power price and capture price forecasts – how robust is the general upwards trend?
- Carbon prices – at what RE penetration do they lose their steering function?
- Legacy plants – impact on the market value of new capacity additions?
- Market design – which changes are most suited to increase both, market & system value?
- Too cheap to meter – (when) will it happen and what alternatives are possible (market design, technologies, business models)?
- Virtual power plants / “islanded” grids – could they power a nation more efficiently than grid-heavy systems?

# THANK YOU FOR YOUR ATTENTION

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