The Second Fuel Crisis and the Potential Doom of the Domestic Automotive Industry

written by Jack Lifton | April 15, 2023

Economic illiteracy in general and a complete lack of understanding, in particular, of the economics of what the oft-cited political mantra refers to as “working families” by political elites and the new growing class of industrial elites has doomed the domestically owned OEM automotive industry.

Mark Twain is reputed to have said, “History doesn’t repeat itself, but it often rhymes.”

In the 1960s, when oil was cheap, less than $2 per barrel (“bbl”), I heard a General Motors (NYSE: GM) executive say that, ” ‘we’ predict that the domestic American auto market in 2000 will be 28 million cars, and we are preparing for that.” (Note: In 2000, 17.8 million new cars and trucks were sold.) In those far-off days, the big three American OEM automakers had 99% of the domestic market and were vertically integrated, so they were designing and building not only assembly plants but also component plants en masse.

No one in Detroit, then as now, gave any thought to the issue of fuel. They made cars and trucks. The oil industry could take care of finding, producing, refining, and distributing “fuel.” Purdue and the General Motors Institute produced all of the engineers that GM would ever need, and no one at GM even knew if either of those institutions had oilfield engineering or oil refining courses.

The car makers specified the fuel requirements, and it was up to the oil industry to provide the products.

First Fuel Crisis – 1972 Arab Oil Embargo

In 1972, the Arab Oil Embargo hit and suddenly resource nationalism, although not called that then, hit the American OEM automotive industry like a brick wall. I am going to call this series of events the First Fuel Crisis.

Up until 1972, American oil production had not been anywhere near enough to meet domestic demand, but even with freight from the Persian Gulf, oil from the Middle East was so much cheaper than domestic oil that there was little point in increasing domestic production. Except for the West Coast, which was too far from the Middle East to make transportation economical and southern California was covered with pyramidally shaped structures, which were in fact producing oil wells. When I lived in Los Angeles in the late 1960s, I paid no attention to these structures which were common along the coast.

What was called the “Arab” oil embargo shocked the domestic American OEM automotive industry. Up until then, fuel efficiency was nowhere near as important as muscle cars.

When Crisis Meets Opportunity

But the oil shock and its concomitant rise in fuel costs opened a window for Asian and Western European car makers, who by necessity, had been engineering and producing inexpensive fuel-efficient cars for their economically devastated post-war populations.

By the end of the 1970s, Japanese cars were making headway into the US market. But they were poorly designed and not really ready for the US market. Young people, however, flocked to buy them, because they were affordable. U.S. domestic car makers scoffed at “Japanese junk,” but the Japanese were quick learners and they not only rapidly improved their products, but they kept the prices low so that they were “buying” market share.

American government regulations began to weigh heavily on OEM costs. First, there were mandatory safety requirements (Unsafe at any Speed), then the fear of air pollution brought about the catalytic converter requirement, and then competition and spiraling fuel costs mandated engineering improvements that drove margins down.

The Koreans entered the American market with the same scheme as the Japanese had originally had, the purchase of market share.

On top of that desire, as the Japanese and Korean economies boomed and even automation could not contain home country manufacturing costs, both the Japanese and the Koreans began to build assembly and even parts plants in the USA (and Europe, Canada, and Mexico). Even the Germans joined the move to assemble vehicles in the USA and their supply bases soon followed.

The domestic American OEMs had shed their vertical integration in the 1990s to raise much-needed cash and claim that not controlling their supply chains was more efficient for just-in-time manufacturing.

China’s vertically integrated EV supply chain

Meanwhile, a rough beast was slouching towards America, not the Chinese OEM automotive assembly industry but the Chinese total supply chain control of OEM industries.

China’s car industry began with fossil-fueled vehicles, but that soon led to enhanced air pollution in its cities where steel factories already poisoned the air.

China watched as a young South African émigré to the USA, after making his first fortune in the online bill-paying industry, revived the battery-powered electric car, which emitted no chemical pollution. Elon Musk forced the global car-making industry to look at the lithium-ion battery as the right technology to finally underpin a mass-producible, electric-powered car.

China created a resource security and resource processing sufficiency-based industrial policy to support its entry into electric vehicle ("EV") development and manufacturing from the start of its entry into the mass production of this technology. These steps, up until just now, have been ignored by the American (and European) OEM automotive industry, which abandoned vertical integration for outsourced just-in-time delivery at the same time that China, as a nation, moved in the opposite direction to support its fledgling automotive industry both for fossil-fueled and, critically, for battery-powered EVs.

Today, these policies, developed and implemented over the last 15 years have given China dominance or outright control in all of the critical minerals and their processing into end-user forms to support the world's largest fossil fuel and EV car industry.

China's domestic electric power grid has simultaneously managed to support the supply of electricity for charging its world's largest and fastest-growing domestic fleet of "new energy" cars, trucks, and buses.

No other nation has undertaken such a massive and comprehensive support program for an OEM automotive industry transformation of power trains from fossil fuels to electricity.

Second Fuel Crisis – Critical Minerals and Battery Metals

The second Fuel Crisis has thus hit the non-Chinese car industry even harder than the Arab oil embargo.

Natural resources are limited in their production. They are not organic, self-replicating resources. The metals and metalloids critically necessary for the production of the key components of batteries, miniaturized electronic switches and controls ("chips"), and the most efficient electric motors are scarce and or secondary, i.e., they are byproducts of the production of other metals. Thus the main issue of producing them is cost because capital and capital allocation are not infinite resources either.

The controlled production, distribution, and storage of electricity necessary to "fuel" battery-powered electric vehicles was never considered by those building those systems. It is a conceit of those ignorant of electrical engineering to just assume that the systems can accommodate a massive influx of irregular demand without added costs, if at all. It is beyond belief that anyone assumes that the developing nations will prioritize electric vehicles over electric lights as they build their domestic production and distribution systems for electric power, so it is clear that electric vehicles will remain an agenda item of only the developed nations and then only for so long as electricity is affordable.

Today's OEM automotive industry would never consider converting away from fossil fuels if it were not for governmental mandates, themselves based on a dubious climate change agenda, making the manufacturing and sale of fossil-fueled vehicles prohibitively expensive.

Paradoxically, it is only through the continued sale of the largest fossil-fueled vehicles, SUVs, pickup trucks, cargo vans, and freight trucks that the American OEM automotive industry can continue to operate, and that only so long as government subsidies and grants for electric vehicles and new manufacturing facilities continue.

Where is my EV ‘gas’ station

But, back to fuel production and distribution. The unelected bureaucrats and academics who execute the policies prescribed by the elected politicians are quiet with regard to the rebuilding and repowering of the electrical distribution grid that is necessary to accommodate the addition of tens of millions of electric vehicles needing charging at random times across the 5 time zones that encompass the US. This is because the US economy does not have the ability to fund such a massive undertaking and continue on its climate crisis agenda alongside its massive “entitlement” system.

Studies estimate that the electricity-transmitting capacity supplying power to households that own an EV must increase by 70% to 130% to accommodate EV charging. **Upgrading the electrical grid to meet this demand could cost from $10-$25 billion nationwide by 2030. In addition, when you add the additional costs for electrical generation and storage, customer-side infrastructure, and EV chargers, the total investment could range from $75-$125 billion**. While utilities are likely to see an increase in revenue from EV users, it may not be sufficient to cover all of the additional expenses across the electric power supply chain.

The true crisis of on-demand electric fuel is that it is an impossible goal if the current American standard of living and quality of life are to be maintained.

Contrary to what the priesthood of climate change preaches, there is no infinite resource of critical minerals and even the processing of what we can produce or obtain of them is no longer possible in the US. The disorganized US government and OEM industries do not have the capital, much less the expertise, to address a slow-motion, non-catastrophic collapse of the US cheap-energy-based economy. Printing money has only accelerated the decline of American manufacturing as ignorant pronouncements from Washington replace market-based economics.

Goodbye American OEMs, it is too little, too late

The random moves by OEM automotive to reform its century-old procurement system to recognize total supply chains over immediate suppliers have resulted in the chaotic allocation of money to high-risk (aka, unproven) and poorly selected place-holders in total supply chains for not only critical minerals but also for their refining and end-user fabrication vendors.

Only those OEMs that have chosen wisely will survive, and they will be only those that make a mix of vehicles using both types of fuel, fossil and electric. For the rest, their unsold inventory of expensive EVs will be auctioned off by their bankruptcy trustees.

Around 20% of the world's annual production of motor vehicles is assembled in North America. Yet, as the chart below shows, the US only has 6% of the global battery-making capacity. Even more disconcerting is the fact that the US has only 4% of the world's lithium production capacity.

This is not a formula for success or even for the continued existence of an industry.

Battery manufacturing capacity by country (2022)

Battery manufacturing capacity by country in 2022

Rank	Country	2022 Battery cell manufacturing capacity, GWh	% of total
#1	China	893	77%
#2	**Poland**	**73**	**6%**
#3	USA	70	6%
#4	**Hungary**	**38**	**3%**
#5	Germany	31	3%
#6	Sweden	16	1%
#7	South Korea	15	1%
#8	Japan	12	1%
#9	France	6	1%
#10	India	3	0.2%
	Other	*7*	*1%*
	Total	**1,163**	100%

– The countries of Central and Eastern Europe

Source: BloombergNEF

Nano One Performs Well in Solid State Battery Tests at

the University of Michigan

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Nano One Materials Corp. (TSXV: NNO) reported this week that its technology performed well in solid-state battery testing with the University of Michigan (UM).

UM's battery laboratories are exploring various aspects of battery components, designs, interfaces, and assembly of solid-state electrochemical batteries.

Nano One focuses on its patented process for the production of cathode materials used in lithium-ion batteries and is collaborating with the UM on the development of innovative solid-state battery technology.

Richard Laine, Ph.D., Professor of Materials Science and Engineering at the UM commented, "Initial results from our evaluations show that Nano One's HVS materials perform well with our innovative agricultural waste derived electrolytes and we look forward to advancing our collaboration to demonstrate a viable solid-state battery configuration."

Cathode Key for Power and Reducing Costs

The cathode determines the battery's capacity and voltage, and can comprise 20% or more of the costs of a lithium-ion battery. Nano One has developed technology for the low-cost production of high-performance lithium-ion battery cathode materials used in electric vehicles, energy storage devices, and consumer electronics.

Nano One has programs underway with multiple academic research groups, automotive equipment manufacturers, and battery manufacturers to test its lithium-nickel-manganese-cobalt-oxide (NMC) and high voltage spinel (HVS), also known as lithium-nickel-manganese-oxide (LNMO), cathodes in different solid-state battery systems.

LNMO cathodes have garnered industry attention by providing a low-cost, fast charging, and cobalt-free solution, key in cost-effective, large-scale commercial applications.

In December 2020, Nano One announced that it entered into a cathode evaluation agreement with an undisclosed, American-based, car manufacturer. This agreement is in addition to the deals announced with Volkswagen, Pulead, Saint Gobain, and an undisclosed Asian cathode producer.

Nano One's proprietary "One Pot" furnace process creates a coated single crystal powder that protects the cathode from side reactions while allowing the transfer of lithium ions between electrolyte and cathode.

In addition, the "One Pot" process offers the flexibility to use either lithium carbonate or lithium hydroxide as the reaction with the other metal inputs is indifferent to the type of lithium input and produces a finished cathode powder when thermally processed in a furnace.

It is also an environmentally friendly process using limited water and produces no waste stream as it eliminates intermediate steps and by-products in the process.

The Basics of Battery Technology

Reduced to its basics, a lithium-ion battery consists of 4 components: (1) a Cathode, the source of the lithium ions, (2) an Anode, the storage area of released lithium ions, (3) the Electrolyte, the medium which helps the ions flow, and (4) the Separator that prevents contact between the Cathode and the Anode.

The chemical reaction creates a voltage potential between the cathode and the anode. The voltage is the electrical force from the power source, the higher the voltage, the more power it can send to the load, such as a motor.

A solid-state battery uses solid electrodes and a solid electrolyte, instead of liquid or gel electrolytes, found in conventional lithium-ion or lithium polymer batteries. As a solid-state battery can handle more charging and discharging cycles before degradation, it promises a longer lifetime.

In November 2020, Nano One reported that its HVS cathode when paired with a conventional electrolyte and a graphite anode achieved over 500 fast charge and discharge cycles at 45°C and also reached 1000 fast charge and discharge cycles at 25°C. These durability test results confirmed that its technology is stable at elevated operating temperatures required for automotive, power tools, and energy storage applications.

Cashed Up to Reach Commercialization

Recently, Nano One announced it received $4.46 million from the exercise of stock options and warrants since its last financial update dated October 1, 2020, and brings the company's cash balance to approximately C$28 million, including $14.37 million the company raised in October 2020.

Final Thoughts

Nano One's technology is well-positioned to capitalize on the opportunities in the battery technology industry as economies shift to electrification efforts from solar, wind, and electric vehicles to reduce greenhouse gas emissions from fossil fuels.

This week, the Toronto Stock Exchange (TSX) Venture Exchange's named Nano One to its "2021 Venture 50", an annual ranking of the top-performing companies on the exchange. Companies are selected based on share price appreciation, trading volume, and market capitalization growth. Nano One's stock price is up almost 300% in the past year.

Even with the recent stock price increase, there is plenty of market opportunity for the company. Nano One estimates the global cathode market could reach US$27 billion by 2026 and the company is focusing on potential licensing partners for its technology that should mitigate some of the risks.

SOURCE: