

**Steven Gasworth**  
**Senior Technologist**  
**Exatec, LLC**



June 25, 2009, Page 1



### Two Paths to CO2 Reduction via Vehicle Glazing

**Glass**

2007 NREL Paper  
IR glazing  
IR paint  
Roof ventilation

NREL Case Study  
Cadillac STS  
Parked in Colorado  
PGW\* IR glazing

NREL Analysis  
Δ Tts (specific PGW\* glazing)  
Δ Cabin temperature (measured)  
Δ Fuel use (simulated)

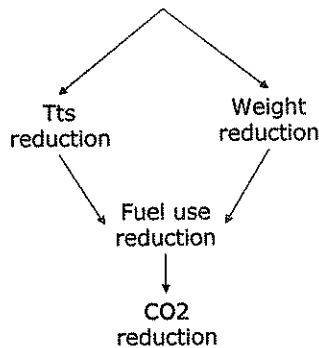
\*Pittsburgh Glass Works, LLC

**Polycarbonate**

2007 MIT Paper  
10% Δ vehicle weight  
= 6-7% Δ mpg  
Exatec test confirmed

Exatec Case Study  
Cadillac STS  
OEM glass thickness  
NREL support

Exatec Analysis  
Δ Weight (calculated)  
Δ Fuel use  
Equivalent Δ Tts



Exatec analysis compares benefits of Tts per NREL study (cited by CARB) and weight reduction per MIT study → weight-equivalent Δ Tts ("Spread")



June 25, 2009, Page 2



## Exatec Analysis: Compare CO2 benefits of IR Glass with CO2 benefits of Polycarbonate

For equal CO2 benefit:

$$\text{Polycarbonate Tts} = \text{IR glass Tts} + \text{"Spread"}$$

- Spread for Windshield or Rooflite = 20 Tts units
- Spread for Sidelites and Backlite = 25 Tts units
- Spread is consistent basis for Exatec Recommended Amendment

Setting separate material-appropriate standards for glass and polycarbonate glazing would recognize their inherent physical and chemical differences and allows for continued innovation



June 25, 2009, Page 3



## Extract from Proposed Amendment

### § 95602. Definitions.

(#) "Alternative Glazing Material" means a transparent or translucent material, other than glass, that is used for glazing and provides equivalent green house gas reduction through reduced total solar transmittance and/or other means, such as reduced weight. Polycarbonate plastic, a synthetic thermoplastic resin, is an example of an "Alternative Glazing Material" where, when the effect of lower weight material is considered, the data demonstrate equivalent green house gas reduction.

### § 95603. Automotive Glazing Standards.

(6) For 2012 and subsequent model year vehicles, sidelites and backlite(s) not meeting 70 percent visible light transmittance requirements must have a Tts less than or equal to forty percent (40%), referenced to a glazing of 4 millimeter thickness. For 2012 subsequent model year vehicles, Alternative Glazing Material sidelites and backlite(s) composed of polycarbonate not meeting 70 percent visible light transmittance requirements must have a Tts less than or equal to sixty-five percent (65%), referenced to a glazing of 4 millimeter thickness.



June 25, 2009, Page 4

