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Transportation Options & Opportunity

a North Carolina Perspective

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Discussion Opportunities

- **Location and mass transit systems as drivers, need and role of long-term strategies**

- Partner/coordinate with local & regional transit systems i.e. PART 2x daily $10 fare Boone to Greensboro; UNC & Towns of CH & Carrboro support for FREE local transit, State support for $25 annual pass for express bus service CH to Raleigh

- **Fundamental role of parking in long-term campus transportation solutions**

-Cost drives use of alternative transportation modes

Discussion Opportunities

- **Decreasing SOVs (ex. zipcar/car-share/ride-share)**

- Zip car programs- NCSU, UNC, others?, Zim Ride : UNC CH, UNC G, ASU, NCSU others?, WeCAR @ Duke/Enterprise partner on car sharing w/ Chevy Volt, RelayRides – on line individual car rentals/ sharing

- **Increasing bicycles, pedestrian, and public transit options**

- campus/town bike sharing programs, incentives for staff & student alternative commutes

Discussion Opportunities

- **Telecommuting/ distance learning insights**

- *University system telecommuting policy?*

- **Changing university faculty/staff/employees travel habits (ex. guidelines for air miles travelled)**
- **Alternative fuels for university fleets (ex. biofuels, natural gas, propane, electric)**
- **Advanced technology vehicles in university fleet; encouraging their use in non-university fleets**
- **Policies to promote better transportation decisions**

Green Fleet Program - Why Have One?

Institutionalize support for petroleum and/or emissions reduction to get:

- Cycle of Improvement
- Less vulnerability to staff turn-over, opposition
- Streamlined ‘green’ decision-making
- Positive PR

How To Green Your Fleet

- Fleet Assessments
  - Fleet Inventory
  - Vehicle Utilization Review
  - Policies and Vehicle Management System Review
- Fleet Improvement Planning
- Mechanism to share/celebrate successes
  - Internally and Externally!

Fleet Improvement Planning

Successful ‘fleet team’ includes:

Fleet manager

Maintenance manager

Vehicle Technicians

Purchasing director

Facility planner

Administrative leader

Vehicle users

Idle Reduction Policies

Implement Your Own Idle Reduction Program

- Recognize drivers who successfully reduce idling
- Award drivers a certificate of recognition (see U.S. EPA Idle-Reduction Kit)
- Rewards for drivers who successfully reduce idling (gift certificates or other items from local businesses, Clean Air non-profit organizations, or Parent/Teacher organizations
- Calculate fuel and dollar savings from idling-reduction with EPA calculator
- Urge community leaders to issue a local Idle-Reduction Proclamation
- Consider using the outreach materials available in the EPA Idle-Reduction Kit to share your success with other fleet managers, the media and the general public: http://epa.gov/cleanschoolbus/index.htm

Federal & State Requirements

1992 Federal Energy Policy Act

- 75% of light-duty vehicle acquisitions in covered fleets (includes state) must be alternative fueled vehicles

2004-2005 North Carolina budget provision 19.5

- State fleet must reduce petroleum use by 20% from 2005 levels by 2016

2007 Federal Renewable Fuels Standard

- Increased the volume of renewable fuel required to be blended into gasoline and diesel

Eco-Driving: Drive Green/ Save Green

Set of driving practices that increases fuel efficiency 15-33%

- Reduces greenhouse gas emissions, air pollution, enhances energy security
- Saves gas money
- Eco-driving = Safe driving
- NCSC offers free ½ hands on training

- Results from UNC G training saw AVG 27% improvement based on before & after driving data

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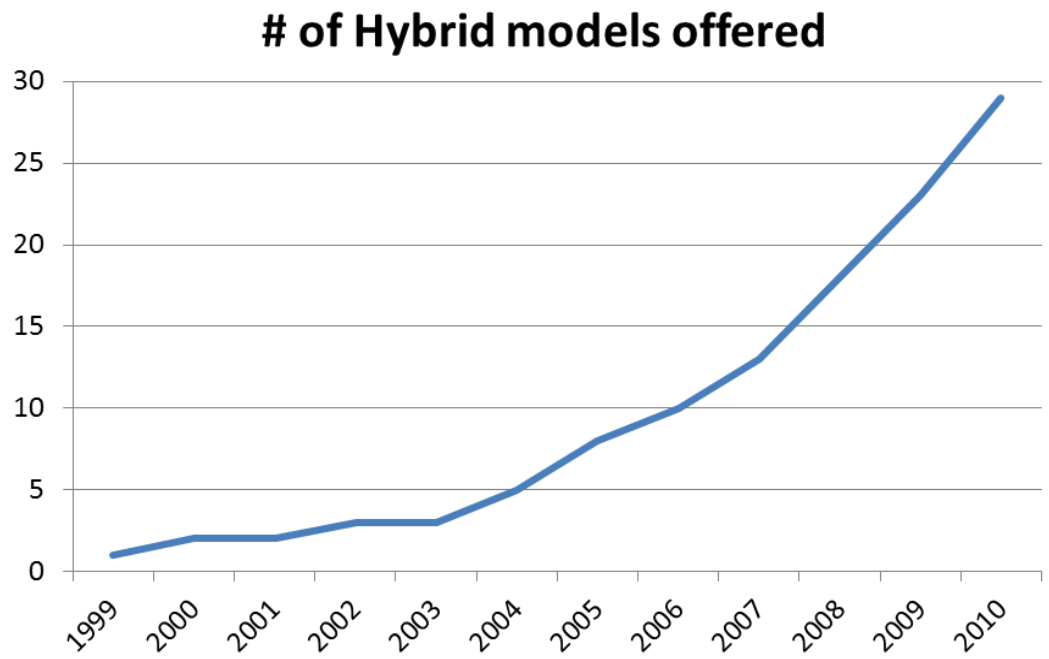
Hybrids

- Combine electric motor/batteries & ICE for improved efficiency /reduced fuel costs/lower emissions
- Increasingly available on more vehicle models (34 in 2012)
- Toyota Camry & Prius II on state contract



Source: http://www.afdc.energy.gov/afdc/data/vehicles.html

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The Segway

- A two wheeled, plug in, self-balancing personal transportation devise that can reach 12 mph

- In use by over 300 police and security forces including Duke University, Charlotte, Monroe & Wilmington

  www.segway.com

www.flickr.com/photos/zen/210417662/

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Neighborhood Electrics (NEVs)

- NEVs can fulfill many tasks especially in urban centers, campus environments, etc.
- Range is typically 30 to 50 miles/charge.
- Speed limited by federal law to 25 mph, can be driven on streets zoned up to 35 MPH.

- No special recharging infrastructure required. Can be plugged into 110 outlet.
- 13 campuses have a total of 232 NEVs in FY 2010-11

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Electric Vehicles

- Potential for zero emissions
- Many options and applications: passenger vehicles, commercial vans, buses, light trucks, trolleys
- Standardized plugs for recharging
- Increased availability of public recharging infrastructure (i.e over dozen at NCSU)
- 50-70 cents per gallon equivalent
- Chevy Volt & Nissan Leaf on state contract

Nissan Leaf plug-in electric

- all-electric, 70-100 mi range
- 3-20 hours to recharge depending on charging station

Chevy Volt- plug in hybrid

- all electric 40 mile range
- standard gas engine extends range between charges

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Natural Gas & Propane

- Natural Gas is compressed (CNG)
- Propane, Liquefied Petroleum Gas (LPG), Autogas is by product of oil and gas extraction
- Clean burning , low carbon fuels
- Energy security: 85% of LPG & CNG used in US is domestically produced
- Available: Established distribution network

Air Quality Benefits

(percent emissions reduction)

	CNG	LPG*
NO_x	50-85%	30-78%
VOC/HC	70%	40-80%
CO	74-90%	20-90%
Particulate matter	-	100%
CO_2	15-30%	21-24%

*Dedicated LPG vehicles only

Sources:
http://www.afdc.energy.gov/afdc/vehicles/emissions_propane.html,

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Natural Gas & Propane Refueling

- For CNG time fill (less expensive) or fast fill
- 14 CNG stations in NC open to state/local govt : http://www.daq.state.nc.us/motor/cng/refuel.shtml
- PSNC and Piedmont Natural Gas are actively engaged in expanding the CNG market in North Carolina http://www.psncenergy.com, https://www.piedmontng.com/
- Propane infrastructure is similar to gasoline, many vendors will provide refueling at no cost to customer as part of fuel contract
- CNG & LPG typically track less than gasoline & diesel (about ½ the price!)

CNG & LPG Vehicles

- Vehicles manufactured for CNG: Honda Civic GX, Ford Focus CNG Bi-fuel (on state contract. More models in 2013
- Vehicles can also be up-fitted to run on CNG & LPG (warranties remain intact)
- More than 40 engines have been EPA-certified through up-fitters
- CNG for Heavy Duty: reliable, no diesel particulate filters needed, lower cost fuel than diesel. Good applications: Refuse and transit
- LPG for Light-Med Duty: NC success stories include Raleigh police, Iredell Co sheriffs dept., Davidson Co transportation dept.,

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Idle Reduction Technologies
Extended Deep Cycle Power Sources

- Operate all on board electrical equipment without having to invest in an APU
- Example includes: The Odyssey Battery , Havis IdleRight
- Energy Xtreme " Independence Package" another option- potential for vehicles electronics to run 4-6 hours and recharge in 2 hours.
- Good choice for police/security
- EPA certification for idle reduction technologies:

http://epa.gov/otaq/smartway/transport/what-smartway/verified-technologies.htm#idle
http://www.odysseybatteries.com/
www.IndependencePackage.com

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Biodiesel

- **Domestic, renewable** fuel for diesel engines
- Derived from fats and oils such as soybeans and animal fats
- Non-toxic, High flash point, Adds lubricity to ULSD
- "Pour and go" technology, no retro-fits required
- For fleet typically blended as B20
- NC has 5 biodiesel production facilities

Air Quality Benefits

Blend	B20	B100
Carbon Monoxide	12%	47%
Hydrocarbons	20%	67%
Particulates	12%	48%
Sulfates	20%	100%
Nitrogen Oxide**	2% *	9%
Air Toxics	20%	60-90%

Source: EPA (www.epa.gov)

** A 2005 NC DOT study found a 10 % decrease in NOX with B20 in on-road testing of dump trucks

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Ethanol

- Renewable fuel produced by fermenting organic materials
- Used in E10 in all gasoline vehicles, E85 in flex fuel vehicles (FFVs)
- 115 octane, non-toxic, biodegradable, water soluble
- Transported via truck or rail, no pipeline
- 27% less energy in a gallon of ethanol, needs to be priced below petroleum to be competitive

Air Quality Benefits	Test Data[1]	Theoretical[2]
Carbon Monoxide	14%	40%
Volatile Organic Compounds	2%	15%
Nitrogen Oxides	31%	10-40%
Particulate Matter	-	20%
Greenhouse gas (corn based E85)	-	15%
Greenhouse gas (cellulose E85)	-	70%

[1]Based on MY2008 FFVs tested by the EPA for their annual certification test results (www.epa.gov/otaq/crttst.htm)

[2]Based on ethanol's inherently "cleaner" chemical properties with an engine that takes full advantage of these fuel properties and Argonne National Lab modeling.

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Why support E85 & B20 use in NC?

- **Already in use:**
  - NC has over 211,000 flex-fuel vehicles (FFVs) while the US has over 9 million FFVs [March 2011, Growth Energy]
  - 26 E85 fueling stations in NC, 18 of them available for public use & 130+ B20 stations
  - 4 campuses using 88,000 E85 and 8 campuses are using over 270,000 gals of B20
  - **State fleet has over 5,000 FFVs, state contract has 4 FFVs** (Chevy Malibu, Ford Fusion, Dodge Avenger, Chevy Impala
- **Auto market expanding:**
  - All major US automakers sell FFVs at no additional cost to the purchaser
  - 40 + FFV models in 2012 with plans to continue expanding production to meet federal directives . Diesel vehicles are more efficient and options are expanding

http://www.eere.energy.gov/afdc/data/vehicles.html

State and Local Resources

Triangle Clean Cities Coalition www.trianglecleancities.org

Centralina Clean Fuels Coalition (Charlotte) www.4cleanfuels.com

Land of Sky Clean Vehicles Coalition (Asheville) www.landofsky.org

State Energy Office www.energync.net

North Carolina Solar Center www.cleantransportation.org

Funding Opportunities

Clean Fuels Advanced Technology, 2013-2016

- $4.5M in sub-award funding for clean tech projects in 24 NC counties

Other funding opportunities listed at www.cleantransportation.org >> Resources >> Available Funding

Centralina Clean Fuels Coalition

Land-of-Sky Clean Vehicles Coalition

Triangle Clean Cities Coalition

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