



Predicting the Environmental Effects of Conventionally Fuelled Vehicles Compared to Electric Vehicles in Scotland.

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1. Introduction and Background

- Scotland is part of the United Kingdom (UK) and is situated off the north-west coast of mainland Europe. By 2016, it was home to a population of 5.4 million¹.



Figure 1: Map of Scotland.

- Based on 1990 levels, the Scottish Government implemented the target of reducing greenhouse gas (GHG) emissions by **80% by 2050**².
- Scotland's **second largest** source of net emissions in 2014 was **transport**, including international aviation and shipping³.

2. Research Aims and Outcomes

- Using the Scottish Transport Energy and Air Pollution Model (STEAM)⁴, a **life cycle analysis approach** was used to examine the direct and indirect GHG emissions produced from **cars**.
- STEAM incorporates a range of **transport-energy-environment scenarios** through policy and socio-economic influences on energy demand.

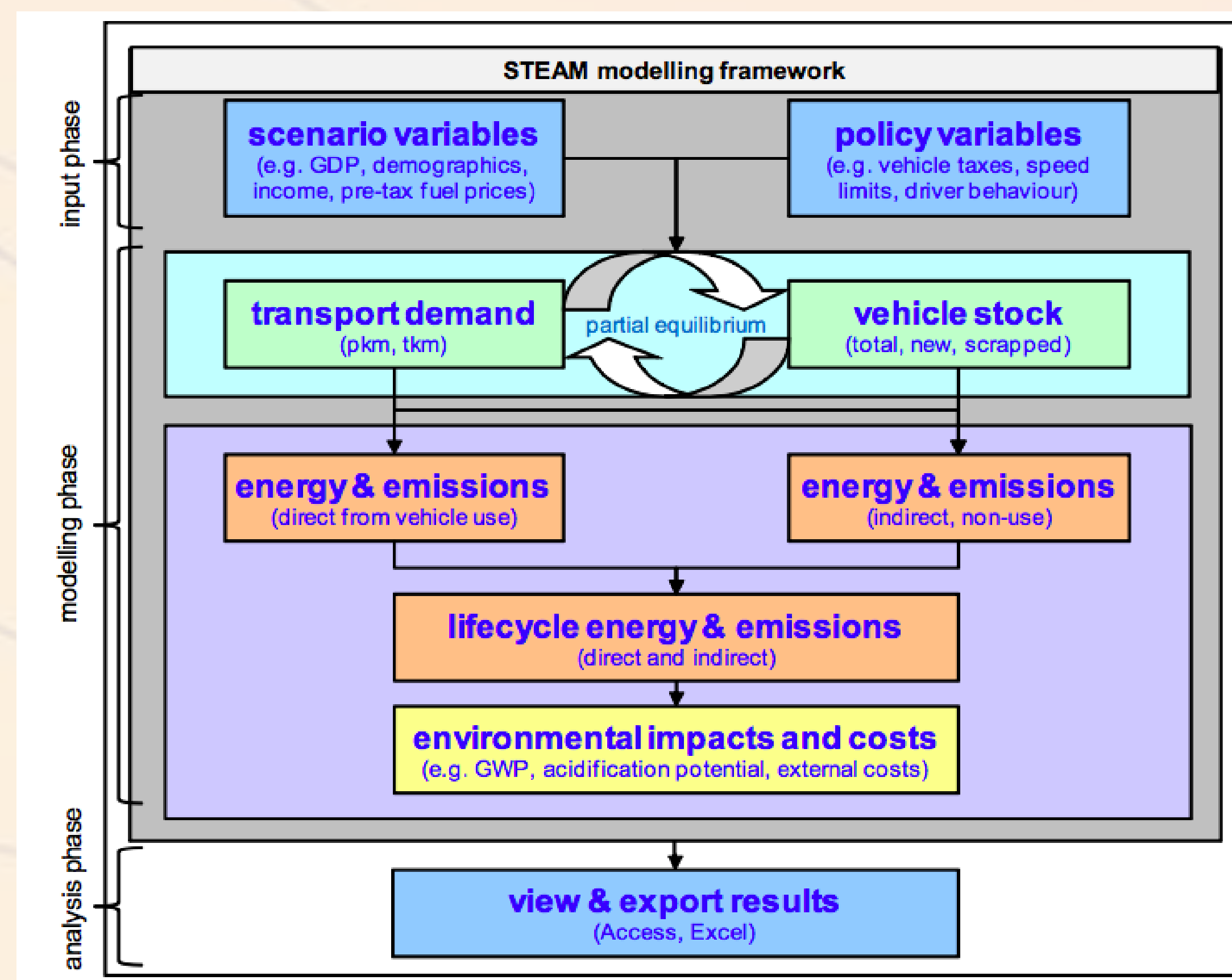


Figure 2: Overview of STEAM Modelling Framework⁴

3. Electricity Generation Mix

- Electricity generation mix used within this model followed UK Government projections.
- Figure 3 demonstrates the projection of electricity generation by source between 2008 and 2035⁵.

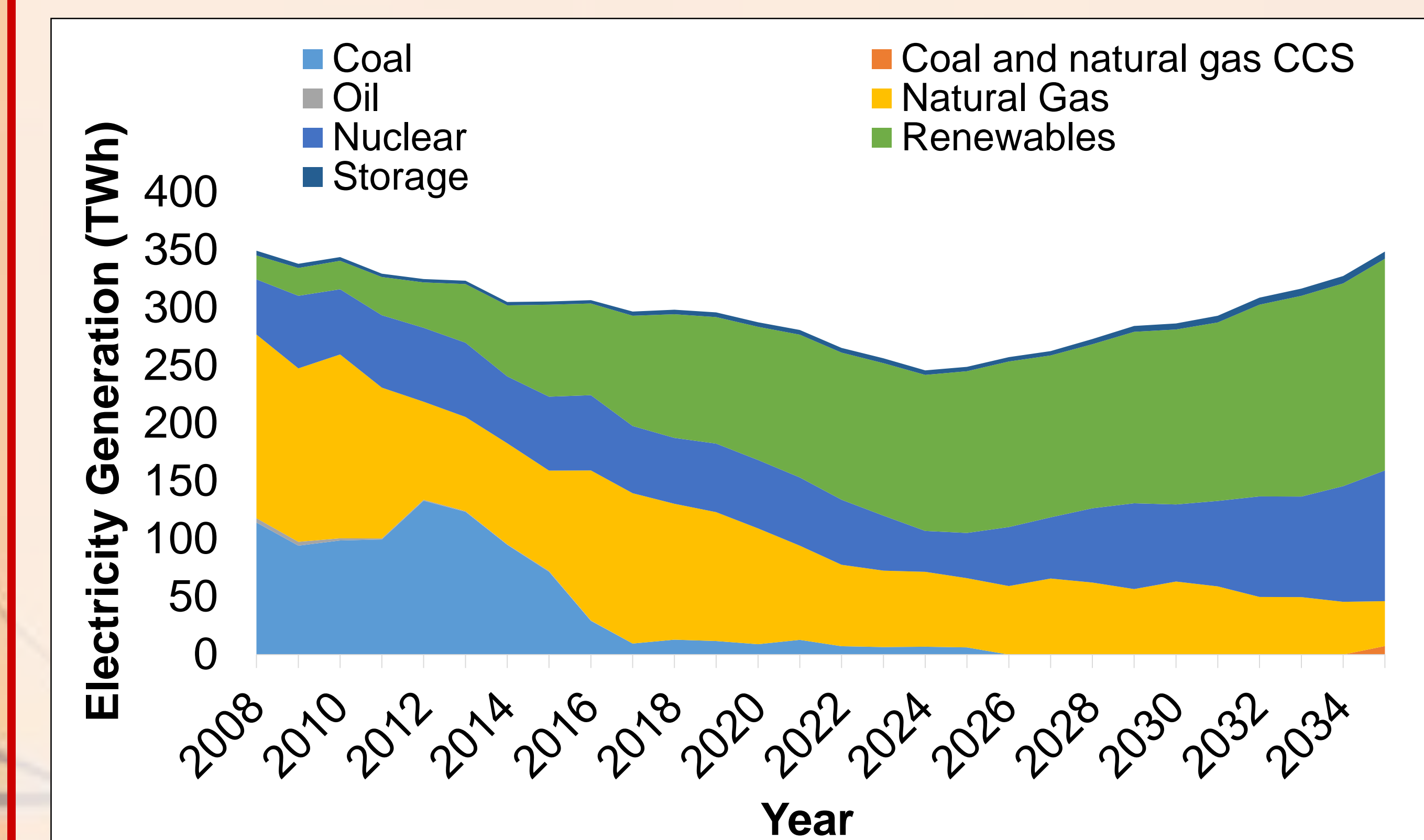


Figure 3: Projection of Electricity Generation by Source between 2008 and 2035.

4. Results for STEAM Outputs

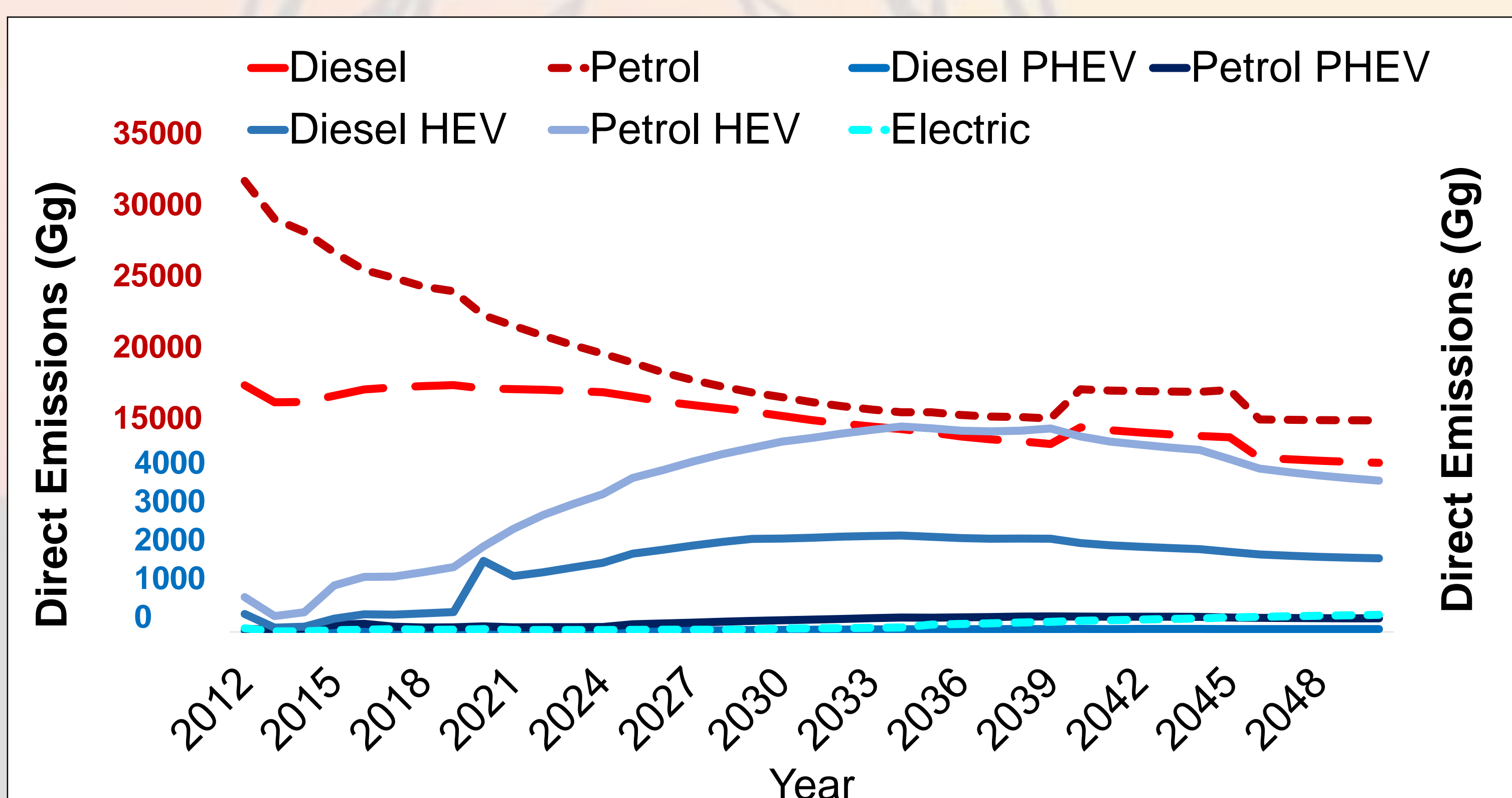


Figure 4: Projected Direct GHG Emissions Produced from Cars between 2012 and 2050.

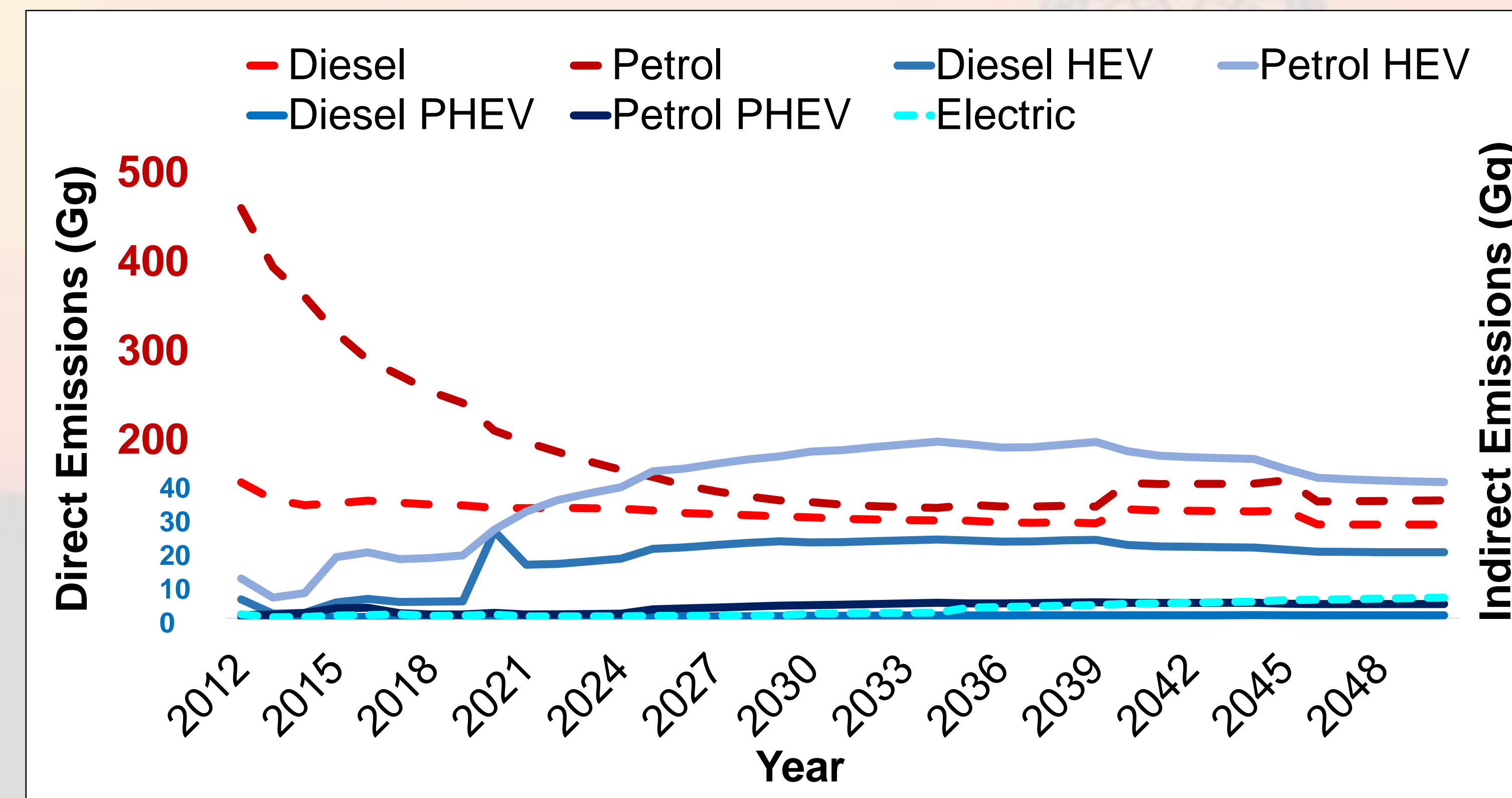


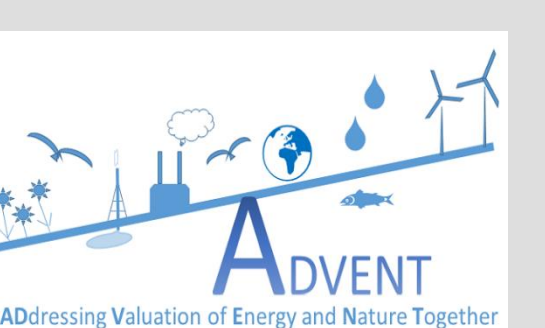
Figure 5: Projected Indirect GHG Emissions Produced from Cars between 2012 and 2050.

5. Take Home Messages

- Whilst technological improvements help reduce emissions, **growing vehicle demand negates** any potential reductions.
- Infrastructure** for electric transport needs to be **in place** before a modal shift toward can be encouraged.
- Small scale projects need to be implemented in **coordination** with nation wide projects to achieve the greatest effect.



Acknowledgements



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