GREATER MANCHESTER 2038

A DECARBONIZATION PATHWAY

JULY 2020

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GREATER MANCHESTER DECARBONISATION PATHWAY TO 2038

Three tracks fuelled by **seven priority actions** for the Greater Manchester Combined Authority to start **transforming the energy demand and supply** now

Kickstarting the transition

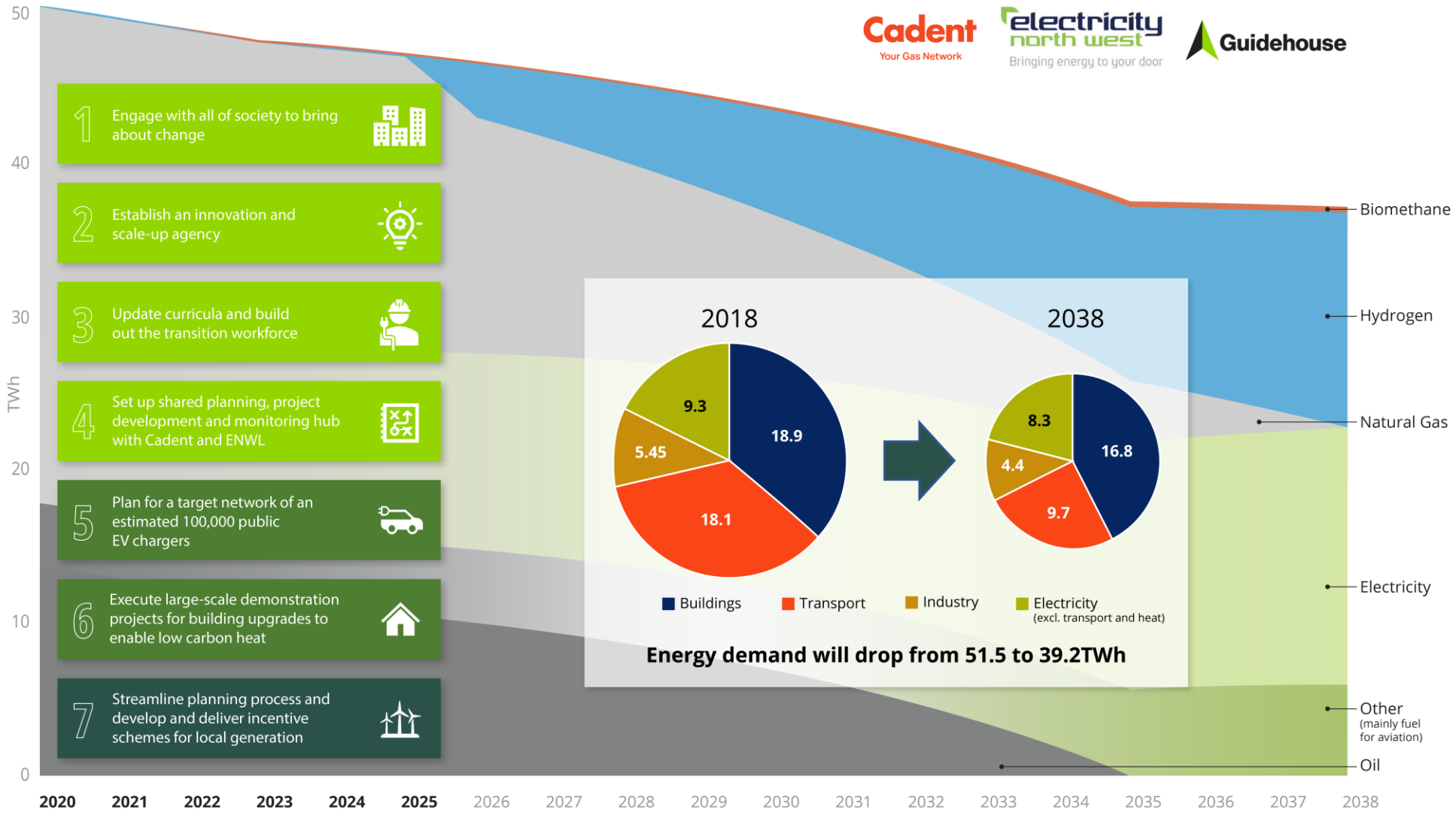
Create a shared sense of purpose, policy framework, detailed planning and upscaling abilities to fulfil the ambition.

Transforming the demand base

Decarbonise across all sectors by switching to hydrogen, green electricity and biofuels.

Securing low-carbon supply

Meet low-carbon demand through more local generation and distribution of clean energy.



INTRODUCTION AND CONTEXT

Strong Ambition

- Greater Manchester Combined Authority (GMCA) has set itself an ambitious target of becoming fully decarbonised by 2038, 12 years ahead of the national target of 2050.
- By creating a sustainable, resilient and equitable urban region for its residents and businesses it will position itself as the innovation lighthouse and economic powerhouse of the North-West.

Need for Action

- 2038 is only 18 years away. Reaching its target will require GMCA to trigger monumental changes across all sections of society.
- Triggering these changes needs to start now
- Given the limited timeframe, there is no time to hit Undo and Redo . GMCA needs to get it right the first time.

Solid Foundation

- GMCA, as the governing body for the 10 districts making up Greater Manchester (GM), has already invested substantially in research and strategy development for meeting its carbon-neutrality goal.
- However, these reports originated in different years, are underpinned by different data sets and span different time periods.
- This makes creating a coherent, actionable view on decarbonisation non-trivial.

Role of Grid Companies

- Cadent Gas and ENWL are operators of critical energy infrastructure and knowledge partners for GMCA.
- In this capacity, they wish to contribute to GMCA's decarbonisation ambitions.
- A common view on how to reach carbon-neutrality in 2038 facilitates taking timely and effective steps in the energy transition

Comprehensive Pathway

- Cadent and ENWL have engaged with Navigant, a Guidehouse company, to develop a balanced scenario and decarbonisation pathway to 2038 for Greater Manchester, based on Navigant's work leading to ENA's *Pathways to Net Zero* report.
- This presentation acts as a companion to the full *Decarbonisation Pathway for Greater Manchester* report. It presents the scenario and pathway actions and summarises the underpinning analysis.

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ENERGY DEMAND

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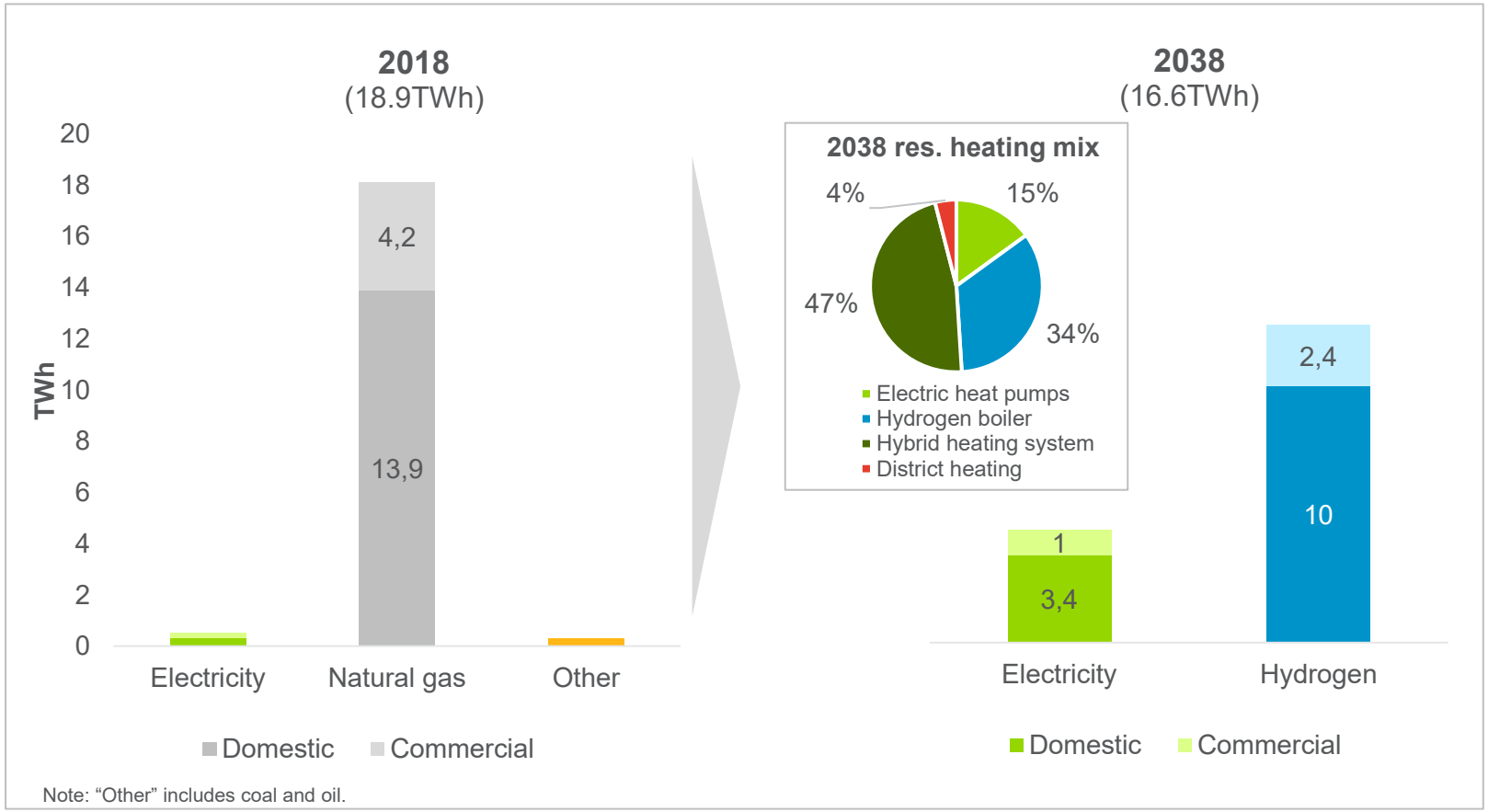
BUILDINGS – HEATING DEMAND DECLINES FROM 18.9TWH TO 16.8TWH IN 2038

By 2038, we expect hybrid heating system and hydrogen boilers to be the dominant heating technologies for building. All-electric heat pumps and district heating will play a role as well.



Note: "Other" includes coal and oil.

Sector pathway actions

2021-2025
D1: Enforce mandatory building codes
D2: Incentivize and promote H2-ready devices
D3: Scale up building insulation and upgrading trials
D4: Pilot BEMS for in-home optimisation
2026-2030
D5: Enforce all-electric ready for new buildings
D6: Mainstream building retrofits for low-carbon heat
D7: Start deployment of B2G and V2G
2031-2035
D8: Expand retrofitting of buildings for low-carbon heat
D9: Start converting H2-ready devices to H2
D10: Expand the use of demand side technologies
2036-2038
D11: Complete upgrading of building stock
D12: Continue switching devices to 100% H2

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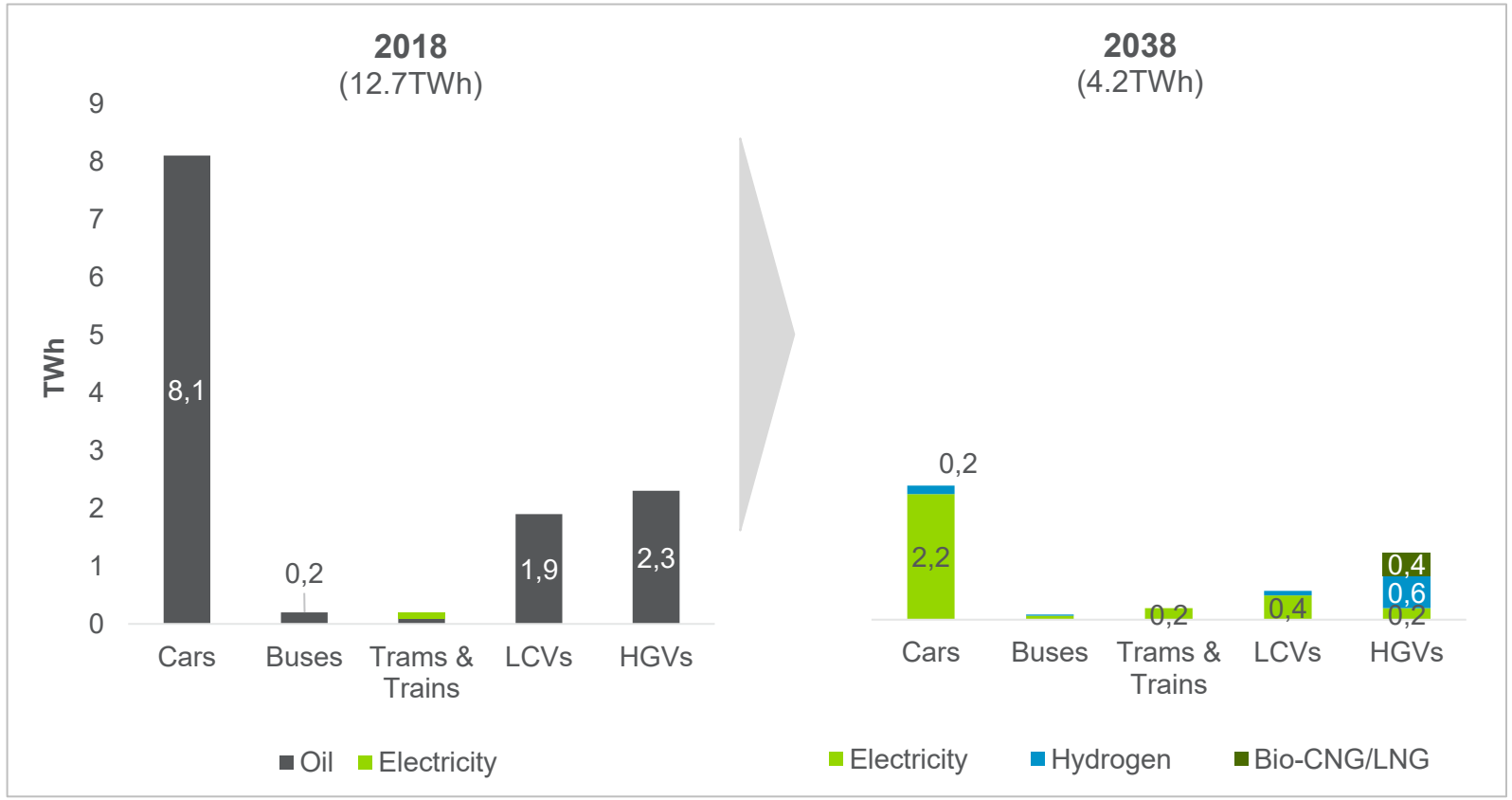
ENERGY DEMAND

TRANSPORT – DEMAND FALLS FROM 12.7TWH IN 2018 TO 4.2TWH IN 2038 *)

High fuel efficiency of zero-emission transport causes significant drop in energy demand. 12.6TWh of oil demand is expected to be replaced by 3TWh of electricity, 0.8TWh of hydrogen and 0.4TWh of bio-CNG/LNG in 2038.



Sector pathway actions

2021-2025
D13: Implement the Bee Network
D14: Create incentives to switch buses to BEV
D15: Coordinate development of bus charging
D16: Plan for network of 100K public EV chargers
D17: Create blueprint for HGV refuelling
2026-2030
D18: Stimulate shift to sustainable public transport
D19: Expand the EV charging network
D20: Decarbonise at least 50% of bus fleet
2031-2035
D21: Introduce a scrappage scheme ICE vehicles
D22: Complete public EV charging network
D23: Ensure whole bus fleet is decarbonised
2036-2038
D24: Apply the zero-emission zone to HGVs

*) Excludes 5.5TWh of demand from the aviation sector

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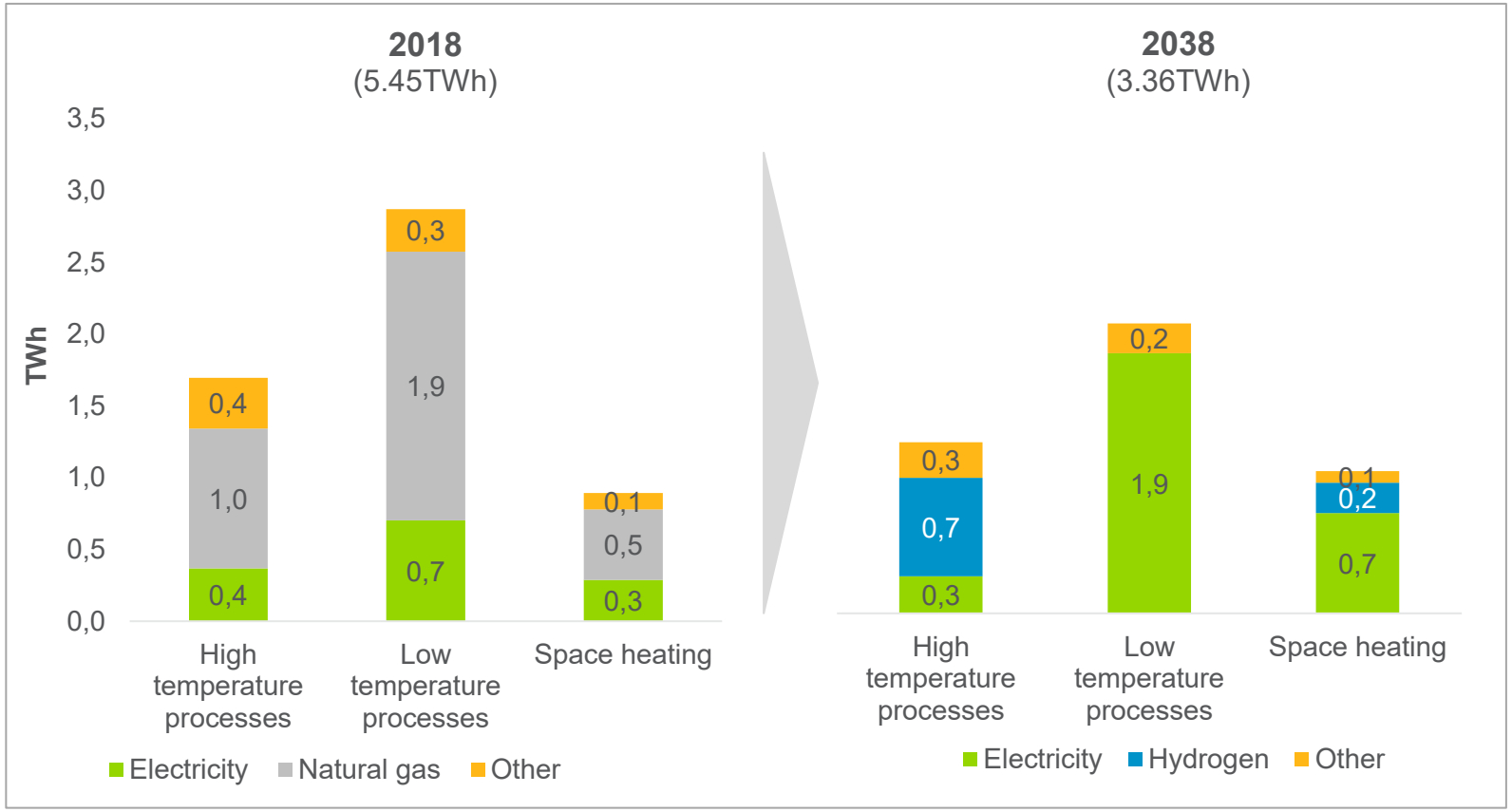
INDUSTRY – HEAT DEMAND FALLS FROM 5.45TWH IN 2018 TO 4.36TWH IN 2038

As industry decarbonises, the share of electricity will increase from 26% to 66% over this timeframe. Hydrogen is expected to provide 21% and other fuels, like biomass, 13%.

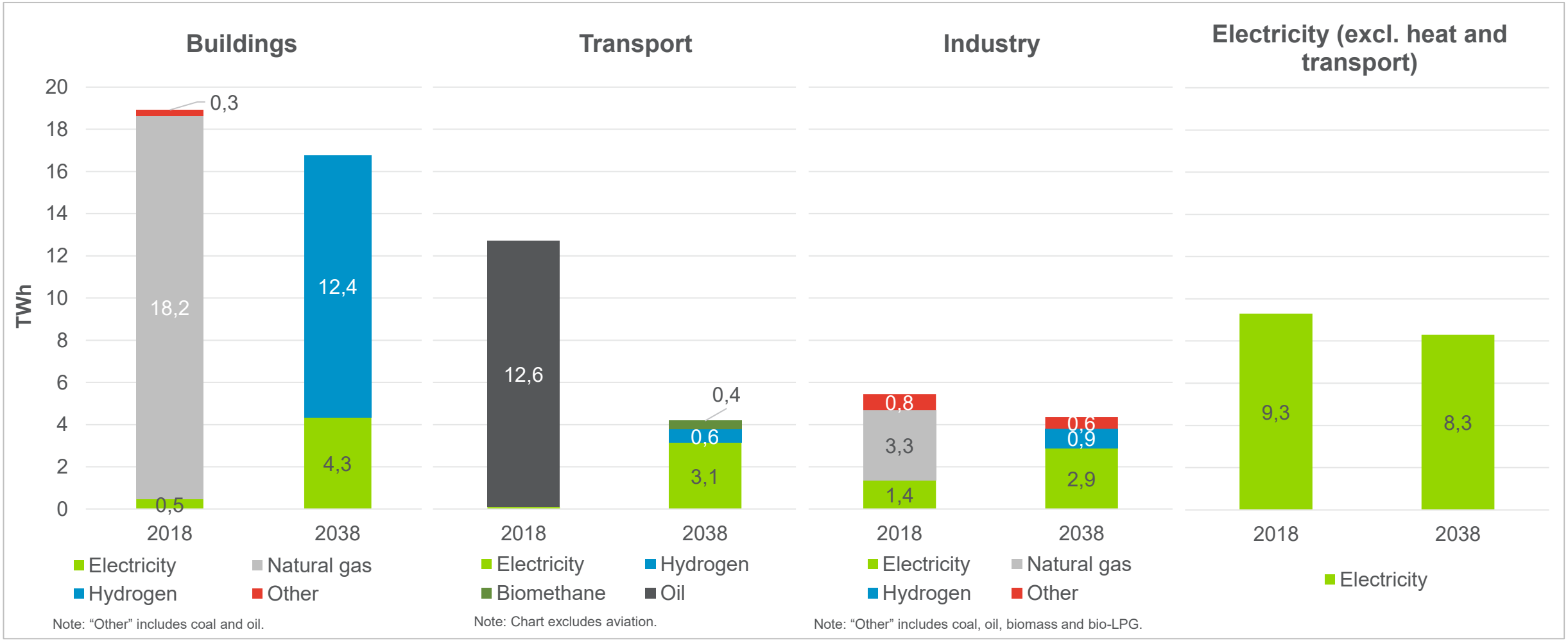


Sector pathway actions

2021-2025
D25: Create incentives for EE in industry
D26: Select decarbonisation options for industry
D27: Start electrification of industry
2026-2030
D28: Supply industry with H2 from HyNet
D29: Make industry H2-ready
D30: Continue electrification in industry
2031-2035
D31: Accelerate H2 switching in industry
D32: Continue industrial equipement replacement
2036-2038
D33: Capture remaining emissions from industry

Note: "Other" includes coal, oil, biomass and bio-LPG.

EVOLUTION OF DEMAND - OVERVIEW



Note: "Other" includes coal and oil.

Note: Chart excludes aviation.

Note: "Other" includes coal, oil, biomass and bio-LPG.

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BALANCED SCENARIO

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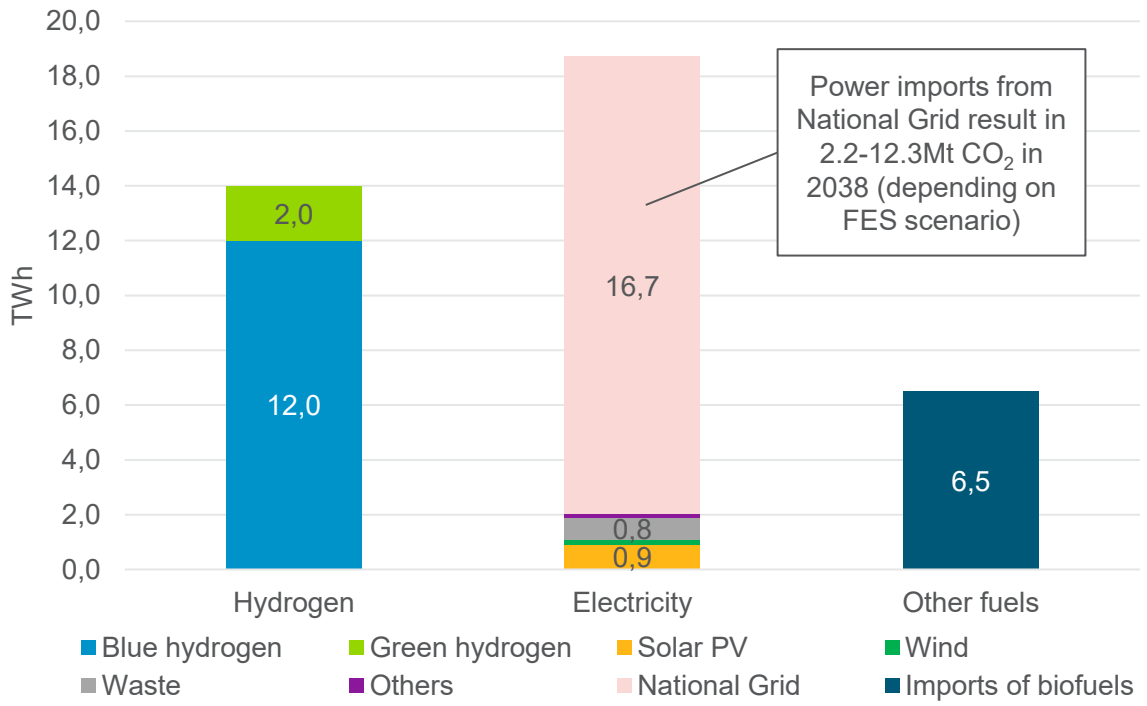
BALANCED SCENARIO

ENERGY SUPPLY IN GREATER MANCHESTER

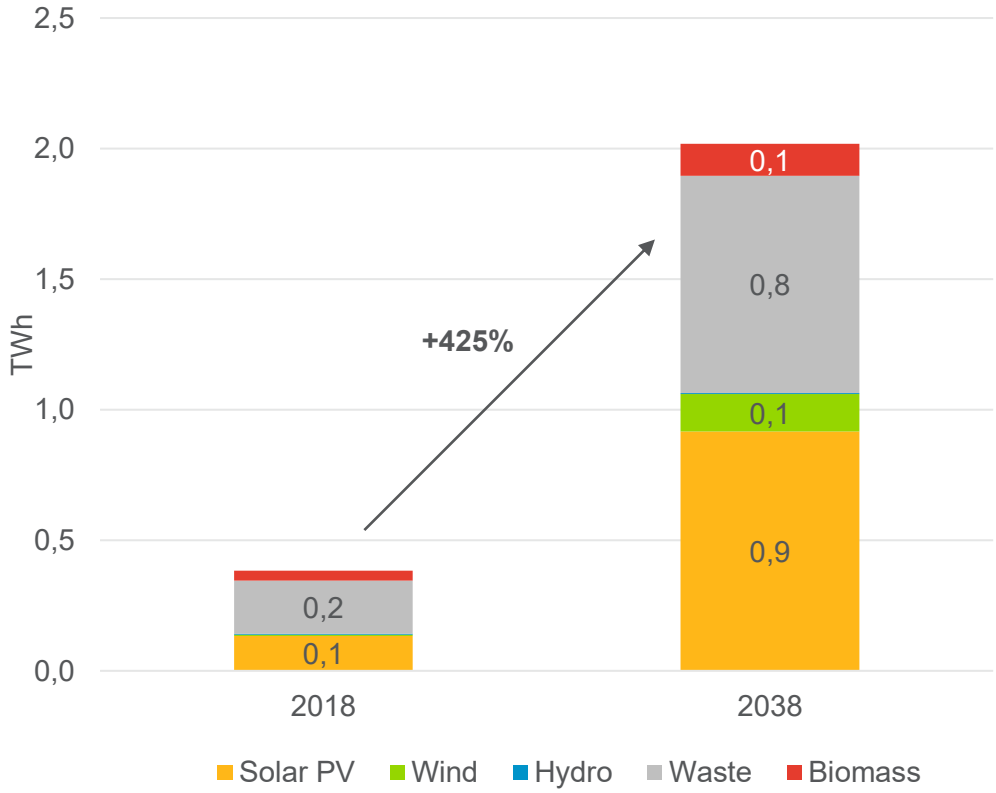
Hydrogen from HyNet and electricity form the backbone of GM's future energy supply. Locally produced renewable energy accounts for 10% of electricity demand. The remainder is imported from the decarbonising national grid.

2038 Greater Manchester Energy Supply



Note: An estimated 7.2TWh of National Grid electricity can be generated at Carrington station located within GM. All other forms of electricity are produced locally.

Evolution of renewable electricity generation



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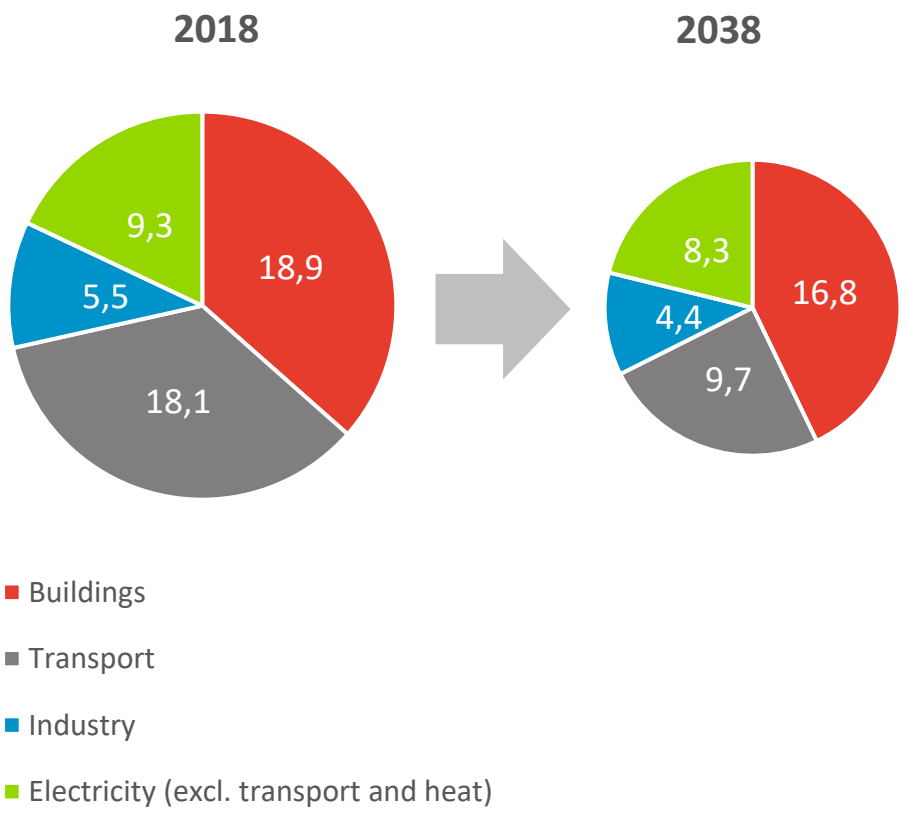
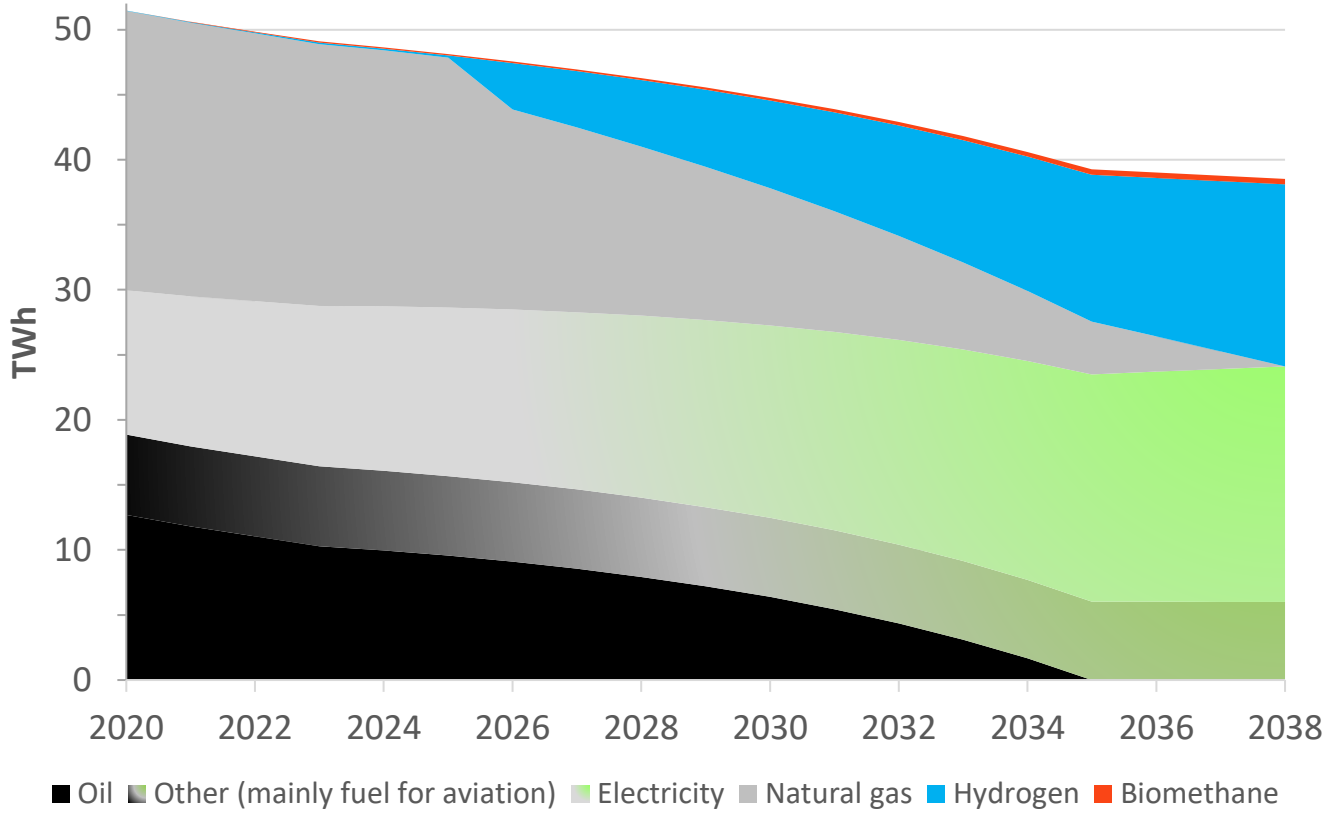
BALANCED SCENARIO

EVOLUTION OF ENERGY DEMAND AND SUPPLY

GM energy demand, by sector



GM energy supply



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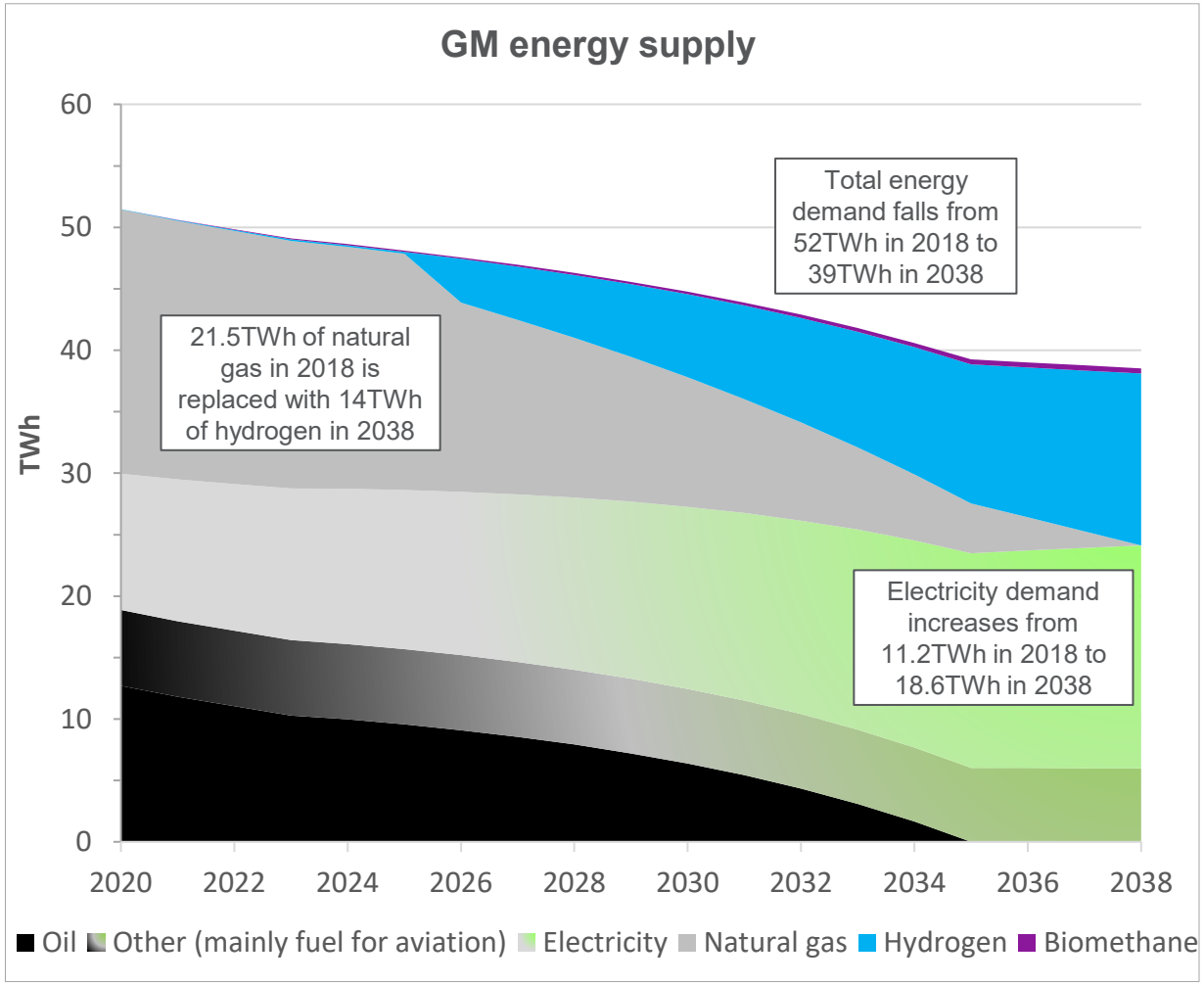

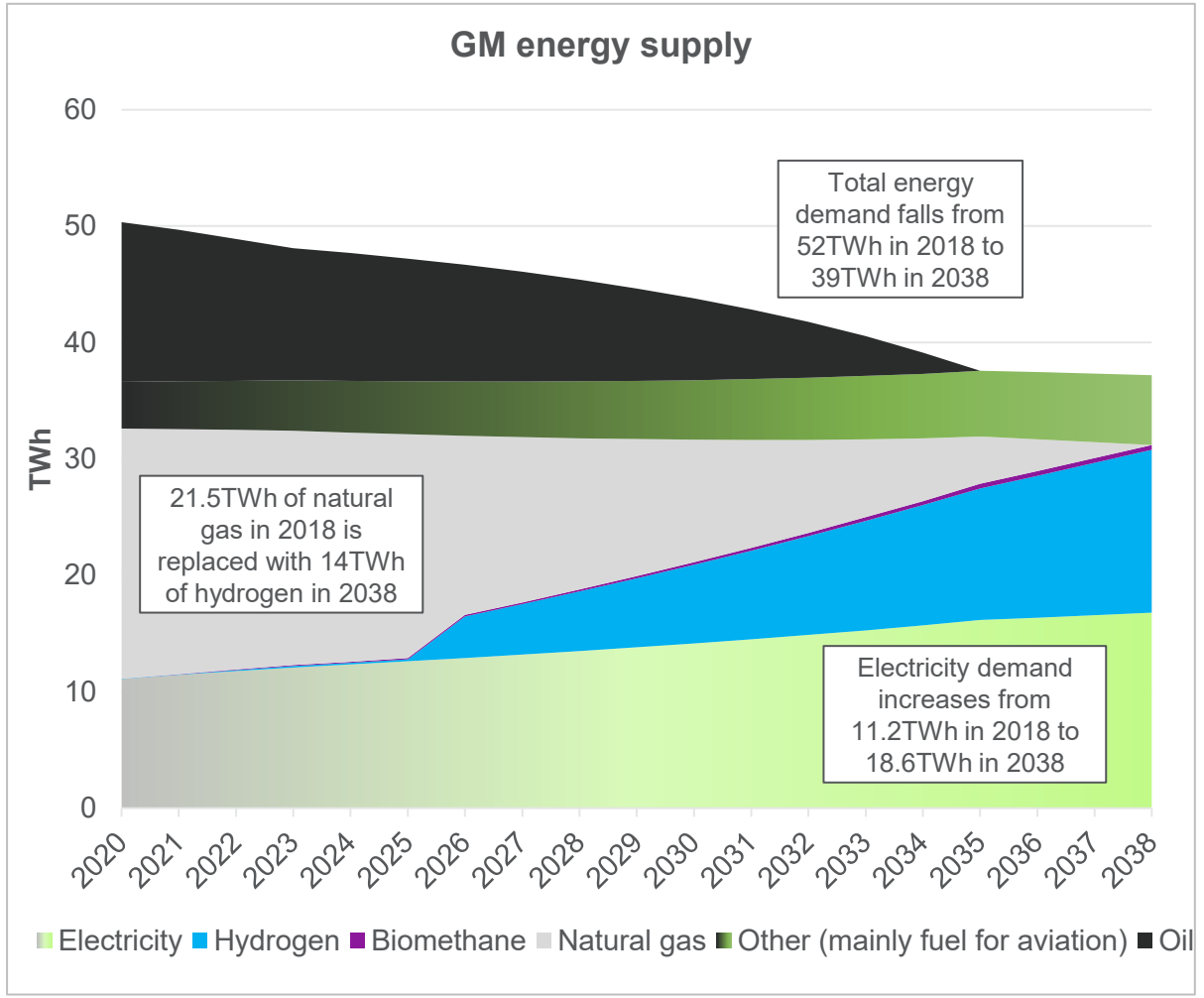

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PATHWAY

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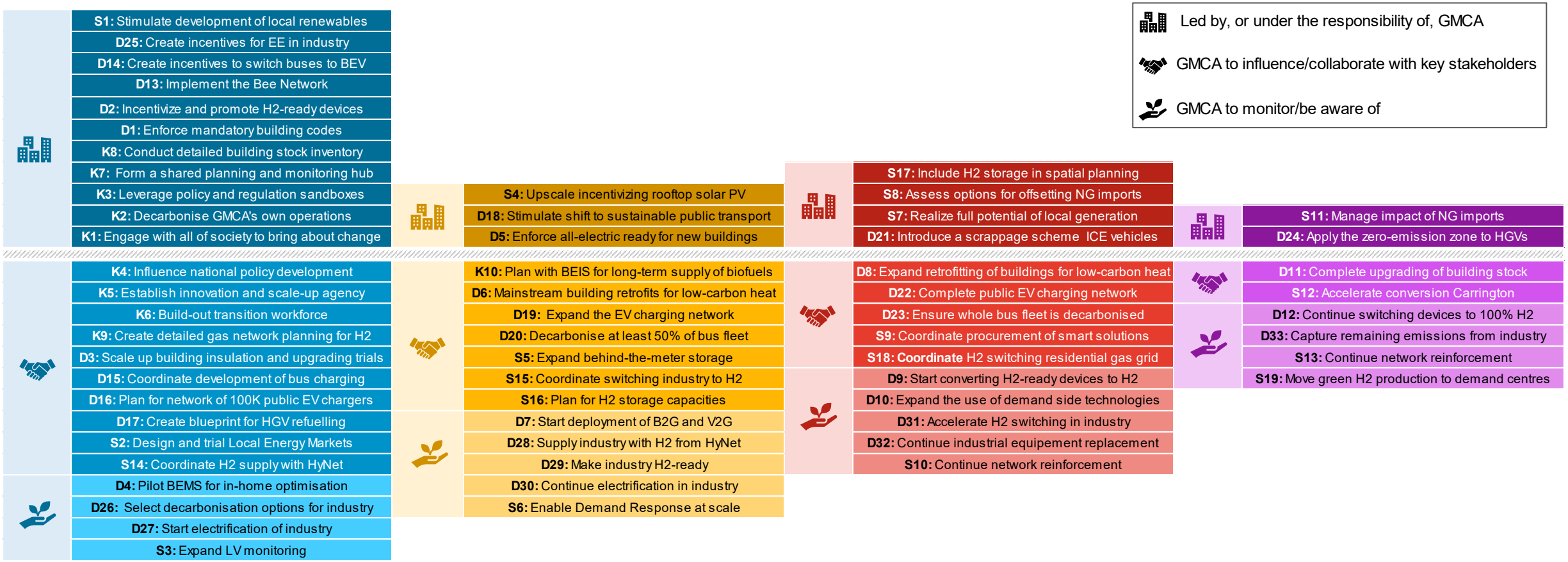
62 ACTIONS FOR GMCA AND ITS KEY STAKEHOLDERS MAKE UP THE PATHWAY

Pathway actions illustrate the need for GMCA to act now to achieve its decarbonisation target by 2038



*) Descriptions of pathway actions have been shortened. See full report for more details.

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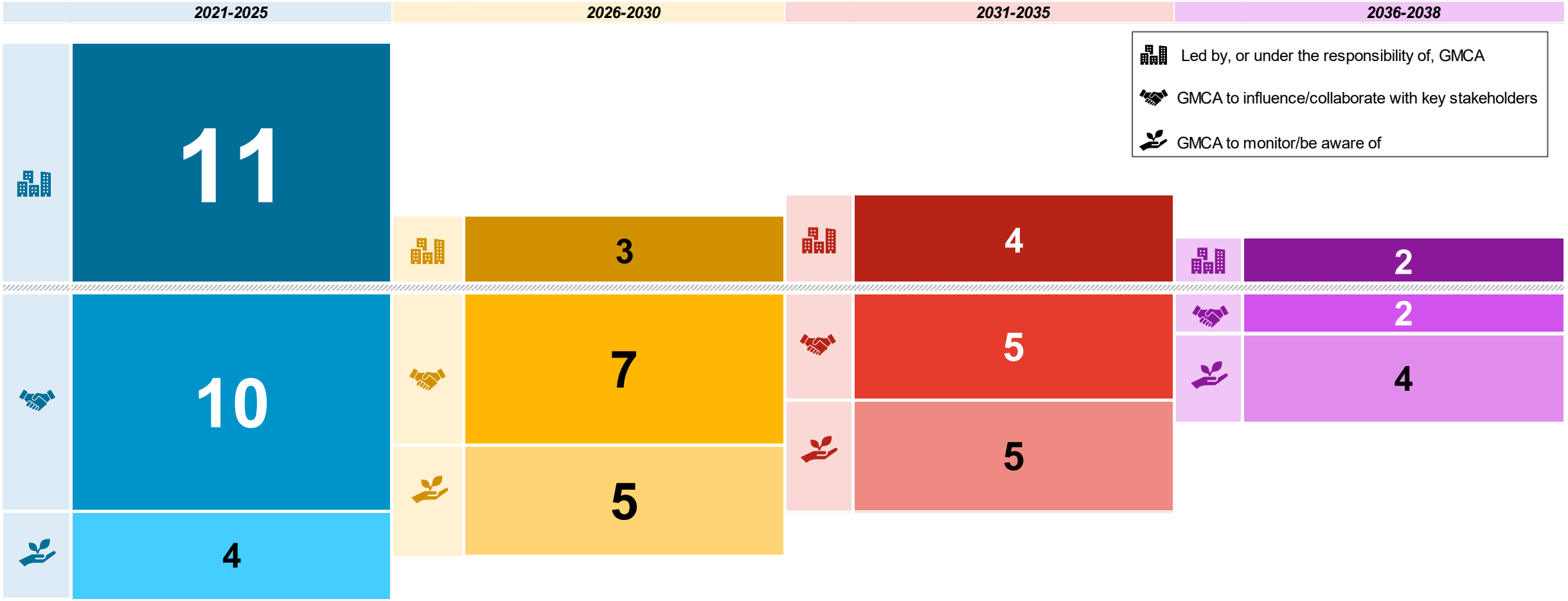
PATHWAY – SUMMARY VIEW

62 ACTIONS FOR GMCA AND ITS KEY STAKEHOLDERS MAKE UP THE PATHWAY

Pathway actions illustrate the need for GMCA to act now to achieve its decarbonisation target by 2038



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APPENDIX

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APPENDIX

MODELLING APPROACH AND MAIN ASSUMPTIONS

Modelling Approach

- Navigant's modelling for the balanced scenario in ENA's *Pathways to Net Zero* report forms the basis for the work presented here.
- Demand and supply per sector or energy carrier were estimated using a bottom-up approach leveraging local data and analyses reflected in various strategy and policy documents
- I case where (insufficient) local data was available, national level data was scaled down to the GM level.
- Based on the demand and supply analysis, a balanced scenario for Greater Manchester in 2038 was created.
- Key stakeholders from GMCA, Cadent, ENWL, academia and HyNet were interviewed to validate assumptions, input documents and provide additional local insights
- Over 60 key actions for GMCA and its key stakeholders were identified that make up the pathway to a decarbonized Greater Manchester in 2038

Main Assumptions

- Grid-connected buildings will be heated either through hybrid heat systems or boilers fuelled by hydrogen, depending on building insulation level, type and size.
- Off-grid buildings switch to purely electric heat pumps
- EPC data on GM's 10 districts can be scaled to model full building stock
- Energy consumption for each mode of transport was calculated using the fuel mix used in the analysis done for the ENA
- Energy demand in industry was assessed using BEIS data on fuel mix for industrial processes
- Hydrogen supply from HyNet is able to meet demand from the GM area, enabling a demand-driven strategy

Key documents

1. Pathways to Net Zero, ENA
2. Quantifying the implications of the Paris Agreement for Greater Manchester, Tyndall Centre for Climate Change Research
3. Greater Manchester's Plan for Homes, Jobs and the Environment, GMCA
4. Greater Manchester's Spatial Energy Plan, GMCA
5. Decarbonising Greater Manchester's Buildings
6. 5 Year Environmental Plan for Greater Manchester 2019-2024, GMCA
7. Greater Manchester low-emission strategy
8. Greater Manchester Local Industry Strategy
9. Developing networks for the future, Cadent
10. Distribution Future Electricity Scenarios, ENWL
11. Future Energy Scenarios 2019, National Grid

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