Trends in Passenger Transport and Freight Energy use in Spain

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Introduction - *Relevance of the transport sector in Spain*

•Transport sector GHG emissions increased by 89% from 1990 to 2006, accounting for 12.4% of EU 15 total transportation emissions.

•Over 38% of total energy is demanded by transport industry.

•Present need to comply with CO_2 emissions targets, developing strong policies to target the transport sector.

This study aims to identify some of the key trends in passenger and freight transport, which, coupled with data regarding emissions and investments in these different sectors, will propose new alternatives for Spain to reach these targets by improving its transport sector.

Data Sources: Data used were retrieved from the 2008 Anuario Estadístico of Spain's Ministerio de Fomento, Odysee data base, the IDAE (Instituto para la Diversificación y Ahorro de Energía, Spanish Energy Efficiency Agency), International Transport Forum. The analysis is based on data from 1990 onwards.

Analytic Framework: The "ASIF" equation computes the level of emissions by taking into account total travel, or freight activity (A) and its respective modal shares (S, in %). I encompasses both vehicle energy intensity (V, in veh-km), and the level of vehicle use (L, in passengers or tonnes), taking into account differences in mode (j) and fuel type used (k). F specifies the carbon content of fuels(k) for a specific mode (j).

$$G\ *(\text{Emissions}) = A * S_i * I_{k,j} * F_{k,j}$$

Analysis – Activity, Modal Shares, Energy Intensity & Carbon Intensity

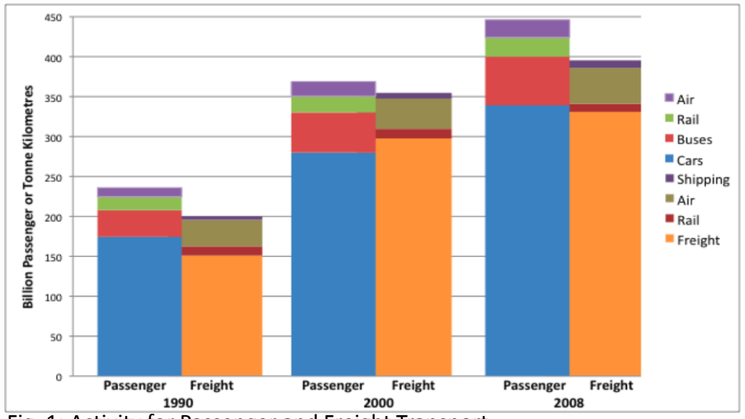

Fig. 1: Activity for Passenger and Freight Transport.

Modal Shares:

Passenger Travel: Cars (over 78% of travel) dominate. Car and air travel have shown a general increase, while rail and bus shares have been decreasing (rail is recovering due to AVE). Freight Travel: Road transport dominates the sector (growth from 76% to 84%). While air shipping remains stagnant, both rail and water shipping have dropped.

Activity:

Travel volume for passenger transport (in passenger-km) grew by 89%, while freight (in tonne-km) grew 97%.

Road-modes are favored over other forms of transport (intense development of the road network in Spain: 22.9 km/capita) . Daily commute patterns have also indicated that the general population is shying away from public transport and more carbon intense automobile transport instead

Freight travel: Spain stands third in the EU, with 84.6 km/1000 ton-km.

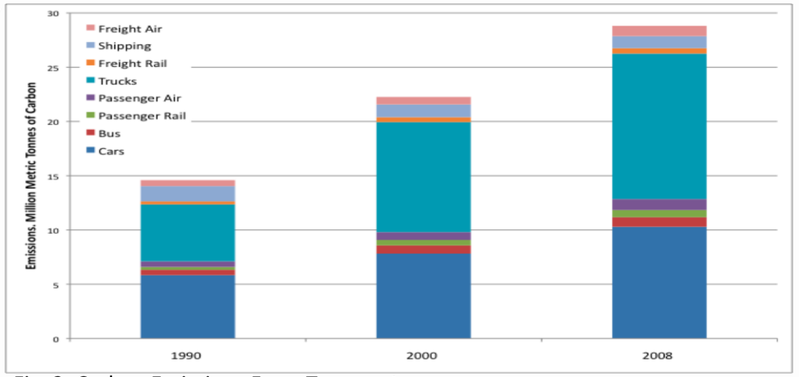

Fig. 2: Carbon Emissions From Transport.

Energy & Carbon Intensities:

Trucking and cars, are the modes with more activity, and responsible for the bulk of emissions. Air travel has the highest carbon intensity in both the freight and transport modes. Carbon intensity for passenger travel increased 16% from 2000 to 2008 due to rising high speed rail travel, air and car carbon intensity. For freight transport, carbon intensities have remained constant. Air and shipping have become less carbon intense, but trucking has increased at a rate of 2.7% per year.

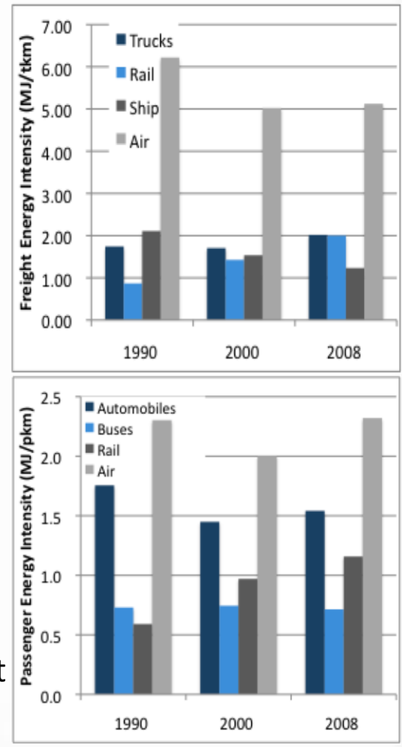

Fig. 3: Freight (above) and passenger (below) energy intensities.

Conclusions

1)**Activity** in the transportation industry can be recognized as the main driver of Spain's emissions increase. This activity is mainly focused on road-based forms of transport, given that the prime road network Spain has invested in foments the use of trucking as the main mode of freight. **Activity reduction** would be achieved through price incentives, taxation, urban planning and other such policies which would reduce the number of pkm or tkm in both the passenger and freight industries.

2)R**idership** should be increased, with the Spanish government advocating for carpooling, and increasing modal shares for public transportation. The expansion of the High Speed Rail network will shift a road passenger and freight transport to rail.

3)**Competing services**: the recent significant developments in Spanish transport have generated a dynamic where services compete instead of collaborating to generate a better experience for the user and society. (AVE vs Buses)

4)**Untargeted investments**, spread out over various sectors, ignore the needs of communities, and aren't directed towards areas where there is demand or where obsolete and underdeveloped sectors still remain ignored.

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