

Emission Control Challenges and Opportunities for Hybrid Electric Vehicles

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Topics

Opportunity

- Improved fuel economy

Challenges

- Public perceptions
- Regulatory requirements
- Emissions testing concerns
- New emissions issues

What the public sees

Electric And Hybrid Cars Might Produce As Many Toxins As Diesels

Jason Torchinsky

5/10/16 2:57pm Filed to: ELECTRIC CARS

Nothing is easy. That's the big takeaway here. Almost every system we encounter is full of unseen complexity. A great example of this is found in a **new study that suggests that electric and hybrid vehicles may actually produce as many atmospheric toxins as combustion cars**. How can this be, if they produce no exhaust? The answer is that they produce more non-exhaust emissions.



Daily Mail
.com

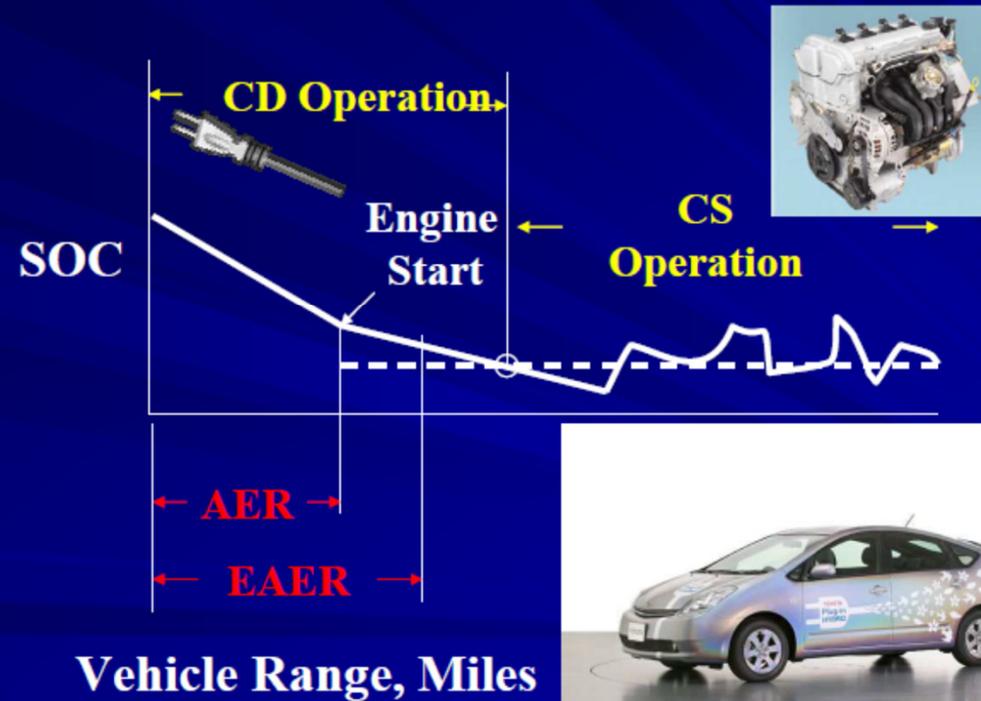
Electric, hybrid and other eco-friendly cars fill the air with as many toxins as dirty diesels say scientists

- Eco-friendly electric and hybrid cars fill air with as many toxins as diesels
- That was finding of a study looking at particles from tyre and brake wear
- Greener alternative produces more tiny particles because they are heavier**
- Made heavier by batteries and parts meaning tyres and brakes wear faster

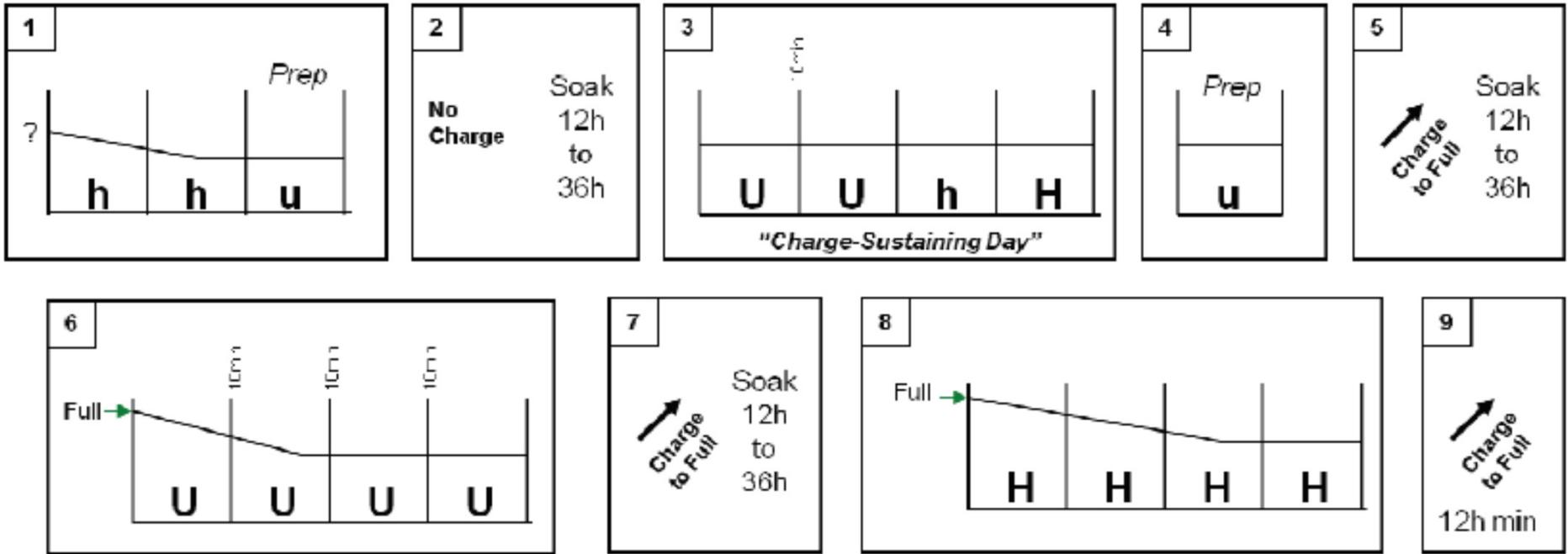
Combustion & electricity – blended propulsion

HEV Technology

PHEV with Blended Operation



SAE J1711 – test procedure for hybrid and plug-in hybrid vehicles



U = UDDS drive cycle

H = Highway fuel economy drive cycle

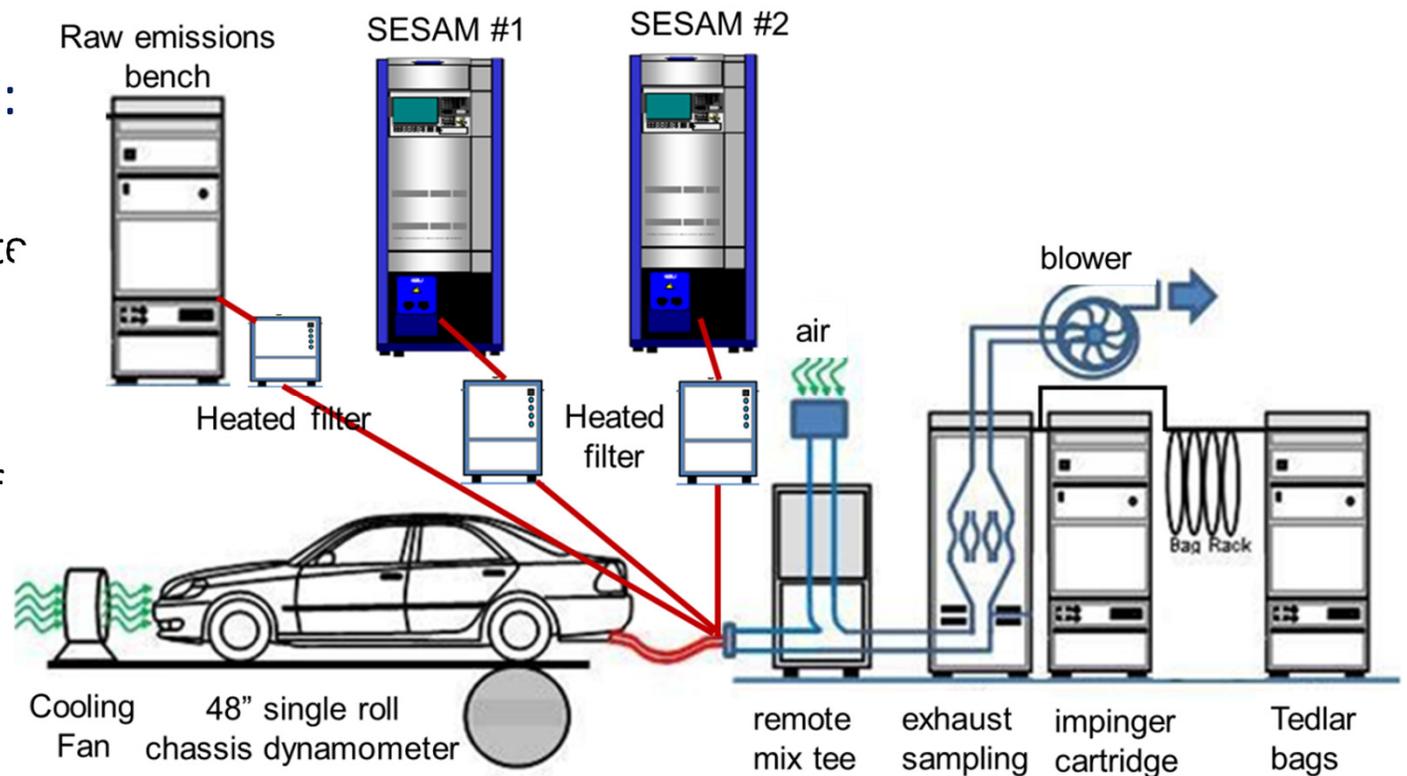
Vehicle emissions test can affect emissions

Sampling exhaust can:

- Cool catalyst
- Change oxidation state

Testing modifications

- Detect engine shut-off
- Stop sampling



California's Advanced Clean Cars Midterm Review Appendix H: Plug-in Hybrid Electric Vehicle Emissions Testing

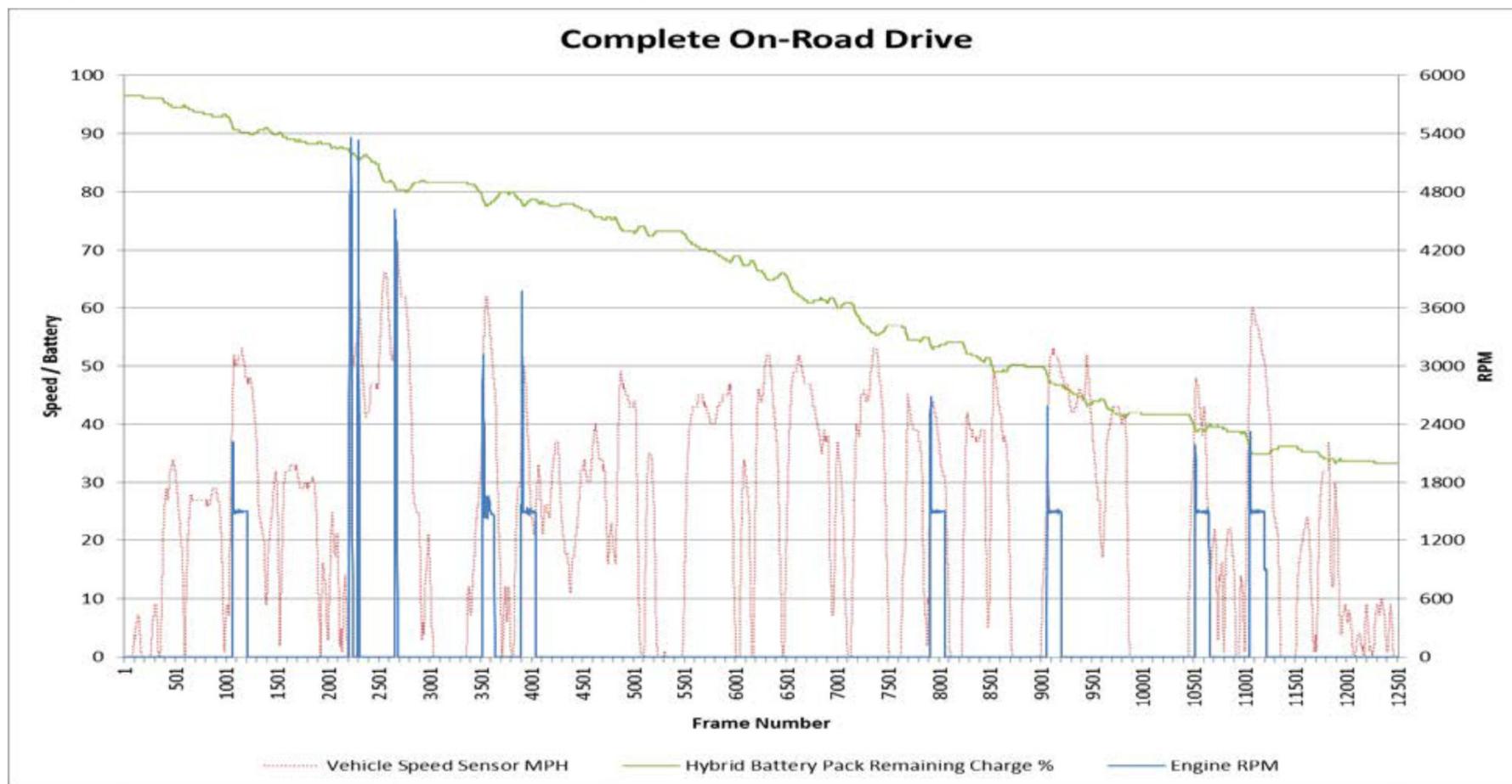
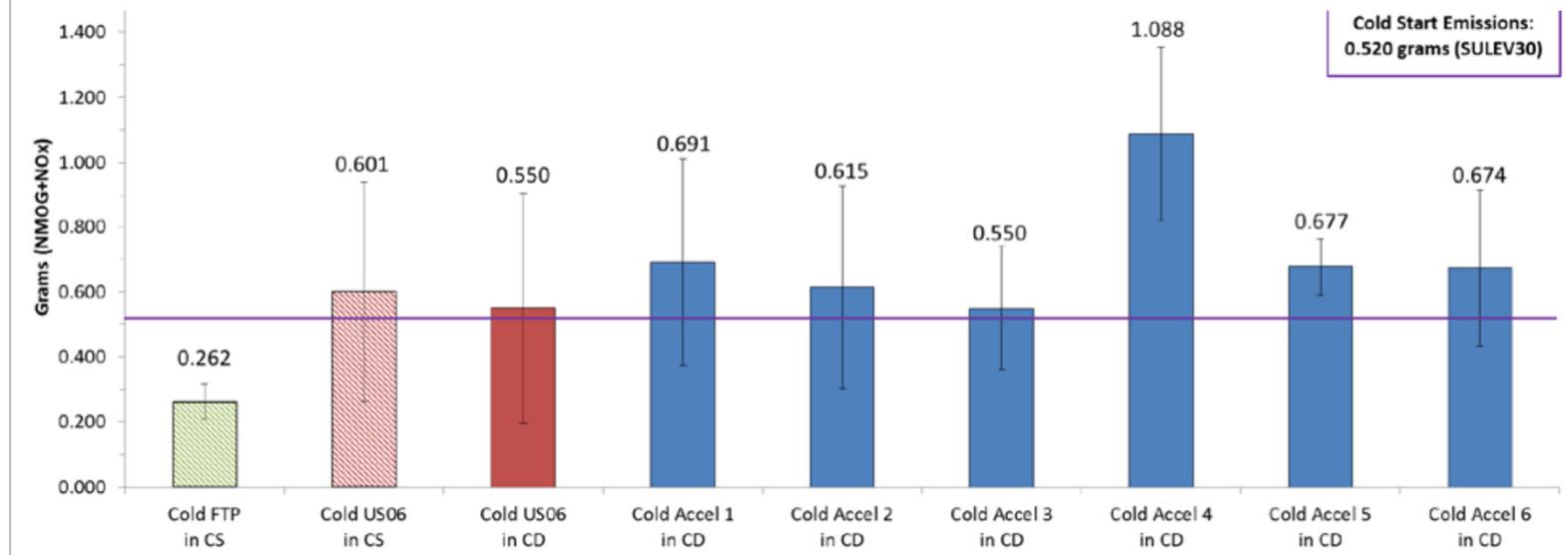


Table 1 - Acceleration cycles developed for the dynamometer

Acceleration 1	Short freeway on-ramp acceleration.
Acceleration 2	Short freeway on-ramp acceleration combined with a merge and change lanes passing maneuver.
Acceleration 3	Short freeway on-ramp acceleration, brief cruise in slow lane, and then a change lanes passing maneuver.
Acceleration 4	Gradual demand freeway on-ramp acceleration with a merge into traffic.
Acceleration 5	City road (~40mph speed limit) passing maneuver.
Acceleration 6	Right-hand turn, merge into traffic on city road (~45mph speed limit).



Other hybrid specific issues

State offers emissions testing accommodations to some hybrid drivers amid Denver7 investigation

Drivers failed because of check engine light

BY: [Ryan Luby](#), [Brittany Freeman](#)

POSTED: 10:16 PM, Jan 20, 2017

UPDATED: 11:41 PM, Jan 20, 2017

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The state of Colorado is offering accommodations to several drivers of hybrid vehicles that failed emissions testing amid a Denver7 investigation into its issue.

This week, the state sent letters to some drivers whose hybrid vehicles failed emissions testing due to hybrid battery problems, offering free testing at the state's technical centers. Experts tell Denver7 Investigates the hybrid battery issues likely have little to no impact on the actual pollutants a vehicle emits, but the presence of a "Check Engine" light means the vehicle cannot pass the state's test – which is required for vehicles eight-years-old and older to register or renew registration in Colorado.

Current regulatory climate regarding vehicle emissions: Challenges for hybrid emissions

- Regulatory emissions testing is becoming a bare minimum qualification
- Failure of EU6 NOx regulations to reduce real world NOx emissions
- VW scandal
- RDE testing in EU and China

“It’s what happens in the real world that matters”