Irisbus Iveco and Trolleybus

Philippe Grand
Product Manager
Transport and Environmental issue

A multi dimensions problem:

- Local pollution
- Global pollution (GHG)
- Resources availability and Energetic independence

...and Noise reduction + recycling

97% of energy used by transportation industry comes from crude oil

The different solutions

There are different solutions to Local pollution (EuroIV), Global pollution (CO2), Noise and independence to crude oil:

- **Using ICE (Internal Combustion Engine):**
  1. Alternative Fuels to 100% Diesel (Emulsions, Bio fuels, Gas, Synthetic fuels)

- **Using ICE / Electric Hybrid solution:**
  1. Hybrid

- **Using Electric Power train:**
  1. Trolleybus
  2. Bus with Batteries
  3. Fuel Cell Bus
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ICE – Alternative fuels

- **From Crude oil:**
  1. Emulsion added to Diesel (water, Ethanol) Irisbus Iveco products compliant
  2. LPG (liquefied Petroleum Gas)

- **From Natural Gas:**
  1. CNG (Compressed Natural Gas) Irisbus Iveco products compliant
  2. LNG (Liquid Natural Gas)

- **Synthetic from Fossil sources:**
  1. CTL (Coal To Liquid) Projects planned
  2. GTL (natural Gas To Liquid) Projects planned

- **Bio Fuels:**
  1. FAME (Bio Diesel) Irisbus Iveco products compliant
  2. Ethanol
  3. Bio Gas Irisbus Iveco products compliant

- **Synthetic from Biomass:**
  1. BTL (Biomass To Liquid) – second Bio fuel generation Projects planned
  2. DME (DiMéthyléther)
  3. Methanol

- **Hydrogen**
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Regarding electric Hybrid solutions:

Irisbus has got an interesting experience and has already provided customers with Hybrid buses:

→ Diesel electric Civis
→ Series Hybrid Midibus Europolis
→ Series Hybrid 12 meters long citybus
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Electric Buses – Irisbus Iveco Products

Cristalis Trolleybus

Main characteristics:
- Integral low floor
- **Alstom** power train
- 80 kW Motors inside wheels (2 for 12m, 4 for 18m)
- Electric doors
- 65 kW APU
- Air Conditioning

In operation or ordered:
- **Lyon (F):** 113 (12m and 18m)
- **Saint-Etienne (F):** 11 (12m)
- **Limoges (F):** 15 (12m)
- **Milan (I):** 10 (12m)
Electric Buses – Irisbus Iveco Products

Civis Tram on tires

Main characteristics :
- Same as Cristalis

and ...
- Central driving position
- Optical Guidance provided by Siemens

In operation
- Las Vegas (USA): 10 (18m)

Ordered
- Bologne (I): 49 (18m)
- Valencia (E): 3 (12m)

Guidance system can be installed in CITELIS
Citelis Trolleybus: Skoda 24 Tr Irisbus

- Length / width / height: 11 990 / 2 500 / 3 500 mm
- Entrance step: 330 mm
- Max. speed: 65 km/h
- Number of seats: 30
- Standing passengers: 69
- Traction motor: Asynchronous 210 kW
- Traction power: AC propulsion with IGBT technology
- Heating: Water heating with heat exchanger
Electric Buses – Irisbus Iveco Products

Citelis Trolleybus: Skoda 25 Tr Irisbus

- Length / width / height: 17 800 / 2 500 / 3580 mm
- Entrance step: 330 mm
- Max. speed: 65 km/h
- Number of seats: 45
- Standing passengers: 110
- Traction motor: Asynchronous 240 kW
- Traction power: AC propulsion with IGBT technology
- Heating: Water heating with heat exchanger
Electric Buses – Irisbus Iveco Products

Citelis Trolleybus : Astrabus

- **Length / width / height**: 11 990 / 2 500 / 3 500 mm
- **Entrance step**: 330 mm
- **max. speed**: 65 km/h
- **Number of seats**: 30
- **Standing passengers**: 69
- **Traction power**: DC propulsion
<table>
<thead>
<tr>
<th>Model</th>
<th>Ordered</th>
<th>which are delivered</th>
<th>Countries</th>
</tr>
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<tbody>
<tr>
<td>Cristalis / Civis trolleybus</td>
<td>201</td>
<td>149</td>
<td>France, Italy, Spain</td>
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<tr>
<td>Citelis Skoda</td>
<td>334</td>
<td>93</td>
<td>Czech Republic, Slovak Republic, Romania, Latvia</td>
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<td>Citelis Astrabus</td>
<td>125</td>
<td>75</td>
<td>Romania</td>
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<td>660</td>
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Electric Buses – Irisbus Iveco Products

Electric Europolis

Main characteristics :
- 7,4 m long Midibus with Integral Low Floor
- **Ansaldo** electric drive
- 140kW asynchronous motor
- 8 **Zebra** batteries (Sodium-Nickel-Chloride) of 38 Ah each
- Ramp for disabled people
- 42 to 48 passengers
- **120 km autonomy** in urban conditions. Charging time 9 hours

In operation :
- Lyon (France): 5
- Saint-Denis (France): 1

Ordered :
- Regione Campania: 22 (+19)
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Electric Buses – Irisbus Iveco Products

Fuel Cell experimentation

Main characteristics:
- 12 meters long Hybrid Fuel Cell Cityclass bus
- Low Floor
- Ansaldo electric drive
- Lead-acid batteries
- 62 kW Fuel Cell system
- 200 bars compressed hydrogen storage system

In experimental operation:
- Turin (Italy): 1
- Madrid (Spain): 1
History of trolleybus in Lyon
History of trolleybus in Lyon

- **1882**: The first trolleybus of Siemens / Halske in Germany
- **1888**: The first trolleybus in the US
- **1900**: Lombard-Gerin from Lyon created the Electrobus in France. No real success
- **1905**: New version with 2 current collectors. Operation stopped in 1906 after an accident
History of trolleybus in Lyon

• **1932-1939 New birth.** 20 new Vetra CS60 replaced the old trams. In 1935 creation of two lines where slope is important. During the first 6 months of operation, the number of clients increased by 18.25%. The average speed is increased by 65%.

• **1940-1945 World war period.** New lines are created due to the lack of petrol. New trolleybus Vétra B41 are built. In 1945, there are 5 trolleybus lignes and 53 trolleybuses
History of trolleybus in Lyon

• **1946-1959 Great success.** Lines where trams are operated are replaced with trolleybuses. Introduction of Vétra B47, B48, Berliet VA3 (12m, 3 axles). In 1956 trolleybus have replaced all the Trams. In 1958, there are 344 trolleybus, 21 lines, 8 depots.
History of trolleybus in Lyon

- **1960-1969 Bad period.** The Diesel bus are progressing (better performances). Some trolleybus lines are dismantled. Only 6 lines are still in operation in 1971

- **1970-1975 Survivance period.** 115 Berliet VA3B2 are operated on the 6 lines. At the end of 1975, only 103 trolleybus are operated
History of trolleybus in Lyon

- **1976-1990.** The VA3B2 are 20 years old. In 1977, delivery of the first series ER100 with APU. In 1981: ER100H (chopper). 8 lines, 143 trolleybuses (110 ER100, 26 ER100H, 7 VBH)

History of trolleybus in Lyon

- **From 1999.** Remplacement of old trolleybuses of line 6 (MAN Kiepe) in 2000. In 1999, order from Sytral of 67 Cristalis (55 ETB12 + 12 ETB18)
History of trolleybus in Lyon

Tramway → Trolleybus  Trolleybus → Diesel Bus
History of trolleybus in Lyon

- From 2006, extension of trolleybus dedicated lines C1, C2, C3
Thanks for your attention

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