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Centre for Sustainable Road Freight

Virtual Tour of ELISA eHighway Project

10 September 2020

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Decarbonising UK's Long-Haul Road Freight

UK Electric Motorway System (UKEMS)*

* D Ainalis, C Thorne, D Cebon 'Decarbonising the UK's Long-Haul Road Freight at Minimum Economic Cost', 2020.
<http://www.csrf.ac.uk/2020/07/white-paper-long-haul-freight-electrification/>



UKEM Roll-Out Plan – Phase 0 (Trial)

Phase	ERS Length Built	Construction Cost	% covered of Major Road HGV-km in each phase	% of decarb. In each phase
0 (Trial)	39 km	£80 mn	0.48%	0.32%

Total	39 km	£80 mn	0.48%	0.32%
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Notes:
 > Decarbonisation and HGV-km data not available for NI.
 > ERS length includes both directions
 > % of decarbonisation assuming that 2/3 of all hgv-km are on SRN/TRNs
 > % of HGV-km = ((SUM(HGV_counts)/(no. count points))*road_lengths)/
 ((SUM(ALL_GB_HGV_counts)/(all_GB_no. count points))*SRN_road_lengths)

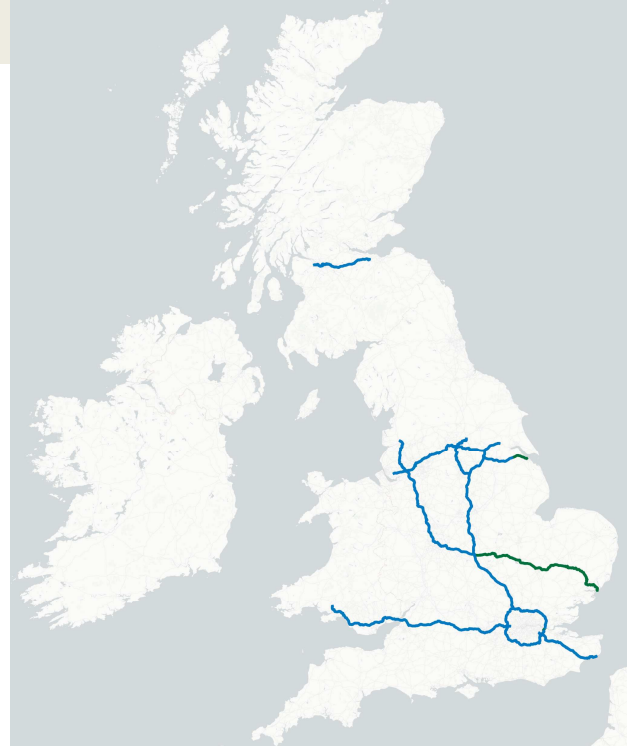


UKEM Roll-Out Plan – Phase 1

Phase	ERS Length Built	Construction Cost	% covered of Major Road HGV-km in each phase	% of decarb. In each phase
0 (Trial)	39 km	£80 mn	0.48%	0.32%
1	3,261 km	£5.6 bn	46.84%	31.23%

Total	3,300 km	£5.7 bn	47.32%	31.55%
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Notes:
 > Decarbonisation and HGV-km data not available for NI.
 > ERS length includes both directions
 > % of decarbonisation assuming that 2/3 of all hgv-km are on SRN/TRNs
 > % of HGV-km = ((SUM(HGV_counts)/(no. count points))*road_lengths)/
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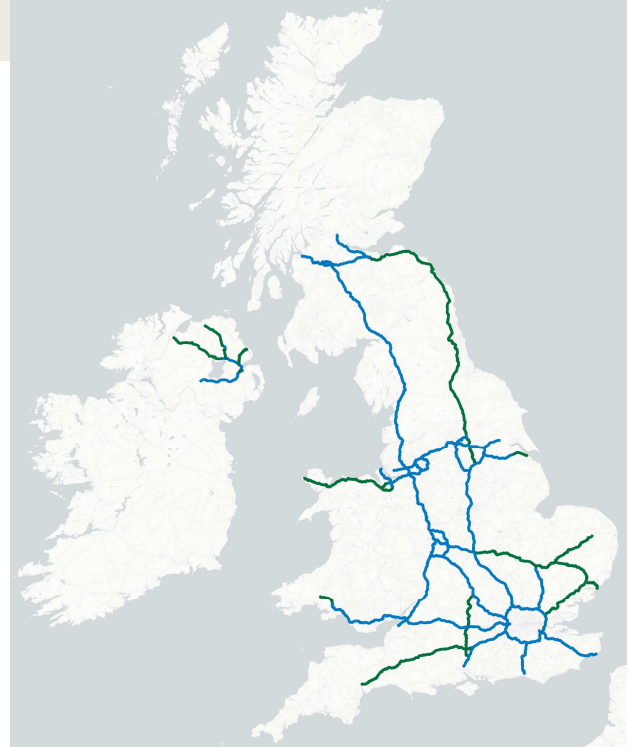




UKEM Roll-Out Plan – Phase 2

Phase	ERS Length Built	Construction Cost	% covered of Major Road HGV-km in each phase	% of decarb. In each phase
0 (Trial)	39 km	£80 mn	0.48%	0.32%
1	3,261 km	£5.6 bn	46.84%	31.23%
2	4,759 km	£5.7 bn	28.05%	18.70%
Total	8,059 km	£11.4 bn	97.20%	50.25%

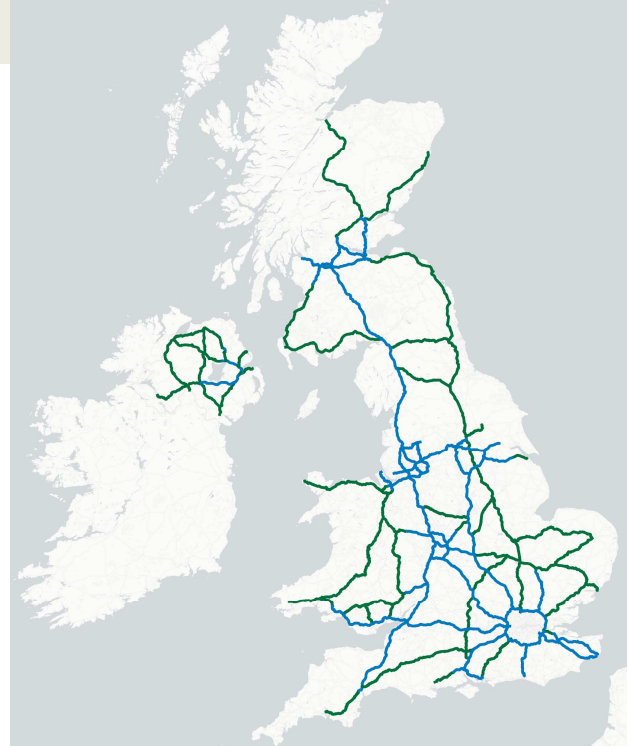
Notes:
 > Decarbonisation and HGV-km data not available for NI.
 > ERS length includes both directions
 > % of decarbonisation assuming that 2/3 of all hgv-km are on SRN/TRNs
 > % of HGV-km = ((SUM(HGV_counts)/(no. count points))*road_lengths)/
 ((SUM(ALL_GB_HGV_counts)/(all_GB_no. count points))*SRN_road_lengths)



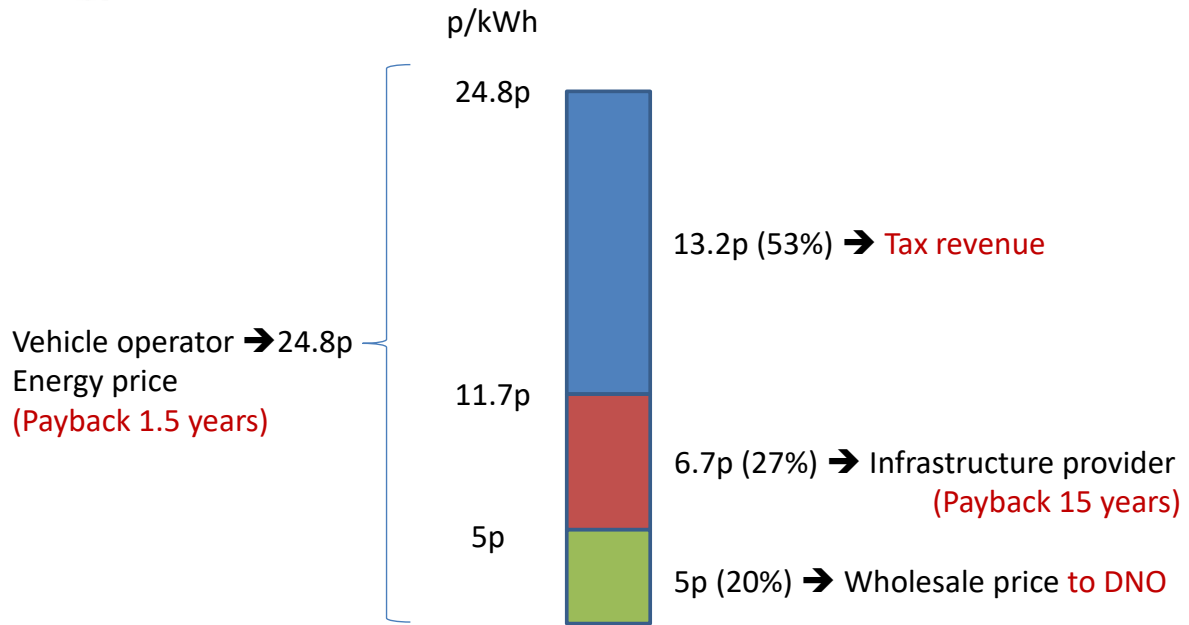
UKEM Roll-Out Plan – Phase 3

Phase	ERS Length Built	Construction Cost	% covered of Major Road HGV-km in each phase	% of decarb. In each phase
0 (Trial)	39 km	£80 mn	0.48%	0.32%
1	3,261 km	£5.6 bn	46.84%	31.23%
2	4,759 km	£5.7 bn	28.05%	18.70%
3	7,062 km	£7.9 bn	21.83%	14.55%
Total	15,121 km	£19.3 bn	97.20%	64.80%

Notes:
 > Decarbonisation and HGV-km data not available for NI.
 > ERS length includes both directions
 > % of decarbonisation assuming that 2/3 of all hgv-km are on SRN/TRNs
 > % of HGV-km = ((SUM(HGV_counts)/(no. count points))*road_lengths)/
 ((SUM(ALL_GB_HGV_counts)/(all_GB_no. count points))*SRN_road_lengths)



Example Distribution of revenue



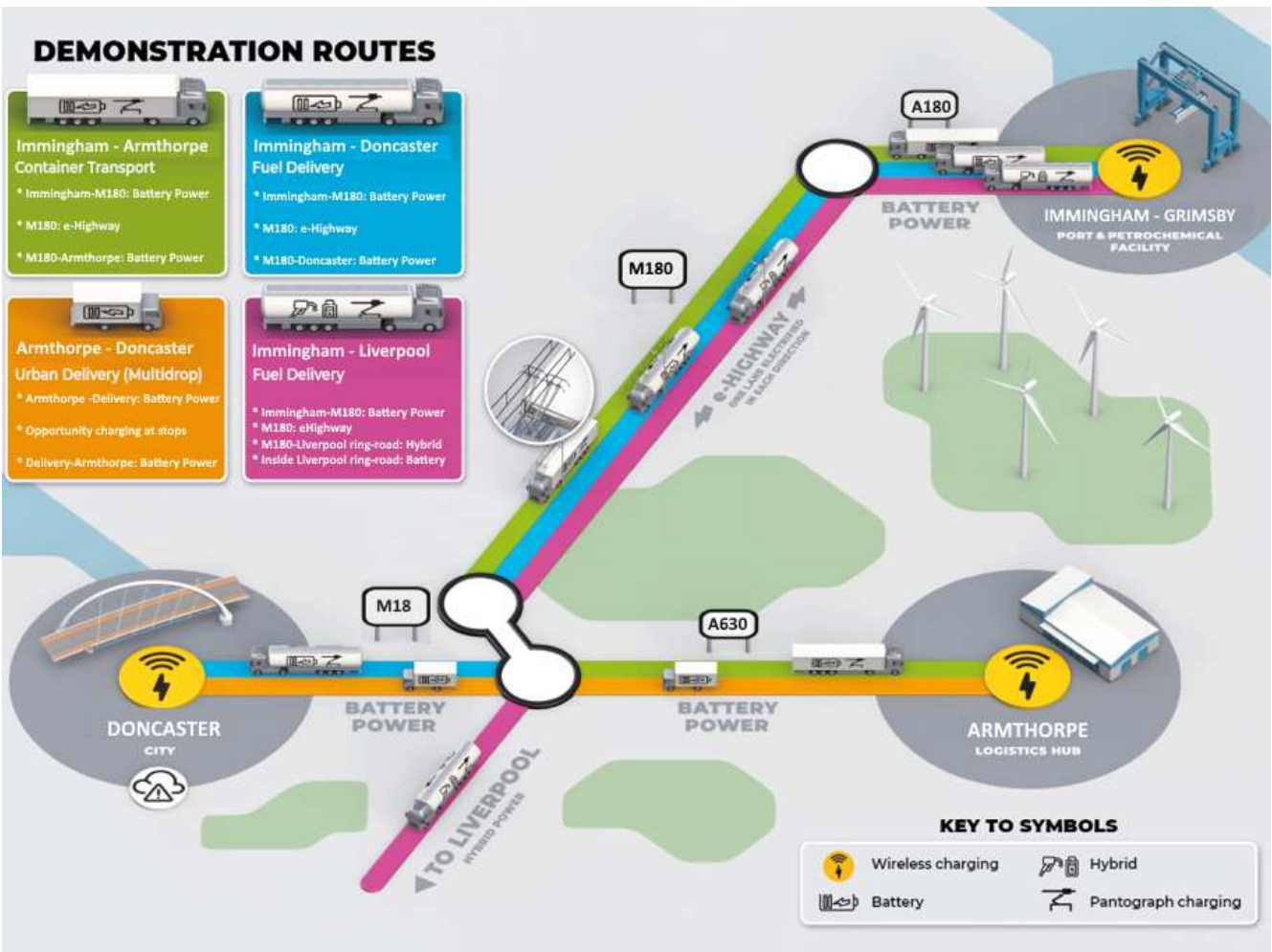
(15 year payback; 5p Wholesale price)

Tax Revenue





Proposed UK Pilot Project





Pilot Project Objectives

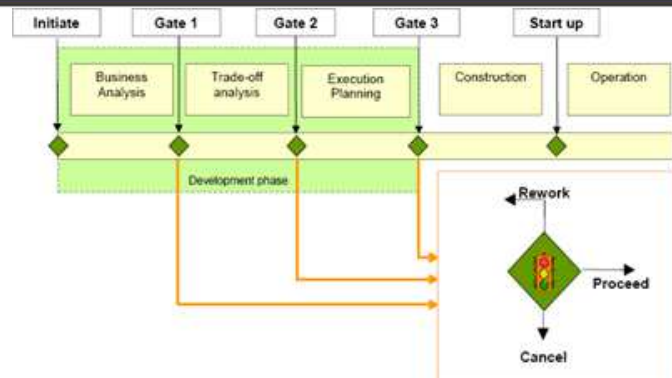
1. Develop a **holistic understanding** of the challenges of electrifying the UK road freight system
2. Use a 'living laboratory' to test a variety of electrification technology options in an **integrated logistics environment**.
3. Verify the **operational readiness** level.
4. Prove the **business models** for direct beneficiaries
5. Prove the **business case for UK PLC**
6. Demonstrate **tax revenue** generation for UK Treasury
7. Prove the **carbon case**
8. Prove the **infrastructure, safety** and the **system resilience**
9. Show **compatibility** between vehicles in different markets + roaming issues (Sweden, Germany, Italy)
10. Prove that that **transition** to Electric Road Freight can work
11. **Train vehicle operators and infrastructure providers:** drivers, maintenance teams, finance & operations staff, emergency services, motorway & catenary system operators

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Preliminary Timeline

If the UK is to achieve net zero in 2050 (2045 in Scotland) then the **outcomes are needed to inform a UK rollout by 2025-26**



Phase	Duration	Start	End
Funding justification and procurement			Jan 2021
Business Planning (Front End Loading 1 – FEL1)	9 months	Jan 2021	Q4 2021
Scope Development (FEL2)	9 months	Q4 2021	Q3 2022
Project Planning (FEL3)	12 months	Q3 2022	Q3 2023
Construction	15 months	Q4 2023	Q1 2025
Operation	12 months	Q1 2025	Q1 2026



Estimated Project Costs for M180

WBS	FEL 1	FEL 2	FEL 3	Execute	Operate	Total
0. Project Management	108,760	322,410	1,128,707	1,010,121	235,324	2,805,322
1. Distribution Centre	0	7,630	30,521	7,176,083	2,705,176	9,919,411
2. E-Motorway	0	7,630	76,304	70,829,472	5,578,799	76,492,205
3. Port of Immingham	0	0	0	736,861	304,652	1,041,513
4. Systems Engineering and Integration	292,497	607,885	1,368,376	38,152	633,319	2,940,228
5. Data Capture and Performance Monitoring	0	0	45,782	105,782	663,128	814,693
6. Stakeholder Communication	10,174	123,847	366,715	761,755	415,040	1,677,530
7. Replication strategy and information	0	0	254,345	254,345	466,952	975,642
8. Handover to end owner and operator	0	0	0	0	2,454,345	2,454,345
Total	411,431	1,069,402	3,270,750	80,912,570	13,456,737	99,120,889

Costs dominated by catenary, network and substation costs



Conclusions

1. The only feasible way to get UK road freight to 80%+ CO₂ reduction by 2050 is to electrify long haul.
2. eHighway is the highest TRL technology available:
 - Well tested and proven → ready for prime time
 - Lowest energy and carbon emissions
 - Small batteries
 - Interoperable with Europe
 - Practical roll-out/transition scenarios
 - Attractive business cases
 - Full fuel tax recovery
3. UK pilot project is needed to de-risk remaining issues prior to roll-out.