

Connecting the dots



Distribution grid investment to power the energy transition



Jointly undertaken with



#ItsElectric #PowerGrids #Investments

A €400 billion investment challenge

5. Investments rely heavily on enabling regulatory requirements frameworks

4. This investment increase should not translate into a major additional cost to the KWh

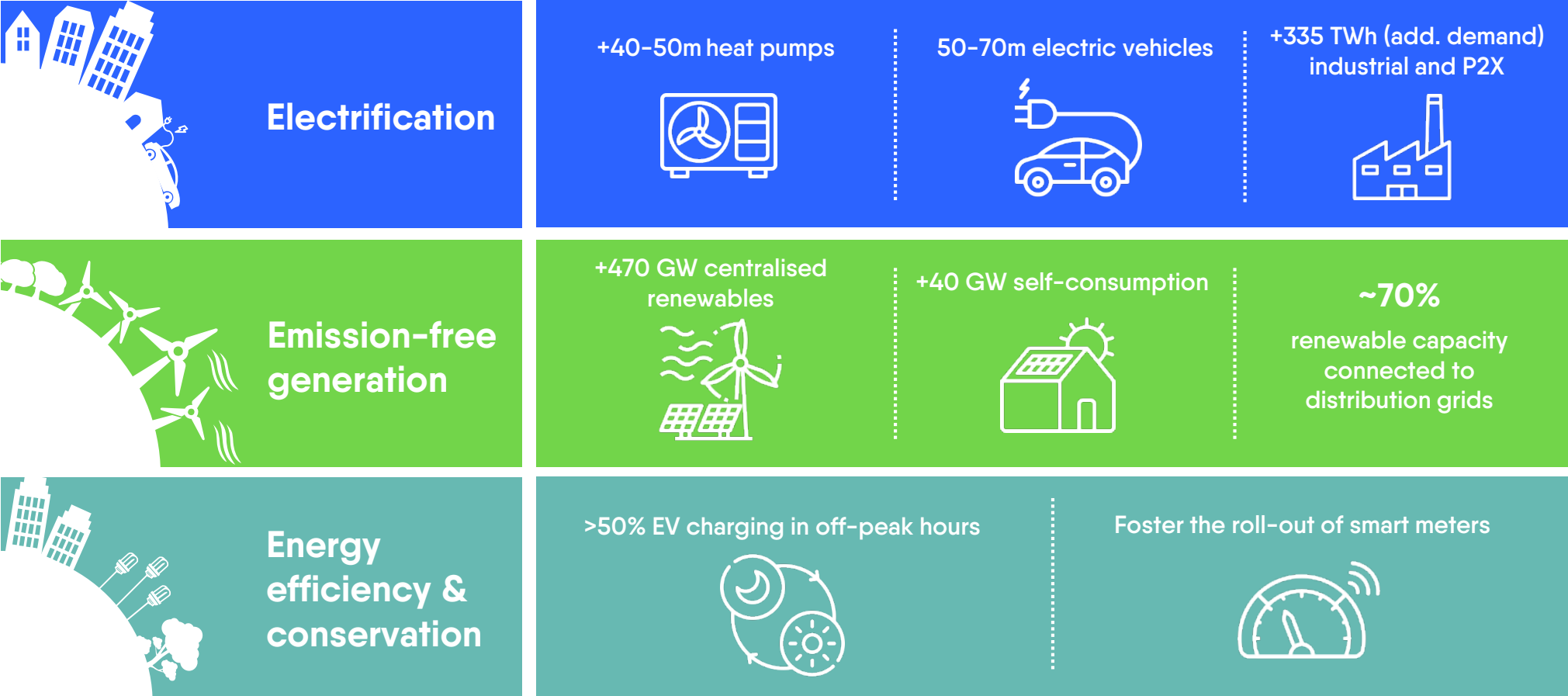
3. Societal benefits with regards to sustainability, competitiveness and the economy significantly outweigh the economic impact on distribution tariffs

2. This is a considerable investment,
50-70% higher than today

1. DSO investment needs: €375-425bn



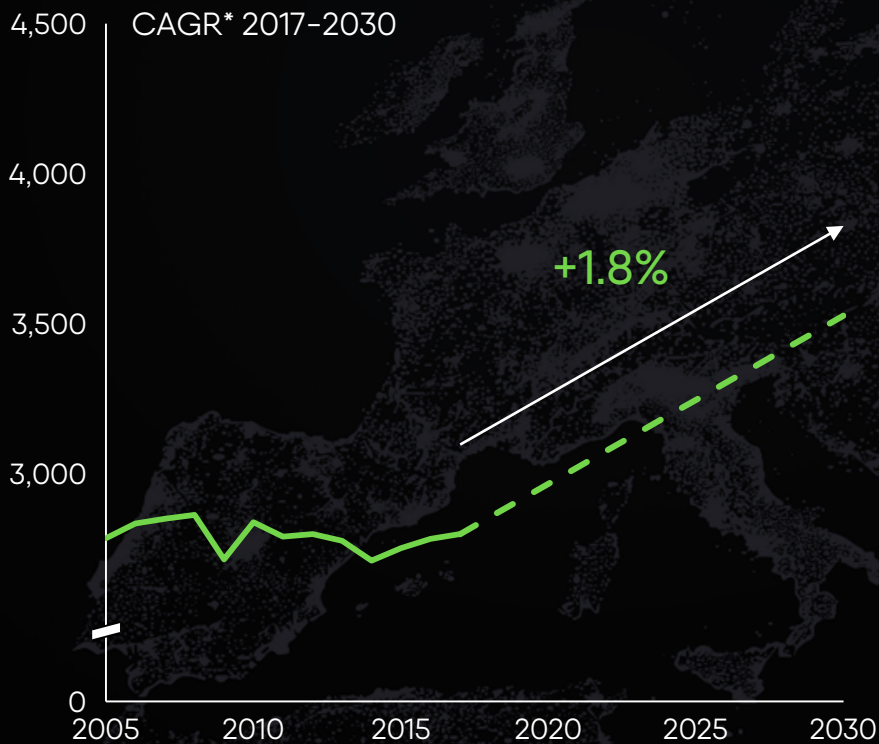
Massive energy system changes needed by 2030



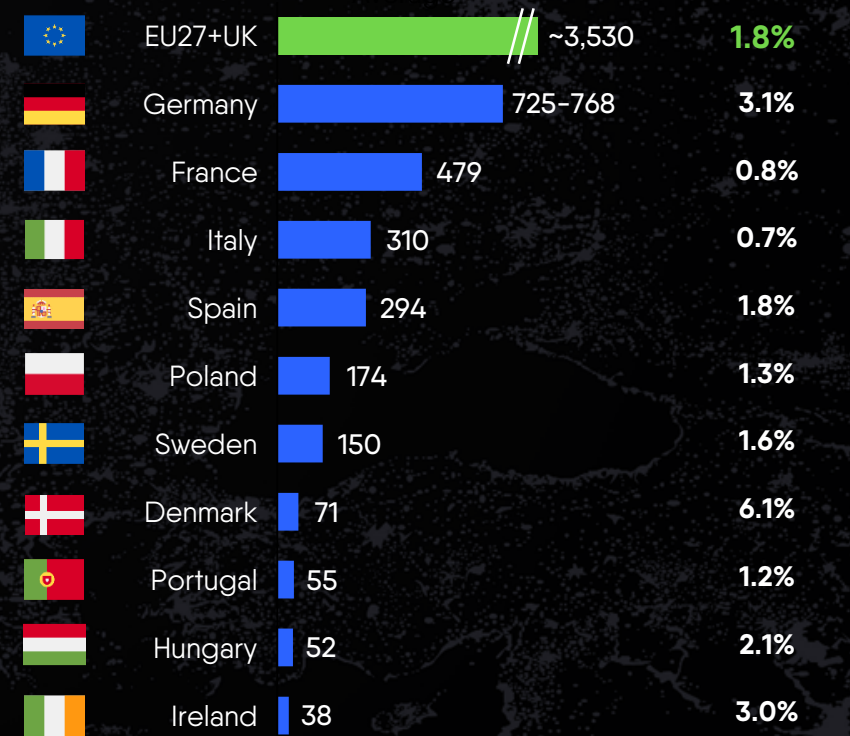
Total electricity demand will rise by +1.8% per year by 2030

DSO grids will need reinforcements and additional transformation capacity in substations to effectively accommodate for the anticipated rise in demand and ensure quality of supply

Final electricity demand (TWh; 2005-2030)



Final electricity demand per country (TWh; 2030)

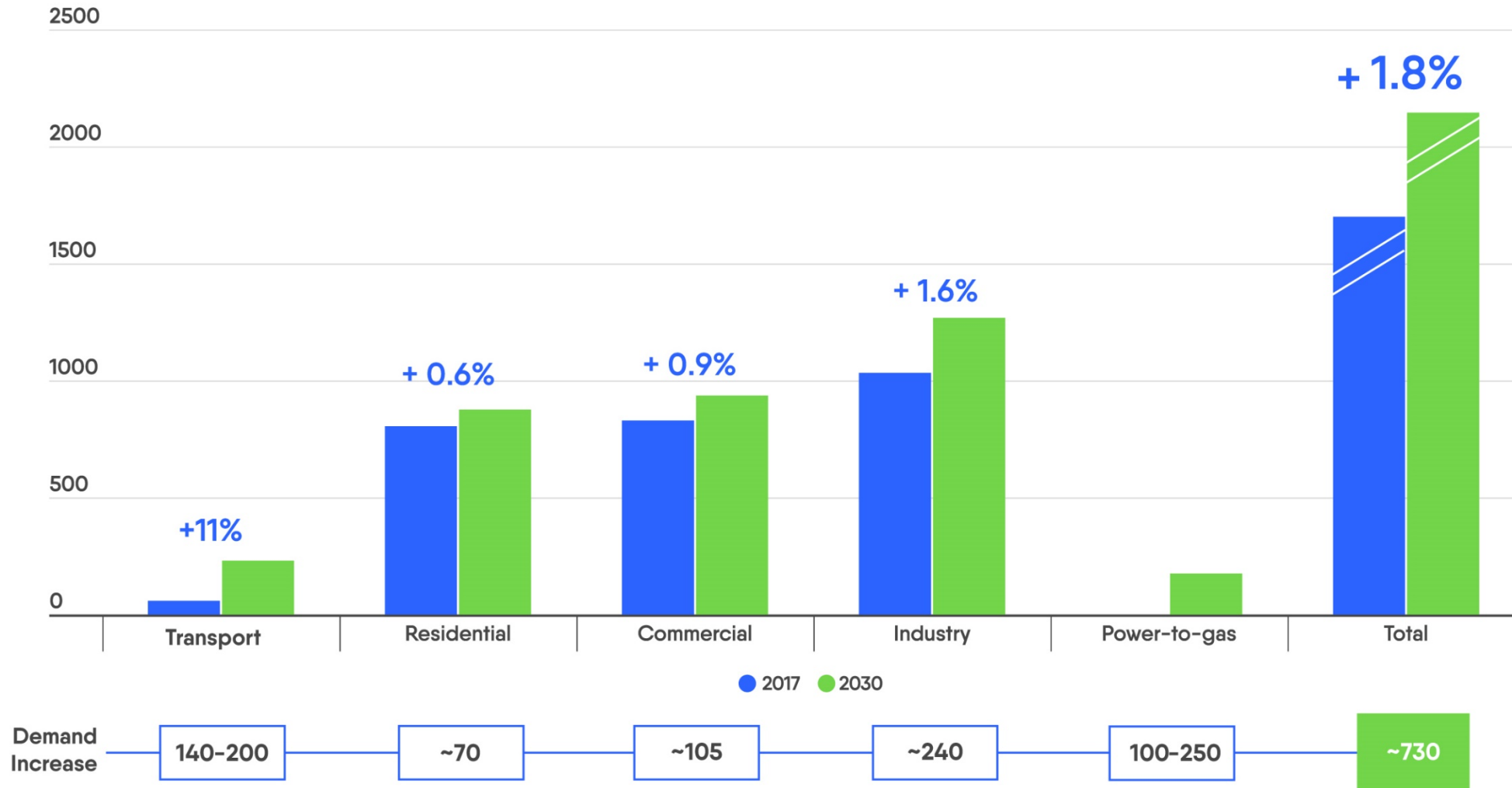


CAGR
(2017-30; %)

All sectors will contribute to electricity demand growth

Electricity demand by sector (TWh; 2017-2030)

CAGR* 2017-2030

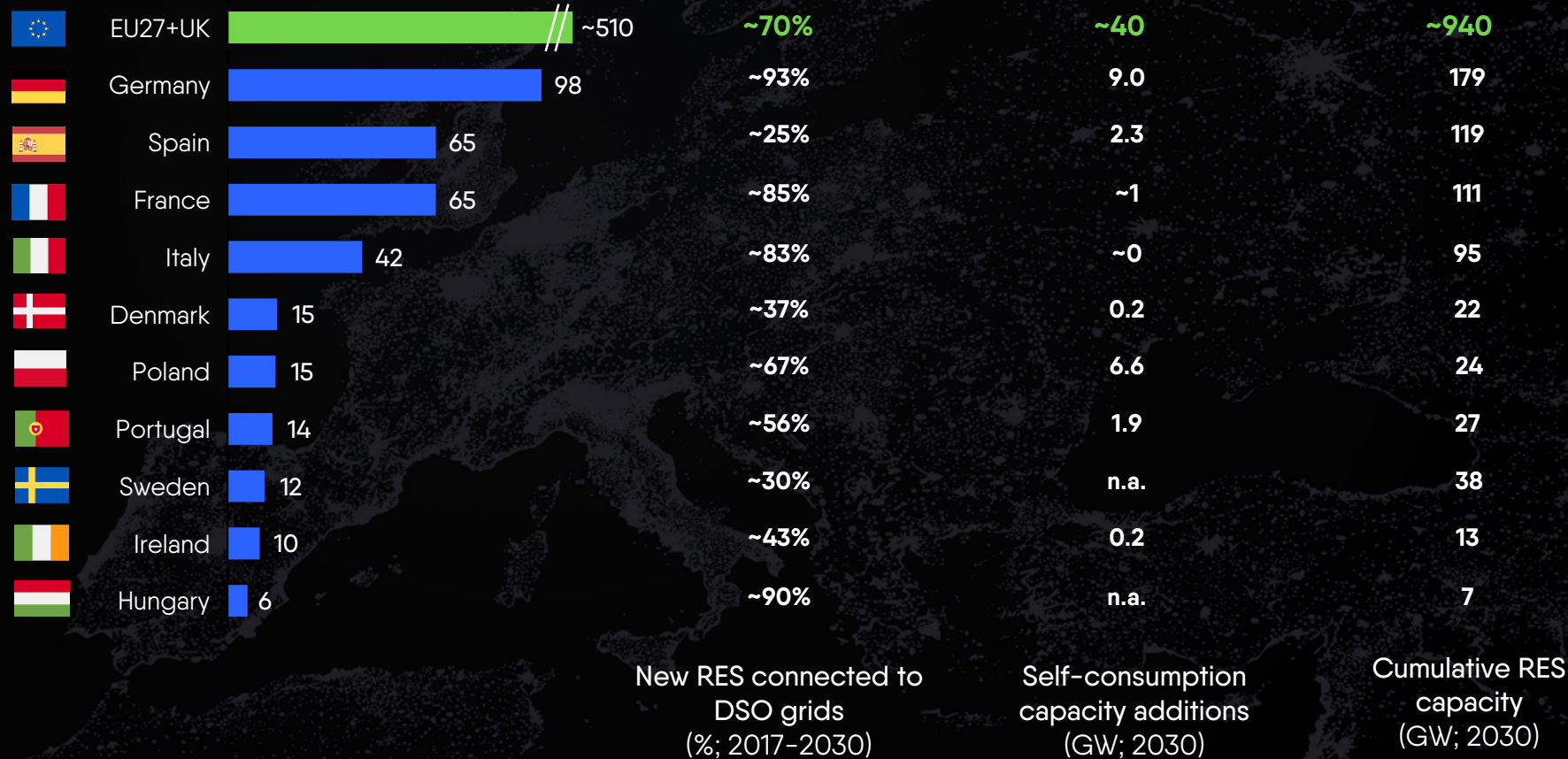


Source: Eurelectric; DSOs and associations; iea; Monitor Deloitte

* Compound annual growth rate

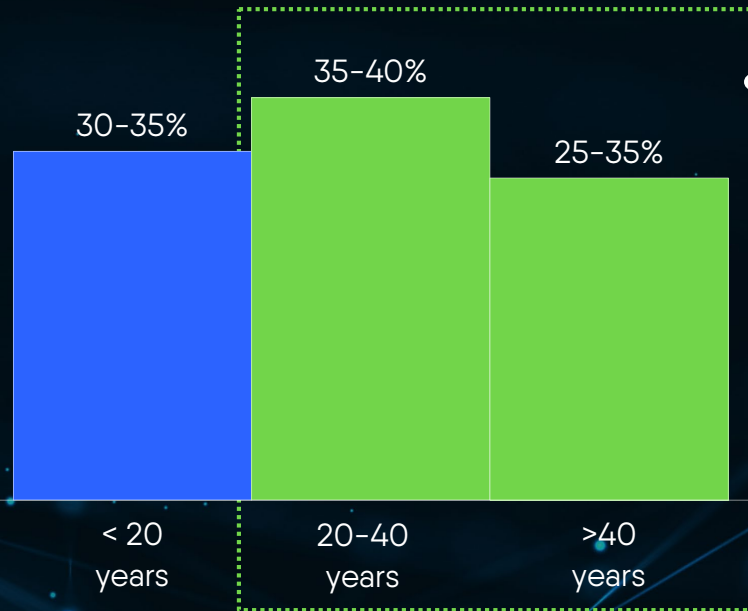
70% of new 510 GW RES capacity will be connected at distribution level

RES capacity additions (GW; 2017-2030)



Distribution grids are ageing

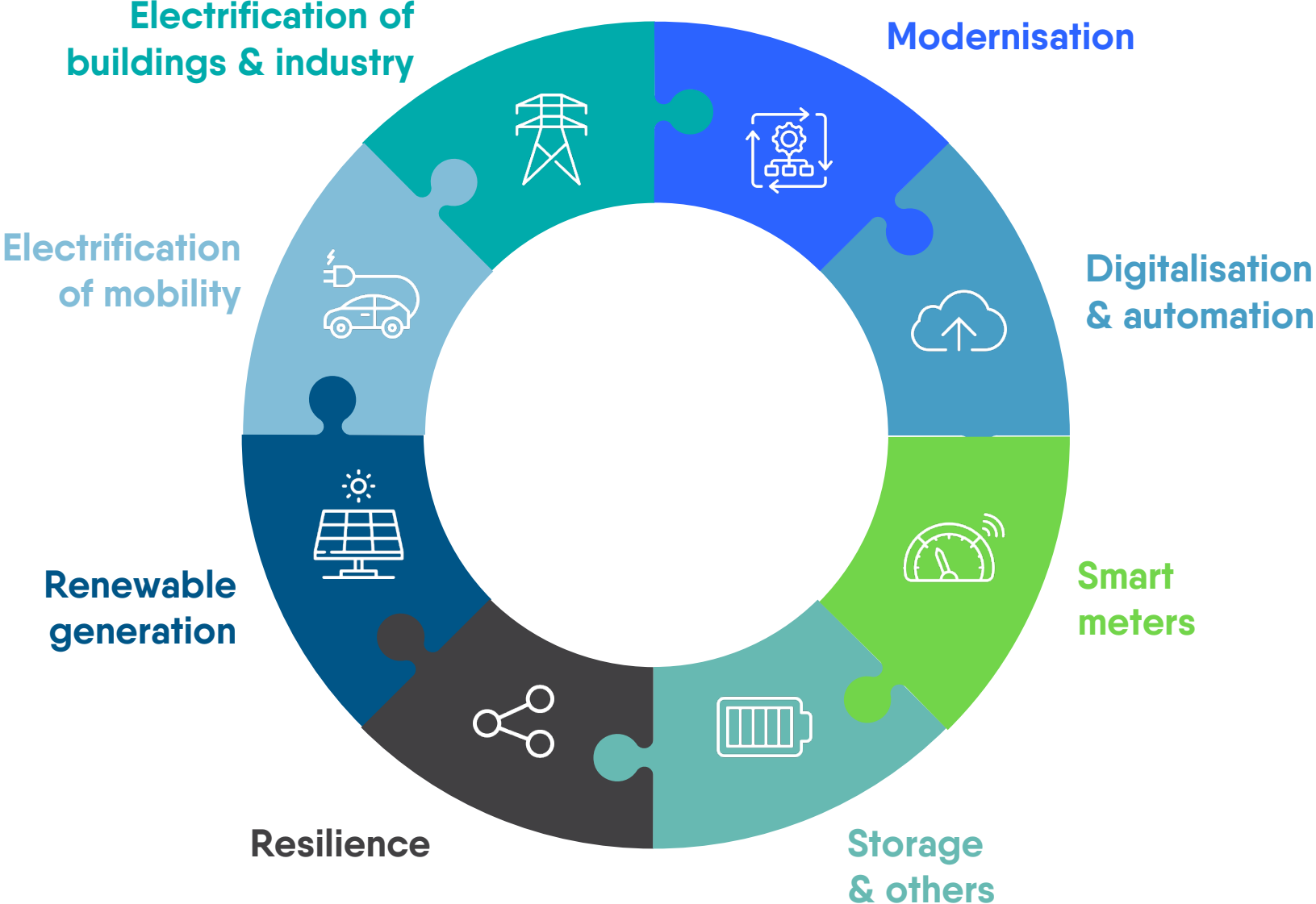
Average age of low-voltage lines in 2020 (in %)



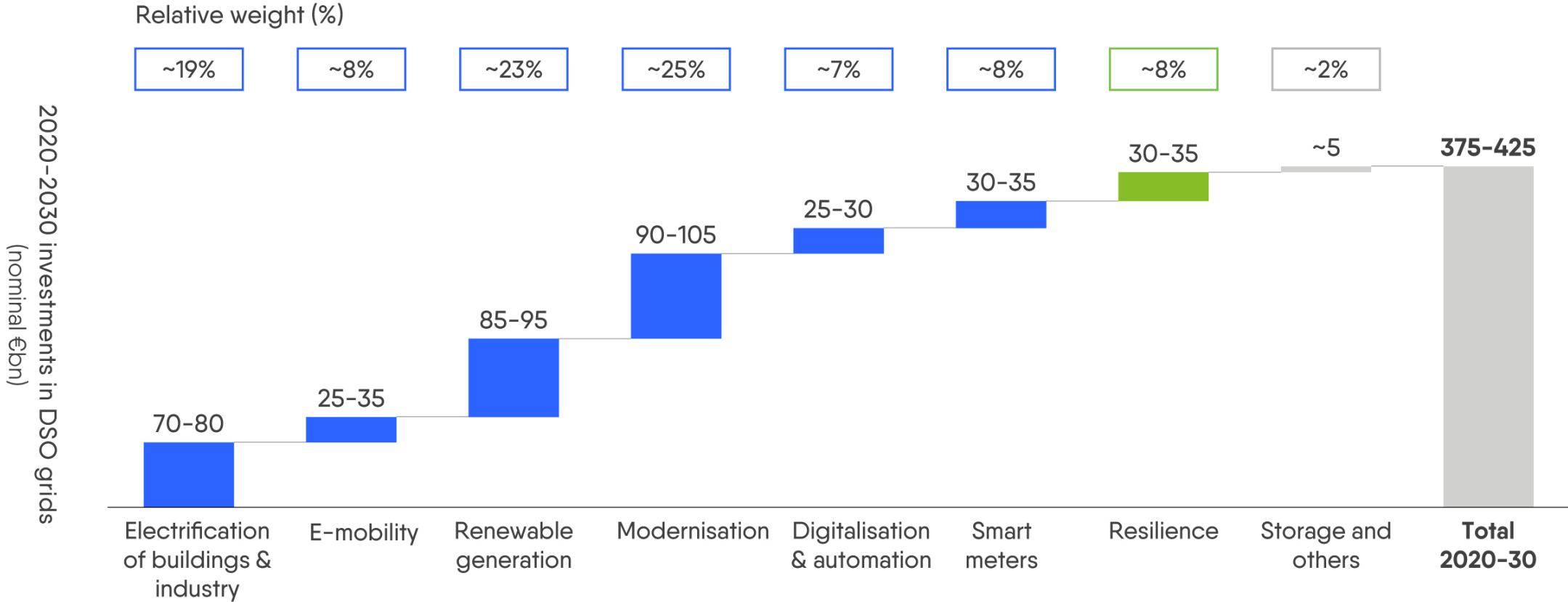
- **Investment needs due to modernisation by 2030 may grow**
- If assets are not replaced after their useful life, **40-55% of our low-voltage lines could be >40 years old by 2030**
- Modernisation needs vary depending on expansion timings at national level

The replacement equipment must be planned to ensure compatibility with new digital assets and avoid obsolescence

Distribution grid investments should focus on 8 key drivers



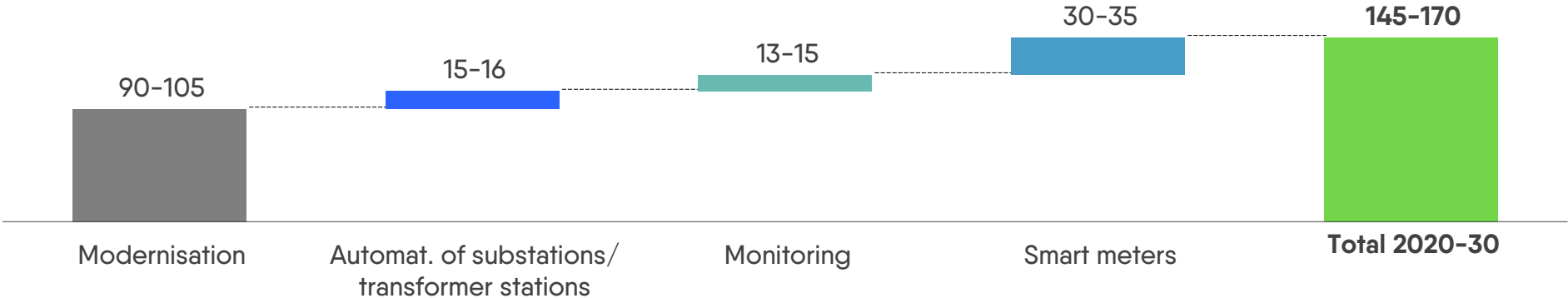
Key investment drivers: modernisation, renewables and electrification







Source: DSOs and national associations; Monitor Deloitte

Modernisation is the first area of investment in most of countries

(nominal €bn; 2020-30)



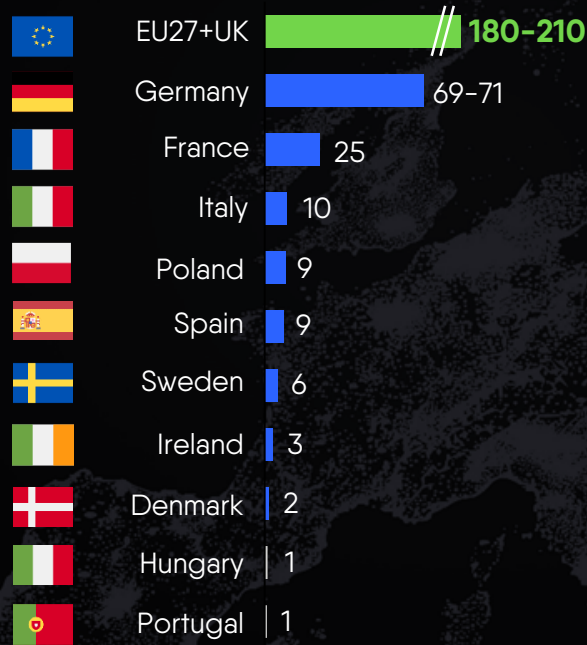
 <p>Replacement and modernisation of grid assets (e.g. lines, transformation centers), to maintain high levels of robustness</p>	 <p>Automation of substations at distribution level, including remote control of substations</p>	 <p>Grid monitoring to improve efficiency and security of supply</p> <p>Data management (storage, processing, cybersecurity, etc.)</p>	 <p>Smart meters (1st and 2nd generation) to enable customers' monitoring and increase observability of LV grid</p>
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Modernising and replacing aging assets, especially in low voltage, has no downside

Investments in digitalisation will help integrate a high volume of DER resources, and enable customer participation

Electrification and decarbonisation will trigger new grid build out

Investments in distribution grids due to electrification and renewables by country (nominal €bn; 2020-30)



Final electricity demand (CAGR; 2017-2030)

Electric Vehicles (BEV and PHEV) (million; 2030)

RES connected to distribution grid (GW; 2017-2030)

Country	Final electricity demand (CAGR; 2017-2030)	Electric Vehicles (BEV and PHEV) (million; 2030)	RES connected to distribution grid (GW; 2017-2030)
EU27+UK	1.8%	50-70	+360
Germany	3.2%	10-24.3	+91
France	0.8%	6.0	+55
Italy	0.7%	6.0	+35
Poland	1.3%	1.5	+10
Spain	1.8%	4.0	+16
Sweden	1.6%	1.0	+3
Ireland	3.0%	0.9	+4
Denmark	6.1%	1.5	+6
Hungary	2.1%	0.2	+6
Portugal	1.2%	0.6	+8

Examples

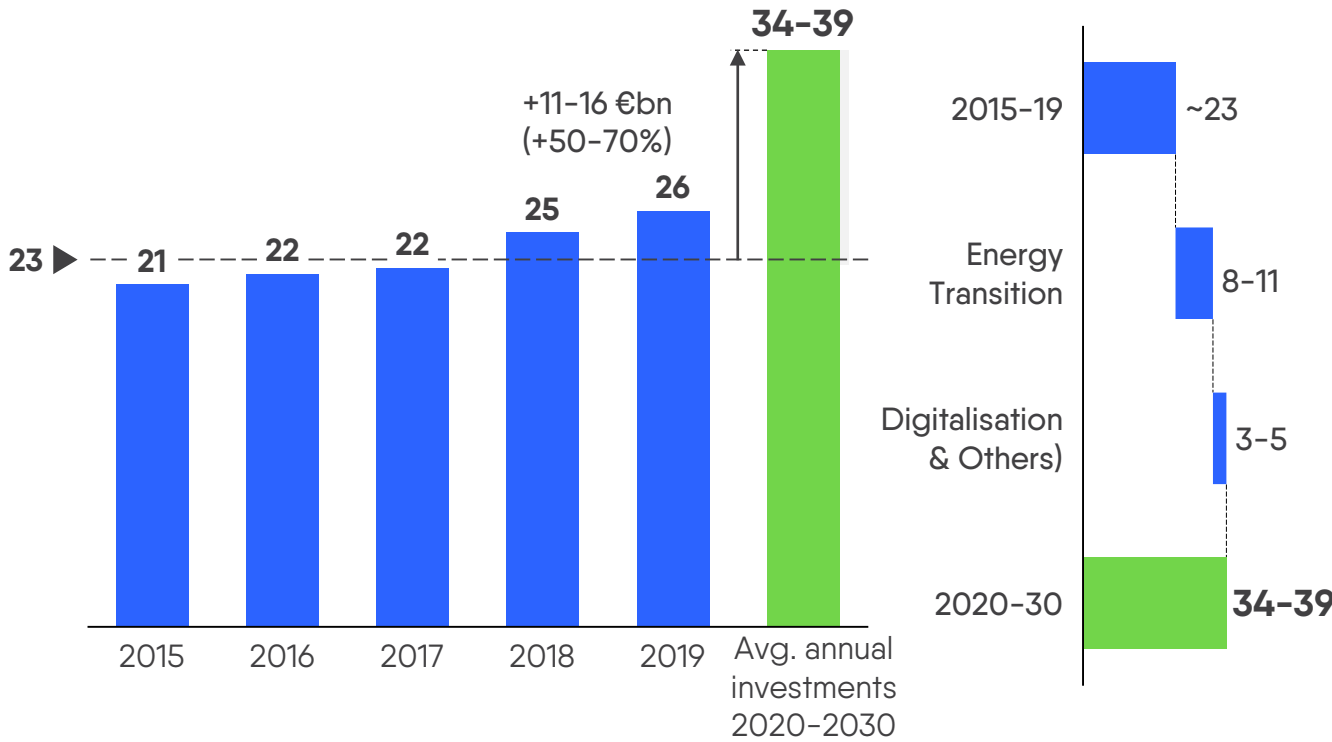
1. Electrification in commercial and residential sectors (+ 400 000 new customers /year in France), is mainly driven by heat pumps (ex : 600 000 domestic heat pumps in Ireland) and renovations

2. Renewable capacity will increase by x6 in Hungary by 2030; strong development needs for rural grids in Germany to integrate renewable generation

3. The grid has the capacity to integrate the majority of the charging needs by 2030 coming from strong penetration of electric vehicles

Investment needs to increase by 50-70% to €34-39bn/year

EU27+UK annual investments in power distribution grids and key drivers (nominal €bn; 2015-2030)



Source: Eurelectric; Eurostat; IEA; DSOs and national associations; Monitor Deloitte

Grid investments have major societal benefits

SUSTAINABILITY

€17-22bn annual CO₂ savings

€40-140bn annual savings in health

58,000 premature deaths avoided

460 Mtoe less of final energy consumption by 2030, achieving 32.5% of efficiency target



COMPETITIVENESS

Territorial cohesion and promotion of local economies

€28-37bn average electricity cost reduction (thanks to 50-65% lower RES than fossil generation cost)

+€175bn annual savings in fuel imports



ECONOMY

€ 30-35 bn of annual revenues for EU companies (e.g. manufacturers & service providers)

440-620k quality jobs per year related to DSO grids

€30-35bn annual sales in equipment (~90% of total investment)



CUSTOMER EMPOWERMENT

~40 GW self-consumption capacity added

50-70m EVs with smart charging

New services: storage, electric heating, smart appliances, aggregators

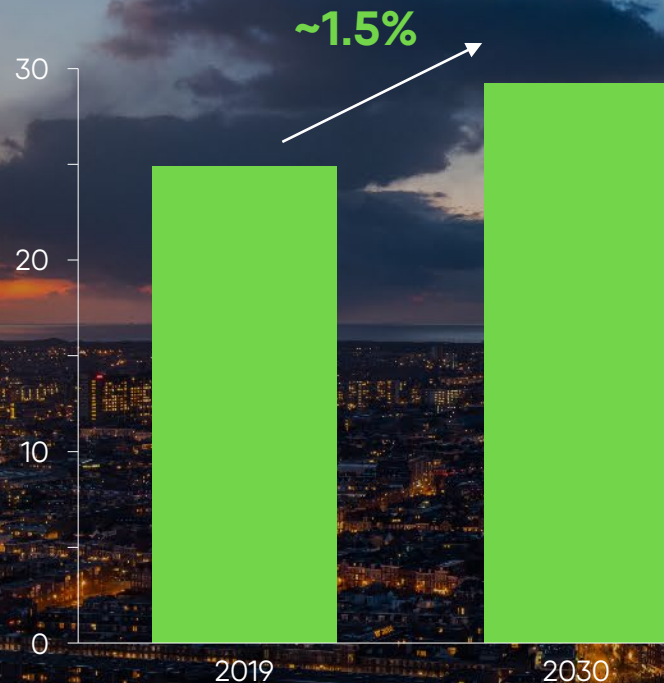
€34-39bn
of annual
DSO investments
in power grids



~0.2-0.3% of current EU GDP in annual investments in power distribution grids

Investments will marginally impact electricity costs

Impact of DSO investment on electricity cost per electricity unit (€nominal/MWh; EU27+UK)



This investment will ultimately help lower the total energy bill

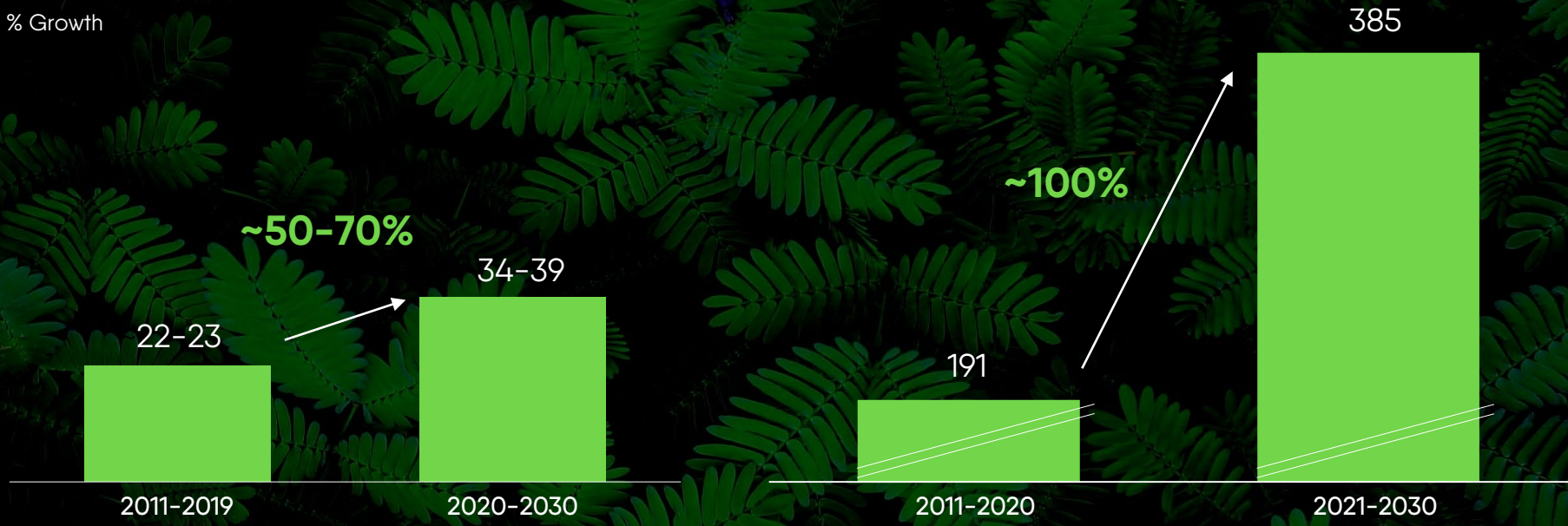
- DSO investment will result in an increased cost of electricity (**CAGR~1.5%**), but **EU inflation rates will also be rising by 2%**
- **Investment in distribution grids has no downside, bringing long and short term benefits:**
 - **Long term reductions of incremental investment needs and tariff impact**, especially with the efficiency of grid modernisation and digitalisation,
 - **Enable RES deployment and electrification that will ultimately reduce the total energy bill**
 - **Enable flexibility measures that increase cost-effectiveness** and **may** also help reduce tariff impact

Grid investments growth is limited compared to other decarbonisation needs

Annual investment in DSO grids (nominal €bn)

Investments for EU decarbonisation according to EC existing targets, excluding transport (nominal €bn)



% Growth














Annual investments in DSO grids will grow ~60% by 2030, less than the expected investment growth ~100% for decarbonisation

Source: European Commission; Eurelectric; Eurostat; European Central Bank; DSOs and associations; Monitor Deloitte

Regulatory actions to boost investments

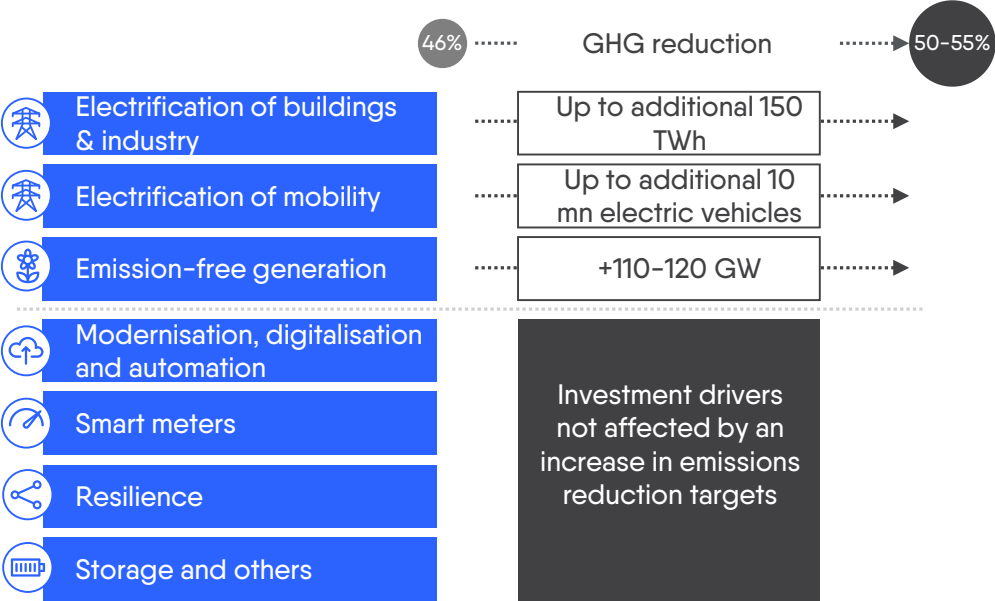
 EU level  National level

Challenges	Policy issues	Regulatory actions	Policy level
Plan & execute investments	Planning	Low long-term visibility and lack of planning	
	Funding	Barriers for DSOs to apply for EU funds	 
	Execution	Bureaucratic delays in permits & environmental authorisations	
Improve security of supply & automation	DSO role	Little clarity on principles of enhanced role of DSOs	 
	Remuneration	Historic costs and low exposure to disruptions are intrinsic features of current remuneration models	 
Enable the energy transition	Flexibility	Lack of comprehensive regulation on flexibility	 
	Tariffs	Electricity tariffs should be more cost-reflective	

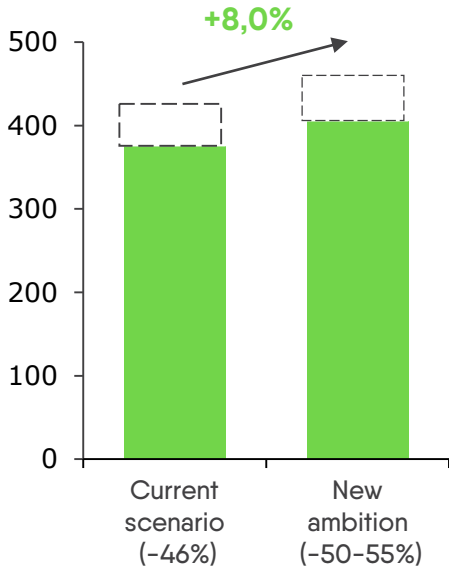
Source: Eurelectric; DSOs and national associations; Monitor Deloitte

An increased GHG reduction target would result in a marginal impact on grid investments (~8%)

Impact on EU27+UK due to increasing the ambition towards 2030

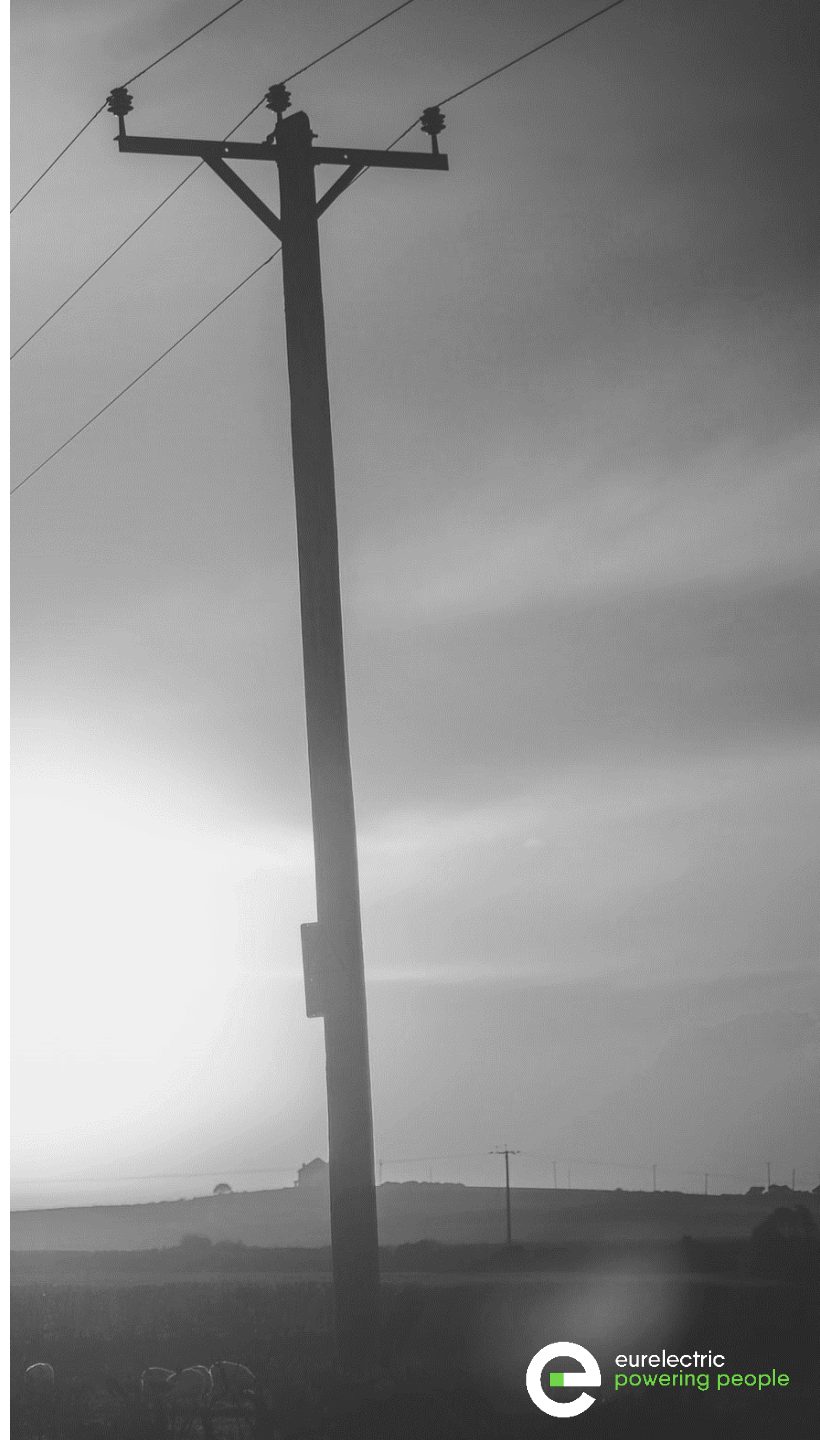


EU27+UK power grid investments 2020-2030 (€ nominal billion)



50-55% GHG reduction ambition would require an additional 25-30 bn€ of investment (+8% relative to current ambition) which is primarily driven by the increase of renewables

Source: European Commission; Eurelectric; DSOs and associations; Monitor Deloitte



Peak demand will grow at different pace

Countries should deploy flexibility through load, generation, or storage related measures depending on technical (e.g. ramp response), economical, and regulatory conditions (e.g. saving potential, conducive framework)

