



The objective is to develop a fact based report that is supported by key stakeholders and feeds in directly to EU decision making

Key deliverables

- A set of **plausible and visionary emissions pathways with an 80% reduction** across the EU-27 below 1990 levels by 2050
- Deep dive **on the decarbonization of the power sector**
- Implications on **strategic options** for the EU
- A related **set of policy options** highlighting potential decisions for the next 5 years

Overarching objective

Develop a fact based, **ECF branded report** to support the European Commission and Member State agencies to chart an energy strategy for 2010-2014 consistent with the EU's 2050 climate and energy security commitments



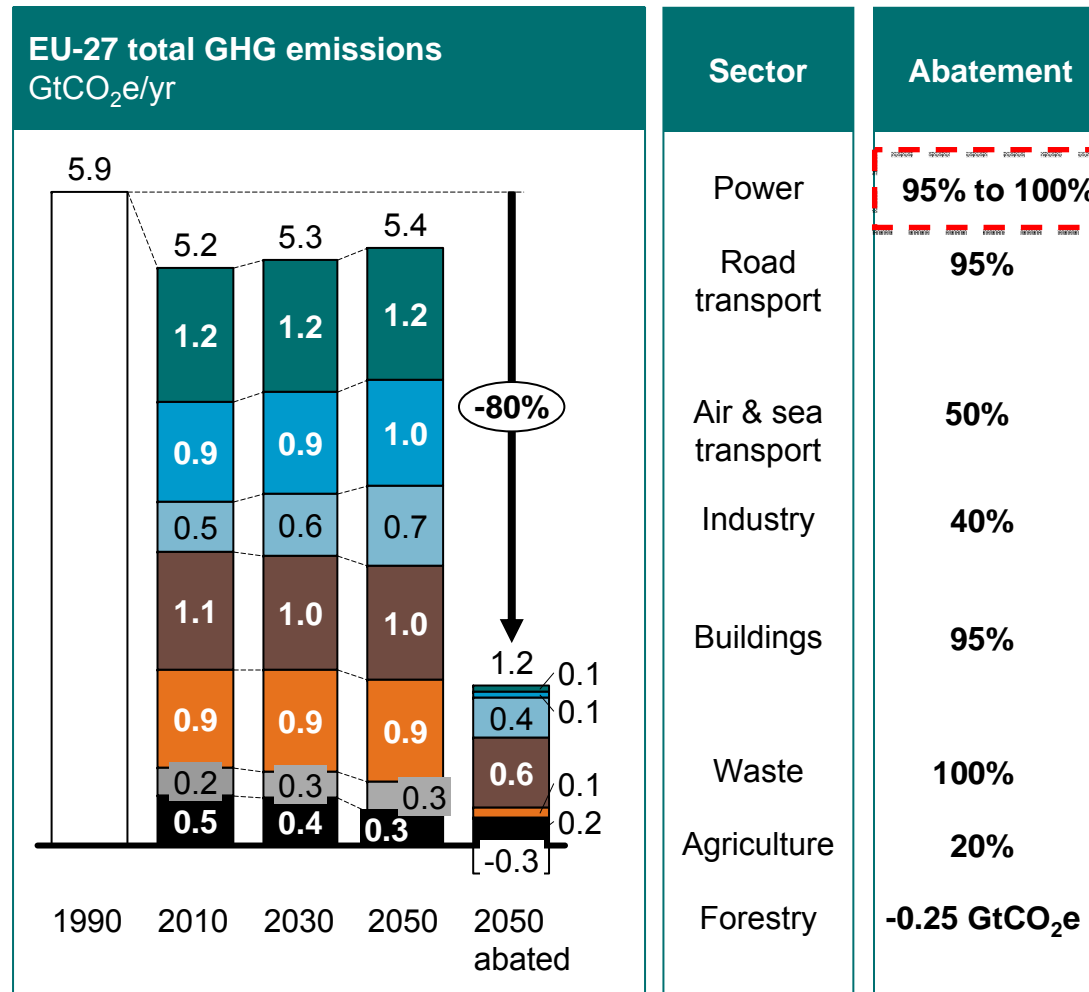
Political agenda

Post-Copenhagen **political agenda** to inform the new Commission & parliament:

- **Summer 2010 (tbc)**
Commission to publish its communication on the 2050 Energy Vision
- **Summer 2010**
3rd Strategic Energy Review
- **Late 2010**
Heads of State endorsement at European Council



An 80% GHG reduction could be achieved by maximum abatement within and across sectors





The 4 following 2050 decarbonized power mixes are the basis of the power deep-dive

Focus of the work

Pathways

80% RES
10% Nuclear
10% CCS

Renewable energy mix based on key limitations¹

60% RES
20% Nuclear
20% CCS

Renewable energy mix based on key limitations¹

40% RES
30% Nuclear
30% CCS

High nuclear (sensitivity only)
Even split nuclear/CCS
High CCS (sensitivity only)

100% RES

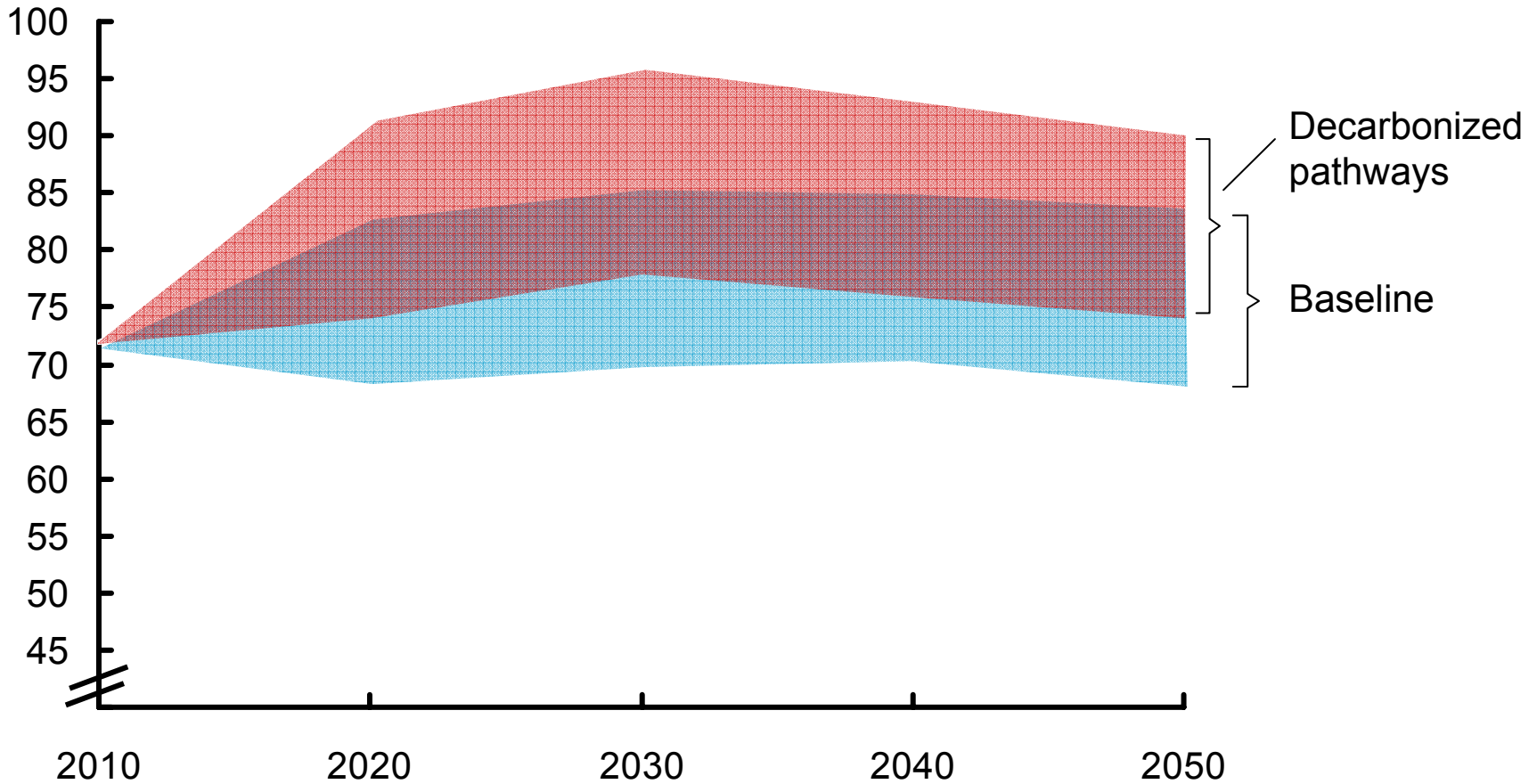
Pathway dominated by wind/solar
Pathway including breakthrough technologies (e.g., EGS) and CSP from Africa

¹ Key constraints include such as maximum deployment per country, self sufficiency, etc.



The average COE is ~15 to 25% higher in the decarbonized pathways, but the uncertainty is significant

Likely ranges over time in the cost of electricity of new builds¹
EUR/MWh (real terms)



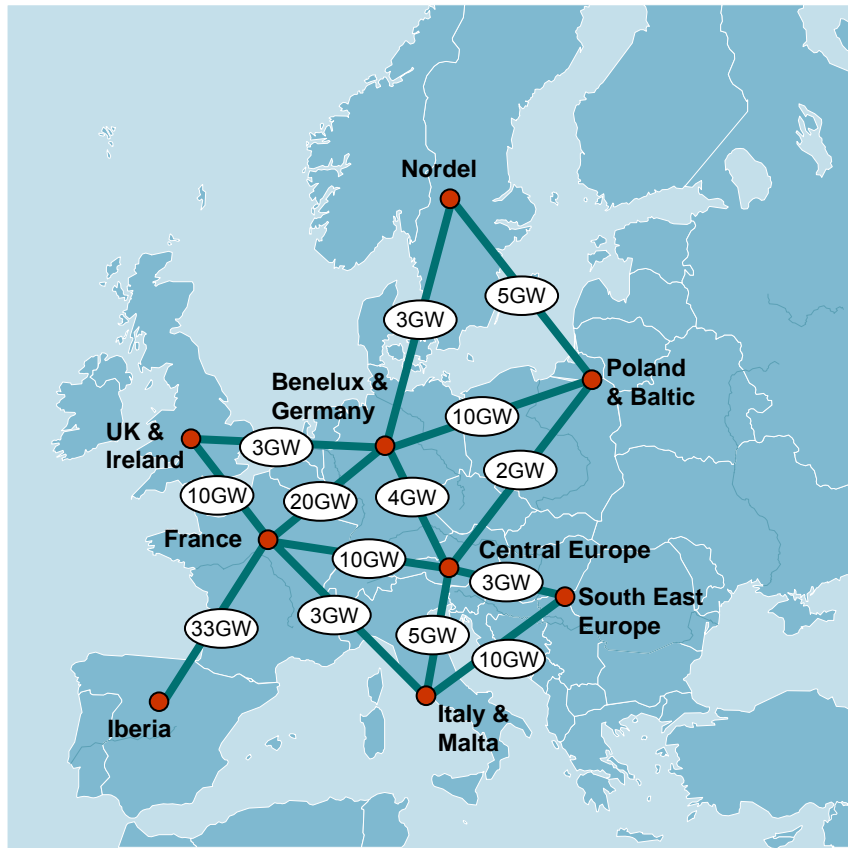
NOTE This is excluding a price for CO₂. A price of ~€50 per tCO₂e would be equivalent to the range shown in the baseline

¹ Based on a WACC of 7% (real after tax), computed by technology and weighted across technologies based on their production; including grid



Transmission requirements are very significant, particularly between France and Iberia

60% RES, 20% DSM



● Centre of gravity

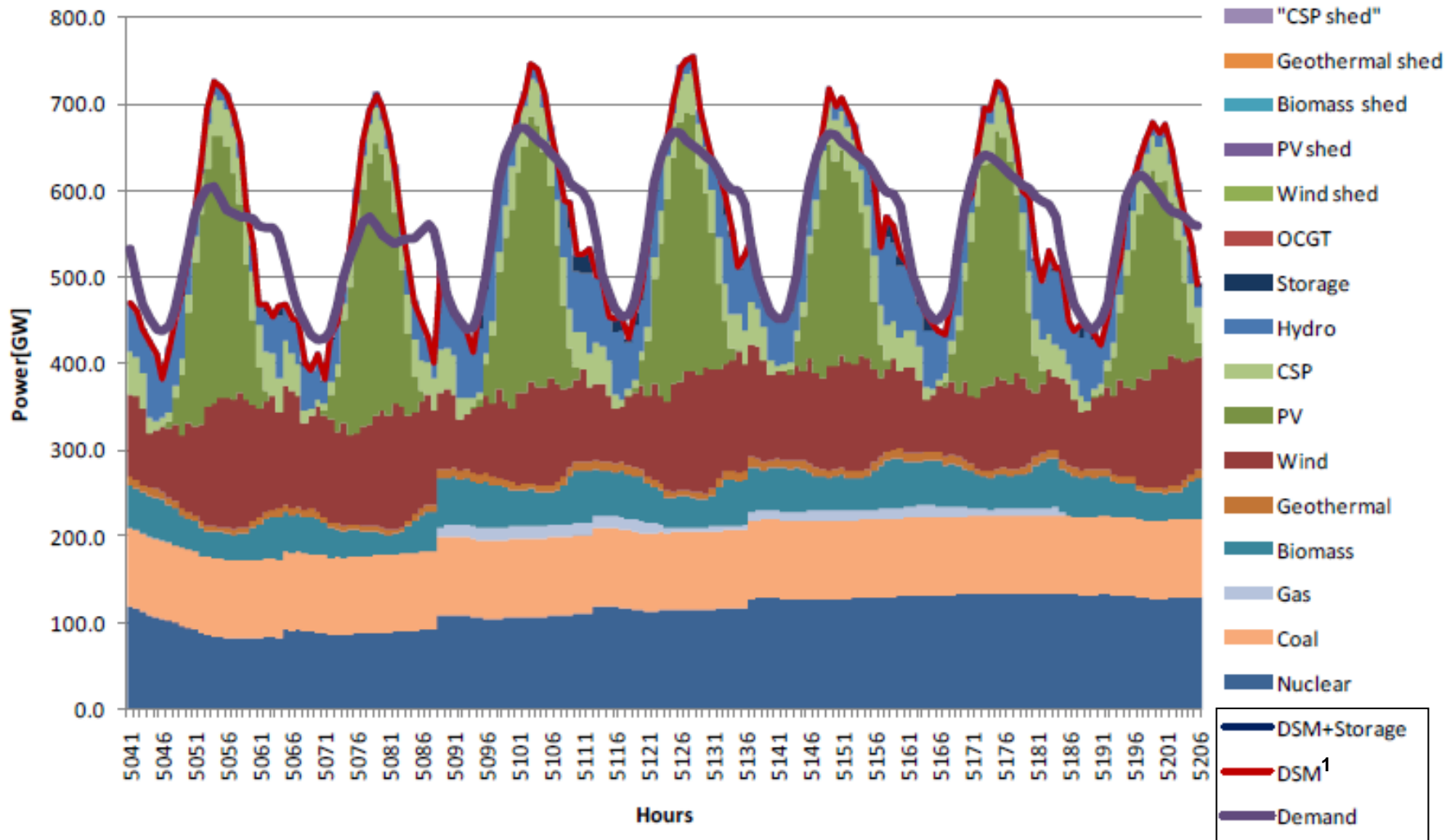
Interconnection	Capacity additional (existing) [GW]	Annual utilization [%]
UK&Ireland-France	8 (2)	75
UK&Ireland-Nordel	0 (0)	0
UK&Ireland-Benelux&Germany	3 (0)	83
France-Iberia	32 (1)	83
France-Benelux&Germany	14 (6)	78
France-Central-Europe	7 (3)	93
France-Italy&Malta	0 (3)	92
Nordel-Benelux&Germany	0 (3)	75
Nordel-Poland&Baltic	4 (1)	60
Benelux&Germany-Central-EU	0 (4)	74
Benelux&Germany-Poland&Baltic	9 (1)	81
Central-Europe-Poland &Baltic	0 (2)	77
Central-South East EU	1 (2)	80
Central-Europe-Italy	0 (5)	58
South East EU-Italy	9 (1)	79
Total	87 (34)	



Load management helps to follow peak supply, maximizing the use of renewables

60% RES, 20% DSM

WEEK 32 – SUNNY WEEK



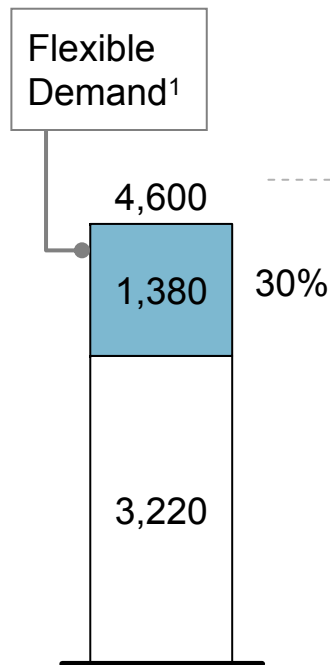
1 The graph shows how the original demand line (purple) is shifted to a higher level (red line) by DSM to capture the higher PV production



Energy flexibility up to 30% comes mainly from heat pumps and electric vehicles

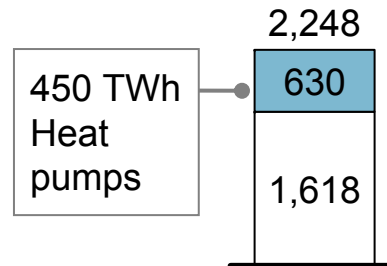
TWh per year

Total electricity demand

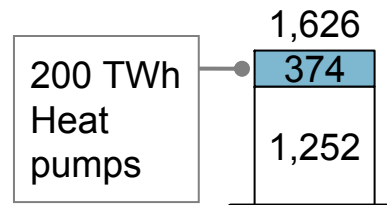


Breakdown by sector

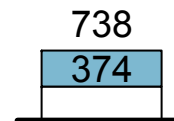
Buildings



Industry



EVs



Assumptions

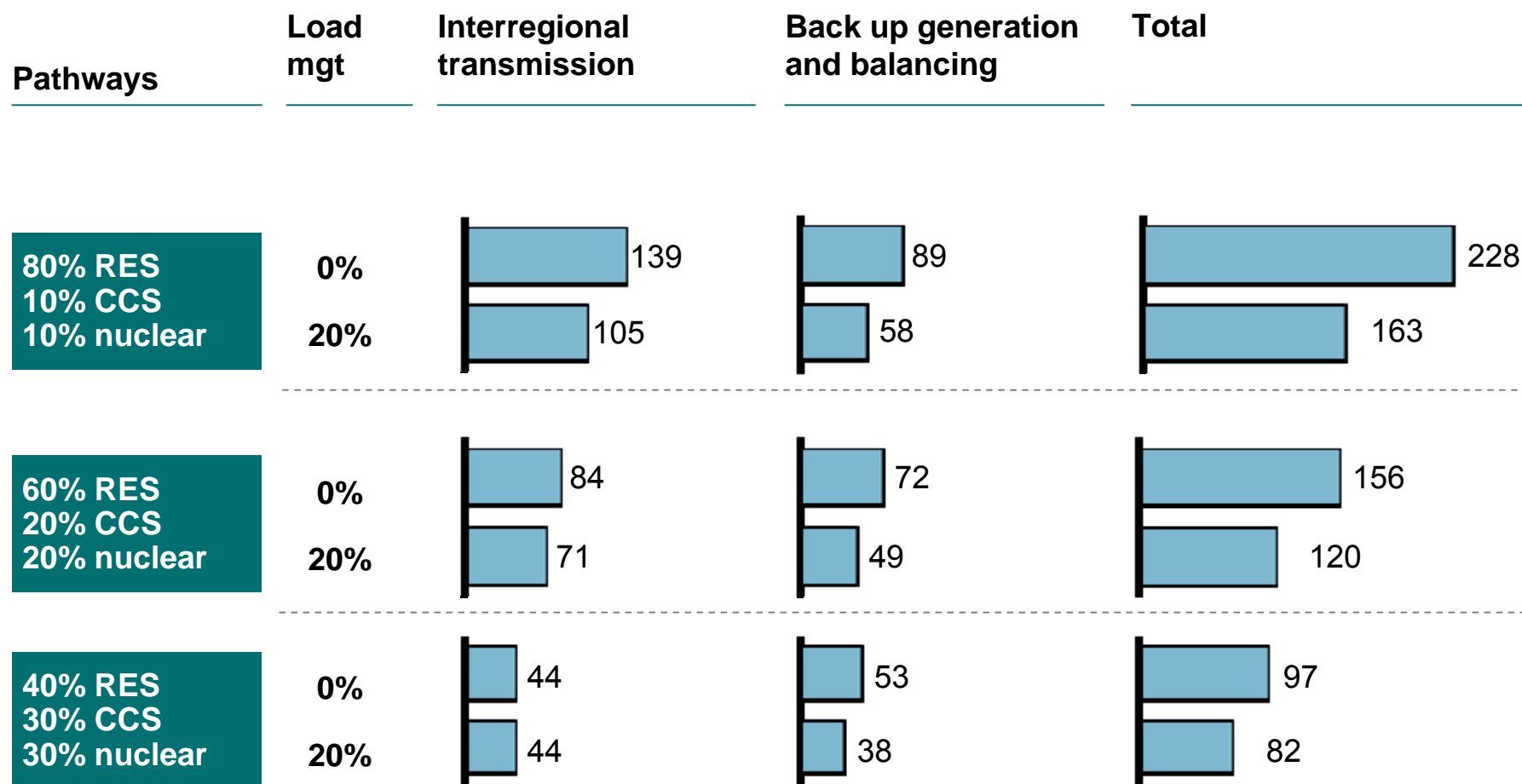
- 80% of heat pumps fully flexible
- 15% of other demand flexible (e.g., washing machines, fridges, freezers)
- 80% of heat pumps fully flexible
- 15% of other demand flexible (e.g., heating and air conditioning before heat pumps)
- 50% of energy demand for cars can be supplied flexible over the day (on average, every car travels approx. 1 h/day, charging takes approx. 2 hours)

¹ "Flexible demand": This portion of the demand is assumed to be fully flexible within 24 hours (over this time, total demand is the same); for simplicity it is assumed that relative consumption between sectors is stable at all times



Lower capex investments are needed in a decarbonized power sector with load management

Cumulative capex from 2010 to 2050, € billion (real terms)



Excluding distribution transmission capex