Using innovative transport technologies to stimulate regional development

Sustainable, cost-effective solutions to improve accessibility to, from and within peripheral regions in North-West Europe

London, 25 May 2011

The tilting train: From a national to a transnational solution

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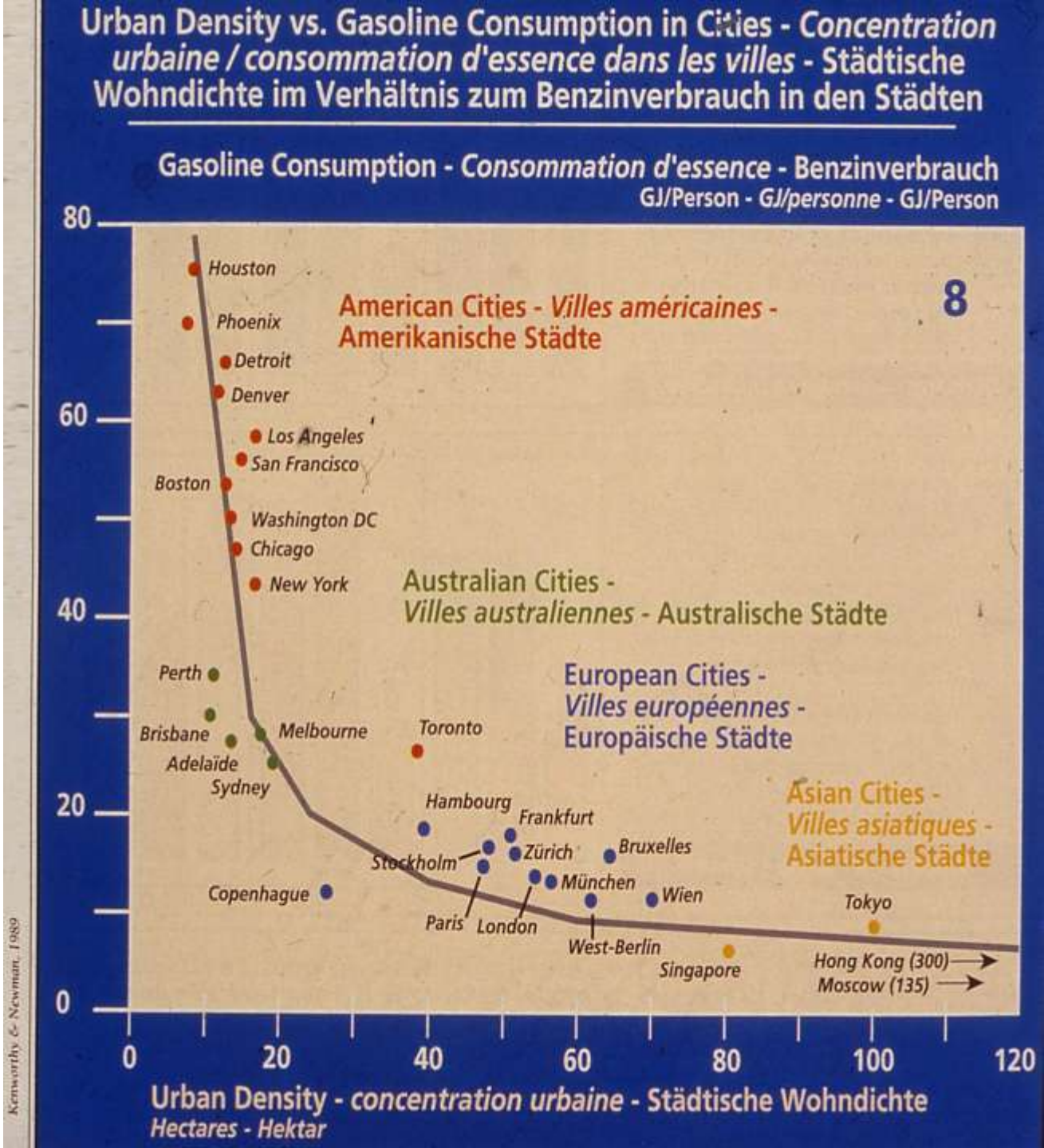
1. **Global Framework.** Urban density is the key to modal split. Rail has a brighter future in regions with dense human settlements.



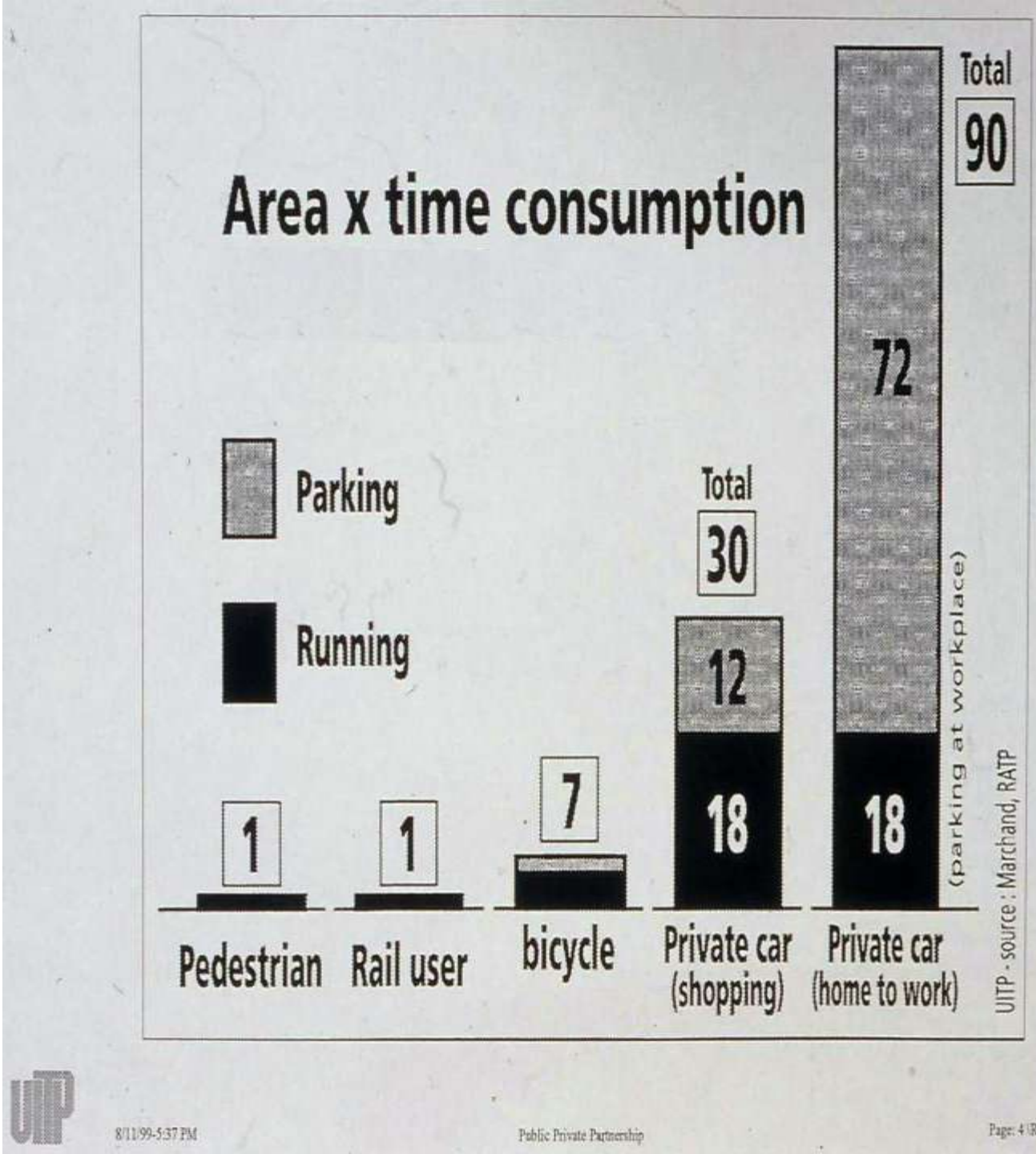
2. Market conditions.

The railway age in the industrial world was based on private investment in infrastructure, rolling stock and operations, rewarded by the market.

3. New market conditions

The market changed in the US when the automobile was allowed to use the road network free of charge (except for a few turnpikes) while the railroads' infrastructure did not get the same treatment.

4. **Land use.**
   Railways induced high density development around the stations. Roads and car parks could be developed anywhere. Their space consumption was much higher than that required by a rail-oriented city.

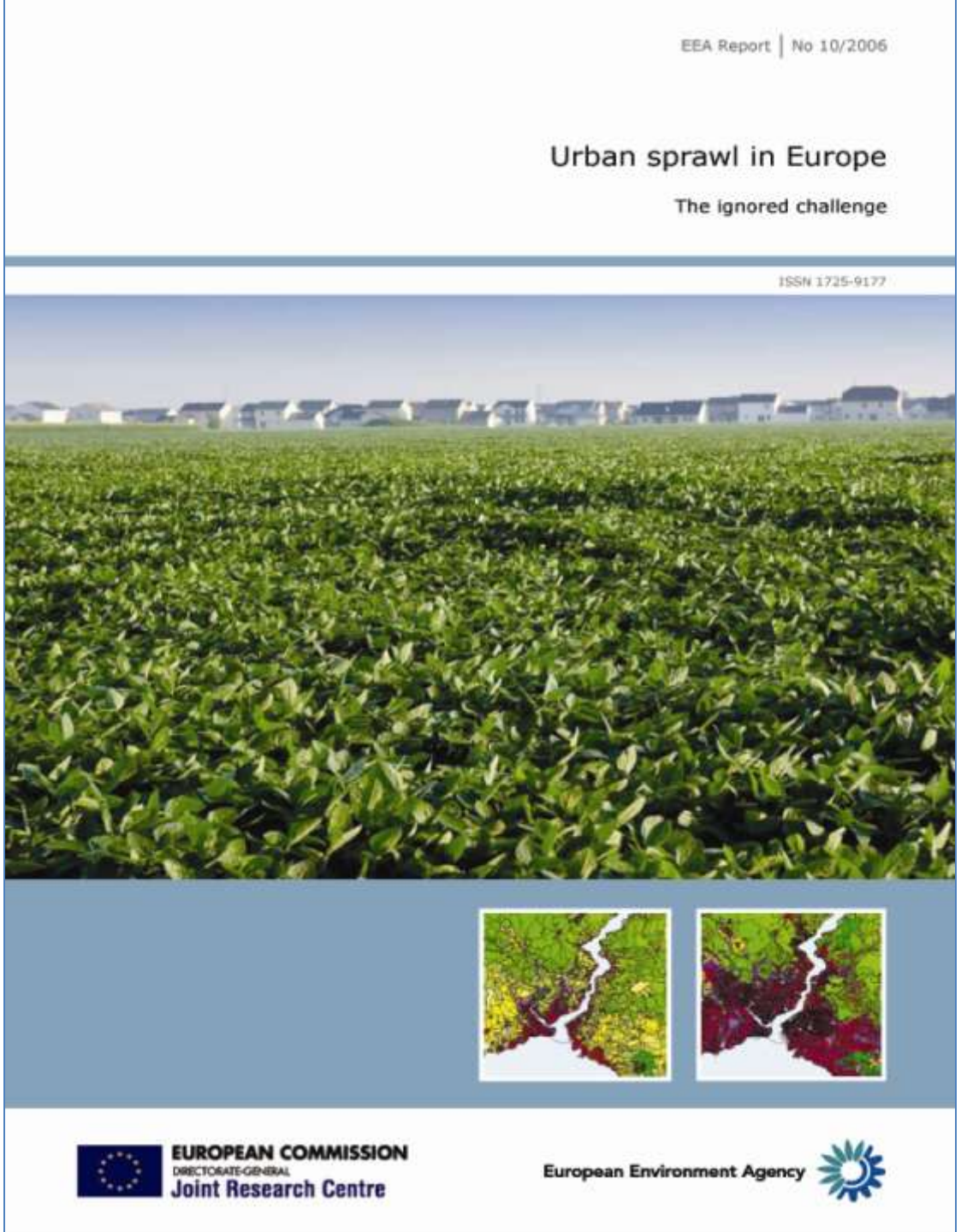


5. **The present situation.** Unbridled US urban sprawl was the result as sprawl cannot be served effectively by rail.

6. Europe.

Starting in the US, the dispersal model gradually became dominant in Europe also.

www.eea.europa.eu



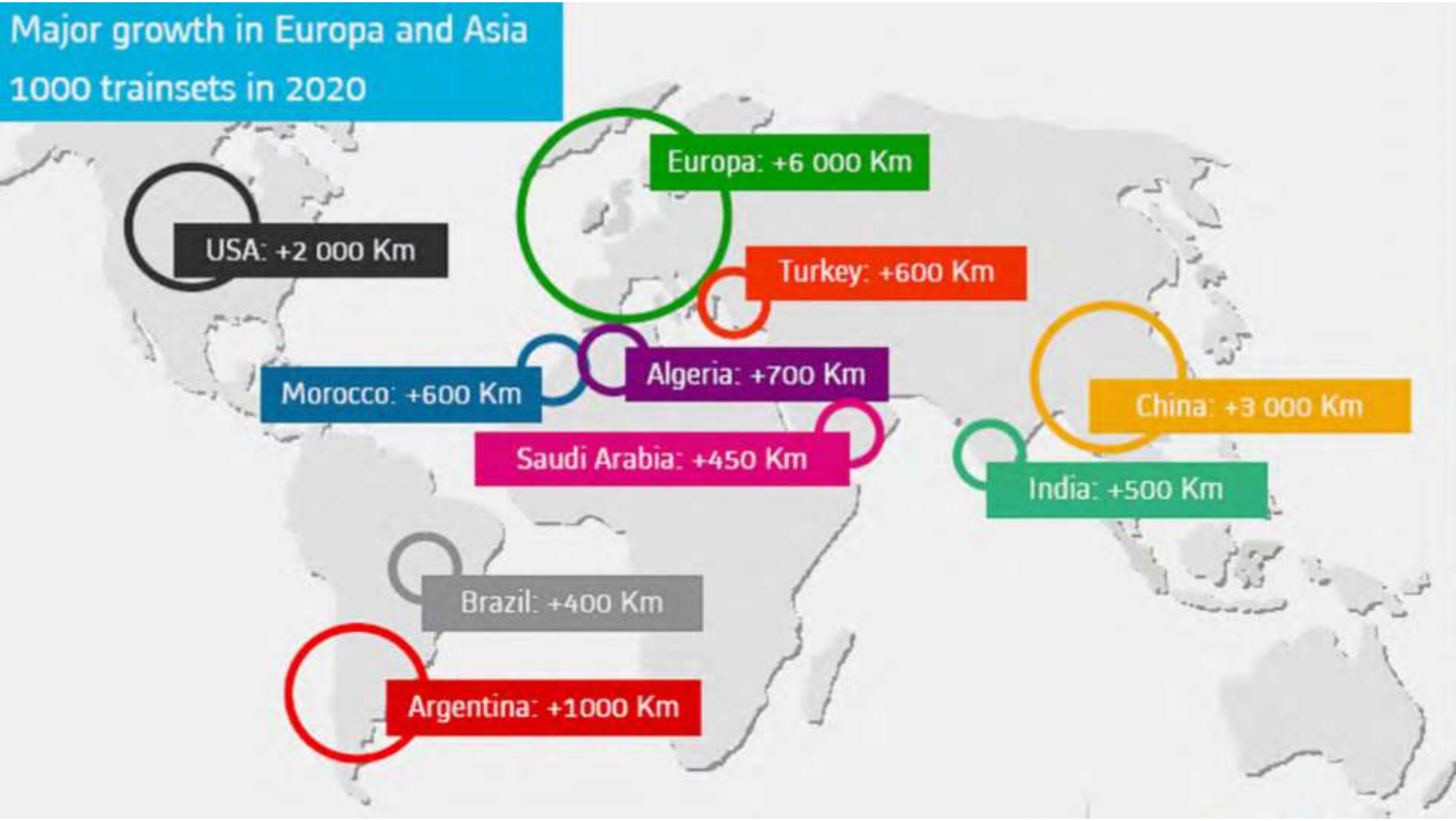
7. Faster trains and the new railway age.

A revolution in rail transport started in Japan in 1962: the Shinkansen (220 km/h), followed in 1976 by the European HS train : in France, the TGV PSE (270 Km/h), followed in 1991 by the German ICE (300 km/h) and the new ICX (250 km/h). The latest models allow a speed of up to 350 km/hour on dedicated straight track.

8. Higher capacity. Double-deck rolling stock allows the capacity of trains to be adapted to traffic growth on existing high-speed lines.

9. Expanding the network. Meanwhile the network is constantly expanding, the main equipment suppliers being Alstom, Ansaldo/Bombardier, Bombardier/Talgo and Siemens.

10. Expanding supply. The number of train sets and the length of track is expanding mainly in Europe and Asia (but also in Morocco, Turkey, Argentina, etc).



11. In the US and UK. Lack of political support has inhibited HSR in finding the right conditions for its development.

“High-speed rail: running rapidly right off the rails

The Birmingham-London supertrain is being proclaimed as the totem of a new golden age in British transport. Already, however, it looks a safe bet that the reality will fail to match the rhetoric.”

“'High-speed' rail will, in fact, almost certainly slow down the journeys of more rail users than it speeds up.” Photo: REX. Source: The Telegraph.

12. The Advanced Passenger Train.

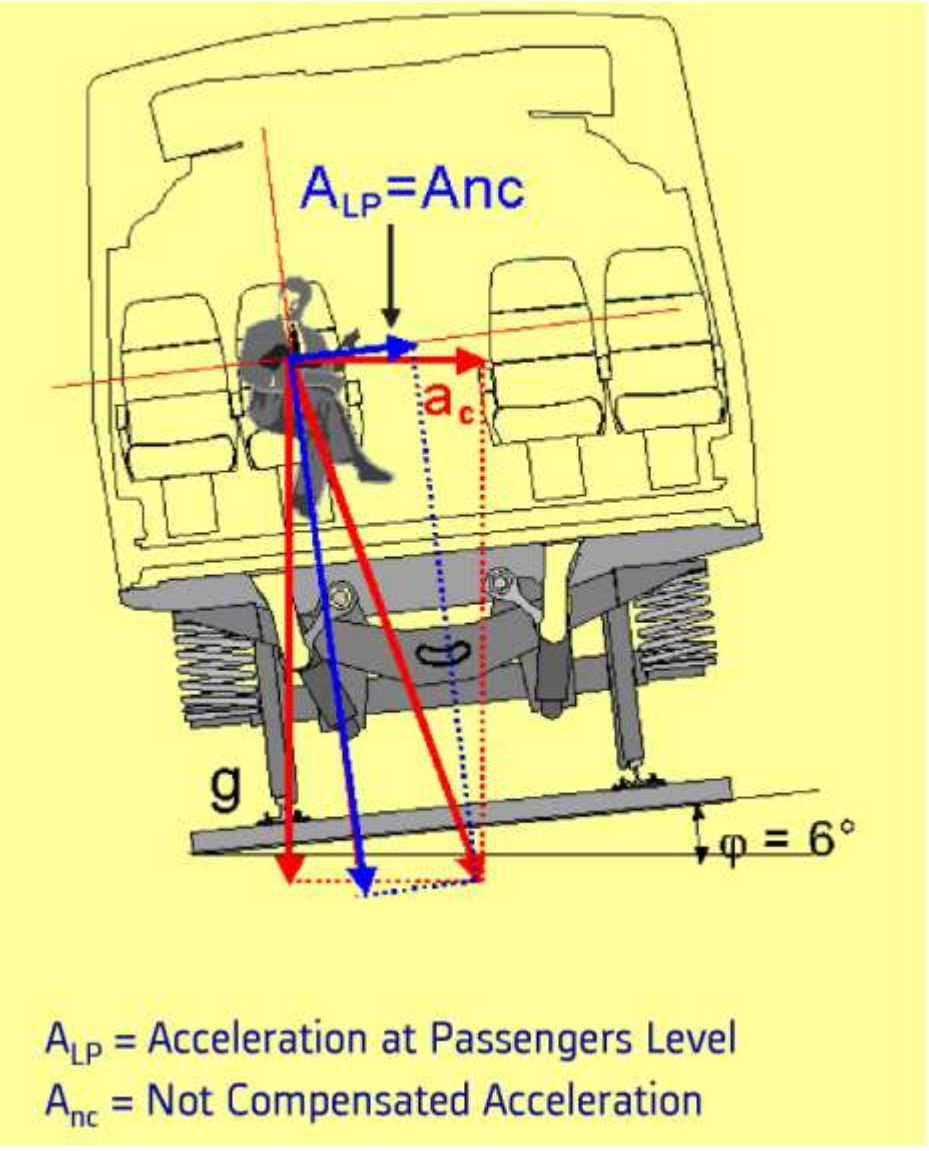
However in the 80's the UK developed a medium speed rail system (the Advanced Passenger Train) based on increasing speed on existing tracks, thanks to a system allowing the trains to tilt when travelling around curves.

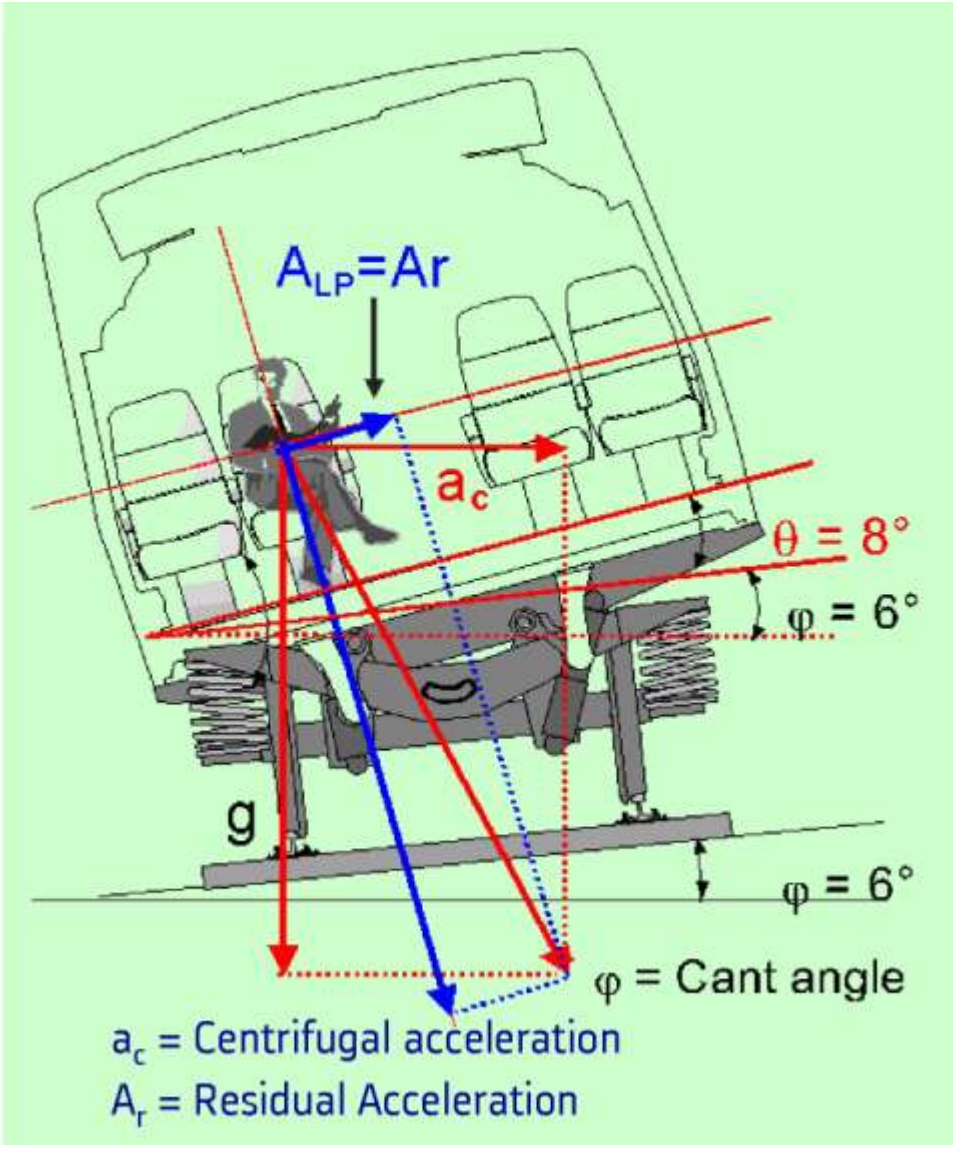
(APT – 1980)

13. Virgin. The pioneering UK technology was abandoned, but similar continental technology developed by Fiat Ferroviaria ("Pendolino") was introduced nearly 20 years later. Tilting trains designed in Italy were successfully adopted by Virgin for the West Coast main line.

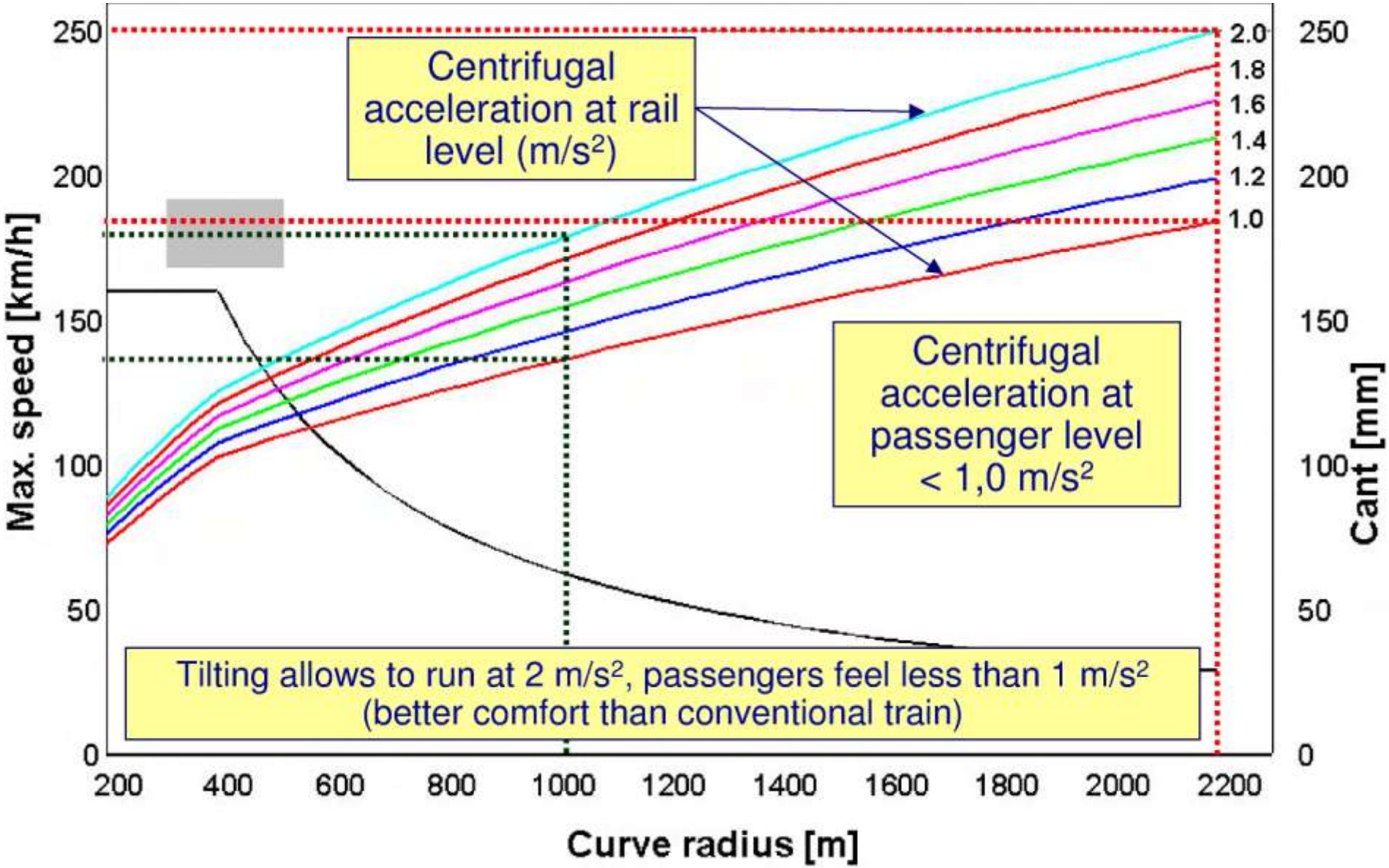
Photo by G-Man, June 2005

14. The tilting principle. The system allows Virgin's trains to handle sharp curves much faster than before, increasing their commercial speed by some 30%.



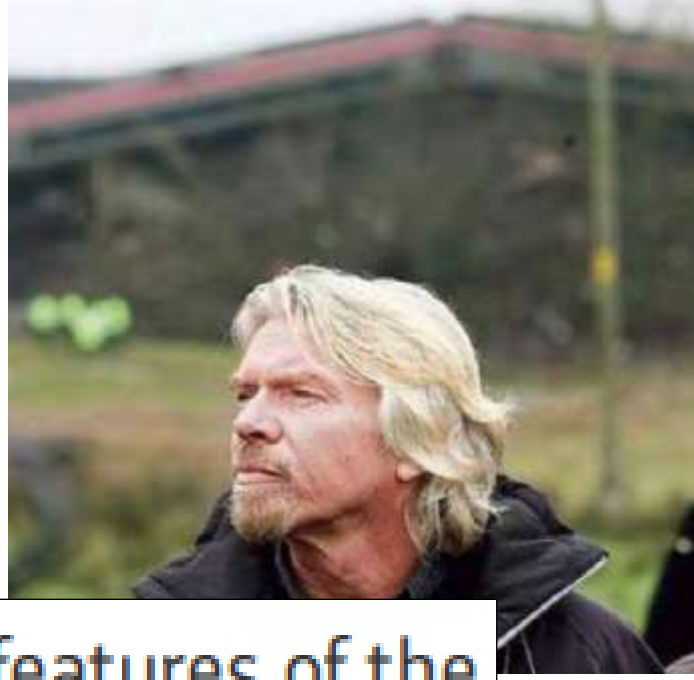


15. Passenger comfort. Passenger comfort is also higher than conventional trains when traversing curves.



16. Safety. In the event of a crash, passenger safety is higher - as was shown by this spectacular accident which resulted in only one fatality.

17. “Built like a tank”.

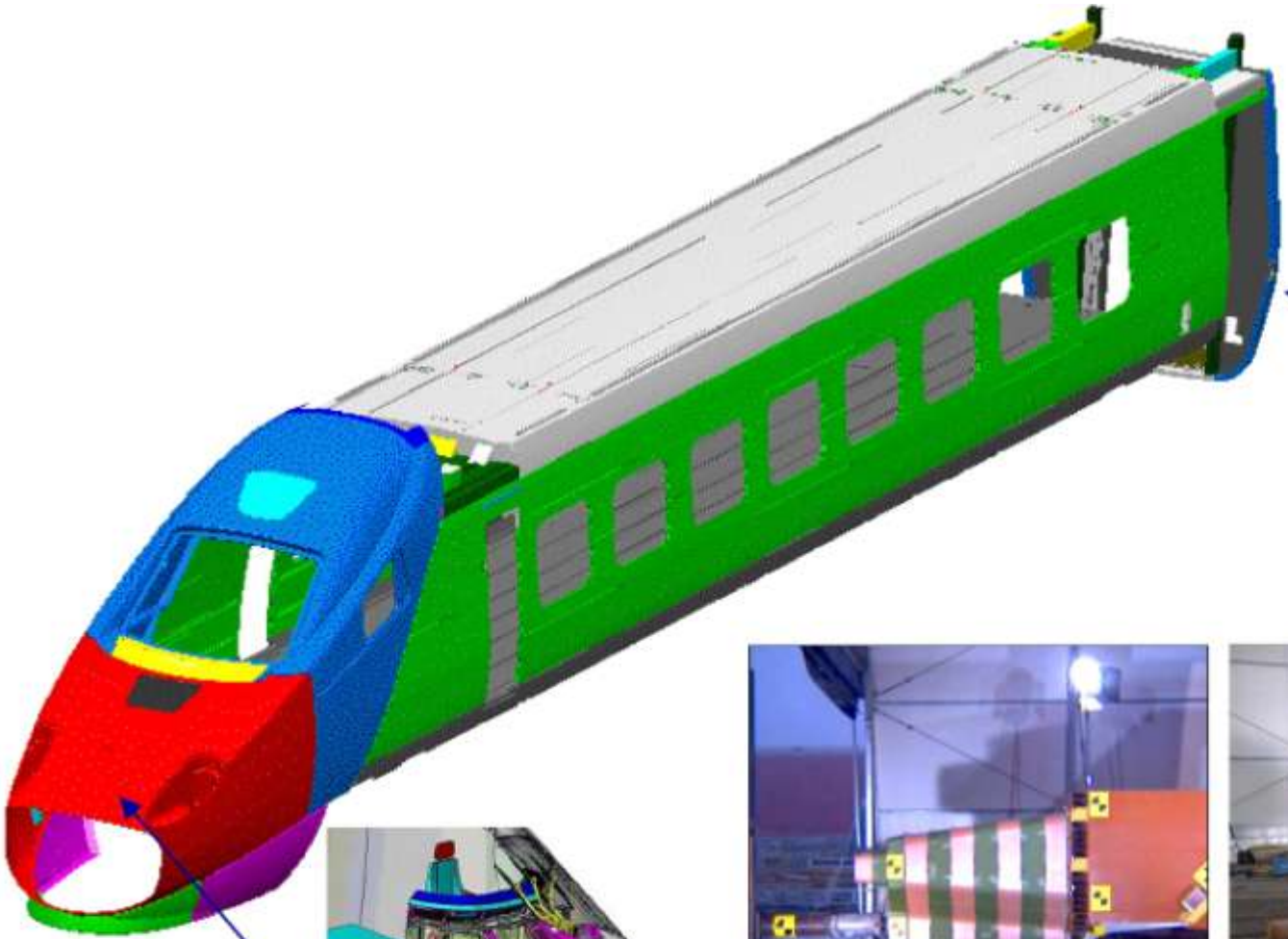


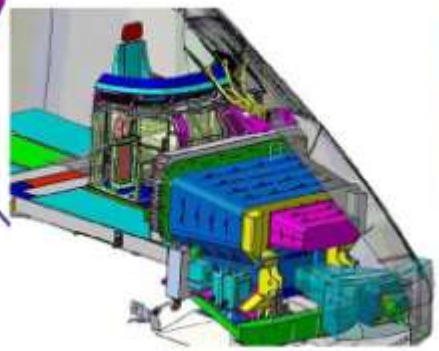
Sir Richard has stressed the safety features of the Virgin Pendolino train involved, saying he feared the accident would have been much worse if an old service had been in operation.

He said the train was "built like a tank", the carriages stayed together, remained in one piece and many windows did not even break.

Source: RailNews.co.UK

18. Shock absorption. The carriages remain intact and shock absorption is concentrated at the front.





19. The tilting market today.

About 500 tilting train sets have been sold and their supply is becoming ever more diversified. Delivery is notoriously slow, which in the UK slows down their expansion to other trunk lines (see Railnews 13/8/2010: Virgin opposed “its” trains being used for the East Coast main line).

20. Modus operandi.

Operating experience suggests that service is better secured by a single operator (as in the UK and Switzerland). Cross-border services between Italy, Switzerland and Germany have revealed problems of coordination between the national operators involved.

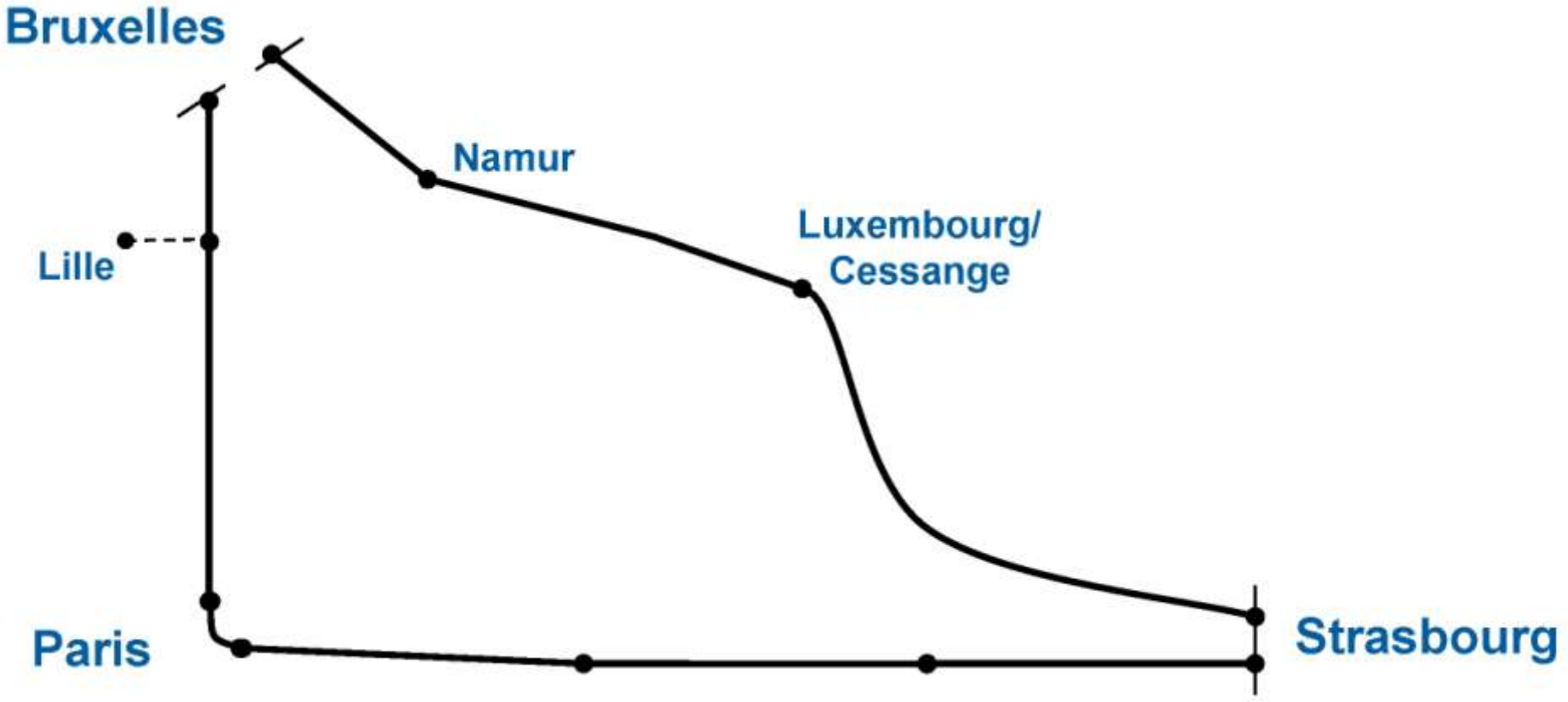
21. The tilting market tomorrow.
The main potential market for tilting trains is on lines complementing the HS network. A case in point is the link between Brussels, Strasbourg and Zurich, presently served by three national operators, with a combination of traditional rolling stock. The trip takes more than 5 hours for a distance of 450 km.

22. The effects of EU liberalisation.

The liberalisation of passenger rail services in Europe opens the door for trans-national private operators to use existing track. Some regions seem favourable to the privatisation of regional express services (TER).

23. HSR vs tilting rail.

The choice presently being debated is between using French Railways' HS services via Lille and Paris airport and developing a tilting train service run as a single operation, responsible for the whole link (and its continuation to Basel, Zurich and the successful Swiss tilting rail network). On 20 May 2011 an agreement between all parties involved was announced in the press in favour of a tilting train (ETR 610).



24. What next?

There is another technical innovation that still has to fully materialise on the market: bogies combining the rigidity needed for HS on straight dedicated track and the tilting capacity needed where the service continues on conventional track.

Acknowledgments: Peter Hall, Harry Hondius, John Cartledge