UNIVERSITY of NEW HAMPSHIRE
Evolving Sustainable Transportation Systems

November 1, 2013
University of Rhode Island

Stephen Pesce,
Special Projects Director
Campus Planning
spesce@unh.edu

Setting and Stats:
16,000 students (13,600 undergrad and 60% resident)
3,900 fac/staff (faculty 1,200)
Total headcount of 20,000
approx 11,000 ‘commuter HC’ 40-50% by vehicle

Town Population of 13,000
midpoint in Boston-Portland Corridor
midpoint of Urbanized area: population 190,000

180 head dairy herd
60 organic
120 conventional
Campus Image

There are three distinct and differentiating images:

- New England village
- New England college campus
- New England native landscape

Framework of Transportation Efforts at UNH

Transportation Demand Management (TDM) based policy adopted in 2003 and became a cornerstone of the 2004 Campus Master Plan Update. Reaffirmed in 2012 Plan.

- Enhance the walking campus
- Reduce community transportation impacts
- Improve the network of streets
- Improve mobility for UNH community with a systems approach
- Consider energy and emissions impacts of our choices
- Expand accessibility of the University
Campus Master Plan & changing population affects transportation demand

- Flexible Scenario enrollments:
  - undergraduates: 11,000-13,000
  - graduate students: 2,000-2,500
  - faculty/staff: 3,200-3,900

- Growth in Research Programs
- Goal to house at least 60% of undergraduates on campus (stable from current)
- Limited parking expansion and maintain freshman parking permit ban
- Adapt system design to changing student and fac/staff work populations and daily schedules and demographic changes

Evolving Transportation Policy
Leadership and Community Dialog

Transportation Policy Committee
(since 80s but redesigned under VPFA in 2001)
- Dialog on transportation choices, costs and impacts on land-use, climate and energy. Town representation (resident, staff and Durham Police)

System Improvements Yield Results:
- Transit: 100% since 2001 - >1.2 million trips
- Parking Permits – decline over past 7 years
- New Services Such as ZipCar, Amtrak Downeaster
- Ongoing improvements to short-term access, campus transit standards
  - New transit equipment, higher transit frequency
  - Improved parking lot enforcement and services
  - Student Transportation Fee assistance
  - Aggressive pursuit of grant funding
  - Technology based solutions (NextBus)
Systems Approach

**Sustainability ↔ Climate Education ↔ Transportation Systems**

- After heat and electricity, UNH fleet fuel consumption (direct) and personal commuting (induced) are the biggest energy uses and emission generators. Increasing share since EcoLine Cogeneration

- Transportation choices have community impacts. UNH has successfully worked to reduce vehicular commute traffic to Durham and works to reduce our impacts on Durham neighborhoods.

- We are approaching the issue with a series of institutional practices, data collection, transportation system choices, demonstration of new technologies and general community education.

---

20 Year Master Plan Context

Reducing Commute trips (VMT) and emissions through on-Campus Housing

<table>
<thead>
<tr>
<th>Population Component</th>
<th>2002 Base</th>
<th>2012 Build Projection</th>
<th>2022 Build Projection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty/Staff (all commute)</td>
<td>3,320</td>
<td>3,400</td>
<td>3,520</td>
</tr>
<tr>
<td>Graduate (all commute)</td>
<td>2,150</td>
<td>2,325</td>
<td>2,500</td>
</tr>
<tr>
<td>Undergraduate Population:</td>
<td>10,850</td>
<td>11,450</td>
<td>12,000</td>
</tr>
<tr>
<td>On-Campus undergraduate housing</td>
<td>5,610</td>
<td>6,400</td>
<td>7,200</td>
</tr>
<tr>
<td>On-Campus family/graduate housing</td>
<td>333</td>
<td>420</td>
<td>566</td>
</tr>
</tbody>
</table>

**Commute population**

| Faculty/Staff plus students minus on-campus housing | 10,377 | 10,355 | 10,254 |

Reduced traffic and emissions due to significant increases in on-campus housing - 20 year growth plan with reduced SOV commutes
**Benchmarking**

*Show Results:*

1. Develop broad support and demonstrate new fiscal commitment (student fee)
2. Identify greatest deficiencies (transit, parking, traffic) and fix. (visitor access, equity, enforcement)
3. Go after outside funds – USDOT funding ($7mill)
4. Improve service and listen better
5. Consistent reporting to community

*Ongoing Detail:*

1. completed parking Structure Studies (true cost)
2. completed first traffic model – objective data (town/gown)
3. press Coverage
4. enforcement (fairness)
5. encourage new ideas and constituent dialog as well as student research (gondolas, monorail)

---

**Parking By the Numbers**

2002-2013

---

**Parking Permit Snapshot**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>2002</th>
<th>2004</th>
<th>2010</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res Student</td>
<td>8,503</td>
<td>1,550</td>
<td>1,557</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cmtr Student</td>
<td>3,143</td>
<td>3,031</td>
<td>2,434</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fac/Staff</td>
<td>838</td>
<td>1,033</td>
<td>1,889</td>
<td>2,434</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>449</td>
<td>747</td>
<td>3,031</td>
<td>3,143</td>
<td></td>
</tr>
</tbody>
</table>

---

**Ratio Management**

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2004</th>
<th>2010</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permit: Space</td>
<td>1.38</td>
<td>1.28</td>
<td>1.26</td>
<td>1.19</td>
</tr>
<tr>
<td>F/S Permit: F/S HIC</td>
<td>0.71</td>
<td>0.63</td>
<td>0.83</td>
<td>0.77</td>
</tr>
</tbody>
</table>
Pedestrian Walk Times

5 Minute Walk

Existing Vehicle Parking

2004 Parking: 6,450
2013 Parking: 6,679
Proposed Parking (2022):
7,050 spaces

Net gain capped at 600 spaces or 10% increase over 2004

Academic Way (future)
University Transportation Services (UTS) offers many services:

- Wildcat Transit
- Campus Connector
- Access Van
- Safe Rides
- Guaranteed Ride Home
- Cat Courier
- Cat Cycle (Bike Program)

And we manage the parking system

Funded by parking permits, Student Transportation Fee and federal Capital Investment in transit fleet equipment
UNH Wildcat Transit – two public systems

**Wildcat Transit**
Free for UNH ID holders
$1.50 cash fare for others

**Routes**
#3 – Dover  
#4 – Portsmouth  
#5 – Newmarket  
#125 - Rochester

Near hourly frequency during academic weekdays. Daily service during the school year and weekdays during breaks.

**Campus Connector**
Free to all
Operates daily during academic semester

---

**UNH Wildcat Transit Ridership Trends**

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>FY 01</th>
<th>FY 05</th>
<th>FY 13</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNH Transit Ridership (Passenger Trips)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Campus Connector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>201,150</td>
<td>805,643</td>
<td>1,184,560</td>
<td></td>
</tr>
<tr>
<td>Campus Connector</td>
<td>480,684</td>
<td>630,754</td>
<td>895,203</td>
<td></td>
</tr>
<tr>
<td>Wildcat Transit</td>
<td>110,486</td>
<td>174,889</td>
<td>289,447</td>
<td></td>
</tr>
</tbody>
</table>
...results in significant private vehicle miles avoided (over 5 million) ...and less traffic

However… these savings require investment:
• UNH transit operating cost per mile averages $4.00/mile (excluding capital).
• UNH transit system budget is +/- $3M/year.
• Students contribute over $1.5M of that in their transportation fee.

Other UNH TDM Services

Access Van
Provides on-call transport around campus for those injured or disabled.
Operates
Daily 6:30 am to midnight

Safe Rides
Provides UNH students a backup safe ride home from social events.
Not a replacement for designated driver.
Operates
Thursday – Saturday
11:00 pm – 3:00 am
Guaranteed Ride Home

Emergency rides from campus to home or to pickup children in school.
For fac/staff/students who have taken transit, carpooled or biked to work. Managed through UNH Dispatch.

Medi-Cat

Non-emergency, transportation to hospitals or specialists scheduled through UNH Health Services or Wentworth-Douglass Hospital

Two Bike Programs

- **Cat Cycles**
  Free sign out of a community bike for up to a week at a time.

- **Blue Bikes**
  Buy a blue bike for the use by your university department.

Cat Courier

Don’t have time to wait for the Campus Connector or Mail Services?
Cat Courier is a fee based courier service for people and packages on campus.
A history of Climate focus...

UNH Greenhouse Gas Inventory

Oldest endowed Sustainability Program in the US: established in 1997

Co-developed greenhouse gas emissions calculator with Clean Air Cool Planet in 2000...now used as a model by AASHE and a component of the STARS reporting program

Signator to the ACUPCC *Presidents Climate Commitment* now signed by 700 US Universities including URI

Adopted a Climate Action Plan – ‘Wildcap’ in 2009

Ranked by USDOE as top 5% for energy efficiency

Clean Fleet and Emissions

UNH is a state leader in alternative fuel use in its fleet

- UNH Transit runs CNG and B20 fueled buses.
- Almost 20% of UNH total fleet and 40% of Transit is powered by CNG.

*The shift to CNG is accelerating with new fast-fill fuel station*

UNH general fleet fuel trends over past five years:

- Gas and petroleum diesel ↓ 10%.
- CNG ↑ 5x displacing 47,000 gallons gas/diesel.
- Biodiesel (B20) introduced 2006 is used in over 85% of UNH diesel fleet and last year saved over 17,000 gallons petroleum diesel.
- Increasing hybrid and electric vehicles.
Institutionalizing Choices
Clean Fleet Practices and Policies

ECOCat: Vehicle Selection Calculator
http://www.unh.edu/facilities/ecocat_calc.html

Alt Fleet Fuel Consumption and Emissions

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>CNG (gge)</th>
<th>% Total Fleet Fuel Share</th>
<th>% Transit Fleet Fuel Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>12,288</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>2008</td>
<td>13,938</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td>2011</td>
<td>39,672</td>
<td>9%</td>
<td>13%</td>
</tr>
<tr>
<td>2012</td>
<td>37,318</td>
<td>18%</td>
<td>30%</td>
</tr>
<tr>
<td>2013 projection</td>
<td>40,000</td>
<td>20%</td>
<td>40%</td>
</tr>
</tbody>
</table>

UNH CNG Fleet Use (selected years)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Petrodiesel</th>
<th>B20 Biodiesel</th>
<th>Combined</th>
<th>Petrodiesel</th>
<th>Biofuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>110,309</td>
<td>0</td>
<td>110,309</td>
<td>110,309</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>51,368</td>
<td>51,805</td>
<td>103,173</td>
<td>92,812</td>
<td>10,361</td>
</tr>
<tr>
<td>2008</td>
<td>26,687</td>
<td>77,092</td>
<td>103,779</td>
<td>88,360</td>
<td>15,419</td>
</tr>
<tr>
<td>2009</td>
<td>23,465</td>
<td>85,543</td>
<td>109,009</td>
<td>92,658</td>
<td>16,351</td>
</tr>
<tr>
<td>2010</td>
<td>31,232</td>
<td>76,116</td>
<td>107,348</td>
<td>92,125</td>
<td>15,223</td>
</tr>
<tr>
<td>2011</td>
<td>18,949</td>
<td>85,561</td>
<td>104,510</td>
<td>87,398</td>
<td>17,112</td>
</tr>
<tr>
<td>2012</td>
<td>13,351</td>
<td>70,392</td>
<td>83,743</td>
<td>69,665</td>
<td>14,078</td>
</tr>
<tr>
<td>2013</td>
<td>13,000</td>
<td>69,000</td>
<td>82,000</td>
<td>68,200</td>
<td>13,800</td>
</tr>
</tbody>
</table>

FY 13 Total
Fleet Fuel Use:
242,000 gge
$734,000
20% AFV miles

FY 13 Goal 20% 40% CNG
CNG Facilities at UNH

**FUELING STATION - Incremental expansions**

- 2001: 1st Fuelmaker
- 2006: 2nd Fuelmaker
- 2008: 4th Fuelmaker & cascade tank set
- 2011: Hi-speed compressor and dispensers

10 year investment of just under $1M (80% federal)

**Next upgrade – increase storage/backup power**

<table>
<thead>
<tr>
<th>Year</th>
<th>scfm</th>
<th>12 gal tank fueling time</th>
<th>Available drawdown (gge)</th>
<th>Max 24 hour output (gge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>8</td>
<td>4 ½ hours</td>
<td>0</td>
<td>132</td>
</tr>
<tr>
<td>2006</td>
<td>16</td>
<td>2 ¼ hours</td>
<td>0</td>
<td>264</td>
</tr>
<tr>
<td>2008</td>
<td>32</td>
<td>1 hour</td>
<td>0</td>
<td>528</td>
</tr>
<tr>
<td>2011</td>
<td>125</td>
<td>3-7 mins</td>
<td>100 gge</td>
<td>1,440</td>
</tr>
</tbody>
</table>

Current peak 200 gge/day

CNG Fleet at UNH

In 2013, CNG represented approximately:

- 20% of total fleet fuel use
- 40% of UNH Transit

**FY 14 Goal is 25/45%**

<table>
<thead>
<tr>
<th>Year</th>
<th># Vehicles</th>
<th>Types</th>
<th>CNG miles</th>
<th>CNG gge</th>
<th>fuel savings</th>
<th>CO2 savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1</td>
<td>Sedan</td>
<td>3,000</td>
<td>300</td>
<td>$500</td>
<td>1.5 tons</td>
</tr>
<tr>
<td>2013</td>
<td>29</td>
<td>Sedans, Pickups Transit (full and med)</td>
<td>200,000</td>
<td>44,000</td>
<td>$72,500 gross of fuel station</td>
<td>135 tons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th># Vehicles</th>
<th>Types</th>
<th>CNG miles</th>
<th>CNG gge</th>
<th>fuel savings</th>
<th>CO2 savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1</td>
<td>Sedan</td>
<td>3,000</td>
<td>300</td>
<td>$500</td>
<td>1.5 tons</td>
</tr>
<tr>
<td>2013</td>
<td>29</td>
<td>Sedans, Pickups Transit (full and med)</td>
<td>200,000</td>
<td>44,000</td>
<td>$72,500 gross of fuel station</td>
<td>135 tons</td>
</tr>
</tbody>
</table>
Biodiesel at UNH

in coordination with DOT, ULSD B20 arrived in summer 2006
transitioning entire diesel fleet to year-round ULSD B20
UNH has +/- 55 diesel vehicles
87% now running on B20:
– In FY 2012 used 70,391 gallons B20 equivalent to 13,351 gals biofuel (avoided petroleum)
Saved 350 tons CO2 since 2006
Goal FY 13: 95% B20 powered

Diesel (b20+petro) is declining at UNH: from a high of 110,000 gals in FY 06 to <80,000 gals in FY 13 as CNG grows

Regional Coordination

- UNH is an active member of Strafford Regional Planning and the MPO and is actively involved in regional and state transportation planning efforts.
- UNH appointee represents shared interests of Town and University on the NH Rail Transit Authority
- UNH is an Active participant in Northern New England Passenger Rail Authority/Amtrak Downeaster events and committees.
Collaborations with Durham

- Durham-UNH Traffic Model
- NH 108 improvement advocacy
- Brownfields/redevelopment applications for Craig Supply property.
- Main Street CMAQ and TE projects - shared management.
- Dialogs regarding downtown traffic patterns and development partnerships.
- Combined Grant Applications
- Amtrak Station Community shared support
- Traffic Safety Committees (speed limits, shared pavement graphics, nuts and bolts)

Durham-UNH Traffic Model

- Collaboratively funded objective analysis tool managed by 3rd party consultant.
- AM peak hour model completed.
- Available for use by Town, University and developers - at discretion of Planning Board.
- Coordinated with regional traffic model.
- State of the art and expandable.
Transportation Improvements

New Transit Fleet – Ongoing
Over $4.25 million of new clean fuel vehicles since 05
Including $1.25 of ARRA CNG buses

Main Street-East (2007) CMAQ
$1.3 million street redesign improved bike/transit

Rail Station (2007-2008) CMAQ/TE
$900,000 renovation and transit improvements

Main Street-West (2010) TE
$1.3 M corridor investment – over $900k federal ($758,000 ARRA)

CNG Station/Garage (2008-11) CMAQ
$740,000 renovation and transit improvements

Coordinated Efforts
Energy-Transportation – Climate Education

UNH Clean Fleet Programs
- Eco-Cat alternative fuel
- B20 Biodiesel transition
- CNG on-campus
- Enterprise hybrid fleet
- Right-sizing and AFV use

DOT/DOE/EPA Partnerships on high visibility successful projects
- Over $6.5 million of USDOT and USDOE funds leveraged for transit, rail station, ped/bike and alternative fuel projects

Investment in Transit
- Leveraged USDOT funds
- Voluntary student investment
- Expanded free community transit
- Cost-effective utilizing student drivers
- Largest transit agency in state
Amtrak Downeaster and C&J
our intercity partners

Intercity Rail & Bus Ridership
Durham-UNH

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,413</td>
<td>49,193</td>
<td>61,500</td>
</tr>
<tr>
<td>Downeaster</td>
<td>4,413</td>
<td>49,193</td>
<td>54,000</td>
</tr>
<tr>
<td>C&amp;J</td>
<td>-</td>
<td>-</td>
<td>7,500 (est.)</td>
</tr>
</tbody>
</table>

- Growing Transit Center welcomes new carriers and new options for our community.
- On peak days this semester there were over 9 roundtrips to Boston. 5 daily to Portland.
- 80% of intercity travelers walk/bus to station.
- Approximately 25-40 daily outbound commuters.

drive zipcars by the hour or day

unh students, faculty, and staff can join zipcar for only $35/year. you also get $35 in free driving to use your first month!

Get 24/7 access to Zipcars parked right on campus! Simply reserve online, let yourself in with your Zipcard and drive. Our low hourly and daily rates always include gas and insurance.
Newest Projects:

AVL-GPS: Real Time Transit Info
- $350,000 Total
- 25% Match
- AQ Benefit 6,087.0 kg
- Cost/Benefit $43/kg saved

Wildcat Expansion: Rochester/NH 125
- $1.2M Total
- 20% Match
- AQ Benefit 4,587.5 kg
- Cost/Benefit $215/kg

Wildcat Transit Fleet Replacement - IV
- $1.2M Total
- 25% UNH Match
- AQ Benefit 5,864.5 kg
- Cost/Benefit $169/kg

South Drive Transitway
- A major segment in on-campus street network.
- Evaluated with UNH-Durham traffic model for traffic and air quality benefits.
- UNH pursuing funding opportunities.
- Will also permit other utility improvements to southwest quadrant of campus.
Next Goals – 5%

Fleet Fuel
- In FY 14 increase CNG by 5% to 50,000 gge
- Decrease diesel by 5% while increasing the remaining share B20 to 95% fleet
- Increase purchased/replacement vehicle efficiencies by 5% (improve benchmarking)

Fleet Efficiency
- FY 14 Life Cycle Cost Calculator for all vehicle purchases
- FY 14 AFV and MPG documented increase in sedan mpg efficiency

SOV Commuter
- Move 5% more of current SOV commuters into transit or non SOV commute
  Up to 200 commutes/day – 200 parking spaces freed / 6-8,000 VMT reduced/day
  75,000 gallons of fuel reduction/yr and 860 tons/yr of CO2e
  Cost deferral of $1M in new parking infrastructure/ $40,000 yr operational costs
- Connect UNH-Durham with UNH Manchester and School of Law in Concord via Transit

Low Hanging Fruit…I can see it but I can’t reach it

Biggest UNH Non-Success Stories:
1. moving fac/staff parking to more market-based or fiscally sustainable rates to fully fund the system
2. introduction of zero-emission vehicles into on-campus service fleet
3. Acceptance by the old dogs.....inertia

Balanced by A decade of surprising success, impressive change and hope from - from the students:

1. Student expectations, demographics and behaviors are changing far faster than the campus adults....they are moving into a post car age...the universities that grasp this and give them the transportation options they expect will have a strategic advantage.
2. Students support transportation choice financially

University Transportation Systems are uniquely positioned to demonstrate best practices....we are each unique...but we also have the most creative minds and willing partners to make things happen.

Benchmark…measure and grow your success stories.