Published on 7, In Edition 03/05/17 0101bd0305
FUTURE ENERGY

Burgeoning electric cars will be a disruptor for production and jobs

Some developed countries have already indicated an intent to accelerate the introduction of the technology

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SA's new energy plan has sparked strong emotions because of the high cost and fears about corruption in the nuclear-build programme. This is evident from the political fallout from the recent decision by the High Court in Cape Town setting aside international agreements arising from the proposed 9.6GW nuclear-build programme.

The deadline for submissions on the draft Integrated Resource Plan (IRP) 2016 was March31. The IRP sets out the strategy to meet electricity demand to 2050, but the crucial debate centres on the competing role of nuclear and renewable energy.

A report in April by the US department of energy set out a doable path to a world solar energy capability in 2030 of 5,000GW-10,000GW (compared to Medupi's 5GW), from a 2015 base of less than 153GW. This represents at least a 50-fold increase for solar energy output worldwide. By way of comparison, the world's total electricity capability in 2015 was 15,000GW.

This possible worldwide solar capacity increase by 2030 is deemed achievable by the Global Association of Solar Energy Research Institutions and is based on, inter alia, an increase in demand for transportation — the electric car — as well as continued progress on solar-storage technology.

While the original numbers for the initial IRP 2010 to 2030 in SA were based on optimistic growth rates, the low rates over the past six years have affected demand figures and it will be interesting to see what the current projections are like once the final report is published. Some views have been expressed that nuclear may not be needed at all.

Also in the mix is the likely retirement of the ageing fleet of coal-fired power stations, five of which have already been earmarked. This is referred to as decarbonising electricity.

To add to this conundrum is the possibility of electricity demand increasing in this time frame by the expected introduction of electric cars, and whether this will be restricted by SA's electricity-production capacity. Assuming each car would use about 10kWh/100km and a 30,000km annual mileage per car, a 10% market penetration would require 10% of a Medupi-sized power station.

Some developed countries recently indicated an intent to accelerate the introduction of this technology actively. The Norwegian government plans to phase out the internal combustion engine completely by 2025 — the country already has the highest per-capita concentration of electric cars at 10 times that of the US. The Dutch parliament has

already passed a bill with the same time frame that needs only to be ratified by the senate to become law — and 2025 is not far off. On May 1 India's Coal and Mines Minister, Piyush Goyal, said the aim was for all cars sold in the country after 2030 to be electric.

Porsche CEO Klaus Zellmer said in April that this tipping point or phasing out of fossil fuels "is something we're racking our brains about. The whole industry is [asking]… when do you stop building a combustion engine and replace it with an electric engine?"

It is the task of major competing technologies to ensure that mankind uses the world's precious resources optimally. This is well illustrated by the competition for market share in the motor car industry — there are 1.2-billion cars worldwide.

All-electric (rather than hybrid) car technologies have been around a lot longer than the internal combustion engine. The history of these two inventions illustrates the challenge facing competing technologies.

In 1900 in the US, electric and internal-combustion engine technologies competed head to head. Several factors influenced the contest in favour of combustion. The starter motor was invented that gave the combustion engine a much-needed boost (some might still remember the emergency crank handle).

Improvements in road construction led to a greater need for cars with extended range capability and the internal combustion engine proceeded to knock the competition out of the market due to its longer range and rapid refuelling capacity.

At the start of the 21st century climate change considerations,which led to subsidy stimulation from the US federal government, and so-called "peak oil" galvanised the reinvention of electric-car technologies. Both factors have resulted in an intense focus on battery technologies to remove the two major constraints of 1900 — the lack of range and long recharge time of batteries. This has been tackled in large part by South African-born electrical engineer Elon Musk, with his now well-known Tesla-branded car.

Over the past two decades, the top range of electric cars had reached 500km and recharging was reduced to about 30 minutes. Porsche is punting a target of 15 minutes by 2020.The battery industry is actively exploring a number of alternative technologies to the lithium-ion battery. The motor industry has come full circle, with electric car technologies starting to gain the upper hand.

In September 2016, the cumulative worldwide production total of electric cars was about 1-million out of 1.2-billion cars sold worldwide, a market share of only 0.1%. That number has now increased to about 100-million electric vehicles.

While this is still only a fraction of the market, it was to be expected that such a major transition would be slow, and makers of the internal combustion engine were not going to roll over and play dead. However, most of those same major motor manufacturers have well advanced electric car-development programmes and have already embraced the new

technology in the form of hybrids, so the market will certainly not be caught napping. If electric is to be the preferred technology for the motor industry of the future, they will be geared for the change, even if it does take decades.

In SA, the number of electric cars in operation is vanishingly small. But how will SA be affected by the introduction of large numbers of electric cars worldwide?

What is certain is that any future shrinking of the internal-combustion engine market will have the following important economic implications:

For the platinum-mining sector, a strategic resource for the country given its use in petrol-driven car exhaust catalysts;

For Sasol, with its dependence on its gas-to-liquid fuel technology; and

On the need for additional electricity production capacity.

SA has more than 90% of the world's platinum reserves, so the industry will be significantly affected as the worldwide need for car-exhaust cleaning systems diminishes. The loss of this important outlet for platinum is bound to happen eventually since electric cars do not need catalytic converters.

Sasol is a remarkable example of innovation in its own right, but the wholesale conversion of vehicles to electrical power will reduce demand for hydrocarbons and have negative implications for the group. It is no coincidence that Sasol has expanded offshore and into purely petrochemical ventures such as its world-class ethane cracker in Lake Charles, US. It seems likely that the group will eventually morph into a petrochemical manufacturer rather than a fuel producer with chemical by-products.

For the well-heeled, the take-up of electric cars with a Tesla (or now Mercedes) home storage/battery device is a technological option that is already available in SA. The country is obliged to enter the new age, but there is a risk of major job losses unless the government attends to these dynamic economic issues.

The R50bn South African motor-manufacturing industry employs about 34,000 people producing about 650,000 cars and trucks each year, half of which are exported. Robotics has already reduced the labour component.

Managing the introduction of the electric car in SA needs to be carefully planned. Even so, it will be a difficult path to navigate. It is to be hoped the government is alive to the challenge, that the country has sufficient skills, and that the new energy minister is up to the task.

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