



RTA
Climatic-Wind-Tunnel
Vienna

Cross fertilisation between ground transport and aviation in the field of
severe weather conditions

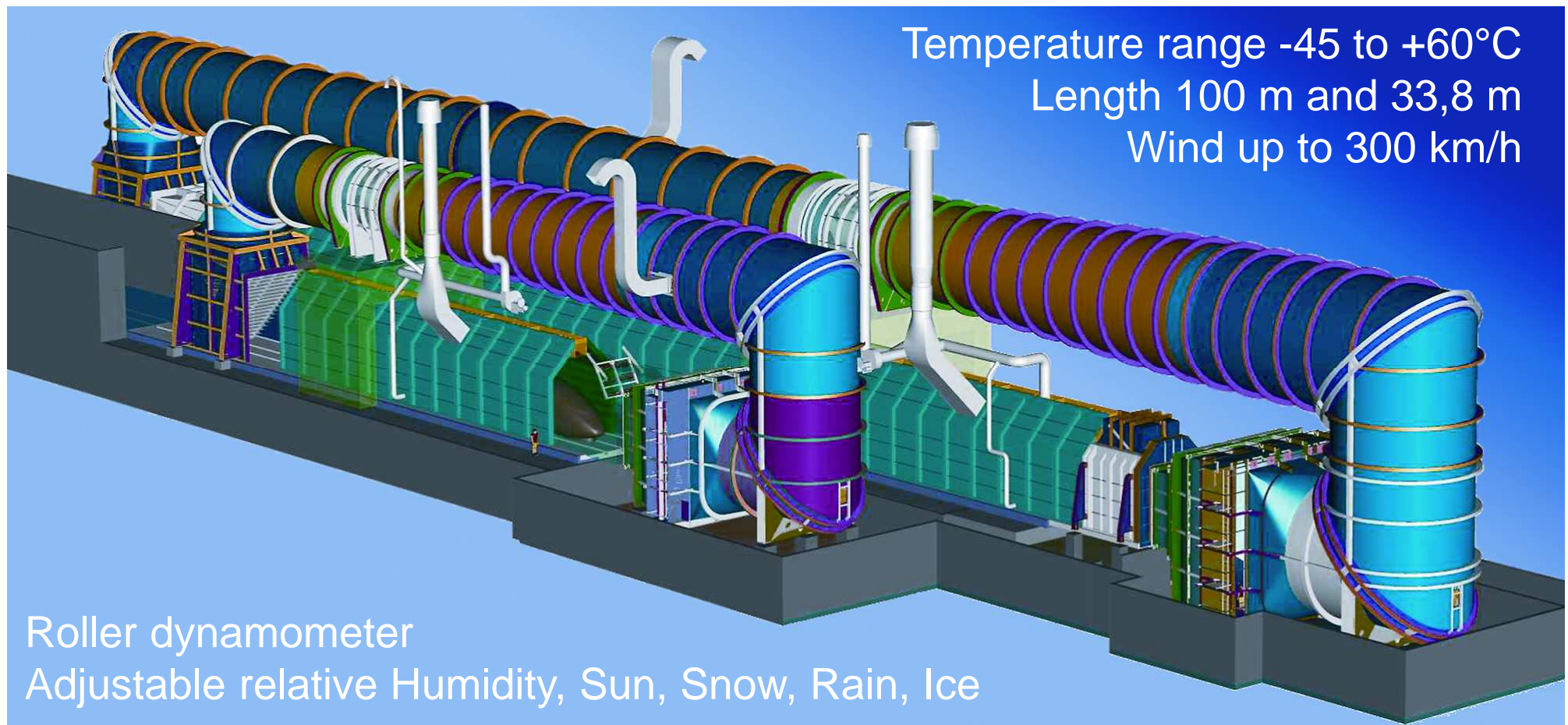
AirTn at NLR May 2016

History

- ▶ Climatic tests for rail vehicles in Vienna's Arsenal since 1961
- ▶ New facility built at a new site in Vienna
 - 1999 completion of contract
 - 2000 - 2002 construction phase
 - 2003 start of CWT operation
 - 2013 IWT construction phase
 - 2014 start of IWT operation

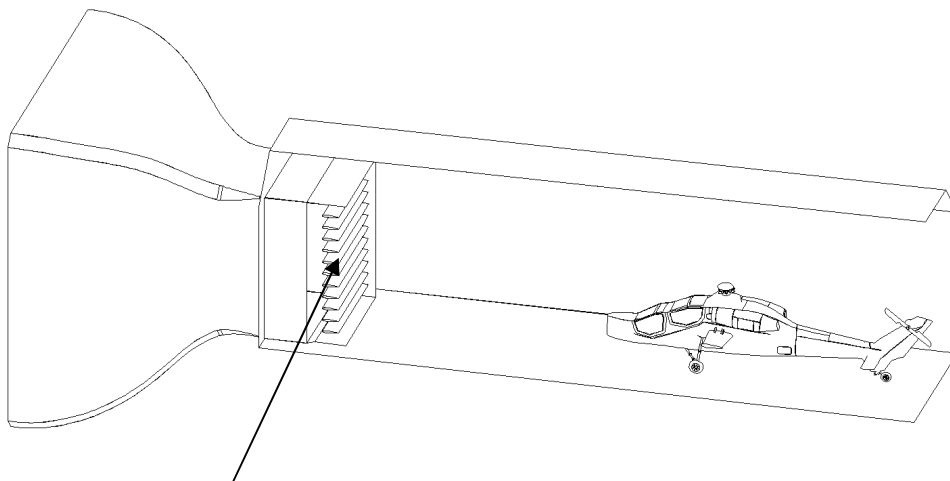


System

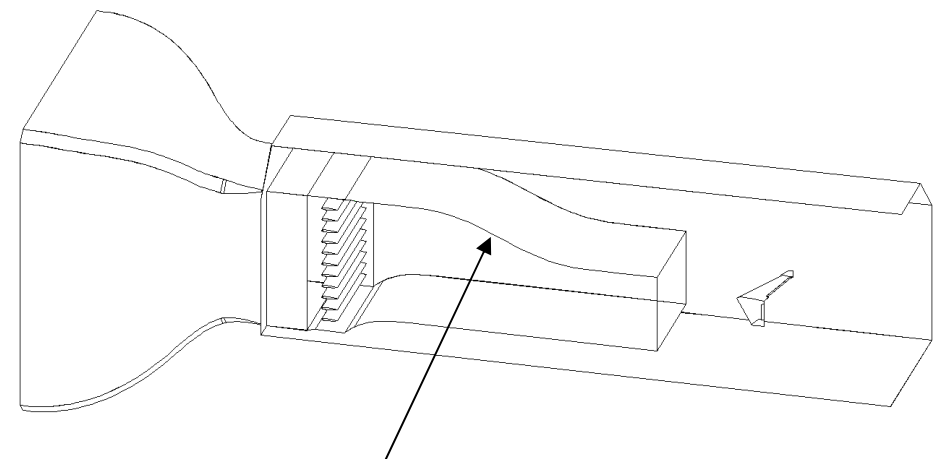


Icing Wind Tunnel Vienna

- ▶ Full cross section 16.1 m²
- ▶ Especially for huge test objects (up to 20 m/s)
- ▶ Distance to the test object 11,5m
- ▶ Reduced cross section 8.75 m²
- ▶ Especially designed for higher wind speed requirements up to 80 m/s
- ▶ Distance to the test object 11,5m



Spraying rig with 11 bars and 264 nozzles



Additional contraction nozzle

Icing Rig with mobile contraction nozzle



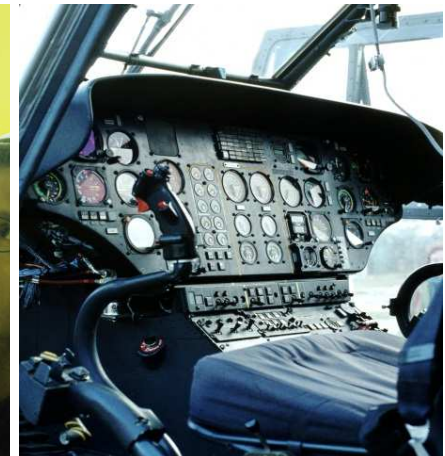
Company

- ▶ Accredited test laboratory
- ▶ Internationally known experts for climatic testing
- ▶ Consulting, testing, certifying
- ▶ Neutral and independent

Testing fields

At Rail Tec Arsenal, seasons change on demand

- ▶ Rail Vehicles
- ▶ Road Vehicles
- ▶ Aviation
- ▶ Technical Systems



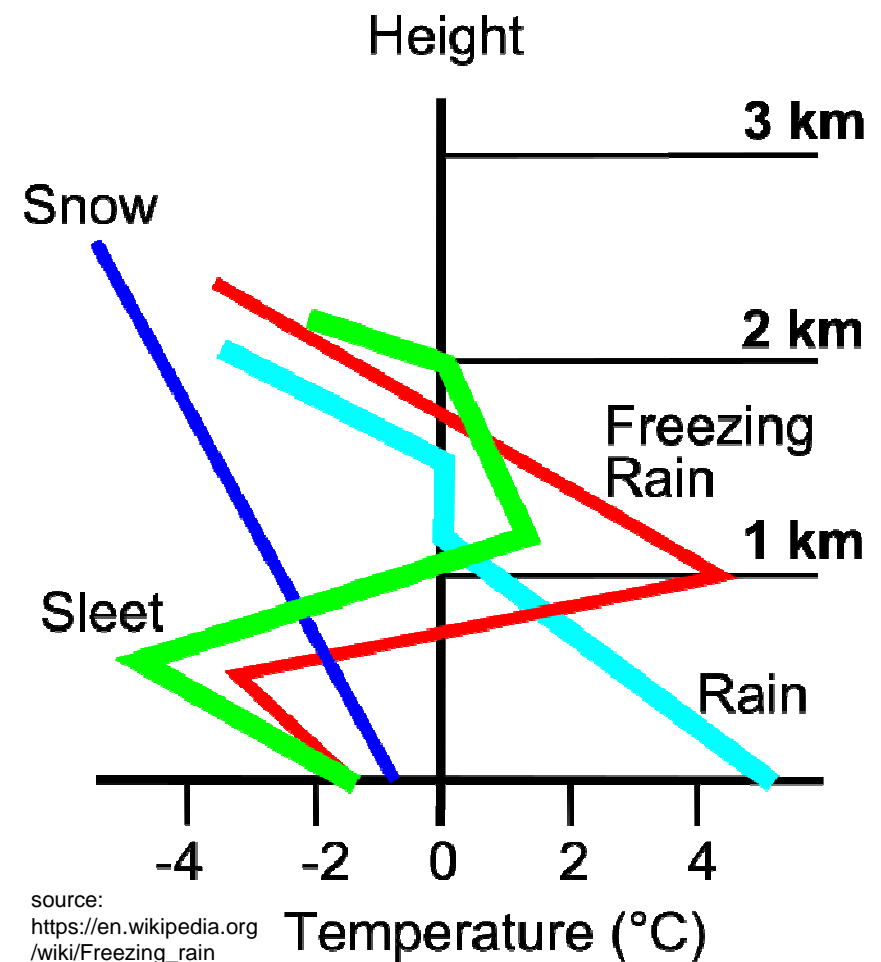
Services for Aviation

- ▶ Engine cold start tests at low temperatures
- ▶ HVAC system tests
- ▶ Tests of components under extreme temperature and solar radiation
- ▶ Snow and Icing tests



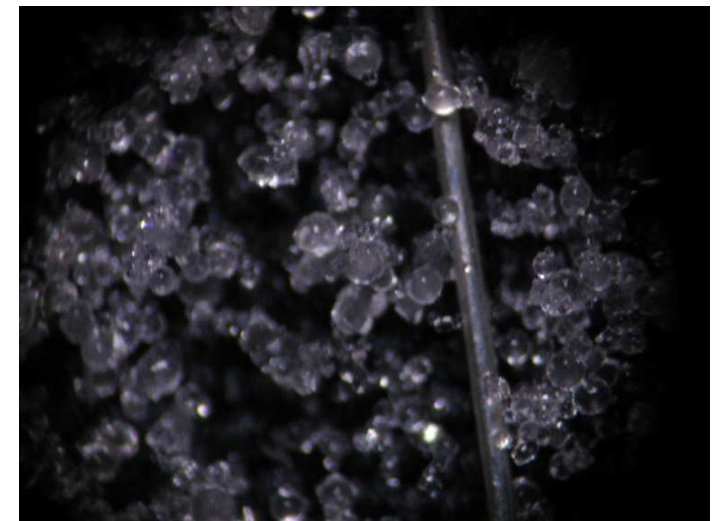
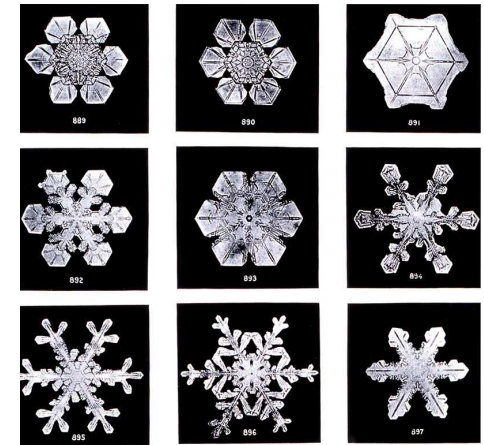
Freezing rain / Ice Pellets (Sleet)

- Ambient Temperature: -10°C
- Rainfall: $\sim 28\text{mm/h}$
(middle to high rainfall)



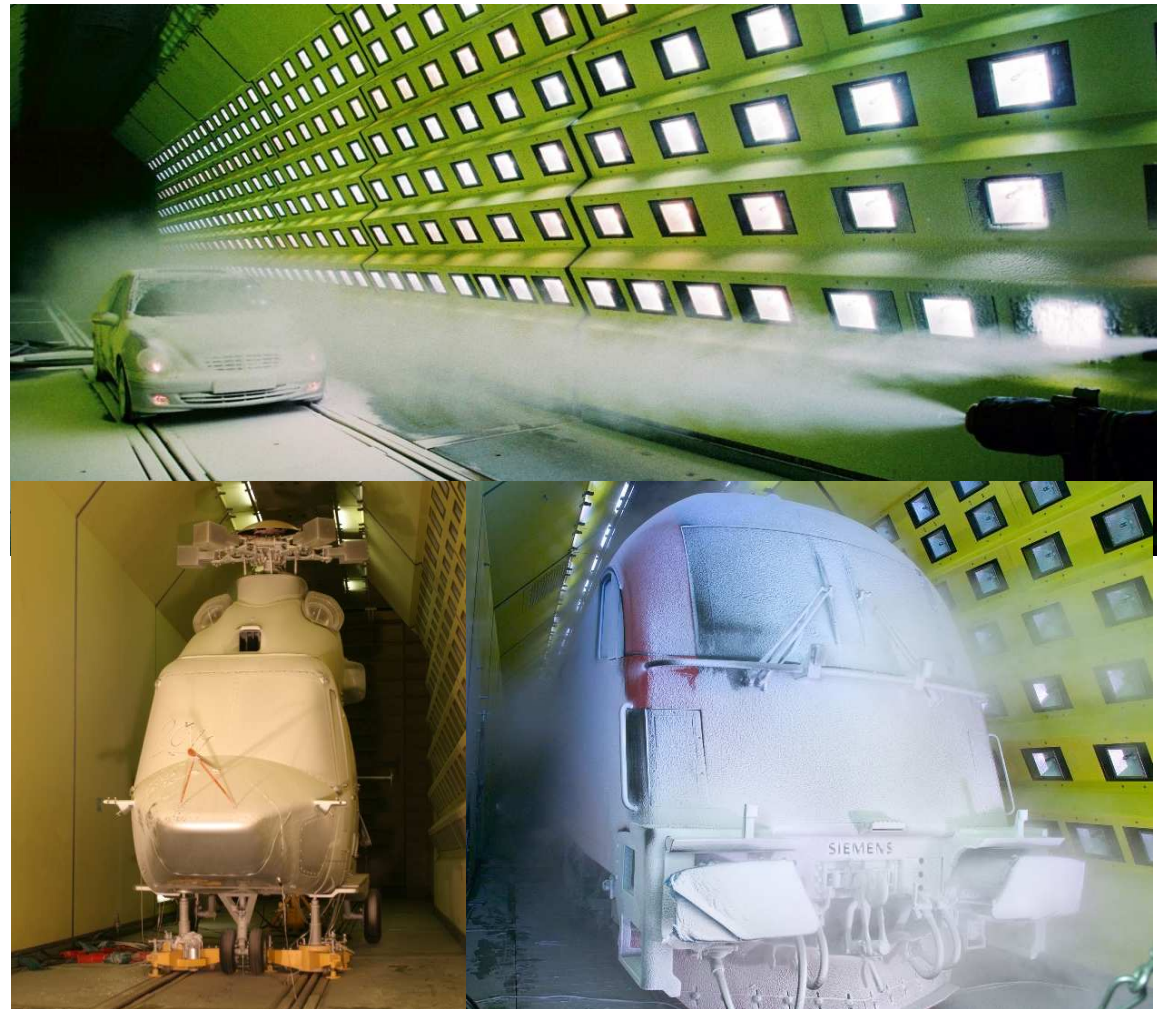
Snow

- Ambient Temperature:
< -18°C
- Snow density:
180 – 480 kg/m³
- Dry snow (powdery)
- Wet snow (fresh, granular)



Dry Snow

- Ambient Temperature: -10°C
- Snow density: $180 - 220 \text{ kg/m}^3$
- MVD: $\sim 30 \mu\text{m}$

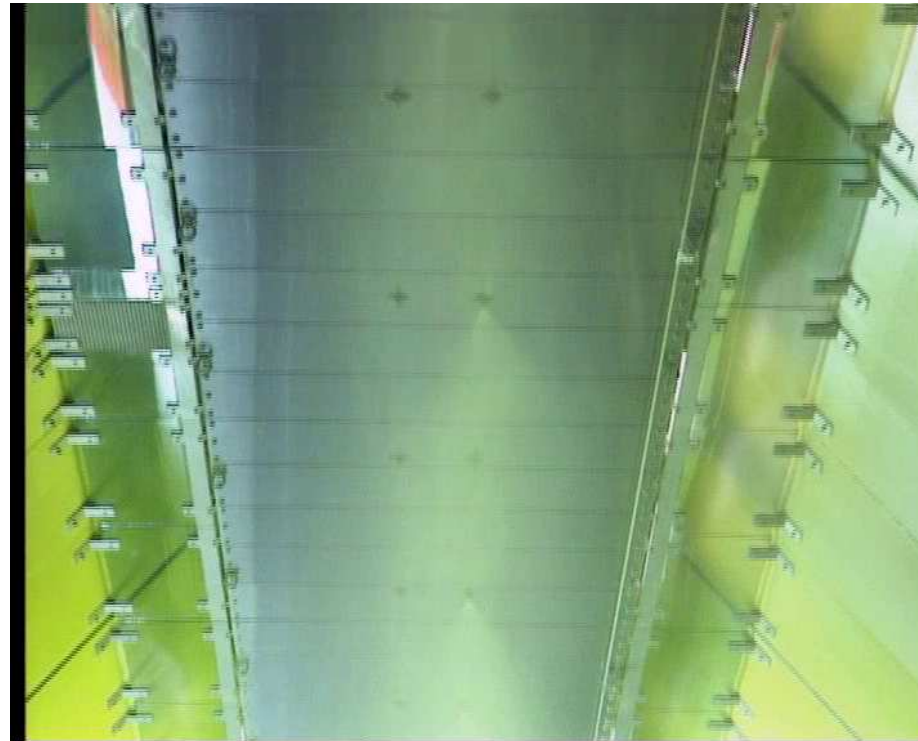


Wet Snow

- Ambient Temperature: -5°C
- Snow density: $400 - 480 \text{ kg/m}^3$
- MVD: $\sim 50 \mu\text{m}$



Snow and Freezing Rain Simulation



Snow



Freezing Rain



Freezing Rain / Ice Pellets



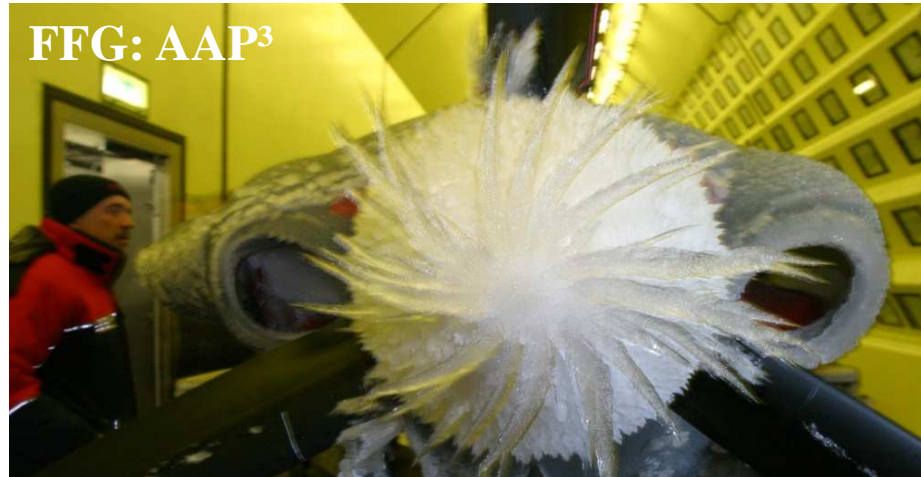
FFG: ElectricGroundDeice



Freezing Rain / Rime Ice



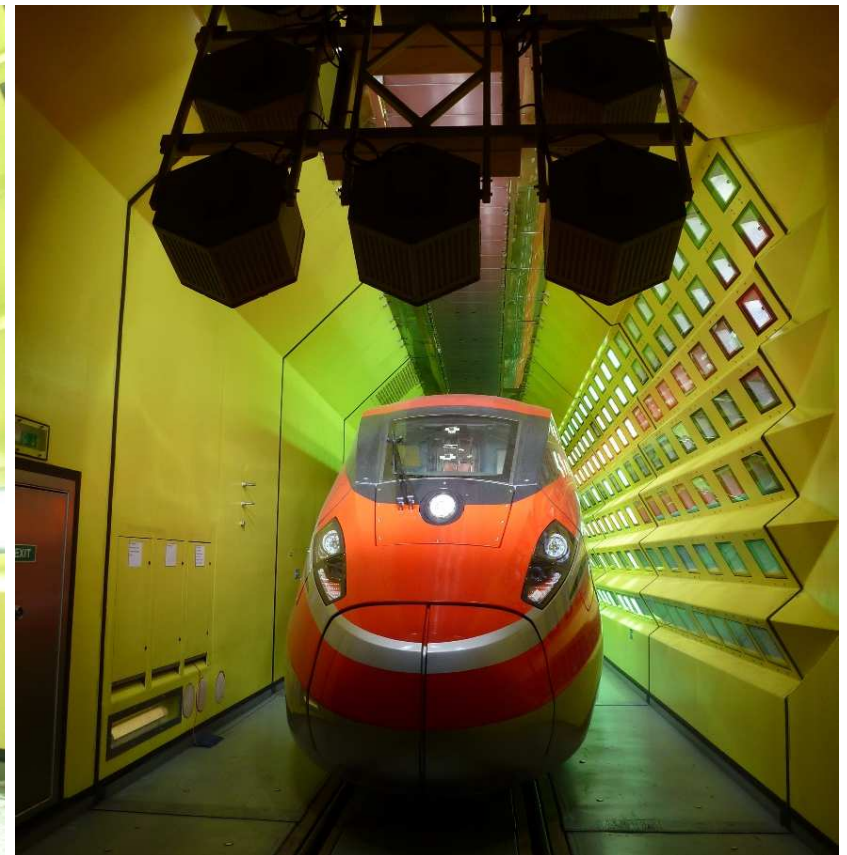
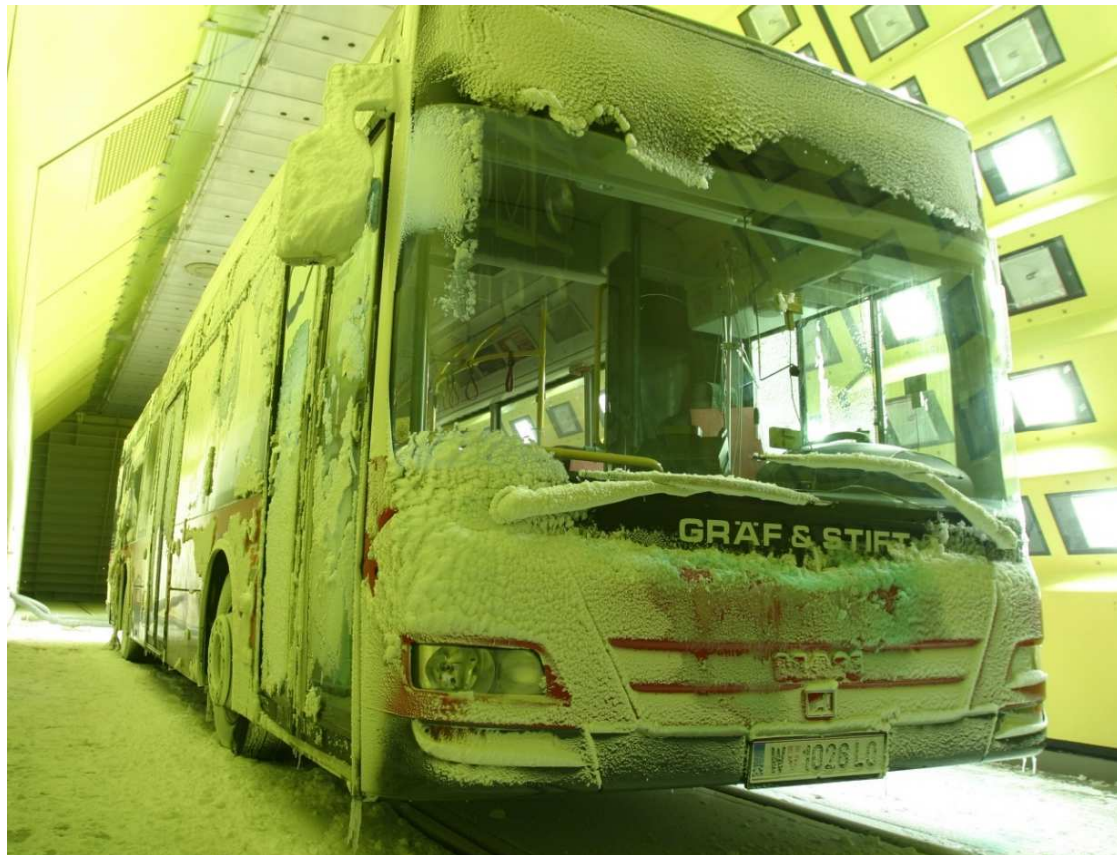
FFG: eWING_DE_ICER



FFG: AAP³



Thermal Comfort



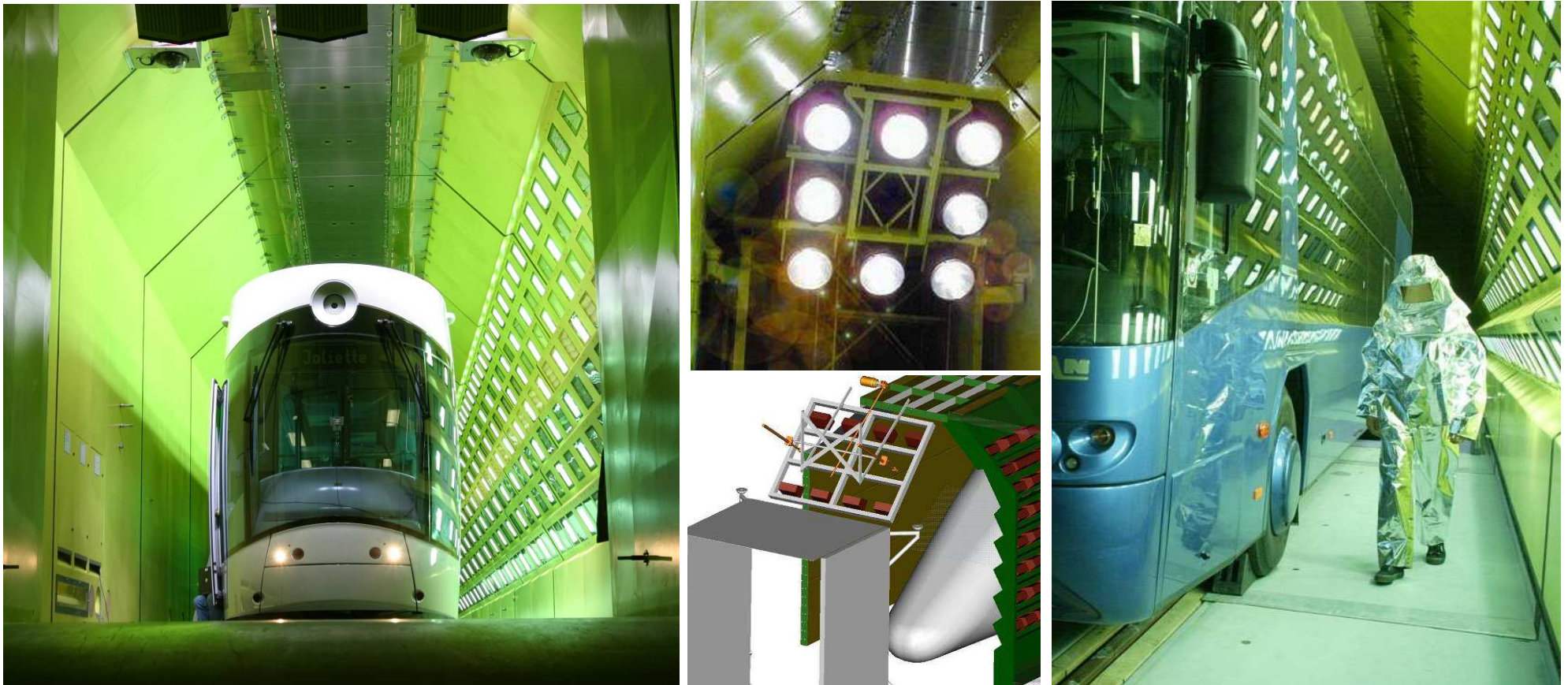
Thermal Comfort



EU Clean Sky 2: Helicomfort



Sun



Sun



Ongoing/planned research projects CWT and IWT

▶ National funded projects

- **IceDrip** (Aircraft anti-icing and de-icing through assemblies of conducting varnish and functional coatings)
- **ElectricGroundDeice** (developing a system for de-icing on the ground)
- **AquaSense** (simultaneous detection of the physical state and the LWC flowing media with high time resolution based on photoacoustic spectroscopy)
- **Thermal Wing Ice Detector** (A method for the detection of ice on wing surfaces and other relevant structures of aircraft is developed and tested)
- **Aviation Icing Tests II** (increasing the LWC, SLD simulation)

▶ EU funded projects

- **No-Ice-Rotor** (Development and demonstration of materials and manufacturing process for ultra-high reliability electric Anti-ice/De-ice thermal layers for high strain rotor blades and helicopter airframe sections)
- **Helicomfort** (Adaptable power density coating for energy efficient heating of cockpit and cabin)
- **SnIce** (Starting Community for Ground-Based Climatic Tests on Helicopters and Small Aircraft in the Field of Snow and Ice)

Climatic Wind Tunnel and Icing Wind Tunnel Vienna

Quality in any weather

