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By Simone Tagliapietra

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EXPLORING THE POTENTIAL FOR ENERGY EFFICIENCY IN TURKEY

By Simone Tagliapietra*

Energy efficiency is one of the key crossroads between energy, climate and economic issues. In fact, it represents one of the most cost effective ways to enhance security of energy supply, to reduce emissions of greenhouse gases and to enhance economic competitiveness at one fell swoop. This paper explores the potential for energy efficiency gains in Turkey, a country characterized by a strong growth in energy demand and by a strong need of better security of supply, emissions reduction and economic competitiveness.

Keywords: Energy efficiency; Turkey; Sustainability

JEL: Q41, Q43, Q48

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Energy efficiency is one of the key crossroads between energy, climate and economic issues. In fact, it represents one of the most cost effective ways to enhance security of energy supply, to reduce emissions of greenhouse gases and to enhance economic competitiveness at one fell swoop. As an overall trend, the world's energy intensity (the indicator generally used to measure the energy efficiency of a nation's economy) has fallen over the last decades, primarily as a result of efficiency improvements in the power and end-use sectors and a transition away from energy-intensive industries. However, the rate of decline in energy intensity has widely differed from country to country. For instance, the best performers in terms of energy intensity reduction have been the United States and Japan, which started to lower their energy intensity already in the second half of the 1970s, when the oil crises of 1973 and 1979 seriously impacted their economies. On the contrary, Turkey (albeit starting from a structural lower level of energy intensity) has not improved its energy efficiency performance over the last decades. In fact, looking at the long-term evolution of Turkey's energy intensity (Fig. 1) it is impossible to recognize any sign of improvement as the trend remains basically fixed at a constant level.

It might be argued that this difference is basically due to the different level of economic development of the three countries. For this reason, it may be useful to compare also the evolution of energy intensity in Turkey with that of countries placeable at the same level of economic development, in terms of GDP per capita. Looking at this comparison (Fig. 2) it is possible to realize that Argentina and Chile are embarked on a path of energy intensity reduction; a trend particularly marked in the last decade. On the contrary, Mexico (albeit after a reduction in the 1990s) and Brazil (albeit after a considerable reduction in the 1970s) currently present a flat trend of energy intensity, well comparable with the one of Turkey. The point here is that Mexico and Brazil are both major energy producing countries, while Turkey is not. For this reason, Turkey should have been on the same energy intensity path than Argentina and Chile, rather than Mexico and Brazil.

On the basis of these two comparative analyses it seems that Turkey is not yet on the optimum path as far as energy efficiency is concerned. This might signify that a considerable untapped potential in terms of energy savings is there; a potential that, if unlocked, could ultimately provide a considerable contribution to lowering the country's current account deficit. In Turkey three sectors have the potential to provide the most tangible opportunities for energy efficiency improvements: industrial, residential and transportation.

According to a major study carried out by the World Bank (2010), in Turkey the industrial and residential sectors alone offer an aggregated energy savings potential of over 15 million tons of oil equivalent (toe) of energy consumption per year, or about 18 percent of the country's current total primary energy consumption. The industrial sector accounts for about 35 percent of

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total final consumption and is the largest consumer of energy in Turkey, while the buildings sector accounts for about 30 percent of total final consumption (public/residential/commercial buildings). These two sectors also have the highest projected energy demand growth. Therefore, they offer the largest potentials for energy savings, making them priority sectors for promoting energy efficiency investments. Turkey's industry is dominated by energy intensive industrial subsectors, where energy costs range approximately between 10 and 50 percent of the total production costs (Fig. 3).

The iron and steel subsector uses the largest share of Turkey's industrial energy consumption (about 25 percent), followed by the non-metallic subsector (cement, glass, ceramics, bricks; about 23 percent), the chemical-petrochemical subsector (9 percent) and the textile subsector (6 percent). These subsectors have the highest energy efficiency gains potential. The largest companies have already implemented some energy efficiency improvements and investments to maintain their global competitiveness. However, a systematic effort to prioritize and encourage investments could provide additional energy efficiency benefits to the country.

Turkey has also a considerable energy savings potential in the residential sector. Due to rising living standards linked to economic growth (including increased use of appliances and air conditioning), together with substantial increase in the national building, the energy consumption of the residential and services sectors has increased three fold over the last 40 years, yet its share in the total energy consumption continues to decline (Fig. 4).

Heating accounts for 80 percent of energy consumption in buildings. Most of the buildings in Turkey were built years before 2000 and not regulated on energy performance. As such, a large improvement in energy efficiency can be achieved by increasing use of thermal insulation to avoid heat loss. The implementations of these energy efficiency requirements will also have a positive spillover on the international competitiveness of Turkey's industry, as by meeting the EU labelling standards, its products could have a number of additional export opportunities. All these elements demonstrate how energy efficiency could well be seen by Turkey as a unique opportunity for further growth, both in macro- and micro-economic terms.

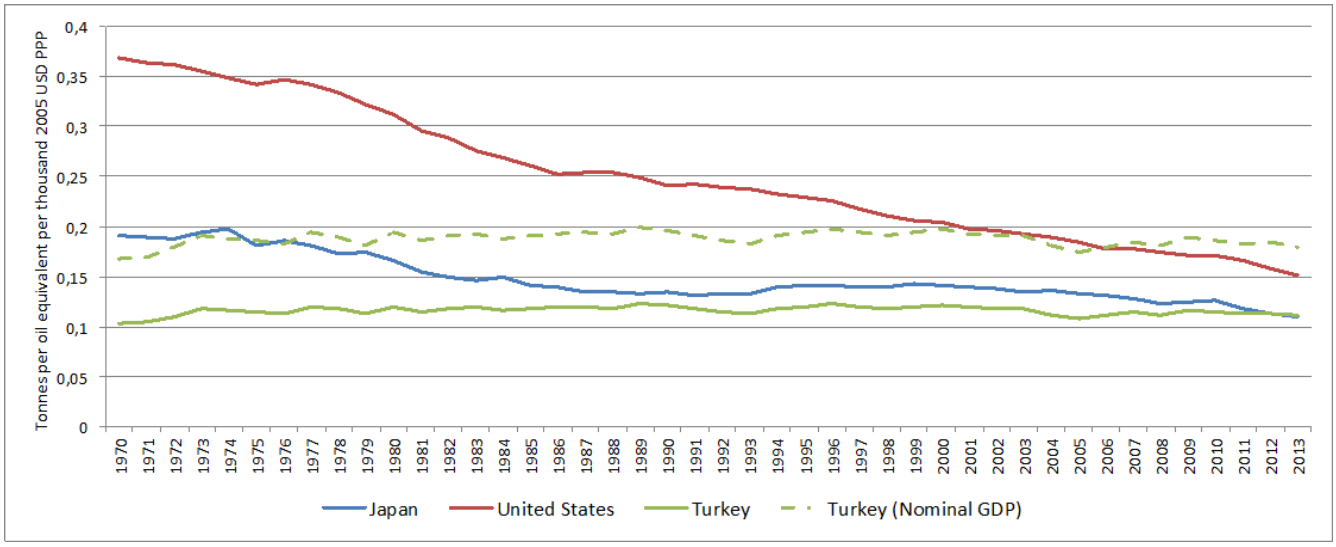
Furthermore, major energy efficiency improvements might also be obtained in the transportation sector. Considering that in Turkey the average pump price for diesel ranks among the highest in the world (Fig. 5), energy efficiency improvements in the transportation sector should represent an economic imperative for the country, as they would considerably enhance the competitiveness of the economy.

But how can these efficiency improvements be achieved? Looking at the previous international experiences (most notably of Japan, the United States and the European Union), in the transportation sector major energy efficiency gains could well be achieved by implementing the following policies: i) To improve tyre energy efficiency, mandating tyre pressure monitoring systems on all vehicles and setting minimum requirements for rolling resistance and other essential tyre performances; ii) To improve fuel economy standards for both light-duty and heavy-duty vehicles, tightening vehicle CO2 emissions standards and enhancing fuel economy labelling; iii) To promote fuel-efficient driving, implementing eco-driving programmes; iv) To enhance the energy efficiency of the public transportation sector.

If appropriately implemented, all the energy efficiency policies just illustrated with regard to the industrial, residential and transportation sector might contribute to achieve the triple-target of enhancing security of energy supply, reducing CO2 emissions and enhancing economic competitiveness of Turkey.

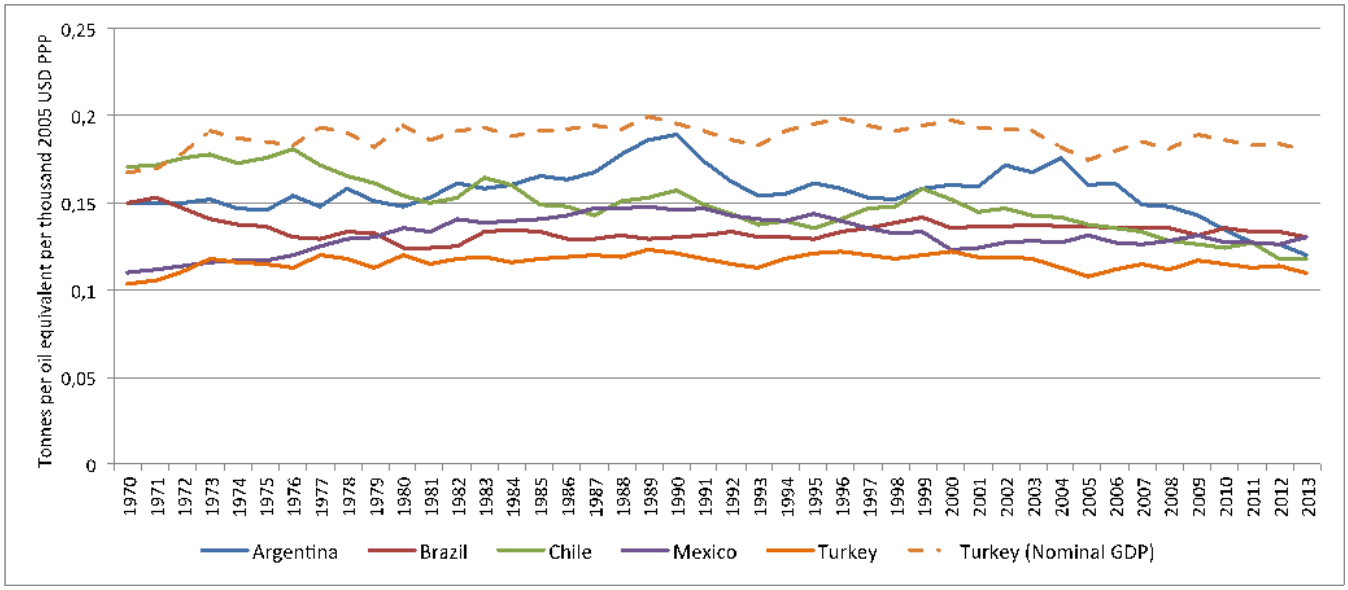
Figures

Figure 1 - Total primary energy supply per unit of GDP: A comparison between Japan, the United States and Turkey



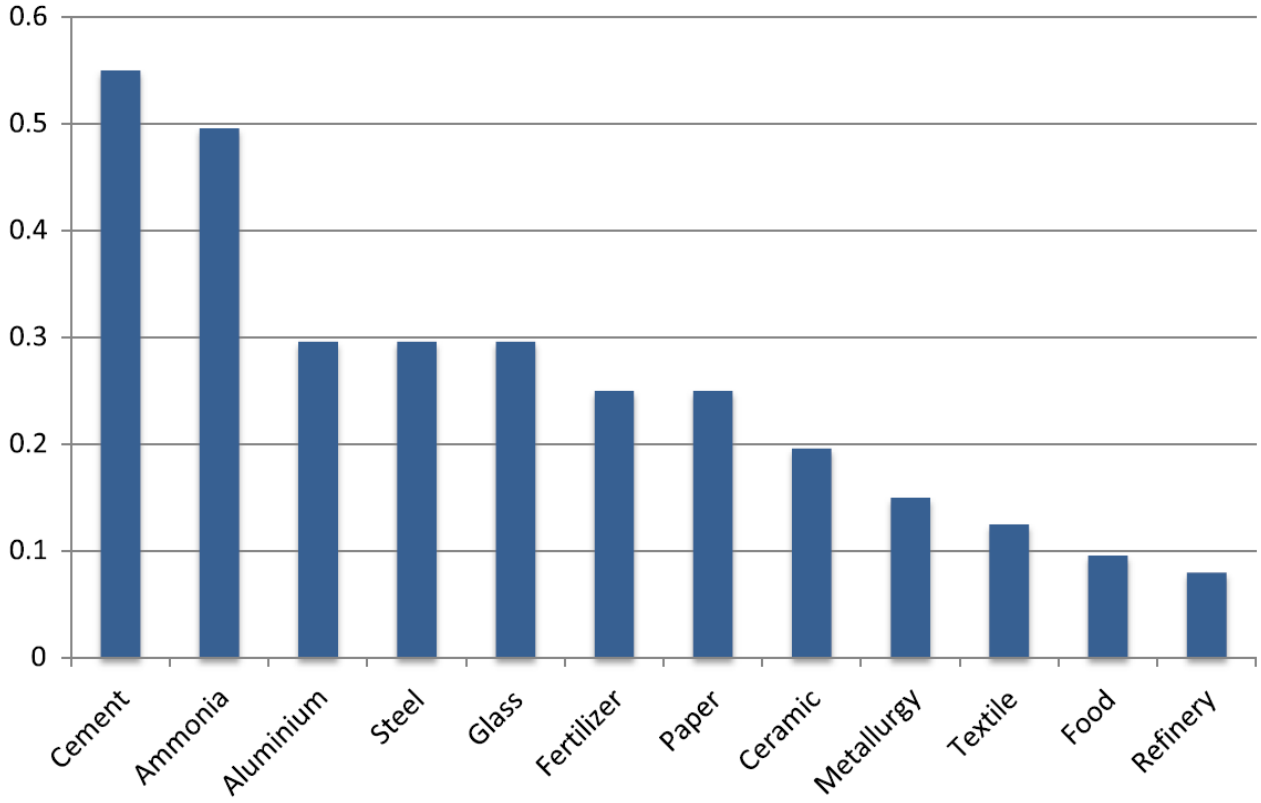
Source: own elaboration on IEA World Energy Statistics and Balances, accessed in February 2016.

Figure 2 - Total primary energy supply per unit of GDP:A comparison between Turkey, Argentina, Brazil, Chile and Mexico



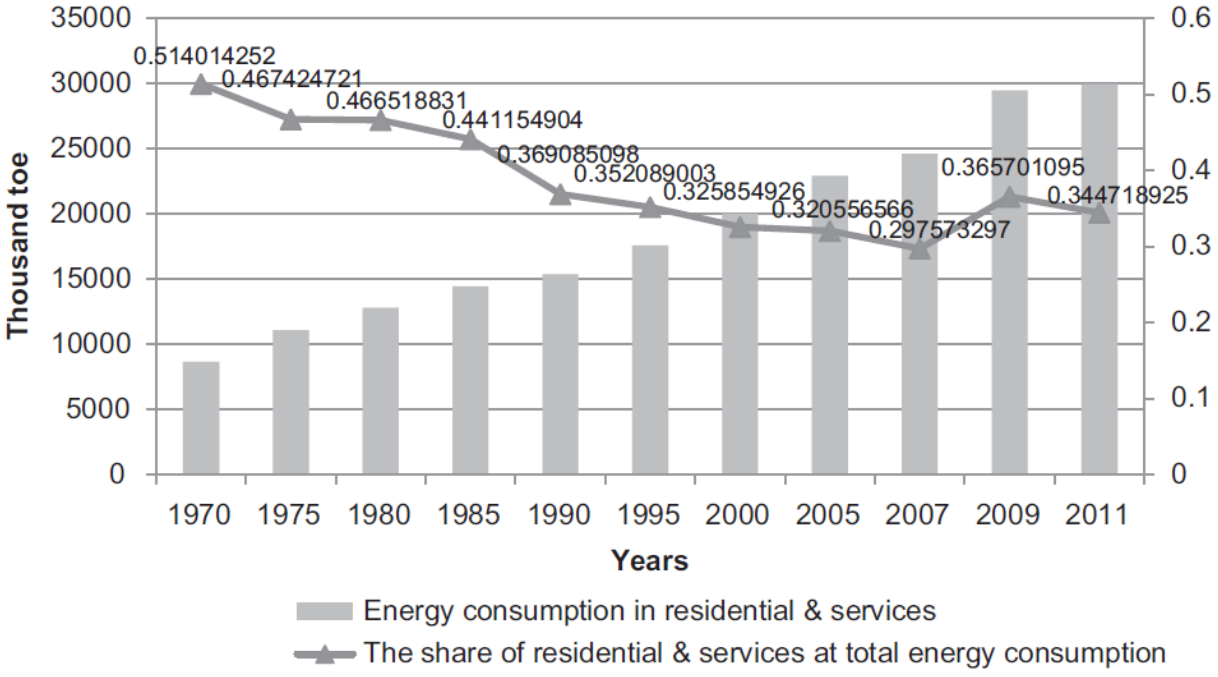
Source: own elaboration on IEA World Energy Statistics and Balances, accessed in February 2016.

Figure 3 - Share of energy costs in total production costs in Turkey's industry



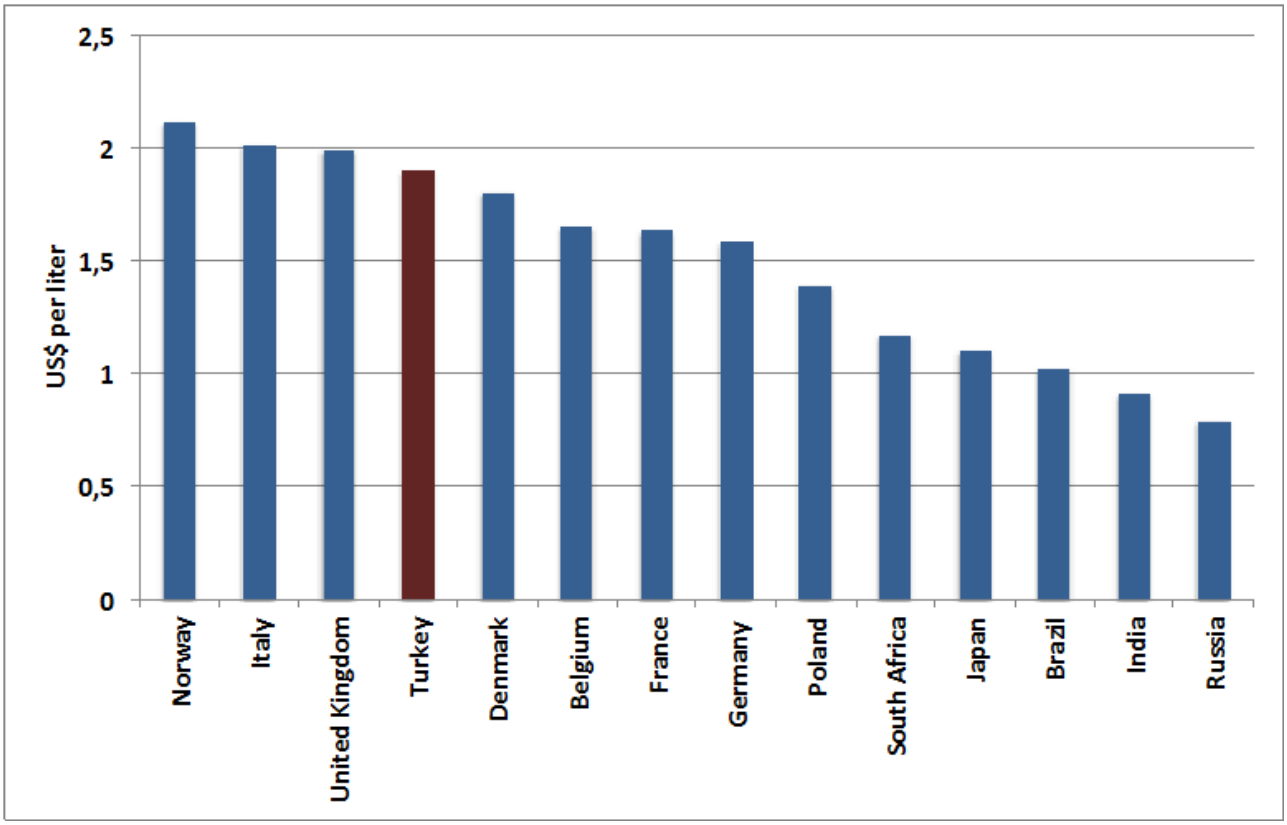
Source: Yalcin (2010).

Figure 4 - Energy consumption of residential and services and their share in total energy consumption



Source: Duzgun and Komurgoz (2014).

Figure 5 - Comparison of average pump price for diesel fuel in selected countries (2014)



Source: own elaboration on World Bank, World Development Indicators, accessed in February 2016.

References

ABB (2011), "Turkey. Energy efficiency report", Zurich.

Blanc, F. (2012), "Energy efficiency: trends and perspectives in the Southern Mediterranean", MedPro Technical Paper No. 21, Center for European Policy Studies (CEPS), Brussels.

Duzgun, B. and Komurgoz, G. (2014), "Turkey's energy efficiency assessment: White Certificates Systems and their applicability in Turkey", in Energy Policy, 65 (2014), pp. 465-474.

Hafner, M. and Tagliapietra, S. (2013), "A new Euro-Mediterranean Energy Roadmap for a sustainable energy transition in the region", MedPro Policy Paper No. 3, Center for European Policy Studies (CEPS), Brussels.

INTERNATIONAL ENERGY AGENCY (2015), "World Energy Outlook 2015", OECD, Paris.

Suehiro, S. (2007), "Energy intensity of GDP as an index of energy conservation. Problems in international comparison of energy intensity of GDP and estimate using sector-based approach", The Institute of Energy Economics, Tokyo.

World Bank (2010), "Tapping the potential for energy savings in Turkey", Sustainable Development Department, Washington, D.C.

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