



# SAA Conference “It’s a Sci Fi World”

March 24, 2022

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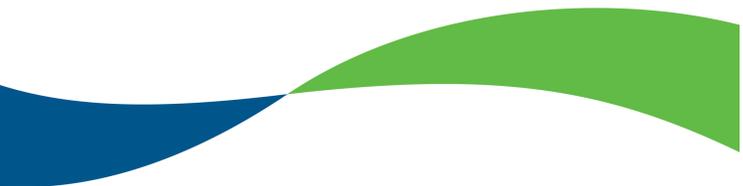
# Yesterday, Today and Tomorrow.....





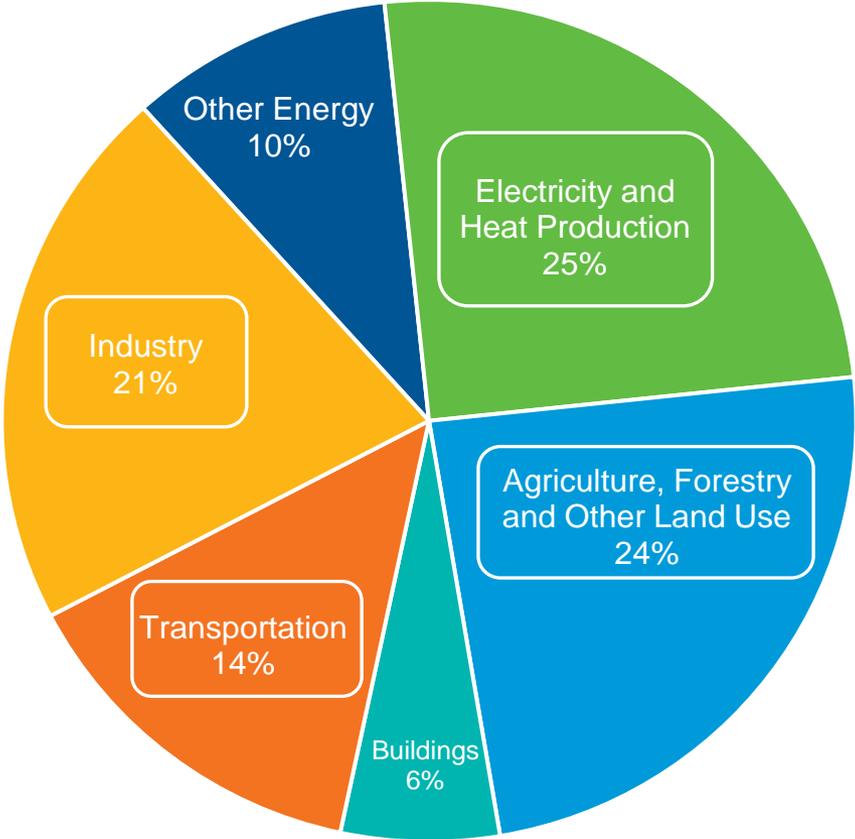
## Current Themes Shaping Our World

- Climate Change and Energy
- Electric and Autonomous Vehicles
- Health Care and Genetic Editing
- 5G and the “Metaverse”



**Energy Transition**  
*Observations and Implications*

## Global Greenhouse Gas Emissions by Economic Sector



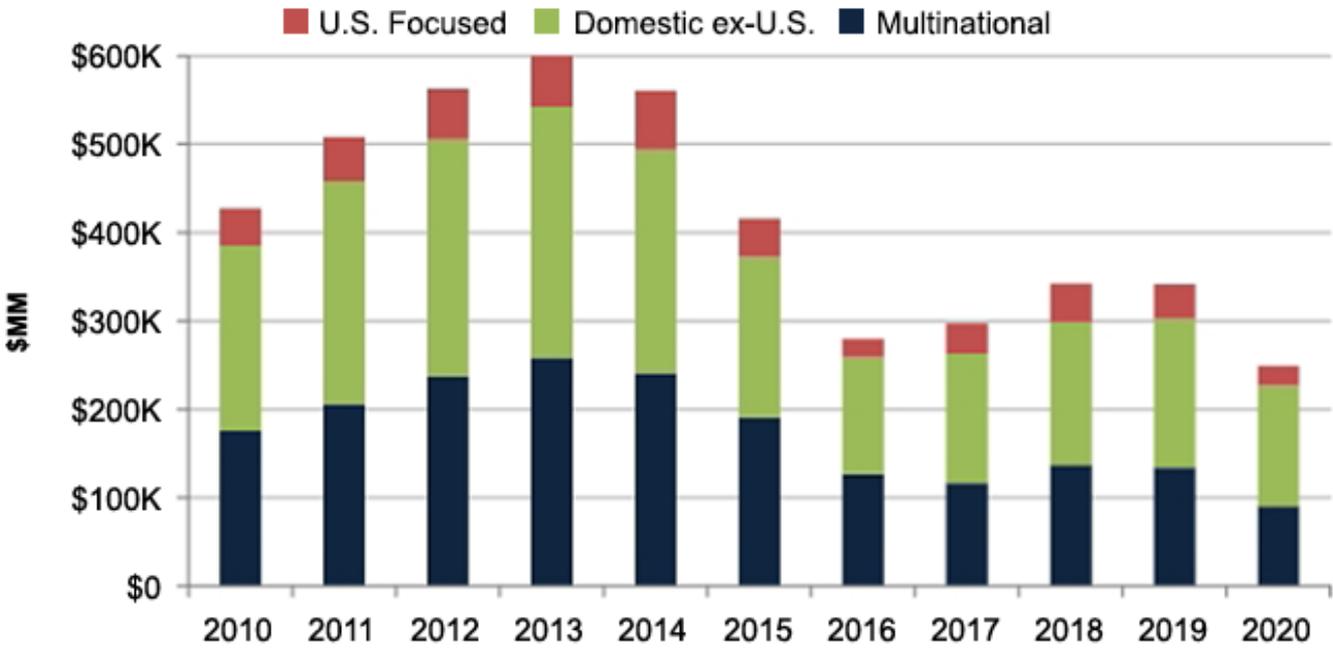
Source: U.S. Environmental Protection Agency

# Oil and Gas Capital Expenditures Declining



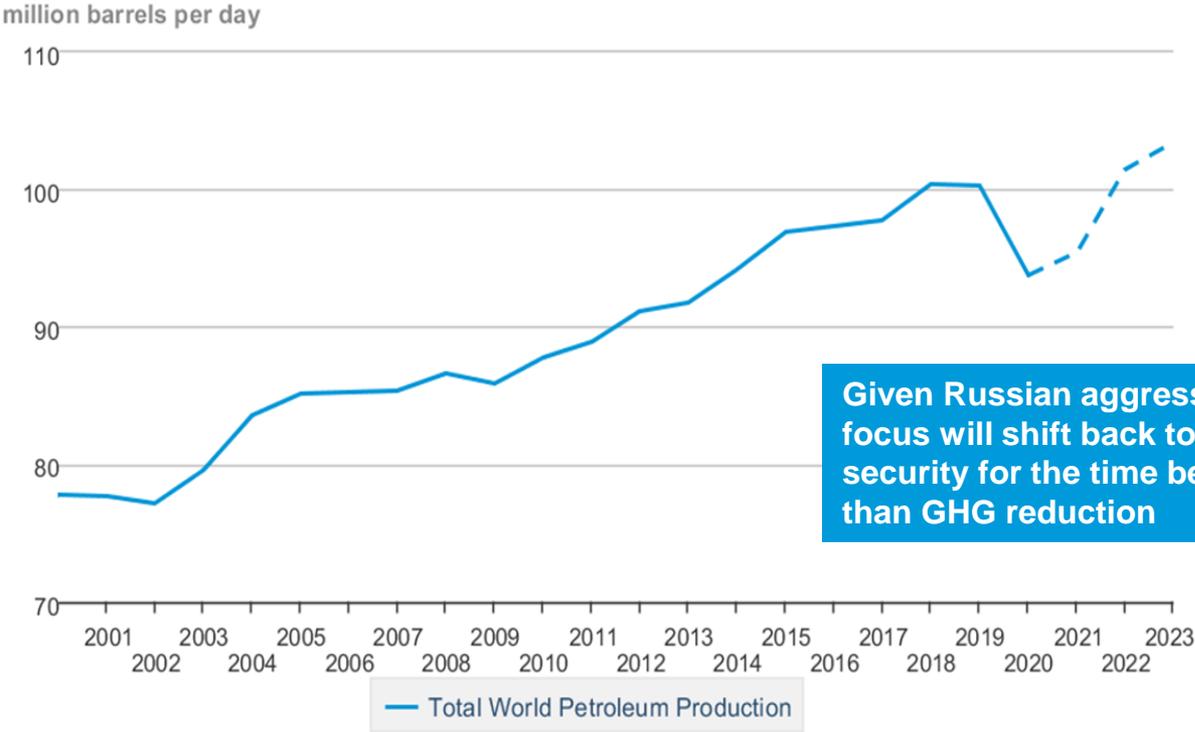
Oil and Gas Companies Have Been Positioning for Transition

### Capital Spending of Mid/Large Oil & Gas Companies



Source: Oil and Gas Company Filings, Raymond James Research

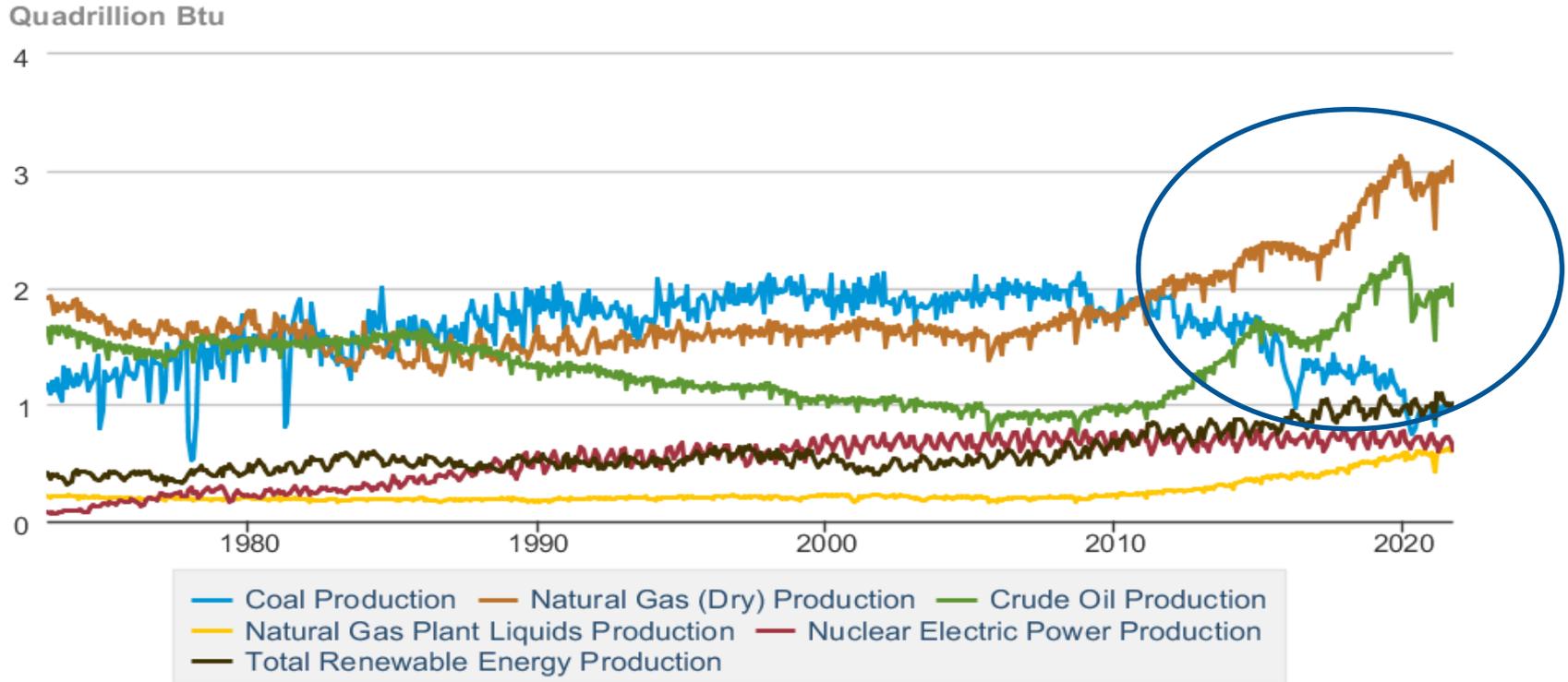
## Total World Petroleum Production



Source: U.S. Energy Information Administration

# Energy Sources

Coal Reduced, but Replaced by Oil and Gas



Source: U.S. Energy Information Administration

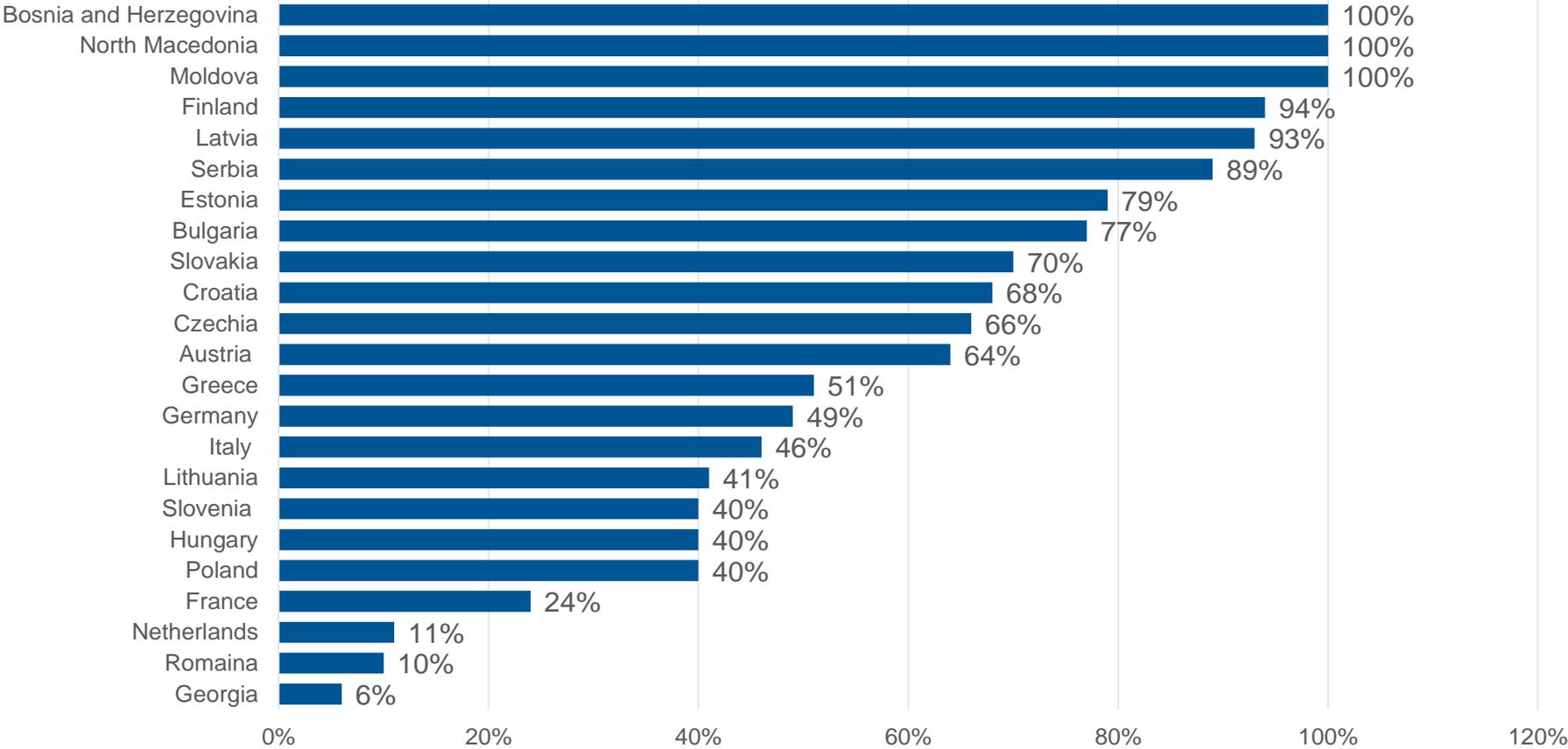
# Geopolitics Lays the Truth Bare

*Fossil Fuels Remain a Strategic Weapon for Bad Actors*



## Energy security has not been a focus for Europe...until now

Percentage of Natural Gas Sourced from Russia as of 2019



Source: Statista

# Air Travel

A Very Significant Contributor to Greenhouse Gas Emissions...



Source: FlightRadar24

# And It is a Global Issue...

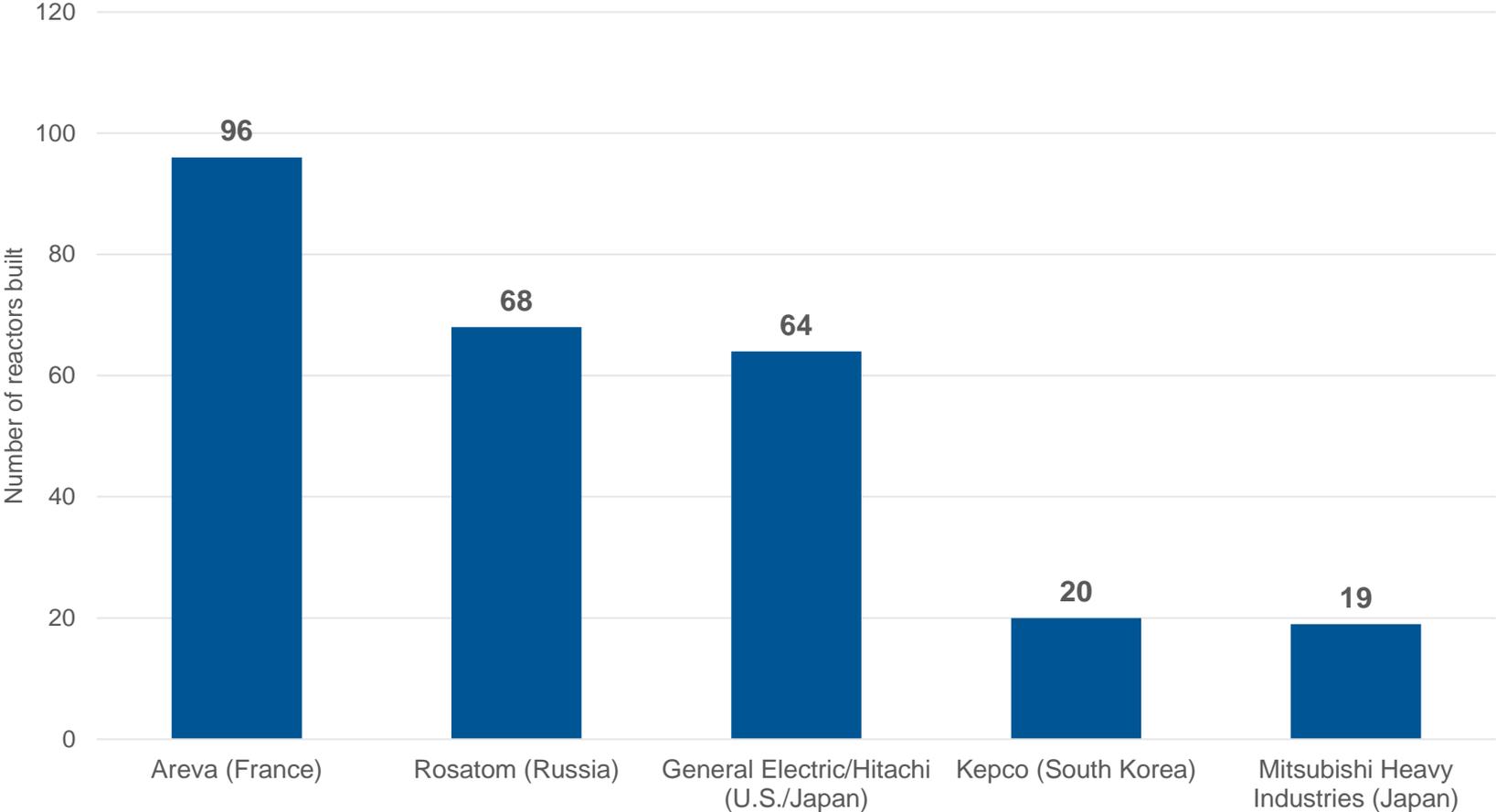


Source: FlightRadar24

# Nuclear Probably Needs to Be Reconsidered



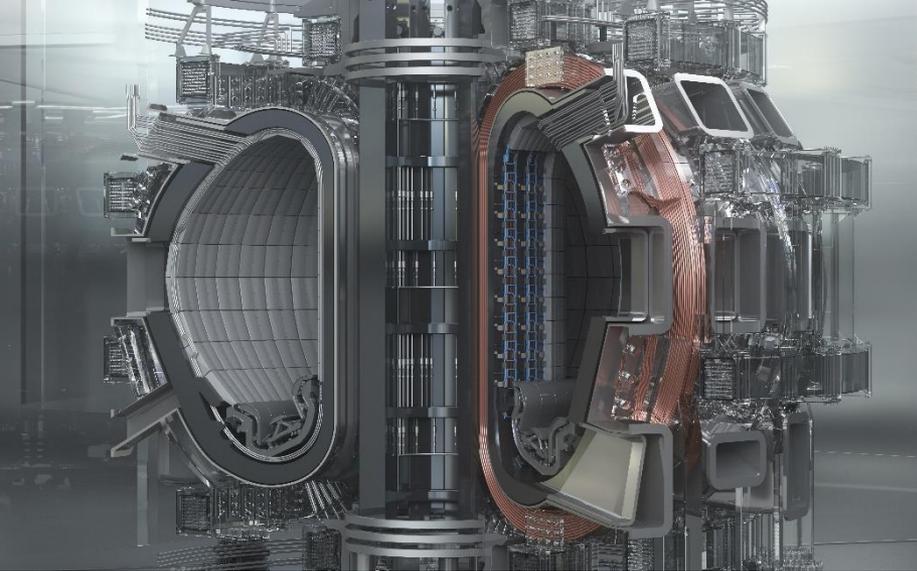
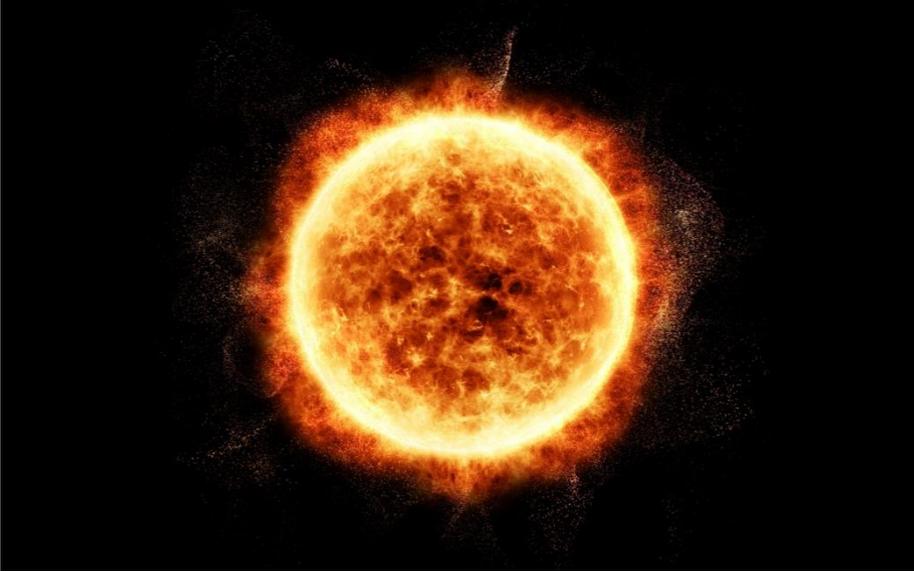
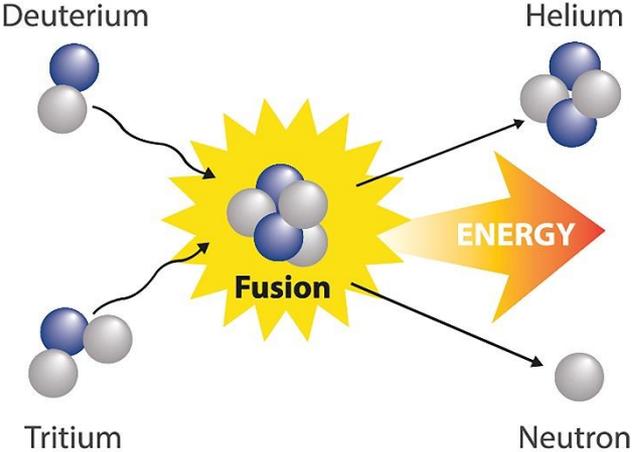
# Major Players in Nuclear Construction



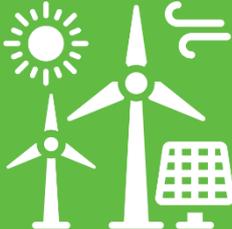
Source: Statista

# Nuclear Fission is Much Easier than Fusion

*Fusion reaction emits only Helium and no waste, but Requires Extreme Temperatures*



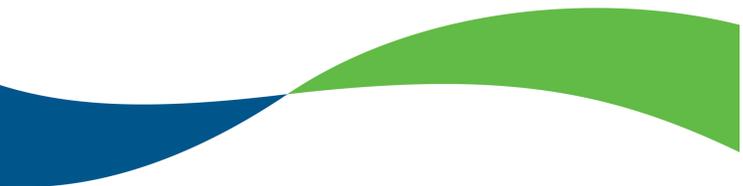
# The Many Shades of Hydrogen

	<b>GREY</b> HYDROGEN	<b>BLUE</b> HYDROGEN	<b>TURQUISE</b> HYDROGEN*	<b>GREEN</b> HYDROGEN
Color				
Process	SMR or gasification	SMR or gasification with carbon capture (85-95%)	Pyrolysis	Electrolysis
Source	Methane or coal 	Methane or coal 	Methane 	Renewable electricity 

NOTE: SMR – steam methane reforming.  
\* Turquoise hydrogen is an emerging decarbonization option.

Source: World Economic Forum

- The next 20 years should see major advancements in alternative energy, but it will be slow and expensive.
- The world will be reliant on fossil fuels for decades to come, as we “talked the talk before we could walk the walk”.
- Coal usage has been reduced in the U.S., but it was replaced by oil and gas, not renewables, nuclear or clean energy sources.
- Emerging markets are still extremely reliant on coal
- Ongoing areas of investment:
  - Nuclear
  - Renewables
  - Hydrogen
  - Carbon Capture



# Electric and Autonomous Vehicles

# Electrification of Vehicles

Reduces Greenhouse Gasses but NOT Energy Demand

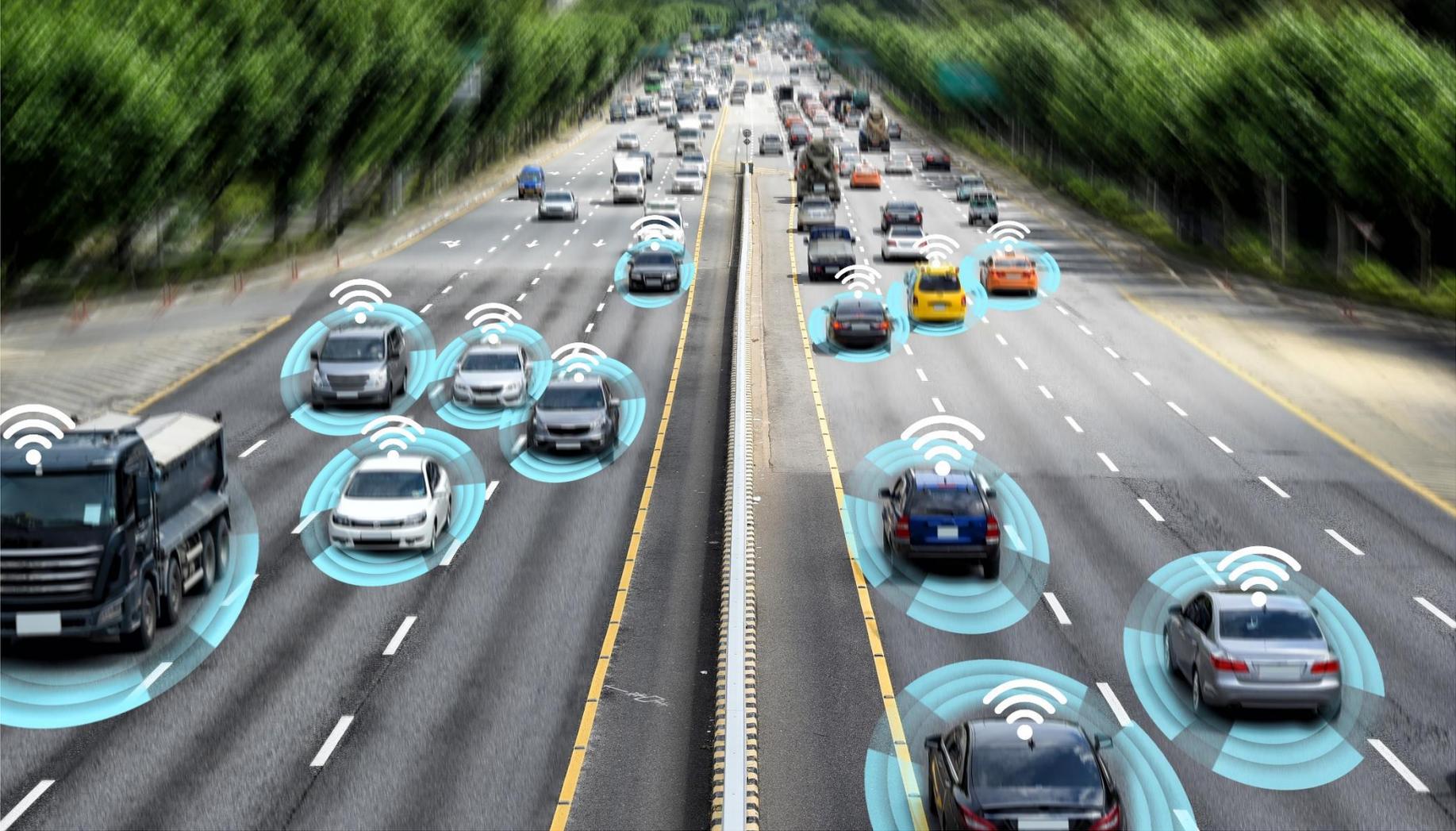
Rank	Name	Market Cap as of March 15, 2022
1	<b>Tesla</b> TSLA	<b>\$817 B</b>
2	<b>Lucid Group</b> LCID	<b>\$35 B</b>
3	<b>Rivian Automotive</b> RIVN	<b>\$32 B</b>
4	<b>NIO</b> NIO	<b>\$24 B</b>
5	<b>Xpeng</b> XPEV	<b>\$18 B</b>



**Battery on TESLA S  
Weights ~ 1,200 lbs.  
Estimated range 400 mi.**

Source: Bloomberg; Based on share prices and float as of March 15, 2022

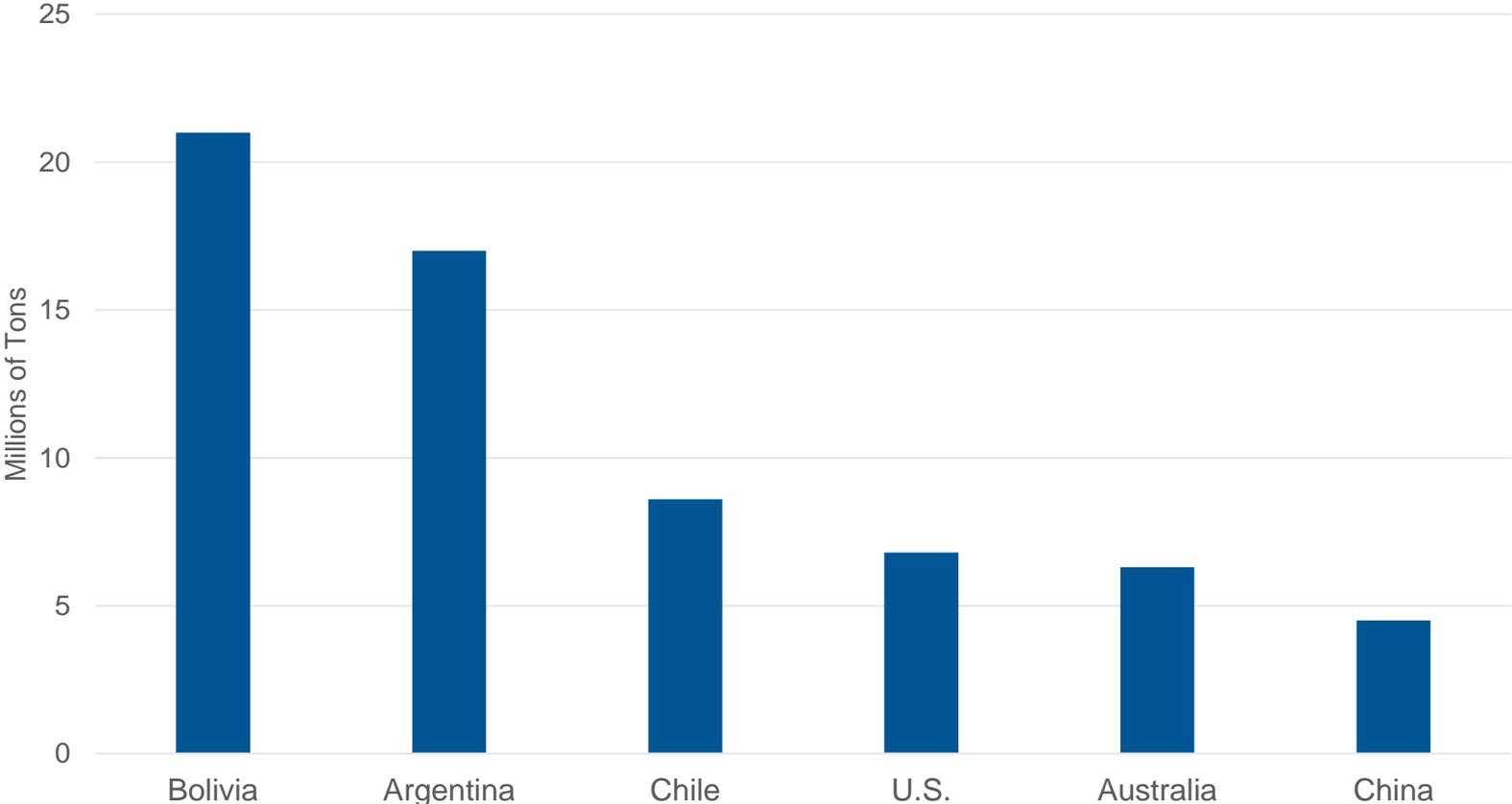
# Autonomous Vehicles Might Have Some Benefits



# EV Batteries Require Lithium



## Estimated Lithium Reserves by Country



Source: NS Energy; NSEnergybusiness.com

# Lithium-Ion Battery Supply Chain Rankings



Country	Rank
China	1
Japan	2
South Korea	3
Canada	4
Germany	5
U.S.	6
U.K.	7
Finland	8
France	8
Sweden	10

Source: Bloomberg, NEF Rankings

- Electric vehicles will be a great advancement IF we can power them from renewable or clean energy sources. Otherwise, we are simply swapping one type of carbon emission for another, albeit perhaps somewhat cleaner.
- Certain countries and regions seem well positioned to benefit if the EV push is scaled to the masses
- Demand for raw materials for EV batteries will increase manifold.
- Autonomous vehicles may control costs in the long run, but require significant capital outlays for both hardware and software (processors, AI, etc.)



**Genetic Editing**  
*The Secret to Longer,  
Healthier Lives?*

# Gene Editing May be Biotech's Next Act



**Cancer**

**Heart disease**

*Diabetes*

**Neurological Disorders**

**Blood Disorders**

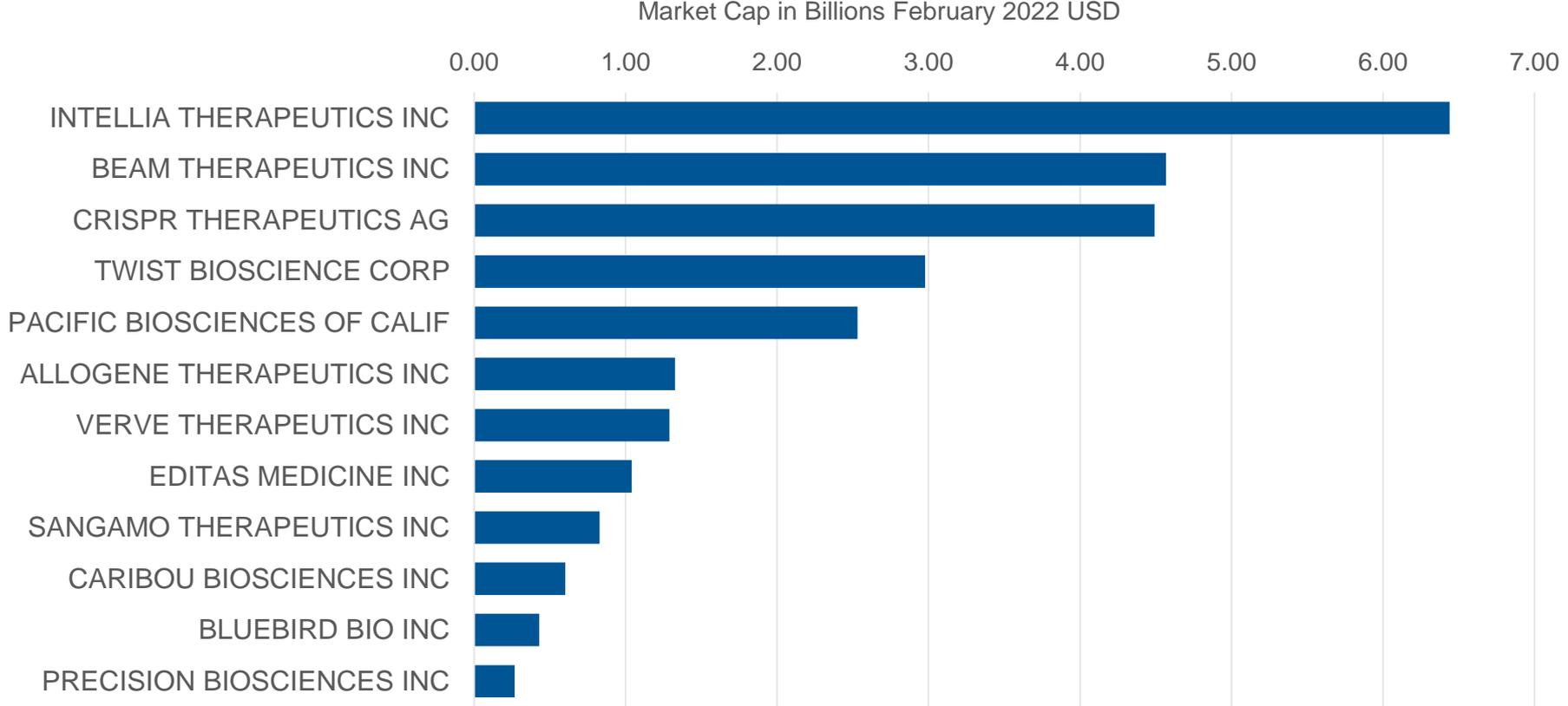
**AIDS**

# Gene Editing Specialty Companies

List Drawn from Kelly CRISPER & Gene Editing ETF



## Sample Gene Editing Companies w/ Market Caps Below \$10 BB



Source: Bloomberg; NEAM

# Genetic Editing Bottom Line:

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- Genetic editing may unlock new pathways to healthier lives and may allow engineering some diseases and disorders away entirely...
- This trend is very much in a nascent stage
- Large pharma and biotech companies are involved, but in a relatively small way.....so far
- If advancements are promising, look for acquisition of specialty companies.



**5G Telecommunications**  
*Better, Stronger, Faster*

# Videoconferencing Got Us Through the Pandemic



Webex Meetings



# But This Isn't an Ideal Team Meeting...

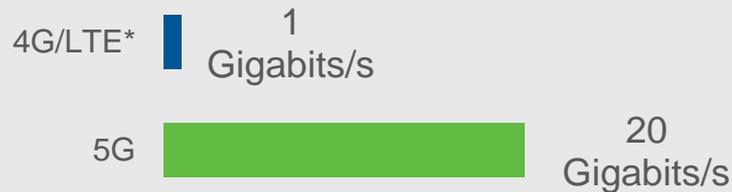


# 5G – The Difference a Digit Makes

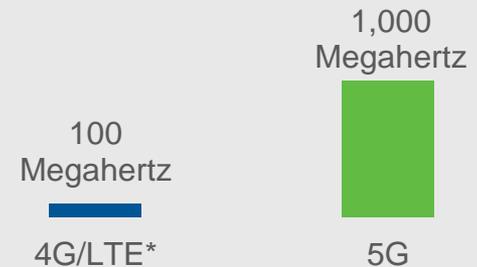
## 5G Dwarfs all of 4G's Specs

Comparison of key performance of 4G and 5G networks

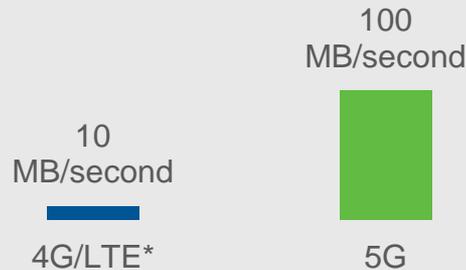
### Download speed (peak)



### Maximum Bandwidth\*\*



### Download speed (real world)



### Latency in milli-seconds

(lag from download order to download start)



### Maximum number of carriers



\* Specs for LTE-Advanced, release 10-12  
\*\* Used to distribute the signal through the air

Source: Android Authority, Statista

How long to download a two hour film?



**3G**  
384 Kbps  
(2001)



**4G**  
100 Mbps  
(2003)



**5G**  
10 Gbps  
(2020)

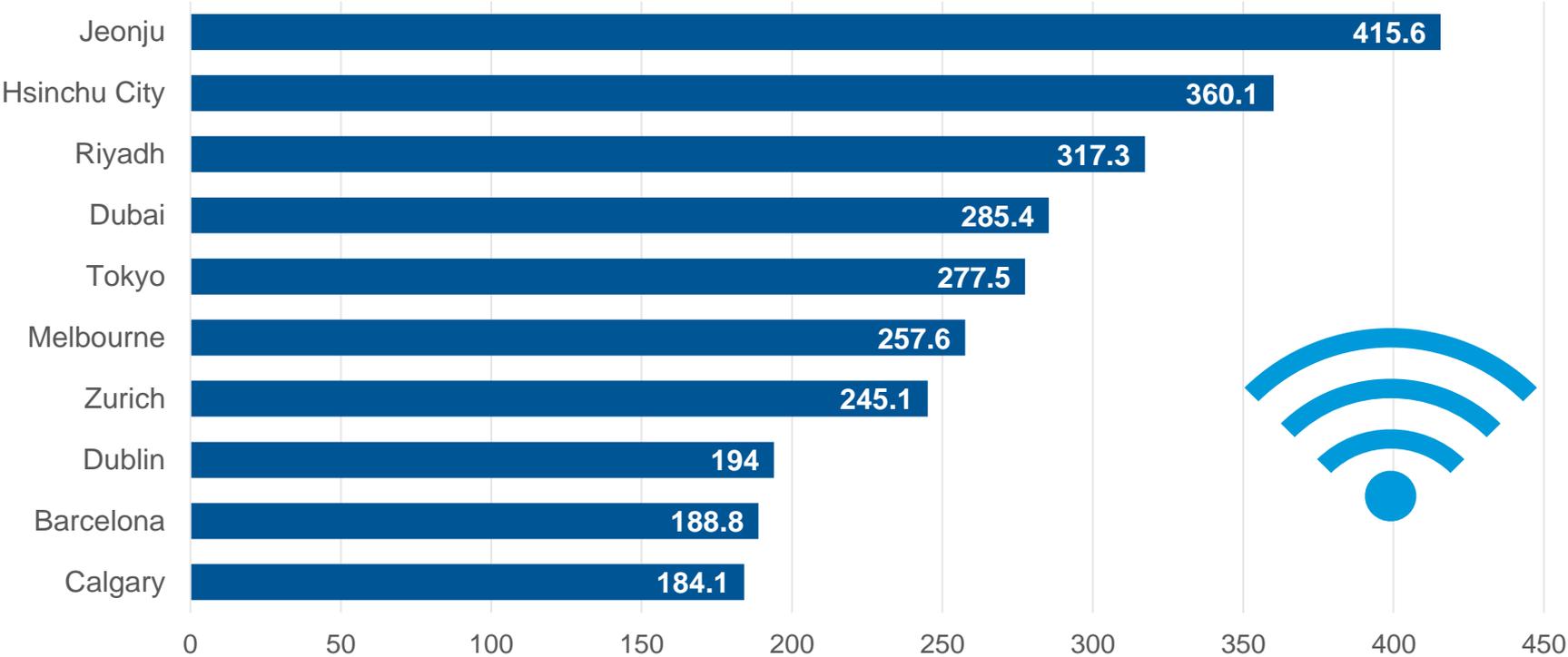
Source: URTech.ca

# The U.S. is Behind in the 5G Evolution



## The Cities With The Fastest 5G Speeds

Cities with the fastest 5G download speeds globally in Mbps (Jan 01-Mar 31, 2021)



Source: OpenSignal

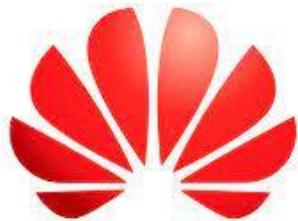
# 5 G Network Infrastructure Companies



AT&T

ZTE

NOKIA



HUAWEI

QUALCOMM®

NEC



**The Metaverse:**  
*What is it and Why Should We Care?*

# The Metaverse

It Might Not be Just for Gaming Anymore



# The Business Meetings of Tomorrow

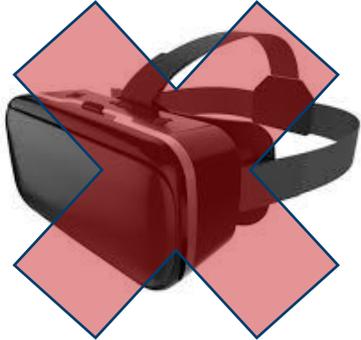
Let's Hope Not...



# Holograms and 3 D Interactions



# Technological Advancements May Help Solve Some of Today's Problems



## Tired of Zoom Calls? Company Offers At-Home Hologram Machines

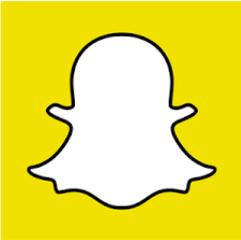
The device made by PORTL lets users talk in real time with a life-sized hologram of another person.

By Reuters | Updated: 9 August 2020 14:06 IST

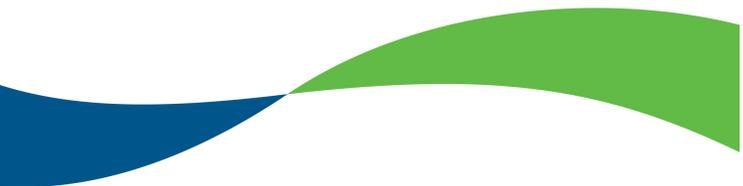
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# Companies Actively Engaged in the “Metaverse”



- 5G speed is faster than 4 G by order of magnitude
- It's impact on our *current* routines will be minimal, but it will unlock opportunities for the next level of development and technological advancement
- The “metaverse” may evolve into a way to interact more naturally and multi dimensionally without driving or flying, thereby making it relatively “green”



## Final Thoughts

- Fossil fuels will be with us for a long time as there are few if any scalable solutions to certain carbon intensive industries
- The longer the transition takes, the more likely fossil fuel prices will stay elevated as exploration and cap ex investments have been greatly curtailed
- Proven oil reserves remain plentiful, but new fields would be the most expensive to develop and most difficult to access.
- Difficult to see “net zero” goals becoming a reality unless we quickly reduce travel and increase renewables and nuclear (neither can happen quickly).
- Electric Vehicles are not a panacea. They do not reduce the need for energy, only the emissions from tailpipes. Unless we curtail the use of fossil fuels. In power generation, the emissions simply take another form.

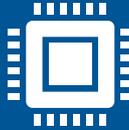
- Technological Advancements may be able to help reduce emissions
  - Hybrid Work Models and WFH positions
- Robotics can, and already are, helping workers remain in the workforce longer
  - All else equal, this should mitigate price pressures from aging demographics and smaller workforces in advanced economies.
- Gene editing, if successful, could lengthen lifespans
- Technology may play a crucial role in:
  - Reducing healthcare costs on net, by “fixing” genetic defects that cause disease or disorders
  - Reducing Greenhouse gas emissions by reducing the number of miles driven or flown
  - Improving the safety and efficacy of nuclear power
  - Continuing to be a counterweight to inflationary pressure

# Industries that Could/Will Be Impacted

Tech  
Infrastructure



Semiconductors



Communications



Utilities



Energy



Health Care



Airlines



Airplane  
Manufacturers



Trains and other  
Transports



The image features a white background with two large, overlapping, wavy shapes. The shape on the left is a dark blue curve that tapers to a point on the right. The shape on the right is a green curve that starts from the point where the blue curve ends and extends to the right edge of the frame. The text 'Thank You' is centered between the two curves.

**Thank You**