Roadway Safety and Energy Development

2014 Traffic Safety Conference
May 12-14, 2014
San Antonio, Texas

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The past decade has seen **substantial growth** in U.S. (domestic) energy development.

Much of it is due to a combination of horizontal **drilling** and hydrofracturing (‘**fracking**’) in shale formations that hold oil and gas.

Some states also have extensive **wind energy** developments.
TTI Policy Research Center

Currently investigating best practices and lessons-learned about how DOTs are managing impacts from oil, gas, and wind developments on roadways in ...

Top eight (8) energy producing states
- Colorado
- Kansas
- North Dakota
- Oklahoma
- Pennsylvania
- Utah
- West Virginia
- Wyoming

Types of impacts analyzed
- Finance
- Maintenance
- Safety
- Environmental

Research is on-going, discussion today is on preliminary results for these states.
Energy Development (EDev) and roadway traffic

- EDev is often concentrated in **rural/agricultural areas**
  - Local infrastructure & networks designed for low traffic volumes
  - Can also affect urban areas

- EDev is associated with rapid **increases in population**

- EDev affects roadway traffic and driver characteristics:
  - Specific types of vehicles (**heavy trucks**) and drivers (**younger, male**)

- EDev activity is **difficult to predict**
Truck traffic and energy supply chains

EDev and roadway traffic

- EDev can require **over 1,000 truck trips** to develop and fracture a single well:
  - Site and well installations
    - Large/heavy construction and rig equipment
    - Access roads
  - **Well operations** - millions of gallons of water/chemical/sand mixture per well
    - Freshwater input
    - Saltwater output
  - **Resource extraction** – crude oil trucks
  - **Additional** truck trips for refracturing the well
    - Timing??
  - Equivalent to millions of passenger cars
Roadway safety issues

- Roadway condition
- Roadway design
- Congestion
- Commercial vehicle operations
- Driver behavior
Roadway conditions

- Surface condition (e.g., rutting, spalling, cracking)
- Structural integrity
  - Road base
  - Bridges
- Contamination
  - Mud
  - HazMat/chemicals
- Signage

Photo by D. Bierling, Texas A&M Transportation Institute.
Roadway conditions before, during, and after intensive energy development activity in Bradford County, Pennsylvania (Christie, 2012)
Roadway design

- Lane width & shoulder width
- Number of lanes
- Access road/driveway entrances
- Structure (pavement/base thickness)
- Signalization

Photo by D. Bierling, Texas A&M Transportation Institute.
Roads which previously had less than *tens or hundreds* of trucks per day now have *hundreds or thousands* of trucks per day.

Commercial vehicle operations

Types of violations include:

• Vehicle **maintenance**
  • Brakes
  • Suspension
  • Tires
  • Frames

• **Hours** of service

• **Oversize/Overweight**

• **Hazardous materials**
Driver behavior

• Accidents
  • Some (but not all) states experiencing increases in heavy truck crashes
• Aggressive driving
• Impaired driving
Commercial vehicle violations

Examples from Pennsylvania State Police

• **Timeperiod**: April 1 to June 7, 2010
  
  **Roadside inspections**: 400 industry trucks
  
  56% driver or vehicle placed out of service for **serious safety violations** (Cook, 2010)

• **Timeperiod**: January 2010 to June 2011
  
  **Roadside inspections**: 5,800 industry trucks
  
  13,000 driver and vehicle safety [combined] violations, including **2,800 serious safety violations** that placed the driver or truck out of service (Schmitz, 2011)
How are eight other state DOTs addressing safety issues?

**Prevention**
- Increasing weight/load restrictions for roads and bridges (some states)
- Educating industry and public (some states)

**Partnering**
- Bonding/road use maintenance agreements (some states)
- Commercial vehicle and traffic enforcement (all states)
- Industry-agency collaborations/coalitions (some states)

**Maintenance and construction** (all states)
- Resurfacing and rebuilding
- Widening roads and shoulders
- Adding turning lanes
DOT challenges in addressing energy development impacts

- **Informational**
  - Data on traffic, future developments not shared by industry
  - EDev partners may not understand seasonal road impacts
  - Changes in markets, locations difficult to predict

- **Spatial** – scale of impact may be a few counties, or entire state

- **Resources – Financial**
  - Revenue sources
  - Transportation appropriations

- **Resources – Personnel**
  - Labor shortages/ability to pay

- **Organizational**
  - Headquarters/District
  - Proactive/Reactive
Summary

• EDev can have substantial **benefits** for communities, landowners, states, and industry partners
• EDev can also result in transportation system **impacts**, including on traffic safety
• Extremely **complex** relationships between industry, market, regulatory, development, and infrastructure, and demographics
• Other states/DOTs vary in how they are addressing EDev impacts on transportation systems
• **Planning** for growth and associated impacts on local communities and states can be challenging, but is very important
Thank you!

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