LECTURE 22:
MEXICO CITY:
TRANSPORTATION AND THE ENVIRONMENT

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Relating the Mobility Engendered by Transportation to Environmental (and Energy) Impacts: A Key Public Policy Question

SUSTAINABILITY--THE 3 Es--economic development, environmental impact and social equity
KEY POLICY QUESTIONS

- What is the issue (problem)?
- What are the competing values and interests?
- Who are the stakeholders and what is their ability to change things?
- How do we negotiate a “solution” that appropriately weighs the competing interests?
- What methods are appropriate to study the issue?
- What is the process by which policy is changed?
- How does one implement the changed policy and make sure it works in practice?
Nested Complexity

• Physical system “layer”
  – More quantitative principles
  – Engineering & economic models

• Institutional sphere “sphere”
  – More qualitative in nature and often more participatory
  – Stakeholder evaluation and organizational analysis

• Different methodologies are required
  – within the physical system
  – between the institutional sphere and the physical system
  – within the institutional sphere
The Mexico City Megacity Issues “Checklist”

• “Megacity” close to 20 million people in Mexico City Metropolitan Area (MCMA).

• The combination of topography and meteorological conditions, together with increased auto ownership, producing an air quality problem of the first magnitude.

• As with many developing countries, a tremendous range in wealth among its citizens.

• A sprawling land use pattern fueled by both illegal settlements on the fringes and “suburbanization” and the resistance of central city “delegaciones” to densification.
The Mexico City Megacity Issues “Checklist” (cont.)

- A surface transportation subject to substantial congestion – throughout the day in some parts of the city – exacerbating the air quality issue in the MCMA.

- The MCMA as institutionally complex, considering its relation to the federal government and relationship between the Distrito Federal (DF) and the Estado de Mexico (EM).

- The MCMA as the economic engine of Mexico, but dependent on the economic health of its neighbor to the north.

- Economic growth as a driving policy.

- A potentially extraordinary political shift for Mexico with the election of President Fox in 2000, after 71 years of presidential rule by the same party-- the PRI

- And in 2006, a very close and contentious election between (pres- elect) Calderon and Lopez Obrador
The Mexico City Megacity Issues “Checklist” (con’t)

• 18 million in Mexico City Metropolitan Area (approx. 20% of national pop.)
• Political, economic and population center of Mexico
• Emerging federalism – shift of power to states
The Mexico City Megacity Issues “Checklist” (con’t)

- Expansion of urban area into less habitable zones
- Pressure on transportation, water and other infrastructures
- Change in travel demand and mode share
- Irregular settlements are “complemented” by irregular/informal public transportation modes
Changes in mode split

- Metro
- Light Rail, Trolleybus
- Bus
- Minibuses, Colectivos
- Taxis
- Private Autos

1986: 19% Metro, 3% Light Rail, Trolleybus, 42% Bus, 6% Minibuses, Colectivos, 25% Private Autos
1989: 21% Metro, 3% Light Rail, Trolleybus, 19% Bus, 19% Minibuses, Colectivos, 16% Private Autos
1994: 16% Metro, 10% Light Rail, Trolleybus, 53% Bus, 3% Minibuses, Colectivos, 17% Private Autos
2000: 14% Metro, 9% Light Rail, Trolleybus, 55% Bus, 5% Minibuses, Colectivos, 16% Private Autos
Booming market (annual new car sales)
THE MEXICO CITY CHALLENGE

• Retaining and improving mobility while enhancing air quality.
  – Recognize the exceptional close linkage of transportation and air quality in Mexico City
  – Recognize that air quality improvement is not a “luxury” -- profound health effects
  – Recognize that economic activity and growth are fundamental to Mexico’s long-term interests and mobility is essential - but further, recognize that distribution of economic benefits is critical
TWO BASIC APPROACHES

• Throttle down mobility (and economic growth) to improve air quality
• Attain improved air quality through growth -- get rich and clean

Is there a “win-win” approach?
THE MCMA CLIOS SYSTEM

• The Mexico City Metropolitan Area is a CLIOS System
  – Complex
  – Large-Scale
  – Interconnected
  – Open
  – Sociotechnical System

• Everything affects everything else

• Need to work on many alternatives -- both tactical and strategic -- and be sensitive to unintended consequences
MANY IMPORTANT TACTICAL ACTIONS

• Enforcement
• Improvement in Traffic Management
• Implementation of Inspection Schemes
• ...

as well as strategic issues to be considered
STRATEGIC ISSUES

• Land Use
  – Control of physical extent of MCMA

• National Policy
  – Decentralization of economic activities on a national scale

• Change in mix of public transport modes

• Economic Growth

• Metro Expansion

• …

*There is no silver bullet*

*Need to do “everything”*
MANY PLAYERS & INSTITUTIONAL ISSUES

- Travelers
- Auto Owners
- Public Transport Users
- Transport Operators
  - Metro
  - Colectivo Associations (drivers, owners, route associations)
  - Buses
- Trucking Companies
- Inspection Stations
- PEMEX
- Auto Manufacturers
- Industry
- Political parties
- Government Agencies
  - DF, EM, Federal Government, SEMARNAT, SCT, PEMEX, CAM, COMETRAVI, SETRAVI (Transport), SMA (Environment), SCT-EM, Secretaria de Ecologia
- Environmental Stakeholders
MANAGING A COMPLEX METROPOLITAN SYSTEM

• Mexico City provides a clear example of how changes in the physical system can impact the types of policy-institutional structures that are needed to manage certain issues.

• The urbanized area has progressed beyond the Federal District across state boundaries to the State of Mexico, and more recently, to the State of Hidalgo.

• In this manner, the physical system changes generated a tension across the institutional sphere, which necessitated new institutions at the metropolitan-level.

SOME CRITICAL FACTORS (I)

1. The institutional complexity inherent to the transportation-land use system across the continuously sprawling MCMA;

2. The rapid and intensifying dispersion of activities across the MCMA, resulting in new trip patterns/interactions among the DF and EM which the current transportation system does not adequately satisfy;

3. Great disparities in infrastructure provision and institutional capacity between the EM and the DF;

4. Great disparities between the EM and DF in terms of trip-making rates of residents, both currently and in the future;
SOME CRITICAL FACTORS (II)

5. Trends in mode share evolution away from high capacity modes towards low capacity modes (colectivos and autos);

6. The conflict between colectivo and bus viability, driven by the massive growth in colectivos, political clout of their owners/operators, and subsequent difficulty in successfully concessioning out bus services;
7. High levels of subsidies for DF-operated public transport modes (Metro, trolleybuses, light rail), and stagnant or declining patronage;

8. Infrastructure-oriented transportation plans, with a supply expansion focus and apparent failure to account for subsequent trip generation and changes in land use, not to mention air pollutant generation.
POLICY AREAS (TRANSPORTATION)

- Fleet Composition and Operations/Inspection and Maintenance
  - Trucks
  - Buses
  - Colectivos
  - Taxis
  - Private Cars

- Fuels
  - Composition

- Public Transportation
  - Buses
  - Metro
  - Colectivos
  - Intermodalism
POLICY AREAS (TRANSPORTATION)

(CONTINUED)

• Infrastructure/Technology
  – Truck bypass
  – Metro expansion
  – Dedicated bus lanes
  – Intelligent Transportation Systems (ITS) pricing

• Regional Land Use Strategies
  – Transit-oriented development
  – Redensification

• Institutions
  – Transportation and environmental planning
  – Linkages between DF and EM
  – Regulation
  – Regional perspective on land use
PUBLIC TRANSPORTATION

• Provide choice for mobility
  – Collectivos, bus, Metro

• Sensitivity to the public’s view of quality transportation service

• Incentives for intermodal opportunities

• High-tech opportunities
  – Smart Card, Fare Integration
PUBLIC TRANSPORTATION (2)

• Ownership structure of operating units is important
  Behavior

• Security is an issue that needs attention if market share is to be improved
PUBLIC TRANSPORTATION (3)

• No major expansion of Metro in recent years
• New initiative with Bus Rapid Transit
  – “Metrobus” – 19 mile route on Insurgentes Avenue
  – Opened in 2004, now has 260,000 riders/day
  – Advanced ITS technologies, exclusive lanes, lower polluting buses
• Shift toward light rail?
  – Currently only one light rail line
  – Plans for more?
  – Abandoning the BRT system concept?
Hoy No Circula - Day without a Car

- Based on license plate number and age of car
- Linked to vehicle emissions inspections
- Trying to limit daily vehicle circulation and create incentives for newer vehicle purchases to replace older vehicles
- Policy possibly backfired (2nd-hand family vehicle)
- Creates incentives for corruption (bribes to pass inspection, stealing emissions verification stickers)
Mexico City’s Central Artery

• High levels of motorization
• Pressures for new infrastructure for private autos
• The administration’s response
  – “Segundos Pisos” (Second Stories)
  – Construction began in 2003
  – Major interchanges and flyovers between two major urban highways
  – Source of major controversy
SOME ADDITIONAL PERSPECTIVES
FLEET TURNOVER

• Continue use of vehicle restriction days penalty in inspection programs to enhance fleet turnover

• Enforce existing regulations that limit age of high-use vehicles
  – Taxis
  – Paratransit vehicles

• Develop incentives to increase fleet turnover taking into account equity issues
  – Use tax and license fees to encourage fleet turnover
SOME ADDITIONAL PERSPECTIVES
INSPECTION & MAINTENANCE

The purpose of the vehicle inspection program is to:

- Identify high emitting vehicles
- Cause these vehicles to be:
  - Repaired
  - Scrapped
  - Sold out of the metropolitan area

Improve the DF inspection program

- Reduce forgeries
- Target overt audits
- Establish undercover audits
- Track fate of failed vehicles
INSPECTION & MAINTENANCE (2)

- Upgrade the EM inspection program to the standards of the DF program
  - Until the EM program is equivalent to the DF program, continue to inspect DF vehicles in the DF

- Use license plate renewal program to establish a high-quality registration database and link this with the inspection database to enhance compliance
INSPECTION & MAINTENANCE (3)

• Establish a remote sensing program to:
  – Monitor uninspected vehicles driving in the Mexico City Metropolitan Area
  – Target inspection lanes for undercover audit
  – Monitor durability of repairs

• Use analysis of inspection data to:
  – Target inspection lanes for overt and undercover audit
  – Identify vehicle models by model year for more frequent or less frequent testing
Failed vehicles should be repaired to fix the underlying cause of malfunction; merely changing the catalyst may have no lasting effect.
SOME ADDITIONAL PERSPECTIVES
NEW VEHICLE AND FUEL STANDARDS

• Setting vehicle and fuel standards should be a highly integrated process

• The pace of investment in low sulfur refining capacity is crucial to success in implementing these standards, but these decisions are controlled by the treasury, not PEMEX
NEW VEHICLE AND FUEL STANDARDS (2)

• Dilemma:
  – Differentially priced fuels at different sulfur levels create consumer incentives to purchase fuels that damage the catalyst
  – But a single fuel nationwide would increase the refining investment cost substantially, slow the availability of low sulfur fuels and could adversely affect the economy
SOME ADDITIONAL PERSPECTIVES TRUCKS

• As a major source of PM and NOx emissions, truck pollution is a key priority for emission reductions; but far better basic data about this sector needs to be compiled:
  – Size and composition of metropolitan area fleet and federal trucks that make through trips
  – Origin and destination studies within the MCMA
  – Emissions inventory

• Federal emissions regulation of trucks needs to be adjusted to meet the more stringent standards of the MCMA-- a political issue
TRUCKS (2)

• Truck retrofit policies and incentives for fleet turnover need to be developed

• MCMA should consider a low sulfur diesel fuel/particulate trap program for high-use urban bus and truck fleets
TRUCKS (3)

- Trucks are central to the economic life of the MCMA, but new policies should be assessed with the aim of reducing usage to the greatest extent possible:
  - Truck corridors
  - Central distribution systems
  - By-pass possibilities for through traffic
SOME ADDITIONAL PERSPECTIVES
LAND USE

• Recognize critical linkage of land use, mobility and the environment -- these systems co-evolve

• Need to institutionally link transportation, environmental and land-use planning

• Opportunities to shape the MCMA
  – New airport -- siting -- major political issue--currently dormant
  – Metro build-out -- including transit-oriented development
LAND USE (2)

• Densification through zoning reform
  – Rigid rules need relaxing
  – Flows of tax revenues to delegaciones
  – Need to keep the city “alive”
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