

# **FYI**

# **For Your Information**

**A collection of thoughts on the Trends in Technology, prepared for you as an educational document on Technology, Batteries and Electric Vehicles.**

**Not intended as investment recommendations or disinvestment information.**

## **Version 32 (August 2023)**

**James T Norman  
Norcom Consulting, Inc  
216 Prince Street  
Alexandria, Virginia 22314**

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## Headlines

### Trend 1 Software Driven Change

Software has become the most important ingredient in the Technology Recipe. It can be improved, repaired, quickly changed at will, particularly when the host-connected over the air updates are included (Think Tesla and Apple updates). Non-human assistants (think almost any Customer Support Center) will be visible in many industries. Corporate examples of “Software-driven companies” include Microsoft (lower risk) and Alphabet (higher risk) *Starts on page 6*

### Trend 2 Battery Driven Changes

The chemistry of the battery is changing. Lithium-ion is the loser. The winner will probably be Sodium-based and will be Solid. EV Ranges will double (300 to 600 miles) or triple (to 900 or 1,000 miles) in the near future (5 year time frame) and recharge times will be about 10 minutes. Smaller Energy users (tools, personal devices, medical instruments) will successfully employ Solid Technology. Corporate examples include Panasonic (lower risk) and BYD (higher risk). *Starts on page 10*

### Trend 3 Change driven by manufacturing.

The Electric Vehicle will need as sophisticated a power (Battery) management system as a driving assistant system. Trend 3.1 is a reduction in traffic deaths and injuries with a corresponding decrease in Insurance rates for Automobiles with Driving Assistants. This will illustrate Real World value which can be available to anyone. Range has become an advertising keyword. Even when the car is NOT an EV. Corporate participants include Ford (Lower Risk) and Tesla (Higher Risk). *Starts on page 16*

### Trend 4 Changes which could un-do, upset, de-construct or otherwise stop these trends.

The de-construction of Globalization will combine with Global Nationalism and the wealth of jobs from the laborer to the Designer and Engineer will await skilled persons around the world, not just in one individual geography. One major exception is possibly North America. It could become the highest yielding economic geography, particularly if Government meddling in the economic decisions of the corporation can be kept to a minimum. Corporate examples include IBM (Lower Risk) and Foxconn, listed as: Hon Hai Precision Manufacturing, HNHPF (higher risk) *Starts on page 19*

Thank you,



Jim Norman

## For Your Information – Version 32, August 2023

### Introduction and This issue's Background

Scattered around this documentation are sentences that highlights what's really up.

This issue will concentration on what I believe is the most significant technology-based change of the 21<sup>st</sup> Century. While there are purveyors of this trend, there are neigh-sayers, too. The potential of these trends impact economics, employment, academia, and it is not a single continent, country or industry trend. It's direction that will invoke innovation to produce results.

One example that fits is the result the description is Tesla manufacturing which is impacting the worldwide manufacturing of automobiles and other products. This has been compared to Henry Ford's improvements a century earlier. Multiple other impacts are in this newsletter.



August 2023

## Trend 1 Software Driven Change

When it arrived on the scene, a computer did only a few things. It could add, and subtract, usually in binary and save and restore the results. To do something as sophisticated as multiplication or division, the programmer had to create a small piece of software to perform that function. Thus the concept of a programmer was created. The programmer's job has evolved today to translate the desires of the business (agency, organization or group) into something that a particular computer could understand and act upon..

The arrival of languages that did things to help the programmer do functions like Formula Translation (FORTRAN), Report generation (RPG) and a language called the Common Business Oriented Language (COBOL). Each of these needed a well-trained and skilled expert to translate the business challenge into the "Computer's Language" which then had to be further converted (called compiling) into the specific internal language of the individual computer itself. Many times pre-compiled sections had to also be added to make the 'whole picture' work together. Over time, as new languages came into play, the new computers would implement the earlier languages slightly differently requiring additional testing.

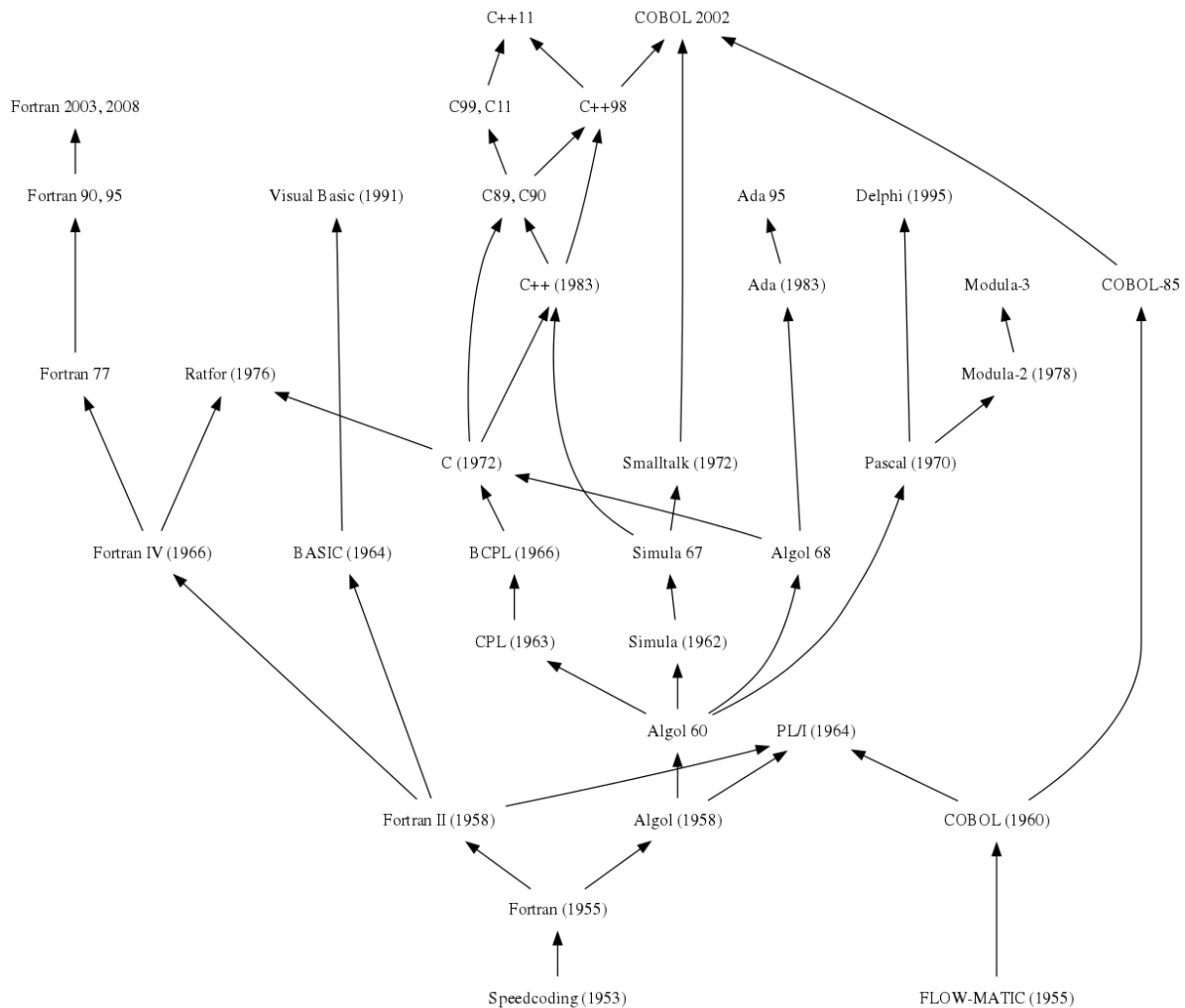


Figure 1: A map of the genealogy of computer languages depicts several of the major ones.

As the evolution moved on, languages designed to allow a human to interact with some specific applications to perform a specific job. These languages took on some functions for the customer user (through an add-on called Windows) such as 1-2-3, Excel, Word, Word Perfect, and many other variants along with languages specific for data such as SQL and Dbase, each connected to a 'user-friendly' front end. In addition there were the languages specific to the network, providing connections and security, which entered the picture.

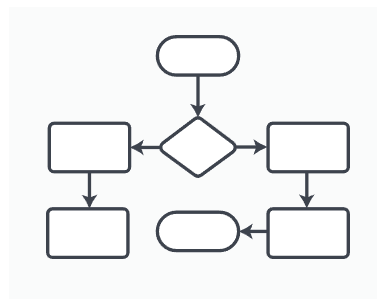
Shared code called subroutines or even drivers [for devices] made them easier to use but allowed for many configuration choices. (Think about simple devices such as printers, then add scanners and ultimately cameras and microphones as a moving target) for an application like "Zoom."

*Thus, in summary, a programmer uses software tools to translate ideas into a language that the computer understands.*

Language 'old' to Language 'New' new news

IBM announced this month that it is training a large language model (AI database) to translate 1960's COBOL into a Java-based syntax. IBM says there are over 20 million programs still in COBOL and the number of programmers who can read, update, and create in the language is aging rapidly. The technique is not a one for one translation, rather built on the process that must be accomplished. Cobol's structure with the Data Division already is usable by several compilers and is good documentation for data driven applications. The process division is the next extension. The IBM effort is keyed into the process section.

On that framework, arrived multiple languages that allowed the Business Process to be described. Once done, and the devices and data were attached, with the right process, then the instructions for the computer could potentially be created without a programmer.



*Figure showing BPL*

That is the keystone to the next developments in the information technology space. General Purpose Programmers will no longer be needed. This is where Artificial Intelligence steps in. By combining the experts on data, devices, networks, and those who can integrate the various parts into a solution; the computer will take on the tasks previously reserved for a human being. The combination will be in very high demand as it matures. The economics of computing will take a massive turn as this gets implemented. This could be what Mr. Bill Gates was talking about when he lauded AI in the computing environment.

So, I tried it. I asked ChatGPT release 3 to “Connect Business Process Management to code generation.” And here are the results:

ChatGPT3 is the author.

Business Process Management (BPM) and code generation are two distinct concepts, but they can be connected in various ways to enhance software development processes. Let's explore some of the connections between BPM and code generation:

1. **Process Automation and Code Generation:** BPM tools are often used to model and automate business processes. These processes may involve various steps that require software implementation. BPM platforms can be integrated with code generation tools to automatically produce the code corresponding to the process steps. This helps streamline the development process and reduces manual coding efforts.
2. **Model-Driven Development (MDD):** BPM involves creating process models that define how a business process should flow. MDD is a software development approach where the focus is on creating models that can be automatically transformed into code. BPM models can serve as the basis for generating code, facilitating the translation of business requirements into executable software.
3. **Domain-Specific Languages (DSLs):** BPM tools often use domain-specific languages to represent business processes. These DSLs can be extended to include code generation specifications. By defining code generation rules within the BPM tool, developers can produce code directly from the process models, translating high-level process representations into low-level code.
4. **Integration with Application Development Platforms:** BPM platforms can integrate with specific application development environments or frameworks. For instance, a BPM tool might provide plugins or extensions for popular programming languages and frameworks. This integration enables seamless code generation within the context of the application development platform.
5. **Code Generation for Workflow Implementations:** BPM involves defining workflows, which represent the sequence of activities in a process. Code generation can be employed to generate workflow implementations automatically. This is particularly useful when building applications that follow a well-defined process flow, such as approval systems or order processing systems.
6. **Maintaining Consistency:** BPM models often capture business logic and rules. By linking BPM models to code generation, developers can ensure that the code implementation remains consistent with the process models, reducing the risk of discrepancies between the intended process and the actual software behavior.
7. **Agility and Iterative Development:** BPM allows for iterative process improvement and changes. When BPM models are connected to code generation, updates to the process models can lead to automatic updates in the generated code, enabling a more agile development approach.

Overall, connecting Business Process Management to code generation can streamline development processes, improve consistency, and enhance the communication between business analysts and developers by providing a direct translation of high-level business requirements into executable code. **End of ChatGPT3 Authorship**



This becomes an emerging software development and computer trend.

As apps that work on a telephone and a computer networked take on more complex functionality, these may well be hosted, or developed in an Artificial Intelligence environment. The easiest of applications are already taking to AI like a duck to water. A couple of current application examples are valuable.

### Trend 1: AI is useful for Data Consolidation

The travel application called “Tripit” on the surface tracks the parts of an out-of-town trip. Under the covers, the data is presented by capturing the confirmation information from Airlines, Trains, Rental Cars and other transportation systems, combining with hotel information and adds in restaurant and sightseeing activities. Significant is that the source information is not in a strict format, the Tripit host system parses the valuable information for their own use. This is a valuable use of Artificial Intelligence in the background.

### Trend 2: AI learns to ‘follow the rules.’

Now that the foundation for the future is overviewed, lets discuss one Artificial Intelligence application which fills out a space previously reserved for human beings. That AI application is called Full Self Driving by one of the automobile vendors. It is another Artificial Intelligence application which learns from the person who taught the 16 year-olds how to drive. They explained lanes on the road, signs to watch for and what do when a green light is yellow or even red. One automobile vendor, Tesla, has separated Full Self Driving into an option (costing about \$ 15,000 usually). They combine a large number of sensors, evaluate each and combine that information to tell the car to speed up or slow down or even stop. As the software is being developed, senior management states clearly that the software will be ready when it can drive the car with the full safety that an experienced human driver would. In general, this is AI at its finest.

It connects from multiple cameras a computer image of the position of the car and the position of everything around it, whether moving or not. This software then takes directions from the human supplied data in the integrated mapping system about where the car is supposed to go and starts to perform the exercise of ‘driving.’ The computer must monitor the braking capabilities, the acceleration capabilities, and the comfort of the occupants. A very busy assignment by anyone’s definition.

When we were 16 or so, we took classes in “How to Drive” the family car in the State where we grew up. Are we still in that state? If the learning must be done for all states, who teaches the Artificially Intelligent computer program? And how do they know that a red Hexagonal Sign with big CPON on it means STOP? It is red, hexagonal, but it is also language dependent. Just one of many examples; guess I could drive on the right in the UK, Japan, Ireland, and survive or do we have to have customized rules?

Here we have two trends about to converge and change the way the world gets from one place to another. Transportation as a Service will likely take you driverless from an airport to a hotel safely in the near future. It is a short plan that removes the family car and allows a driverless automobile to take you to and from work, the grocery store, and to your church. Not many years away..

Software remains the most important ingredient in the Technology Recipe. It can be improved, repaired, changed at will, particularly when the over the air updates are included (Think Tesla and Apple updates). Non-human assistants will be visible in many industries.

## Topic: Batteries

### Trend 2 Battery Driven Changes

The chemistry of the battery is changing away from Lithium Ion to something else. The winners will probably be another light weight compound, possibly Sodium and probably will be Solid – not containing a liquid to move electrons from Cathode to Anode. Solid to significantly to reduce the risk of fire along with the chemistry change. EV Ranges will double (from about 300 to 600 miles) or maybe even triple (to 900 or 1,000 miles) in the near future (5 year time frame). In addition to higher range, the time for recharging will fall to 15 minutes and on down to 5 minutes for an additional 100 miles. Beyond Automobiles, there are many smaller energy users (tools, personal devices, medical) which will successfully increase in quantity and quality.

The simplest battery is in formats AAA, AA, C, and D at the local drug store. The designations separate the 1.5 Volt, DC non-rechargeable batteries for toys, simple tools, flashlights and other small items by physical size. In some cases we put multiple in series which increases the voltage to 3 volts, 4.5 volts or even higher. In several toys, we put multiple in parallel to keep the voltage at 1.5 but increase the length of time at that voltage. This actually increases the ‘Amperage’ that most of the simple devices don’t worry about.

Then, with the Sony Walkman, we introduce rechargeability in our lives of laptops, watches and telephones –all of which have become small computers. The ability of plugging in overnight or occasionally allows the battery pack to operate for many more hours before being turned on or discharged. One of the most frequently used rechargeable batteries was in our automobiles. The power (12 volt) was used to start the engine and then the generator used engine power to update the electricity in the typically lead – acid 10 pound batteries under the hood. Over time, accessories (power windows, locks, and heating / cooling systems) were built on the 12 Volt architecture. The primary purpose was that it would start the engine successfully the next time it is needed.

This rechargeability is also very useful for the electronic telephone. In this case, the phone actually monitors the amount of energy left in the battery and reminds the user that it should be plugged in for a period of time to keep the power on the circuitry and transmitter/receivers.

### The Battery Industry and the Electric Vehicle

With the arrival of Electric Mobility supported by batteries, the calculations totally changed. For instance, the Volumes went up by many digits. An early Tesla Model 3 had over 7,104 batteries about the size of a flashlight (non-rechargeable) AA. They were actually labeled by their size a 2170. That is, they were 70 mm in length and a circumference of 21 mm and generally gave about 348 miles per charge. As time passed and the products matured, the capabilities became bigger, so the Model S and Model X had 1179 cells arranged in four modules for a total of 4716 in the car, and the range approached 400 miles. In the year 2022, the Model Y with 818 new batteries called the 4680 entered the market with additional range. As the name shifted to 4680, a length of 80 mm and a circumference of 46 mm became a household word. Looked like a big D Cell for Flashlights. Recharging stations were then needed across the globe to add energy to the battery packages in the Electric Vehicle. So, Tesla built a charging network and other entrepreneurs built a smaller one for non-Tesla’s. Recently, some

agreements have given access to the better network by non-Tesla EV's. Presumably, this convergence will become the 'standard' for North America.

### New news for some companies

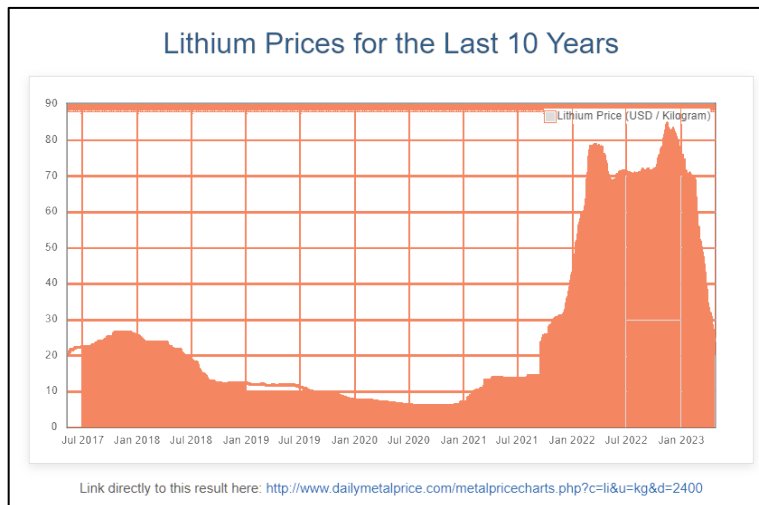
Just for fun, pretend, for a minute, that you are an investor or an executive in a traditional "Battery Maker." Those figures are what will immediately catch your eye. While you were making batteries for flashlights successfully for years, suddenly there is an opportunity to ship the equivalent of two thousand flashlights every minute to a car company. Little wonder that the supply contracts from the battery companies were very interested in the electric vehicle. Simultaneously, the car makers realized the issue and built, or bought factories that make batteries. In 2022, the largest Battery maker in the World CATL ships over 80 percent of their output to the EV Businesses. The second largest, BYD, bought and integrated a car manufacturer into their business. BYD. In 2022, was the largest car maker in the country of China, which is the largest market for automobiles in the world. BYD in 2022 started some 2023 development contracts with Tesla, Volkswagen, Mercedes, BMW, and Ford.

Given the growth in demand for batteries for Electric Vehicles, there is renewed interest in the Chemistry which the rechargeable cells use. Another major push comes from the price point of the metals used in the manufacture of those cells.

### Chemistry

Rechargeable batteries were originally developed about 40 years ago to support mobile entertainment devices like the SONY Walkman. The chemistry has improved but is substantially the same using Lithium with a copper top and some cobalt to enhance the power and shorten the time to recharge. The lithium-ion battery became the standard that most rechargeable products were designed for.

And today they are reliable, and until recently, not very expensive. They do have one flaw which surfaces if the environment were not kept correct. They would burst into flames when the temperature got too hot and the internal mixture of chemicals were to develop, or age into, a short circuit. Recent onboard ship fires have caused losses of both automobiles, but of the ships themselves. Lithium ion fires burn at over 5,000 degrees and cannot be water extinguished. Fire fighters unknowingly do not treat this as a unique circumstance and several lives have been lost by using land-based planning.



Lithium-ion had many advantages, but as the price of the raw material climbs it is time to look for other solutions and the fire issue becomes better known.. Note in the following chart that sometime around the Fall of 2021, the price really increased significantly.

Let's look at other metals being considered for batteries. First, let's look at this price chart giving the view now 7 years old, but valuable for understanding:

| Element      | Symbol | Price US\$ / kg | As of      | From                |
|--------------|--------|-----------------|------------|---------------------|
| 3 Lithium    | Li     | \$115.70        | 12/14/2016 | Shanghai Metals Mkt |
| 11 Sodium    | Na     | \$3.04          | 12/14/2016 | Shanghai Metals Mkt |
| 12 Magnesium | Mg     | \$2.26          | 5/31/2017  | InfoMine            |
| 13 Aluminium | Al     | \$1.91          | 7/13/2017  | London Metal Exc    |
| 25 Manganese | Mn     | \$2.06          | 6/31/2017  | InfoMine            |
| 27 Cobalt    | Co     | \$59.50         | 7/14/2017  | London Metal Exc    |
| 28 Nickel    | Ni     | \$9.19          | 7/13/2017  | London Metal Exc    |
| 43 Niobium   | Nb     | \$42.00         | 1/26/2016  | US Geological Sur   |

Note that Lithium was very expensive at that time so multiple laboratories and research groups started looking seriously at alternate metals. Let's do some simple math. If Lithium in 2016-2017 were replaced with Aluminum, the power available in each cell is down about 20 percent, recharge time could be one tenth as long and the weight is about the same, the auto manufacturer could use 120 % more of the cells and produce cost decreases of over \$ 100 per kg. And have a little more power (expressed as range) than the Lithium-ion did. So the Battery, which represents about 1/2 of the cost today of the car decreases by \$25,000 either increasing the profit per car or reducing the price to the consumer by some amount. Is there anything not to like about this solution?

### EV effect on Batteries

That title could be the battery effect on EV's, but they are interconnected. Based on the demand and the dependencies of the EV on the choice of fuel, there now is a discussion about alternative chemistries.

To do a comparison of 6 different battery chemistries I relied upon Matt Ferrel of "Undecided" on You Tube for most of the research. Thank you Matt ! While there are probably 50 different studies going on, Matt selected five to compare to the current state of the art.

| Measurement    |         | Lithium- Ion  | Lithium Sulfur | Solid State  | Aluminum - ion | Niobium                   | Lithium-Ion |
|----------------|---------|---------------|----------------|--------------|----------------|---------------------------|-------------|
| Energy Density | wh/kg   | 150-250       | 443            | 240 - 300    | 160            | 140                       | 70 - 150    |
| Cycle Life     | Cycles  | 1,000 - 2,000 | 4,000 +        | 5,000        | 6,000          | 3,000                     | 2,000       |
| Charge         | C-Rate  | 0.7 - 1       | 0.5            | 1 - 4        | 6              | 6                         | 3           |
| Discharge      | C-Rate  | 1.0 - 2.0     | 0.5            | 1 - 4        | 6              | 6                         | 3           |
|                |         |               |                | Higher Power |                |                           |             |
|                |         |               |                |              |                | Longer Lifetime           |             |
|                |         |               |                |              |                | Faster Charge / Discharge |             |
| Cost           | \$ / Kg | \$115.70      |                |              | \$1.81         | \$42.00                   | \$3.04      |

To properly read this chart, start with known information. For instance, most EV's today (2023) still have Lithium-Ion as their principle battery chemistry. Therefore look at the first column, noting the Energy Density. This is a weight per energy item. Weight of a fixed amount of stuff is important to the EV Maker because this is a major contributor to how far the energy will take the car. Now look across the columns and compare a '200 value to Sulfur, Aluminum, Niobium and the Lithium-ion Phosphate final column. Reflecting the higher power of the first two. These then are important candidates for the next-generation chemistry. Next is the number of times that the battery can be drawn down very low and then recharged to a very large condition. This is an indication of the lifetime of the battery before it must be replaced. The Charge rates higher than Lithium-ion indicate a faster charge time. Now lets look at some entries coming on to the market.

### Battery Types – Lithium-ion Baseline

This is the industry baseline for current Electric Vehicles. It uses Nickel, Manganese and Cobalt for the Anode and Cathode. Use of these metals brings out the environment of their extraction and the human suffering caused during the gathering of these rare earth metals. The history is over 40 years with this chemistry, so the experience rates are well known. In addition, it is known that this chemistry can develop dendrites and short circuit with a fire. That is probably it's most serious drawback. This is managed by the software in the car called Battery Management Software. Whole books have been put together on this topic.

With the previous chart we set the goal posts against which all of the other contenders are placed. One item of note is that as recently as two years ago, Lithium was selling for \$ 7.00 per kg. During 2023, It went up 10 times to over \$ 70.00 per kg. That kind of price increase is causing many major customers to look for alternatives.

In this baseline, the Energy Density sets the stage for the EV Parameter "Range" and the recharge rates of about 1 amp increased per hour connected.

### Battery Types – Lithium-Sulfur Characteristics

This battery converts the rare earth metals into a more plentiful and cheaper alternative at a cost of reduction in power output. Not a favored solution principally for its slow charge and discharge rates.

### Battery Types – Solid State Battery Characteristics

This battery probably holds the highest position in terms of characteristics, but is only now shipping pre-production versions to the future customers. At least four companies are very active in this section, each with a slight twist on the solution. Quantum Scape, Solid Power, Amperis, and SILA Nanotechnologies each have a solid battery solution and are testing them now (in mid 2023). One other version with a unique format is the BYD Blade now in use by multiple automotive manufacturers. Of note, they use the majority of the production in their own BYD automobiles which is the number one car seller in the country of China which is the number one country by volume of Electric Vehicles in the

world. This blade battery is reported to be 'like a solid' in that it does not catch fire, uses iron ions and is available today.

### Battery Types – Aluminum-ion Battery Characteristics

Aluminum is a very prevalent and lower cost removing the rare earth from the equation. The lifetime of the battery is very long and the charge times are quite fast. Some tests are suggestion that the number of cycles could approach 20,000 which makes it a qualifier for the 'million mile battery' designation.

### Battery Types – Niobium Battery Characteristics

The characteristics seem to be quite good, but the availability and cost of the metal is the downfall.

### Battery Types – Sodium-ion Battery Characteristics

This is the real elephant in the room. Sodium is one of the most prevalent minerals / metals in the world and has the lowest cost of any solution. The electrical characteristics are excellent, and one of the several vendors can get some samples; it could be the best horse in the derby at this time. CATL is shipping production samples to several EV Makers. The conversion from Lithium-ion to Sodium-ion can be completely contained in the Battery Management System controller. The range is improved and the re-charge times are lowered, the cost is  $\frac{1}{4}$  of Lithium for an identical size solution. This will be the competitor with the Solid State Battery because it will be ready in volume earlier and has a lower projected price point.

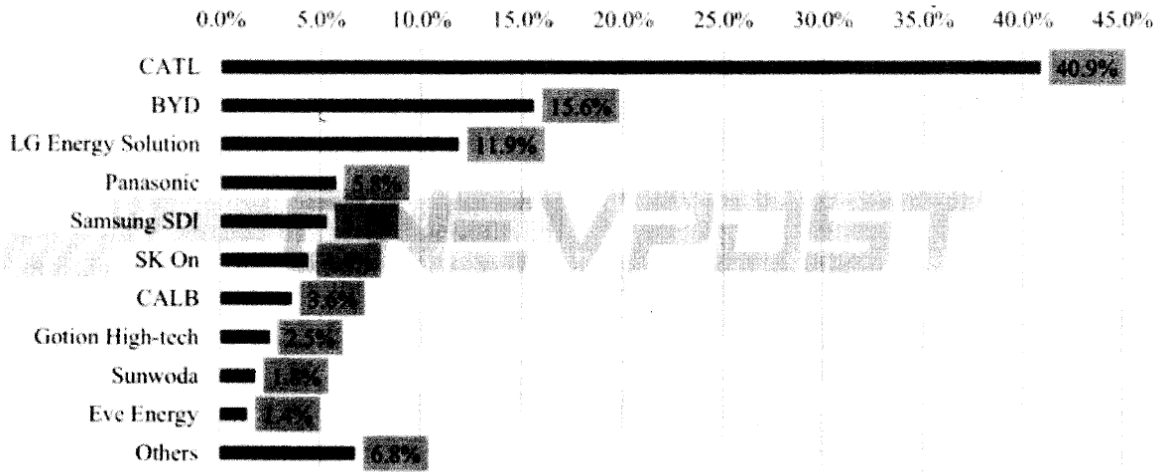
### Summary effect on Electric Vehicle choices

Step back, think about what you have just read. Then look at the EV choices, brands, models, and prices and look for an indication about the 'Battery Style.' It is not there. Battery choices belong to the Automotive designers and Automotive Engineers. The results of the decision are what affects the Customer / User positive or negative reaction to the car.

Oh, so why waste my time wandering through all that stuff? The decisions that the Engineers make reflect on the brand, model, and style of the car. It is important to know what the Engineering choices were which directly affect the range and rechargeability of the car. The range and rechargeability directly affect the consumer and his / her opinions of the car.

Most importantly, as 2023 ends, the type of battery could become one of the major differentiators among the automotive brands. Therefore, what we covered here will not be lost. It just may have to wait a few months to move to the forefront and be published by the auto-makers.

# Market Share of World's Top EV Battery Makers (Nov 2022)



Source: SNE Research

© CnEVPost

## Topic: Electric Vehicles

### Trend 3 Change driven by manufacturing

As the Summer progresses, more owners are doing Electric Road Trips. Hopefully these will be read carefully by potential customers and future purchasers. Those I have read are generally honest telling the good and disappointing sides of the trip. It is interesting that the most consistent complaint is in the process of being improved – that of re-charging. Over time, the new batteries will not need the time or frequency of recharging, and the range-fear's will diminish with the more available recharging stations across the whole country.

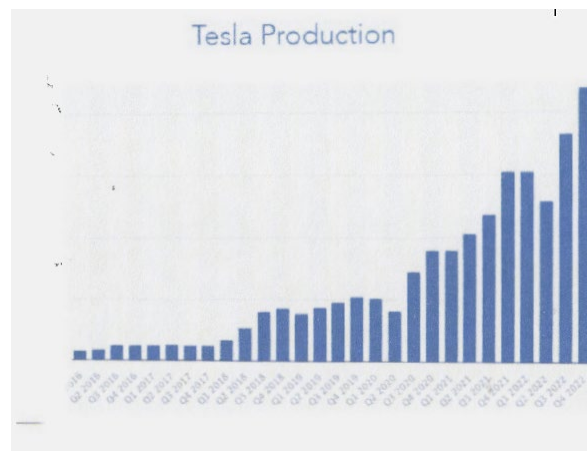
The Electric Vehicle will need as sophisticated a power (Battery) management system as a driving assistant system. Hidden beneath the arrival of the Driver's assistant is possibly a significant reduction in traffic deaths and injuries. This should result in a corresponding decrease in Insurance rates for EVs-with Driving Assistants. There is economic inertia to slow this down, but after enough success is shown, some leading edge insurance companies will start to take the initiative. Slowly, the real world value of an EV with Driving Assistance will be exposed to many people. Nation States with high acceptance rates of the feature will be the first to step up –think Norway and the Baltic States long before North America.

Several disconnected stories this month. Take each as a stand alone story, and make your own connections.

### Infrastructure comment

The political pocketbook is wide open; but it seems to be shared across highways, train track, shipping ports and airports. Very little concentration on a single method of transportation. This might be the smartest way to spend the windfall.

While thinking about charging infrastructure, it is important to note that in the 1900's, Henry Ford started mass producing automobiles while the first stations that delivered gasoline for that demand did not even get built until 1913. Maybe the agreement between certain Legacy manufacturers and Tesla is actually a better solution than two separate networks.



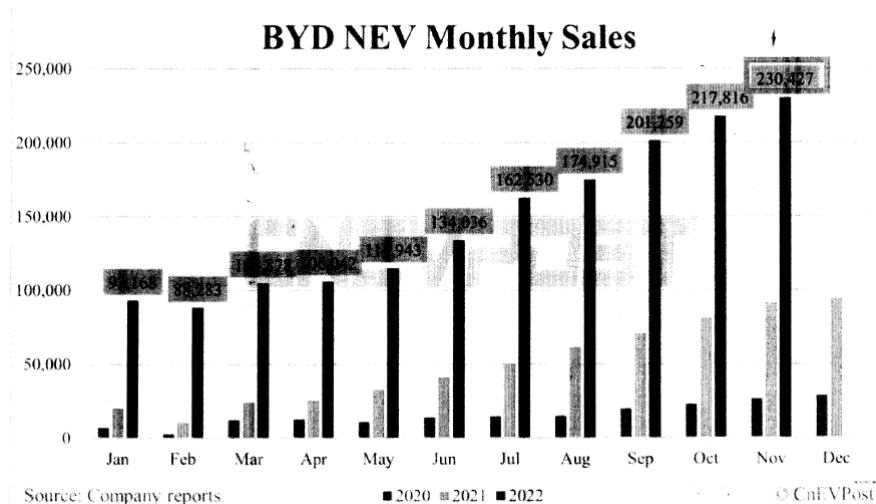


## Manufacturer Comments

One manufacturer seems to be bending the Range rules by leading the headline with claims over 400 miles for their Hybrid model. That's right. **Kia** is advertising over 400 miles and using a hybrid model to prove their point. I claim unfair!

**Vinfast** from Vietnam is building a very large factory near Raleigh, NC and has a busy several months getting the line up and running for US delivery of US made cars. The factory is designed for the VF 7, the VF 8 and the VF 9. The major owner of VinFast put about 10 percent of his ownership through a SPAC on the market only to discover that the total holdings exceed that of General Motors. We have to remind ourselves that the stock market is not only demand driven, it also can be supply constrained.

**BYD** is building inventory of the North American Line and should shortly start delivering first to Vancouver and then Los Angeles before moving eastward. The most significant part of this move is the low price that they are 'listing.'. Separately, BYD got a US patent on a future battery for EV's. BYD is a major producer of patent filings. This one seems to be based on the success they have had with the Blade battery. The most recent filing involved the M3P that they are supplying to CATL. BYD outsold the Tesla Y in Sweden in July becoming the best selling EV in the country. This is an interesting mark for the Chinese company outside China.



BYD over three years

**Fisker**, in Q2 delivered 1,022 Ocean SUV's; while easing their 2023 outlook to 20,000 -23,000 units mostly on 'supplier' issues. They plan four new models in 2024 called Ronin, PEAR, Alaska and an Ocean model with an off-road package.

**Lucid** is lowering prices about 20 percent on all models. In Q2, they delivered 1,404 models.

In July, **Toyota** announced plans for a new battery technology that could offer up to 900 miles of driving range. The significance is that Toyota has been on the sidelines of Electric Propulsion. Even to the point

of introducing a Hydrogen powered concept car. Management seems to be on a 'catch up' strategy of some kind.

Two manufacturers have demonstrated the Vehicle to Load technology. Both the **BYD Atto 3** and the **Ionic 5** can power homes and appliances during emergencies. We are expecting almost all manufacturers will have a similar capability by 2025, if not before. The cost is low and the yield, although not that often, is worth noting.

**Volvo**, now owned by Geely Automotive, announced that its Recharge models accounted for nearly 30 percent of overall sales. Canadian sales rose by 28 percent. Geely also owns Polestar, Lotus and Zeeker. When the London Black Cab company was in distress, the Geely brand company bought it a decade ago and as an Electric Brand is now considered successful

With China's acceptance of EV's, they became the largest auto market in the world. This seems to be headlined by the battery sourcing. In July, Chinese buyers top 10 automakers only included one not-Chinese brand. Tesla was the only foreign brand in the top 10 list.

**Full Self Driving** as a feature of Tesla automobiles is predicted by Elon Musk to be out of Beta Testing and into general availability in calendar year 2023.

One new boy on the block is not an Electric Automobile; it is an Electric Locomotive (mostly). A St. Louis company, **Intramotev**, is now testing a unit which becomes a locomotive when piloted by a computer. It has a fairly large battery pack which can be recharged 80 percent in 10 minutes, or when idling. It is designed to shuffle freight in a sorting yard where most commands come from a computer to put the inbound cars on the correct outbound track for their destination. This could just bring the Acela North to Quebec and Portland-Bangor or South to Richmond, Raleigh, Charlotte, Greenville-Spartanburg and Atlanta before Electrification construction is completed.

## Topic: Perspective on next 5 years

### Trend 4 Change which could un-do, upset, de-construct or otherwise stop these trends De-Construction of our world

The De-construction of Globalization will combine with Global Nationalism and the wealth of jobs from the laborer to the Designer and Engineer will await skilled persons around the world, not just in one geography. The post-Second World War sharing among all nations of skills and resources has seen its ascendancy ending. When political leaders who are focusing on National issues rather than the sharing, rise to power, then pressures such as Manufacture in North America, Don't use Chinese Cars, and find ways not to use metals only sourced from the third world nations. This walling off of genuine economic advantages may help politicians in the short term; but is raising the cost of all goods, or lowering the quality of all goods to others.

In the immediate term, this will impact most of the world very seriously. The one major exception is that North America will become the highest yielding economic geography. It is very lucky that the area generally accepts immigrants to take on the manual labor and the general population is getting technologically educated to guide and plan the products to be built.

Every Politician's dream is to be able to manage the economy. The current administration is slowly working into that environment. And, naturally, they are using technology to drive. The experience with Crypto has opened the door to alternate currencies. Block Chain is the connection technology. Do you remember what one of the valuable aspects of Block Chain is? It can completely back up and document every step of a transaction. Now, apply that to your new checking account. Are you 100 % satisfied that some person can tell who, how, when, and how much you paid? And they are politically motivated (perhaps not your party). Looking for privacy? Not here!

### Long-term View

A book to read: "[The end of the World is just the Beginning](#)" by Peter Zeihan, outlines just how Globalization will end and names the losers and the winners. He also has a You Tube lecture that is 57 minutes long but is worth substituting for a fairly long read.

Go to You Tube in any browser  
Search for "Jordan Harbinger"  
Select the entry for "Peter Zeihan"  
The one I got hooked on was Episode 781

He is an expert in geopolitics: the study of how place impacts financial, economic, cultural, political and military developments. He presents customized executive briefings to a wide array of audiences which include, but are not limited to, financial professionals, Fortune 500 firms, energy investors, and a mix of industrial, power, agricultural and consulting associations and corporations. Mr. Zeihan has been featured in, and cited by, numerous newspapers and broadcasts including *The Wall Street Journal*, *Forbes*, *AP*, *Bloomberg*, *CNN*, *ABC*, *The New York Times*, *Fox News* and *MarketWatch*. And now FYI!

## Technology supports change

Technology is producing changes over time. For instance, the Criminal – and Medical community are actively looking forward to the end of the Serial Killer. Today’s video captures, cell phone records, and connected data bases are leading law enforcement closer to the killer quicker. This results in removal of the repeat killer from the opportunity to kill their proscribed target. This is now the subject of multiple scientific analysis and documentation. It will not happen overnight; but will over several generations diminish the opportunity to kill by improving the opportunity to be safe for many individuals. That is poorly written, but a huge tutonic shift.

## Summary

In General, AI will improve in capability and in use cases and we humans will adjust

In General, Prices for Battery operating things will drop significantly and the time to recharge will continue to decrease. Some medical batteries will exist that will not need recharging for over 15 to 50 years. This will exceed many patient’s life span. In other words, no recharging “ever.”

We, humans, will work with technology better than ever; gaining leisure time in the process.

## Endnotes:

As usual, many thanks to many people.

A few extra goodies go to Sandy Munro and his Internet savvy sidekick Corey Steuben and the entire team.

Special well wishing thoughts go to the notable You Tubers, Sam Evans, Melbourne Australia for sharing his personal life and not missing a technology beat. Information and entertainment are not limited to the Octogenarians, a multi year thanks to the youngsters Jeff and Zach from Colorado. Sam, on a personal note, we are pulling for your bride’s full recovery each in our own way.

Many words of wisdom have to go to several You Tubers from the UK, including ‘Undecided’ and ‘Just have a think.’

This month, I have to thank You Tuber Jordan Harbinger for bringing Peter Ziehan forward with his incredibly insightful thoughts on the direction of Globalization.

