SMU Steel Summit 2021

Electric Vehicle Outlook and the Role Steel Will Play

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American Iron and Steel Institute
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Steel Industry Collaboration

Increases the use of steel by developing innovative materials and applications by working with automotive customers.

Pre-competitive Collaborative Research & Development; Leveraging joint contributions and intellectual capital providing more value and quicker results.

Advances and communicates steel’s unique ability to meet the automotive industry’s needs and challenges in a sustainable and environmentally responsible way.

www.steel.org
www.autosteel.org
www.a-sp.org
The steel industry has a long history of partnering successfully with global automakers to develop highly optimized, cost-effective and mass-efficient solutions:
- Ultra-lightweight Steel Auto Body
- Future Steel Vehicle

Future Steel Vehicle results were rapidly and widely adopted by automakers as evident in 2015 vehicle model years.

ELECTRIFIED/FUTURE MOBILITY WILL BE NO EXCEPTION
EV Sales
EVs Are Coming – Short Term

BEV sales are outperforming total Light Vehicles

Global LV Sales
- Global LV sales % change H1 2021 from H1 2020: +21%
- Global BEV sales % change H1 2021 from H1 2020: +172%

US LV Sales
- US LV sales % change H1 2021 from H1 2020: +30%
- US BEV sales % change H1 2021 from H1 2020: +168%

Source: LMC Automotive
3.1 million EVs were sold in 2020, 4.7% of new passenger cars. EV sales will continue to rise, reaching 48% of passenger car sales by 2030.

*Excludes commercial vehicles
Source: Canalys estimates, January 2021
EVs Are Coming – Further Incentives

• Biden administration looking to create further demand
  o $7,000 per vehicle tax credit
  o Targeting 50% EVs by 2030

• Senate-passed infrastructure legislation, contains $7.5 billion for electric vehicle charging network

• Potential increase in fuel economy targets, pressures OEMs to make the switch to electric vehicles
Many EV players:

- Tesla
- Lucid
- Nio
- Canoo
- Rivian
- and more...
EV Offerings

Electric-Car Boom
Models by style and range available through 2020

SUVs
- Land Rover Defender
- Toyota RAV4
- BMW iX
- Audi Q8
- Mercedes-Benz EQC
- Jeep Wrangler
- Rivian R1T

Sports cars
- Ferrari 812 Superfast
- Lamborghini Huracan
- Porsche 718 Boxster
- McLaren 720S
- Lexus LC 500

Sedans
- Tesla Model S
- Audi A6
- Mercedes-Benz S-Class
- BMW 7 Series
- Volvo S90

Hatchbacks
- Toyota Prius
- Honda Civic
- Nissan Leaf
- Chevrolet Bolt
- Hyundai Ioniq

Runabouts
- Smart Fortwo
- Renault Twizy
- BMW i3
- Mercedes-Benz Smart EQ fortwo

Small vans
- Ford Transit
- Mercedes-Benz Sprinter
- Fiat Ducato
- Toyota Proace
- Volkswagen Caddy

Miles of electric range
0 50 100 150 200 250 300 350

Bloomberg
New Energy Finance

2020
EV Affordability

U.S. medium segment vehicle price estimates

Source: Bloomberg New Energy Finance
Steel’s Role
Architectural Impact - Battery Enclosure/Protection

Source: automotive.arcelormittal.com
Today’s Expanding Steel Portfolio Will Help

CONTINUOUSLY EXPANDING STEEL GRADE INNOVATIONS

<table>
<thead>
<tr>
<th>STEEL GRADES</th>
<th>Yield Strength (Y) (MPa)</th>
<th>Tensile Strength (T) (MPa)</th>
<th>Total Elongation (%)</th>
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- Yield Strength (Y) (MPa) range from 100 to 1400
- Tensile Strength (T) (MPa) range from 100 to 1700
- Total Elongation (%) range from 0 to 50
Steel Sustainability Advantage

Total CO₂ Emissions Intensity - Seven Largest Steel Producing Countries (2016)

SUSTAINABILITY OF THE AMERICAN STEEL INDUSTRY
Steel’s attributes, including its inherent durability and recyclability, make it vital to modern society. The American steel industry is committed to manufacturing innovative products and implementing processes that achieve environmental, social and economic sustainability. The American steel industry is the cleanest and most energy-efficient of the seven largest steel producing countries in the world.1

VITAL TO THE U.S. ECONOMY
The American iron and steel industry is a dynamic part of the U.S. economy, accounting for more than $520 billion in economic output and nearly two million jobs.2 These workers earned more than $120 billion in wages and benefits, and the industry generated $66 billion in federal, state and local taxes.
What is the Threat?
North American LV Material Content Share

2022 Expected Material Share of Curb Weight (3,820 lbs)

- Steel: 52%
- Aluminum: 12%
- Other Metals: 8%
- Conventional SMC/Fiberglass: <1%
- Glass: <1%
- Iron: 9%
- Magnesium: 4%
- Polymers: 2%
- CFRP SCM >1.25G: 12%
- Other Materials, Rubber, Fluids, Etc.: <1%
Automotive Aluminum Sheet Material Offerings

• 5000 Series (typical AA5022)
  ➢ Mainly exterior panels/closures
    (Largest growth)
  ➢ Tempered to T4 or T6

• 6000 Series (typical AA6016)
  ➢ Structural panels

• 7000 Series (typical AA7075)
  ➢ High-Strength Structural panels
Supporting Value Chain with Forward Looking Innovation

- EV Battery Packaging
- B-Pillarless Design
- Efficient Lightweighting

COST IS KING IN AUTOMOTIVE

Image: WSJ.com
Thank You / For More Information

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