2016-2017 Powertrain Strategies for the 21st Century Survey

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The Powertrain Strategies for the 21st Century Survey (PTS21)

• A survey of powertrain experts from automotive manufacturers, suppliers, government, NGOs, academia, and consulting

• Asks for their predictions for 2020 and 2025.

• Follows our similar surveys from 2006, 2007, 2012, and 2015
Survey Demographics

Organizations: Total Number of Respondents= 56
  Vehicle Manufacturer: 21%
  Parts/Service Supplier: 54%
  Other: 25%
    (Other Includes: Academic Research, Government, NGOs, and Consultants)

Titles:
  CEO, President, VP: 19%
  Chief engineer, Chief technology officer/Director: 19%
  Manager: 32%
  Engineers, Technicians: 19%
  Researchers, Scientists: 11%
Analysis Key for Previous Survey Comparisons

Results with this blue background are from the 2016-2017 PTS21 Survey

Results with this red background are from the 2014-2015 PTS21 Survey

Results with this yellow background are from the 2012 PTS21 Survey
Key Findings from the PTS21 2016-2017 Survey
Powerplants
In 2012, Experts predicted, spark-ignited powerplants are predicted to drop to slightly less than 50 percent for passenger cars while hybrids and advanced diesels increase their share.

Hybrids (2025)
- Full: 9%
- Plug in: 6%
- Mild: 10%
- Diesel: 3%

Growth, but low penetration
In 2015, experts expect growth in all areas except spark-ignited powertrains for passenger vehicles.

- Spark-Ignited Engine: 53% (2025), 68% (2020)
- Hybrid:
  - Full: 8%
  - Plug in: 9%
  - Mild: 12%
  - Diesel: 2%
- Advanced Diesel: 9%
- Electric: 5%
- Extended Range: 3%
- Fuel Cell: 1%

Percent Penetration
Experts expect growth in the use of mild hybrid, full hybrid, and electric powertrains by 2025 for passenger cars.

- **Hybrids (2025)**
  - Full: 6%
  - Plug in: 7%
  - Mild: 13%
  - Diesel: .5%

Growth, but low penetration.
Powerplant Analysis: Passenger Cars

• Experts expect over 50 percent of all PCs sold in 2025 to have spark-ignited gas engines. This is higher than their predictions in 2012 and 2015.

• Experts expect higher penetration of mild hybrids and electrics compared to their predictions in 2012 and 2015.

• Experts expect lower penetration of diesels, diesel hybrids, full hybrids, and fuel cells compared to their predictions in 2012 and 2015.
In 2012, Experts predicted light trucks, increase their share of diesel and hybrid powerplants in 2025 at the expense of spark-ignited engines.

- **Spark-Ignited**: 74% in 2016, 52% in 2025
- **Advanced Diesel**: 26% in 2016, 17% in 2025
- **Hybrid**: 17% in 2016, 7% in 2025
- **Extended Range**: 2% in 2016, 2% in 2025
- **HCCI**: 1% in 2016, 0% in 2025
- **Electric**: 1% in 2016, 0% in 2025
- **Fuel Cell**: 0% in 2016, 0% in 2025

**Hybrids**
- Full: 5%
- Plug in: 2%
- Mild: 7%
- Diesel: 3%

Percent Penetration
In 2015, Experts expect growth in all areas except spark-ignited powertrains for light trucks
Experts expect an increase in the use of advanced diesel powertrains by 2025 for light trucks.
Experts predict more passenger cars than light trucks in the fleet in 2025.
Powerplant Analysis: Light Trucks

- Experts expect over 60 percent of all LTs sold in 2025 to have spark-ignited gas engines. This is higher than their predictions in 2012 and 2015.

- Experts expect higher penetration of electrics compared to their predictions in 2012 and 2015.

- Experts expect lower penetration of diesels and diesel hybrids compared to their predictions in 2012 and 2015.
Comments

• “Most engines will be mild gasoline hybrids. 48v system is a big enabler and this architecture delivers the biggest bang for the buck. At a fuel savings of ~$60/mo EVs will not be a major player, especially after 2022 when the grid needs to be included in the tailpipe numbers.”

• “I expect the Trump Administration to provide some regulatory relief between 2020 and 2025--esp. for Light Trucks. Electrification growth will be exclusively to meet ZEV mandate--but CA may be pressured to back off on ZEV mandate increases.”
CAFE Goals
Experts expect most manufacturers to utilize credits to reach their 2025 CAFE goals.

- Use Credits: 47%
- No Credits: 37%
- Will Not Reach Goal: 16%
• “There will be some manufacturers that will opt to pay fines rather than lose market share and sales, as well as those who aren’t able to meet norms on account of technology.”
Experts expect it to be difficult for manufacturers to reach their 2025 CAFE Goals
Comment

• “All the measures are available somewhere. Automotive Industry just needs to optimize the integration and production facilities (availability and cost reduction). Basically, the Automotive Industry has to react properly to the new regulations demands to avoid what is happening in Europe with Electrification/Hybridization.”
Based on the Mid-Term Assessment, experts mostly think the government will keep the current the 2022 to 2025 CAFE goals.
Comments

• “... the gov't will inflate the credit market my creating and selling GHG credits as needed. It the easiest way to provide relief while keeping the structure of the rule and the stated goals.”

• “The new EPA administrator may change these standards because he may think that returning to the past is more profitable, but the technology is already in motion that shows the real profit will be in new much more efficient and lower cost to manufacture products that depend on advanced battery and electronics. International competition will drive this and EPA may realize that retaining old products and concepts will be a loser strategy for this country.”
The top 10 technologies/strategies that experts think will have to be utilized in order to meet these goals are:

- Hybridization: 31%
- Weight Reduction: 19%
- Turbocharging: 15%
- Electrification: 11%
- Advanced Diesel: 7%
- ICE Improvement: 6%
- Usage of Credits: 4%
- Advanced Transmission: 4%
- Cylinder Deactivation: 2%
- Shared Fleets: 1%
When taking into account the strategies and technologies that will need to be deployed to reach the 2025 CAFE goals, experts expect the average cost per vehicle increase to be:

$2326
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