

OEMs brace for 'dogfight' to meet 2017-2025 CAFE

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Dan Kapp, Ford's advanced powertrain R&D boss, said don't expect all-new ICE architectures such as split-cycle and OPOC engines, to emerge as game-changers between now and 2025. (Image by Lindsay Brooke)

The new U.S. vehicle fuel efficiency regulations, and OEM strategies to meet them, dominated discussions at this year's Management Briefing Seminars, held August 1-4 in Traverse City, MI. Top engineers told two packed powertrain sessions on Tuesday that the CAFE (Corporate Average Fuel Economy) mandate to essentially double today's light-vehicle fleet average, to 54.5 mpg by 2025, has already escalated the technology battle among automakers and Tier 1s.

"It's a dogfight," said Charlie Klein, **General Motors'** Director of Global Mass, Energy, and Aerodynamics. "We bring out our best hardware and a year or two later someone else brings out theirs. We're going to continue to see that race going forward," Klein said.

He reminded the MBS audience that, for automakers, "none of the global regulations are harmonized, and all of them have different test cycles and requirements, creating an incredibly complex challenge for the industry."

Klein and Dan Kapp, **Ford's** Director of Powertrain Research and Advanced Engineering, said the technology solutions the industry will use to meet the 2016 standards will be mainly incremental improvements to gasoline ICEs and drivetrains, with a major focus on reducing mechanical losses.

But the second phase of CAFE, from 2017 to 2025, will require greater levels of vehicle electrification to deliver the significant year-to-year increases in fleet fuel efficiency called for. "The need to recover energy within the vehicle will be critical, for example," Klein said.

Ken Davis, President of **Eaton's** Americas Group, noted that half his company's engineering resources are now in the electrical/electronics space, and that he expects increased technology sharing among Eaton's passenger-vehicle and truck R&D teams to meet the higher fuel-economy rules.

Touring with Leaf a 'weinie roast'

Electric cars were humorously panned by panel moderator Sean McAlinden, Vice President and Chief Economist of the **Center for Automotive Research**, which hosts the annual conference.

In his introduction to the "Policy Matters and Technology" panel, McAlinden likened the initial crop of EVs to other recent "green" technologies such as the coil-like mercury-laden light bulbs that are mandated to replace incandescents in the U.S. "Their cost is two to five times more than incumbent technologies but they work half as well," he said.

He cited the limited range of **Nissan's** 2011 Leaf EV. "If I had driven a Leaf up to this conference on Sunday [a 300-mile drive from CAR headquarters in Ann Arbor], I would have just arrived here an hour ago," McAlinden quipped. "I would have spent two full nights roasting weinies in a state park attempting to charge this puppy every 75 miles."

McAlinden said he personally sees the 54.5-mpg CAFE deal as "political engineering" by the Obama administration to do something about high gas prices. He called it a "shotgun marriage" between the automakers, the White House, and California air-quality regulators.

"The administration desperately wanted to promise free fuel economy in the future to pay for the cost at the pump today," he said.

But panelist Dan Becker, Director of the **Center for Auto Safety's** Safe Climate Campaign and long-time industry critic, defended the Leaf, touting it as a useful second car for most people who don't drive long distances in their regular commuting.

Don't expect new engine architectures

If EVs and other alternative-fuel vehicles including those using hydrogen-powered fuel cells are to make a meaningful impact on U.S. energy consumption and air quality, the infrastructure is woefully behind and needs a major upgrade, said Mike Stanton, CEO of the **Association of Global Automakers**, which lobbies for import OEMs and some Tier 1s (including **Delphi** and **Bosch**).

Stanton stated his concern about California's plans to expand its zero-emission vehicle mandate to 2018. The state wants to require 5.5% of all vehicles sold there by 2018—referring to battery EVs and hydrogen FCVs—to emit no greenhouse gases. Other states are expected to follow California's lead.

"We are really 'bellying up to the bar' [on meeting 54.5 mpg by 2025]," he said. "Why do we have to pursue this [a ZEV mandate] as well?"

Speaking of the conventional technologies that will be key to meeting the new CAFE rules, Ford's Kapp, Eaton's Davis, GM's Klein, and Doug Patton, **Denso's** Senior Vice President of Engineering, stressed continued downsizing with boosting, stop/start systems, driver coaching displays, and increased hybridization as foundations to vehicle fleets achieving 54.5 mpg.

"Long term, there will be some form of lean combustion—stratified charge or HCCI (homogeneous-charge compression-ignition)—but both present emissions challenges," Kapp said. So cooled EGR is a solution—it's not many years away," he said. "It's not clear to me whether HCCI will be a player, as getting over knock limitations is another challenge."

None of the day's expert panelists were bullish on all-new engine architectures, such as recently shown split-cycle engines and opposed-piston types, emerging as game-changers due to cost of retooling.

"I don't think the technologies we see now will change dramatically. It will be a function of mix," noted Kapp.

Lindsay Brooke

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