## APTS-PHILEAS: Clean-HighTech PT-system



uud Bouwman en Maurizio Bottar 25 March 2011

How You May Live and Travel in the City of 1959 trets, say: Mi. Catlett, will be in fran levels. The tay initiate, the next level for the entry truth, the anter truth, and the level is of derive truths, the will be an anter heiding the sense in the working of the anter truth. and the level is of derive truths.











APTS\_ retransport Evolution



### **History:**

- 1994 Establishment Platform HOV Eindhoven
- 1994 1998 Technical & financial feasibility study
- 1998 Establishment of APTS
- 1999 Contract 12 Phileas vehicles for Eindhoven
- 2001 First Phileas prototype ready; start testing
- 2004 First vehicles in operation
- 2005 Contract 12 Phileas vehicles for Douai
- 2005 License agreement with KRRI Korea
- Co-operation APTS world-wide
- 2006 Contract 50 Phileas vehicles for 1stanbul
- 2007 Contract 6 Phileas vehicles for Pescara
- 2007 Retrofit Eindhoven vehicles to 2<sup>nd</sup> Generation
- 2009 Contract 4 Phileas Fuel-Cell vehicles for Amsterdam and Cologne













## **Phileas Fogg**



#### **Part I – Phileas = Tram**

- -Image, Design-Comfort
- -Capacity, Modularity
- -Driving Guided (Virtual Rail)
- -Clean, Environmentally friendly, Efficient

System names: HOV Metrobus Tram on tyres Bimodal Tram Bus/Guided Rapid Transit Intermediate Transport Tram su gomma a guida vincolata Tram sur pneus à guidage immatriel













## **Guided (Virtual Rail):**

-Comfortable -On small infrastructure (old cities) -Accurate stopping (whole length) -Safe <u>>SIL2</u> according EN50126-128-129 -Flexible (Automatic or Manual)







### Clean, Environmentally friendly:

Hybrid drive-train:

-Series Hybrid (Alstom)

-Parallel Hybrid (Allison (US))

NiMeh Battery + Cummins ISB EEV 250hp (18m)

NiMeh Battery + Cummins ISL Euro4 340hp (18 to 26m)

-Series Hybrid (Vossloh-Kiepe)

NiMeh Battery or SuperCap + Ballard Fuel-Cell

- -Trolley Hybrid (Vossloh-Kiepe)
  - **Overhead wire + Diesel-Generator**
- -Other, Phileas as development platform





\*Based on CIDI engine with state-of-the-art exhaust filter and oxidation catalyst.





### **Zero Emissions**

Demonstration FC-hybrid: -Total 2 cities in Germany/Netherlands -Total 4 vehicles of 18m (1<sup>st</sup> in the world) -4 vehicles with NiMeh battery and SuperCap



Goal: -Upgrade 18m to 24-26m FC-hybrid















### Vehicle(s) for ZERO emission transport solution:

-100% clean, possibility to use Green-Energy -In combination with battery or super-cap: \*full mobility \*flexibility (route) \*energy recuperation \*higher efficiency (then today's systems) -Less energy storage equipment then with full electrical vehicles (less weight) -Full performance (10-320 kW) -Simple system, no noise, more freedom of design, less maintenance etc.











#### **Part II-Phileas > Tram**

- -Light weight
- -Comfortable and Low energy consumption
- -Flexible (use, integration, infra)
- -Affordable system













## Light weight:

- Flexible in design
- Doors on 2 sides
- Strong and Stiff
- Light weight 4.685 kg
- Self-supporting
- Vinylester-Al-sandwich
- Recyclable
- Fire resistant









### **Flexible** (use, integration, infra):

Easy integration in city All wheel steering: -Small turning radius and swept path -Crab drive Manual or Automatic drive





# Affordable system:

63

evéole

VIE 04242

COST COMPARISON	Bus 18m	Guided Phileas 18m	Guided Phileas 24m	Tram 2-Rail 37m	
Persons per hour per direction	3,000				
Number of Vehicles	28	24	17	13	-
Length Infrastructure	11.5	11.5	11.5	11.5	km
Capacity (6p/m2)	143	143	195	345	Persons
Investments Infrastructure Investments Vehicles	44,100,000 8,960,000	48,300,000 26,400,000	48,300,000 21,930,000	105,000,000	Euro Euro
Investments Total	53,060,000	74,700,000	70,230,000	157,000,000	Euro
Km per year per Vehicle	69,000	79,000	78,000	73,000	km
Costs per km per Vehicle Costs per ticket per Vehicle	3.95 0.29	4.59 0.33	5.59 0.28	14.24 0.48	Euro Euro

#### Summary:

#### **Phileas as tram alternative:**

\*Modern Design \*Capacity as 2.2m x 30m tram (Homologated) Adaptable to customer needs \*Virtual Rail on >SIL2 safety level \*Hybrid Diesel and/or Fuel-Cell, Ext. Elect.

#### **Phileas extra advantages:**

\*33% lighter as comparable tram \*Easy integration in city All wheel steering Manual or Automatic drive \*40-50% cheaper as tram system





