FOR ALL THE TRAINS IN THE WORLD

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ERESS Forum

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Faiveley TRANSPORT

Agenda

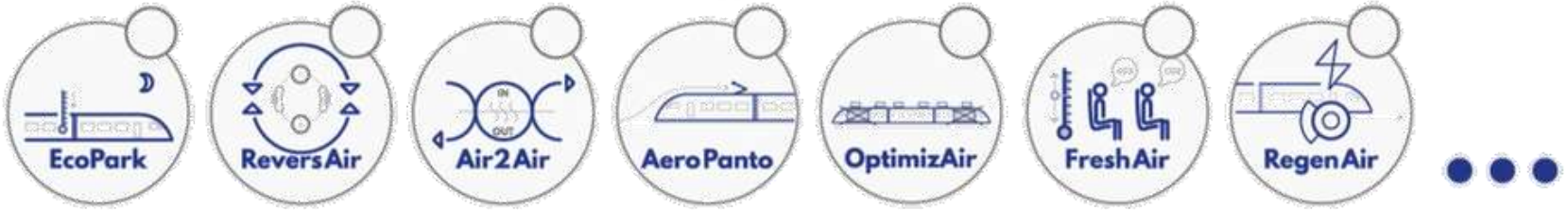
Introduction Video – Energy Efficiency by Faiveley Transport

Catalog of Solutions and Application Cases

- Catalog
- References
- EcoPark: case study – SNCF installation

Conclusion - Simulation

Energy Efficiency



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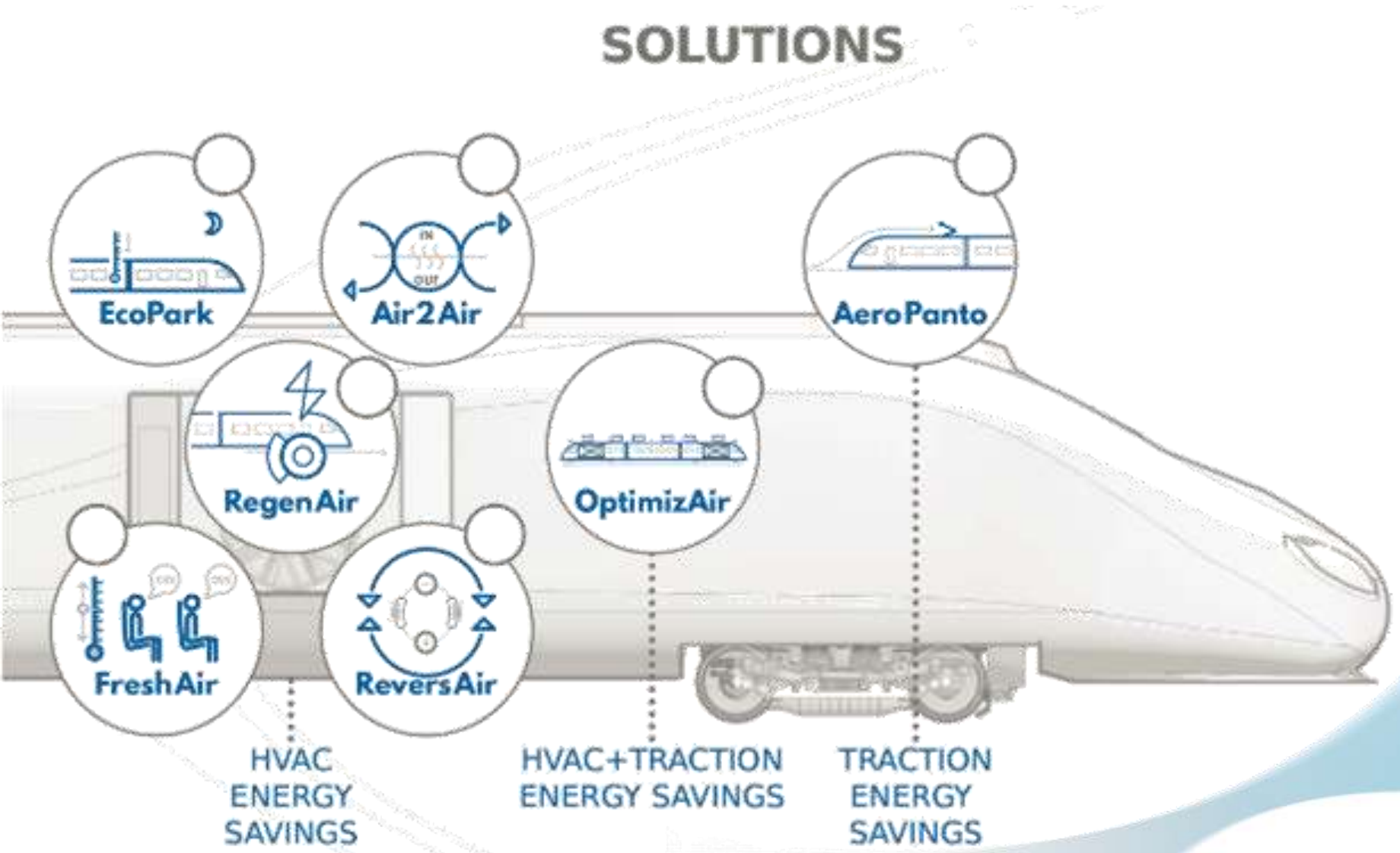
Energy Efficiency Catalog



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Ecopark®

« Plug and play » equipment allowing to modulate any HVAC intensity (heating or cooling), in particular to better manage parking phases

- No problem of **train availability**
  > Even in case of failure, normal HVAC behavior is not impacted
- **No maintenance**
- **Non intrusive, easy installation**
  > Installation in less than 1 hour, no heavy modification, auto-powered.
- **Compatible** with all HVAC suppliers
- Allow **peak loads management** for trains equipped with TCMS/during operations
- **1-2Y ROI**

Investment level	+
Technical Intrusivity	+
Energy Savings (up to)	**20%**
Solution availability	**Short term**

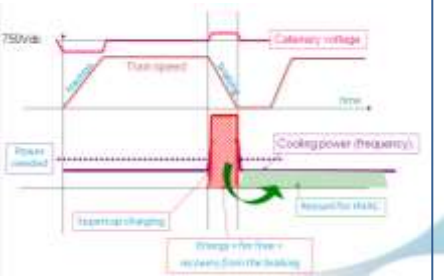
PATENTED

RegenAir®

Allows the synchronization of the HVAC function with the train operation phases (accelaration/braking) to benefit from the regenerative braking energy at disposal

- **Limit the ohmic losses** in the catenary
- Suitable **even if trains are equipped** with traction regenerative braking technologies
- Different implementation levels, **from speed indication up to full version with storage capacity**
- Efficient not only at train level, but **maximizes effects at fleet level** (operation synchronization)

PATENTED



Investment level	++
Technical Intrusivity	+++
Energy Savings (up to)	**60%**
Solution availability	**Medium term**

OptimizAir®

Integration of the auxiliary converter within the HVAC system, increasing its efficiency thanks to variable frequency, and lowering the HVAC/APS combined weight along with better on board distribution

- Proven technology
- **References** (MWM, X60, Citadis,…) > 20% of Faiveley HVAC installed base
- Better **working conditions** (reduced condensing temperature, increased evaporation temperature)
- limit start and stop cycles, providing **increased reliability**
- heater control using static switch > better **LCC & regulation**

Investment level	**++**
Technical Intrusivity	**++++**
Energy Savings (up to)	**10%**
Solution availability	**Available**

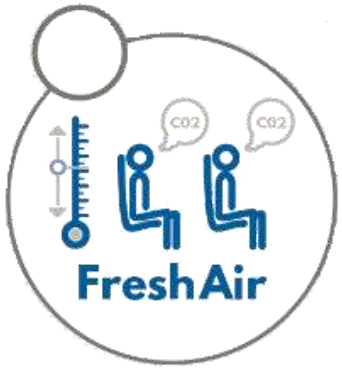
Faiveley: n°1 HVAC & APS supplier

Air2Air®

Recovery of the energy created by the exhaust air flow to pre-heat or pre-cool the incoming fresh air

- Proven technology
- **References** (Norway, Finland): max efficiency in heating mode
- Suitable in particular for **extreme conditions** regions & **highly occupied** routes

Investment level	**++**
Technical Intrusivity	**++++**
Energy Savings (up to)	**30%**
Solution availability	**Available**



FreshAir®

CO2 sensors allowing to regulate the HVAC accordingly to the number of passengers on board at any point in time

- Proven technology
- **References** (switzerland, finland, netherlands, poland, shanghai…)
- Important savings for trains with high variations in pax loading (**trams, metros**..)
- **benefit in both heating & cooling** modes

Investment level	+
Technical Intrusivity	+
Energy Savings (up to)	**30%**
Solution availability	**Available**

Suitable for any HVAC module

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ReversAir®

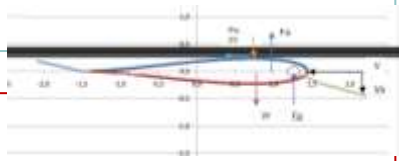
Heat pump system replacing electrical heaters, via HVAC cooling circuit inversion

- Proven technology, **extensive test trials** have demonstrated an impressive efficiency
- **References** Dosto NS, Flirt NSB, Dosto SBB

Investment level	**++**
Technical Intrusivity	**+++**
Energy Savings (up to)	**40%**
Solution availability	**Available**

AeroPanto®

Pantograph optimized to reduce its aerodynamic impact through new coating, aeroflaps and lowered roof distance



- Set of innovation by the world leader in high speed pantographs:

> **New aeroflap design** to decrease the drag effect
> Innovative **coating to reduce the wake effect** behind the pantograph arm
> **Removal of insulators** to lower pantograph base by up to 20cm

Investment level	**+++**
Technical Intrusivity	**++++**
Energy Savings (up to)	**10%**
Solution availability	**Under develop.**

Huge savings on Traction energy

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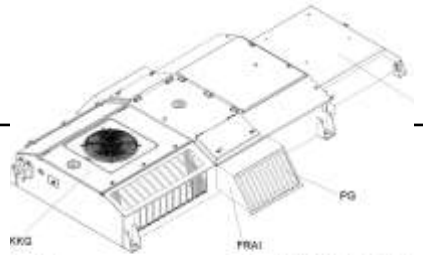
In Service Projects (select.)

Project	Country	Solution	
FLIRT	CH, PL, F, I, HU,	FreshAir®	 
FLIRT	FIN	Air2Air® FreshAir®	
DDZ Refurbishment	NL	ReversAir®	 
FLIRT	N	ReversAir® FreshAir® Air2Air®	 
BR 407 Velaro D	D	FreshAir®	 
DOSTO SBB	CH	FreshAir® ReversAir®	

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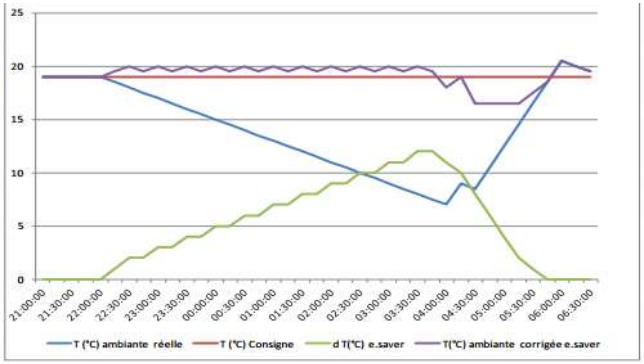
EcoPark® - Case study

Z2N SNCF's rolling stock for the trial period

Full cooperation between FT teams, Technicentre and CIM

EcoPark® installation inside a lighting panel



- Successfull implementation within a constraint timeframe
- First results on heating consumption reduction during parking phase (without impact on the service) are exceeding previsions
- Full trial to last until next winter

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Simulation - Example

Enter main parameters:
Network/Rolling Stock/Operations

Select the solutions

See the results

Go!

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