ENERGY POLICIES IN THE TRANSPORTATION SECTOR

Paulo Henrique de Mello Santana, Energy, ABC Federal University, Brazil, +55 11 4996-0001, Paulo.santana@ufabc.edu.br
Conrado Augustus de Melo, Energy, ABC Federal University, Brazil, + 55 11 4996-0001, conrado.melo@ufabc.edu.br
Luiza Pássaro Bertazzoli, Energy, ABC Federal University, Brazil, + 55 11 4996-0001, luizapbertazzoli@hotmail.com

Overview

Although some authors question the veracity of anthropogenic influences on climate change, the first part of the Intergovernmental Panel on Climate Change (IPCC's) fifth assessment report says scientists are 95% certain that humans have been the "dominant cause" of global warming since the 1950s. Transport is the sector with the highest final energy consumption and, without any significant policy changes, is forecast to remain so (IEA, 2010). Energy use could increase as much as 70% by 2050 if no further policies are adopted in support of efficiency, alternative vehicles/fuels and modal shifting. (IEA, 2012). Although plenty of transportation energy policies were launched in the two last decade around the world, a more coordinated action is needed to improve energy efficiency in the transportation sector. The sector comprises both passenger and freight modes. The passenger modes include light-duty cars and trucks, buses, 2- and 3-wheel vehicles, airplanes, and passenger trains. The freight modes, which are used in the movement of raw, intermediate, and finished goods to consumers, include trucks (heavy-, medium-, and light-duty), marine vessels (international and domestic), rail, and pipelines (EIA, 2017). The subject of this paper addresses the beginning of a three year project. The general objective of this project is to develop a macroeconomic model, based on econometric relations and highlighting the energy sector, to simulate the impacts in the state of Brazilian economic activity, employment, energy supply and consumption and CO2 emissions of current and possible future public policies. The project intends to evaluate the importance, effectiveness, and efficiency of energy policies in the transportation sector in Brazil. This paper reviews and classify energy policies for the transportation sector in selected countries and proposes an integrated approach to achieve a infrastructure/technology/policy interface. The objectives of this paper are to review and classify energy efficiency policies mechanisms in selected countries; and also to propose an integrated policy approach.

Methodology

Energy policy for transportation in selected countries are classified into different policy mechanisms. The four known criteria of technology-push, demand-pull, market incentives and command-and-control were aggregated into four quadrants (de Mello Santana, 2017). This classification was made to clarify these policy mechanisms to help policymakers better design and deploy energy policy mechanisms. The first category is called technology-control, where policies are technology-push and command-and-control type because they have the potential to reduce private costs and are mandatory. The second is called market-control policy, where policies are demand-pull and command-and-control type because they have the potential to increase private profits and are mandatory. The third is called open market policies, where policies are demand-pull and market-incentive type because they have the potential to increase private profits and are not mandatory. The last category is called techno-economic, and they are technology-push and market-incentive because they have the potential to reduce private costs and are not mandatory.

Results

Figure 1 shows the main energy policies implemented in the transportation sector around the world, classified according de Mello Santana (2017). Technology tranfer is classified as technology-control policy. Direct investments, credit incentives and tax credit are techno-economic policy. Fuel-efficient tires, low carbon/sulfur fuels are market-control policy. Furthermore, fuel consumption labels, information campaign and eco-driving are usualy open-market policy. Fuel efficiency standards for HDV and HDV is usually voluntary at the beginning (open-market policy approach), but in some cases it evolves into a mandatory policy (market-control policy).
Table 1 shows these policy mechanisms, the countries and the estimated energy savings according to literature review. These energy policies should be designed and implemented together. However they are normally isolated actions. Policies envisaging basic R&D and commercial implementation of transportation technologies and mode change were also studied.

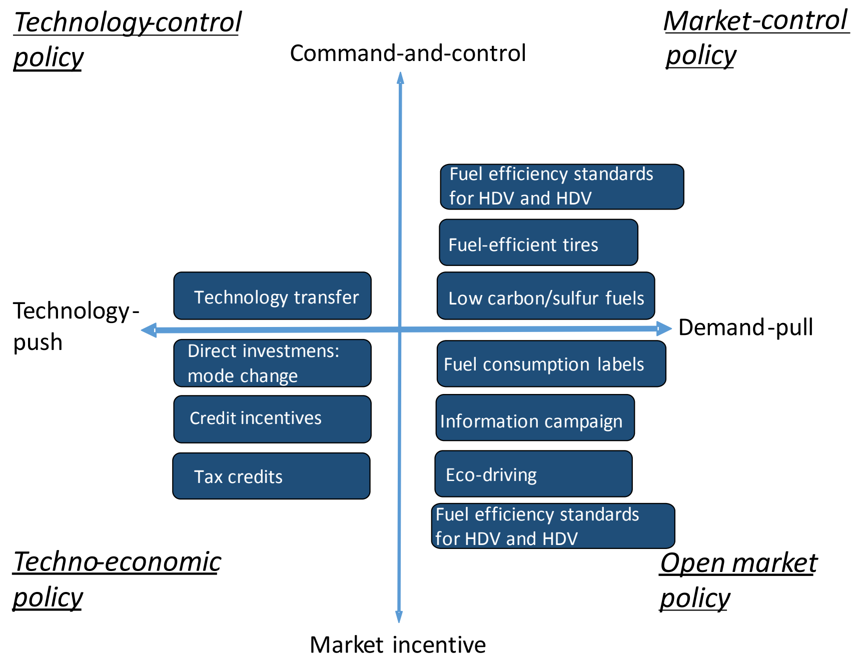

Figure 1: classification of energy policies implemented in the transportation sector around the world

Table 1: energy policies in several countries and the estimated energy savings expected

Policies	Countries	Estimated energy savings
Fuel-efficient tyres	European Union, Canada, United States and Japan	5%
Fuel efficiency standards for LDV	Canada, European Union, South Korea, China, Brazil, United States, India, Russia, Japan, Mexico and Saudi Arabia	12 - 34%
Fuel efficiency standards for HDV	Japan, China, United Stated, Canada, South Korea, Russia, European Union	11 - 14%
Low carbon/sulfur fuels	United States, Brazil, China	10% carbon and 10-50 ppm limit sulfur content
Tax credit	Brazil	12-19%
Direct investments	China and Japan	2-14%

Conclusions

The main energy policies implemented in the transportation sector around the world were classified according to de Mello Santana (2017) and detailed in Table 1. Those policies are designed to improve the efficiency of the transportation sector. However, these policies are normally isolated actions. These energy policies should be designed and implemented together. Moreover, R&D, commercial implementation, mode change and energy policies for the transportation sector should work closely together, what doesn't happen in the majority of the cases studied. Transportation companies, policymakers and academia should make an effort work closely together to in most cases to build a future agenda to achieve better results in the low carbon economy.