

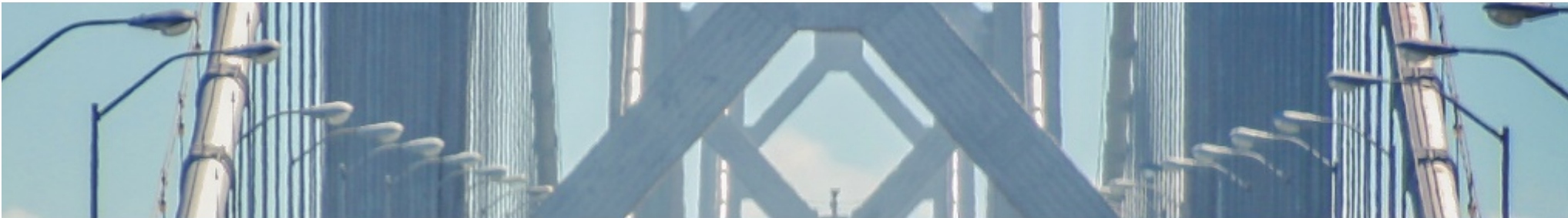
BOARD ON ENERGY AND ENVIRONMENTAL SYSTEMS

***NASEM Light-Duty Vehicle
Efficiency Study***

Not-Open-to-the-Public Information Gathering
Sessions Read-out

Gary Marchant, Committee Chair
Beth Zeitler, Study Director

September 29, 2020



*The National
Academies of* SCIENCES
ENGINEERING
MEDICINE

Assessment of Technologies for Improving Fuel Economy of Light-Duty Vehicles

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Assessment of Technologies for Improving Fuel Economy of Light-Duty Vehicles

(Ongoing: late 2017 - early 2021)

Task Statement Highlights

- Estimate of cost, efficiency improvements, and implementation timing of internal combustion and electric powertrain technologies and non-engine technologies for 2025 to 2035
- Examine consumer behavior, shifts in personal transportation including automation, regulatory aspects and related impact on vehicle technologies, operation and energy use.

Approach to Task

- Committee composed of technology experts with backgrounds inside and outside of the automotive industry, as well as economists and consumer behavior experts.
- Gathering information from automobile manufacturers, suppliers, academics, national labs, and other technology experts in open session and under NDA.
- Targeted to inform USDOT and other stakeholders, with report release expected early 2021.

The 15 member committee has diverse expertise in automotive engineering and production, consumer behavior, regulation and economics.



Dr. Gary Marchant, Arizona State University,
Committee Chair



Ms. Carla Bailo, Center for Automotive
Research



Dr. Nady Boules, NB Motor, LLC



Dr. David Greene, University of Tennessee



Mr. Daniel Kapp, D.R. Kapp Consulting, LLC

Mr. Ulrich Kranz, Canoo, Los Angeles, CA



Dr. Therese Langer, American Council for
an Energy-Efficient Economy



Dr. Zhenhong Lin, Oak Ridge National
Laboratory

Dr. Joshua Linn, University of Maryland

Dr. Nic Lutsey, International Council on
Clean Transportation

Dr. JoAnn Milliken, Independent Energy
Consultant

Dr. Randa Radwan, UNC Chapel Hill

Dr. Anna Stefanopoulou, University of
Michigan, Automotive Research Center

Dr. Deidre Strand, Wildcat Discovery
Technologies

Dr. Kate Whitefoot, Carnegie Mellon
University



Information Gathering

The committee completed many information gathering sessions, some open to the public, and some not-open-to-the-public (NOTTP) sessions to receive confidential business information.

Public open session information gathering

- Open Session at NASEM (Industry, EPA, UCS), July 16, 2018
- Open Session at NASEM (Academic, Industry), October 15-16, 2018
- Open Session at UC Davis (State Government, Industry, Academic), January 24, 2018
- Webinar: Electric Vehicle Infrastructure, May 2, 2019
- Webinar: Materials, May 17, 2019
- Webinar: Hydrogen Infrastructure, June 26, 2019
- Webinar: Safety, September 25, 2019
- Webinar: Design Optimization, January 6, 2020
- Open Session Online (EPA): June 16, 2020

Not-open-to-the-public information gathering

- FCA, June 5, 2019
- Delphi, June 6, 2019
- Munro/Bosch, September 24-25, 2019
- BMW/Daimler/VW, October 14-18, 2019
- Ford, December 9, 2019
- Tesla, January 16, 2020
- GM, January 30, 2020
- Nissan/Toyota/Panasonic/Hyundai/LG, Feb 3-13, 2020
- Toyota Follow-up: June 18, 2020
- Honda: September 10, 2020

Fiat Chrysler America and Delphi Technologies

Committee members present were: Nady Boules, David Greene, Joshua Linn, Daniel Kapp, Randa Radwan, Kate Whitefoot, Therese Langer. Several staff were also present.

FCA: The data gathering session was held on June 5, 2019, from 9:00 am - 4:00 pm, EDT at Fiat Chrysler America, Auburn Hills, MI.

Delphi: The data gathering session was held on June 6, 2019, from 8:00 am - 2:00 pm, EDT, at Delphi Technologies, 5825 Innovation Drive, Troy MI.

Munro and Associates, Inc. and Robert Bosch, LLC

Committee members present were: Carla Bailo, Nady Boules, David Greene, Daniel Kapp, Zhenhong Lin, Joshua Linn, Gary Marchant, Therese Langer, Anna Stefanopoulou, Deidre Strand. Several staff were also present.

Munro: The data gathering session was held on September 24, 2019, from 12:30 pm - 5:00 pm, EDT at Munro and Associates, 1140 Centre Road, Auburn Hills, MI.

Bosch: The data gathering session was held on September 25, 2019, from 9:00 am - 11:30 am, EDT, at Bosch Group, 38000 Hills Tech Drive, Farmington Hills, MI.

Germany: BMW, Mercedes-Benz Daimler, And Volkswagen

Committee members present were: Daniel Kapp, Ulrich Krantz. Two NASEM staff were also present.

BMW: The data gathering session was held on October 14, 2019, from 10:30 am - 3:00 pm, CET, at BMW Welt, Am Olympiapark 1, 80809 München, Germany

MB Daimler: The data gathering session was held on October 16, 2019, from 9:00 am - 4:00 pm, CET, at Daimler, Bela-Barenyi-Straße 71059 Sindelfingen, Germany

Volkswagen: The data gathering session was held on October 18, 2019, from 9:00 am - 3:00 pm, CET, at Volkswagen AG, VW-Straße 103, 38440 Wolfsburg, Germany

Ford Motor Company

Committee members present were: Carla Bailo, Nady Boules, David Greene, Daniel Kapp, Therese Langer, Zhenhong Lin, Nic Lutsey, Gary Marchant, Anna Stefanopoulou, Deidre Strand, Kate Whitefoot. Several NASEM staff were also present.

Ford: The data gathering session was held on December 9, 2019, from 8:00 am - 12:00 pm, EST, at Ford World Headquarters, 1 American Road, Dearborn MI

Tesla

Committee members present were: Carla Bailo, Nady Boules, Zhenhong Lin, Nic Lutsey, Anna Stefanopoulou, Kate Whitefoot. Several NASEM staff were also present.

Tesla: *The data gathering session was held on January 16, 2020, from 9:00 am - 2:00 pm, PST, at Tesla Factory, 45500 Fremont Boulevard, Fremont, CA*

General Motors

Committee members present were: Gary Marchant, Carla Bailo, Nady Boules, David Greene, Daniel Kapp, Therese Langer, Zhenhong Lin, JoAnn Milliken, Anna Stefanopoulou. Several NASEM staff were also present.

General Motors: *The data gathering session was held on January 30, 2020, from 9:00 am - 12:00 pm, EST, at GM World Headquarters, 100 Renaissance Center, Detroit, MI*

Nissan, Toyota, and Panasonic

Committee members present were: Carla Bailo, Daniel Kapp, Therese Langer, Deidre Strand. One NASEM staff was also present.

Nissan: The data gathering session was held on February 4, 2020, from 9:00 am - 4:00 pm, JST, at Nissan Technical Center, 1-1, Morinosatoaoyama, Atsugi-shi, Kanagawa 243-0123, Japan

Toyota: The data gathering session was held on February 6, 2020, from 9:00 am - 5:00 pm, JST, at Toyota Head Office, 1 Toyota-Cho, Toyota City, Aichi Prefecture, Japan

Panasonic: The data gathering session was held on February 7, 2020, from 1:00 pm - 4:00 pm, JST, at Panasonic Moriguchi Office, 3 Chome-1-1 Yagumo Nakamachi, Moriguchi-shi, Osaka-fu 570-0005, Japan

Hyundai and LG Chem

Committee members present were: Daniel Kapp, Therese Langer, Deidre Strand. Two NASEM staff were also present.

LG Chem: The data gathering session was held on February 11, 2020, from 1:00 pm - 3:00 pm, KST, at LG Chem R&D Campus, #104-1 Munji-dong, Yuseong-gu Daejeon 305-380 South Korea

Hyundai: The data gathering session was held on February 12, 2020, from 9:00 am - 3:00 pm, KST, at Hyundai Kia Namyang R&D Center, 150 Hyundaiyeonguso-ro, Namyang-eup, Hwaseong-si, Gyeonggi-do, 18280, South Korea

Toyota (follow-up meeting)

Committee members present were: Gary Marchant, Carla Bailo, Nady Boules, Ulrich Kranz, JoAnn Milliken, Joshua Linn, Zhenhong Lin, David Greene, Daniel Kapp, Anna Stefanopoulou, Nic Lutsey. Several staff were also present.

Place: The data gathering session was held on June 18, 2020, 1:30 pm - 4:30 pm, remotely via Microsoft Teams.

Honda

Committee members present were: Carla Bailo, Nady Boules, Daniel Kapp, David Greene, Joshua Linn, Randa Radwan, Therese Langer, Gary Marchant, Kate Whitefoot, Zhenhong Lin. Several staff were also present.

Place: The data gathering session was held on September 10, 2020, 4 pm - 6 pm, remotely via Microsoft Teams.

Summary of Topics Discussed with OEMs and Suppliers in NOTTP Sessions

Vehicle Manufacturers, Technology Suppliers and Battery manufacturers:

- *Technology achievements for ICE, HEV, BEV, FCEV, CAV*
 - *Engines, Transmissions*
 - *Motors, Inverters*
 - *Batteries*
 - *Fuel cells and associated technologies*
 - *Materials/design/mass reduction, Aero, Tires*
 - *Connected and Autonomous*
- *Future technology plans for ICE, HEV, BEV, FCEV*
 - *Same technologies as above*
- *Market and consumer experiences and plans*
- *Regulatory aspects, including credits and alternative fuels*
- *Manufacturing and supplier considerations*

Use of Material Discussed with OEMs and Suppliers in NOTTP Sessions

Confidential business information collected in NOTTP sessions, collected under Subsection 15(b)(3) of the Federal Advisory Committee Act, 5 U.S.C. App., is used by the committee in its deliberations, but is not discussed nor cited in the report. If the committee wishes to use in its report any information that is confidential to the OEM or supplier, it must receive permission to cite the information, and disclose it in the committee's public access file.

- Questions?
- Suggestions?

Contact Beth Zeitler, vehicle energy study director:
ezeitler@nas.edu,

For more information on the study and the committee's activities, visit:
www.nas.edu/fueleconomy