**Agenda: Clean Cars Minnesota technical meeting**

Friday, November 15, 2019
1:00 p.m. – 3:00 p.m. Central

Minnesota Department of Health Freeman Building, Room B145
625 Robert St. N., St. Paul, MN 55164

**Transit and parking instructions**

To access the meeting online via webinar: click [here](#)
Meeting number (access code): 967 122 326
Meeting password: mdBspqjS

To access the meeting via telephone (we recommend joining by webinar if you can):
Phone number: 415-655-0003
Access code: 967 122 326

**Meeting goals**

- Understand Clean Cars Minnesota proposal, reasons for it, and how the rules work.
- Understand rulemaking process and timeline.
- Discuss cost-benefit analysis.
- Stakeholders receive information and have opportunities to ask questions that will help them develop their written comments.
- MPCA and stakeholders learn from each other.

**Agenda**

1:00 p.m. **Welcome and introduction**  
Craig McDonnell, MPCA

1:10 p.m. **Clean Cars Minnesota**  
Amanda Jarrett Smith, MPCA  
*Summary of Clean Cars Minnesota proposal, input received so far, and process. Questions and discussion.*

1:35 p.m. **Low Emission Vehicle and Zero Emission Vehicle Standards in depth**  
Elaine O’Grady and Coralie Cooper, Northeast States for Coordinated Air Use Management (NESCAUM)  
*Details of the proposed rules and how they work. Questions and discussion.*

2:10 p.m. **Cost-benefit analysis**  
David Bael and Hannah Scout Field, MPCA  
*Initial plan for cost-benefit analysis. Questions and discussion.*

2:50 p.m. **Wrap-up and next steps**  
Amanda Jarrett Smith, MPCA

3:00 p.m. **Adjourn**

**Next meeting: Thursday, December 5, 2019, 2 p.m. – 4 p.m. Central at MPCA St. Paul office. Stay tuned for details.**
Adopting clean car standards

Amanda Jarrett Smith | Climate and Energy Policy Coordinator
November 15, 2019
Our mission

Protect and improve the environment and human health.
What is Clean Cars Minnesota?

Two standards for passenger vehicles:

• Low-Emission Vehicle (LEV) standard
• Zero-Emission Vehicle (ZEV) standard

To address two major challenges: climate change and air pollution.

November, 2019
Challenge #1: Climate change

Historical surface transportation greenhouse gas (GHG) emissions

Business as usual

GHG emissions (MST CO2e)

- 15% below 2005 levels
- 30% below 2005 levels
- 80% below 2005 levels

November, 2019
Pathways to transportation decarbonization

80% emission reduction by 2050 scenario

- GHG emissions standards
- Reduced vehicle miles traveled
- Light-duty electric vehicles
- Medium-duty electric and hybrid vehicles
- Heavy-duty electric and hybrid vehicles
- Biofuels
- Mobile refrigerants
- Next Generation Energy Act GHG emissions goals
Electric vehicles are part of the solution

• Other recent studies show similar results:
  • Midcontinent Transportation Electrification Collaborative whitepaper
  • National Renewable Energy Laboratory, “Electrification and Decarbonization”
GHG emissions from surface transportation

- Passenger vehicles (cars, pickups, SUVs), 74%
- Heavy-duty trucks, 20%
- Buses, 1%
- Motorcycles, 1%
- Mobile A/C, 4%

Source: MPCA GHG emission inventory, 2016
Challenge #2: Air pollution from vehicles affects human health

Fine particles and ground-level ozone (often called smog) are widespread pollutants linked to health effects.

**Fine particles** (PM$_{2.5}$) pollution can cause:
- Shortness of breath
- Wheezing, coughing
- Chest pain
- Fatigue

Fine particles can make these conditions **worse**:
- Cardiovascular and heart disease
- Asthma and COPD

**Ground-level ozone** pollution can cause:
- Difficulty breathing deeply
- Shortness of breath
- Sore throat
- Wheezing, coughing
- Fatigue

Ozone can make these conditions **worse**:
- Asthma and COPD
- Emphysema
Clean Air Act allows states to do more than the federal government requires, but all states must adopt the same alternative standards.
The LEV standard is a tailpipe emissions standard for auto manufacturers.

- Applies to GHGs and other harmful air pollutants.
- Tailored to the size of the vehicle.
- Does not apply to heavy-duty trucks or off-road equipment.
- Does not put requirements on individuals
- Does not require emissions testing
Why we should adopt the LEV standard now

Current federal standard is the same as the LEV standard, and we want to ensure Minnesotans continue to have access to the cleanest cars available.
The ZEV standard requires manufacturers to deliver more vehicles with ultra-low or zero tailpipe emissions for sale in Minnesota.

- More electric vehicle (EV) and plug-in hybrid models available here.
- Does not require anyone to purchase an EV.
- Already adopted by 11 states.
Clean Air Act requires two model years between adoption and implementation.
Rulemaking process

• Proposing under MPCA’s statutory authority to regulate air pollution (Minn. Stat. 116.07)

• Process involves:
  • Opportunities for public input
  • Analysis of need and reasonableness

• Administrative Law Judge must approve the rule before the agency can adopt it.
Timeline

Request for comment and public meetings (Oct. 7 – Dec. 6, 2019)

Notice of intent to adopt rules (Winter 2020)

Hearings (Spring 2020)

Administrative processes and reviews

Draft rule and regulatory analysis

Comment period and public meetings

MPCA revises rules and analysis and responds to comments

Final rule published (Goal: Dec. 2020)
Minnesotans calling for action

Clean transportation future

Very strong support for:

• Require car makers to offer more fuel efficient vehicles in MN
• Fund EV and biofuel infrastructure
• Fund EV incentives
• Require multimodal options in community design

Input locations

10 public meetings and online survey
1,500 comments and meeting attendees

November, 2019
What we’ve heard so far

Variety of concerns about effects on dealers

Addressing climate change

More EV choices / Availability

Out state charging stations, need more for non-Tesla models

Preference for a non-regulatory solution
We want to hear from you

Request for comments:

• What costs and benefits do you see for your organization?
• What data do you have?
• What are you excited about?
• What are you concerned about?
• What else should we consider?
Deadline for comments: December 6, 2019

https://www.pca.state.mn.us/cleancarsrule

Google: Clean cars rulemaking
Clean Cars Minnesota is part of the solution

We need action across many areas and by many groups.
Benefits for Minnesotans

1. Minnesotans will continue to have access to cleaner cars, trucks, and SUVs in the future.


3. Reduce air pollution.

4. Important step towards achieving our GHG reduction goals
What questions and input do you have?

Web: mn.gov/cleancars
Email: cleancarsmn.pca@state.mn.us
Thank you

Amanda Jarrett Smith

amanda.smith@state.mn.us

651-757-2486
• Minnesota Department of Transportation and other MN state agencies, “Pathways to Decarbonizing Transportation in Minnesota.” https://www.dot.state.mn.us/sustainability/pathways.html

• Midcontinent Transportation Electrification Collaborative, “A Road Map to Decarbonization in the Midcontinent: Transportation Electrification.” http://roadmap.betterenergy.org/transportation/

Today’s Presentation

1. Advanced Clean Cars Program Overview
2. LEV III Criteria Pollutant Standards
3. LEV III Greenhouse Gas Standards
4. Zero Emission Vehicle Standards
California’s Advanced Clean Cars Program was approved in 2012 as an integrated program:

- 75% reduction in fleet average NOx+NMOG emissions
- 90% reduction in PM emission standard
- 34% reduction in GHG emissions
- More ZEVs and PHEVs
LEV III Criteria Pollutant Standards
Acronyms

• PC – passenger car (ex. sedan)
• LDT – smaller trucks/SUVs/vans (ex. Tacoma)
• MDV – larger truck/van/SUVs (ex. F-250)
• MDPV – large passenger vehicle (ex. van with 9 seats)
• MY – model year
• NMOG – non-methane organic gases
• NOx – oxides of nitrogen
• PM – particulate matter
LEV III and Tier 3 Standards for NOx + NMOG

150,000-mile New Vehicle Fleet Average Emissions

Source: California Air Resources Board
LEV III PM Standard More Protective Than Tier 3

• Starting in MY 2025, the LEV III PM standard declines to 1 mg/mi from 3 mg/mi
  • Federal Tier 3 standards remains at 3 mg/mi from MY 2017+
• Per vehicle PM standard - no fleet averaging
• Examples of vehicles already meeting the 1 mg/mi standard:
  • Toyota Tacoma
  • Hyundai Sonata
  • Subaru BRZ
  • Honda Accord
  • Mazda 3
LEV III Greenhouse Gas Standards
STRUCTURE OF GHG STANDARDS

• Two categories of GHG standards: passenger cars and light-duty trucks.

• Within each category, CO2 standard targets are indexed to vehicle footprint.

• Allows manufactures to produce and sell types of vehicles consumers want.

Source: California Air Resources Board
Flexibilities Preserve Vehicle Choice

- Separate car and truck standards
- Flexible footprint-indexed standards
- Company sales-weighted fleet averaging for GHG emissions
- Credit banking (5-year carryforward, 3-year carryback)
- Technology specific credit opportunities

Source: EPA
GHG TECHNOLOGY ADVANCEMENT

This figure shows how technology has evolved rapidly to meet the standards.

5-Year Change in LDV Technology Penetration Share

Source: California Air Resources Board
Strong Electrification Not Needed To Meet GHG Standards

Source: California Air Resources Board
“Deemed To Comply” Provision

- Allows automakers to comply with the federal GHG standards as an alternative to California’s GHG standards.

- In 2018 rulemaking, California clarified this “deemed to comply” option is valid only with existing U.S. EPA GHG standards.

- If federal standards change, automakers would need to meet the California standards in California and the Section 177 States for the affected model years (potentially model year 2021+).
Section 177 State Administration

- Usually ½ FTE to 1 FTE required for administration
- Receive end of model year and credit account reports for GHG and criteria pollutants
- The program is transparent to administer
- States respond to questions on vehicle registration, warranty provisions, and other issues as part of program administration
Zero Emission Vehicle Standards
How Does the ZEV Regulation Work?

- ZEV credit % requirement based on average annual sales
- Generate ZEV credits through introduction of clean vehicle technology
- Rules on earning and using credits to meet annual ZEV requirement
Who does the ZEV regulation apply to?

**Large volume manufacturers (LVMs)**
- Average CA sales > 20,000 per year
- LVMs include BMW, Fiat Chrysler, Ford, GM, Honda, Hyundai, KIA, Mercedes, Nissan, Toyota, Volkswagen

**Intermediate volume manufacturers (IVMs)**
- Average CA sales > 4,500 and ≤ 20,000 per year
- IVMs include Jaguar Land Rover, Mazda, Subaru, Volvo

*The ZEV regulation does *not* apply to small volume manufacturers (average CA sales ≤ 4500 per year).*
Which types of cars generate ZEV credits?

Pure Zero Emission Vehicles (ZEVs):
- Battery Electric Vehicles (BEVs)
- Fuel Cell Electric Vehicles (FCEVs)

Transitional Zero Emission Vehicles (TZEVs)
- Plug-in Hybrid Electric Vehicles (PHEVs)
An automaker has a ZEV credit obligation equal to a percentage of their annual sales. That percentage starts at 4.5% in 2018, increasing 2.5% per year, and flat lining at 22% in 2025.

Source: California Air Resources Board
A minimum portion of the total ZEV credit obligation must be met with pure ZEV credits, and the remainder may be satisfied with credits from TZEVs.

Source: California Air Resources Board
Credits Increase with Range

- ZEV
- TZEV
- TZEV w/ 10mi AER

Credits per Vehicle vs. Miles of Zero-Emission Range
ZEV Rule Flexibility

• ZEV/TZEV credits are earned when a vehicle is “delivered for sale” in the Section 177 state.

• Credits produced in excess of a manufacturer’s requirements may be “banked” for future use.

• Credits earned may be traded or sold to any other party; traded credits can be used the same way earned credits can.

• IVMs may meet entire ZEV credit requirement with TZEV credits.

• Credits from FCEVS may be “traveled” from one ZEV state to another.
ZEV CREDIT REPORTING

Compliance data submitted by auto manufacturers via online reporting tool (ZEV-CRDT System). State ZEV-CRDT Administrators review and approve credits.
ZEV Credit Deficits

**Large Volume Manufacturers:**
- Must make up a deficit by the next model year
- May only use ZEV credits

**Intermediate Volume Manufacturers:**
- May request up to three consecutive model years to make up a deficit
- May use ZEV and TZEV credits
Conclusions

• LEV criteria program provides added PM pollutant reductions as compared to the Federal program
• ZEV program provides NMOG, PM, and NOx emissions benefits
• ZEV program provides consumers with additional vehicle options
• GHG program could provide significantly greater reductions than Federal program
• Program can be administered with minimal complexity
For questions, please contact:

Coralie Cooper // ccooper@nescaum.org
Elaine O’Grady // eogrady@nescaum.org
Initial regulatory analysis plan

David Bael | Economic Policy Analyst
Hannah Scout Field | Data Specialist
November 15, 2019
Request for comment and public meetings (Oct. 7 – Dec. 6, 2019)

Draft rule and regulatory analysis

Notice of intent to adopt rules (Winter 2020)

Comment period and public meetings

Hearings (Spring 2020)

MPCA revises rules and analysis and responds to comments

Administrative processes and reviews

Final rule published (Goal: Dec. 2020)
Early 2020, MPCA will publish a **Notice of Intent to Adopt Rules:**

- Draft LEV/ZEV rules
- Statement of Need and Reasonableness (SONAR) on proposed rule
  - *Includes regulatory analysis on the estimated costs and benefits of adopting the LEV/ZEV rules in Minnesota*
Key questions

• What are the costs and economic benefits of the Clean Cars rules?

• Who bears the costs and who receives the benefits?
Scope of analysis

Emissions impacts

What are the estimated emissions benefits (reductions in GHGs & criteria pollutants) of the LEV/ZEV rules?

Health and climate impacts

What are the health and climate benefits of the emissions reductions?

Economic impacts

What are the economic effects on Minnesota consumers and businesses and on Minnesota’s economy overall?
Other states’ approaches

• Colorado most recently adopted LEV/ZEV rules (LEV in 2018, ZEV in 2019)
  • Minnesota’s proposed approach draws on Colorado’s
• Some northeast states proportionally scaled California’s estimated emissions benefits to their state using relative vehicle sales volumes
• California’s ZEV regulatory compliance calculator
Colorado estimates

- Greenhouse gas reductions, 2022-2032: 31 million tons from LEV, 3.5 million tons from ZEV
- Significant emissions reductions
- Increased vehicle purchase costs are well off-set by fuel and maintenance savings
- $72 million annual increase in state GDP
- 1,700 new jobs

Initial purchase price of conventional and electric cars, 2020-2030

Source: ICCT, Electric Vehicle Costs and Consumer Benefits in Colorado in the 2020-2030 Time Frame
Proposed general approach

Reference scenario
No Clean Cars rule, assume federal Safer Affordable Fuel-Efficient (SAFE) Vehicle rule goes into effect

Clean Cars scenario
LEV/ZEV rules implemented starting model year (MY) 2024

2023-2033

VS.
Step 1: Estimate how many light-duty vehicles (LDVs) will be sold annually in MN, 2023-2033

For each scenario...

**Emissions and Health**

- Step A2: Estimate emissions of GHGs and criteria pollutants in each scenario
- Step A3: Estimate health impacts

**Consumer and Statewide Impacts**

- Step B2: Estimate costs and benefits to Minnesota consumers and businesses
- Step B3: Estimate macroeconomic impacts (state GDP, employment)

Step 4: Economic valuation of costs and benefits and equity analysis
Estimating emissions benefits

Reference scenario

Total emissions* 2023-2033 (GHGs and criteria pollutants)

Clean Cars scenario

Total emissions* 2023-2033 (GHGs and criteria pollutants)

Difference is emissions benefit of LEV/ZEV scenario

Health and climate benefits

*Tailpipe and electricity generation
## Estimating emissions benefits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Equal in both scenarios?</th>
<th>Considerations for Clean Cars Scenario</th>
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<tbody>
<tr>
<td>Overall vehicle sales</td>
<td>?</td>
<td>• Decreased, due to increased purchase price of vehicles?</td>
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<tr>
<td></td>
<td></td>
<td>• Increased, due to decreased lifetime maintenance costs? (ZEVs)</td>
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<td>Electricity generation mix</td>
<td>?</td>
<td>• Does having more EVs affect development of grid?</td>
</tr>
<tr>
<td>Annual vehicle miles traveled (VMT)</td>
<td>?</td>
<td>• Will Minnesotans drive more if they’re spending less to drive?</td>
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Impacts to consumers and businesses

• Benefits and costs to car owners:
  • Vehicle purchase prices
  • Operations and maintenance costs
  • Fuel savings

• Benefits and costs to businesses:
  • Car producers and dealers and related businesses
  • Gasoline sector
  • Utility sector
Clean Cars rule may stimulate auto sector investment, electricity sector investment, and reduced gasoline spending. What will be the impact of these on:

- State GDP?
- State employment?

We want to hear from you

Request for comments:

• Data, methods, etc.
  • Specific needs:
    • Minnesota annual light-duty vehicle sales data
    • Electricity and gasoline costs
  • What is specific to Minnesota that is different from other states’ analyses?
• Additional topic areas for analysis
• Anything else we should consider?
www.pca.state.mn.us/cleancarsrule

Google: Clean cars rulemaking
Comments due by December 6, 2019
Questions and input?

Submit comments online
www.pca.state.mn.us/cleancarsrule
Thank you

David Bael
david.bael@state.mn.us
651-757-2528

Hannah Scout Field
hannah.field@state.mn.us
651-757-2760