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Démarche Prospective Transport 2050 – For a Better French Transport Policy

Foresight Brief No. 112

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Sponsors: French Ministry of transportation
Type: Covering the French situation while taking global challenges into account
Field/sector: transport
Organizer: Conseil général des Ponts et Chaussées, Claude Gressier,
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Duration: Dec. 2003 – Dec. 2005 **Budget:** NA **Time Horizon:** 2050 **Date of Brief :** August 2007

Purpose

This foresight initiative intends to initiate the elaboration of a long-term strategic plan for French Transport policy. The exercise uses a French methodological approach to carry out retrospective analysis of historical trends and build quantitative scenarios. It provides general insights on transportation flows and opens public debate on public policies designed to prepare for the “post-oil” era and create impulses for a serious effort to reduce greenhouse emissions.

A Shared Long-term Vision of the Transportation System

“Démarche Prospective transport 2050” is a foresight initiative launched by the Conseil Général des Ponts et Chaussées (CGPC), a committee associated to the French Ministry for transportation. The CGPC organization comprises an "Economics and Transportation" Directorate, which is often requested to provide consultative input on projects with very long-term planning horizons.

At first, the CGPC carried out an audit between September 2002 and February 2003 on large-scale infrastructure programmes emphasizing the need for a better strategic assessment of existing and future transportation systems. Therefore, at the end of 2003, the CGPC decided to conduct a long-term

planning study on the transportation system in 2050.

The long-term horizon was chosen because of policy-making schedules in this field (15 to 20 years) and depreciation cycles of infrastructure facilities (30 years). By describing various future scenarios, this study intended to provide material for initial strategic discussion and debate amongst ministry officials and partners engaged in determining transportation policy.

Apart from the CGPC's staff, this planning exercise also involved a wide range of experts in the areas of demography, economics, transportation, energy and tourism, including representatives from various Transportation Ministry's offices (Direction de la Recherche et des Affaires scientifiques et techniques, etc.) as well as the INRETS Transport Research Institute and Futuribles International's think-tank.



An Iterative and Scientific Approach

The exercise uses a French methodological approach based on the development of quantitative models to carry out a retrospective analysis of historical trends and build four scenarios incorporating demographic, socio-economic, technical and environmental hypotheses.

The scenario-building work was performed from December 2003 through December 2005 in five iterative steps:

1. A retrospective assessment of transportation advances in order to determine a set of influential variables to be taken into consideration.
2. An elaboration of four prospective scenarios.
3. The quantification of the four scenarios by stipulating a range of possible values for both demand and supply variables for each one.
4. A quantitative estimation of the resulting transportation flows for each scenario using the hypothesis selected for demand and supply variables.
5. A compilation of analyses of the first key issues of transportation policy and conclusions for such policy.

The Futuribles think tank was commissioned to conduct the retrospective analysis of transportation over the past 30 years, as well as to identify system determinants and design the exploratory scenarios. A series of seminars was held in conjunction with the Futuribles working group.

All scenarios emphasize key structural trends (yet for the most part exclude potential crises and system failures) such as:

1. An average population of 67 million French residents in 2050 and the aging population.
2. France's economic growth averaging 1.5% annual GDP growth over the period 2002-2050 (1 to 2% range).
3. Alternative non-oil technologies providing between 8 and 50% of liquid fuels.
4. The price of a barrel of oil (including a carbon tax) or of alternative fuels varies between \$60 and \$180 across scenarios.
5. The price of electricity increases from 30 to 100% depending on the scenario.

Meeting Transport and Energy Future Challenges with Realistic Predictions

The four potential worldwide and European geopolitical outlooks serving as input to the four quantitative scenarios were:

- **Scenario 1 "Worldwide governance and environment-friendly industry"** is characterised by worldwide cooperation for enhanced control over energy-

production technologies and pan-European policy, favouring industrial development that alleviates adverse effects of greenhouse gas emissions.

- **Scenario 2 - "European isolationism and decline"** anticipates ferocious economic competition in the context of an energy supply crisis; each European nation manages and protects its resources, and both demographic and economic growth rates remain low.
- **Scenario 3 - "A tightly-integrated, enlarged Europe"** encompasses the successful economic integration of the Mediterranean Region and Russia into the European Union, providing economic development and European security.
- **Scenario 4 - "Inward-looking European governance and regionalization"** anticipates a worldwide energy crisis, in which Europe pursues an endogenous growth strategy, emphasizing integration but restricting open-door policy.

Limited Growth in Future Transportation Flows with Contrasting Trends for Freight Flows

	2002	Horizon 2050 scenarios			
		Scenario 1	Scenario 2	Scenario 3	Scenario 4
Demo-graphic development (in millions)	59	67	58	67	70
GDP (annual growth)	2%	1.5%	1%	2%	1.5%
Price of a barrel oil	28\$	30\$	60\$	60\$	120\$
Carbon tax	0	60\$	0	30\$	60\$
Land-based passengers	100 (base)	150	118	164	158
Airline passengers	100 (base)	191	185	318	168
Freight volume	100 (base)	167	94-117	146-182	150

Prices shown in US\$

Each scenario lays out a different future course, with economic growth being more robust in Scenario 3. Moderate transportation increases, compared to the past 30 years, represent the most obvious future trend.

The first observation is that the demand increases for passenger transportation can be expected to slow down on global scale. Main reasons are:

- A marginal rise of the household rate of automobile ownership.
- The stability of travel speeds due to network operations, safety or environmental considerations.
- The increase of transportation prices because of stricter environmental and safety rules, as well as the rising cost of energy.

Because of slowing French population growth and expansion of remote access services such as e-administration, e-commerce or telemedicine, the **softening in demand** will be particularly significant in day-to-day **local mobility** (in the range of 10 to 40% over the period 2000-2050).

With the exception of Scenario 2, on the other hand, **long-distance passenger flows could double** over the period as a result of slower household income growth. Although the increase will benefit from the road network, gains in public transportation will rise, particularly for high-speed rail (+100-200%).

Regarding international airline **travel**, an **increase** between 100 and 320% at all French airports is foreseeable (compared with 156% during the 1986-2000 period). Limited growth would be due to the level of congestion already reached for domestic airline travel, the competition with trans-European high-speed rails and the impact of oil price hikes on air transportation costs (especially in scenario 4).

Freight transportation development will be structurally **tied to industrial trade patterns** at national and European levels. Differences between scenarios depend on the type of growth envisaged (favouring industry vs. the tertiary sector):

- Scenario 1 reflects a slowing in the expansion of intra-European flows and a strong increase in international flows such as container traffic.
- According to Scenario 2, domestic transportation will drop beyond 2025 and settle at a level just slightly higher than the situation in 2002.
- Scenario 3 will result in a strong global growth in freight flows, along with a concentration on major land transit corridors and Mediterranean ports.
- In scenario 4, national transportation volumes will experience stronger growth, but trading and transit traffic, along with container shipments, will increase at a slower rate than in either of these two other scenarios.

Traffic Flow Concentration: Bottlenecks on the 2050 Horizon

From the angle of limited growth in travelling under all scenarios and given a 2050 horizon year, the risks of network congestion remain contained and visible.

Within interurban areas, France's average road network load factor will stay at a manageable level, especially in comparison with networks in Germany and the Benelux countries. This global forecast in local mobility must not obscure distinct regional disparities in demographic development (from -20% to +25%) and their impact on transportation.

Some major metropolitan areas, such as Marseille, Nice-Riviera Coast, Nîmes-Montpellier and Toulouse, will face strong real estate pressure and increasing operational difficulties. On the other hand, metropolitan areas located in regions with projected demographic drops could face obstacles in managing their public transportation services.

The risks of congestion will mostly be concentrated along suburban thoroughfares and on a small number of network bottlenecks. Traffic will be concentrated on major transit corridors or amass at popular tourist destinations.

Regarding the Rhone corridor, scenarios calling for an average growth in European GDP predict a doubling in passenger traffic between 2000 and 2050 on the road network and, depending on the hypotheses adopted, a rise in freight traffic by 50% to 100%.

Scenarios for the Atlantic seaboard forecast a doubling in passenger traffic and an increase by 50 to 150% in freight, depending on growth prospects affecting the Iberian Peninsula and its international trading patterns.

Consequences for Transport Modes Development and Energy Consumption

While all scenarios indicate a favourable modal shift - travel speeds, fuel prices, taxes, automobile limitation policies within high-density zones, etc. - roads will, in any case, remain the dominant channels of transportation. Regarding fuel price, a 50% rise in the energy cost of a vehicle-km in scenario 2 would induce a net drop of just 6.4% per vehicle-km.

Even if an increase in rail and waterway freight traffic induces sizable local effects along major bulk corridors, these effects will not significantly influence overall flows. In Scenario 3, for example, a large jump in rail and waterway traffic would only lower the share of road trips in 2050 by 4.5%. The stagnation or relative dip in energy products and raw and intermediate goods making up the traditional core of freight transported by rail and waterway will tend to consolidate the modal share of road transportation.

For this reason, large-scale modal shifts allowing a drastic shift in energy consumption and greenhouse gas emissions are hardly conceivable. Accordingly, it is necessary to simultaneously improve energy efficiency and reduce greenhouse missions associated with road transportation.

When considering ambitious road transportation improvements, some scenarios do forecast sizable reduction in road-generated CO₂ emission. For example, in scenario 1, CO₂ emissions from transportation could be reduced by a factor of about 2.5 by 2050, compared with year 2000 values. This is owing to passenger vehicles with an average consumption efficiency of 3 litres per 100 km, one third fuelled by biomass and another third by electricity.

Need for Multi-layered Governance & Political Cooperation

Although this foresight project was not carried out in view of drawing up policy recommendations, the project team did contribute to the formulation of a framework for building public-sector action plans.

Preparing for the Post-oil Era and Taking a Serious Stand against Greenhouse Emissions

Technological breakthroughs necessary to achieve emissions reduction require a decisive step forward in worldwide governance or, at the very least, in consolidated European governance.

- **Assign clear priority to research & development activities.** In this field, developing policies on a European scale is more promising than on a national one. Specific target fields would include rechargeable hybrid vehicles, carbon-free electricity production and synthetic fuels stemming from biomass.
- **More ambitious standard-setting actions.** Breakthroughs shall be instigated by regulatory measures. Because of its longstanding experience with the technical aspects of vehicle regulations, the European Union can establish a set of objectives and rules for the automobile industry, such as energy-consumption standards on vehicles or fuels (minimum percentage of "clean" fuels), taxes or permitting tradeoffs, etc.

- **Filling the worldwide governance gap to deal with the greenhouse effect.** A European policy on fuel-efficient vehicles and clean fuels will only be truly effective if it is adopted and relayed across the world. Hence, the development of new energy systems must be supported by globally applied economic instruments, such as negotiable emissions permits or a tax on carbon.

Handling Bottlenecks within Infrastructure Networks

In order to tackle future traffic and transport operations, the project team strongly recommends conducting more focused studies and measurements over the Atlantic seaboard and the Rhone corridor in conjunction with a large-scale infrastructure projects approved by the government in 2003.

The next stage will extend this planning approach by involving appropriate administrative agencies and service operators to enhance transportation supply and demand forecasts on the basis of the four scenarios.

These organisations shall cooperate closely with local actors and public authorities to establish and adopt key planning documents or hold public hearings.

Besides, improving major trans-European routes will only be possible if neighbouring public authorities cooperate closely. To this end, "Rhone Valley and Languedoc Mediterranean rim transportation policy" constitutes a very useful initiative.

Sources and References

Transport 2050 final report: http://www.equipement.gouv.fr/IMG/pdf/report_cle1db135.pdf

Futuribles Think-Tank report: http://www.equipement.gouv.fr/IMG/pdf/prosp.tr.2050_-_rapport_vljuin.05_cle0efd4b.pdf

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