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Intelligent Energy Europe

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Workshop Transports & Air Quality
Lisbon, 9th November 2006

Supported by

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3 years project : 01/01/2006 => 31/12/2008

ALTERNER (Renewable energy) / Alternative fuels

Budget : 1,4 M€ -

Partners :			
	5 national agencies	Italy	ENEA
		Greece	CRES
		Poland	KAPE
		Portugal	Lisboa e-nova
		France	ADEME (leader)
	Engine Laboratory	France	CRMT
	Technical center	France	CETE
	Main european BUS	France	RATP
	Expert decision tool	France	BR

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General Objectives

Choose best energetic pathway for urban buses is important :

- Public Transport Attractivity (improve fuel efficiency)
- City image

But more and more pathways are available :

- Diesel reference (with Diesel fuel)
- Diesel evolutions DPF, SCR (idem)
- LPG or NGV (with Natural Gas, Biogas, Hythane, Hydrogen)
- Biofuels (Ester, Synthetic, Ethanol)
- Hybrid (Diesel)

Each country or even region has also :

- its buses manufacturers or energies suppliers
- its own biofuel potentiel and biofuel preference

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General Objectives

To decide, multiple criteria need to be considered :

- Depending on real speed conditions,
- Depending on existing bus fleet considered, criteria are :
  - Pollutants emissions (regulated and unregulated)
  - Noise
  - Green Houses Gases emissions
  - Economic costs : investments, maintenance (€/km)

=> Choice is difficult:

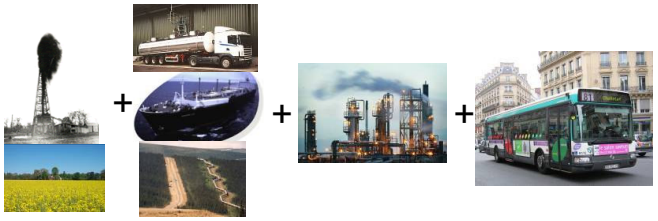
- Decisions makers are not always specialists
- Criteria are different and not comparable
- High potential pathways are often new and also more risky …

Decision Tool Definition

For all pathways

Need a Decision Tool to :

- Estimate emissions (pollutants, noise, GHG) in real conditions **without expensive measurements** from well to wheels



- Compare emissions between all pathways

Decision Tool Definition

Need a Decision Tool to :

- Valorize emissions in costs using external costs

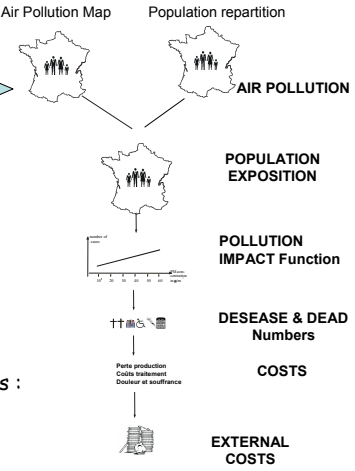
Emissions from well to wheels :

gNOx/km => €NOx/km

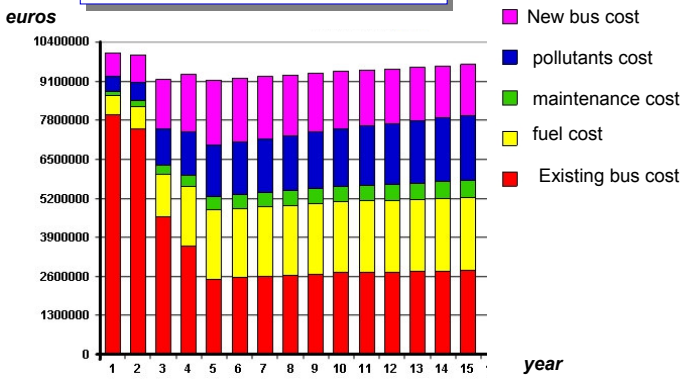
- Estimate economics costs (investments and €/km) during bus life time (10 years)

- Compare pathways using a single criteria aggregating economic and emissions costs.

- Estimate influence of parameters : fuel costs, CO_2 cost, …



Example for a bus network introduction of new NGV buses



Decision Tool Definition

Tool basis :

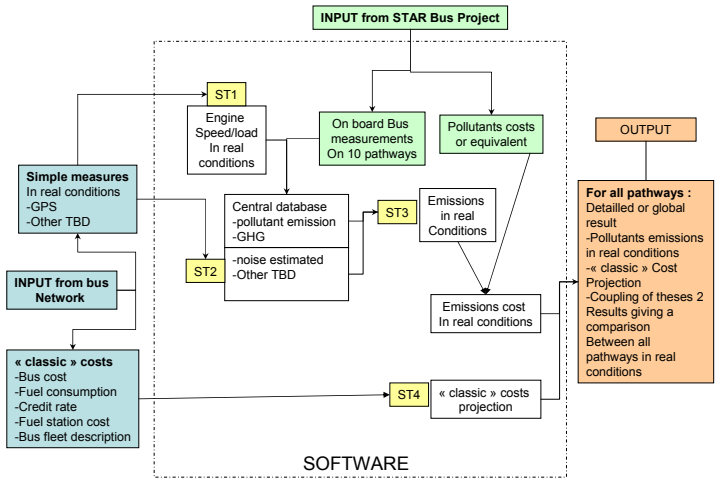
- criteria & methodology for comparison validated by futur users

- pollutants and noise database for all pathways with modern and reliable on board measurements.

- « simple » measurements definition for real cycle determination
⇒ Pollutants emissions calculation on real cycle

- pollutants costs and classic economic costs
⇒ single criteria for comparison

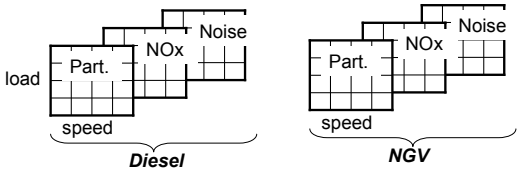
Decision Tool in details



Tool Development

During project :

On board measurments for all pathways : pollutants, GHG, noise for all engine speed and load => emissions maps



LPG, Biofuels ...

All emissions maps included in database in decision tool

Majors pathways in Europe

Pathway	*Engine*	*Fuel*	*After Treatment*
1	Diesel (Euro 0 to Euro 5 and EEV)	Diesel	serial
2	Diesel	Diesel	Retrofit : DPF, DeNOx, catalyst
3	Diesel	Biofuel RME 30%	Serial or retrofit
4	Diesel	Emulsion	Serial or retrofit
5	Spark plug : stochio or poor	NGV	serial
6	Spark plug : stochio or poor	Biogas	serial
7	Spark plug : stochio or poor	Hythane (mixture hydrogen / NGV)	serial
8	Spark plug : stochio	LPG	serial
9	Spark plug : stochio or poor	Hydrogen	serial
10	Diesel	Ethanol 95%	serial
11	Diesel with hybridation	Diesel, RME	serial

Validations :

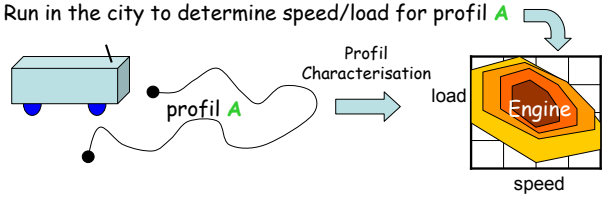
- Synthesis with UITP on european bus fleet :
  - number of bus per pathways and evolution (up or down ?)
  - Technologies : stochio or poor ?

Tool Utilisation

Example of utilisation :

Estimate emissions in a specific city profil A for pathways comparison

1. Equipe one bus (Euro 3 with automatic gearbox) with « simple » measurement : GPS + sensors (to determine) + memory stick
2. Run in the city to determine speed/load for profil A



3. Introduce profil A map in decision tool :
   For all pathways : **pollutants, GHG, noise on profil A**

Validations

Tool and methodology will validated by :

In real use :

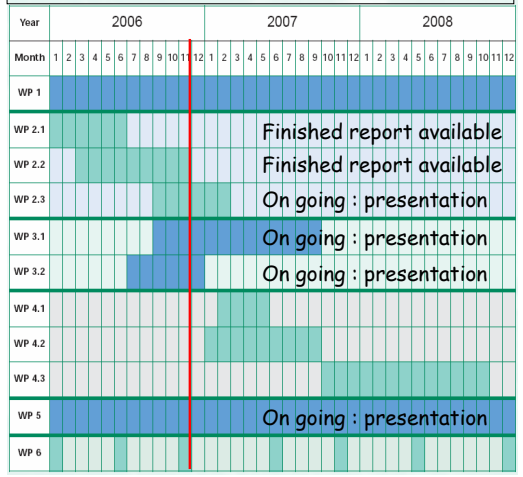
With bus networks associated with agencies :

ATL	Livorno	ENEA
ETHEL A	thens	CRES
CARRIS	Lisbon	Lisboa
to determine	?	KAPE
RATP	Paris	RATP/ADEME
VEOLIA	St Etienne	ADEME

Others users & dissemination vectors :

- UITP
- cities from Civitas
- Others stakeholders identified

Schedule



Deliverables & Conferences

Deliverables available :

- Newsletter N°1 in english, french,
- Web site : www.starbus-project.eu

Conferences :

- First conference with main stakeholders : ***to organize 03-04/2007***

- Participations to :
  - Bilbao UITP conference via RATP (October 2006)
  - Lisbon conference (9th November 2006)
  - Helsinki UITP world conference (May 2007) : *on going*
  - Lille ADEME bus national conference (Sept 2007) : *on going*

THANK YOU FOR YOUR ATTENTION !!