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HTaaS is more than a Transport Solution.

It is a **new municipal energy model**, a **new commercial model**, and a **new pathway to net-zero cities**.

The transition to a net-zero economy requires solutions that are not only technically credible, but **deliverable, affordable and capable of transforming the way our city's function**.

Hydrogen Trams as a Service (HTaaS) represents precisely this kind of innovation: a UK-developed, commercially mature, whole-system approach that integrates clean transport, local energy production and municipal fleet decarbonisation into a single, coherent platform.

At a time when local authorities face unprecedented financial pressures, HTaaS offers something genuinely new: a **zero-emission mass-transit system that removes capital risk, accelerates delivery and creates a new municipal revenue stream**.

By enabling councils to produce, store and distribute hydrogen locally—using their own land, solar assets and waste-derived feedstock—HTaaS transforms the municipality from a passive energy consumer into an **active participant in the clean-energy economy**.

This model aligns directly with the UK's strategic priorities:

- **Net Zero 2030–2035 pathways**
- **Local energy resilience and independence**
- **Green-economy job creation**
- **Regeneration of towns and city-regions**
- **Affordable, reliable, modern public transport**

HTaaS demonstrates that decarbonisation need not be a cost burden. Instead, it can be a **driver of growth, innovation and long-term financial sustainability**.

By combining Very Light Rail MRT, with local hydrogen production, digital optimisation and a subscription-based commercial model, HTaaS provides a blueprint for how the UK can deliver clean transport at pace and scale.

This submission sets out the full case for HTaaS: its innovation, its carbon impact, its regeneration benefits and its commercial strength.

It shows how a UK-origin technology can support local authorities, strengthen regional economies and position the United Kingdom as a global leader in hydrogen mobility.

Podcast @ https://www.railindustryconnect.co.uk/rail-industry-connected-hydrogen-trams-as-a-service-with-jim-harkins-light-rail-uk/

Light Rail (UK)

The Proposition

Hydrogen Trams as a Service (HTaaS) is the UK's first **fully integrated, zero-emission, whole-system hydrogen mobility platform**, enabling rapid deployment of Very Light Rail MRT (VLR) without the capital, delivery or operational risks associated with traditional tram systems.

HTaaS replaces the conventional "procure-build-own-operate" model with a **single-contract, OPEX-based Energy-as-a-Service framework**, delivering predictable costs, guaranteed performance and verifiable carbon reduction from day one.

HTaaS integrates **hydrogen production, storage, refuelling, fleet operations, digital optimisation and lifecycle management** into a unified service.

This transforms hydrogen from a fragmented, project-by-project fuel into a **bankable, city-region-scale energy system** aligned with Net Zero 2030–2035 pathways.

A defining feature of HTaaS is its ability to transform the municipality and others, from a **transport operator** into a **local clean-energy producer and distributor**.

The model incorporates:

- **Local hydrogen production** using municipal feedstock such as solar PV, waste-derived biogas and grid-connected electrolysis.
- **On-site hydrogen storage in pressure vessels**, providing resilience, peak-saving and grid-independent operation.
- **In-house conversion of domestic rubber-tyred fleets**—waste, highways, parks, enforcement and community transport—into hydrogen-powered operations using the same hub.
- **A new municipal revenue stream** through hydrogen sales to third-party fleets (logistics, taxis, SMEs) and local businesses.
- **A closed-loop, municipally controlled energy ecosystem** that reduces reliance on national grid volatility and external suppliers.

This integration of **transport + energy + municipal operations** creates a system that is:

- **Low-carbon** (operational and embedded)
- **Low-risk** (commercial, technical and delivery)
- **Low-cost** (OPEX-based, no capex requirement)
- **High-impact** (mobility, regeneration, energy resilience, revenue generation)

HTaaS enables cities and small towns to deploy modern tram-like services with:

- **Minimal civil engineering**
- **80% lower embedded carbon**
- **18–24 month deployment timelines**
- **Zero tailpipe emissions**
- **Guaranteed availability and performance**
- **No public-sector capital requirement**

HTaaS is already progressing with authorities including Cambridge, Leeds and the West Midlands, demonstrating market readiness and alignment with national hydrogen and clean-growth strategies.

It directly addresses the three structural barriers that have historically prevented UK cities and small towns from delivering mass transit: **cost, complexity and risk**.

HTaaS is a **UK-origin innovation** with global export potential, positioning the UK as a leader in hydrogen mobility and delivering a commercially viable, technically robust and socially transformative solution for the energy transition.

Light Rail (UK)

E. Commercial Model & Financial Case — E-Commerce Combined Version

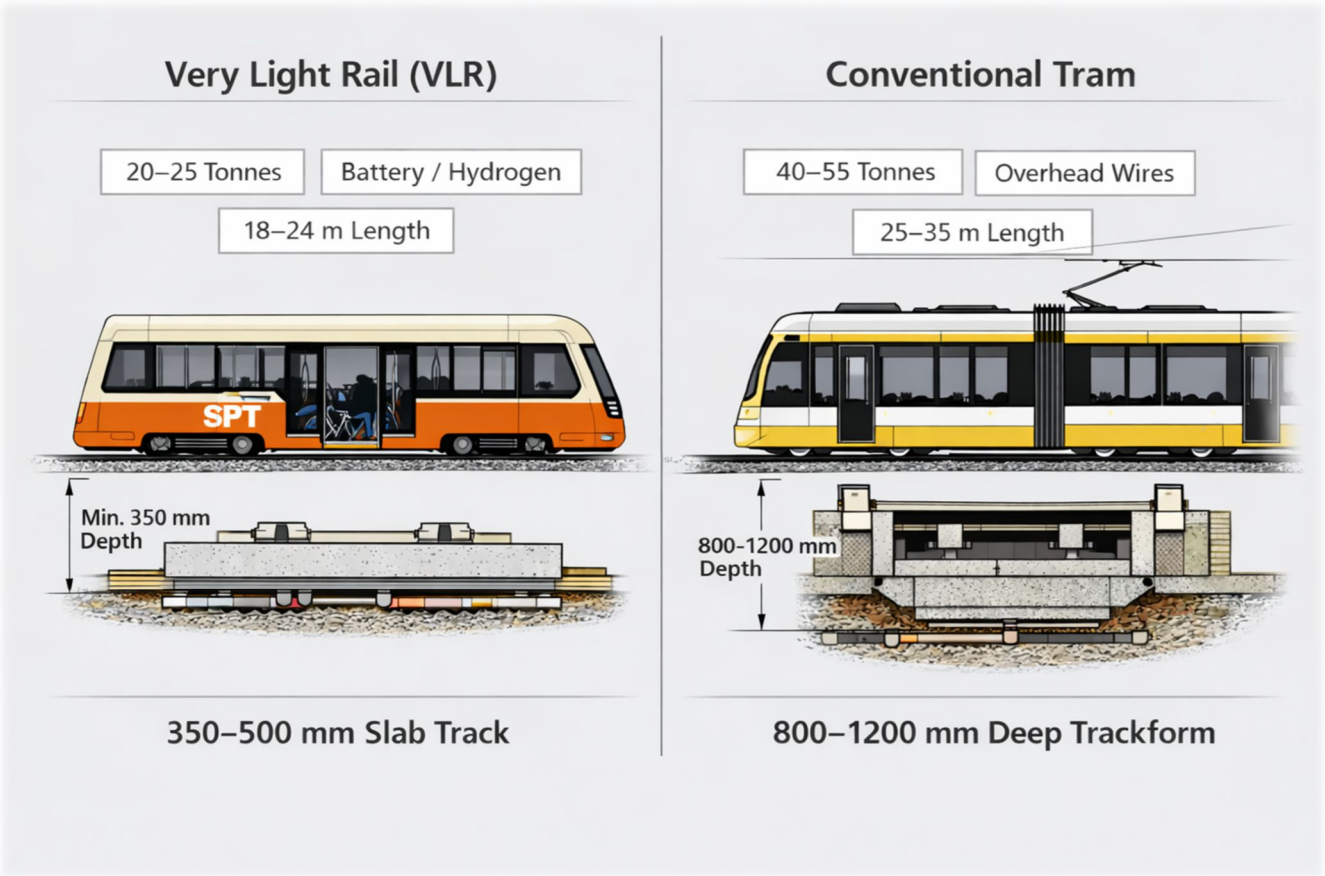
HTaaS introduces a **single-contract, OPEX-based commercial model** that functions like a **city-scale subscription service** for zero-emission mobility and hydrogen energy.

It is structured with the clarity, predictability and transactional simplicity of a modern e-commerce platform — but applied to municipal transport, energy and fleet operations.

HTaaS is not a procurement exercise. It is a **service purchase**, with the municipality buying:

- **Zero-emission kilometres**
- **Hydrogen supply**
- **Fleet availability**
- **Energy resilience**
- **Revenue-generating capability**

All delivered through one integrated platform.



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The HTaaS "Product"

HTaaS is sold as a **bundled service package**, combining:

- **Hydrogen production** (local, municipal feedstock)
- **Hydrogen storage** (pressure vessels, on-site resilience)
- **Hydrogen distribution** (refuelling for trams + municipal fleet)
- **VLR fleet provision** (vehicles, depots, maintenance)
- **Digital twin operations** (monitoring, optimisation, reporting)
- **Lifecycle management** (repairs, upgrades, end-of-life recycling)

This is a **single SKU** for the municipality: **"Zero-Emission Mobility + Hydrogen Energy System — Delivered as a Service."**

Pricing Model — Cost Per Kilometre

HTaaS uses a **simple, predictable, subscription-style pricing model**:

- The municipality pays **£X per kilometre delivered**.
- All capex is removed.
- All risk is transferred.
- All performance is guaranteed.

This brings the simplicity of software as a service to transport and energy.

Municipal Revenue Engine

HTaaS is the first mobility system that **generates income** for the municipality.

Revenue Streams Include:

- **Hydrogen sales to third-party fleets** (logistics, taxis, SMEs).
- **Hydrogen sales to regional operators** (bus, refuse, highways contractors).
- **Energy-system surplus monetisation** (solar, biogas, grid-balancing).
- **Fleet conversion savings** (diesel displacement, maintenance reduction).
- **Asset-based revenue** (land, depots, solar, waste feedstock).

*This transforms HTaaS into a **municipal e-commerce platform for clean energy**.*

In-House Fleet Conversion — Zero-Emission "Add-Ons"

HTaaS includes optional "modules" that mirror e-commerce upsell logic:

- **Municipal fleet conversion package**
- **Waste-to-hydrogen feedstock integration**
- **Emergency-resilience hydrogen storage module**
- **Third-party fleet fuelling package**
- **Digital fleet optimisation suite**

Each module is plug-and-play, priced transparently, and delivered through the same contract.

Risk Allocation — Zero-Risk Checkout

HTaaS removes all major risks from the municipality:

- **Technical risk** → provider
- **Hydrogen price volatility** → provider
- **Asset risk** → provider
- **Delivery risk** → provider
- **Lifecycle risk** → provider

*The municipality receives a **guaranteed service**, not an asset.*

Financial Benefits — The Municipal "Basket"

HTaaS delivers a combined financial package:

- **Predictable long-term OPEX**
- **No capital requirement**
- **Reduced procurement complexity**
- **Earlier carbon and economic benefits**
- **New revenue streams**
- **Lower fleet operating costs**
- **Energy independence**
- **Resilience for emergency services**

This is a **complete financial ecosystem**, not a transport project.

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Why This Model Wins

HTaaS is the first UK mobility system that:

- Works like an **e-commerce subscription**
- Generates **municipal revenue**
- Delivers **energy independence**
- Decarbonises **transport + fleet + energy**
- Removes **all capex and risk**
- Provides **guaranteed performance**
- Creates a **closed-loop municipal hydrogen economy**

*It is a **commercially transformative model**, not just a technical innovation.*

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The Benefits of HTaaS

Hydrogen Trams as a Service (HTaaS) is the UK's first **fully integrated, zero-emission, whole-system hydrogen mobility platform**, enabling rapid deployment of Very Light Rail (VLR) (MRT) without the capital, delivery or operational risks associated with traditional tram systems. HTaaS replaces the conventional "procure-build-own-operate" model with a **single-contract, OPEX-based Energy-as-a-Service framework**, delivering predictable costs, guaranteed performance and verifiable carbon reduction from day one.

HTaaS integrates **hydrogen production, storage, refuelling, fleet operations, digital optimisation and lifecycle management** into a unified service. This transforms hydrogen from a fragmented, project-by-project fuel into a **bankable, city-region-scale energy system** aligned with Net Zero 2030–2035 pathways.

A defining feature of HTaaS is its ability to transform the municipality from a **transport operator** into a **local clean-energy producer and distributor**. The model incorporates:

- **Local hydrogen production** using municipal feedstock (solar PV, waste-derived biogas, grid-connected electrolysis).
- **On-site hydrogen storage in pressure vessels**, providing resilience, peak-shaving and grid-independent operation.
- **In-house conversion of domestic rubber-tyred fleets** (waste, highways, parks, enforcement, community transport).
- **A new municipal revenue stream** through hydrogen sales to third-party fleets and local businesses.
- **A closed-loop, municipally controlled energy ecosystem** that reduces reliance on national grid volatility and external suppliers.

This integration of **transport + energy + municipal operations** creates a system that is:

- Low-carbon
- Low-risk
- Low-cost
- High-impact

HTaaS enables cities and small towns to deploy modern tram (VLR MRT) like services with:

- Minimal civil engineering
- 80% lower embedded carbon
- 18–24 month deployment timelines
- Zero tailpipe emissions
- Guaranteed availability and performance
- No public-sector capital requirement

HTaaS is already progressing with Cambridge, Leeds, Warrington, Edinburgh and the West Midlands amongst others, demonstrating market readiness and alignment with national hydrogen and clean-growth strategies. It directly addresses the three structural barriers that have historically prevented UK cities and small towns from delivering mass transit: **cost, complexity and risk**.

HTaaS is a **UK-origin innovation** with global export potential, positioning the UK as a leader in hydrogen mobility and delivering a commercially viable, technically robust and socially transformative solution for the energy transition.

Innovation

HTaaS is a **category-defining innovation** in clean transport and hydrogen energy. It is the first system to integrate the entire hydrogen value chain with a modern VLR platform and deliver it as a **single, commercially deliverable service**.

Whole-System Hydrogen Integration

HTaaS unifies production, storage, refuelling and fleet operations into one optimised platform, eliminating fragmentation and enabling predictable, bankable deployment.

Energy-as-a-Service Mobility

Cities pay only for kilometres delivered. All capex, risk and lifecycle responsibilities sit with the provider.

Very Light Rail Architecture

Lightweight vehicles and shallow-build track reduce embedded carbon by up to 80% and enable deployment in constrained urban environments.

Digital Twin Operations

Real-time optimisation of energy use, fleet health and route performance ensures maximum efficiency and reliability.

Risk-Transfer Commercial Model

HTaaS removes financial exposure for local authorities, enabling delivery without long-term asset liabilities.

HTaaS is not an incremental improvement; it is a **new delivery paradigm** for zero-emission mass transit.

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Carbon & Environmental Impact

HTaaS delivers **verifiable, high-confidence carbon reduction** across operations, infrastructure and the wider municipal fleet ecosystem.

Operational Carbon

- Zero tailpipe emissions
- 70–90% lifecycle CO_2e reduction
- Green hydrogen supply ensures full well-to-wheel decarbonisation

Embedded Carbon

- 80% reduction in embedded carbon
- Avoids deep utilities diversions and heavy concrete foundations

Municipal Fleet Decarbonisation

HTaaS enables in-house conversion of:

- Waste collection
- Highways and maintenance
- Parks and environmental services
- Enforcement and community transport

Shared hydrogen hubs reduce cost per kg and create a **whole-fleet decarbonisation pathway**.

Local Hydrogen Production & Storage

Hydrogen is produced locally using municipal feedstock and stored in pressure vessels, providing:

- Energy resilience
- Peak-shaving
- Grid-independent operation
- Emergency-response continuity

Environmental Quality

- Air quality uplift
- Noise reduction
- Biodiversity-positive corridor design

Modal Shift

- 15–25% shift from private car use

HTaaS becomes a **city-wide decarbonisation engine**, not just a transport intervention.

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Social, Economic & Regeneration Impact

HTaaS is a **place-based regeneration and municipal-finance transformation tool**.

Social Impact

- Improved access to employment, education and healthcare
- Inclusive design
- Cleaner, safer streets
- Enhanced public realm

Economic Impact

HTaaS enables municipalities to become **hydrogen producers**, generating:

- Skilled jobs
- Local supply-chain growth
- Reduced diesel and electricity procurement
- A new municipal revenue stream from hydrogen sales
- Long-term financial resilience

Regeneration Impact

- Green corridors and placemaking
- Hydrogen hubs as employment anchors
- Transit-oriented development
- Reduced congestion
- Energy resilience for critical services

HTaaS strengthens local economies while delivering equitable, low-carbon mobility.

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E. Commercial Model & Financial Case (E-Commerce Combined)

HTaaS functions like a **city-scale subscription service** for zero-emission mobility and hydrogen energy.

The HTaaS "Product"

A single bundled service:

- Hydrogen production
- Hydrogen storage
- Hydrogen distribution
- VLR fleet provision
- Digital twin operations
- Lifecycle management

One SKU: "Zero-Emission Mobility + Hydrogen Energy System — Delivered as a Service."

Pricing Model — Cost Per Kilometre

- Municipality pays **£X per kilometre delivered**
- No capex
- No risk
- Guaranteed performance

Municipal Revenue Engine

HTaaS generates income through:

- Hydrogen sales to third-party fleets
- Regional operator fuelling
- Energy-system surplus monetisation
- Fleet conversion savings
- Asset-based revenue (land, solar, waste)

In-House Fleet Conversion — Modular Add-Ons

Optional modules include:

- Municipal fleet conversion
- Waste-to-hydrogen integration
- Emergency-resilience storage
- Third-party fuelling
- Digital optimisation suite

Risk Allocation — Zero-Risk Checkout

All major risks transfer to the provider.

Financial Benefits — The Municipal "Basket"

- Predictable OPEX
- No capital requirement
- Reduced procurement complexity
- Earlier carbon and economic benefits
- New revenue streams
- Energy independence
- Resilience for emergency services

HTaaS is the first UK mobility system that **generates municipal revenue** while delivering zero-emission mass transit.

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Scalability, Replicability & Evidence of Delivery

HTaaS is designed for **national rollout** and **international export**.

Scalability

- 18–24 month deployment
- Modular hydrogen hubs
- Standardised VLR platforms
- Suitable for 50+ UK towns and cities

Replicability

- Works in historic or constrained environments
- Integrates with bus, rail and active travel
- Interoperable digital systems

Evidence of Delivery

HTaaS is progressing with:

- Cambridge
- Leeds
- Milton Keynes
- West Midlands
- Kuala Lumpar
- UK hydrogen producers
- VLR manufacturers

*HTaaS is **market-ready**, technically validated and aligned with UK Net Zero and clean-growth priorities.*

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HTaaS — The Commercial Proposition

TWO-PAGE COMMERCIAL SUMMARY

(For cabinet, board or investor briefing)

Hydrogen Trams as a Service (HTaaS) is a **subscription-based, zero-emission mobility and hydrogen-energy platform** that transforms how municipalities deliver transport, energy and fleet operations.

HTaaS is not a tram project. It is a **city-scale clean-energy business model**.

What the Municipality Buys

A single integrated service:

- Zero-emission kilometres
- Hydrogen production
- Hydrogen storage
- Hydrogen distribution
- VLR fleet availability
- Digital optimisation, Lifecycle management

One contract. One price. One accountable provider.

What the Municipality Gains

A new municipal revenue stream

Hydrogen sales to:

- Logistics fleets
- Taxis
- SMEs
- Regional operators
- Contractors

A local hydrogen economy

Using municipal feedstock:

- Solar
- Waste-derived biogas
- Grid-connected electrolysis

A decarbonised municipal fleet

Waste, highways, parks, enforcement and community transport all convert to hydrogen using the same hub.

A resilient local energy system

On-site pressure-vessel storage provides:

- Grid-independent operation
- Emergency resilience
- Peak-shaving capability

The Pricing Model

£X per kilometre delivered.

Includes:

- Vehicles
- Hydrogen
- Infrastructure
- Maintenance
- Digital systems
- Lifecycle management

No capex. No risk. Guaranteed performance.

The Financial Transformation

HTaaS converts transport from a **cost centre** into a **revenue-positive municipal asset**.

Financial benefits include:

- Predictable long-term OPEX
- No capital requirement
- Reduced procurement complexity
- New revenue streams
- Lower fleet operating costs
- Energy independence
- Resilience for emergency services

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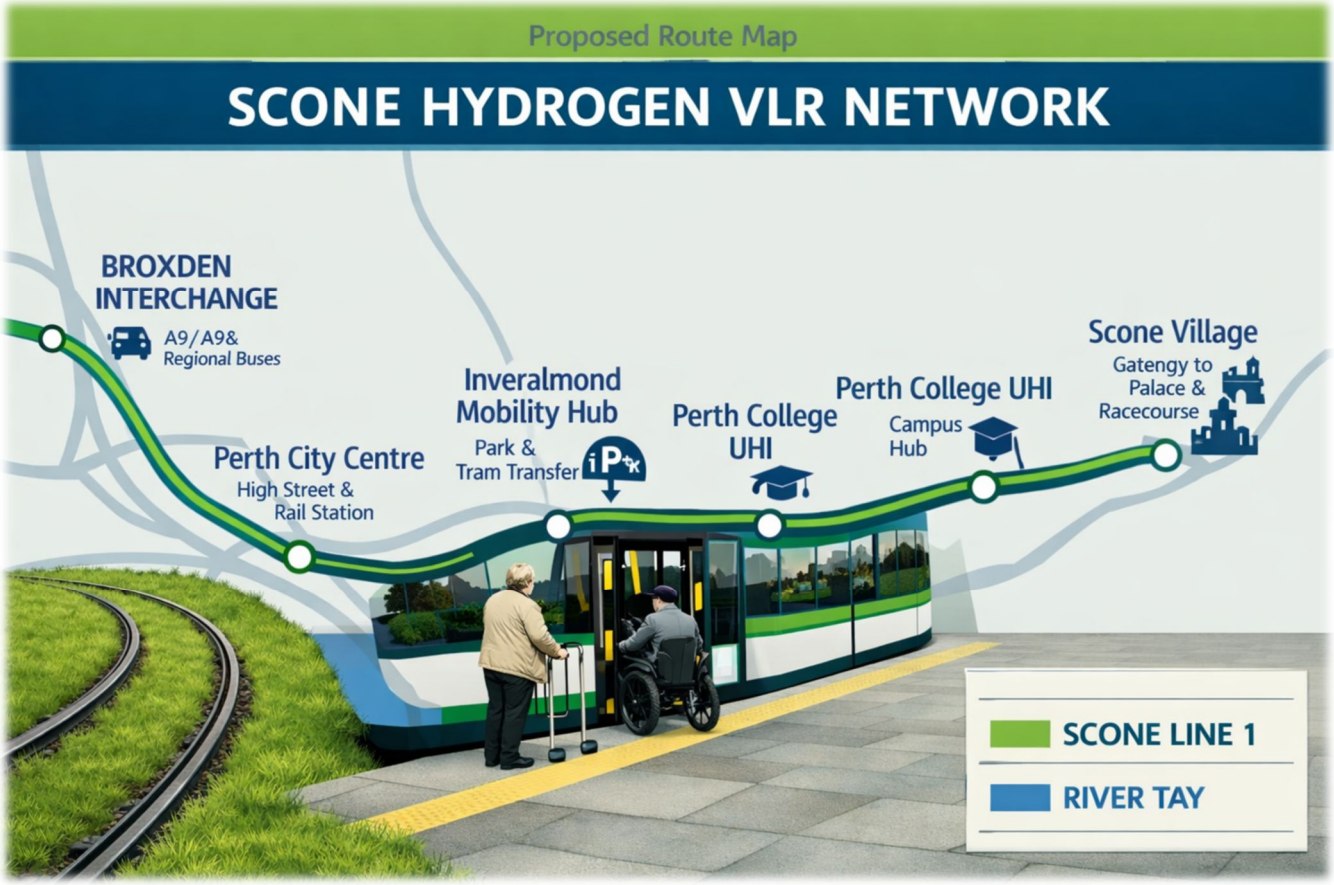
Why HTaaS Wins

HTaaS is the first UK mobility system that:

- Works like an **e-commerce subscription**
- Generates **municipal revenue**
- Delivers **energy independence**
- Decarbonises **transport + fleet + energy**
- Removes **all capex and risk**
- Provides **guaranteed performance**
- Creates a **closed-loop municipal hydrogen economy**

HTaaS is a **commercially transformative model**, not just a technical innovation.



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Commercial Model & Financial Case — E-Commerce Combined Version

HTaaS introduces a single-contract, OPEX-based commercial model that functions like a city-scale subscription service for zero-emission mobility and hydrogen energy. It is structured with the clarity, predictability and transactional simplicity of a modern e-commerce platform — but applied to municipal transport, energy and fleet operations.

HTaaS is not a procurement exercise. It is a service purchase, with the municipality buying:

- Zero-emission kilometres
- Hydrogen supply
- Fleet availability
- Energy resilience
- Revenue-generating capability

All delivered through one integrated platform.

1. The HTaaS "Product"

HTaaS is sold as a bundled service package, combining:

- Hydrogen production (local, municipal feedstock)
- Hydrogen storage (pressure vessels, on-site resilience)
- Hydrogen distribution (refuelling for trams + municipal fleet)
- VLR fleet provision (vehicles, depots, maintenance)
- Digital twin operations (monitoring, optimisation, reporting)
- Lifecycle management (repairs, upgrades, end-of-life recycling)

This is a single SKU for the municipality: "Zero-Emission Mobility + Hydrogen Energy System — Delivered as a Service."

2. Pricing Model — Cost Per Kilometre

HTaaS uses a simple, predictable, subscription-style pricing model:

- The municipality pays £X per kilometre delivered.
- All capex is removed.
- All risk is transferred.
- All performance is guaranteed.

This mirrors the clarity of software-as-a-service but applied to transport and energy.

Municipal Revenue Engine

HTaaS is the first mobility system that generates income for the municipality.

Revenue Streams Include:

- Hydrogen sales to third-party fleets (logistics, taxis, SMEs).
- Hydrogen sales to regional operators (bus, refuse, highways contractors).
- Energy-system surplus monetisation (solar, biogas, grid-balancing).
- Fleet conversion savings (diesel displacement, maintenance reduction).
- Asset-based revenue (land, depots, solar, waste feedstock).

This transforms HTaaS into a municipal e-commerce platform for clean energy.

In-House Fleet Conversion — Zero-Emission "Add-Ons"

HTaaS includes optional "modules" that mirror e-commerce upsell logic:

- Municipal fleet conversion package
- Waste-to-hydrogen feedstock integration
- Emergency-resilience hydrogen storage module
- Third-party fleet fuelling package
- Digital fleet optimisation suite

Each module is plug-and-play, priced transparently, and delivered through the same contract.

5. Risk Allocation — Zero-Risk Checkout

HTaaS removes all major risks from the municipality:

- Technical risk → provider
- Hydrogen price volatility → provider
- Asset risk → provider
- Delivery risk → provider
- Lifecycle risk → provider

The municipality receives a guaranteed service, not an asset.

6. Financial Benefits — The Municipal “Basket”

HTaaS delivers a combined financial package:

- Predictable long-term OPEX
- No capital requirement
- Reduced procurement complexity
- Earlier carbon and economic benefits
- New revenue streams
- Lower fleet operating costs
- Energy independence
- Resilience for emergency services

This is a complete financial ecosystem, not a transport project.

Why This Model Wins

HTaaS is the first UK mobility system that:

- Works like an e-commerce subscription
- Generates municipal revenue
- Delivers energy independence
- Decarbonises transport + fleet + energy
- Removes all capex and risk
- Provides guaranteed performance
- Creates a closed-loop municipal hydrogen economy

It is a commercially transformative model, not just a technical innovation.