Automotive Market Outlook

December 2019

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Automotive Advisory
Leveraging Analysis, Relationships and Insight Into Unique Engagements

Market Sizing

Will Thailand be the new China?
"Will there be a market for low cost LIDARs in North America?"

Market Intelligence

"My sales department told me we have 80% market share on OEM X but I’m missing 200,000 units on this account."

Portfolio Management

"How can I benefit from the emergence of the connected car and new mobility trends?"

"How is the fuel mix changing in Europe after the VW affair? Does it make sense to invest in SCR systems?"

Competitor Benchmark

"I have a vague idea of my competitor’s production network, I have enough problems looking after my own."

Resource Allocation

"In which regions will I need to hire application engineers to best serve my clients? How does that impact my supply chain capacity?"

Unparalleled combination of industry-leading SMEs, ongoing forecasts and analysis integrated into critical client engagement. Structured to drive actionable insight amidst our shifting automotive environment.
Agenda

• **Five Key Forces**
  • *Global Market Dynamics*
  • *North American Outlook*
  • *Impact on Suppliers*
An Industry of Many Vectors

There are Known … Knowns
- Segment mix and OEM customer mix requires new approaches and engagement dynamics
- The pace of new engine and transmission design has declined precipitously
- New players will enter both the OEM and supplier ecosphere – altering the landscape

There are Known … Unknowns
- Electrified propulsion will increase in all regions – There is uncertainty as to how it will exactly play out
- The industry value equation will alter as secular forces (EV and AV) further penetrate – new pools will emerge
- Virtually every OEM is envisioning how to be efficiently competitive in an ACES environment – Not all will win

There are Unknown … Unknowns
- Extraneous events which were never contemplated will impact our industry
- As we progress down the ACES path, new partnerships/affiliations not anticipated will emerge
- New technologies and innovations will steer the course of our industry

Every enterprise will need to focus on new revenue streams, mitigating risk and engaging in new partnerships

5 Forces
- Impact of China
- Electrification
- ADAS
- New vs. Old Co.
- Value Shift
1. Growing Influence of China

Beyond Volume, Technology w/Scale
Sales market will grow \( \frac{1}{2} \times \) to \( 2 \times \) the US in 18 yrs

China is no longer a production outpost

Dependency on China volume also dictates global propulsion and platform strategies

Share of Global Output Based in China

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<th>OEM</th>
<th>Share</th>
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<tr>
<td>VW Group</td>
<td>40%</td>
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<td>GM</td>
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<td>Honda</td>
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<td>R-N-M</td>
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<td>Hyundai</td>
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<td>Ford</td>
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<td>Toyota</td>
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<td>PSA</td>
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<td>FCA</td>
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US-China Sales

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<tr>
<td>2007</td>
<td>( \frac{1}{2} \times )</td>
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<tr>
<td>2009</td>
<td>1x</td>
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<td>2025</td>
<td>2x</td>
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Share of Western OEM production from a global platform

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<th>Year</th>
<th>Share</th>
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<tr>
<td>2010</td>
<td>65%</td>
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<tr>
<td>2025</td>
<td>90%</td>
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Increasing propulsion electrification has implications across other major systems—From a technology spectrum perspective—ultimately the elimination of the ICE from the vehicle.
2. Global Propulsion Design Islands

2030 Snapshot, and one region is truly alone

Europe:
- 46% ICE
- 21% PHEV
- 10% MHEV
- 9% FHEV
- 4% BEV

China:
- 41% ICE
- 22% PHEV
- 9% MHEV
- 4% FHEV
- 3% BEV

Japan/South Korea:
- 39% ICE
- 21% PHEV
- 12% MHEV
- 8% FHEV
- 7% BEV

North America:
- 65% ICE
- 10% PHEV
- 9% MHEV
- 7% FHEV
- 6% BEV

Source: IHS Markit

IHS Markit October 2019 Production Powertrain forecast
© 2019 IHS Markit

Europe, China and Japan/Korea Extend into Electrification
Global Engine Launches
Decline in New Engine Families post 2020

Moderates, minors and ‘top-end’ technology inclusions continue

Importance of Electrified Propulsion to Suppliers

- Engines still in production with new technologies and improvements continuing. Transmissions following the same fate.
- Ability for resourcing of major components may wait until required by technology shifts – procurement and engineering are refocused.
- Traditional suppliers in the powertrain space will find it difficult to alter their trajectory without critical new technologies or shifting course.
3. Evolution of Automation by SAE Levels

North America Autonomous Technology outlook

Competition in adoption of Level 2 and 3 will be the critical battleground.
4. New co. versus old co.

Substantial capital and resource diversion emerges

- Investment in electrification, shared mobility, and autonomous driving enables the formation of new entities and business models, such as:
  - Reduced reliance on fixed assets
  - Ease of integration of partnerships and alliances
  - Differing valuation structures (read ‘the street’) and capital/resource deployment
  - New channel strategies and technology cadence

- More traditional automotive entities evolve:
  - Under continued pressure to improve efficiency and cost containment
  - Capital allocation under intense scrutiny due to timelines and alternatives
  - Potential separation of skill sets and talent attraction

Emergence of new co. impacts suppliers

- Capital, resources, and attention slowly shift toward new business models.
- In the continued battle to drive value and differentiation, innovation takes center stage.
- Transition will be difficult for many and impossible for others.
5. Secular Forces – Significantly Impacting the Vehicle/Supplier Ecosystem

- **Conventional**: Some conventional platforms can implement batteries, but cannot change the overall architecture to form a battery driven vehicle assembly.

- **Multi-Energy**: Initially designed to support both BEV and conventional powertrain vehicles. Structure is more flexible than conventional platform.

- **Battery Electric**: Platform is designed only for pure BEV applications. Skateboard style architecture allows for more battery capacity and more interior space with the same vehicle size.
Industry Dynamics - Summary

• Market complexity has increased exponentially within the expanding automotive ecosystem. Changing dynamics driven by electrification, autonomy and ‘new mobility’ creates new opportunities and challenges.

• China’s impact cannot be underestimated – regulatory, scale, pace of adoption and emergence of new players on the global scene.

• OEMs are busy reinventing themselves to be more flexible, less capital reliant, partnership/affiliation-focused and reevaluating the value characteristics within the organization.

• Platforms and architectures being designed today are dual-mode – offering challenges in packaging, efficiency, customer delight and cost with a view on reducing stranded capital.

• Pace of both EV and AV adoption will vary by region though economies of scale and a global marketplace will even the playing field over time.

**Suppliers will continue to struggle with the ‘Bridge’ – Adoption & profitability of EV and AV technologies juxtaposed to the leading R&D required.**
Agenda

- Five Key Forces
- Global Market Dynamics
- North American Outlook
- Impact on Suppliers
Economic growth is slowing in advanced countries and emerging markets

Real GDP

Source: IHS Markit

© 2019 IHS Markit
Deficits Problematic, Oil Long-term Stable

- Softening global demand growth is restraining commodity prices.
- With core inflation calm and downside risks prevailing, near-term monetary policies will be accommodative.
- The US dollar will appreciate moderately in the near term, based on favorable rates of return and risk aversion.
- Downside risks include an escalation in the US-China war, new trade conflicts, hostilities in the Middle East, a hard Brexit, and rising debt levels.
- Relatively low interest rates and sizable fiscal deficits in many countries leave little scope for policy stimulus in the next recession.
- Commodities in general are moderating as global demand moderates.
Global Sales Moderates Through Still Rises

Global sales walk 2018 to 2030

- **North America**: Sales will be flat through 2030.
- **Japan/Korea**: -1.1%.
- **Europe**: -0.1%.
- **South America**: 3.4%.
- **Middle East/Africa**: 3.7%.
- **Greater China**: 1.8%.
- **Greater China** sales: 4.82 Mn in 2018, 6.57 Mn in 2030.
- **South America** sales: 2.08 Mn in 2018, 1.93 Mn in 2030.
- **Europe** sales: 2.9%.
- **Europe** sales: 1.91 Mn in 2018, 1.90 Mn in 2030.
- **Japan/Korea** sales: -0.90 Mn.
- **North America** sales: -0.33 Mn.
- **Global sales**: +1.3% CAGR from 2018 to 2030, with a global sales of 109.76 Mn in 2030.

Source: IHS Markit
Global LV Production Outlook
80%+ of Total Growth from Emerging Asia/China – 2019 Volume Reset

Production is increasingly co-locating to in-region sourcing

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<td>Europe</td>
<td>22.0 M</td>
<td>21.2 M</td>
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<td>21.9 M</td>
<td>22.5 M</td>
<td>23.1 M</td>
<td>5%</td>
<td>-0.6%</td>
<td>0.7%</td>
<td>• Tier 3 &amp; 4 city growth</td>
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<td>Greater China</td>
<td>26.9 M</td>
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<td>25.8 M</td>
<td>27.3 M</td>
<td>31.9 M</td>
<td>34.2 M</td>
<td>53%</td>
<td>-1.3%</td>
<td>2.9%</td>
<td>• Lack of NEV success &amp; Trade</td>
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<td>13.2 M</td>
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<td>12.8 M</td>
<td>12.7 M</td>
<td>-5%</td>
<td>-1.6%</td>
<td>0.3%</td>
<td>• Slow domestic markets, production co-location</td>
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<td>Middle East/Africa</td>
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<td>1.9 M</td>
<td>1.9 M</td>
<td>2.1 M</td>
<td>2.3 M</td>
<td>2.9 M</td>
<td>2.9 M</td>
<td>3%</td>
<td>-6.0%</td>
<td>2.9%</td>
<td>• Focus of more attention by OEMs</td>
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<td>16.3 M</td>
<td>16.5 M</td>
<td>16.6 M</td>
<td>16.7 M</td>
<td>17.2 M</td>
<td>17.3 M</td>
<td>3%</td>
<td>-0.7%</td>
<td>0.5%</td>
<td>• New capacity (Mex), D3 re-alignment</td>
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<td>3.4 M</td>
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<td>3.4 M</td>
<td>3.8 M</td>
<td>3.9 M</td>
<td>4.5 M</td>
<td>5.2 M</td>
<td>11%</td>
<td>3.0%</td>
<td>3.7%</td>
<td>• Well below 2013 record of 4.5 mil</td>
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<td>8.5 M</td>
<td>9.2 M</td>
<td>9.8 M</td>
<td>12.0 M</td>
<td>14.3 M</td>
<td>30%</td>
<td>0.2%</td>
<td>4.9%</td>
<td>• India domestic &amp; export weakness, ASEAN rise</td>
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<td>Grand Total</td>
<td>94.2 M</td>
<td>88.8 M</td>
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<td>100%</td>
<td>-0.9%</td>
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Source: IHS Markit Light Vehicle Production Forecast
Top OEM **Cooperative Groups** by Production Volume 2026

OEM Partnerships Enable Greater Scale, Risk Reduction and Cost Savings

- **Toyota** maintains strong Domestic OEM partnerships
- **VW & Ford** align: EU scale & AV
- **Audi and SIAC** Renew their JV
- **R-N-M alignment** redefines
- **FCA & PSA** drive scale
- **Honda & GM** partnership in AV & Fuel Cells
- **Ford & VW** partnership in AV & EV
- **BMW & JLR** partnership in E-Motor Technology
- **Tata (JLR)** seeking partners to increase scale

Global Production Volume
Agenda

• Five Key Forces
• Global Market Dynamics
• North American Outlook
• Impact on Suppliers
US Light Vehicle Sales
Reaching a saturation point

US light vehicle sales

Economic issues

- US consumer outlook to remain broadly supportive
- Sales mix increasingly attractive, but riskier and more competitive
- Pressure on OEMs to manage plateau
- Opportunities to find right customer based on vehicle age and scrappage
- Launches to accelerate, mix increasingly attractive
- Vehicle development costs rising
  - Regulatory compliance
  - Consumer contenting
- Market attractive from consumer perspective, risk shifting to lenders
North American Light Vehicle Production Outlook
Capacity Expansion Enables Modest Growth

North America Light Vehicle Production

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<th>Years</th>
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<td>2025</td>
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Growth Next Decade Focused on New Players

- OEMs find balance amid rising costs and increased competition
  - Incentives
  - Fleet
  - Inventory
  - Portfolio mix shifts
- Growth due to localization and portfolio expansion
  - Exports support production growth
- GM labor stoppage shifts ~150k of volume to 2020
NA LV Production Outlook

German 3 and “Others” Rise

North American LV Production

Production Share by OEM Type

Source: IHS Markit

© 2019 IHS Markit
North America Production Volume by Segment
The Gap Between SUV and Sedans Widen

North American Production – Volume by Segment

Source: IHS Markit
© 2019 IHS Markit
### Production Outlook: North America – NA Regional Shift

**Segment & OEM Shifts Pressure Logistics and Supply Structures**

- **Midwest/Ontario**
  - Mix towards D/E-segment and Full Frame
  - Detroit 3 still account for +60% of MW/ONT volume by 2027

- **Southeast**
  - Remarkable stability – newer facilities w/ export focus
  - Higher concentration on C & D-segment CUVs

- **Mexico**
  - Mid-Mexico has recently accounted for ~70% of Mex volume
  - Rise of B & C-segment products with increasing luxury focus for export

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#### Midwest/Ontario

<table>
<thead>
<tr>
<th>Year</th>
<th>Prod Vol</th>
<th>Mil</th>
<th>A4</th>
<th>D3</th>
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- **D3 Output off 26%**

#### Southeast

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<tr>
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#### Mexico

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- **Remarkable stability**
  - Newer facilities w/ export focus

- **Higher concentration on C & D-segment CUVs**
Electrification Trends – North America and Europe

- In NA, Stop-Start will provide most of the relief from emissions regulations over the forecast horizon

- MHEV is the leading electrification method, though production of alt. propulsion types will be low overall

- EU was an early adopter of S/S, and forecast toward MHEV as the dominant propulsion strategy

- Pure EVs are expected to achieve ~10% production share by 2024, besting Full- and Plug-In-Hybrids
Agenda

• Five Key Forces
• Global Market Dynamics
• North American Outlook
• Impact on Suppliers
The New Cadence – Faster, Integrated and Global

- **Build Process Change / All-New Architecture**
  - Integrate new build processes due to platform consolidation, increased flexibility and need to integrate new materials.

- **All-New/Major Platform, Powertrain Packaging**
  - All-new dimensions, locations points, powertrain packaging/fitments & suspension/chassis structures.

- **Moderate Revision/ Mid-cycle Enhancement**
  - New interior/exterior styling, add bodystyles, significant trim levels and new/major powertrains changes.

- **Exterior Modifications & Electronic Changes**
  - Exterior lighting, front/rear fascia trim, interior electronic content, software revisions, incremental electronic content.

**Scale & Global Platforms**
- Staying aligned to drive multi-region scale is key.

**Driven by Content**
- Integration of electronic content, emissions compliance and global platforms drive a new dynamic.

**Feeling The Pressure**
- Tier 1 & 2 require faster, more integrated development processes, tooling coordination and upstream supplier coordination.
Capital and Resource Decisions
Lead, Fast Follower or Sceptic? Make a decision ....

Continue to refine traditional technologies, wait for capacity to evacuate & define a path?

Determine the risk tolerance within the organization to lead technology & development into new, unproven areas?
Industry Forecast - Summary

• Shift of players (OEMs), platforms and structures are altering market opportunities.

• Growth of Mexico has moderated significantly – driven mainly by trade and political threats.

• BEV growth is driven by compliance and the need to drive technology leadership – not profitability.

• Global OEMs are shifting focus from new engines and transmissions to top end modifications, incremental technology (with major capital) and a base development of the electrified propulsion portfolio.

• Number of opportunities is declining though content integration will rise significantly – propulsion, safety and ADAS.
Thank You

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