Reshaping the energy system through Electrification, Decentralization & Digitalization

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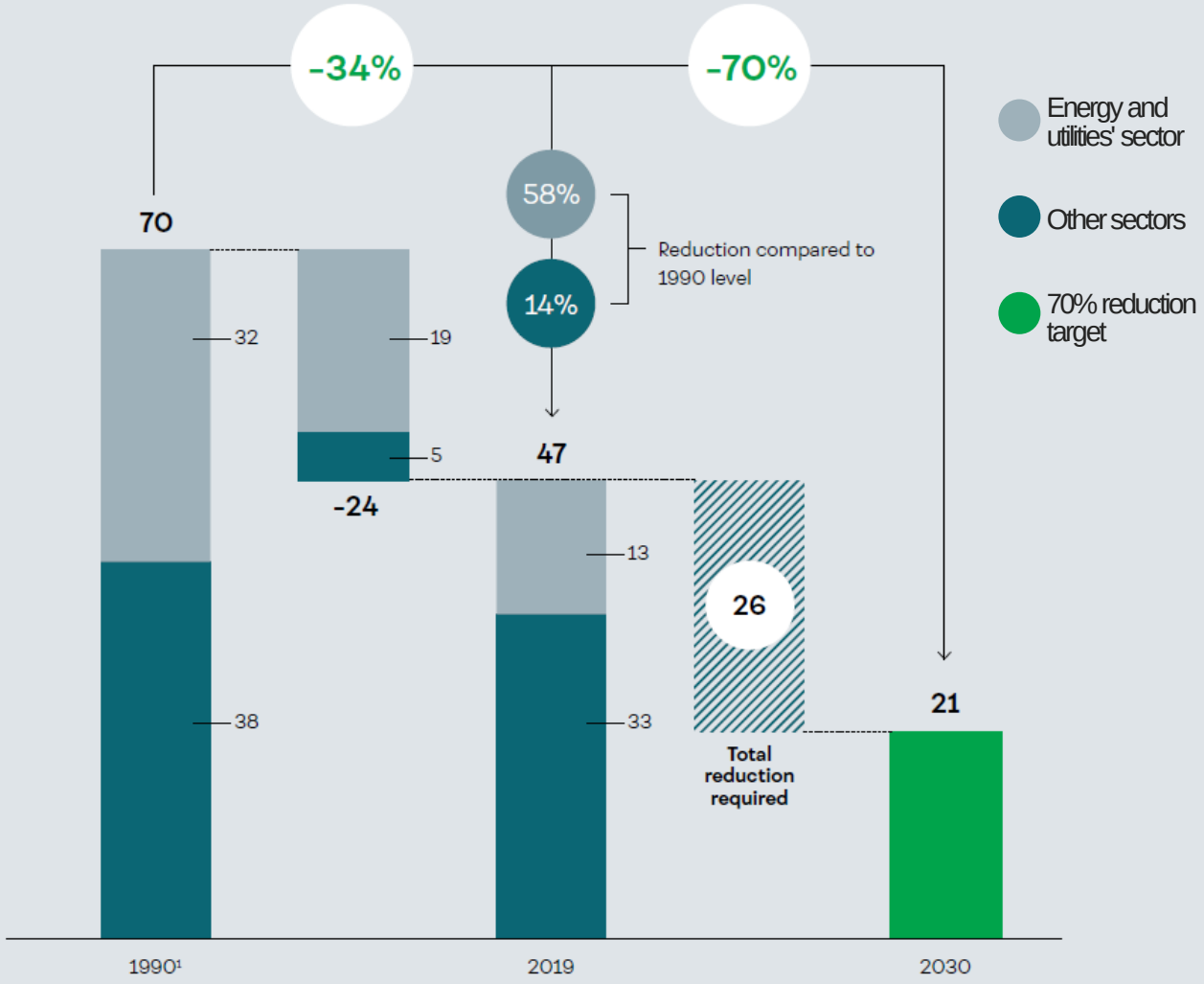
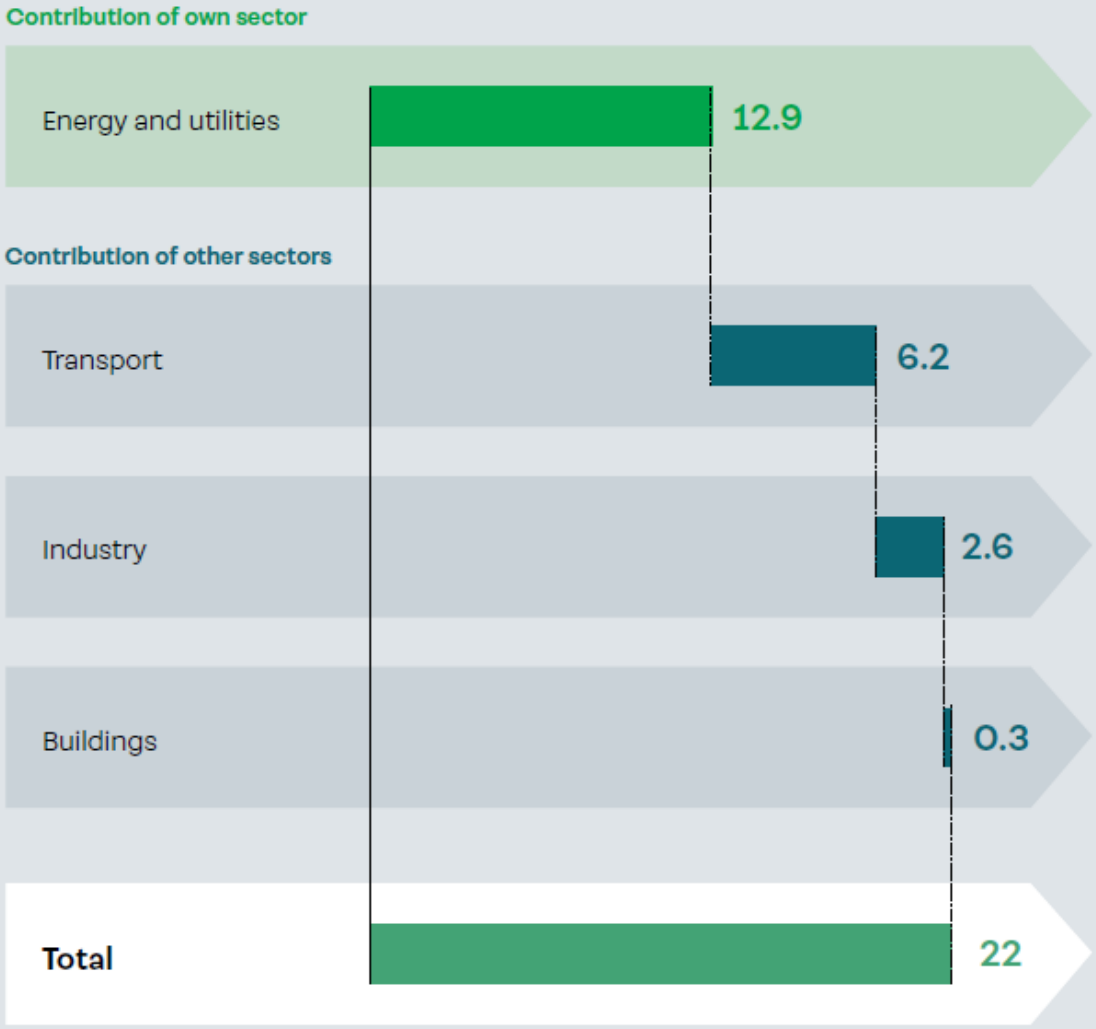
The way forward – 70 % by 2030



"Over the next ten years, Denmark must reduce carbon emissions by almost the same amount as in the past 30 years

Full report, sources and more info at: www.climatepartnership.dk

Estimated reductions across sectors



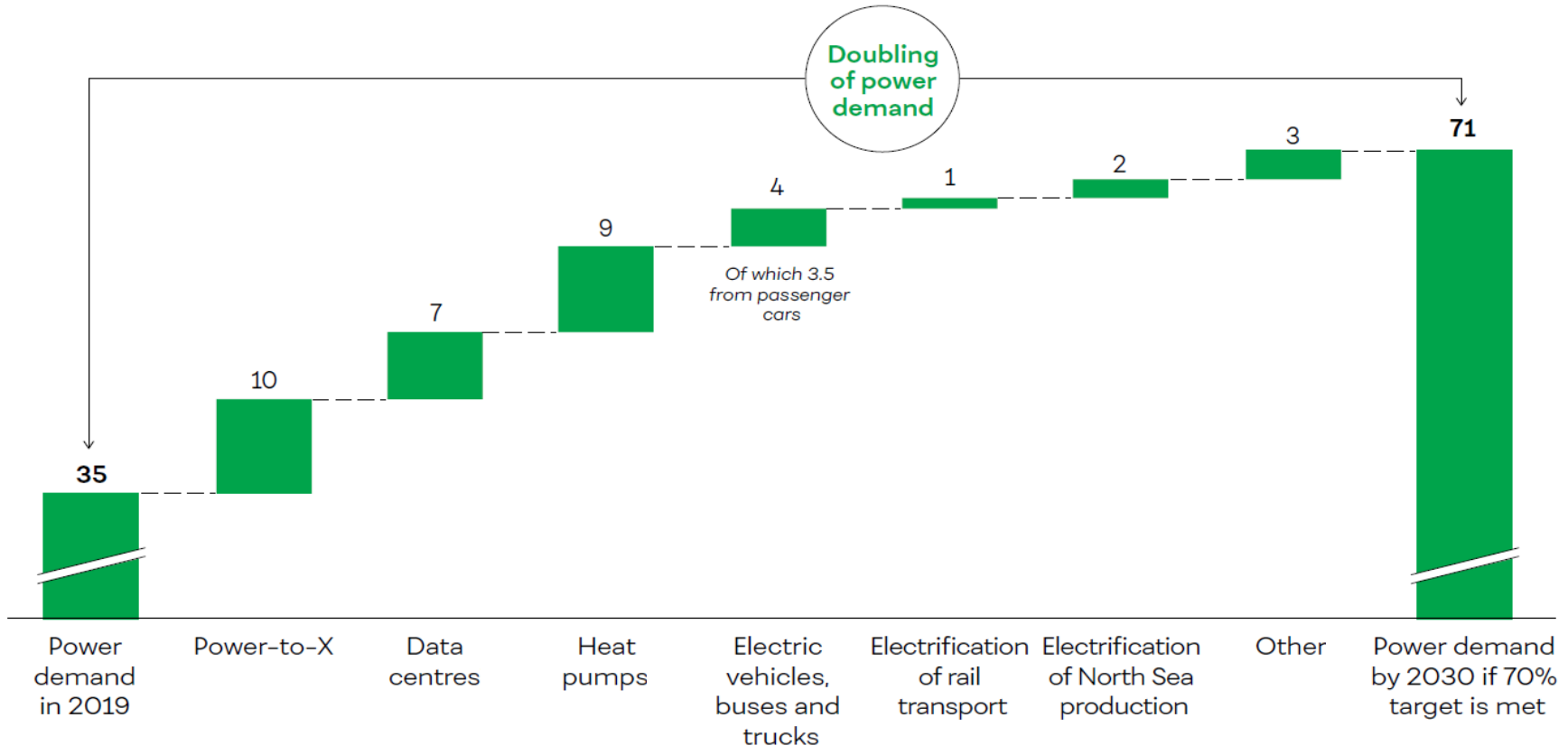
6.9 Renewable energy in power and district heating	2.8 Oil and natural gas phased out of individual heating systems	1.3 Carbon capture and storage	0.8 Separation of plastics in waste-to-energy	1.1 Optimisation and electrification of North Sea prod
0.6 Adjustment of baseline projection	2.1 1.5 million electric or hybrid vehicles	1.9 Power-to-X in heavy transport	0.9 Electric commercial vehicles, electric buses and electric lorries	0.8 Biofuel e.g. biogas and biodiesel
-0.2 Adjustment of baseline projection	1.5 Heat pumps in process heat[1]	0.6 Energy efficiency improvements	0.6 Internal transport	0.1 Biogas and biodiesel for process
– Adjustment of baseline projection[2]	0.2 Building installations[3]	0.1 Building insulation[4]		

All circled initiatives require renewable energy (electricity)

Full report, sources and more info at: www.climatepartnership.dk

70 % by 2030 – electrification plays an important role

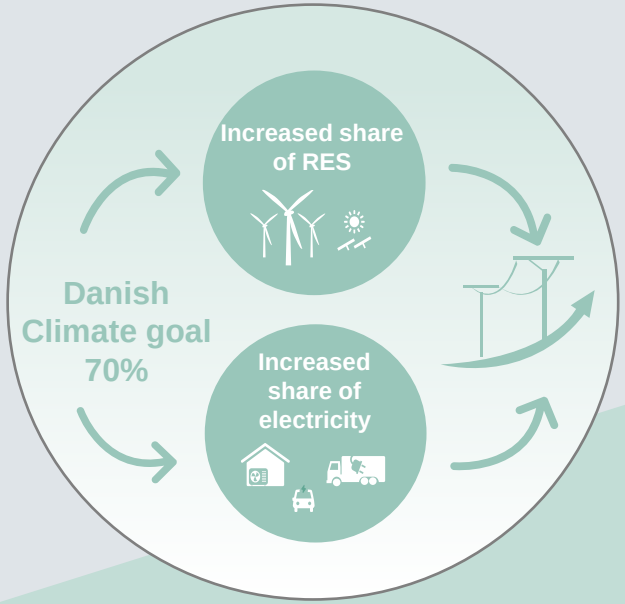
Estimated increase in power demand towards 2030 (TWh)



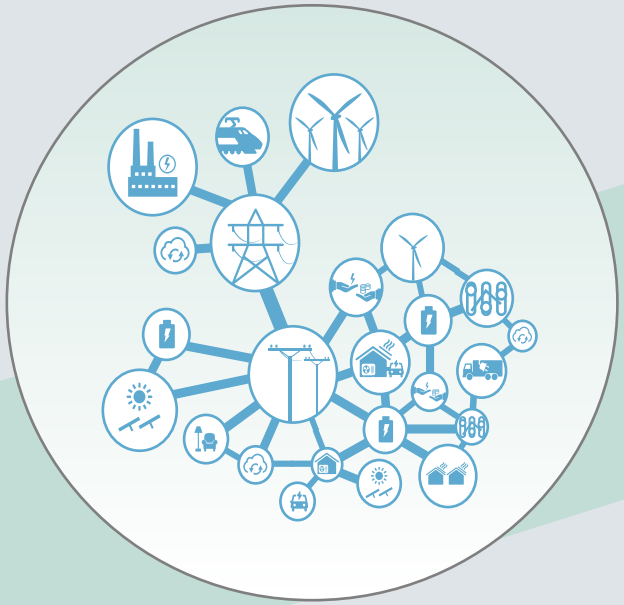
Full report, sources and more info at: www.climatepartnership.dk

A successful transformation with new skills and instruments

From ambitious goals to more RES and more electricity



New types of customers in a decentralized world



New technologies, new skills and new ways of thinking about the energy business needed

- Digitalization of grid planning and operations
- Ability to forecast long term and near real term
- Activation of Flexibility through redesign af tariffs and markets for flexibility
- More specific and complicated contact with customers
- Platforms instead of separated “pipes and tubes”

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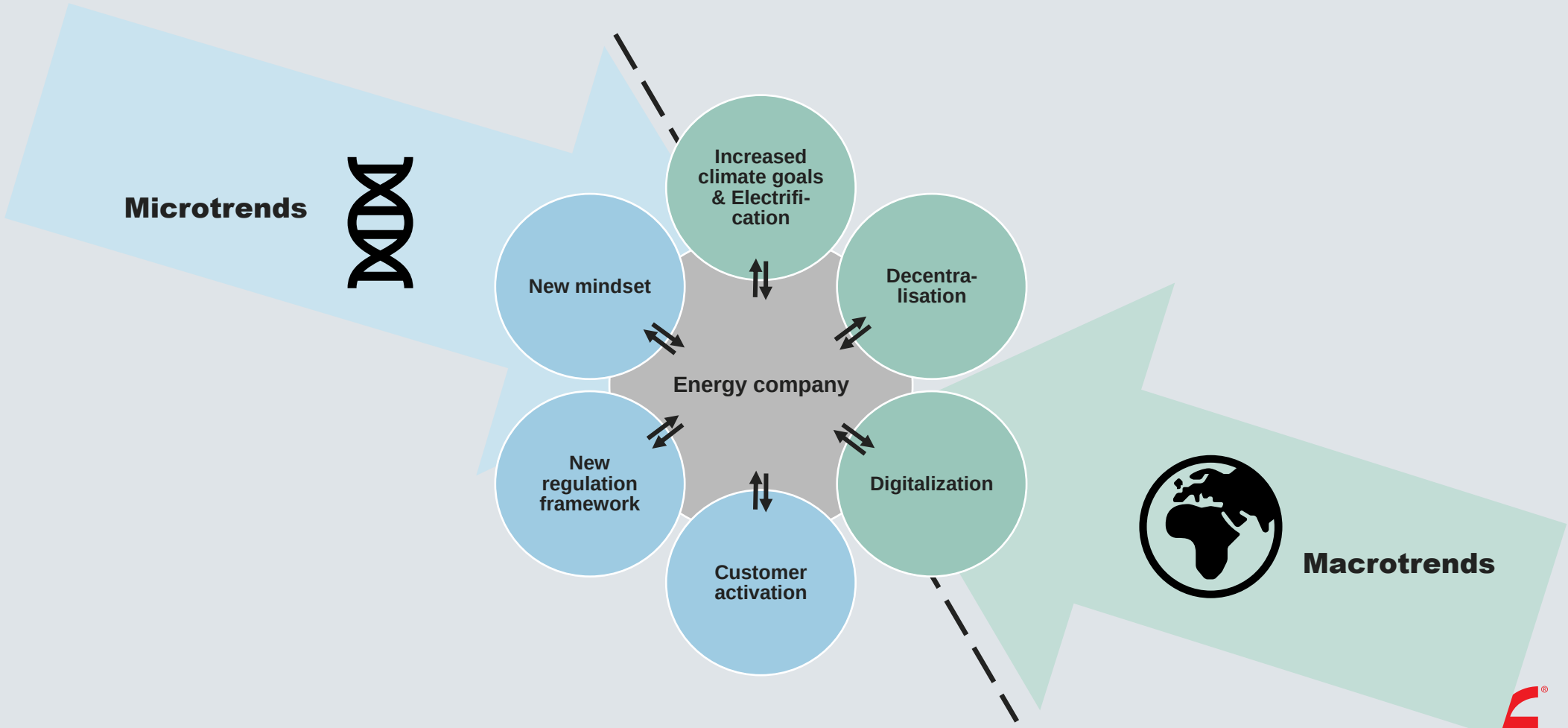
Energy companies surrounded by new trends they need to handle



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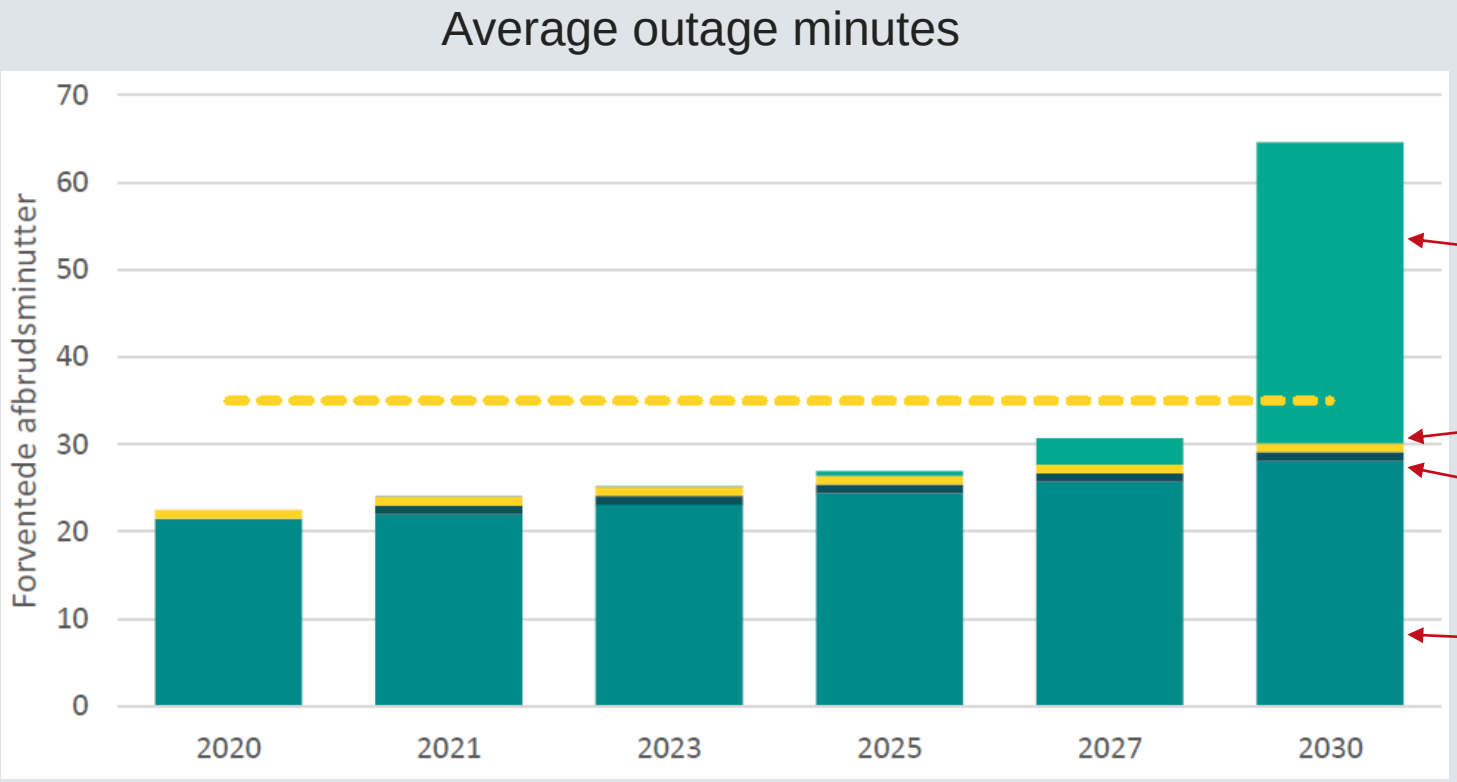
What will the future bring?



Outage due to:

- Generation adequacy
- Robustness
- Grid – Transmission
- Grid - distribution

Source: Energinet (2020) – Danish TSO

- However this scenario does not take into account the political agreement to reduce emissions with 70% by 2030 compared to 1990.

Maintaining a high level of security of supply towards 2030 requires further initiatives

- Increased build-out of renewables
- Development of interconnections
- Utilization of battery or storage capacity
- Less peak load and more demand-side response
- Correct price signals
- Optimal investments in Grid

Catalyzed by digitalization

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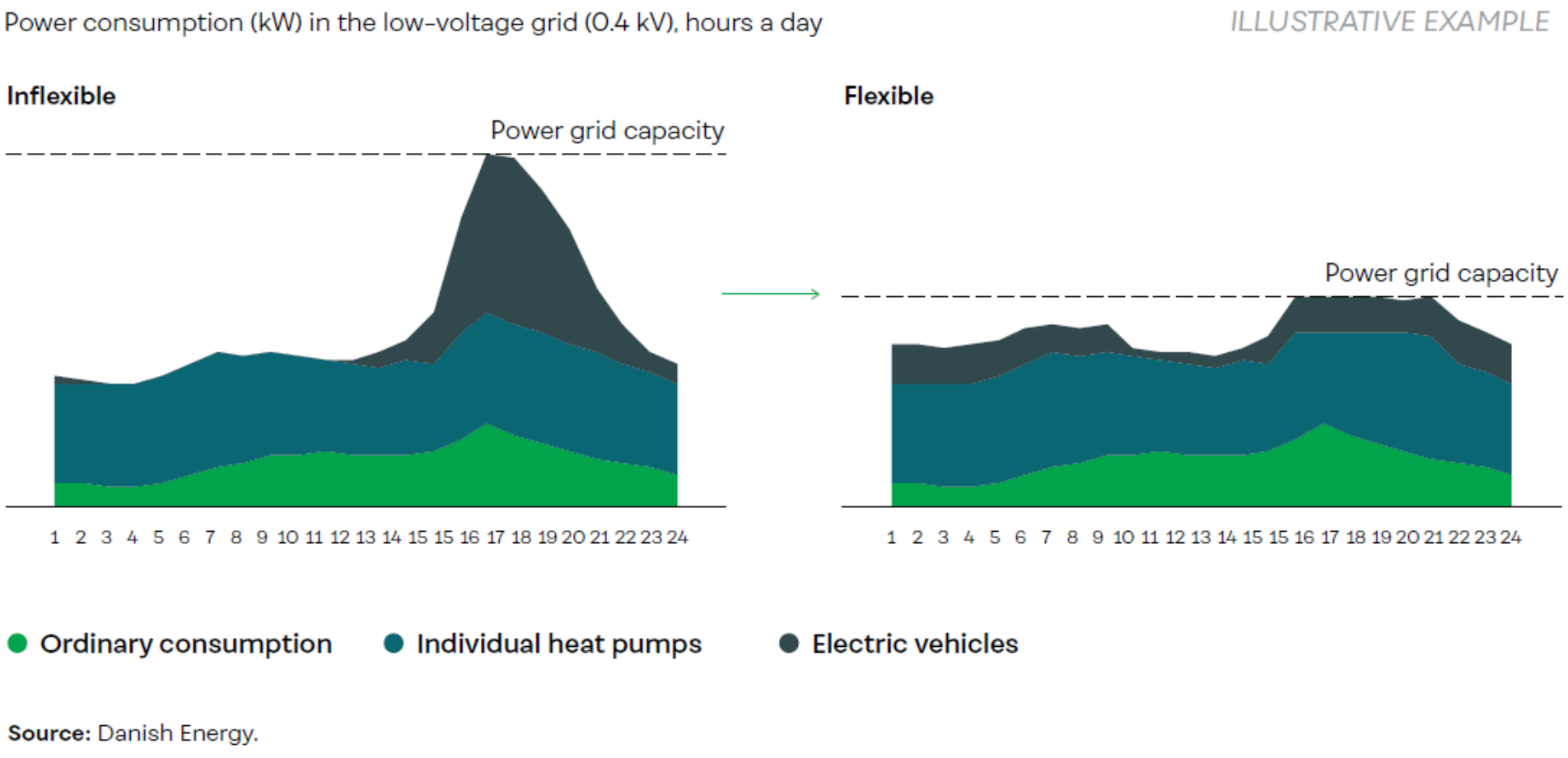
Figure 24. **Examples of smart measures in the power grid**

Source: Danish Energy and Energinet.

Figure 25. **Maximum 24-hour load on the power grid in inflexible and flexible consumption scenarios**



Source: Danish Energy.

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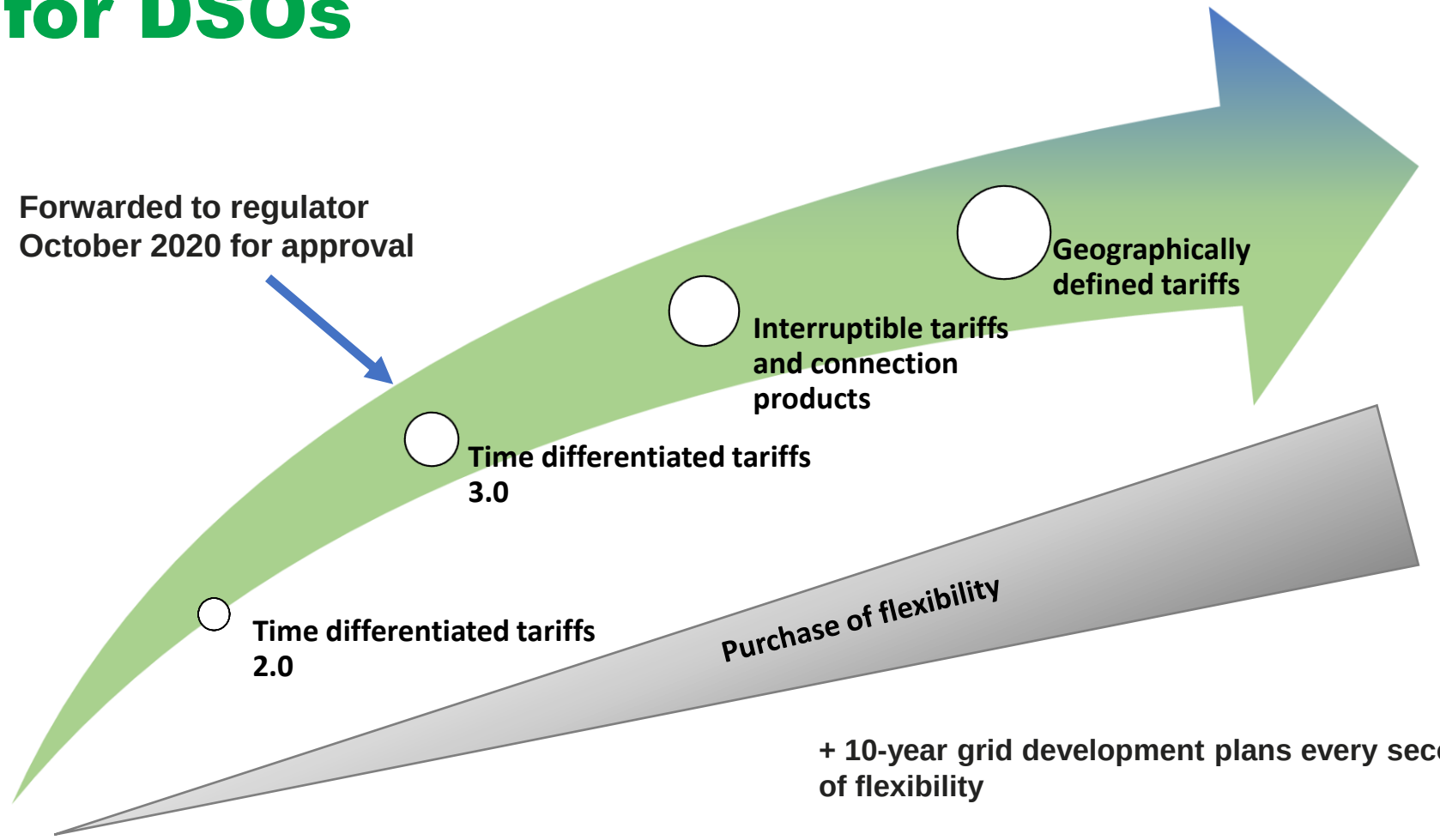
Full report, sources and more info at: www.climatepartnership.dk

New pricing philosophy – pricing toolbox for DSOs



+ 10-year grid development plans every second year (focus on the role of flexibility

+ Tariffs for suppliers of electricity

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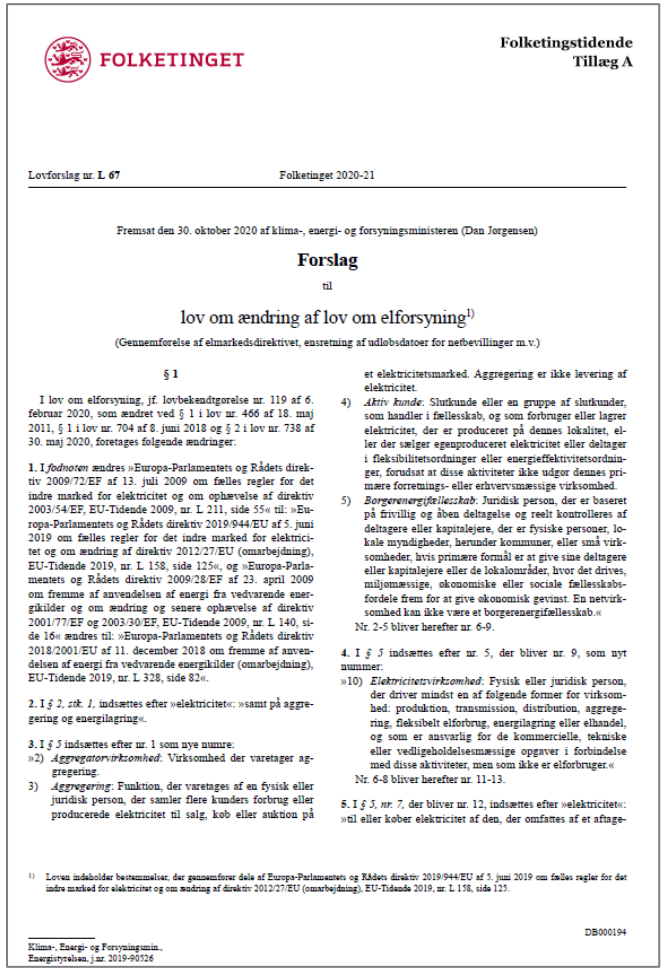
New electricity act in Danish Parliament - with effect from new Year (20/21)



FOLKETINGET

Folketingstidende
Tillæg A

Lovforslag nr. L 67 Folketinget 2020-21

Fremsat den 30. oktober 2020 af klima-, energi- og forsyningsministeren (Dan Jørgensen)

Forslag

til

lov om ændring af lov om elforsyning[1)]

(Gennemførelse af elmarkedsdirektivet, ensretning af udløbsdatoer for netbevillinger m.v.)

§ 1

I lov om elforsyning, jf. lovbekendtgørelse nr. 119 af 6. februar 2020, som ændret ved § 1 i lov nr. 466 af 18. maj 2011, § 1 i lov nr. 704 af 8. juni 2018 og § 2 i lov nr. 738 af 30. maj 2020, foretages følgende ændringer:

1. I *fodnoten* ændres »Europa-Parlamentets og Rådets direktiv 2009/72/EF af 13. juli 2009 om fælles regler for det indre marked for elektricitet og om ophævelse af direktiv 2003/54/EF, EU-Tidende 2009, nr. L 211, side 55« til: »Europa-Parlamentets og Rådets direktiv 2019/944/EU af 5. juni 2019 om fælles regler for det indre marked for elektricitet og om ændring af direktiv 2012/27/EU (omarbejdning), EU-Tidende 2019, nr. L 158, side 125«, og »Europa-Parlamentets og Rådets direktiv 2009/28/EF af 23. april 2009 om fremme af anvendelsen af energi fra vedvarende energikilder og om ændring og senere ophævelse af direktiv 2001/77/EF og 2003/30/EF, EU-Tidende 2009, nr. L 140, side 16« ændres til: »Europa-Parlamentets og Rådets direktiv 2018/2001/EU af 11. december 2018 om fremme af anvendelsen af energi fra vedvarende energikilder (omarbejdning), EU-Tidende 2019, nr. L 328, side 82«.

2. I *§ 2, stk. 1*, indsættes efter »elektricitet«: »samt på aggregering og energilagring«.

3. I *§ 3* indsættes efter nr. 1 som nye numre:
»2) *Aggregatorvirksomhed*: Virksomhed der varetager aggregering.
3) *Aggregering*: Funktion, der varetages af en fysisk eller juridisk person, der samler flere kunders forbrug eller producerede elektricitet til salg, køb eller auktion på et elektricitetsmarked. Aggregering er ikke levering af elektricitet.
4) *Aktiv kunde*: Slutkunde eller en gruppe af slutkunder, som handler i fællesskab, og som forbruger eller lagrer elektricitet, der er produceret på dennes lokalitet, eller der sælger egenproduceret elektricitet eller deltager i fleksibilitetsordninger eller energieffektivitetsordninger, forudsat at disse aktiviteter ikke udgør dennes primære forretnings- eller erhvervsmæssige virksomhed.
5) *Borgerenergifællesskab*: Juridisk person, der er baseret på frivillig og åben deltagelse og reelt kontrolleres af deltagere eller kapitalejere, der er fysiske personer, lokale myndigheder, herunder kommuner, eller små virksomheder, hvis primære formål er at give sine deltagere eller kapitalejere eller de lokalområder, hvor det drives, miljømæssige, økonomiske eller sociale fællesskabsfordele frem for at give økonomisk gevinst. En netvirksomhed kan ikke være et borgerenergifællesskab.«
Nr. 2-5 bliver herefter nr. 6-9.

4. I *§ 3* indsættes efter nr. 5, der bliver nr. 9, som nyt nummer:
»10) *Elektricitetsvirksomhed*: Fysisk eller juridisk person, der driver mindst en af følgende former for virksomhed: produktion, transmission, distribution, aggregering, fleksibelt elforbrug, energilagring eller elhandel, og som er ansvarlig for de kommercielle, tekniske eller vedligeholdelsesmæssige opgaver i forbindelse med disse aktiviteter, men som ikke er elforbruger.«
Nr. 6-8 bliver herefter nr. 11-13.

5. I *§ 5, nr. 7*, der bliver nr. 12, indsættes efter »elektricitet«: »til eller køber elektricitet af den, der omfattes af et aftage-

1) Loven indeholder bestemmelser, der gennemfører dele af Europa-Parlamentets og Rådets direktiv 2019/944/EU af 5. juni 2019 om fælles regler for det indre marked for elektricitet og om ændring af direktiv 2012/27/EU (omarbejdning), EU-Tidende 2019, nr. L 158, side 125.

DB000194

Klima-, Energi- og Forsyningsmin.,
Energistyrelsen, j.nr. 2019-90526

Tariffs seen as an important instrument to activate Flexibility

Non-market based instruments can be utilized if there is no market for flexibility or if delimited local bottlenecks are addressed

Market based instruments should be pursued. Method to be developed by the DSOs

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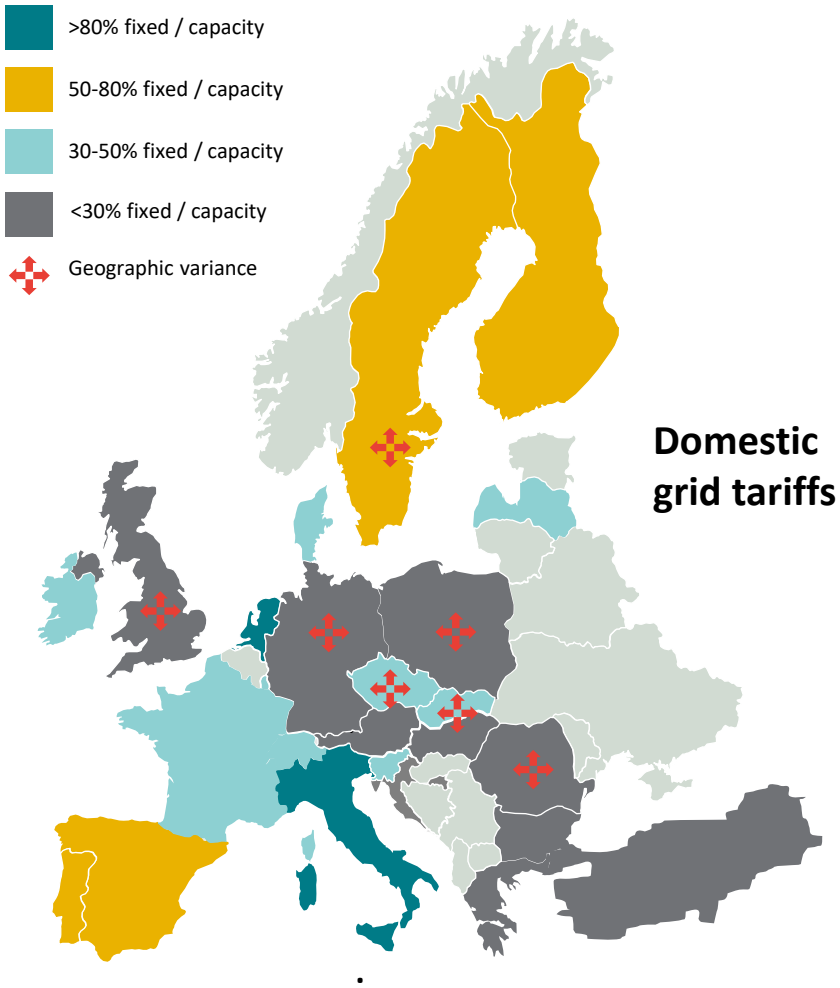
European perspective

Domestic Customers	• Increasingly "Time of Use" tariffs being implemented
Non Domestic customers	• Wider range of tariffs and more capacity components along with charges for reactive power.
Geographic differentiation + interruption	• Several countries are using geographical differentiation of the tariffs plus Interruptible tariffs



Domestic grid tariffs

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Geographically defined tariffs to reward local simultaneity between local feed in of electricity and local load

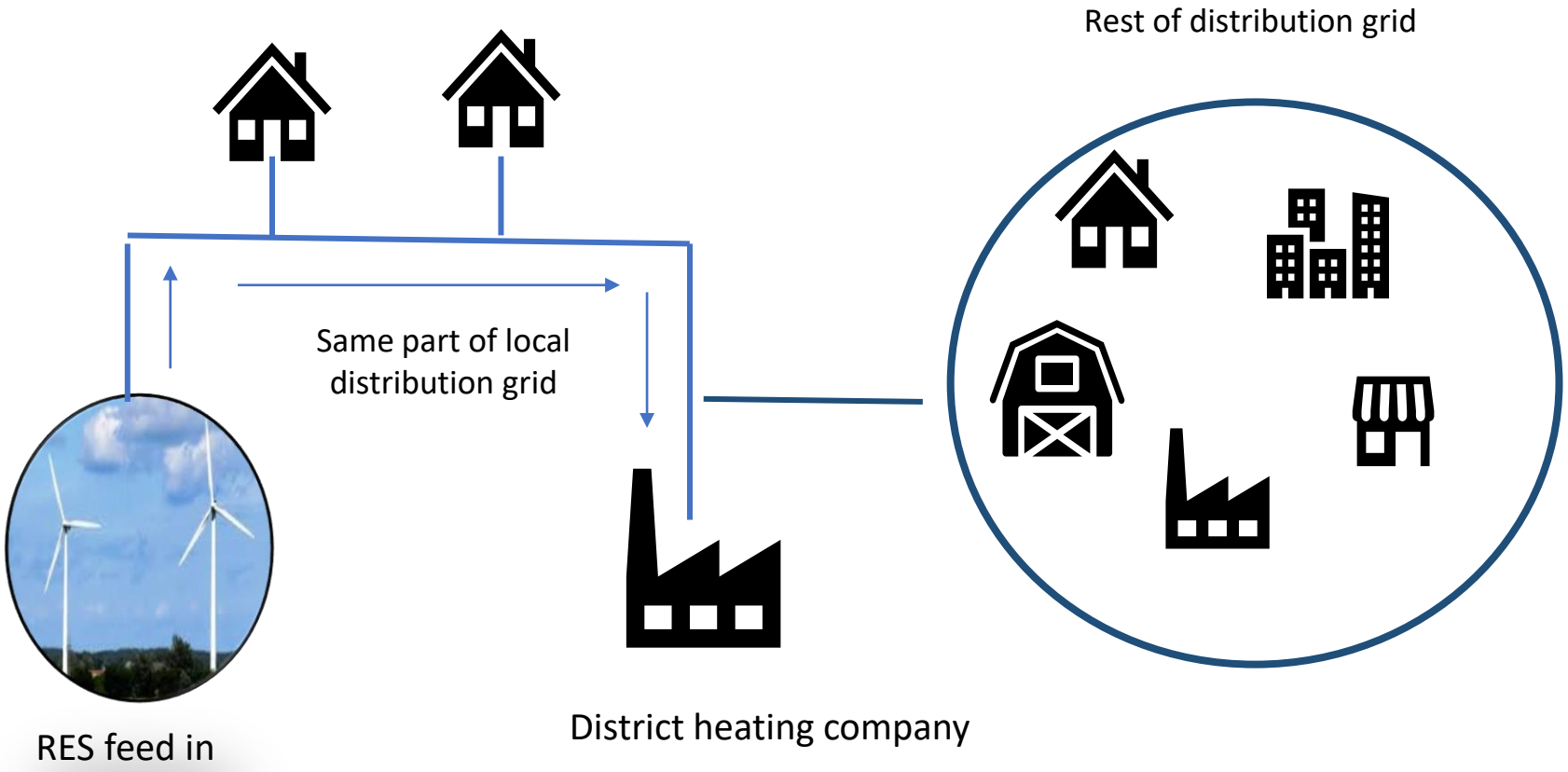

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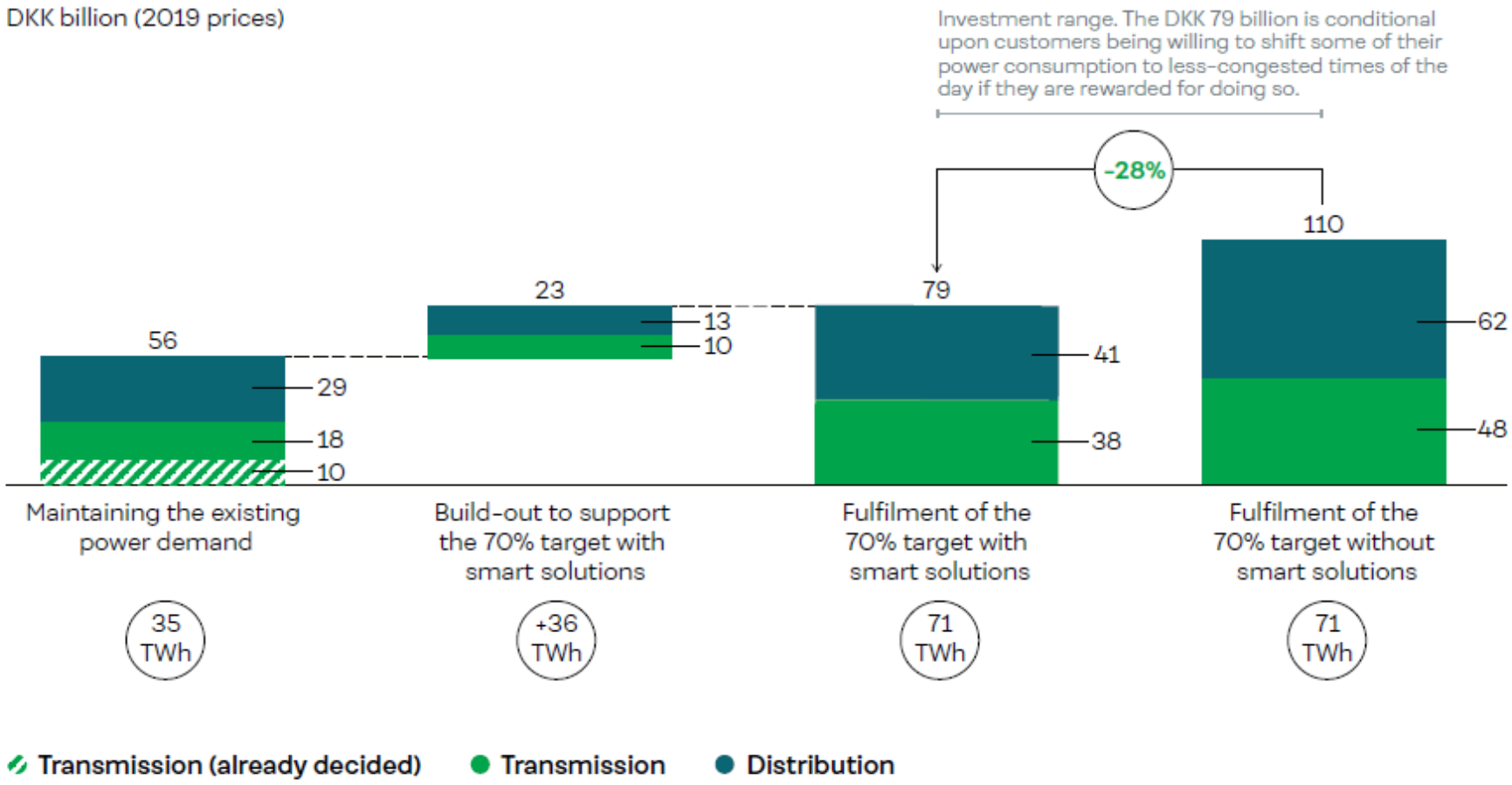
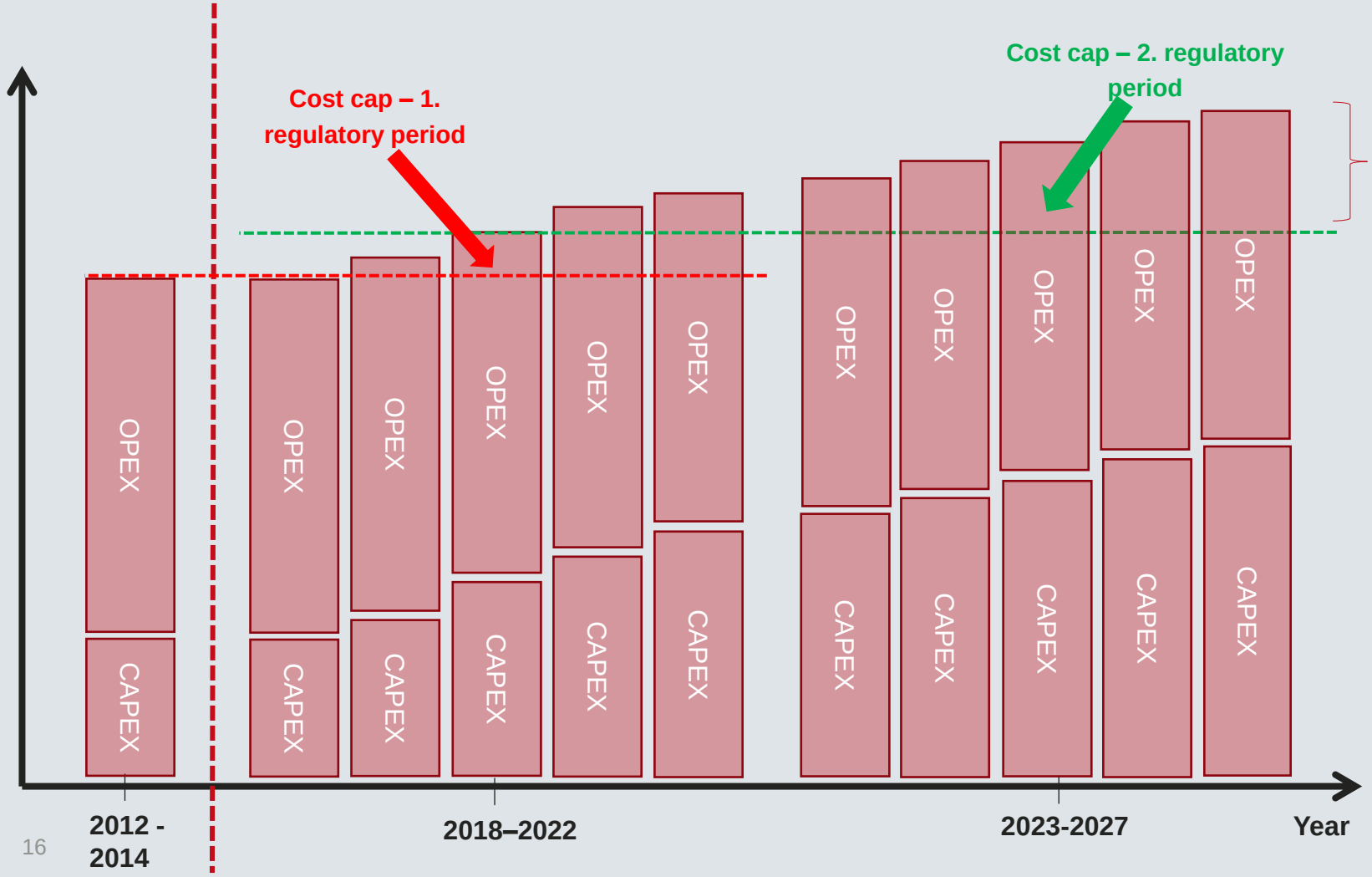
Figure 22. **Investments in power grid infrastructure towards 2030**



Note: Investments in transmission already decided are budget figures at the beginning of 2020 and mainly comprise functionality upgrades and costs for a new interconnection to the UK. Other investments in maintaining the existing demand for power are reinvestments in the period 2019-2030. Transmission figures for investments not yet decided represent the mean of large intervals and are exclusive of investments in additional interconnections, a potential energy island and cabling to shore. For the transmission grid, the illustrated effect of a non-smart transformation is an example. Calculations for the distribution grid are exclusive of investments to support the 3 TWh increase in consumption in 2019-2030 from agriculture and the private service sector (~5% of total consumption from the distribution grid in 2030).
Source: Calculations made by Danish Energy and Energinet based on the RUS Plan 2018.

Present allowed revenue-cap for DSOs - not designed for growth and increased investments + not designed for "flexibility"

... which is problematic in a time of rising grid investments due to electrification



Deficit

The revenue cap is based on historic costs – that is, the regulations is backward looking.

However, we need to look forward. Electrification is an important factor in the green transition and requires increasing investments in the grid. This can be problematic with the regulation we have today.

Same situation in other EU countries

What about the DSOs in Europe ? - more about this soon

New study from Eurelectric

Public next year

eurelectric

Power Distribution Grid: Critical enabler of the European Green Deal
Final Deliverable