



DRIVING THE FUTURE OF EV

Guest Presenter

**SANDY
MUNRO**

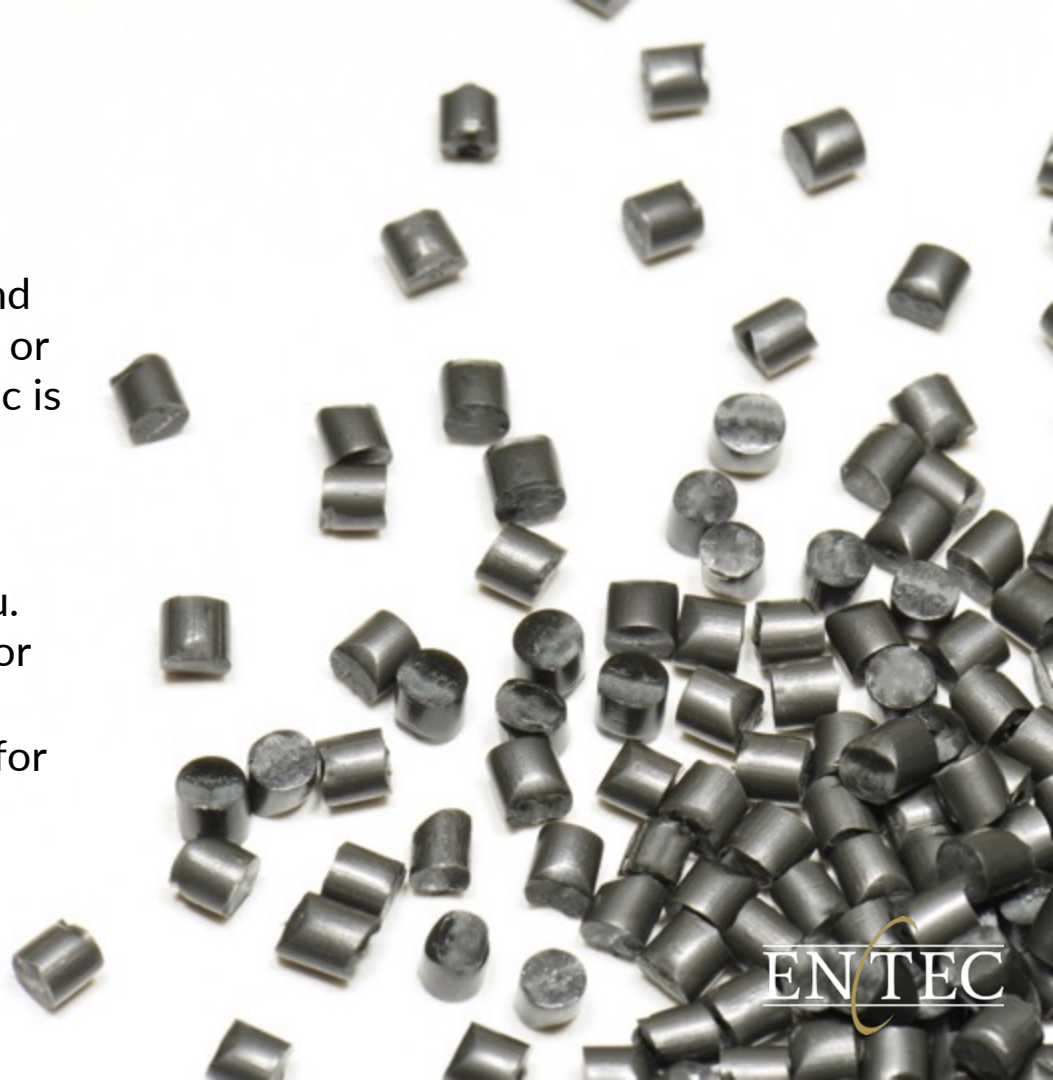


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ENTEC

We partner with the world's leading resin suppliers providing the most expansive product line and selection of plastics materials in the industry, including:

- High Performance Thermoplastics
- Engineering Thermoplastics
- Commodity Thermoplastics
- Elastomers
- Specialty Resins & Custom Compounds
- Recycled / Bio-Based Materials



11 Technical
Service Engineers



90+ Sales
Representatives



7 Market-Specific Business
Development Managers



Fully Integrated Supply
Chain Solutions



Leading Plastic, Chemicals & Rubber Distributor

Entec is one of North America's leading suppliers of plastics and Ravago's largest distribution unit.



Volume

14.5 Billion LBS

2020
Internationally



7,000+

Employees

More than 30% are
Dedicated Sales Employees



50,000+

Customers Worldwide

Large Loyal
Customer Base



325+

Locations

Across 55+
Countries



3,250+

Suppliers

55+ Years Lasting
Strategic Partnerships



40,000+

Product References

Large & Diverse
Portfolio

OUR HOSTS



Eric Parrell

Entec | Automotive Business Manager
EParrell@EntecPolymers.com | 810-923-0942



Alex Lukshaitis

Entec | Automotive Business Manager
ALukshaitis@EntecPolymers.com | 616-822-4335



Benjamin Houriez

Entec | E-Mobility Business Manager
BHouriez@EntecPolymers.com | 323-762-0991

IN THE
BUSINESS
OF BETTER

OUR PRESENTER



Sandy Munro

Founder and CEO of Munro & Associates



PRESENTATION HIGHLIGHTS

Short Bio: Sandy Munro

Honored as LTU's Innovator of the Year. Titled a visionary and master innovator by NASA, Sandy is a frequent speaker and advisor to some of the world's top executives on implementing change and innovative development strategies.

SAE June 2021 Cover Story



Jim Farley | CEO Ford Motor Company to Sandy



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“No baloney, you have done so much for our industry, you have opened so many eyes, at Ford and across our industry. You have helped all of us get healthier, your team is terrific.”
“Is it comfortable? No. But it’s completely critical for our sufficiency and success is to have someone like you and your team, who is the arbiter of what really is happening.”
“I think you deserve all the credit you get...or more”

<https://youtube.com/clip/UgkxX3bAHeA5hDZl0Vpd2GetslUWg2iaWXj7>



Who Is Munro?



Munro & Associates Inc.
1140 Centre Dive
Auburn Hills, MI 48326
www.leandesign.com
www.designprofit.com



“We stepped aside and let Munro do it all to make sure we were thinking outside the box.”



Phil Tralies
President & CEO
Club Car, Inc.



Photo Source Club Car

787 NPD Using Munro



“We have made statements to the airlines regarding the interior installation times we are targeting of 232 hours relative to the 3500 hours today on 777.” ~ Pete Guard, Boeing 787

Find the Car!



Photo: Fifth Ave NYC Easter 1900 Source US National Archives

Find the Car!



Photo: Fifth Ave NYC Easter 1900 Source US National Archives

1913 Find the Horse



Photo: Fifth Ave NYC looking N 1913 Source US National Archives

1913 Find the Horse

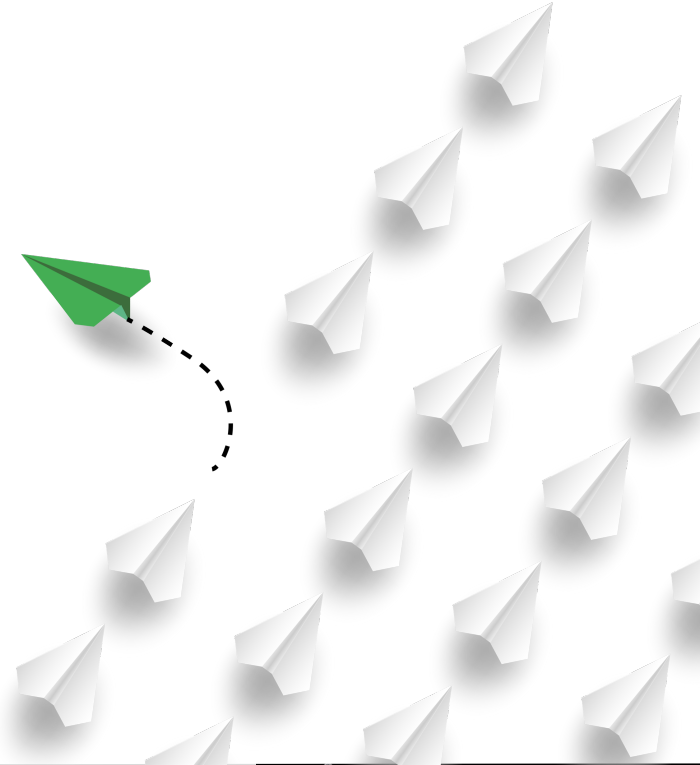


**In 11 years, car ownership
went from 7.7% to 80%**

Photo: Fifth Ave NYC looking N 1913 Source US National Archives

When a Paradigm Shifts

- When a Paradigm shifts...everyone goes back to ZERO.
- Your past success means nothing when the Paradigm changes.
- No one goes back to the old Paradigm.
- Steam engines, stone tools, kerosene lamps, women's whale bone corsets...all gone forever.
- Success in a dead or dying Paradigm WILL block your vision to the Future.



They All Ignored the Warning Bell...



2017/2018

2019

2020

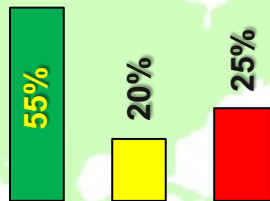
2021



OEM's Blinded: ICE Age over in 2028

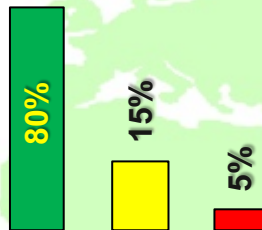
NORTH AMERICA

■ EV ■ HEV ■ ICE



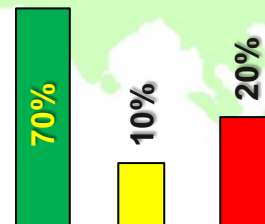
EUROPE

■ EV ■ HEV ■ ICE



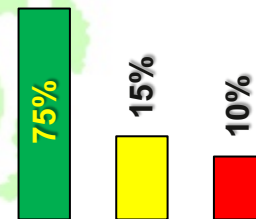
CHINA

■ EV ■ HEV ■ ICE



JAPAN / S.KOREA

■ EV ■ HEV ■ ICE



Global Cars/Light Trucks Build/Sold

OEM's Blinded: ICE Age over in 2028

Global Cars/Light Trucks Build/Sold

EV

HEV

ICE

70%

25%

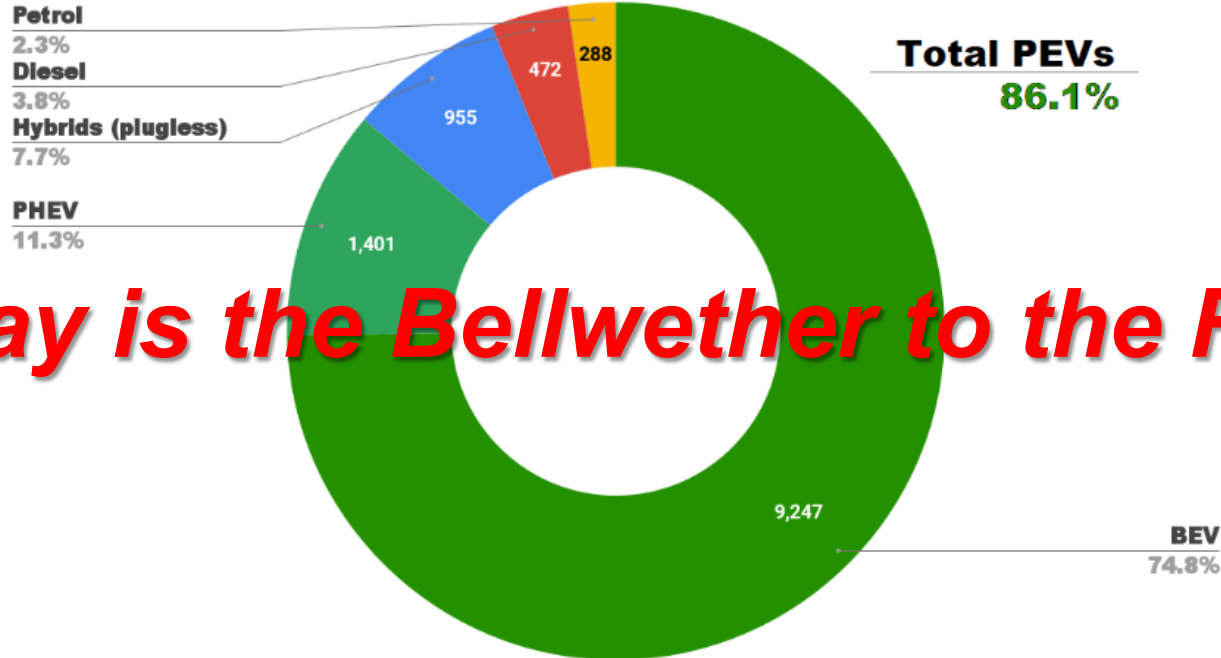
5%

(Excludes Africa, Middle East, South America, and India)

Norway Leads in EV Adoption

August 2022 Norway Passenger Auto Registrations

Data from OFV



Norway is the Bellwether to the Future

<https://cleantechnica.com/2022/09/04/norways-plugin-evs-still-falling-for-reasons/>

© Max Holland / CleanTechnica

These Are Times For Bold Leadership!



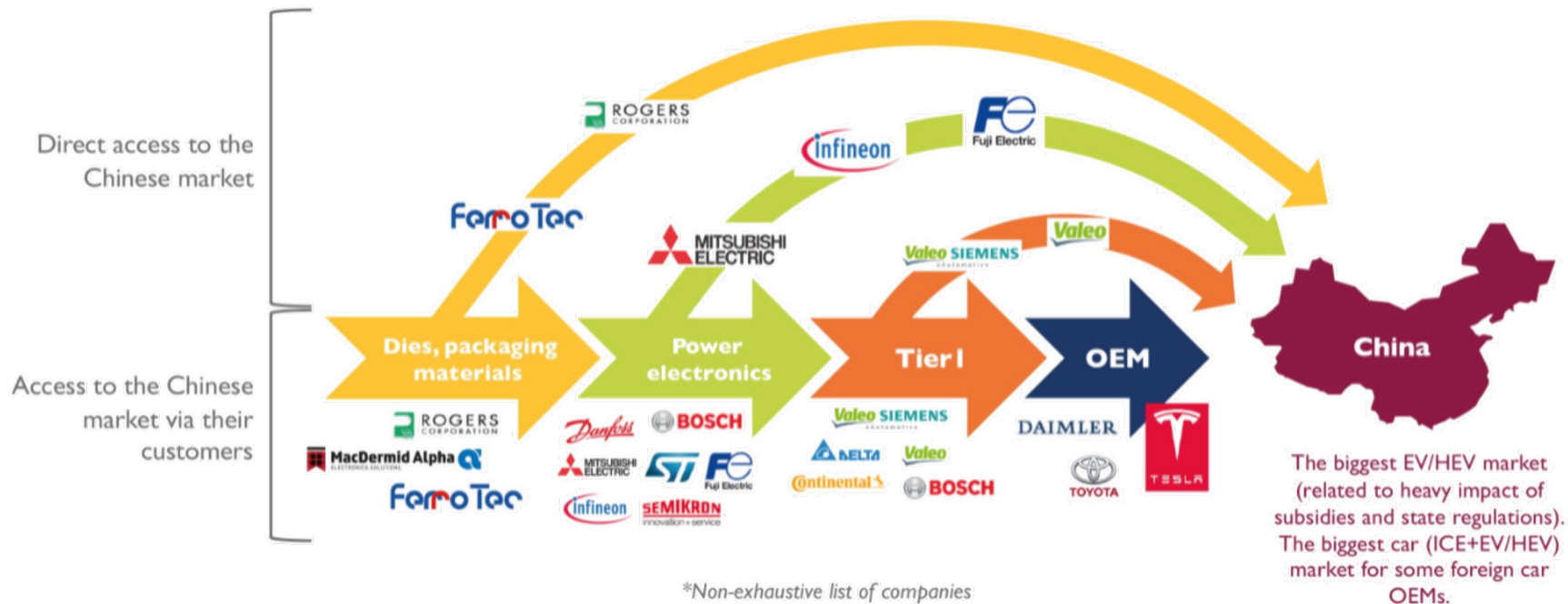
China Will Dominate EV's For A Decade

- Chairman Xi Jinping announced that China will endeavor to reduce its carbon emissions to reach carbon neutrality by 2060
- China 75% EV's 2030
- 100% EV's by 2035
- Total stop to manufacturing of ICE (gas) 2040



How China is driving the Future...

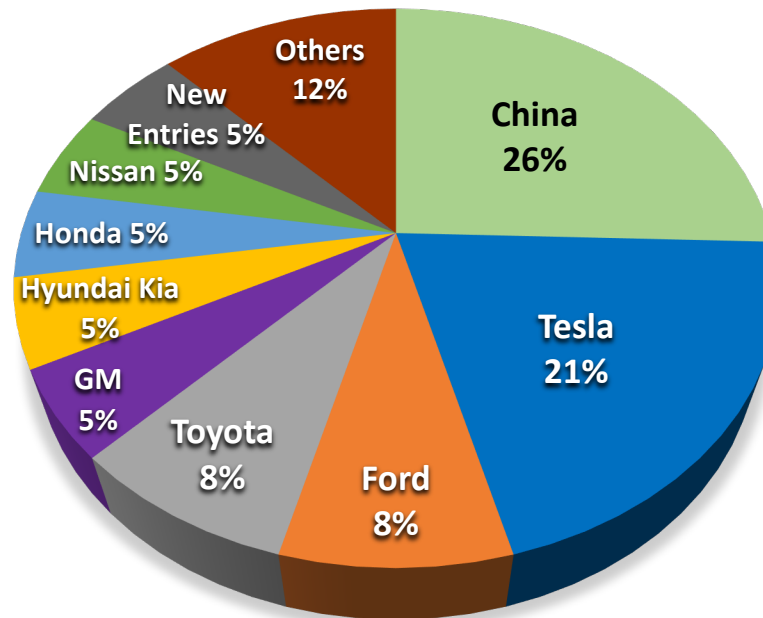
EV/HEV & Associated Power Electronics



(Source: Power Electronics for Electric & Hybrid Electric Vehicles 2020 report, Yole Développement, 2020)

Sandy's NA Top 10 in 2030

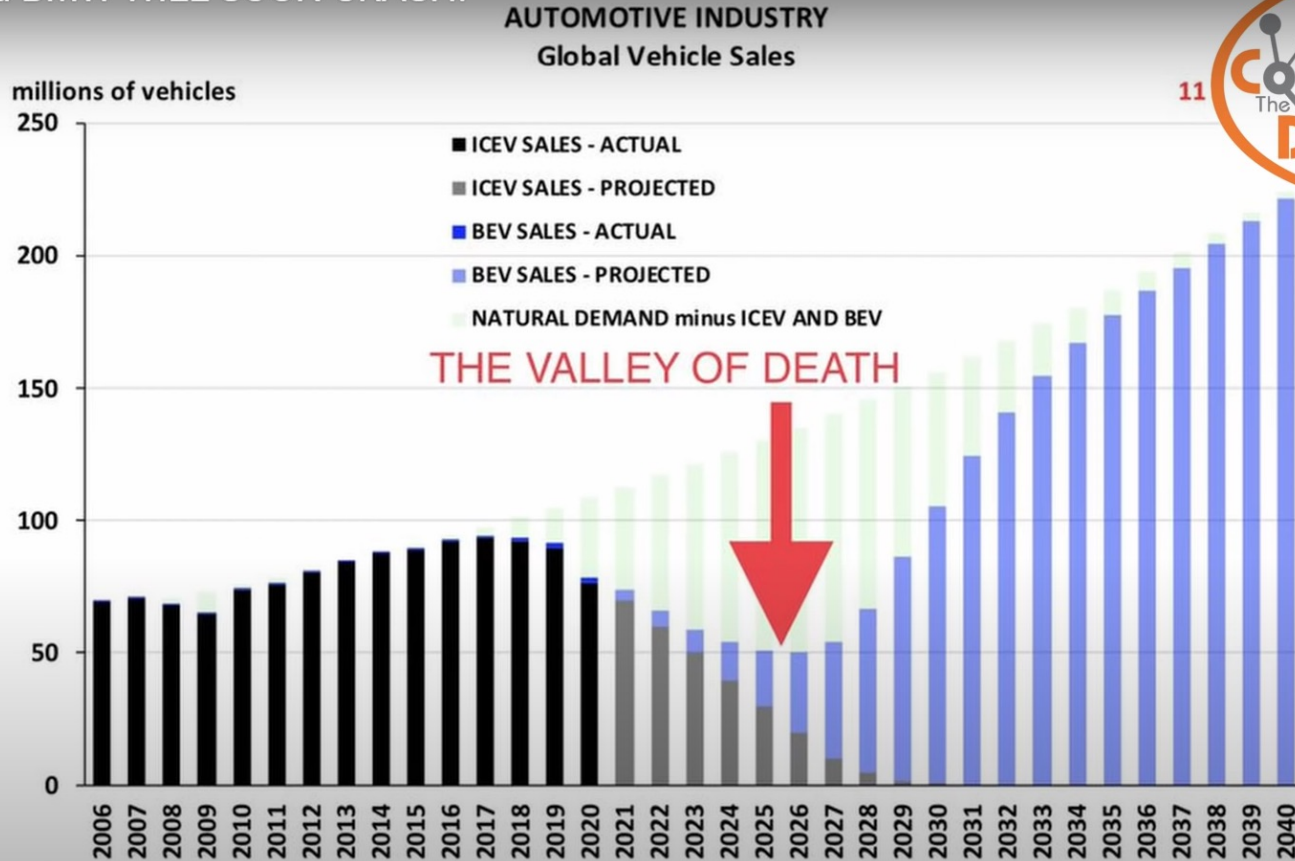
China
62
cars/hour



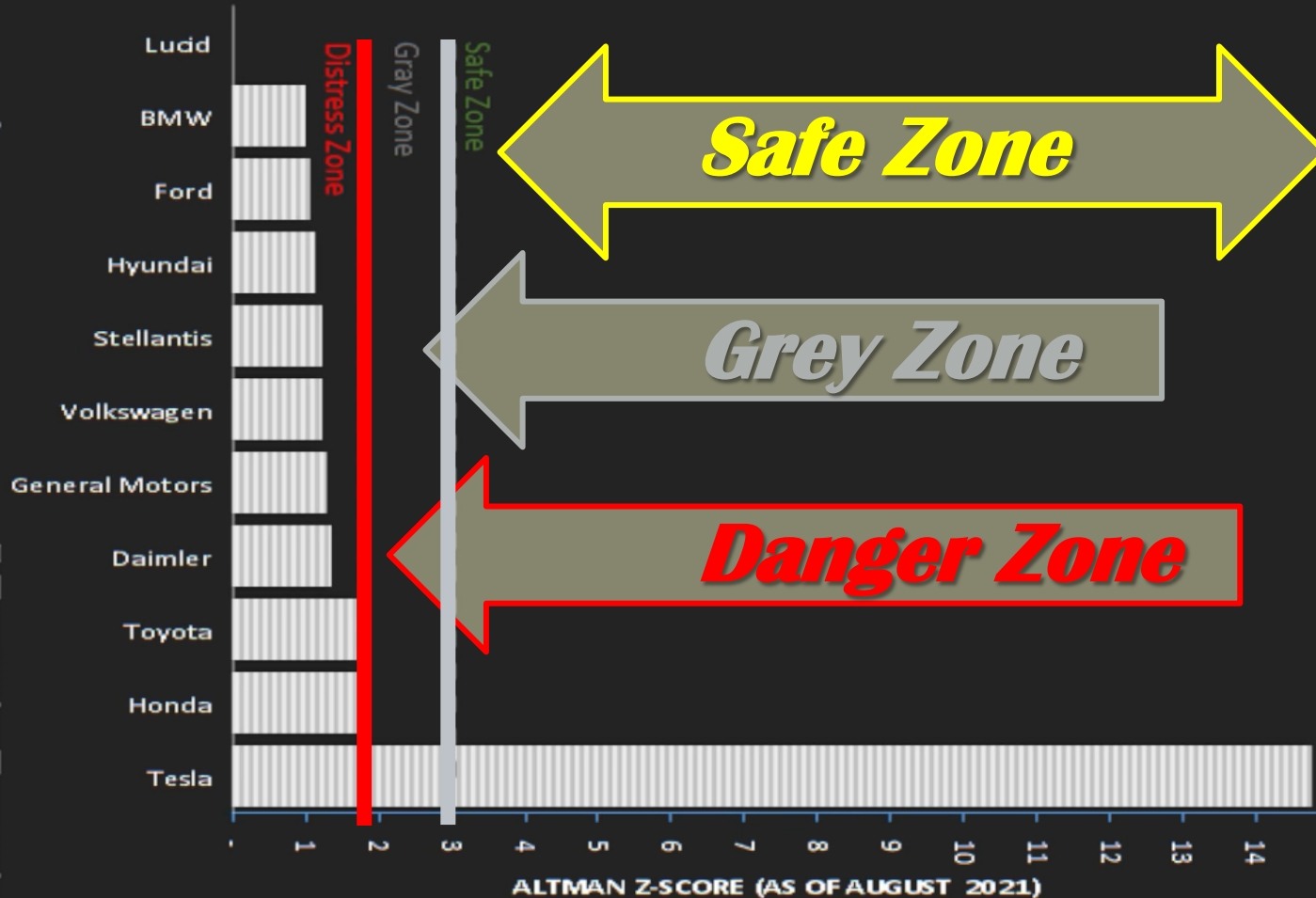
Tesla
42
cars/hour

China Tesla Ford Toyota GM Hyundai Kia Honda Nissan New Entries Others

Ford, GM and BMW WILL SOON CRASH!



Why
 invest
 if you
 know
 there is
 huge
 risk?



Russian Invasion Will Accelerate EV's

Crude Oil Prices – Historical Annual Data | Macro Trends

Year	Average Closing Price	Year Open	Year High	Year Low	Year Close	Annual % Change
2022	\$98.20	\$76.08	\$123.70	\$76.08	\$88.30	17.40%
2021	\$68.17	\$47.62	\$84.65	\$47.62	\$75.21	55.01%
2020	\$39.68	\$61.17	\$63.27	\$11.26	\$48.52	-20.64%

**Get Prepared for \$10/gallon In
Less than 5 Years!**

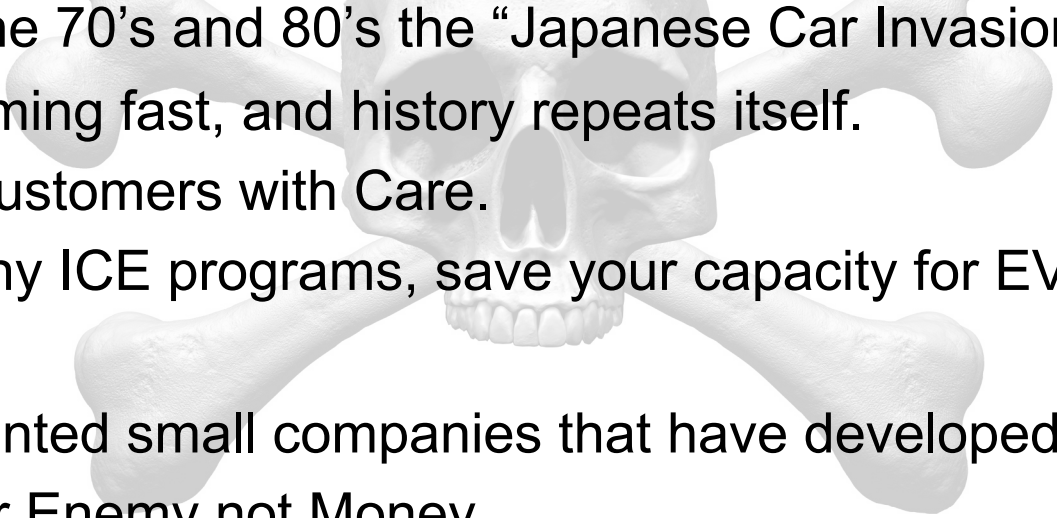
Source: Macrotrends

Think I Am Crazy? Here's the History

Year		Price / Gallon
1974		0.39
1975		0.53
1976		0.57
1977		0.59
1978		0.62
1979		0.63
1980		0.86
1981		1.19
1982		1.31

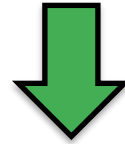
\$0.39 to \$1.31
3X in 9 years

Remember The Jimmy Carter Years? Get Ready For the Sequel !

- 
- ▶ Research the 70's and 80's the "Japanese Car Invasion"... Learn!
 - ▶ China is coming fast, and history repeats itself.
 - ▶ Pick your Customers with Care.
 - ▶ Run from any ICE programs, save your capacity for EV.
 - ▶ Go Faster.
 - ▶ Acquire talented small companies that have developed new tech.
 - ▶ Time is your Enemy not Money.

4680 Battery Pack; Austin Texas

The Future is Designing
for Multi-Function



**Composites Can Help
Tesla Reduce Weight**

No Service! Ever!

Reliable

Carries the Seats

Structural

Recyclable

Bigger Battery Means More Range...Right?

ICE

YEAR	MAKE	MODEL	MSRP	RANGE	MPGe AVG	MPGe City	MPGe Hwy	COST TO DRIVE 100MI	ANNUAL OPERATING COST*	kWh / 100 mi
2021	Tesla	Model S Plaid	\$129,900	390	101	102	99	\$3.68	\$550	33
2021	Bentley	Continental GT	\$202,500	380	19	16	26	\$20.04	\$8,500	0
2021	Tesla	Model Y Standard	\$41,190	326	129	140	119	\$2.88	\$450	26
2021	BMW	530e (hybrid)	\$57,200	21 both / 340 total	64			\$6.88 / \$14.64	\$1,550	49
2021	BMW	530i (gas)	\$54,200	504	28	25	33	\$13.60	\$3,250	0
2021	Cadillac	XT4 AWD	\$39,795	391	24	22	29	\$15.88	\$3,150	0
2021	Mercedes	GLB 250	\$38,050	413	26	23	31	\$14.64	\$3,200	0
2021	Tesla	Model 3 Standard	\$39,990 - \$56,990	263	142	150	133	\$2.60	\$400	24
2021	Volkswagen	ID.4	\$39,995 - \$48,175	250	97	104	89	\$3.84	\$600	35
2021	Porsche	Taycan Turbo S	\$185,000	212	73	71	75	\$4.96	\$750	45
2021	Porsche	Taycan Perf		200	79	76	84	\$4.52	\$700	41
2021	Ford	Mustang Mach-E AWD	\$42,895 - \$59,900	211	93	100	86	\$4.00	\$600	36
2021	Audi	e-tron	\$65,900 - \$79,100	222	78	78	77	\$4.76	\$700	43
2021	Polestar	2	\$59,900	233	92	96	88	\$4.04	\$600	37

* Operating Costs include fuel, change oil & filter, rotate tires, fluids, and lubrication

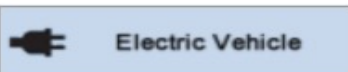
Notes: Gas Reg \$3.29, \$0.11/kWh, 1 gal gas = 33.7kWh, 15k miles/yr, 55% stop and go

Source: <https://www.fueleconomy.gov/feg/Find.do?action=sbs&id=44069&#tab1>

Battery Size **Doesn't** = More Range

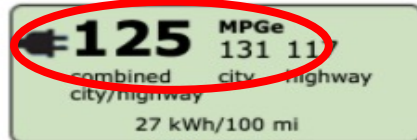
75 kWh

2021 Tesla Model Y
Long Range AWD



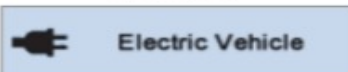
Automatic (A1)

Electricity



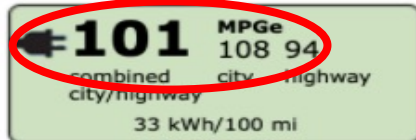
88 kWh

2021 Ford Mustang
Mach-E RWD California
Route 1



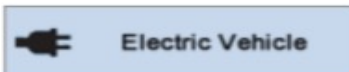
Automatic (A1)

Electricity



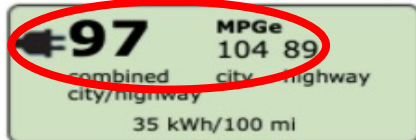
82 kWh

2021 Volkswagen ID.4
1st



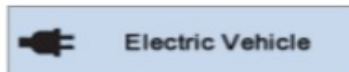
Automatic (A1)

Electricity



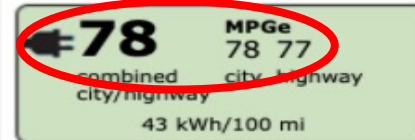
95 kWh

2021 Audi e-tron



Automatic (A1)

Electricity

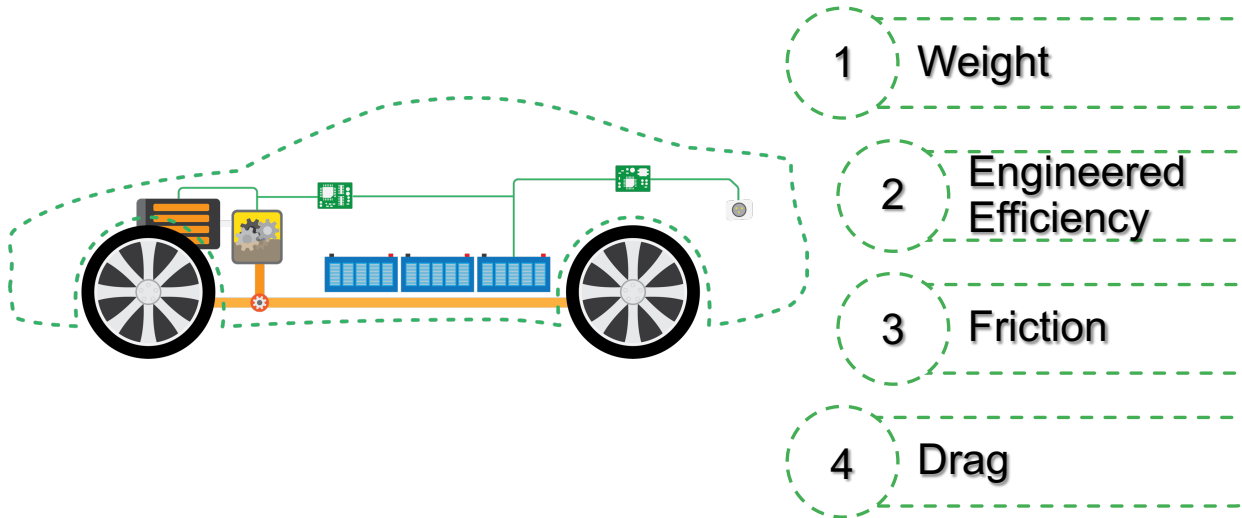


Courtesy of John Neff: <https://www.motor1.com/features/503234/make-cars-out-of-fabric/>

What Enables EV's Growth?

It Must Be Battery Size! **Wrong!!!**

Range Is Mostly Determined 4 Ways



Composites
Can Help In
All These
Criteria

QUESTIONS

Contact Us

Eric Parrell | Entec Automotive Business Manager
810-923-0942 | EParrell@EntecPolymers.com

Alex Lukshaitis | Entec Automotive Business Manager
616-822-4335 | ALukshaitis@EntecPolymers.com

Benjamin Houriez | Entec E-Mobility Business Manager
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SPECIAL THANKS

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