AGENDA

Regional Freight Advisory Committee
Joint Meeting with
Dallas Fort Worth Clean Cities

North Central Texas Council of Governments
Metroplex Conference Room

Tuesday, February 13, 2018
12:30 p.m.

1. Welcome/Previous Meeting Recap                Jeff Hathcock, NCTCOG
2. Funding Opportunities                        Allix Phibrick, NCTCOG
3. Port of Houston Clean Technologies        Ken Gathright, Port of Houston
5. Mobility 2045 Update                        Kevin Feldt, NCTCOG
6. General Discussion/Announcements             All

Next Meeting: May 8, 2018

www.nctcog.org/rfac
Funding Opportunities for Vehicle and Fueling Infrastructure Projects

Regional Freight Advisory Committee Joint Meeting with Dallas Fort Worth Clean Cities

February 13, 2018
Texas Emissions Reduction Program (TERP)
Administered by the Texas Commission On Environmental Quality (TCEQ)

Objectives Of TERP:
- Reduce Emissions From Pollutants
- Prevent Areas in the State from Violating National Ambient Air Quality Standards
- Advance Technologies that Reduce Nitrogen Oxides (NO$_x$)
- Support the Increased Use of Alternative Fuels

Since 2001, TERP Has Reduced Over 171,495 Tons NO$_x$
TERP Impact By Region

$1.14 Billion Funded Since 2001
(Regional Funding Shown in Millions)

- DFW: $384.6M
- Houston/Galveston: $461.7M
- Beaumont: $45.3M
- Tyler/Longview: $33.1M
- El Paso: $4.4M
- Austin: $16.7M
- San Antonio: 3.3M
- Corpus Christie: $9.8M
- Victoria: $4.9M

Total Funding Received:
- $3 Million - $4 Million
- $5 Million - $9 Million
- $9 Million - $45 Million
- $46 Million - $91 Million
- $92 Million - $461 Million

TERP Eligible Counties
## Vehicle Funding: Medium/Heavy-Duty Vehicles

<table>
<thead>
<tr>
<th>Program</th>
<th>Eligible Activities</th>
<th>Funding Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERP Clean Fleet Program* (Expected Spring 2018)</td>
<td>Replace at Least 10 Diesel Vehicles with Alternative Fuel or Hybrid</td>
<td>Up to 80% of Total Vehicle Cost</td>
</tr>
<tr>
<td>TERP Natural Gas Vehicle Grant Program* (Expected Spring 2018)</td>
<td>Replace/Repower Heavy- or Medium-Duty Vehicle with Natural Gas</td>
<td>Up to 90% of Incremental Cost of Natural Gas Vehicle</td>
</tr>
<tr>
<td>TERP Emissions Reduction Incentive Grant (Expected Spring 2018)</td>
<td>Replace/Repower/New Purchase/Retrofit Heavy-Duty Vehicles and Equipment</td>
<td>Up to 80% of Eligible Costs</td>
</tr>
<tr>
<td>TERP Seaport and Rail Yard Areas Emissions Reduction Program* (Expected Spring 2018)</td>
<td>Replace/Repower Drayage Truck or Cargo Handling Equipment</td>
<td>Up to 80% of Eligible Costs</td>
</tr>
</tbody>
</table>

*Program Changes Made In 2017 Legislative Session, Senate Bill 1731
## Infrastructure Funding

<table>
<thead>
<tr>
<th>Program</th>
<th>Eligible Activities</th>
<th>Funding Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERP Alternative Fueling Facilities Program (Deadline: March 29, 2018)</td>
<td>Install Alternative Fuel Infrastructure in the Clean Transportation Zone</td>
<td>Up to 50% of Project Cost, Limited to a Maximum of $600,000</td>
</tr>
</tbody>
</table>

**Clean Transportation Zone**

[Map of Clean Transportation Zone]
Major Funding Sources – Volkswagen Settlement

Total Settlement to Date: $14.7 Billion

- Zero Emission Vehicle (ZEV) Investment - Managed by Electrify America
- Environmental Mitigation Trust (EMT) - Distributed to States

Settlement Breakdown ($ in Billions)

- Vehicle Buyback and Modification: $10.0
- ZEV Investment: $2.0
- Environmental Mitigation Trust: $2.7

Texas’ Share: $209 Million
### Potential Funding – Volkswagen Settlement

**TCEQ Now Accepting Comments on Environmental Mitigation Plan!**

**If Any of These Projects are of Interest be Sure to Submit Comments**

<table>
<thead>
<tr>
<th>Eligible Vehicle/Equipment Types</th>
<th>Eligible Activities</th>
<th>Funding Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 8 Freight &amp; Port Drayage Trucks</td>
<td>Replace or Repower Existing Diesel Trucks/Equipment</td>
<td>40% Repower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25% - 50% for Replace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75% for All-Electric</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100% if Government Owed</td>
</tr>
<tr>
<td>Class 4-7 Freight Trucks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight Switchers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Cargo-Handling Equipment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Electric Vehicle Charging Infrastructure is Eligible for Funding As Part of a Project to Replace/Repower with Electric Vehicle/Equipment – if Needed
NCTCOG Identifying Demand for Projects in DFW

Collaborations Among Regional Councils Could Lead to State-Level “Bundling” of Purchases

www.nctcog.org/airquality

Have A Project Idea? Let Us Know!

On Volkswagen Page:
“NCTCOG Survey: Fleet Project Wish List”
Sign Up For Email Updates!

Go to: www.nctcog.org/aqfunding
Contact Information

Allix Philbrick
Air Quality Planner
(817) 695-9249
APhilbrick@nctcog.org

www.nctcog.org/aqfunding

AQgrants@nctcog.org

North Central Texas Council of Governments
What is Port Houston?

- Port Houston = Port of Houston Authority

- Port Houston is comprised of 8 operating facilities among the 150+ private and public facilities that line the Houston Ship Channel.
Air Quality
Houston-Galveston-Brazoria Area

Nonattainment for Ground-level Ozone
What Does Port Houston do for air quality?
Goods Movement Emission Inventory

• PHA commissioned the first Goods Movement Emissions Inventory (GMEI) in 2000 (for calendar year 1997)
  – Updated In 2009, for calendar year 2007
  – Second update for calendar year 2013 is nearly complete.

• Future updates will be every 5 years.
2013 Port Houston Associated Goods Movement Air Emissions

- NOX: HDDV = 58%, Locomotive = 22%, CHE = 7%, HV = 4%, OGV = 16%
- VOC: HDDV = 46%, Locomotive = 7%, CHE = 2%, HV = 2%, OGV = 14%
- CO: HDDV = 31%, Locomotive = 7%, CHE = 2%, HV = 2%, OGV = 17%
- PM10: HDDV = 56%, Locomotive = 2%, CHE = 4%, HV = 2%, OGV = 19%
- PM2.5: HDDV = 57%, Locomotive = 2%, CHE = 4%, HV = 2%, OGV = 19%
- SO2: HDDV = 100%, Locomotive = 2%, CHE = 16%, HV = 2%, OGV = 16%
- CO2: HDDV = 48%, Locomotive = 2%, CHE = 16%, HV = 2%, OGV = 16%
Port Houston Emissions Contribution In Houston Area

2011 Houston Galveston Brazoria SIP NOx emissions

- Port Houston: 5%
- Non Port Houston associated sources: 95%

2011 Houston Galveston Brazoria SIP VOC emissions

- Port Houston: 0.25%
- Non Port Houston associated sources: 99.75%

2011 Houston Galveston Brazoria SIP PM2.5 emissions

- Port Houston: 1%
- Non Port Houston associated sources: 99%
Clean Air Strategy Plan

- PHA’s Clean Air Strategy Plan (CASP) is aimed at reducing emissions from ocean going vessels, harbor vessels, cargo handling equipment, locomotives, and drayage trucks.
- The CASP document was prepared in 2011 and is currently being updated.
Port Houston Container Drayage
Trucking Characteristics

- Port Houston operates the Barbours Cut and Bayport container terminals.
  - Barbours Cut - about 2,100 truck visits a day
  - Bayport – about 3,000 truck visits a day
- 17,205 trucks visited these terminals for a total of 1,208,226 truck trips in 2016.
  - 80% of drayage trucking fleet is operated by independent owner/operators.
- 622 different trucking companies visited these terminals.
  - 50 trucking companies that came the most accounted for 69% of the truck trips.
## Port Houston Container Drayage Trucking Characteristics

<table>
<thead>
<tr>
<th>Engine Model Year</th>
<th>NOx Standard (g/bhp-hr)</th>
<th>% of Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989 and older:</td>
<td>10.7</td>
<td>0.37%</td>
</tr>
<tr>
<td>1990</td>
<td>6</td>
<td>0.04%</td>
</tr>
<tr>
<td>1991-1997</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>1998-2003</td>
<td>4</td>
<td>32%</td>
</tr>
<tr>
<td>2004-2006(^a)</td>
<td>2.375</td>
<td>31%</td>
</tr>
<tr>
<td>2007-2009(^b)</td>
<td>1.2</td>
<td>9%</td>
</tr>
<tr>
<td>2010 and newer</td>
<td>0.2</td>
<td>14%</td>
</tr>
</tbody>
</table>

\(^a\) Standard is actually 2.4 g/bhp-hr for NMHC+NOX but TCEQ assumes 2.375 g/bhp-hr for NOX.

\(^b\) Most manufacturers certified their 2007-2009 engines to a NOX limit of about 1.2 g/bhp·hr.
Port Houston DERA Grants

- Port Houston has been awarded $8.2 million in DERA funds
  - 64 yard tractor replacements
  - 26 yard tractor retrofits
  - 31 forklift replacements
  - 14 forklift repowers
  - 1 rubber wheel loader replacement
  - 3 marine engine repowers
  - 13 drayage truck replacements
  - Cleaner fuel use in 163 ocean-going vessel calls
Hybrid RTGs

- 5 Hybrid RTGs at Barbours Cut
- Operate from 40 to 60% on batteries
Operational improvements at Bayport and Barbours Cut terminals
Container Tracking Mobile App
Extended Gate Hours

• Bayport terminal recently extended gate hours from 7 pm to 11 pm
• Allow for more off-peak traffic
• Around 6% of trucks are coming during this time
Optical Character Recognition (OCR)

Bayport Inbound
Optical Character Recognition (OCR)

Bayport Outbound
Optical Character Recognition (OCR)
Trucks do not cross traffic

Old Entrance Truck Gate - trucks use to cross traffic lanes when entering

Trucks now enter by turning right and then cross under Port Road
Port Rd at truck exit has been restriped

Stop sign was removed at truck exit and Port Rd. has been restriped to allow two lanes of trucks to exit onto road without stopping
Flyover from SH 146 to Port Rd

Southbound SH 146 to Port Rd flyover has been built

Port Rd to northbound SH 146 flyover was recently finished
On the Horizon

• Trucking companies will be able to do paperwork online before trucks visit the terminal
  • Will allow for faster processing time through gates.
Operational Improvements

Who Benefits?

• Truck Drivers – better gas mileage, no wasted trips, and more pay (more trips = more pay)

• PHA – more efficient truck flow means more productivity

• Environment – less air emissions released into the atmosphere
Alternative Fuel Use

• Diesel and gasoline primarily used in our operations

  • Biodiesel is not used because it does not reduce nitrogen oxides (NOx)

  • Natural gas only used in a handful of forklifts. However, VW settlement funds may allow for more natural gas and/or electric equipment/heavy duty vehicles.
THANK YOU

Name
Ken Gathright
Port Houston

Questions?
713.670.2690
kgathright@poha.com

www.PortHouston.com
111 East Loop North
Houston, TX 77029
Idle Reduction in Transport Refrigeration: A Technical Assistance Case Study to Reduce Idling in Transport Refrigerators

Pollution Prevention (P2) project from October 2015 to June 2017

Presented to:
Regional Freight Advisory Committee
Joint Meeting with
Dallas Fort Worth Clean Cities

John A. Thornton, CleanFuture, Inc.
Opportunity (Problem Statement): Transport Refrigeration Units (TRU) aka Reefer

Big refrigerators on wheels, running on diesel while parked, often running parked for a long time

- Expensive
- Polluting
- Noisy

40% to 60+% idling on diesel
Big refrigerators on wheels, running on electricity while parked, often running parked for a long time.

- Cheap (inexpensive)
- Clean (no source emissions)
- Quiet
eTRU Electric Infrastructure Description

Electrified Parking Spaces
• Idle reduction technology
  • Dual-system electrification
Transport Refrigeration in Food Supply Chain

Project emphasis:
- Technical assistance for private fleets
- Distribution Centers for local/regional delivery
- Food Manufacturing plants

Cold Chain Point

<table>
<thead>
<tr>
<th>Category</th>
<th>Opportunity / Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Wholesale - Outbound</td>
<td></td>
</tr>
<tr>
<td>Food Manufacturing - Outbound</td>
<td></td>
</tr>
<tr>
<td>Food Wholesale - Inbound</td>
<td></td>
</tr>
<tr>
<td>Refrigerated Storage - Inbound</td>
<td></td>
</tr>
<tr>
<td>Refrigerated Storage - Outbound</td>
<td></td>
</tr>
<tr>
<td>Retail - Inbound</td>
<td></td>
</tr>
<tr>
<td>Food Manufacturing - Inbound</td>
<td></td>
</tr>
</tbody>
</table>
## Project Team:

Portland State University  
FORTH  
CleanFuture™

## Project Partners:

<table>
<thead>
<tr>
<th>Technology Provider</th>
<th>TRU OEM</th>
<th>Telematics Provider</th>
</tr>
</thead>
</table>
| SmartWay-verified (Idle Reduction) | Carrier  
Transicold  
(Experts) | CORETEX  
Driving Intelligence  
ibrighth |  
Shorepower Technologies  
NWTPA  
Portland General Electric  
Pacific Power |
| Trade Association | TRU Dealers | Electric Utilities |
| NWTPA  
Northwest Food Processors Association | COAST  
Truck Centers  
Thermo King Northwest |  
Portland General Electric  
Pacific Power |

## Participants:

Organically Grown Company  
Meals Wheels  
DPI Specialty Foods  
KOOL PAK

+ 18 other anonymous refrigerated fleets
Technical Assistance Addresses Key Barriers*

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not aware of electric-capable TRU technologies (eTRU)</td>
<td>Outreach, Education, Workshops</td>
</tr>
<tr>
<td>Lack knowledge on the operating cost advantages of eTRU over diesel</td>
<td></td>
</tr>
<tr>
<td>Little visibility or poor understanding of their idling time</td>
<td>Technical Assistance (Fleet studies, onsite assistance, coaching, idle management systems, etc.)</td>
</tr>
<tr>
<td>Fleets shy away from the acquisition cost of electric infrastructure and/or electric-capable TRUs without understanding total operating cost or return on investment</td>
<td></td>
</tr>
</tbody>
</table>

* Top four barriers identified in other research:  
  * Market and Technology Assessment of Electric Transport Refrigeration Units.  
    3002006036
Approach: Use Fleet Data to Affect Change

• **Fleet Analytics**
  – Big Data & Business Intelligence
    • Telematics Integration

• **Fleet ROI**
  – Motivation & Justification
Why Use Information to Affect Transportation Choices?

Perceptions:
• “We make good utilization of our reefer trailers, we don’t run our units stationary very much.”
• “We load and go.”
• “We don’t run our reefers more than an hour at our facility”
• “We only pre-cool for 30 to 45 minutes”
• “We don’t run our units with the trailer doors open.”
• “Diesel fuel prices are low, electricity is more expensive”
• “The cost to electrify our facility is too high, it’ll never pay back”

Reality:
• Operating data sets the record straight
Why Use Information to Affect Transportation Choices?

**Perception:** “We make good utilization of our reefer trailers, we don’t run our units stationary very much.”

**Reality:**
- 7.25 hours / day stationary run (avg.)
- 4.43 hours / day on delivery (avg.)

**Summary Statistics**

- **Distribution Center (hours)**
  - Mean: 7.25
  - N: 310.00
  - Sum: 2,248.24
  - Minimum: 1.00
  - Maximum: 59.00
  - Median: 6.00

- **Outside DC (hours)**
  - Mean: 4.43
  - N: 275.00
  - Sum: 1,219.46
  - Minimum: 1.00
  - Maximum: 32.99
  - Median: 4.00
Reality: A day in the life of a TRU at a Grocery Distribution Center

TRU Run Hours by Location

Engine Hours

Inside Distribution Center  Delivery

Low  High  Off
Example #1: Food Distribution Company

Distribution Centers Locations: 8 in U.S.
Fleet size: 24 at site, out of 324 reefer trailers
Sample Size: 3 Refrigerated Trailers
Measurement Period: 8 months
Operation: 6 days / week
Outcomes: Implementing technology at first site, evaluating other sites
Example #1: Food Distribution Company

48% to 58% of TRU engine run hours were idling at home distribution center over 8 month measurement period.

4 to 5 hours / day while stationary
**Example #1: Economics at Food Distribution Company**

### Economics Summary

<table>
<thead>
<tr>
<th>Lifecycle Savings</th>
<th>Investment*</th>
<th>Annual Savings</th>
<th>Simple Payback (yrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$138,000</td>
<td>$97,862</td>
<td>1.4</td>
</tr>
</tbody>
</table>

**NPV & IRR shown before application of incentives (if applicable).**

<table>
<thead>
<tr>
<th>Electricity</th>
<th>kWh / year</th>
<th>$1,819,233</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO₂ Reduction</strong></td>
<td>(metric tons / year)</td>
<td>232</td>
</tr>
<tr>
<td><strong>Fleet Diesel Savings</strong></td>
<td>(total gallons / year)</td>
<td>23,892</td>
</tr>
<tr>
<td><strong>Equipment Life:</strong></td>
<td>20 years</td>
<td></td>
</tr>
<tr>
<td><strong>Electricity</strong></td>
<td>167,244</td>
<td></td>
</tr>
</tbody>
</table>

**Lifecycle Savings**

- $1,819,233
  - Equipment Life: 20 years

**CO₂ Reduction**

- 232 (metric tons / year)

**Fleet Diesel Savings**

- 23,892 (total gallons / year)

**Electricity**

- 167,244 kWh / year

---

### Wasted Spend vs. Savings

- **Without Project**
  - Wasted Diesel Fuel Spend: $1,957,233
  - CO₂ Reduction: 232 metric tons / year

- **Shore power electric standby project**
  - Savings: $1,819,233

---

* Net investment and payback after application of incentives.

** NPV & IRR shown before application of incentives (if applicable).
Project Outputs and Outcomes

- Participants included 19 businesses with 40 distribution center locations
  - Increased awareness
    - 16 scoping studies
    - 24 technical studies
  - Installed and implemented three (3) eTRU projects during 18 month project period

<table>
<thead>
<tr>
<th>Source</th>
<th>P2 Activity</th>
<th>Sector</th>
<th>Haz Materials Reduced (lbs.)</th>
<th>MTCO₂e Reduced</th>
<th>Water Saved (gallons)</th>
<th>Savings ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-001</td>
<td>Replaced diesel TRU idling with grid electricity (eTRU)</td>
<td>Food Distribution</td>
<td>4,578</td>
<td>324</td>
<td>0</td>
<td>$71,081</td>
</tr>
<tr>
<td>P2-016</td>
<td>Replaced diesel TRU idling with grid electricity (eTRU)</td>
<td>Foodservice Distribution</td>
<td>4,288</td>
<td>523</td>
<td>0</td>
<td>$60,570</td>
</tr>
<tr>
<td>P2-020</td>
<td>Reduced diesel TRU idling through behavior change</td>
<td>Grocery Distribution</td>
<td>1,259</td>
<td>154</td>
<td>0</td>
<td>$16,224</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>10,125</td>
<td>1,001</td>
<td></td>
<td>$147,875</td>
</tr>
</tbody>
</table>

- Additional project implementation(s) pending
Information Affects Decision Making
Grid-connected Electric Transport Refrigeration Units (eTRU)

- Electrified Idle Reduction is a viable and available technology:
  - Societal benefits
    - Emission reductions
      - Particulate Matter (PM)
      - Nitrous Oxides (NOx)
      - Greenhouse gases
    - Compelling and cost-effective emissions reduction
    - Reduced noise
    - Environmental justice
  - Beneficial Electrification
    - New way to use electricity as a substitute for fossil fuel
  - End-use Fleet benefits
    - 40 – 70% reduction in operating costs
- Refrigerated Transport industry has been very slow to adopt.
  - More about behavior change / market adoption than technology
Acknowledgements

• This project was funded in part by the U.S. Environmental Protection Agency (EPA) though the Pollution Prevention program.
  – Provides technical assistance and training to businesses on source reduction techniques to reduce pollution.

• Project Partners:
  – Portland State University
    • Transportation Research Education Center (TREC)
  – CleanFuture, Inc.
  – Forth

• Additional support was provided by:
  – Shorepower Technologies.
Thank You!

More Information:

John Thornton
john@CleanFuture.us
503-806-1760
Regional Freight Advisory Committee

February 13, 2018
Agenda

1. Why New Mobility Plan?
2. Mobility Plan Process
3. Demographics
4. Recommended Roadway Plan
5. Mobility 2045 Financial Plan
6. Recommended Policy Revisions
7. Schedule and Next Steps
Why New Mobility Plan?
What is the Mobility Plan?

Required by Law

- Represents a Blueprint for the Region’s Multimodal Transportation System
- Covers at Least a 20-Year Timeframe
- Responds to Goals
- Identifies Policies, Programs, and Projects for Continued Development
- Guides the Expenditure of Federal and State Funds
# Important Dates

<table>
<thead>
<tr>
<th>Action</th>
<th>Mobility 2040</th>
<th>Mobility 2045</th>
<th>Mobility 2045 Amendment</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTC Adoption</td>
<td>March 9, 2016</td>
<td>June 14, 2018</td>
<td>~ June 2020</td>
</tr>
<tr>
<td>Conformity Determination</td>
<td>November 23, 2016</td>
<td>*November 23, 2018</td>
<td>~ November 2020</td>
</tr>
</tbody>
</table>

**Comments**
- Additional funding
- Policy bundle emphasis
- Take advantage of required conformity
- New performance measures
- Emerging Technologies and trends
- TBD
Why New Mobility Plan

New AQ Budgets Found Adequate
November 23, 2016

Must Have Conformity Determination Using New Budgets Within 2 Years (11/23/2018)

Best to Restart 4-Year Mobility Plan Clock Simultaneously
New Mobility Plan

New Base Year – 2018
New Horizon Year – 2045
Air Quality (AQ) Conformity Determination
   November 23, 2018 (Deadline)
Environmental Documentation Consistency
Consistency with 10-Year Plan
FAST Act Requirements
85th Texas Legislative Session Outcomes
Mobility Plan Process
Mobility Plan Process

- Infrastructure Maintenance
  - Maintain & Operate Existing Facilities
  - Bridge Replacements
- Management, Operations and Technology
  - Improve Efficiency & Remove Trips from System
  - Traffic Signals and Bicycle & Pedestrian Improvements
- Growth, Development, and Land Use Strategies
  - More Efficient Land Use & Transportation Balance
- Rail and Bus
  - Induce Switch to Transit
- HOV/Managed Lanes
  - Increase Auto Occupancy
- Freeways/Tollways and Arterials
  - Additional Roadway Capacity

Public Involvement

Environmental Justice
- Financial Constraint
- Technology (AV/CV)
- Air Quality

9
Mobility 2045 Goals

Mobility
- Improve Transportation Options
- Support Travel Efficiency Strategies
- Ensure Community Access to System and Process

Quality of Life
- Enhance Environment and Life Styles
- Encourage Sustainable Development

System Sustainability
- Ensure Adequate Maintenance, Safety and Reliability
- Pursue Long Term, Sustainable Financial Resources

Implementation
- Provide Timely Planning and Implementation
- Develop Cost Effective Projects and Programs
Prosperity and Mobility

Region Is Prospering
Adding 100,000+ Population Annually
Adding 60,000+ Jobs Annually

Corporate Relocations
Toyota
Liberty Mutual
State Farm
Amazon?

Mobility Key Factor
DFW Congestion Levels

Dallas-Fort Worth Congestion Levels and Population

Dallas-Fort Worth's congestion is offset with transportation investments.

$28 Billion Roadway Infrastructure Investment Since 2000

Sources: TomTom Traffic Index 2013, 2014, 2015 and 2016 Data; North Central Texas Council of Governments
Texas Metro Congestion Levels

Austin, Dallas-Fort Worth, Houston, and San Antonio
Comparison of Congestion Levels and Population

Sources: TomTom Traffic Index 2013, 2014, 2015 and 2016 Data;
North Central Texas Council of Governments
Demographics
Regional Perspective

Population
12. Virginia – 8,411,808
13. Washington – 7,288,000
★ DFW – 7,123,170
14. Arizona – 6,931,071
15. Massachusetts – 6,811,779
16. Tennessee – 6,651,194

Source: US Census Bureau July 2016 estimate and NCTCOG
DFW estimate is January 1, 2016

Area (square miles)
44. Massachusetts – 10,554
45. Vermont – 9,616
★ DFW – 9,441
46. New Hampshire – 9,349
47. New Jersey – 8,722
48. Connecticut – 5,543
49. Delaware – 2,448
50. Rhode Island – 1,545

Source: US Census Bureau, 2010 Census and NCTCOG

Note:
Lake Erie = 9,910 square miles

Source: US Census Bureau, 2010 Census and NCTCOG
## 2045 County Population Forecast

<table>
<thead>
<tr>
<th>County</th>
<th>2005</th>
<th>2040</th>
<th>2045</th>
</tr>
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## 2045 County Employment Forecast

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<td>359,914</td>
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<td>Wise</td>
<td>23,710</td>
<td>47,224</td>
<td>51,510</td>
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<td>Parker</td>
<td>44,544</td>
<td>80,404</td>
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<td>Denton</td>
<td>205,991</td>
<td>445,070</td>
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<td>Hood</td>
<td>15,011</td>
<td>29,448</td>
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<td>Kaufman</td>
<td>35,352</td>
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<td>Ellis</td>
<td>53,591</td>
<td>96,872</td>
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<td>Johnson</td>
<td>59,327</td>
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<td>Tarrant</td>
<td>947,961</td>
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<td>Hunt</td>
<td>39,064</td>
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<td>Dallas</td>
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<td>3,617,805</td>
<td>6,691,449</td>
<td>7,024,214</td>
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</table>
Recommended Roadway Plan
Major Roadway Recommendations

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
Arterial Capacity Improvements

Disclaimer: Lines indicate arterials with funds for improvement.

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
“Freeway” Recommendations

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
Major Roadway Recommendations

- New or Additional Freeway Capacity
- New or Additional Managed Lane Capacity
- New or Additional Toll Road Capacity
- Staged Facility (Frontage Roads)
- Asset Optimization

DRAFT

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
Illustrative roadway corridors indicate an identified transportation need and do not represent recommendations or specific alignments. Recommendations may be developed for future MTPs through feasibility analyses, thoroughfare plans, and environmental studies.
High-Speed Rail

Connected System

“One Seat Ride”

Three Stations

Fort Worth
Arlington
Dallas

Source: Getty Images
Corridor-specific alignment, design, and operational characteristics for the intercity passenger, regional passenger, and freight rail systems will be determined through capacity evaluation and ongoing project development. Refined rail forecasts are necessary to determine technology and alignment in future rail corridors.
Additional Plan Components

✓ Sustainable Development
✓ Pedestrian Facilities
✓ People Movers
✓ Freight
✓ Aviation
✓ Transportation Demand Management
✓ Transportation System Management
✓ Transportation System Safety and Security
Additional Plan Components

✓ Environmental Considerations
  ✓ Natural Environment – Including Extreme Weather Resiliency
  ✓ Environmental Justice
✓ Social Considerations
✓ Financial Plan
✓ Technology
✓ Policies
✓ Programs
✓ Public Transportation
Transportation Funding Basics

System Revenue + Facility Revenue + Local Revenue = Regional Transportation System Revenues

- Motor Fuel Taxes
- Vehicle Registration Fees
- Other Federal Sources
- Toll System Revenues*
- Other State Sources

- Toll Road Bonds
- Managed Lanes
- Public/Private Partnerships
- Public Transportation Fares

- Sales Taxes
- Special Taxes
- Bond Programs
- Impact Fees
- Property Taxes
- Value Capture

* Revenue from existing NTTA facilities after bonds are retired.
# Prioritization and Expenditures

## DRAFT

<table>
<thead>
<tr>
<th>Infrastructure Maintenance</th>
<th>2040</th>
<th>2045</th>
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</thead>
<tbody>
<tr>
<td>Maintain &amp; Operate Existing Facilities</td>
<td>$37.4</td>
<td>$ 38.7</td>
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<td>Bridge Replacements</td>
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<table>
<thead>
<tr>
<th>Management and Operations</th>
<th>2040</th>
<th>2045</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve Efficiency &amp; Remove Trips from System</td>
<td>$7.2</td>
<td>$ 9.6</td>
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<tr>
<td>Traffic Signals and Bicycle &amp; Pedestrian Improvements</td>
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<table>
<thead>
<tr>
<th>Growth, Development, and Land Use Strategies</th>
<th>2040</th>
<th>2045</th>
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<tbody>
<tr>
<td>More Efficient Land Use &amp; Transportation Balance</td>
<td>$3.6</td>
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<table>
<thead>
<tr>
<th>Rail and Bus</th>
<th>2040</th>
<th>2045</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induce Switch to Transit</td>
<td>$27.2</td>
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<table>
<thead>
<tr>
<th>HOV/Managed Lanes</th>
<th>2040</th>
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<td>Increase Auto Occupancy</td>
<td>$43.4</td>
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<table>
<thead>
<tr>
<th>Freeways/Tollways and Arterials</th>
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<th>2045</th>
</tr>
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<tbody>
<tr>
<td>Additional Roadway Capacity</td>
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<table>
<thead>
<tr>
<th>Total Expenditures*</th>
<th>2040</th>
<th>2045</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$118.9</td>
<td>$ 135.5</td>
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</table>

* Actual dollars, in billions. Values may not sum due to independent rounding.
Regional Funding

Roadway Expenditures
$ 51 B

Regional Roadway Needs
$ 389 B

Shortfall
$ 338 B

DRAFT

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
Recommended Policy Revisions
Proposed Policy Additions

Freight

Encourage Regional Railroads to Participate in Regional Planning

Technology

Support Infrastructure Maintenance
Encourage Automated Vehicles
Encourage Data Sharing
Managed Lanes Evolution

- HOV
- Tolled Managed
- Dynamically Priced
- Guaranteed Transit
- Early Deployment Vehicle Technology
- Driverless Trucks
Proposed Policy Additions

General

Support Ability to Modify Mobility Plan for Emergency Operational Improvements

Technology Lanes
Managed Lanes
Access Ramps
Auxiliary Lanes

Managed Toll Lane System

Support Implementation within a Tolled Managed Lane Policy Area
Toll Managed Lane System Policy Boundary

Congestion Index*

- No Congestion
- Light Congestion
- Moderate Congestion
- Severe Congestion

Major Roads
Toll/Managed Lane Policy Boundary

Dallas CBD

Fort Worth CBD

Within Boundary
13% Land Area
67% of Congestion

DRAFT

Cost of Congestion/Delay: $25.3 billion
*Congestion Index is based on a percent increase in travel time.
Tolled Managed Lanes

Purpose: Manage Congestion

Effect: Increased Mobility

- Improved Speeds in Tolled Lanes
  - Speeds 50% Faster for Non-Tolled Lanes
  - Speeds 75% Faster for Tolled Lanes

Project Funding Supplement

Allow Private Sector Participation

Users Average About $10 per Month

Drivers Have Choice and Predictability
Next Steps
Transportation Project Process

- Idea
- Feasibility Study
- Environmental Review
- Funding Process
- Right of Way
- Final Design
- Implementation

10 to 25+ Years

Mobility Plan
# Mobility 2045 Schedule

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</tbody>
</table>

**Notes:**
- Public meetings held during highlighted months.
- Regional Transportation Council action on Mobility 2045 Plan scheduled for June 14, 2018.
Next Steps

Revise Recommendations

Public Comment Period – April and May

Review and Action

Technical – May 25

Policy Board – June 14
Questions?

Dan Lamers
Senior Program Manager
dlamers@nctcog.org
(817) 695-9263

Jeff Hathcock
Principal Planner
j hathcock@nctcog.org
(817) 608-2354

Kevin Feldt
Program Manager
kfeldt@nctcog.org
(817) 704-2529

www.nctcog.org/mobility2045