FACULTY OF MARINE AND MARITIME TRANSPORT ENGINEERING

UNIVERSIDAD DE CÁDIZ

LOGISTIC.ENERGY USE AND EMISSIONS FROM FREIGHT TRANSPORT

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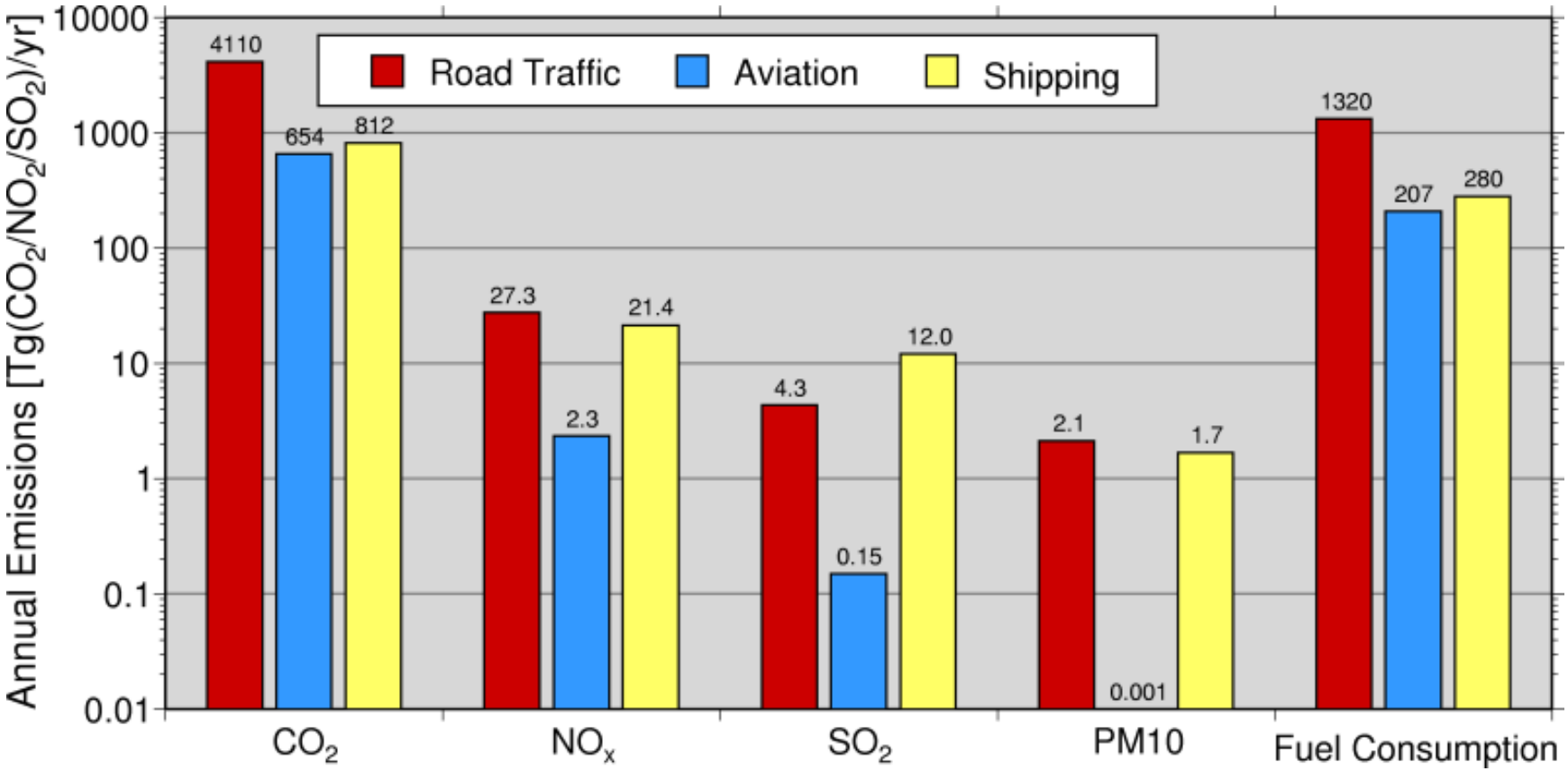
DEFINITION

- **Logistics and freight transport**
- As such, the fundamental question does not necessarily reside in the nature, origins and destinations of freight movements, but how this freight is moving.
- Energy use and emissions from freight transport are increasing at a more rapid rate than other types of transportation

EMISSIONS U.S.A.

- United States (2005), freight transport accounted for approximately 6800 trillion Btu (TBtu) of energy consumption, representing 25.7% of total nonmilitary transportation energy use.
- Currently, freight transport (including rail, truck, air, and domestic and international shipping to the United States) is responsible for approximately 470 million metric tons of CO_2 (MMT CO_2) per year in the United States

EMISSIONS EUROPE



EMISSIONS SPAIN

- In 1990, transport in Spain consumed 39.5% of primary energy and 42.2% in 2006 (Ministry of Development, 2008). In 2006, the final energy consumption in the transport sector was to over 41 million toe (tons oil equivalent).

The experience of the University of Cadiz(UCA) in logistics and transport

- 1.- Education

- 2.- Research

Education

- In Education, UCA are developing a Master's degree named “The port management” that is being taught for eleven years.

RESEARCH

- In Researching our studies are focuses to the binomius energy- emissions in the maritime and multimodal transport.

MASTER”The port management”

- 1.- Economic and Law
  - Analysis, prediction and simulation of supply chains
  - Operational and demand analysis of transport chains
  - Economics and Law applied to the transport and logistics
- 2.- Marine and Mechanics Engineering
  - Energy and environmental engineering (green logistics)
  - Energy and environmental optimization of routes and types of vessels
  - Energy and environmental optimization intermodal transport
- 3.-Maritime Transport Engineering
  - Safety and Security in the Supply Chain
  - Route optimization. Communications
- 4.- Civil Engineering
  - Transport infrastructure
  - Ports and coastal engineering

RESEARCH

- Prelogistics, ERA
- "Logistics,“ERA.
- "Neologistics," ERA, and now

- **“GREEN LOGISTIC” ERA**

EMISSIONS IN THE GIBRALTAR STRAIT

ATMOSPHERIC EMISSIONS

- SO_2,
- NO_x,
- CO_2,
- PM_{10} and
- $PM_{2.5}$

RESULTS

- 1,437.7 kton FOR CO_2 (0,165 % international shipping emitted in the same year
- 29,7 for kton SO_2
- 35.5 kton for No_x
- 3.4 kton for PM_{10} and
- 2,7 kton for $PM_{2,5}$
- The modelled total fuel consumption amounts to 454.7 ktons

Ship Type

- TANKERS
- CONTAINERS
- FERRYS
- PASSENGERS
- RORO
- FREEZERS
- REST

Paper and Research projets

- "Correcting injection pressure maladjustments to reduce NO_X emissions by marine diesel engines". Journal Transportation Research: Environment. Ed. Elsevier.(2008)
- "The viability of pure vegetable oil as an alternative fuel for large ships". Journal Transportation Research: Environment. Ed. Elsevier.(2009)
- "Effects of charged air temperature and pressure on NOx emissions of marine medium speed engines". Journal Transportation Research: Environment. Ed. Elsevier. (2010)
- "The impact of marine engine operation and maintenance on emissions". Journal Transportation Research: Environment. Ed. Elsevier.(2011) (five days ago)

Research Projects

- Analysis of emissions from ships in the Strait of Gibraltar. Ministry of the Presidency.(2005)
- Strategies for minimizing NOx emissions from marine diesel engines. Ministry of Environment. (2007)
- Pilot Plan for the Implementation of Annex VI of MARPOL (Marine Pollution). Ministry of Environment. (2009)

Research Projects. Pending approval.

- PROPOSAL OF A CONTROL SYSTEM OF POLLUTANT EMISSIONS FROM TRAFFIC IN the Andalusian Coast.

- EMISSHIP - Forecasting atmospheric emissions from shipping: Portugal in 2020. UCA-UNIVERSIDAD DE PORTO

- REAL LIFE EMISSION AND FUEL CONSUMPTION FACTORS OF INTERNAL COMBUSTION ENGINES FOR INTERMODAL TRANSPORT ANALYSIS (LAND AND SEA) ON THE HORIZON OF THE YEAR 2020. (FEMCATI).UCA-UPM

NEXT STEPS

- Balancing port operations and development with environmental considerations
- Ship Traffic, Energy and Environment Model

Balancing port operations and development. Energy and enissions

- Ocean/Sea Going Vessels
- Harbor Craft / Inland Vessels
- Cargo Handling Equipment
- Heavy Duty Vehicles – Trucks
- Light Duty Vehicles
- Locomotives and Rail
- Construction Equipment

Ship Traffic, Energy and Environment Model

- To estimate and visualize the risk and severity of collision between ships and the Strait of Gibraltar
- According to the physics of the interaction between a ship and a whale, for ships larger than 500 tons, speed is more important than the size of a ship in determining a lethal injury to a whale

MULTIMODAL TRANSPORT

- Thank you very much