



JAPAN  
RENEWABLE  
ENERGY  
FOUNDATION

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## Is the Shutdown of Nuclear Reactors Really Costing 3.6 Trillion Yen?

A Comparative Analysis of  
the Government's Fuel Cost Estimate

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## SUMMARY

The Japanese Government indicated that fuel cost for electricity generation increased by 3.6 trillion yen per year in FY2013, compared to FY2010, due to an increase in generation from fossil fuel power plants to offset the shutdown of nuclear reactors.

This estimate exaggerates the actual impact of the increase in fossil fuel generation with regard to the following two points.

1 The Government's estimate is based on the assumption that the loss of nuclear power generation is entirely and exactly replaced by fossil fuel, however, after the earthquake disaster and the nuclear accidents, the actual increase in fossil fuel generation was about 30% less than the Government's estimate due to the progresses made in energy savings and energy efficiency. The Government's estimate has not taken into account those reductions.

2 The 3.6 trillion yen claimed increase, is based on the Government's exaggerated fuel quantity factor, but also irrelevant price factors. It is not appropriate to include the rise in LNG price and yen weakening resulting from other causes, and to consider them as consequences of shutting down nuclear reactors.

While the Government has acknowledged that the price factor is included in its estimate, as can be seen in the parliamentary statement by Mr. Motegi, Minister of Economy, Trade and Industry on 3<sup>rd</sup> March 2014, yet the reduction made by energy savings and energy efficiency is still not incorporated into the Government's estimate.

According to the estimate by Japan Renewable Energy Foundation (JREF), the additional fuel cost is 2.4 trillion yen per year, taking into consideration the reduction made by energy savings and efficiency. And the figure is 1.6 trillion yen per year when the price factor is taken out from 2.4 trillion yen.

Details can be seen in Section 1. While there is a view that the price factor, namely the rise in LNG price, is itself caused by the global demand increase due to the shutdown of Japan's nuclear reactors, this is not appropriate either. Please refer Section 2 on this point.

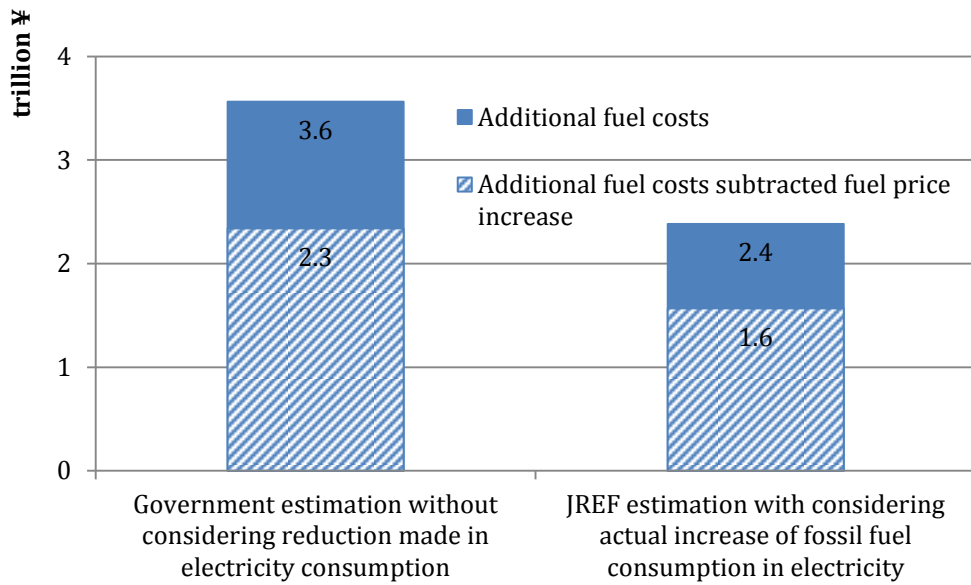


Figure 1 Additional fuel costs in FY2013 compared with FY2010

## Section 1

### Estimate of the Fuel Cost Based on the Actual Increase in Fossil Fuel Generation

1 Under the Government's fuel cost estimate, it is assumed that the reduction in nuclear power generation compared to prior to the accident is entirely replaced by fossil fuel (the generation from nine power companies that own nuclear reactors; the same applies hereinafter).

More specifically, the following figures are used as the required increase in fossil fuel generation; "The difference between the average amount of electricity from nuclear power during FY 2008-2010 and that in FY 2012 and 2013, respectively." (Those are 259.3 TWh for FY2012, 265.5 TWh for FY2013)

2 After the earthquake and the nuclear accidents, the actual increase in fossil fuel generation up to December 2013, the period in which actual data is available, was less than the generation assumed in the Government's estimate, due to the electricity consumption reduction by energy savings.

3 In FY2012, the generation from fossil fuel increased by 181.3 TWh, from approximately 485.4 TWh in FY2010 to approximately 666.8 TWh in FY2012. The increase in fossil fuel generation was approximately 30% lower or 78 TWh less than the Government's estimate of 259.3 TWh.

4 The additional fuel cost for FY2012 was approximately 2.1 trillion yen with the consideration of above reduction. This is approximately 1 trillion yen less than the Government's estimate of 3.1 trillion yen in FY2012.

5 The actual data for FY2013 is not fully available yet. In the nine months from April to December 2013, the generation from fossil fuel was slightly lower than the same period in FY2012. So that JREF has made an estimate assuming the generation for the whole of FY2013 was the same with that for FY2012.

In this case, the additional fuel cost in FY2013 is estimated to be approximately 2.4 trillion yen. This amount is 1.2 trillion yen less compared to the Government's estimate.

6 In order to assess the "quantitative factor" excluding the fluctuation in exchange rate and fuel price ("price factors"), JREF has estimated the additional fuel cost considering the fossil fuel price in FY2012-2013 to be the same as that in FY2010. Results show the additional fuel cost to be 1.6 trillion yen for both FY2012 and FY2013.

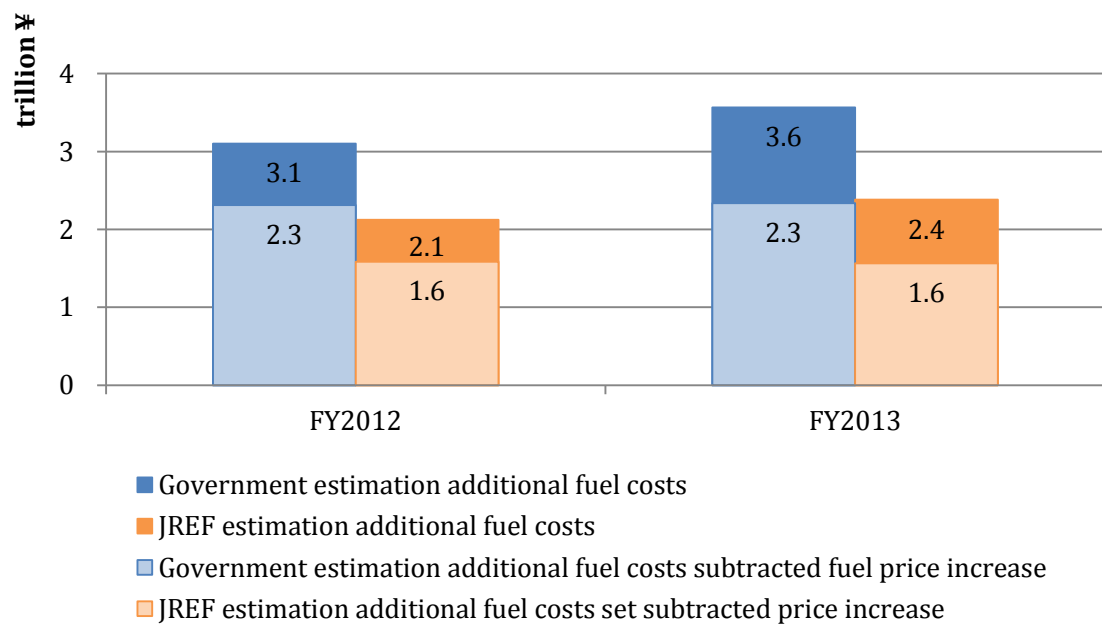


Figure 2 Additional fuel costs in FY2012 and FY2013 compared with FY 2010

## Section 2

### Change in LNG Import Price in Japan after the Shutdown of Nuclear Reactors

As has been explained, the other major factor for the additional fuel cost after the shutdown of nuclear reactors in Japan has been the rise in the fuel price. In this regard, there is an argument that the rise in LNG price is caused by the increase of LNG import by Japan. Hence, JREF has looked into this matter.

1 LNG is imported under long-term contracts or spot contracts. While the volume of spot LNG imports has increased after the shutdown of nuclear power plants, as a result of the increase in natural gas fueled power generation, long-term contracts still account for about 80% of the Japan's imports.

2 The Japan's long-term LNG contract price is set to fluctuate together with the price of crude oil (Figure 3). This import price of crude oil fluctuates due to international conditions, such as the Arab Spring, and has been rising from prior to March 2011. The LNG price has also been rising along with the rise of the import price of crude oil.

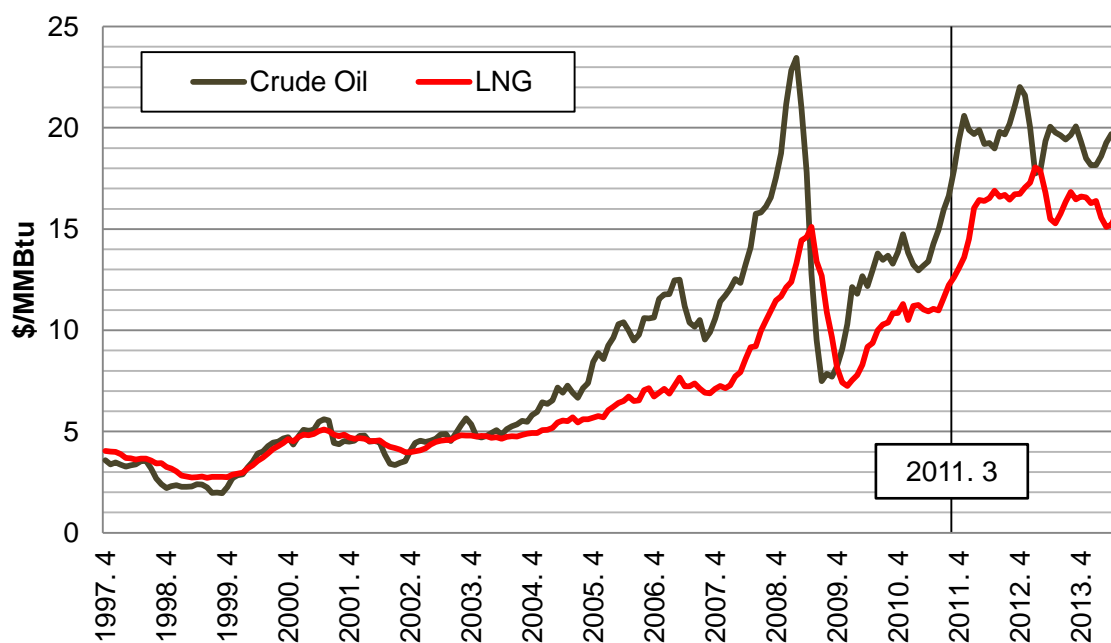


Figure 3 CIF<sup>1</sup> price of crude oil and LNG from 1997 to 2013  
by JREF, based on the statistics of Petroleum Association of Japan \*1)

The LNG CIF price is linked to the CIF price of crude and raw oil, with a lag of approximately three months.

<sup>1</sup> The acronym of "cost, infrastructure and freight," CIF refers to the price at the unloading point at the destination that includes freight and insurance in addition to the price of goods.

3 The price of spot imports, which account for approximately 20% of Japan's LNG imports, fluctuates in response to the short-term change in demand. The trends in JKM spot import price<sup>2</sup> after the Fukushima Daiichi accident, the period in which the spot price is below the average LNG import price has actually been longer, although the price has exceeded the average price at times. It cannot be defined that the suspended operation of nuclear reactors influenced and has raised the LNG price as a whole throughout the fiscal year (Figure 4).

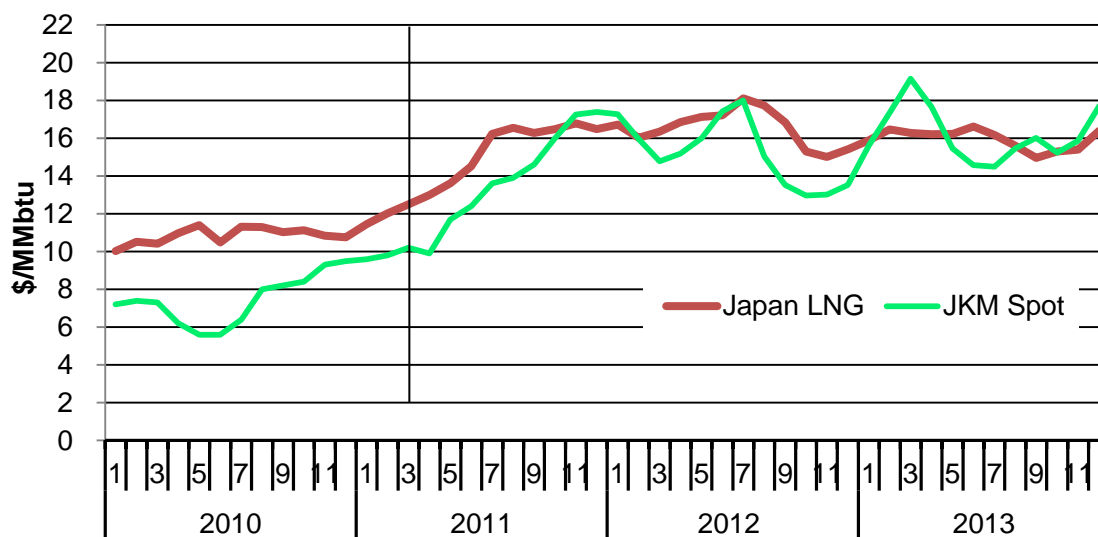


Figure 4 Japan's LNG import price and JKM spot price  
by JREF, based on the data from World Bank \*2) and Platts \*3)

4 The above can be summarized as follows.

- (i) The long-term contract price, which accounts for 80% of Japan's LNG imports, is linked to the price of crude oil and has been rising from prior to March 2011, due to international conditions such as the Arab Spring; and
- (ii) the price of spot imports, which account for 20% of Japan's LNG imports, has been below the long-term contract price for a longer period.

Thus, the argument that the rise in LNG price is caused by the increase in LNG imports by nuclear accidents in Japan may not be appropriate. Similar points have also been raised in the International Energy Agency's report \* 4).

## Sources

\*1. Petroleum Association of Japan (PAJ) statistics web page : <http://www.paj.gr.jp/statis/>

\*2. World Bank: "Monthly world prices of commodities and indices"

\*3. Platts: "Platts JKM and LNG Spot Contracts" and Platts press releases

<sup>2</sup> Spot price for Japan and Korea.

\*4. IEA, 2013: “Developing a Natural Gas Trading Hub in Asia: Obstacles and Opportunities”, p18

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