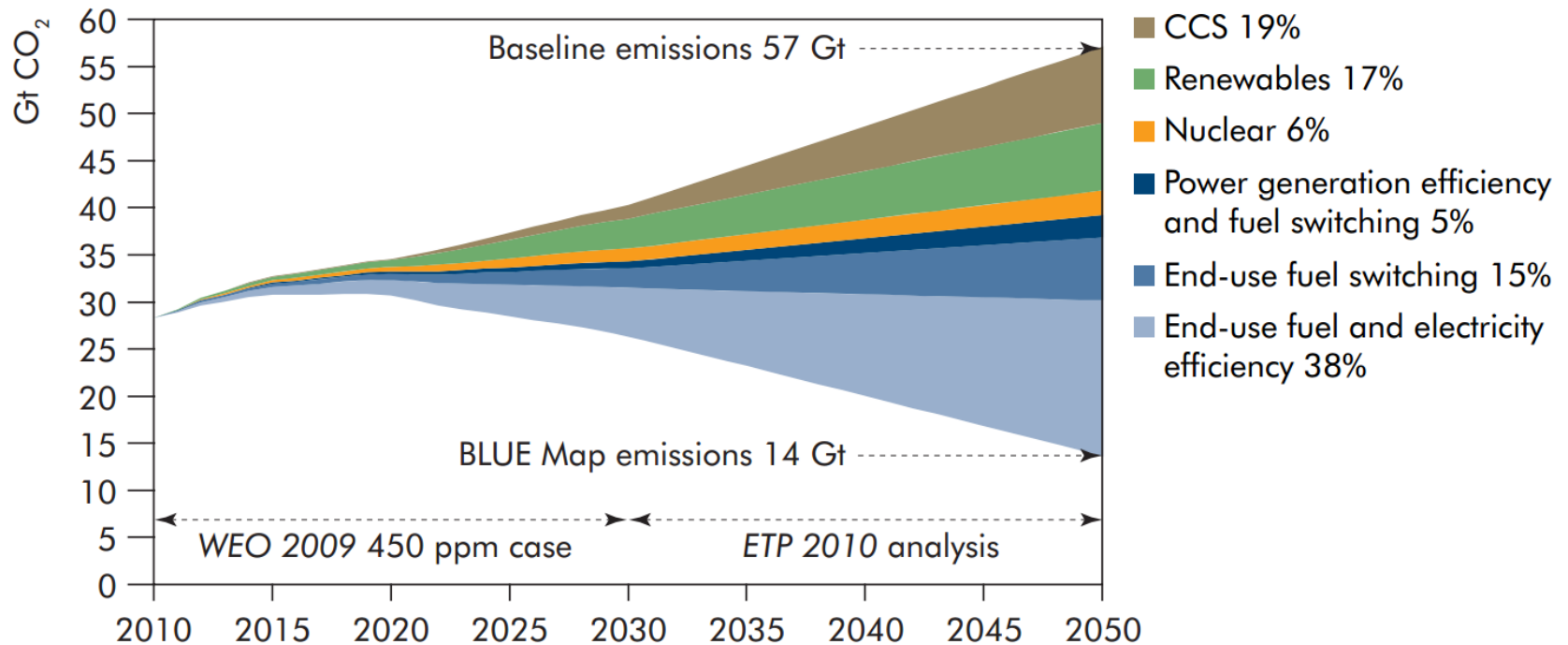


Energy efficiency

Figure 2.2 ► Key technologies for reducing CO₂ emissions under the BLUE Map scenario



<https://www.iea.org/publications/freepublications/publication/etp2010.pdf>

Helfand et al. is a careful analysis with a resourceful approach

- If there are hidden costs of fuel economy (FE) technologies,
 - They should show up in consumer satisfaction,
 - As observed in professional reviews.
-
- How often are the FE reviews positive? Negative?
 - How often is the FE technology reviewed at all?
 - How do FE technologies correlate with negative reviews of operations (e.g., “cornering ability”)?

Comment 1: considering magnitudes

- Magnitudes of coefficients
 - Is there something to be learned from the especially large coefficients?
- And potentially magnitudes in welfare terms
 - Heterogeneity in consumer preferences, in fuel economy gains, and in manufacturer costs

Comment 1: considering magnitudes

| More negative reviews | Fewer negative reviews |
|----------------------------------|--------------------------------------|
| Plug-in hybrid electric -- range | Full electric -- powertrain noise |
| CVT -- acceleration capability | Full electric -- fuel economy |
| CVT -- cornering ability | Low resistance tires -- ride comfort |
| Hybrid -- brake feel | Diesel -- cornering ability |
| Hybrid -- general drivability | GDI -- acceleration capability |
| DCT -- ride comfort | |

Comment 2: preferred specification

Table A1: "Steering feel" negative review linear probability model regressions on efficiency technology

| | Any coded mention of tech in review | | Tech Data | | Tech Data plus vehicle attributes | |
|---------------------------|-------------------------------------|-------------------|-----------------|------------------|-----------------------------------|--------------------|
| | Single | All tech | Single | All tech | Single | All tech |
| Low Resistance Tires | 0.09 (0.11) | 0.04 (0.11) | 0.11 (0.09) | 0.11 (0.09) | 0.16 (0.11) | 0.18 (0.11) |
| Electronic Power Steering | 0.17*** (0.03) | 0.17*** (0.04) | -0.00 (0.04) | 0.00 (0.05) | -0.07 (0.05) | -0.06 (0.05) |
| Turbocharged | -0.00 (0.03) | 0.00 (0.03) | 0.06 (0.04) | 0.09 (0.05) | 0.06 (0.07) | -0.00 (0.08) |
| GDI | -0.03 (0.05) | -0.06 (0.05) | -0.01 (0.04) | -0.05 (0.05) | -0.04 (0.05) | -0.06 (0.06) |
| Cylinder Deactivation | 0.04 (0.09) | 0.06 (0.10) | 0.06 (0.07) | 0.08 (0.07) | 0.12* (0.07) | 0.11 (0.07) |
| Diesel | -0.07 (0.05) | -0.02 (0.05) | -0.02 (0.07) | -0.04 (0.08) | -0.19* (0.11) | -0.22* (0.12) |
| Hybrid | 0.01 (0.05) | -0.06 (0.05) | 0.03 (0.06) | 0.02 (0.07) | -0.15*** (0.05) | -0.21*** (0.08) |
| Plug-In Hybrid Electric | -0.04 (0.07) | -0.06 (0.07) | -0.12 (0.07) | -0.14* (0.08) | -0.05 (0.11) | -0.20 (0.17) |
| Full Electric | 0.03 (0.08) | 0.03 (0.09) | 0.08 (0.12) | 0.02 (0.12) | 0.00 (.) | 0.00 (.) |

Some possibilities for extensions

- Overall, hidden costs pretty small (even negative?)
- And depend on quality of implementation
- Are there technologies that fail along several dimensions or that have particularly bad reviews along some key dimensions?
- Do the cheapest technologies tend to have more positive or negative reviews?
- Do the technologies that bring the greatest fuel economy gains tend to have more positive or negative reviews?

West et al. uses clean, modern methods to get at an old question

- If it's cheaper to drive my car, won't I drive it more?
- So, is the benefit of fuel economy standards offset by the rebound effect?
- Ideally, randomly assign people cars with different fuel economy, and see how they respond.
- Instead, use clever discontinuity in Cash for Clunkers policy.
- Other pluses: observe individual vehicle characteristics (e.g. horsepower) plus VMT for the **entire** household

Comment 1: modern identification methods and external validity

- Empirical estimates are specific to:
 - Households that owned a particular type of vehicle – “relatively older and low value”
 - That could comply with the policy by downsizing
 - Right after a massive recession
- This could impact both vehicle choice and subsequent behavior

Comment 1: modern identification methods and external validity

- Under footprint-based standards, with a growing economy,
- Could imagine that the attribute-based adjustment would be smaller.
 - Helfand et al.: for some technologies, no attribute-based adjustment?
 - And for some technologies, could go in the opposite direction.



Comment 2: understanding the reduction in VMT

- Reduction of around 3% relative to control households.
 - “Control” household buys a new car of their choosing, perhaps 21 MPG, and increases VMT 1000 miles.
 - “Treated” household buys a new car that qualifies for rebate, perhaps 22 MPG, and does not increase VMT.
- This difference is attributed to the treated households enjoying their car less.

Where does this leave us?

- A valuable contribution to a growing understanding of how the rebound effect varies
- Large: households were under-consuming – air conditioners in Mexico (Davis, Fuchs and Gertler)
- Small: time costs are large – washing machines (Davis)
- **Small: FE technology causes me to value the energy consumption less (West et al.)**