Lowering On-Road Fuel Use: A Component Approach

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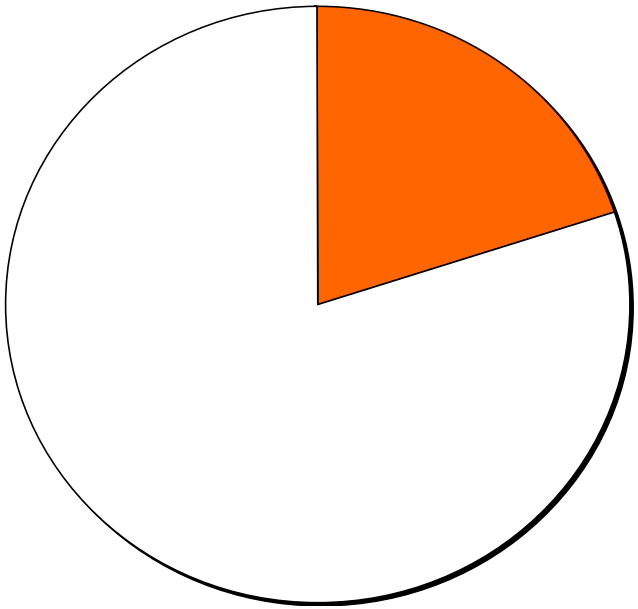
What is the Component Approach?

- **Addresses two aspects:**
  - **"Off-test" energy use**
  - **Energy impacts of aftermarket and replacement products**

Some Aspects of a Car's Fuel Consumption are Not Captured in Tests

- Dynamometer tests and adjustments cannot simulate all aspects of on-road performance
- Actual consumption depends on
  - usage patterns
  - aftermarket conditions

Fuel Consumption Not Fully Captured in Fuel Economy Test



Examples of Components Not Tested in New Vehicles

- Lights
- Air conditioner
- Alternator
- Some motors, pumps and fans
- Consumer electronics
- Tire pressure sensors and inflation devices
- Driver feedback

Aftermarket and Replacement

- Tires
- Tire pressure sensors and self-inflation devices
- Oils & Lubricants
- Luggage racks
- Spoilers & air dams
- Driver feedback devices

Logic

- If component is switched off during test, manufacturer has little incentive to make it efficient
- Consumers have no information about range of performance in aftermarket items

On-the-Road Electricity is Expensive!

- **Electricity generated in a motor vehicle costs about $1/kWh**
- **Compare to:**
  - **Residential electricity at 11 ¢/kWh**
  - **Photovoltaic electricity at 50 ¢/kWh**

==> Aggressive electricity conservation measures may be cost-justified

Component Efficiency Improvements (1)

System	Component Efficiency Improvements
Lighting	• High efficiency headlights, running lights, etc.
Air conditioning and climate controls	• High efficiency AC • Insulated roof • Optically selectively windows • High albedo surfaces • Efficient fans
Tires	• Low rolling resistance tires • Precision pressure sensors • Self-inflation systems

Component Efficiency Improvements (2)

System	Component Efficiency Improvements
Controls and electronics	• High efficiency alternator • Customized control chips for greater fuel economy • Idle-off system • Low-standby consumer electronics
Driver feedback	• Real-time display of fuel consumption • GPS tied to traffic and optimum route guidance • Shift-up indicator (manual transmission)
Lubricants & fluids	• Synthetic oil • Higher performance transmission fluid

Component Efficiency Improvements (3)

System	Component Efficiency Improvements
Aerodynamics	• Low-drag luggage, ski, bicycle racks • Drag-reducing spoilers and after-market products • Low-drag mirrors and other components
Pumps	• Efficient water pump • Efficient steering fluid pump
Photovoltaic (incorporated into roof)	• Ventilation while parked (reduces cool-down power) • Battery re-charge

Potential Savings

Component	Fuel Savings*
Tires	**0 - 5%**
Lights	**0 - 2%**
Driver feedback	**0 - 20%**
AC System	**0 - 5%**

* Savings depend strongly on technology and driving conditions

A familiar example of the strategy of endorsing components

A Similar Approach for an Auto Component

Note: This is only an example to demonstrate the concept. Energy Star has no plans to create such a program.

Or perhaps for a package of components:
"Energy Star Inside"

Efficient Auto Package

This car contains at least 4 of the following components:

- ✓Efficient AC
- ✓Heat-reflecting windows
- ✓Low-friction oil
- ✓Efficient tires
- ✓Extra roof insulation
- ✓GPS linked to traffic advisories

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Other Aspects of Component Approach

- Can be used by policies, labels, incentives, and regulations
- Off-test fuel use often overlooked by present efficiency policies
- Benefits from international collaboration

Research Aspects

- Energy test procedures for components
- Feasibility of improving efficiency of specific components
- Transferring experience from buildings to vehicles
  - AC, building shell, PV, consumer electronics, thermal comfort, user interfaces, networks
- Understanding utility-building-vehicle energy linkages for hybrids

Summary

- Improving fuel economy still primary goal
- Some off-test aspects are not captured in the test (new and aftermarket) and may be easier to address separately
- Research needed to improve technologies and policies to commercialize them

Questions for Discussion

- Is component approach technically feasible?
  - In new vehicles?
  - In aftermarket/replacement products?
- Is component approach administratively feasible?
  - In new vehicles?
  - In aftermarket?
- Is the package approach feasible?