
Alstom Transportation

Western High Speed Rail Alliance
Rail Ahead Conference

November 4, 2011

TRANSPORT

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Two main activities – Power & Transport

93 500 employees in 100 countries



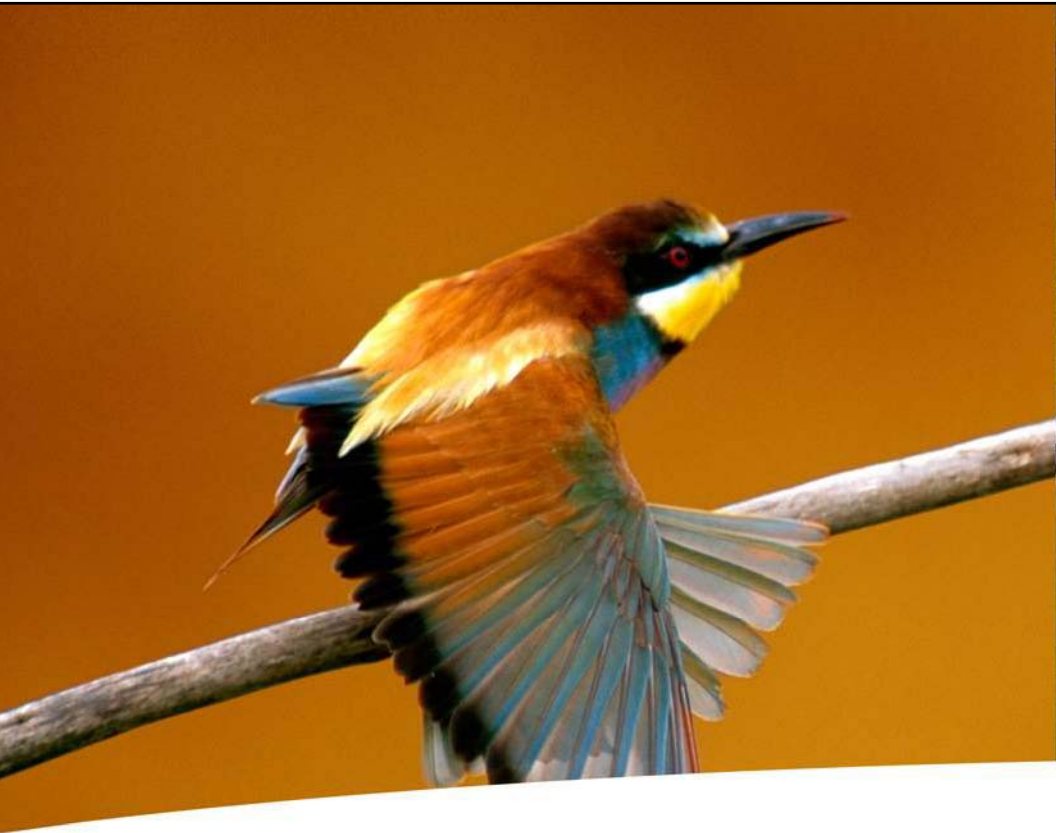
Thermal Power sector
Equipment & services for
power generation

Renewable Power sector
Equipment & services for
power generation

Grid sector
Equipment & services for
power transmission

Transport sector
Equipment & services
for rail transport

\$29 Billion USD in world-wide sales (FY 2010/11)



Alstom USA

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Alstom in the U.S. – By the Numbers



- Equipment in **50%** of all U.S. power plants

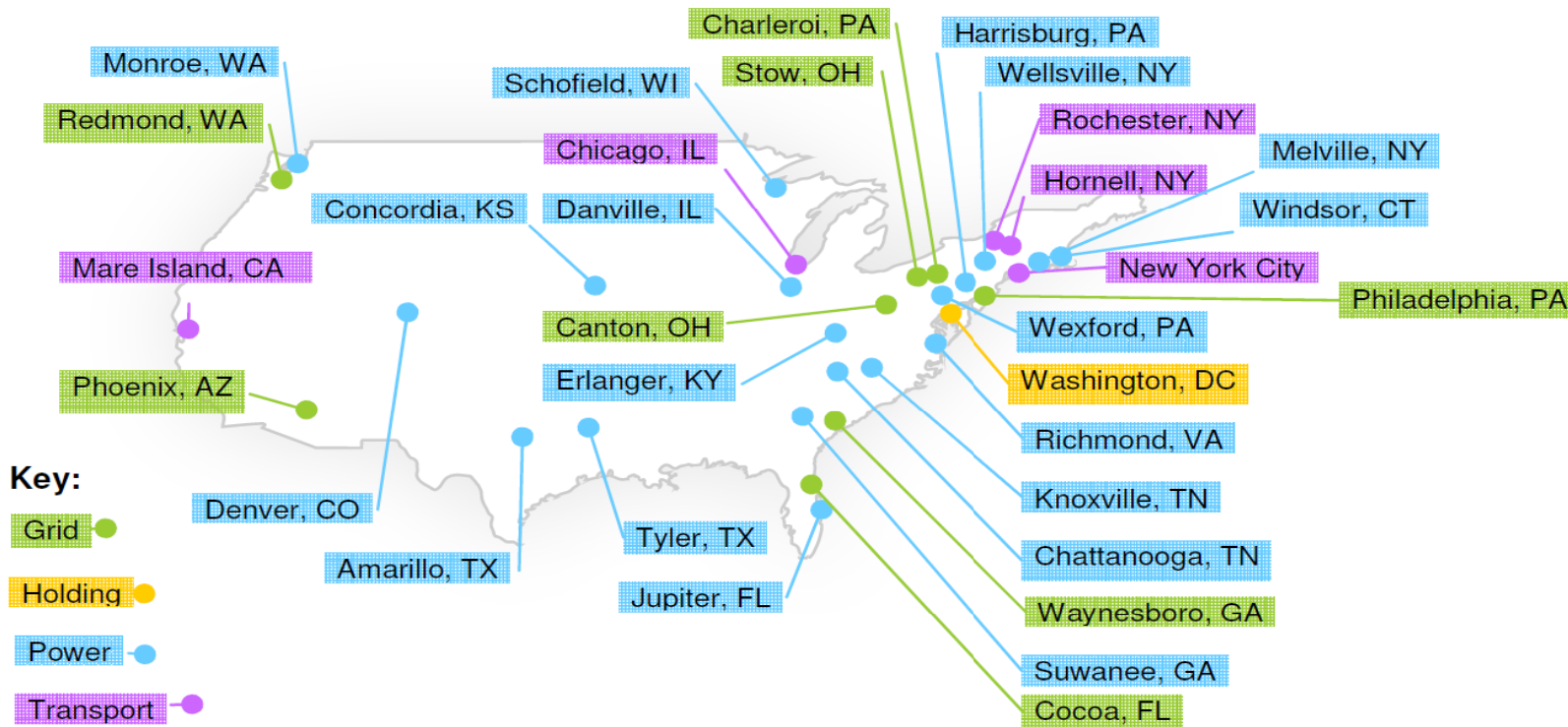
- Advanced software managing more than **40%** of all power flowing on the U.S. grid



- **1 in 5** Subway cars in the US have been built by Alstom and **40%** have been overhauled by Alstom.

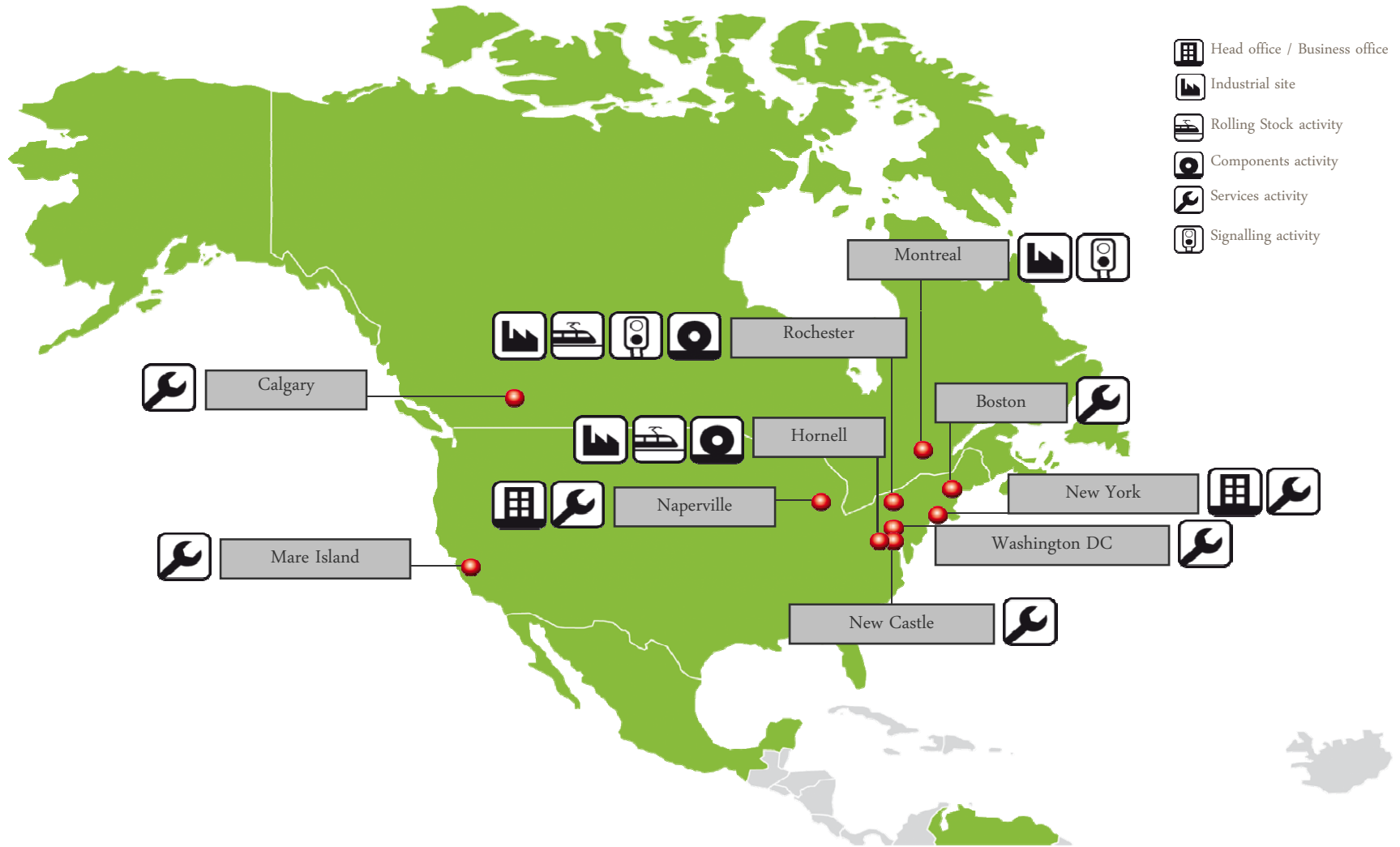
Alstom Innovation, Coast-to-Coast

6,000+ permanent employees in 47 states and the District of Columbia
10,000+ employees including contract workers



100+ years of U.S. market expertise in:
Power Generation
Rail Transportation
Energy Transmission

Alstom Transport – North America



Alstom Signaling Manufacturing Facility Rochester, NY



150,000 sq. ft. under roof – 550 Employees

Hornell, NY Manufacturing Facilities



Plant 2 - ELECTRICAL SHOP (75,000 sq.ft.)



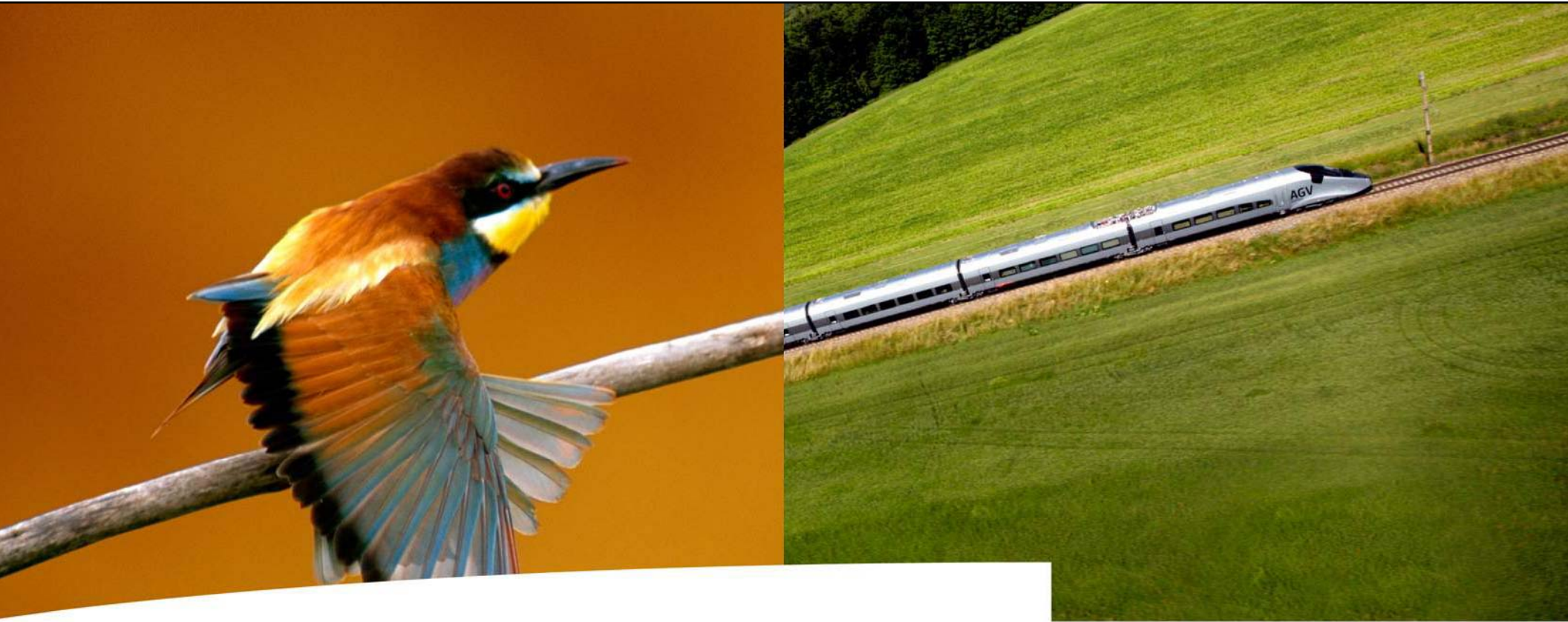
Plant 3 - PARTS, SERVICE AND TRUCK SHOP (135,000 sq. ft.)



Plant 1 - CAR SHOP (420,000 sq.ft.)

New Car Facility (70,000 sq.ft.)

700,000 sq. ft. under roof on 52 acres at 3 separate locations within a 1 mile radius



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Alstom Transport, a passenger rail multi-specialist

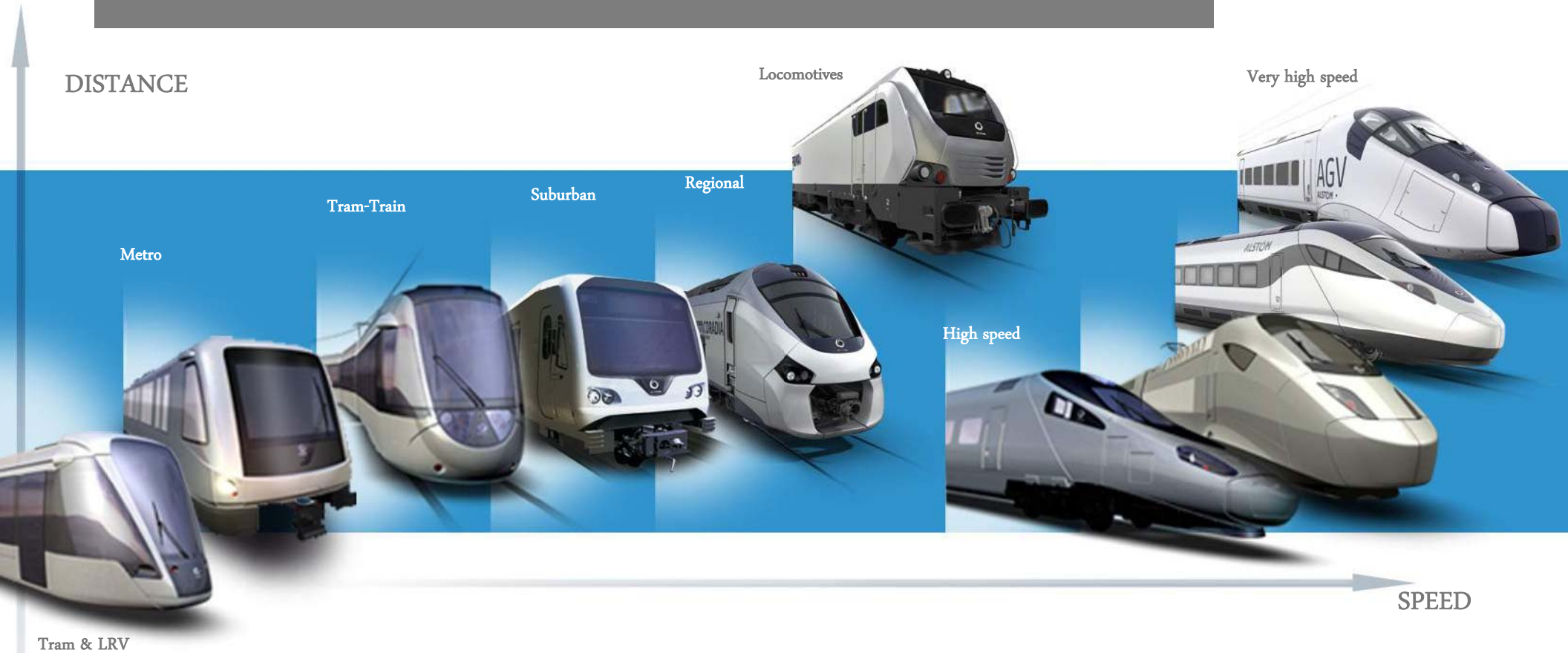


- The most complete range of systems, equipment and services:
Rolling Stock/ Infrastructure / Signaling / Services /
Turnkey transport systems

- N° 1 in high and very high speed
- N° 2 in urban transport (tramways, metros)
- N° 2 in signaling
- N° 2 in maintenance

A wide range of products and services

Rolling stock : from trams to very high speed



Alstom Infrastructure



ELECTRIFICATION

- From 750V to 2x25kV catenary system
- Rigid catenary
- Substations for Urban and Main Line



TRACKWORK

- Concrete & Ballast Track for Urban and Main Line
- Direct fastening concrete track (APPITRACK)
- Rubber wheel track



INFRASTRUCTURE EQUIPMENT

- Station, tunnel and depot equipment
- Road and track signalling
- Ground power supply technology



MAINTENANCE

- Maintenance for Urban and Main Line infrastructures
- Preventive, corrective and Overhauls/Renewals

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VHS MAINTENANCE

Daily commitments to operators since 1992

1992 Full Maintenance AVE in Spain (24 yrs)

- 18 AVE trains operated Madrid Sevilla
(to date AVE accumulated plus 100 Million Train Km)
- 6 Euromed trains operated on Valencia Barcelona

2004 Full Maintenance Pendolino in the UK (22 yrs)

- 52 Pendolino trains operated by Virgin (WCTC)

2006 Full Material Management ACELA in the USA (10 yrs)

- 20 ACELA trains operated by Amtrak

2006 Modernisation of AVE trains

- 18 AVE Interior & external modernisation

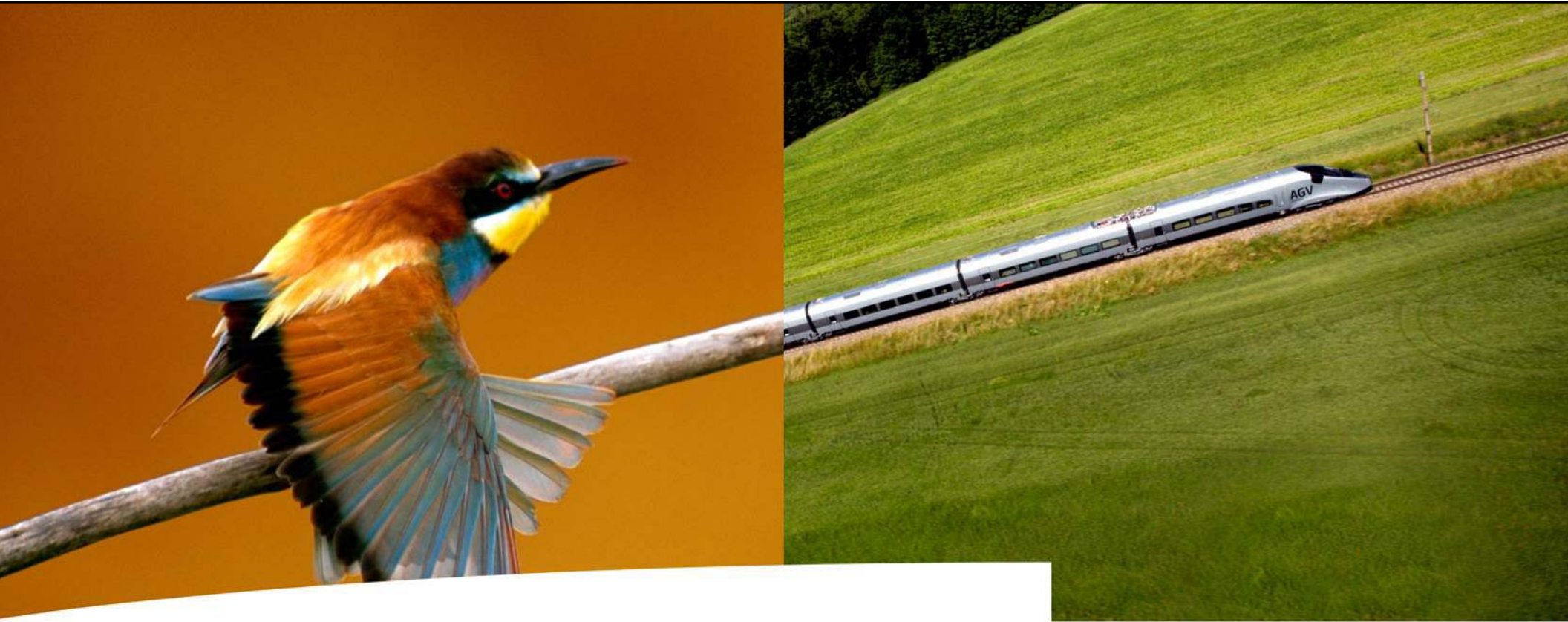
2009 Technical Maintenance of New Pendolino (5yrs)

- 12 New Pendolino operated by Trenitalia

2011 Full Maintenance AGV in Italy (30 yrs)

- 25 AGV trains to be operated by private operator





Alstom High Speed Trains

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High Speed Trains – Over 1000 trainsets sold!
A diverse offer of technical configurations



PENDOLINO

DUPLEX

SPEEDELIA

AGV



High Speed Trains – 200 – 250 kp/h

Solid & proven experience: Pendolino

400 Pendolino's trainsets since 1971
Over 500 Million km traveled

Continuous improvement of
technologies based on
innovation and service return
of experience

1971
1st Pendolini
(Italy)



1980s/1990s
ETR 460/470
(Italy)



1998
Virgin WCML
(UK)



1999
Alfa Pendular CPA 4000
(Portugal)



2004
Pendolino CZ
(Czech Rep.)



2011
PKP
(Poland)



2011
Lanzaderas I
(Spain)



2010
Allegro
(Finland CIS)



2007
CRH 5
(China)



2007
New Pendolino
(Italy Switz. Germ)

2005
Lanzaderas I
(Spain)

The Pendolino platform : also without tilting

Strictly derived from Pendolino without tilting equipment



Lanzaderas, Spain
20 trains of 4 cars



CA250, China
140 trains of 8 cars



New Lanzaderas, Spain
13 trains of 4 cars

Daily operating speed 200 - 250 km/h

Technologies proven in extreme conditions

World speed record: 574,8 km/h (357 mph) April 07

V150 THE RECORD TRAINSET

The quintessence of Alstom's technology

5 REAR POWER CAR
4 DOUBLE DECK CAR
3 MOTORIZED TRAILER CAR RA
2 MEASUREMENT CAR
1 LEADING POWER CAR

Alstom's traction system for the AGV™

- A Power converter
- B Synchronous motor with permanent magnets
- C Gear box

TOTAL POWER	19,6 MW	LADEN LOAD:	268 T
POWER CAR RATING	7,8 MW	LENGTH:	105 m
TRAILER COACH RA:	4 MW		

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VHS IS NOT ONLY ABOUT TRAINS !



SIGNALLING

ERMTS / ACSES / PTC

Revolution in interoperable signaling systems

SERVICES AND MAINTENANCE

Full Maintenance Management

Spare parts management

Renovation

INFRASTRUCTURE

Track laying

Electrification

Electric power supply

Electromechanical equipment

ALSTOM HAS DEVELOPED EXPERTISE IN ALL E&M ACTIVITIES

Very High Speed trains – 300 kp/h 360 kp/h

30 years of daily commercial service

Alstom has sold more than 680 VHS
trainsets since 1981

Continuous improvement of
technologies based on
innovation and service return
of experience

1981
TGV PSE
(Fr. Switz)



1989/93
TGV Réseau
(Fr. Belg. Ital)



TGV Atlantique
(France)



1992
AVE
(Spain)



1994
Eurostar
(Fr. UK. Belg)

1996
TGV Duplex
(Fr. Switz. Germ. Lux)



2010
Duplex
(Morocco)



2009
AGV "Italo"
(Italy)



2007/09
TGV Duplex
TGV POS
(Fr. Switz.
Germ. Lux)

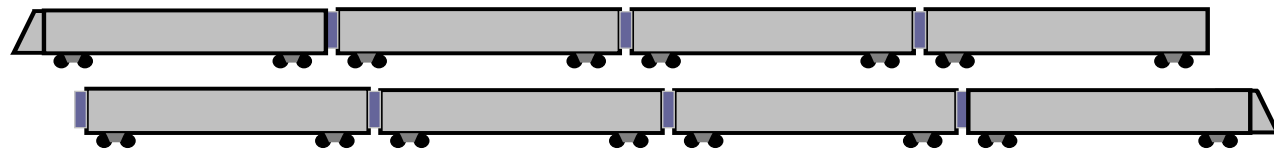
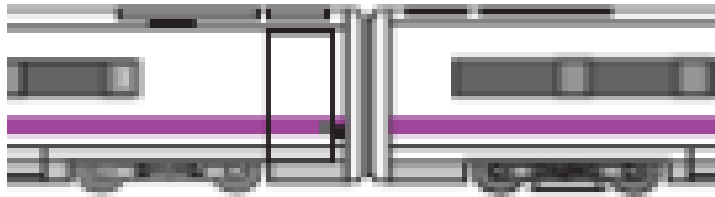
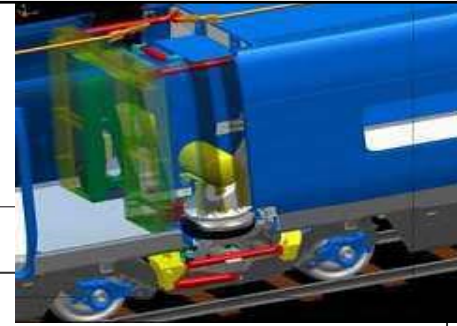


2004
KTX
(Korea)

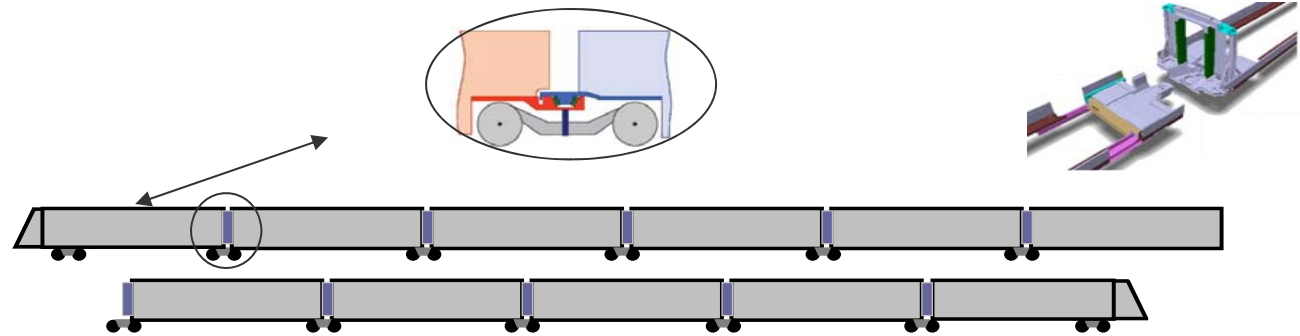


1996
TGV Thalys
(Fr. Belg.
NL Germ)

TGV/AGV : Articulated architecture



Traditional architecture : 16 bogies



Articulated architecture : 12 bogies

Bogies between the cars and not beneath.

TGV/AGV : Articulated architecture

Benefits



- **Safety:** rigidity of the trainset. No “jack knife” effect nor overturn in the case of a derailment.
- **Comfort on board:** rolling noise and vibrations are reduced and restricted to the area between cars
- **Energy consumption:** reducing the number of bogies reduces weight and improves aerodynamic drag
- **Cost:** fewer bogies means lower maintenance costs (bogies account for 40% of the cost of train maintenance)

Very High Speed Trains

TGV Duplex: the highest capacity

The exclusive double decker high speed train



THE CONCEPT

Duplex capacity can reach up to 550 seats (in single unit)

The time-tested articulated architecture of all Alstom's very high speed trains is also applied on the Duplex, guaranteeing trains rigidity to and maximum passenger safety .

On going project : AGV for NTV Italy



25 AGV (+ 10 options): start of operation 2012

+ 30 years of maintenance

Daily operating speed:
300-360 km/h



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AGV : A revolution in railway technology

PERFORMANCE, SAFETY , COMFORT AND REDUCED COST OF OWNERSHIP



THE CONCEPT

The AGV is the first train in the world to combine articulated architecture with distributed power. The principle of the articulated train set is based on a design that places bogies between the cars. This technique, which has ensured Alstom's success in VHSR for over 30 years, eliminates much of the vibration and rolling noise on board, cushions movement between cars, optimizes aerodynamic performance, guarantees maximum security, and reduces maintenance costs by 15%.

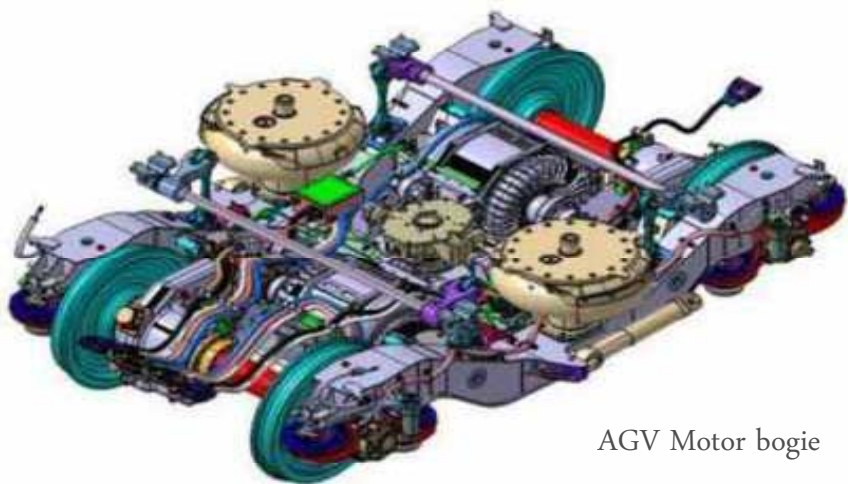
AGV : Safety & Performance

Articulated train with Distributed Power

Traction systems distributed below floors of cars



- Traction system
- Carrying bogie
 - Power bogie
 - Power unit
 - Transformer
 - Auxiliary equipment



AGV Motor bogie

- 10% more space for passengers than concentrated power single deck train
- Power of the train maintained independently to the number of cars

AGV : Environmentally friendly while reducing life cycle cost

Reducing impact on the environment



70 tonnes less than competitive models, improved aerodynamics and articulated

>10% reduction in energy consumption



Less trucks than conventional trains

> 15% reduction in maintenance cost

Able to produce electricity when braking

Up to 8 MW of power feedback into the grid



Aero-acoustics to reduce noise

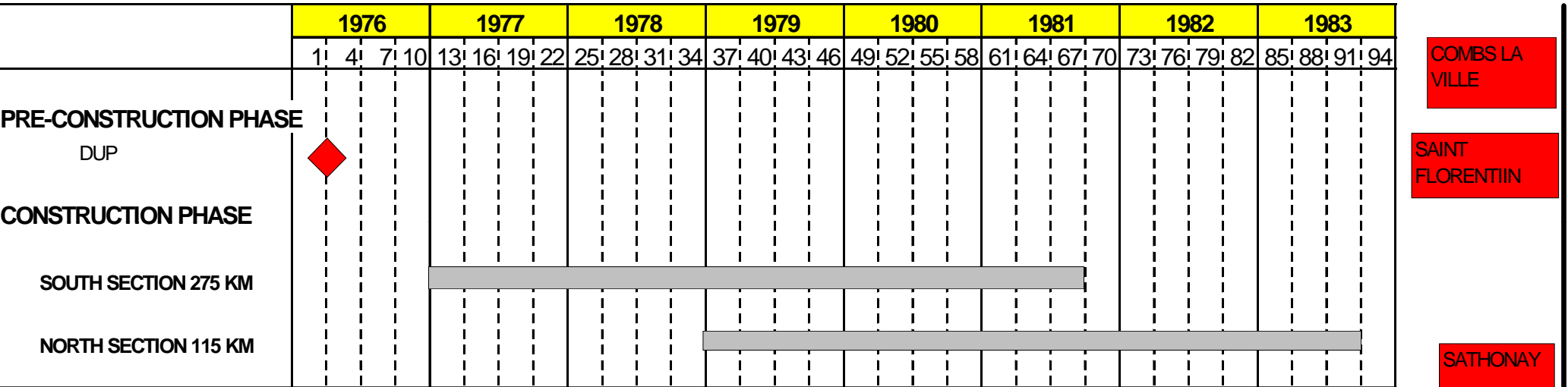
Same noise at 360 kph than other HST at 300 kph

Why High Speed Rail ????



Construction Schedule For TGV Sud Est

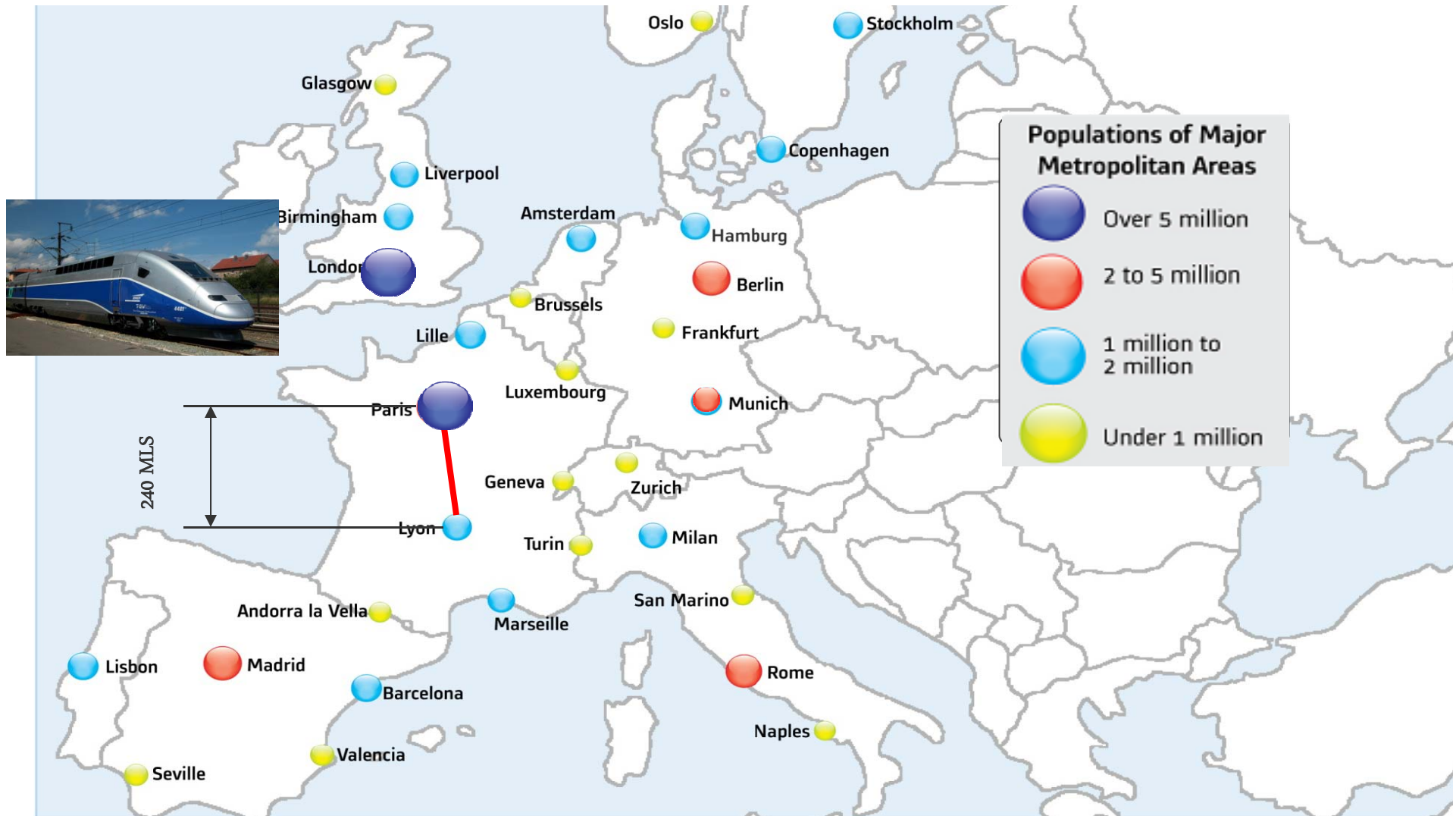
(FRANCE - 242 Miles/ 390 km)



5 YEARS WERE REQUIRED TO DO DESIGN AND APPROVAL BETWEEN 1970 AND 1975

DUP = DECLARATION OF PUBLIC INTEREST

The Success of the Paris - Lyon TGV Line. The idea started over 40 years ago. “A Field of Dreams??”

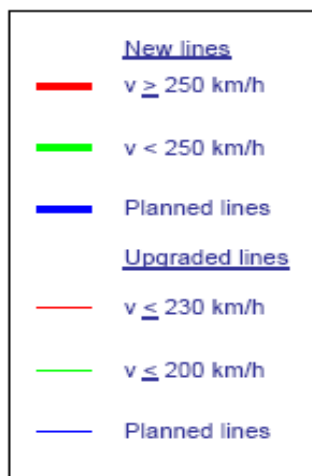


European High Speed Lines in 2020

2006: 1900 Miles → 2020: 5600 Miles

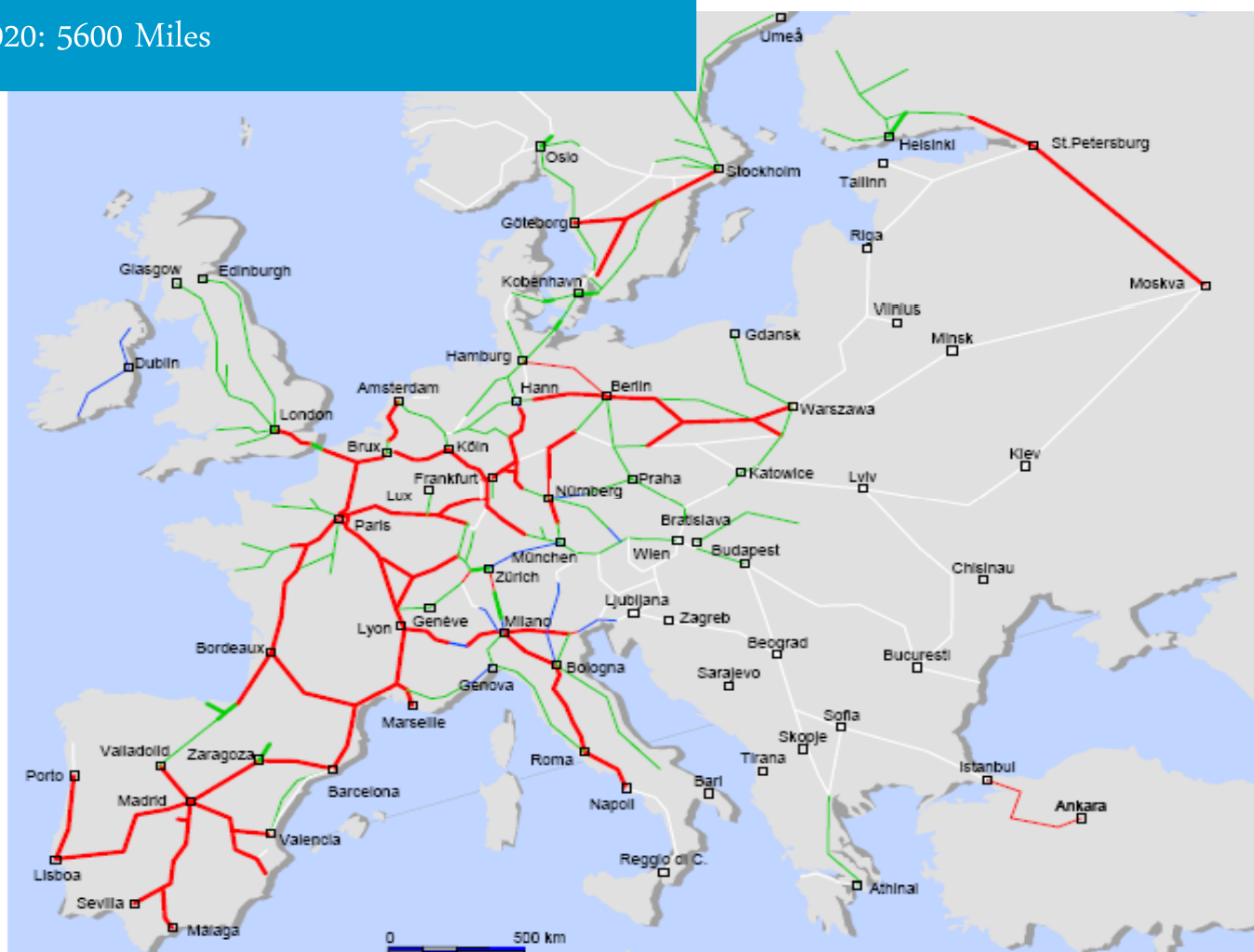
European HS Network

Forecast for 2020



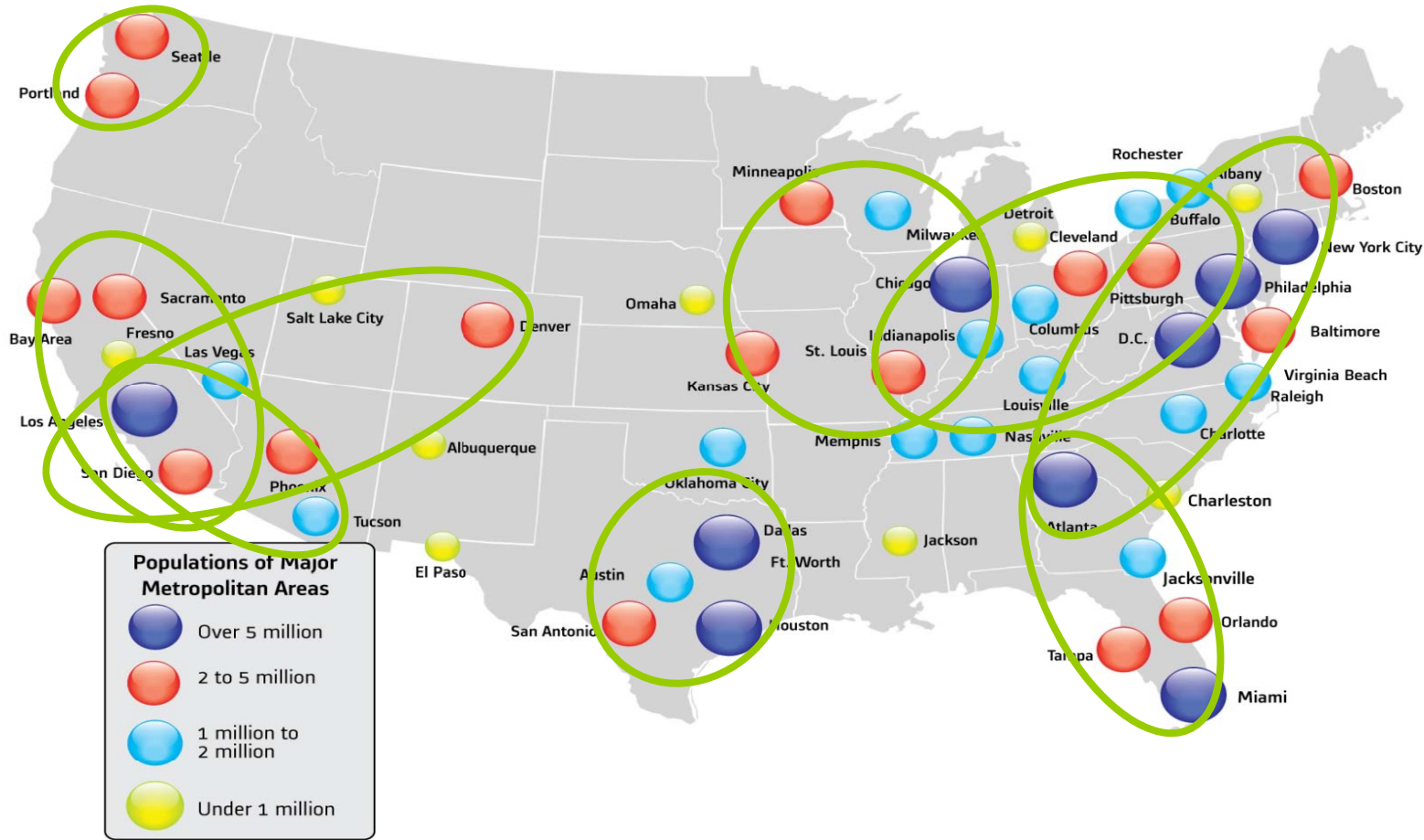
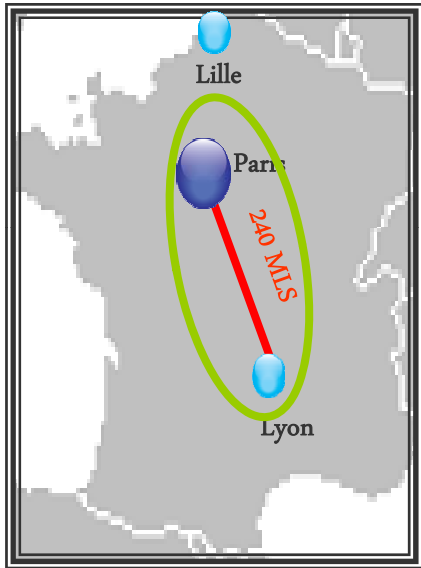
Information given by the Railways

UIC - High-Speed
Updated 17.11.2006 - IB



The US Opportunities for VHSR are Good

We have many corridors that should be VHS (>200MPH)



FRANCE
 Population: 65M
 Pop. Density: 297/sq MI.

Thank you for your attention

www.alstom.com/transport

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