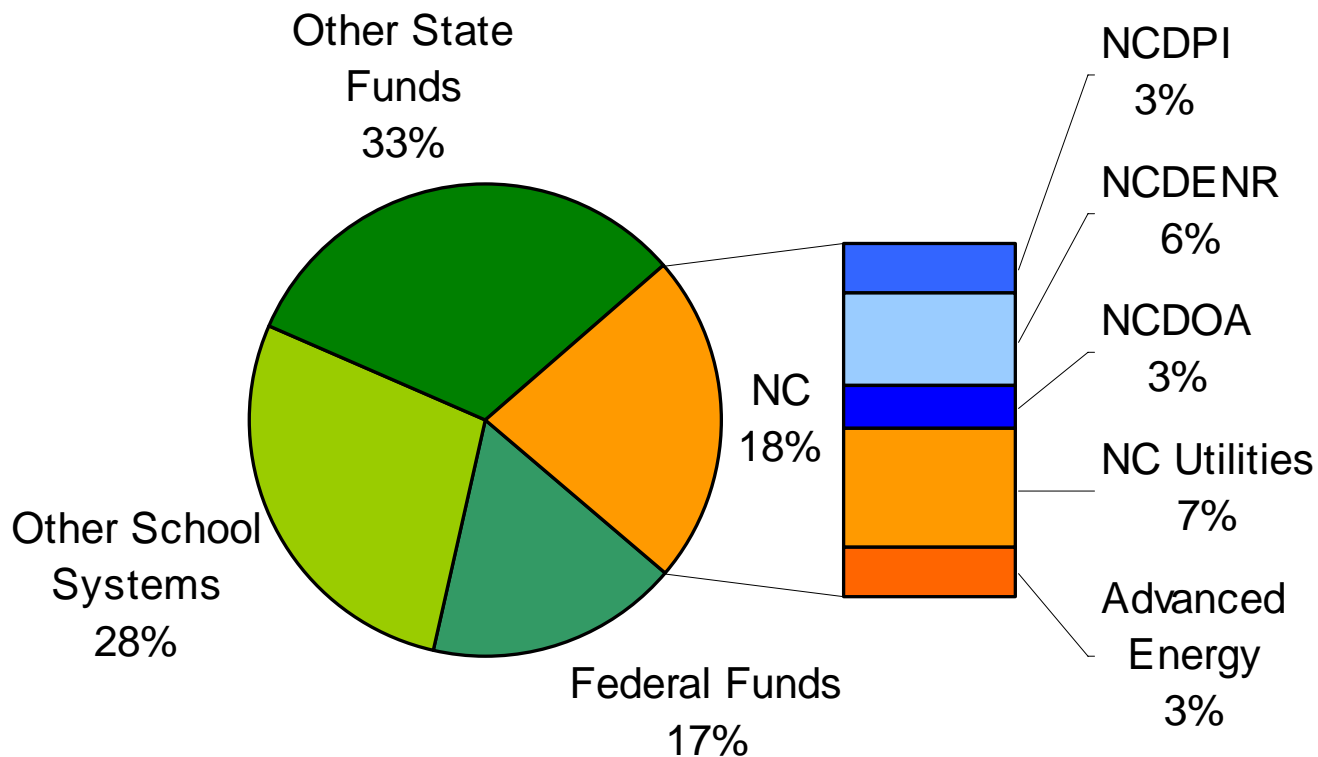




www.advancedenergy.org

► Plug-in Hybrid Electric School Bus Funding [2002 – 2007]



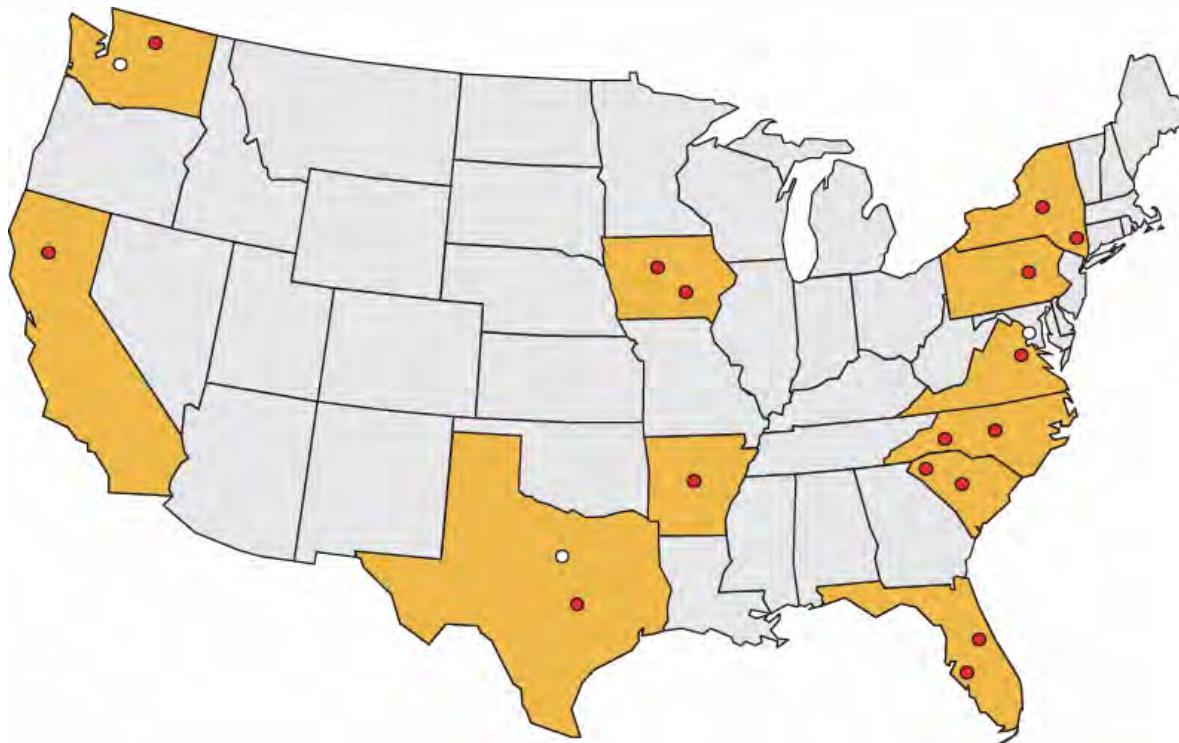
▶ Where We Are

- ▶ Worked with manufacturers to develop supply chains
- ▶ Found funding agencies to fund the first 19 buses
- ▶ Developed a national specification that 11 states agreed upon
- ▶ Issued and awarded an RFP to manufacture buses
- ▶ Delivered the first eight buses
- ▶ Eight to eleven more before the end of 2007
- ▶ Developed a low cost national monitoring and evaluation program
- ▶ Developing more detailed monitoring with universities and labs



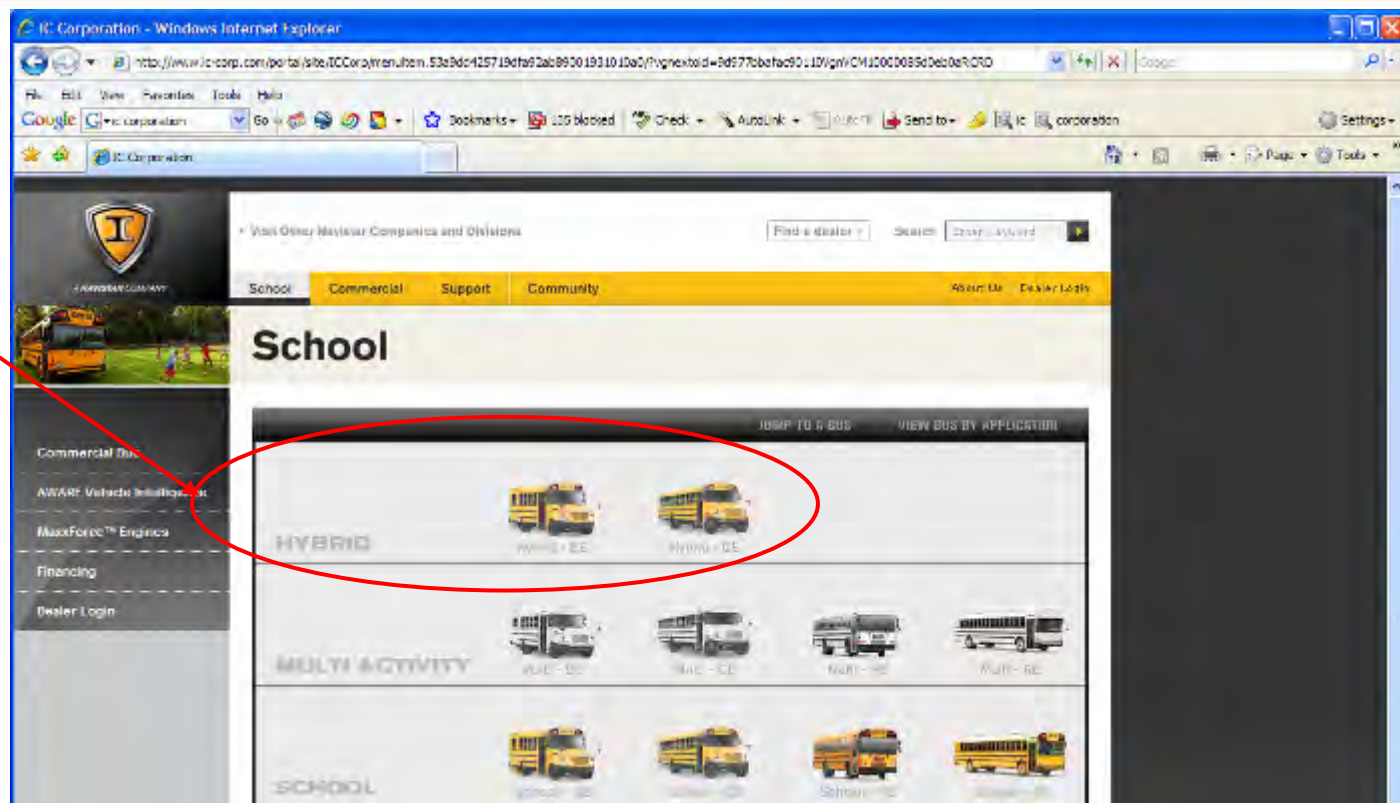
▶ National Focus to Achieve N.C. Benefits

- ▶ North Carolina (2)
- ▶ South Carolina (2)
- ▶ Florida (2)
- ▶ Virginia (1)
- ▶ Washington DC (1)
- ▶ Pennsylvania (1)
- ▶ New York (2)
- ▶ Arkansas (1)
- ▶ Iowa (2)
- ▶ Washington (2)
- ▶ California (1)
- ▶ Texas (2)



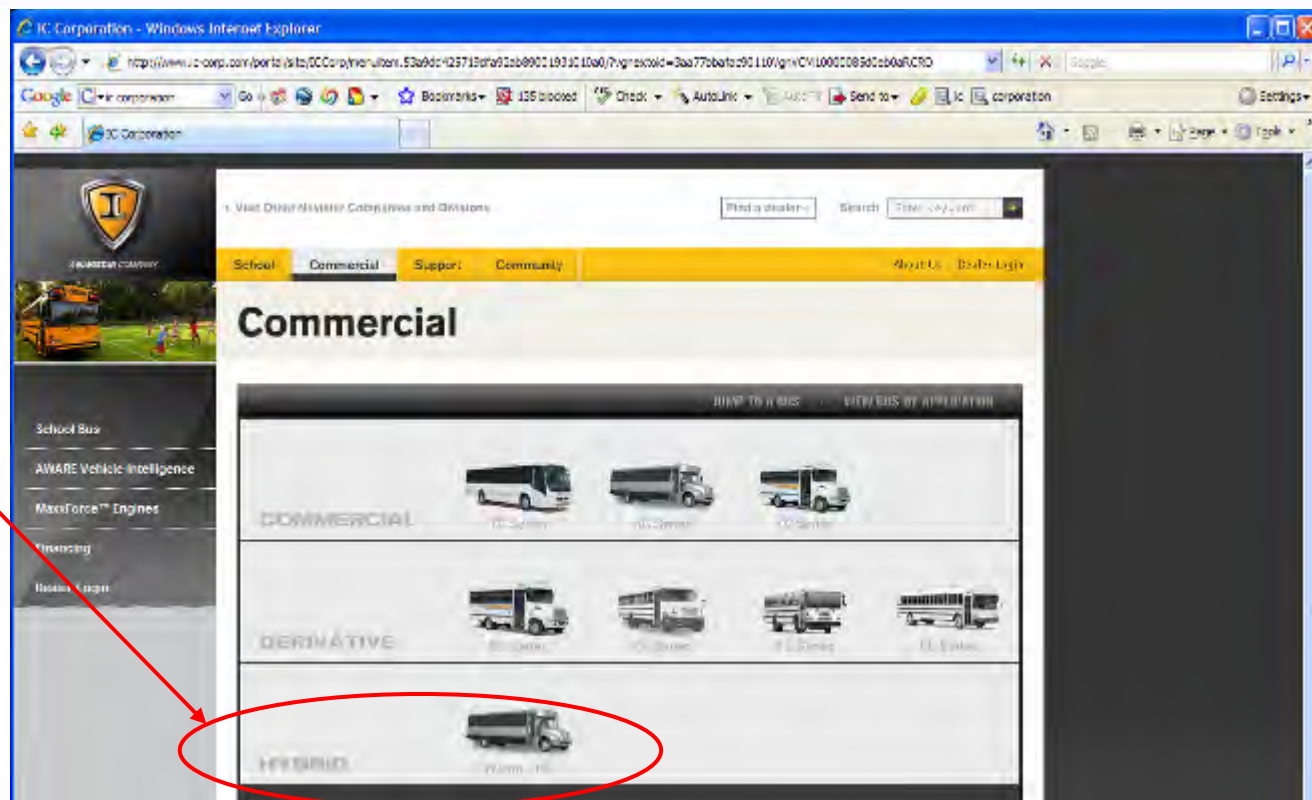
► Focus on Market-Ready Solution

Available for purchase



► Transform Other Markets

Commercial Shuttle Buses



▶ Potential Grid Impacts of PHEV's

- ▶ Near term
 - > Existing studies show large volumes of PHEV's will not impact existing supply
 - > Due to off-peak demand, most experts agree this should reduce rates
 - > Some proposed legislation combines the rate increasing effect of renewables with the rate decreasing potential of plug-ins to hold rates steady
- ▶ Long term
 - > Possibility of utilizing the storage capacity to utilize renewables which do not provide optimal availability
 - > Vehicle to grid offers possibility of peak shaving, reduced spinning reserve and regulation power



▶ How we got here

- ▶ As with many Advanced Energy initiatives – it began with a chicken or egg situation
- ▶ Worked with purchasers, such as N.C. Department of Public Instruction
- ▶ Worked with suppliers, such as Thomas Built Bus and International Truck and Engine
- ▶ Landed STAC grant



▶ Estimated Benefits

- ▶ Plugging in is optional
- ▶ 90 to 100 percent increase in fuel economy for the first 45 miles
- ▶ 40% increase for remainder
- ▶ 90% reduction in particulate matter
- ▶ 60% reduction in NOx
- ▶ Increased engine, transmission and brake life
- ▶ Electricity cost of 60¢ / gallon equivalent



► The Result

Extension cord
ceremonies (so far)

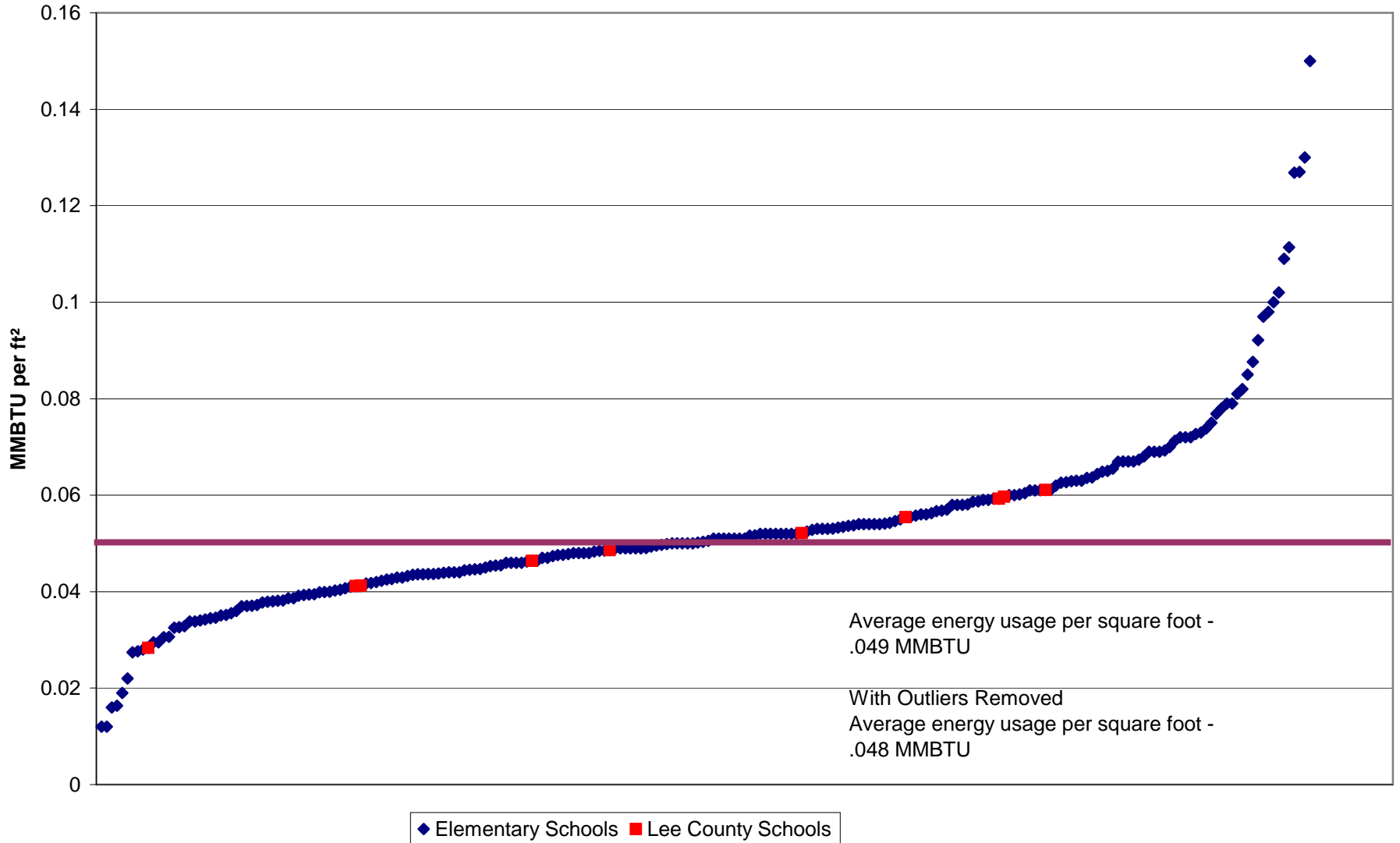
FL (2), PA (1), NC (2)

WA (1), AR (1), CA (1)

Next Step – 300 buses



Elementary School Energy Usage



▶ Plug-in Hybrid Electric School Buses

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