

Risk-aware decarbonisation of residential heating

DATE
10th September 2026

VENUE
ESRI

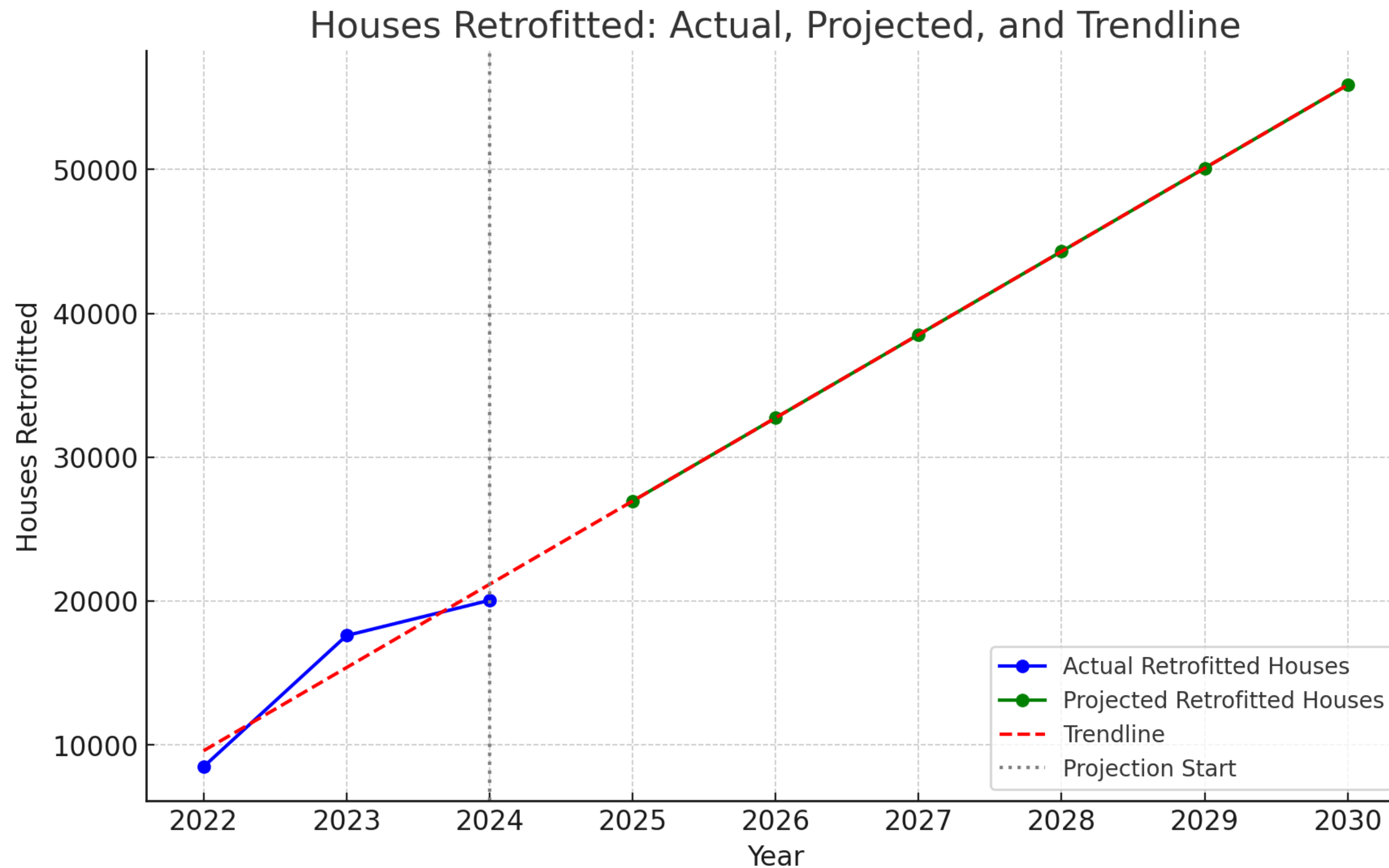
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Introduction

- Climate Action Plan envisages the carbonisation of the residential heating sector via heat pumps and decarbonised electricity
- Grants for retrofitting and heat pumps
- Uptake is very slow 107,089 retrofits to date (~20% of target)

Introduction



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- Linear trend predicts 300k homes retrofitted to B2 by 2030
- Linear trend predicts <50k heat pumps

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- Linear trend predicts 300k homes retrofitted to B2 by 2030
- Linear trend predicts <50k heat pumps
- Linear trend predicted ~28k retrofits in 2025 actual figure was 26,302
- Linear trend predicts ~32k retrofits in 2020 20,276 so far!

Introduction

- Examine costs and emissions associated with various decarbonisation options
- Different assumptions re policy achievement
- Include nonmonetary retrofit costs (i.e., cost of disruption)
- Consider complementary policies
- Consider variance of fuel prices
- Two approaches:
 1. Simulation—**what if** this happens?
 2. Optimisation—**what should** happen?

Assumptions – simulation approach

- MeetTarget CAP target is met
- MissTargetwe fall short of CAP targets for retrofits and heat pumps
- CompGaswe fall short of CAP targets but achieve 5.7TWh of biomethane
- CompOil we fall short of CAP targets but convert households with oil boilers to alternative fuels
- Consider with and without disruption cost
- Assume a new boiler for all alternative fuel scenarios

Assumptions – simulation approach

Policy	MeetTarget	MissTarget	CompGas	CompOil
Retrofit - B2	500	400	400	400
Heat pumps	400	250	250	250
Biomethane			5.7TWh	
HVO				150
LPG				150
BioLPG				50

Data



Data

- CSO:
 - Total dwelling stock
 - BER audits
 - Scaled BERs to national level
- SEAI:
 - Heat study total stock
 - Retrofit data—OSS and individual grant schemes
 - Building archetypes heat demand

Data

Approach taken:

- Use Heat Study dataset for dwelling stock and archetypes
- No additional adjustments for rebound/pre-bound

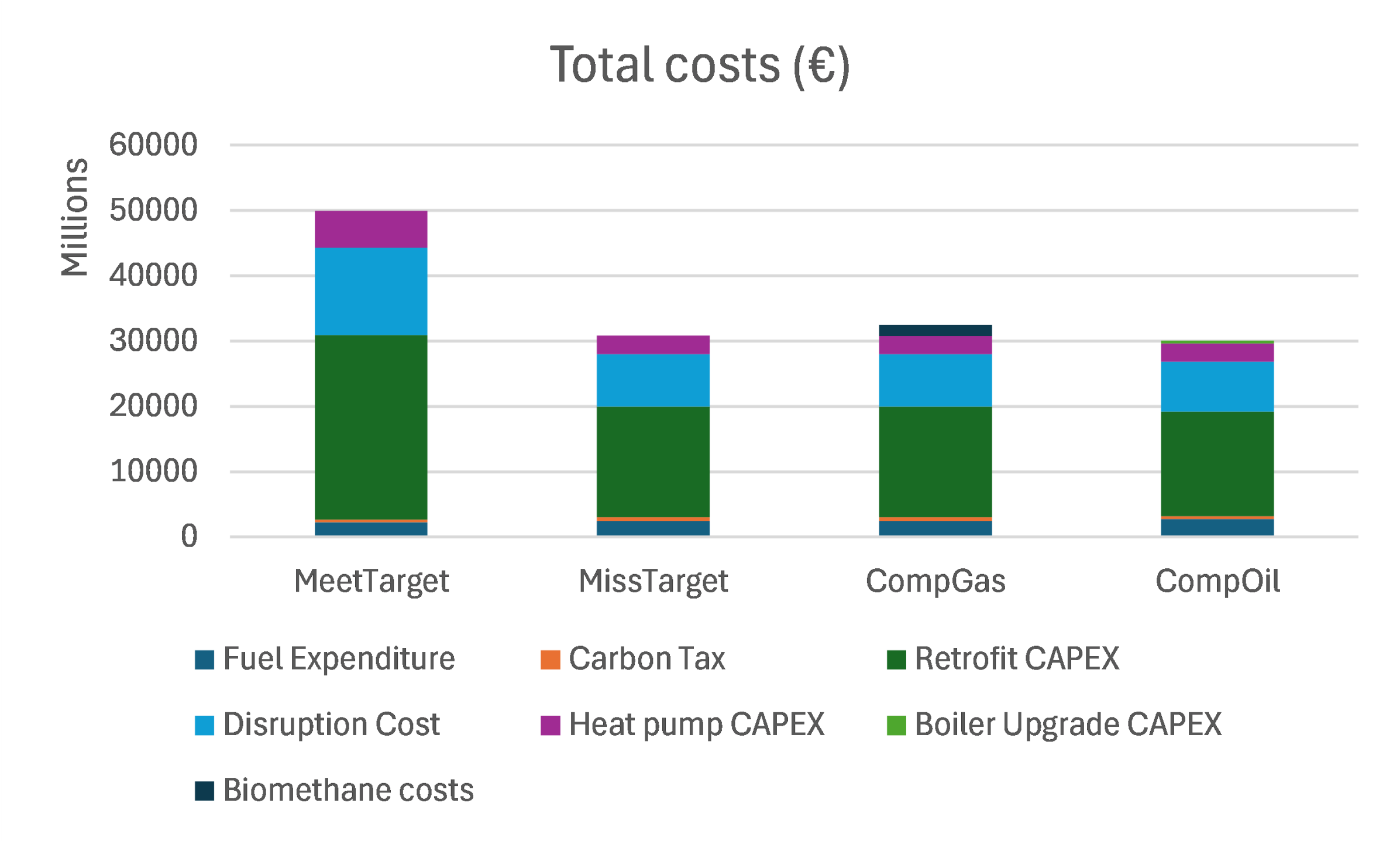
1,554,282 dwellings in total

BER-exempt and new builds not captured

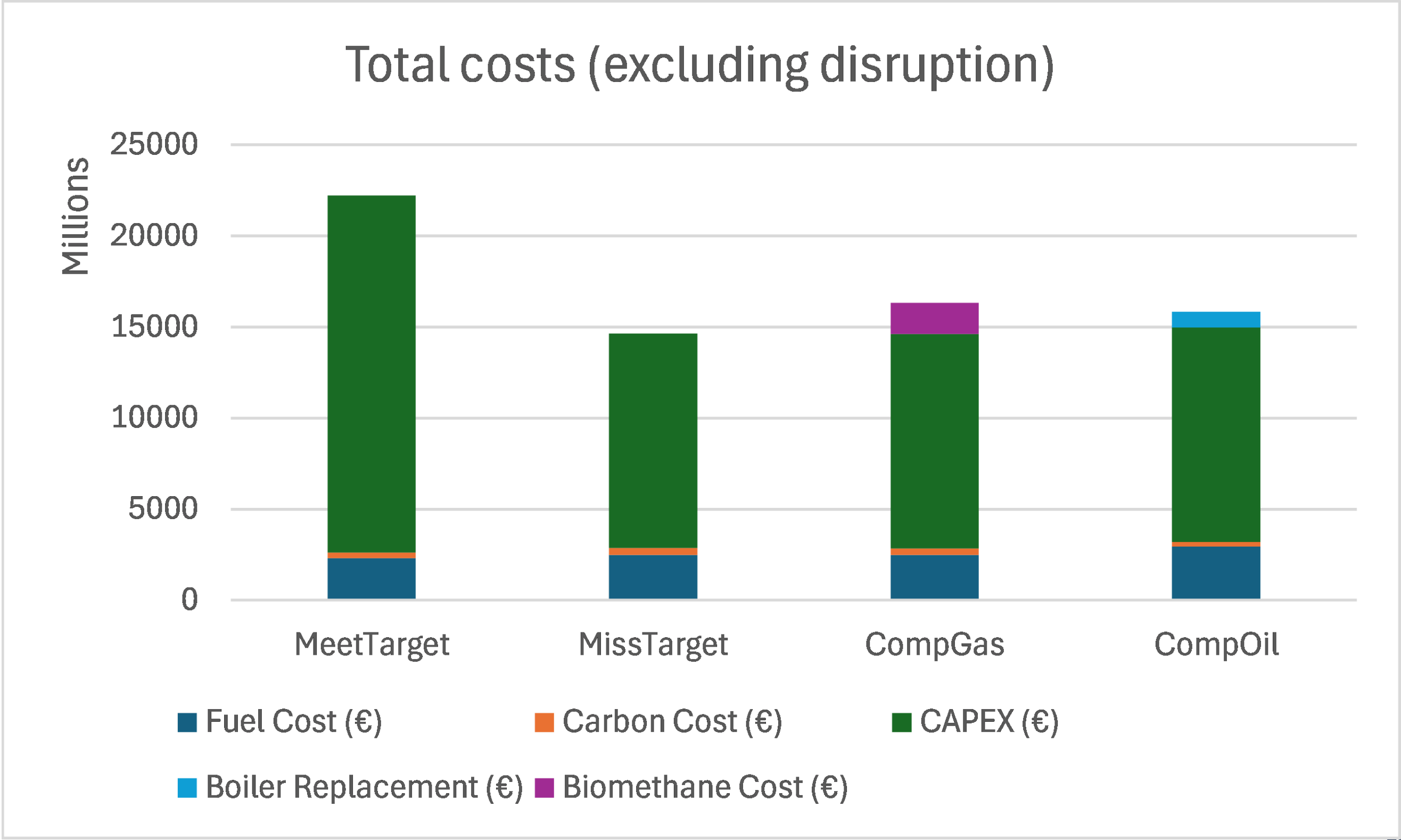
Data

- Gas demand for 2030 from GNI
- Fuel prices and emissions factors from SEAI and industry
- Retrofit costs for One Stop Shops from SEAI
- Disruption costs from Curtis et al. (2024)

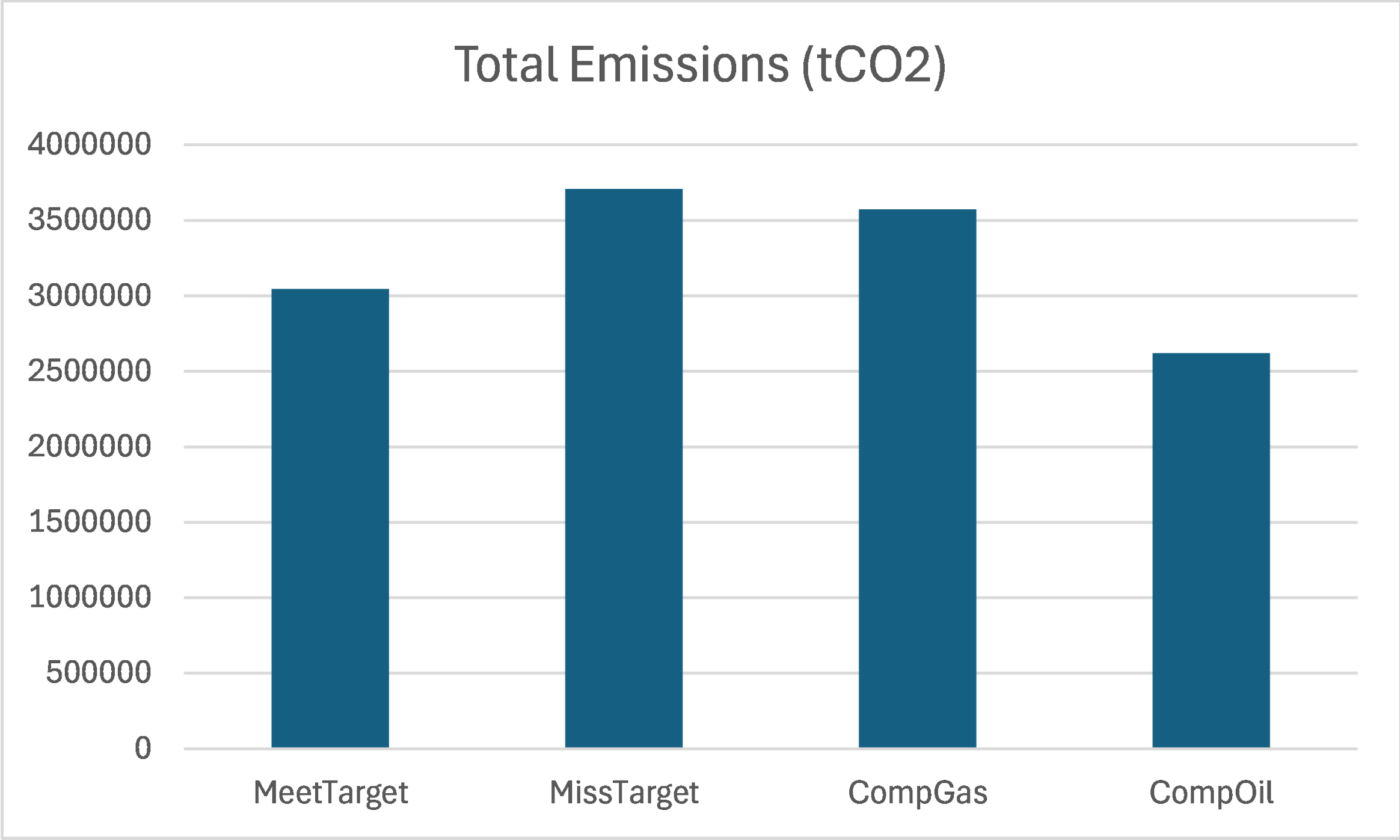
Results



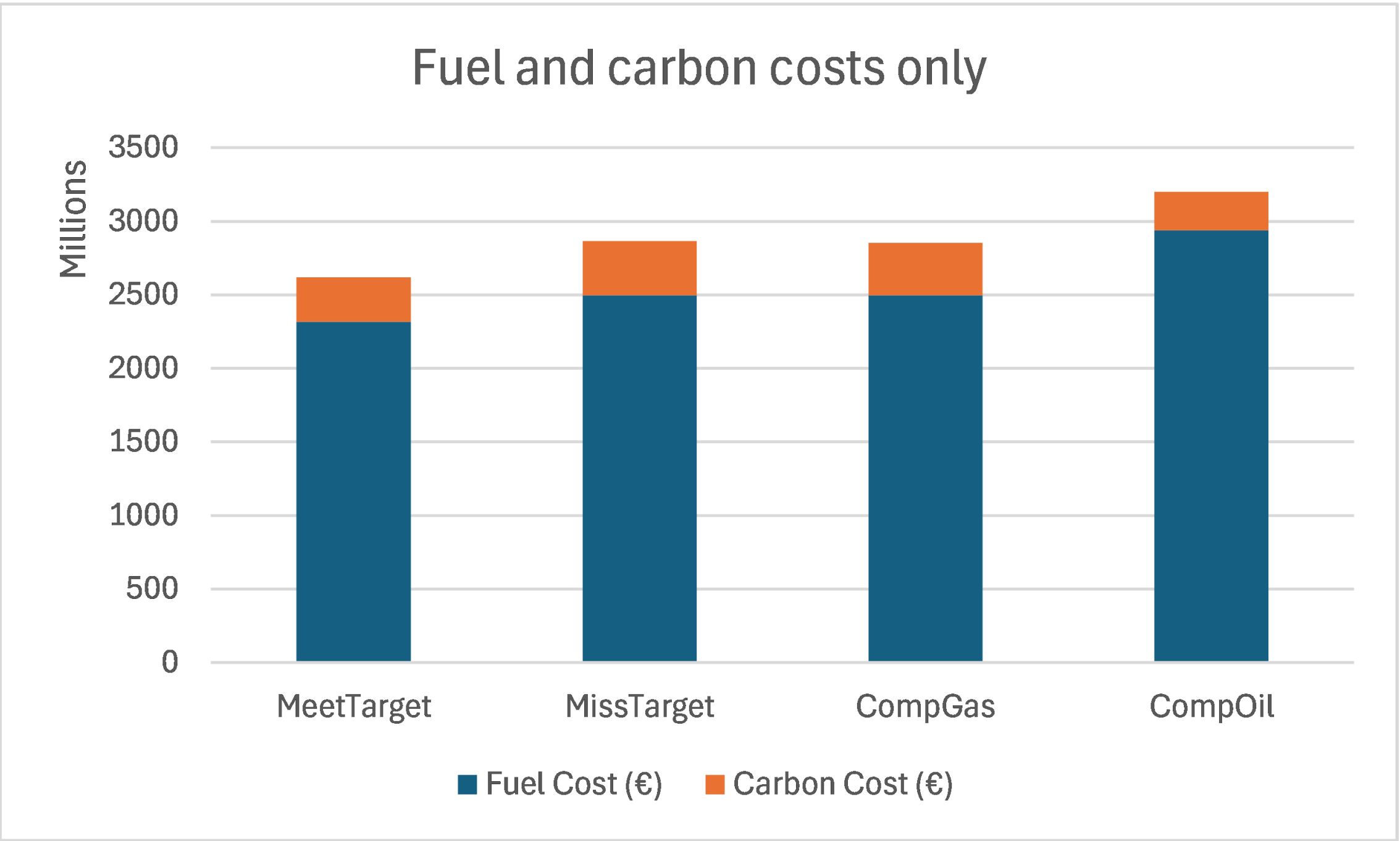
Results



Results



Results



Sensitivities

Disrupt

Ann

Retro

HP

cost

Gas

High

Sensitivities

DisruptY

Ann

Retro Y

HP

cost

Gas

High Y

HP 0

Gas 0

HVO 150

LPG 88

BioLPG 50

Sensitivities

Disrupt	Y	Y
Ann		Y
Retro	Y	Y
HP		
cost		
Gas		
High	Y	Y

HP	0	0
Gas	0	0
HVO	150	150
LPG	88	88
BioLPG	50	50

Sensitivities

Disrupt	Y	Y	Y
Ann		Y	
Retro	Y	Y	Y
HP			
cost			
Gas			
High	Y	Y	

HP	0	0	192
Gas	0	0	0
HVO	150	150	15
LPG	88	88	15
BioLPG	50	50	5

Sensitivities

Disrupt	Y	Y	Y	
Ann		Y		Y
Retro	Y	Y	Y	Y
HP				
cost				
Gas				
High	Y	Y		

HP	0	0	192	192
Gas	0	0	0	0
HVO	150	150	15	15
LPG	88	88	15	15
BioLPG	50	50	5	5

Sensitivities

Disrupt	Y	Y	Y		
Ann		Y		Y	Y
Retro	Y	Y	Y	Y	Y
HP					
cost					
Gas					
High	Y	Y			Y

HP	0	0	192	192	1
Gas	0	0	0	0	0
HVO	150	150	15	15	150
LPG	88	88	15	15	87
BioLPG	50	50	5	5	50

Sensitivities

Disrupt	Y	Y	Y			
Ann		Y		Y	Y	Y
Retro	Y	Y	Y	Y	Y	Y
HP						
cost						
Gas						
High	Y	Y			Y	

HP	0	0	192	192	1	196
Gas	0	0	0	0	0	0
HVO	150	150	15	15	150	15
LPG	88	88	15	15	87	15
BioLPG	50	50	5	5	50	5

Sensitivities

Disrupt	Y	Y	Y				
Ann	Y		Y	Y	Y		
Retro	Y	Y	Y	Y	Y	Y	
HP							
cost							
Gas							
High	Y	Y			Y		Y
HP	0	0	192	192	1	196	1,233
Gas	0	0	0	0	0	0	0
HVO	150	150	15	15	150	15	0
LPG	88	88	15	15	87	15	0
BioLPG	50	50	5	5	50	5	0

Sensitivities

Disrupt	Y	Y	Y			
Ann	Y		Y	Y	Y	
Retro	Y	Y	Y	Y	Y	
HP						
cost						
Gas						
High	Y	Y		Y		Y

HP	0	0	192	192	1	196	1,23€	1,23€
Gas	0	0	0	0	0	0	0	0
HVO	150	150	15	15	150	15	0	0
LPG	88	88	15	15	87	15	0	0
BioLPG	50	50	5	5	50	5	0	0

Sensitivities

Disrupt	Y	Y	Y						
Ann		Y		Y	Y	Y			
Retro	Y	Y	Y	Y	Y	Y			
HP									
cost									Y
Gas									
High	Y	Y			Y		Y		Y

HP	0	0	192	192	1	196	1,23€	1,23€	0
Gas	0	0	0	0	0	0	0	0	655
HVO	150	150	15	15	150	15	0	0	0
LPG	88	88	15	15	87	15	0	0	0
BioLPG	50	50	5	5	50	5	0	0	0

Sensitivities

Disrupt	Y	Y	Y							
Ann		Y		Y	Y	Y				
Retro	Y	Y	Y	Y	Y	Y				
HP										
cost								Y	Y	
Gas										
High	Y	Y			Y		Y		Y	

HP	0	0	192	192	1	196	1,23€	1,23€	0	0
Gas	0	0	0	0	0	0	0	0	655	655
HVO	150	150	15	15	150	15	0	0	0	0
LPG	88	88	15	15	87	15	0	0	0	0
BioLPG	50	50	5	5	50	5	0	0	0	0

Sensitivities

Disrupt	Y	Y	Y								
Ann		Y		Y	Y	Y					
Retro	Y	Y	Y	Y	Y	Y					
HP											
cost									Y	Y	Y
Gas											Y
High	Y	Y			Y		Y		Y		Y

HP	0	0	192	192	1	196	1,23€	1,23€	0	0	0
Gas	0	0	0	0	0	0	0	0	655	655	46
HVO	150	150	15	15	150	15	0	0	0	0	150
LPG	88	88	15	15	87	15	0	0	0	0	0
BioLPG	50	50	5	5	50	5	0	0	0	0	50

Sensitivities

Disrupt	Y	Y	Y										
Ann		Y		Y	Y	Y							
Retro	Y	Y	Y	Y	Y	Y							
HP													
cost									Y	Y	Y	Y	
Gas											Y	Y	
High	Y	Y			Y		Y		Y		Y		
HP		0	0	192	192	1	196	1,23€	1,23€	0	0	0	0
Gas		0	0	0	0	0	0	0	0	655	655	46	412
HVO		150	150	15	15	150	15	0	0	0	0	150	15
LPG		88	88	15	15	87	15	0	0	0	0	0	0
BioLPG		50	50	5	5	50	5	0	0	0	0	50	5

Conclusion

- Retrofit cost dominates even when annualized
- Low carbon oil complements heat pump policy
- Possibility of behavioural considerations beyond disruption costs further work

Thank you

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John Curtis



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