

100% Renewables

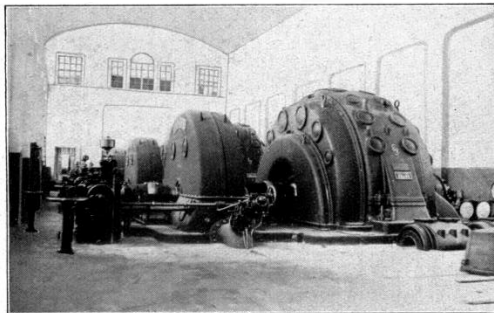
Climate Protection as Business Case in Rail



ELECTRICITY SUPPLY OF RAILWAY TRACTION AND RENEWABLE POWER GENERATION IN AUSTRIA ARE CLOSELY LINKED

1919

Large-scale electrification of railway lines starts



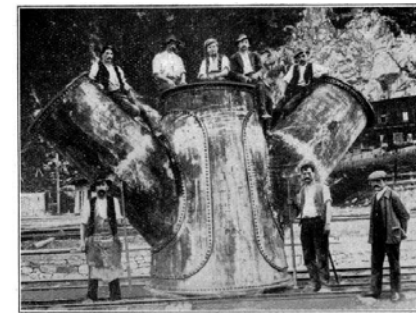
1920s

ÖBB's first own hydropower stations



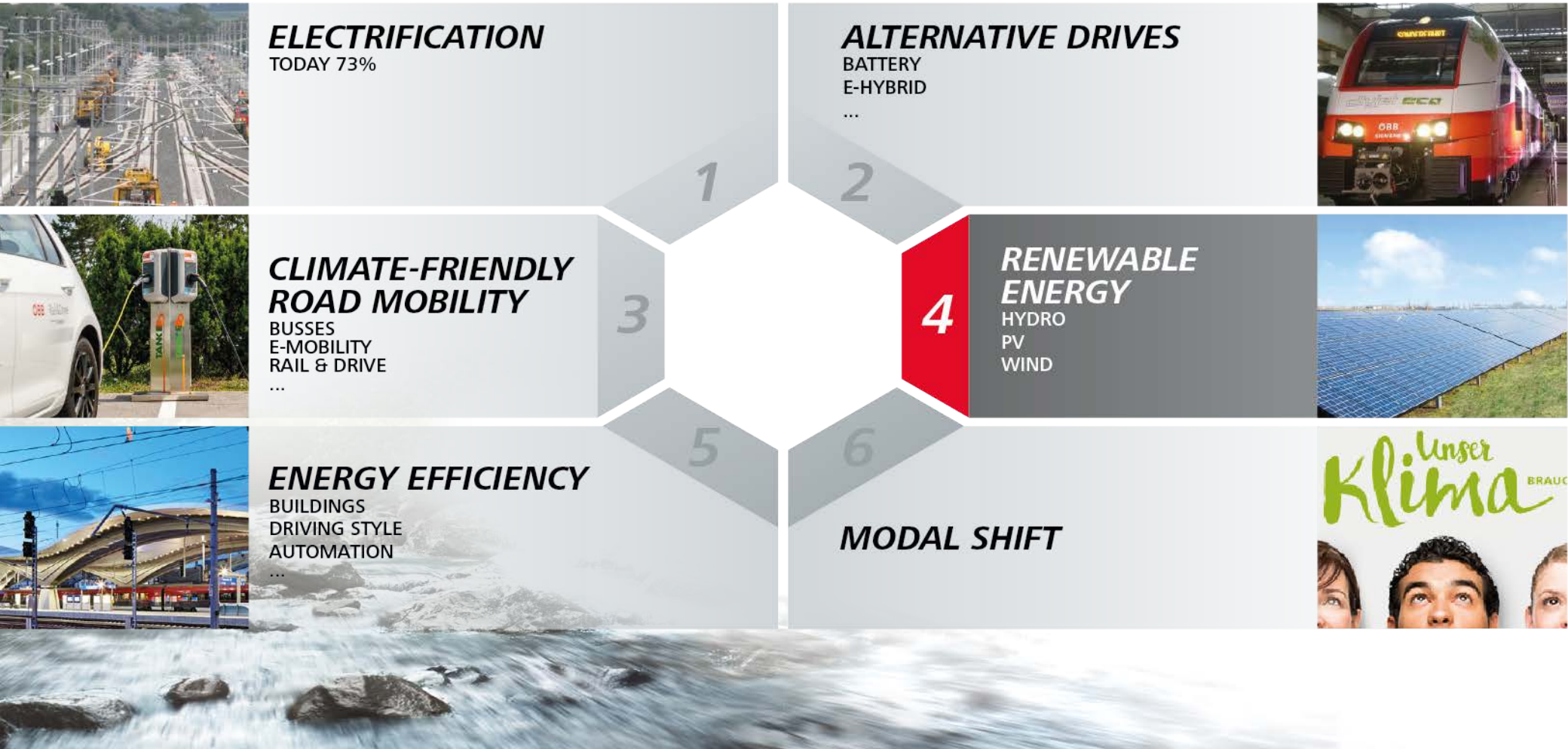
1930

electric traction from Salzburg to Bregenz



2018

4800 km of railway lines, 73% electrified

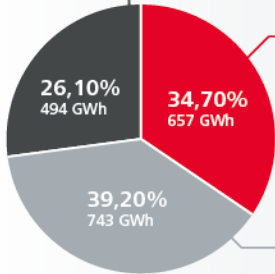


Traction Energy Today

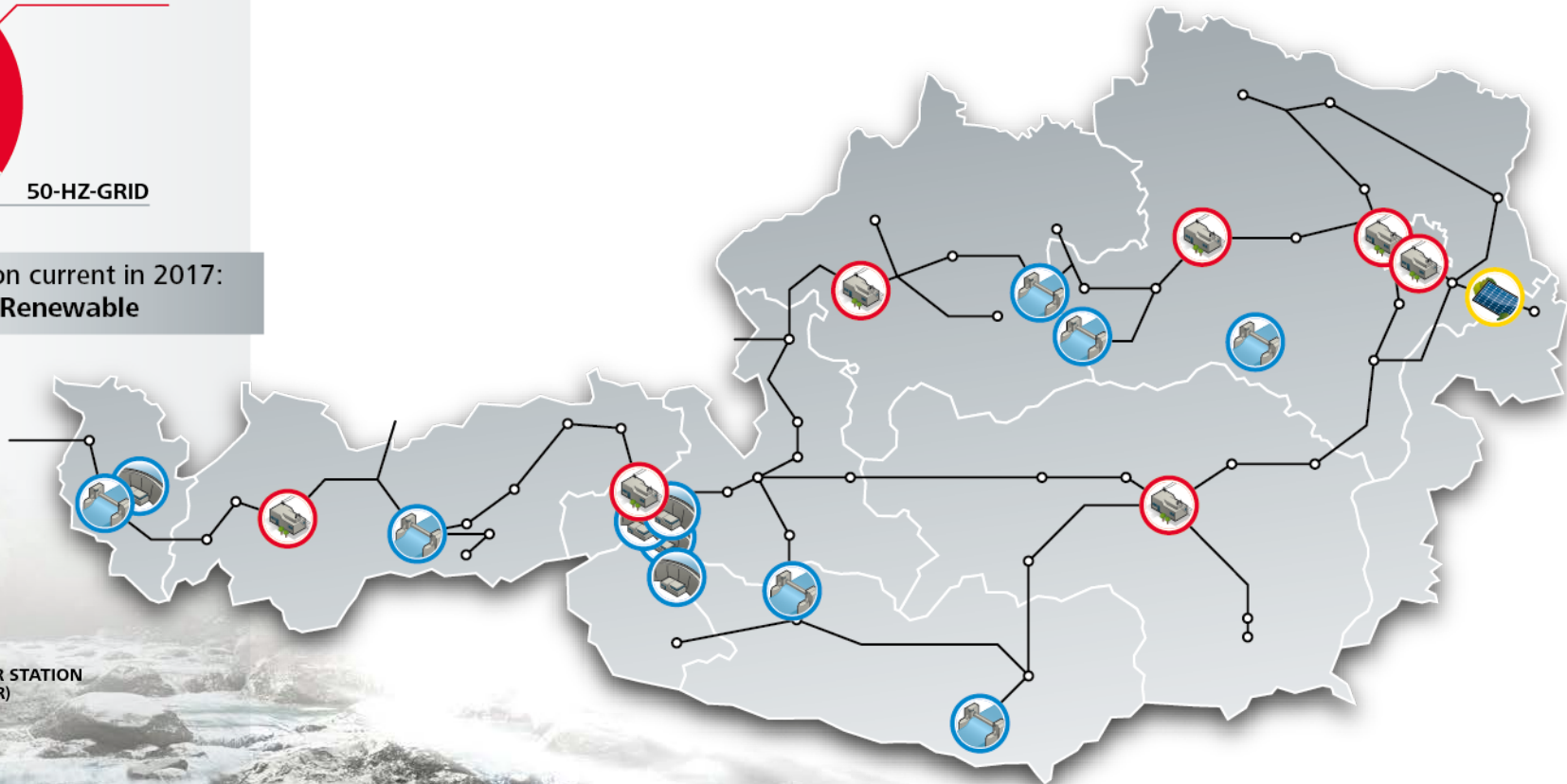
PARTNER PLANTS

ÖBB PLANTS

50-HZ-GRID



Total use of traction current in 2017:
1894 GWh, 92% Renewable



HYDROPOWER STATION
(ÖBB/PARTNER)



FREQUENCY
CONVERTER

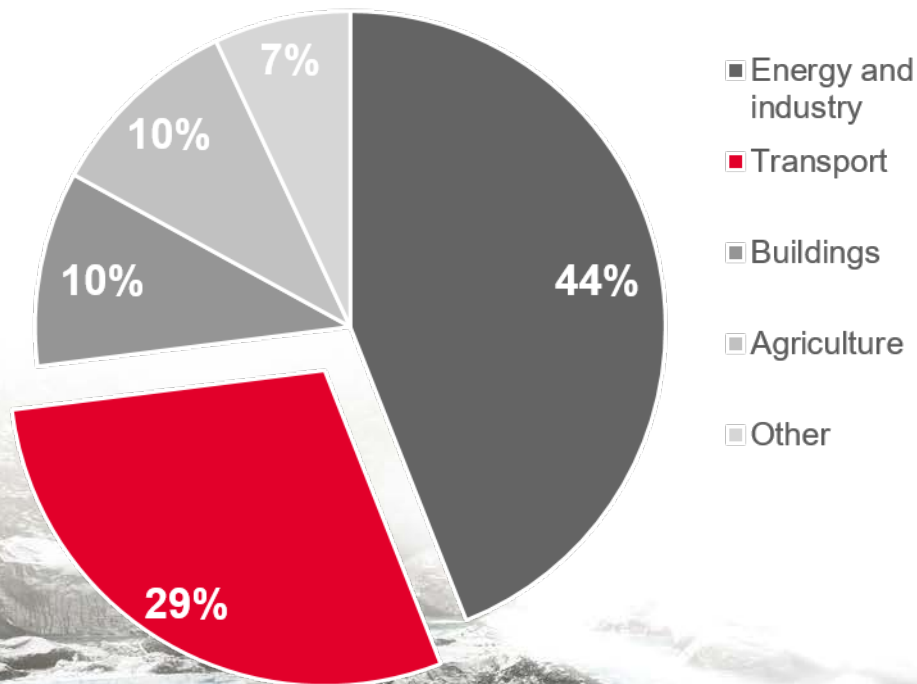


PV GENERATION PLANT

TRACTION CURRENT GRID
(16,7 HZ, 110 KV)

100% Renewables

RENEWABLE TRACTION ENERGY PRODUCTION AND CERTIFIED AUSTRIAN RENEWABLES FROM MARKET



100% Renewables

RAILWAY TRANSPORT IS EFFICIENT AND CLIMATE-FRIENDLY

MODAL SPLIT

in Austria

Passenger transport



Freight transport



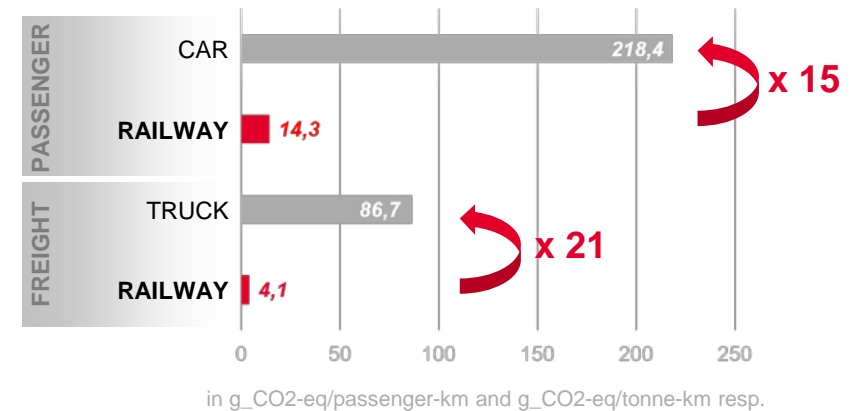
ENERGY DEMAND

of transport (rail, road, water)



EMISSIONS

of passenger and freight transport

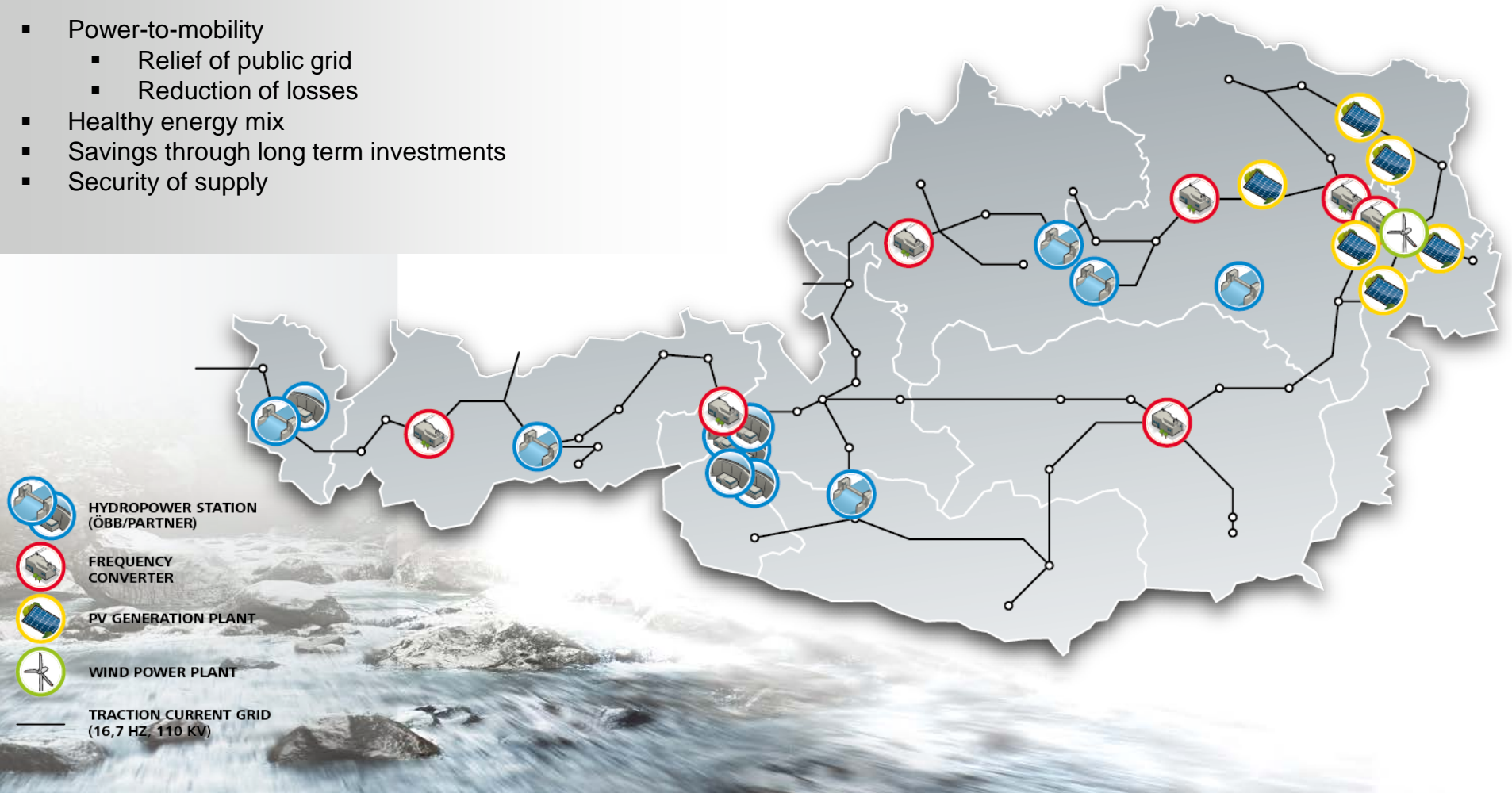


- Security for train operation
- Control and balance traction current grid

- TRACTION ENERGY AT STABLE, ATTRACTIVE PRICES
- SUSTAINABLE TRANSPORT

Vision for the Future

- Power-to-mobility
 - Relief of public grid
 - Reduction of losses
- Healthy energy mix
- Savings through long term investments
- Security of supply



Will it work out?

STRENGTH:

- High-performance grid
- Experience

OPPORTUNITIES:

- Awareness of customers
- Commitment of policy makers

WEAKNESSES:

- 16,7-Hz components are more expensive

THREATS:

- Not (yet) economically feasible
- Public funding restricted

Business case 100% renewables in rail:
Technically feasible, economic obstacles!

EU STRATEGY TO SUPPORT CLEAN AND AFFORDABLE ENERGY FOR RAILWAYS

- Balance prices and true costs of rail and road
- R&D and technology to market
- Level-playing-field for funding

