

# Editorial

## The World Needs Nuclear Power

The decoupling of GDP growth from increasing greenhouse gas emissions in California is nothing short of remarkable. In 2000, greenhouse gas emissions in CA were 468 million metric tonnes (MMT) of CO<sub>2</sub> and rising. By 2005, the ghg emissions increased to almost 500 MMT CO<sub>2</sub>. In 2006 the CA legislature passed the Assembly Bill 32 that required the State to lower its emissions to 1990 level (430 MMT) by 2020. Since the passage of AB 32, the emissions have been falling steadily and by 2014 were down to 440 MMT and are on track to reach the AB 32 target of 430 MMT ahead of 2020.

On the other hand, California's economy has grown from \$2.0 trillion in 2000 to about \$2.5 trillion dollars. California's economy is larger than all but five countries in the world: US, China, Japan, Germany, and United Kingdom. Thus, relative to 2000, whereas the ghg emissions are down 5%, the economy has grown 25%. The economic growth has even outpaced population growth, which has risen by 12% since 2000.

With the success of AB 32 in sight, CA next adopted the Senate Bill 350, which aims to reduce emissions to 40% below that in 1990 by 2030, in other words reduce annual emissions to 260 MMT. Transportation, which accounts for 37% of the emissions is a major target, and the bill seeks to cut the gasoline consumption by half. Increasing the fuel efficiency of vehicles will be a large part of it as will the electrification of the transportation sector.

There are 16 million light duty vehicles in CA with an annual sales of roughly 1.7 million units. Currently California has 200,000 electric vehicles, including both purely battery powered and plug-in hybrids, and SB 350 aims at increasing their numbers to 1.5 million by 2025. Assuming these 1.5 EVs have displaced average vehicles consuming 700 gallons of gasoline and that these vehicles are powered by truly zero-emission electricity, the net reduction on CA emissions would tantamount to 10 MMT. Recall, that we are looking to reduce emissions by another 160 MMT. Of course, the hope is that by 2025 there will be sufficient infrastructure in place to support a large growth in the EV to make a big dent reducing carbon emissions.

An increase in EVs will place a demand for increased electricity consumption and that is why another goal of SB 350 is to decarbonize electricity production. The

DOI #10.7569/JSEE.2016.629523

bill, under its Renewable Portfolio Standards (RPS), promotes the development carbon-free sources such as wind, solar, small hydro (but not large hydro, and biomass). It includes plans to phase out coal power and requires new fossil fuel power plants to emit no more than 400 g CO<sub>2</sub>/kWh, which is lower than the emissions from a garden-variety natural gas plant.

Of the 220 TWh of electricity consumed in CA in 2014, coal contributed about 20 TWh; it was mostly imported from other states as the in-state production of coal power has all but disappeared. The new regulations would eliminate importing all electricity from coal by 2025. Bulk of the electricity (120 TWh) used in CA comes from natural gas. Wind, solar, geo thermal, and hydroelectric power generate relatively smaller amounts: 13, 10, 12 and 17 TWh respectively. In addition to the increasing demand from EVs, California's IT industry also requires large amounts of electricity. Cloud services by Amazon, Google, Microsoft, and others require 10s of TWh of reliable electricity each year. Clearly, there is a large demand for carbon-free electricity. Can CA achieve SB 350 goals by relying mainly on increased efficiency of energy use and increasing wind and solar capacity? That remains to be seen—I am doubtful. So far, switching from coal to natural gas has been the main contributor towards reduced emissions in CA. However, this model is not a recipe for curbing emissions in energy-impooverished societies where most of the growth in energy consumption is expected. Because they are not profligate consumers of energy, there is very little room for gain by increasing efficiency. As they strive to improve their standard of living they will need to sharply increase the total supply of energy.

Nuclear power is one technology that can produce copious quantities of carbon-free electricity. California used to have three nuclear power plant facilities generating about 44 TWh carbon-free electricity; however, two of them have already been closed and there are talks of decommissioning the third one at Diablo Canyon, which last year generated 17 TWh of electricity. In view of the increasing demand for carbon-free electricity, I find plans to turn off nuclear plants misguided. Existing plants should be re-certified and the development of new inherently safe nuclear power technologies needs to be supported. I am heartened to see construction of the such plants in China and India. It would be nice if such development also took place in the US, but that is not likely given the strong anti-nuclear sentiment. This attitude feeds into the “business risk” and renders financing nuclear projects impossible. Countering the widespread public fears of nuclear power is a long-term project and will require engaging the public in a sustained informed dialog on the subject. A first step that legislatures could undertake would be to include nuclear power in the RPS so it could also qualify for the carbon credits that wind and solar power get and thus ease the financing.

Ripudaman Malhotra  
San Carlos, CA  
December, 2016