Light Vehicle Outlook: *Industry at a Crossroads*

For Foley-Lardner

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Michael Robinet
Executive Director, Automotive Advisory
Automotive Advisory

Leveraging Analysis 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 50% 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 SCA systems?"

Competitor Benchmark

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

Customer Targeting

"It is difficult to prioritize RFQs based on OEMs sourcing strategy. We end up dedicating an equal amount of resources to each RFQ, we’re always busy."

Risk Assessment & Mitigation

Should I invest in new models based on these prioritized RFQs? What is the ROI?

"We are not sure whether we should open a new plant in China, the market seems rather volatile right now. What could be my analysis?"

Resource Allocation

"In which regions will I need to hire application engineers to best serve my customer’s needs? Can I reduce our risk of running low on 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.
Automotive M & A – Access to a Breadth of Unique Capabilities

**Speed, Expertise and Insight**

**Competitive Structure, Capacity and Value Analysis**
- What is the sector competitive landscape and capacity – regional/global?
- Value analysis – what drives sustained profitability? Scale, technology, system integration?
- Are there key alignments driving differentiation and advantages?

**System Evolution Analysis**
- How will the expected journey of specific systems alter over time?
- What are the sector impacts and timelines of the growth of electrification and autonomous technologies? Are there tangential competitors or alignments (J/Vs and acquisitions) shifting the value equation?

**Revenue Forecasting and Opportunity Targeting**
- What is the detailed revenue forecast utilizing the world’s most recognized industry forecast source?
- What is the pipeline and customer/product mix versus competitors in the same sector?

**CIM Buildout & TAM – Total Addressable Market Analysis**
- What is the total addressable market for a developing technology? Are there competing technologies given select triggers and market forces?
- How do the future market dynamics shape the prospects for a supplier?

How does the Investment Community engage with IHS Markit Automotive?
- Industry-leading experts in all major facets of automotive analysis
- A collection of real-time detailed global forecasts and databases enables a head start for any engagement
- Access to a network of decision-makers throughout the automotive value chain to drive insight
Agenda

• Global & NA Market Overview
• Supplier Strategy
Economic growth is slowing in advanced countries and emerging markets

Emerging markets regain growth mode into the next decade

Source: IHS Markit  © 2020 IHS Markit
• Softening global demand growth is restraining commodity prices. Oil supply will stabilize long-term pricing.

• 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 the US-China war, new trade conflicts, Middle East hostilities, a hard Brexit, and rising debt levels.

• Relatively low interest rates and sizable fiscal deficits in many countries leave little room for policy stimulus in the next recession.

Oil prices will not drive technology change – legislation and consumers will.
North America sales will be flat through 2030

Global Sales Moderates Through Still Rises

Global sales walk 2018 to 2030

- Greater China: 6.34 Mn, +1.7%
- South Asia: 4.30 Mn, +3.3%
- Middle East/Africa: 1.93 Mn, +3.2%
- South America: 1.60 Mn, +2.9%
- Europe: 1.93 Mn, +0.6%
- North America: -0.33 Mn, -0.1%
- Japan/Korea: -0.86 Mn, -1.1%
- Global: 108.9 Mn, +1.2% CAGR

Source: IHS Markit

China growth amid shifting players

© 2020 IHS Markit
Global LV Production Outlook
80%+ of Total Growth from Emerging Asia/China – 2019 Volume Reset

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</thead>
<tbody>
<tr>
<td>Europe</td>
<td>21.0 M</td>
<td>20.7 M</td>
<td>21.3 M</td>
<td>21.6 M</td>
<td>21.9 M</td>
<td>22.0 M</td>
<td>11%</td>
<td>0.7%</td>
<td>0.7%</td>
<td></td>
<td>• Tier 3 &amp; 4 city growth</td>
</tr>
<tr>
<td>Greater China</td>
<td>24.6 M</td>
<td>24.5 M</td>
<td>25.6 M</td>
<td>26.8 M</td>
<td>28.1 M</td>
<td>29.4 M</td>
<td>30.5 M</td>
<td>48%</td>
<td>2.1%</td>
<td>2.6%</td>
<td>• Lack of NEV success &amp; Trade</td>
</tr>
<tr>
<td>Japan/Korea</td>
<td>13.1 M</td>
<td>12.9 M</td>
<td>12.6 M</td>
<td>12.5 M</td>
<td>12.8 M</td>
<td>12.8 M</td>
<td>12.9 M</td>
<td>-2%</td>
<td>-1.2%</td>
<td>0.0%</td>
<td>• Slow domestic markets, production co-location</td>
</tr>
<tr>
<td>Middle East/Africa</td>
<td>2.0 M</td>
<td>1.9 M</td>
<td>2.1 M</td>
<td>2.3 M</td>
<td>2.5 M</td>
<td>2.7 M</td>
<td>2.8 M</td>
<td>5%</td>
<td>3.5%</td>
<td>1.7%</td>
<td>• Focus of more attention by OEMs</td>
</tr>
<tr>
<td>North America</td>
<td>16.3 M</td>
<td>16.7 M</td>
<td>16.5 M</td>
<td>16.7 M</td>
<td>16.8 M</td>
<td>16.9 M</td>
<td>17.0 M</td>
<td>7%</td>
<td>0.6%</td>
<td>0.3%</td>
<td>• New capacity (Mex), D3 re-alignment</td>
</tr>
<tr>
<td>South America</td>
<td>3.3 M</td>
<td>3.4 M</td>
<td>3.8 M</td>
<td>3.8 M</td>
<td>4.0 M</td>
<td>4.1 M</td>
<td>4.3 M</td>
<td>9%</td>
<td>3.6%</td>
<td>3.7%</td>
<td>• Well below 2013 record of 4.5 mil</td>
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<tr>
<td>South Asia</td>
<td>8.4 M</td>
<td>8.4 M</td>
<td>9.0 M</td>
<td>9.5 M</td>
<td>10.0 M</td>
<td>10.4 M</td>
<td>10.9 M</td>
<td>22%</td>
<td>3.0%</td>
<td>4.6%</td>
<td>• India domestic &amp; export weakness, ASEAN rise</td>
</tr>
<tr>
<td>Grand Total</td>
<td>88.8 M</td>
<td>88.6 M</td>
<td>90.9 M</td>
<td>93.1 M</td>
<td>96.1 M</td>
<td>98.3 M</td>
<td>100.2 M</td>
<td>+15.7 M</td>
<td>1.2%</td>
<td>1.7%</td>
<td></td>
</tr>
</tbody>
</table>

Source: IHS Markit Light Vehicle Production Forecast

Production is increasingly co-locating to in-region sourcing

Volume Play: China & SEA
Technology Play: EU & China
Challenging conditions persist into 2020 but backloaded recovery possible as legislative hurdles ease and trade environment stabilizes

Global production walk 2020

<table>
<thead>
<tr>
<th>Country</th>
<th>2019 Production</th>
<th>2020 Forecast</th>
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<tbody>
<tr>
<td>United States</td>
<td>+4.2%</td>
<td>+0.7%</td>
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<tr>
<td>Canada</td>
<td>-12.9%</td>
<td>-1.2%</td>
</tr>
<tr>
<td>EU-28</td>
<td>-3.8%</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>-0.2%</td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td>-0.2%</td>
</tr>
<tr>
<td>S. Korea</td>
<td></td>
<td>-0.2%</td>
</tr>
<tr>
<td>China</td>
<td>-0.9%</td>
<td>-0.9%</td>
</tr>
<tr>
<td>India</td>
<td>-4.1%</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>+3.8%</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>-3.7%</td>
<td></td>
</tr>
<tr>
<td>ASEAN</td>
<td>+2.9%</td>
<td></td>
</tr>
<tr>
<td>RoW</td>
<td>-0.8%</td>
<td></td>
</tr>
</tbody>
</table>

Global: -0.5%

Source: IHS Markit
Top OEM Cooperative Groups by Production Volume 2026
OEM Partnerships Enable Greater Scale, Risk Reduction and Cost Savings

Global Production Volume

- Toyota maintains strong Domestic OEM partnerships
- VW & Ford: EU scale & AV Audi & SIAC renew JV
- R-N-M alignment redefines
- FCA & PSA drive scale
- Honda & GM expand alignment
- Honda & GM partnership in AV & Fuel Cells
- Ford & VW partnership in AV & EV
- Geely & Volvo consolidate engines
- Minicar JV w/Geely Moving closer w/BMW & away from Nissan
- BMW & JLR e-motor JV Better relations w/Daimler
- Tata (JLR) urgently seeking partners

Shift to EV and AV drives OEMs to moderate risk and shift capital
Europe, China and Japan/Korea Extend into Electrification – NA follows behind

Global Propulsion Design Islands

2030 Snapshot, and one region is truly alone

Europe and China will be the global leaders for electrification beyond mild (MHEV).

Europe and China Extend into Electrification – NA follows behind

Global Propulsion Design Islands

2030 Snapshot, and one region is truly alone

Europe and China will be the global leaders for electrification beyond mild (MHEV).
Electrification portfolio – From Mild Hybrid P0 12V to BEV High performance

Incremental cost vs. standard ICE
- From 5 to 15%
- From 15% to 20%
- +70%
- +100%

CO2 benefit vs. ICE
- From 5 to 15%
- From 15% to 20%
Global Engine Launches
Decline in New Engine Families post 2020

Importance of Electrified Propulsion to Suppliers

- Engines still in production with new technologies and improvements continuing. Transmissions following the same fate.
- Traditional cadence eliminated – procurement and engineering are refocused.
- Suppliers in the powertrain space will find it difficult to alter their trajectory without critical new technologies or shifting course.
North America Autonomous Sales Forecast

North America Autonomous Technology outlook

NA has higher penetration for Autonomous technology compared with global figures
Global Program Launch – By Region

2019 was a peak year for new vehicle program launches
Eventually, portfolio reductions may follow…
Strong US Economic Buffeted by Rising Costs

Despite Sustained GDP Growth – Deficits Rise

- GDP growth is moderating and under pressure – driven by political and trade uncertainty.
- Positives still drive the base case – job growth/stability, credit availability and consumer confidence.

Pressure on Auto PPI is Moderating

- Longer-term - talent pools, deficits higher interest rates. Erratic exchange rates drives need for neutrality.
US Light Vehicle Sales
Reaching a saturation point

Economic Issues

- 2019 sales off 1.6% - 2020 off another 1.9% (Base case)
- US consumer outlook remains broadly supportive
- Pessimistic case has a 35% likelihood
- Used vehicles/ off-lease start to impact
- Increased competition where launch performance
- Vehicle development costs rising:
  - Regulatory compliance
  - Consumer contenting
  - Pressure on traditional systems

Downside case still a real possibility
North American Light Vehicle Production Outlook
Declines Ahead Before Growth Returns

New Decade Growth Focused on Emerging Players

- Increased competition underscores selective underperformance:
  - Incentives rise
  - Fleet supports volume
  - Segment, content and OEM shifts

- Impact of Extraneous Events

- Growth due to localization and portfolio expansion into CUVs
  - Export growth muted though used to justify investments

- S/CUVs approach 50% share of production by 2021.

Source: IHS Markit
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Production Outlook: Europe – Light Vehicle
Recovery quickly gives way to saturation

- Trends
  - Uncertainty within EU about further destabilization – Hard Brexit and slow growth
  - Maintaining exports become crucial to support overall growth
  - Significant vehicle sales collapse in Turkey – directly impacts EU prod
  - Currency neutrality and focusing more resources on BEVs for the EU will pressure volumes

- Long-term
  - Localization will remain a competing trend to exports; Shift of volume to Middle East and Central/Eastern Europe - expansion

EU OEMs need to shift capital quickly – pressures on ICE offer opportunity for supplier re-sourcing
Production Outlook: China – Light Vehicle

- **Trends**
  - Top 5 OEMs declined as a group by 15% last year – next five – only 10%.
  - New OEMs continue to emerge though patience and capital will be in short supply.

- **Long-term**
  - The number of domestic OEMs is likely to decrease as winners emerge and scale rises in importance.
  - Long-term growth opportunities remain strong – A significant opportunity for vehicle sales growth exists in still “untouched” regions within China.

![China LV Production Graph](image)

- Outlook will shift with Coronavirus Impact
  - 2026 Production Share
    - VW: 10%
    - GM: 5%
    - Geely: 0%
    - R/N: 1%
    - Toyota: 1%

- Segment Breakdown
  - VW: 28%
  - GM: 19%
  - Geely: 12%
  - R/N: 6%
  - Toyota: 5%
  - FF Combined: 28%
Agenda

• Global & NA Market Overview
• Supplier Strategy
Navigating the Shifting Landscape – **Strategy Formation is Critical**

- Trade Dynamics & Currency Neutrality
- Capital Availability & Risk Tolerance
- Reacting to Extraneous Events
- Erratic Launch Volume
- Shifting Channel Strategy & Relationships
- Talent Gaps & Organization Transformation
- Structural Change EV & AV

**Suppliers at a Crossroads**
Navigating the Shifting Landscape – Seeking Sustainable Differentiation

**Mega Tier 1s:**
- Multiple System Capability & Global
- Multiple systems, global capability – focused on next generation differentiation

**Midsize T1 & 2:**
- Super-regional or Solo multi-region
- Limited system capability, major region coverage or significant regional player

**Small & Start-up:**
- Specialty Players
- Specialists - Closely-tied to a specific capability – with limited capital risk

**Seeking consolidation opportunities …**
- Expanding capabilities into EV and AV
- Strengthening ‘systems’ capability in key sectors
- Exerting leverage & global capability

**Searching for optimal channel strategy as markets evolve …**
- Lack multi-system leverage and true global capability
- Possible strategic lethargy – difficult to pivot
- Seeking sustainable differentiation and channel strategies

**Able to pivot quickly …**
- Lack of inertia – can shift to new sectors/capabilities
- Ability to assume higher risk profiles
- Multiple channels strategies are possible
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.
System evolution drives consolidation & new channels

<table>
<thead>
<tr>
<th>Driveline</th>
<th>Electrical</th>
<th>BIW</th>
<th>ADAS</th>
<th>Braking</th>
<th>Thermal</th>
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<tbody>
<tr>
<td>Today</td>
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<td></td>
<td>2030</td>
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</tbody>
</table>

1. **Driveline**
   > Lightweight and compact e-axles improve packaging, efficiency, and price of hybrid/electric vehicles.

2. **Electrical**
   > 48-Volt will enable key changes to overall vehicle design, enhancing electrical capabilities to support other systems.

3. **Body-in-White**
   > Further breakthroughs in lightweighting will coincide with improvements in packaging.

4. **ADAS**
   > Practicality of autonomy increases as OEMs breach the L4/L5 threshold.

5. **Braking**
   > ADAS enabler with lightweighting & packaging benefits.

6. **Thermal**
   > Loss of ICE → new sources required, thermal management revision.
7. Exhaust
   > Near-term improvements reduce part count, EVs to force obsolescence.

8. Steering
   > ADAS enabler with lightweight and packaging benefits.

9. NVH
   > Focus shifts. EV powertrains make other system noises stand out in comparison.

10. Suspension
    > Autonomy increases focus on comfort/stability, adaptive suspension required to remedy unsprung mass

11. Wheel & Tire
    > Shifts in wheel/tire market result. Less emphasis on consumer desires.

12. Fuel System
    > Efficiency will reduce size of, or eliminate need for, fuel storage.

13. Seating
    > L4/L5 ease requirements for major safety measures and forward seating.
Capital and Resource Decisions

Lead, Fast Follower or Sceptic? Make a decision …..

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

Determine the risk tolerance within the organization to lead technology & development into new, unproven and patient-capital areas?
Summary

- Shift of players (OEMs), platforms and structures are altering market opportunities, value chains and risk.
- BEV growth is driven by compliance and the need to drive technology leadership – not profitability.
- Global OEMs are shifting focus from new powertrains to top end modifications/packaging, incremental capital-driven technology (batteries, e-systems), autonomy alliances and reducing the ICE infrastructure.
- Number of launch opportunities is declining though content integration rises – propulsion, safety and ADAS.

Consolidation of OEMs and Suppliers will accelerate
Thank You

Michael Robinet
Executive Director, IHS Markit Automotive Advisory Services
michael.robinet@ihsmarkit.com