Citadis X05 sustainable performance

Citadis X05, the latest Citadis generation, is designed applying Alstom ecodesign processes and sustainability performance criteria.

Citadis is an undisputed reference on the Light Rail Vehicle worldwide market with over 2300 vehicles ordered by more than 50 cities.

Citadis X05 for Sydney

Alstom, as part of the ALTRAC consortium, was chosen by Transport for New South Wales to design, commission and deliver the new integrated light rail system in Sydney . Sustainability benefits include:

- Reduction of energy requirements
- Use of recyclable materials (aggregate concrete)
- Light rail vehicle tailored to the customer's needs with high-end passenger comfort

Energy saving

- 25% less consuming than previous generation
- Permanent magnet motors & enhanced electrical braking
- Optimised auxiliaries management (Heating, ventilation and Air-Conditionning system, sleeping modes)
- 100% LED lighting
- Ecodriving option*
- Ecomode option**

Circular economy

- 99% recoverability (ex.: replacement of polyester by thermoplastic components)
- Improved Life Cycle Cost (11% improvement in global maintenance)
- Citadis Ecopack (option)*** contributing to increased life duration of on-board autonomy solution

Ecofriendly materials

- Infusion technology front end for decreased Volatile Organic Compounds (VOC) emissions
- Water-based paints / coatings

Accessibility

- Enhanced accessibility
- Wider corridors
- Dedicated areas for wheelchairs & strollers
- Double doors along the tram (option)

Urban integration

- Low noise emissions
- Improved front end shape to enhance pedestrians safety
- Catenary less (option) with Citadis APS and / or Ecopack

** Driver assistance solutions to optimise traction energy consumption*
*** Light on-board solution allowing energy braking storage*
**** Latest full on-board energy storage solution allowing catenary free operation*

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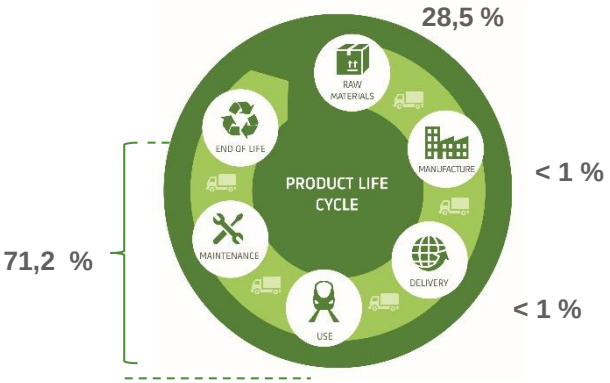
TECHNICAL INFORMATION, ASSUMPTIONS AND CALCULATIONS

Assessment of the environmental impacts throughout the life cycle

This analysis reflects the contribution of each environmental impact throughout the life cycle of the product system studied and allows to determine priorities for design.

Main environmental priorities highlighted include:

- use of clean materials and substances, reduction of materials consumption;
- energy efficiency and savings, noise, vibration and air emissions reduction of transport solution;
- maintenance with clean materials and non-chemical agents;
- end of life management and recyclability optimisation.

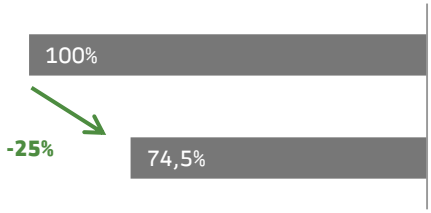


Life cycle analysis performed on Aubagne (France) mission hypothesis, with a 30 years operation and an average of 60 000 km/year.

Reduction of energy consumption

Our 2020 commitment: reduction of energy consumption of our solutions by 20% by 2020.

Defined as average variation of energy consumption for free for tender reference solutions in Wh / pass.km vs baseline 2015.



- Pattern: 9960 m; 19 stations; 20 s stop at station
- Round trip; acceleration, deceleration and average speed fixed
- Power: 750 VDC; 100 % Regenerative braking; Single Train run
- Environmental conditions (Heating, Ventilation and Air Conditioning): EN 14750

Alstom sustainability and ecodesign approach aims at developing environmentally friendly solutions controlling and decreasing environmental impacts of solutions while improving their social and societal benefits. It includes:

- *a network of more than 100 experts,*
- *definition of ecodesign objectives at early stage of product development and documentation of performance,*
- *ISO 14001 certification for manufacturing sites.*

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