



Clean & Green Transport (plc).

Swanwick House,
22 Towcester Road, Old Stratford,
Milton Keynes, MK19 6AQ, England
Tel (+44) (0) 07721378223, email: JimH@jimmyharkins.com



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.

Our Outline tram proposals sometimes meet with this response!

7/8/2019

Sadly, Some Politicians, Leaders of the Authorities XXX, Cllrs XXX etc., are too busy to see the tram advantages just like Hastings 1066!
(Often, they are fighting transport pollution with a NEE based solution by promoting a TramBus type which will kill many Citizens, young and old and is recorded for posterity on this site, instead of being Statesmen.

This project is stored in the National Tram Archives as part of the historical local tram story



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

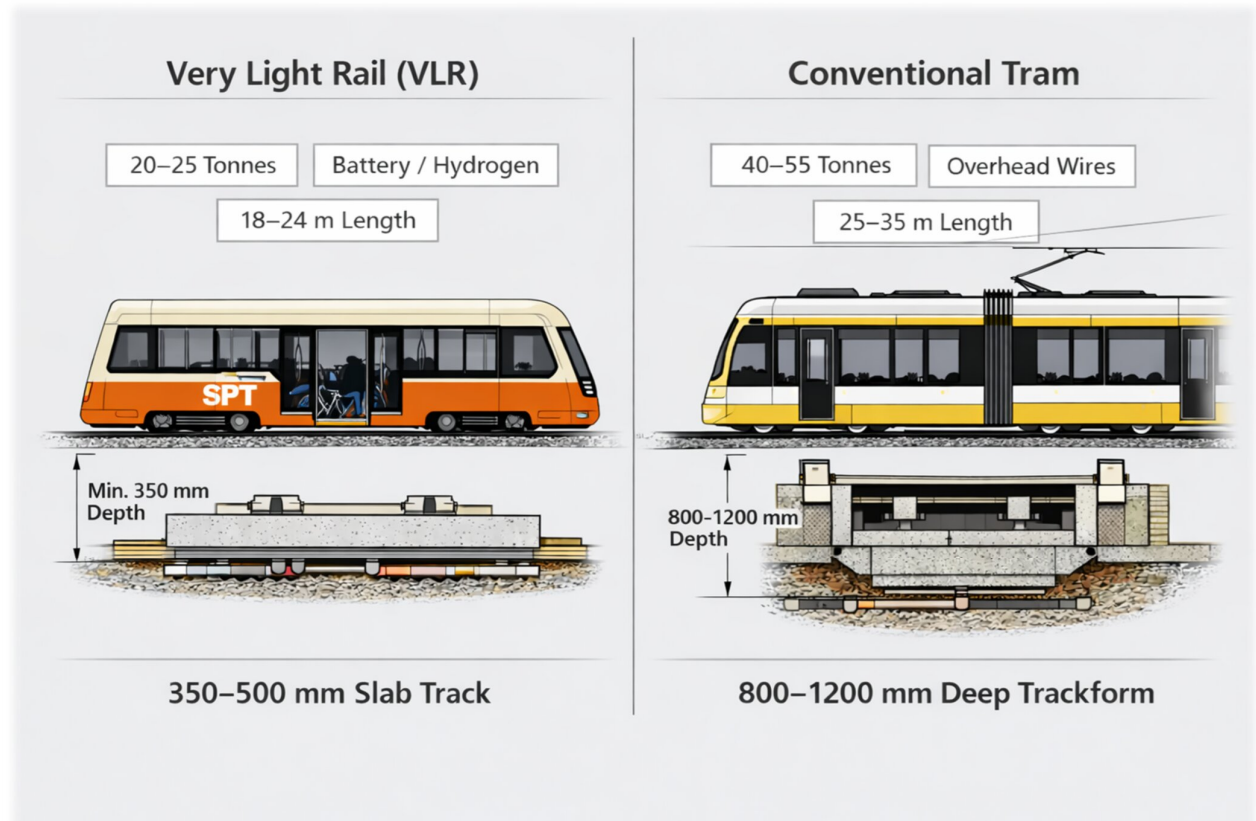
HTaaS introduces a **single-contract, OPEX-based commercial model** that functions like a **city-scale subscription service** for zero-emission mobility and hydrogen energy.

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.





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.



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.*





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.



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 CO₂e 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.





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.



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.



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 Lumpur
- UK hydrogen producers
- VLR manufacturers

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



HTaaS — The Commercial Proposition

TWO-PAGE COMMERCIAL SUMMARY

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



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.

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.

Thamesmead VLR Feeders

Benefits of VLR Feeders

- Permanent, zero-emission access
- Health, environment, compliance
- Stronger rail and retail interchange
- Lower car dependency for estates

Next steps

- Engage stakeholders (TfL, boroughs)
- Walkovers, OD surveys, load counts
- Define compliant stop designs
- Outline ridership, cost, and funding

Tramforward

Thamesmead VLR Feeders

Thamesmead VLR Feeder Options

- **Abbey Wood spine:** Connects Thamesmead estates to Abbey Wood Elizabeth Line station
- **Beckton Riverside Link:** Short shuttle to proposed DLR extension cross the River Thames
- **Internal Circulator:** A loop or linear spine serving Thamesmead estates and waterfront





The Hydrogen Package

Engine Decarbonising - Carbon Clean:

AHT's world leading technology creates cleaner vehicle emissions by using hydrogen within the internal combustion engine.

A DPF (Diesel Particulate Filter) clean refers to the process of cleaning or regenerating a DPF in a diesel-powered vehicle.

The DPF is designed to trap and remove soot and particulate matter from the exhaust gases to reduce emissions. Over time, these particles can build up in the filter, affecting its performance.

Restored Fuel Efficiency

A clean DPF allows for better engine performance and fuel efficiency since a clogged filter can restrict exhaust flow and reduce engine power.

Reduced Emissions

A properly functioning DPF effectively reduces harmful particulate emissions from diesel engines, contributing to cleaner air and compliance with emissions regulations.

Extended DPF Lifespan

Regular cleaning can help extend the life of the DPF by preventing excessive soot and ash buildup, reducing the need for costly replacements.

Restored Engine Performance

A clean DPF ensures that the engine operates at its optimal performance levels, minimising issues like reduced power and engine deterioration.

Lower Maintenance Costs

Cleaning the DPF is often more cost-effective than replacing it, helping to reduce maintenance expenses for diesel vehicle owners.



Improved Longevity

Regular maintenance, including DPF cleaning, can contribute to the overall longevity and reliability of a diesel engine.

Run on up to 80% in house Hydrogen

From £350 per diesel Vehicle subject to fleet size and minimum numbers.

Pictures artists impression only, Routes and statistic for guidance, EOM.

JimH/19/4/26/v.7

