

Fuel economy standards for light duty vehicles and their potential to aid Iran toward achieving fuel saving and emissions reduction

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Abstract At this time, more than 58.4 % of the total amount of oil productions in Iran is consumed in the transportation section. Different fuel saving initiatives and approaches such as the fuel economy standards and labels program for motor vehicles in the transportation section have been applied in many developed countries. This work investigates the influence of executing the fuel economy standard program on the fuel saving and its effects on the environment. The calculation of the standards program is done consider to the data of motor vehicles in Iran. It is found that by implementing the program around 3.81 billion liters of fuel is expected to be saved, from 2013 to 2018. Also, it is estimated that the emission reduction of some gases such as CO₂, CO, and NO_x is equal to 7.35 million ton, 2.54, and 1.2 ton, respectively.

Keywords Fuel economy · Fuel saving · Emission reduction · Light duty vehicle · Standards and labels

List of symbols

AS _{<i>i</i>}	Applicable stock of motor vehicle in year <i>i</i>
AFI	Annual fuel economy improvement
BFC _{<i>s</i>}	Baseline fuel consumption in the year of implementing standards (liter/year)
BFC _{Ysc}	Baseline fuel consumption in the year data are collected
FER _{<i>i</i>}	Fuel economy ratio in year <i>i</i> (km/l)
FS _{<i>i</i>}	Fuel saving in year <i>i</i>
SF _{<i>i</i>}	Scaling factor in year <i>i</i>

SSF _{<i>i</i>}	Shipment survival factor in year <i>i</i> for motor vehicle
SFC _{<i>s</i>}	Standards fuel consumption (l/year)
TI _{<i>s</i>}	Total fuel economy improvement (%)
Ym	Annual mileage
Yse _{<i>i</i>}	Year of standards enacted for motor vehicles
Ysh _{<i>i</i>}	Year <i>i</i> of shipment of motor vehicle
UFS _{<i>i</i>}	Initial unit fuel saving in year <i>i</i> (l/year)
η _{<i>s</i>}	Percentage of standards improvement

Introduction

The final energy consumption in Iran is increased in the past decade because of the industrialization. The total primary energy supply increases with 59.9 % and reaches 1493.21 Mboe in 2008 (Pakdaman et al. 2010). The largest type of fuel that is consuming in Iran is crude oil. The second largest energy consumer in Iran is the transportation sector (Rabiee and Rashtian 2010). This sector contributes around 269.8 Mboe of oil production in 2008. In the developing countries, increase of using motor vehicles is unavoidable. The growth of the transportation system causes to increase the usage of fossil fuels, which have adverse effects on the environment (Dargay and Gately 1999; Pucher et al. 2005; Glaser 2009).

The production of light and heavy-duty vehicle grew at an average rate around 12.2 and 17.7 % in Iran from 2001 to 2009, respectively (Karaminia et al. 2010). The main fuel that is consumed in the transportation sector of Iran is gasoline, diesel. Motor petrol and diesel oil contribute 49.49 and 42.01 % of total fuel consumption in the transportation sector of Iran, respectively (Karaminia et al. 2010). This

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