GREEN AIR SOLUTION
R290 technology

THE IDEAL NATURAL REFRIGERANT SOLUTION
Wabtec Green Air Solution are HVAC units using R290 refrigerant. It is an ideal environmentally friendly alternative to synthetic refrigerant solutions.

For all climatic zones
For most types of railway vehicles
Available for new builds, as well as aftermarket applications
Efficient heat pump option available
Similar cooling performance as existing synthetic refrigerant-based solutions with same train power supply

KEY CUSTOMER BENEFITS
- Dramatically reduces the global warming impact vs standard synthetic solutions
- High-energy efficient natural refrigerant solution
- Cost efficient
- Easy-to-switch technology (from other existing standard synthetic solution)
- No obsolescence risk
- Technology proven
## TOPIC

### GWP and Obsolescence

<table>
<thead>
<tr>
<th>Refrigerant</th>
<th>GWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>R22</td>
<td>1810</td>
</tr>
<tr>
<td>R134a</td>
<td>1430</td>
</tr>
<tr>
<td>R513a</td>
<td>631</td>
</tr>
<tr>
<td>R290</td>
<td>3</td>
</tr>
</tbody>
</table>

- Low GWP vs synthetic alternatives

### Cost Efficiency

- 10% weight savings (80kg/unit) measured vs CO₂ on regional train application
- Lower filling charge (for R290 reduction of approx. 50% expected vs. R134a)
- R290 predictable sourcing price

### Technology Switching Aspect

- Similar pressure level in cooling circuit vs synthetic solutions
- Similar train auxiliary power supply needed vs synthetic solutions
- For most applications identical mechanical interfaces work for R290 and synthetic with same capacity

### Energy Efficiency

Coefficient of performance (COP) over ambient temperature for a theoretical unit: similar performance vs R134a and better than CO₂ (R744) and Air-cycle (R729)

### Technology Proven

- Checked and tested by internal and external experts (e.g. BAM/TÜV)
- Units running in daily passenger operations since July 2020 with the Deutsche Bahn