

EMS Implementation Success at New York City Transit

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Overview of NYC Transit

A map of the United States with state boundaries outlined in black. New York State is highlighted in red. The map includes Alaska and Hawaii.

Largest Mass Transit System in the US

Approx 50,000 employees

Move 7.2 million passengers daily

4200 buses

6204 trains cars

Approx. 814 miles of track

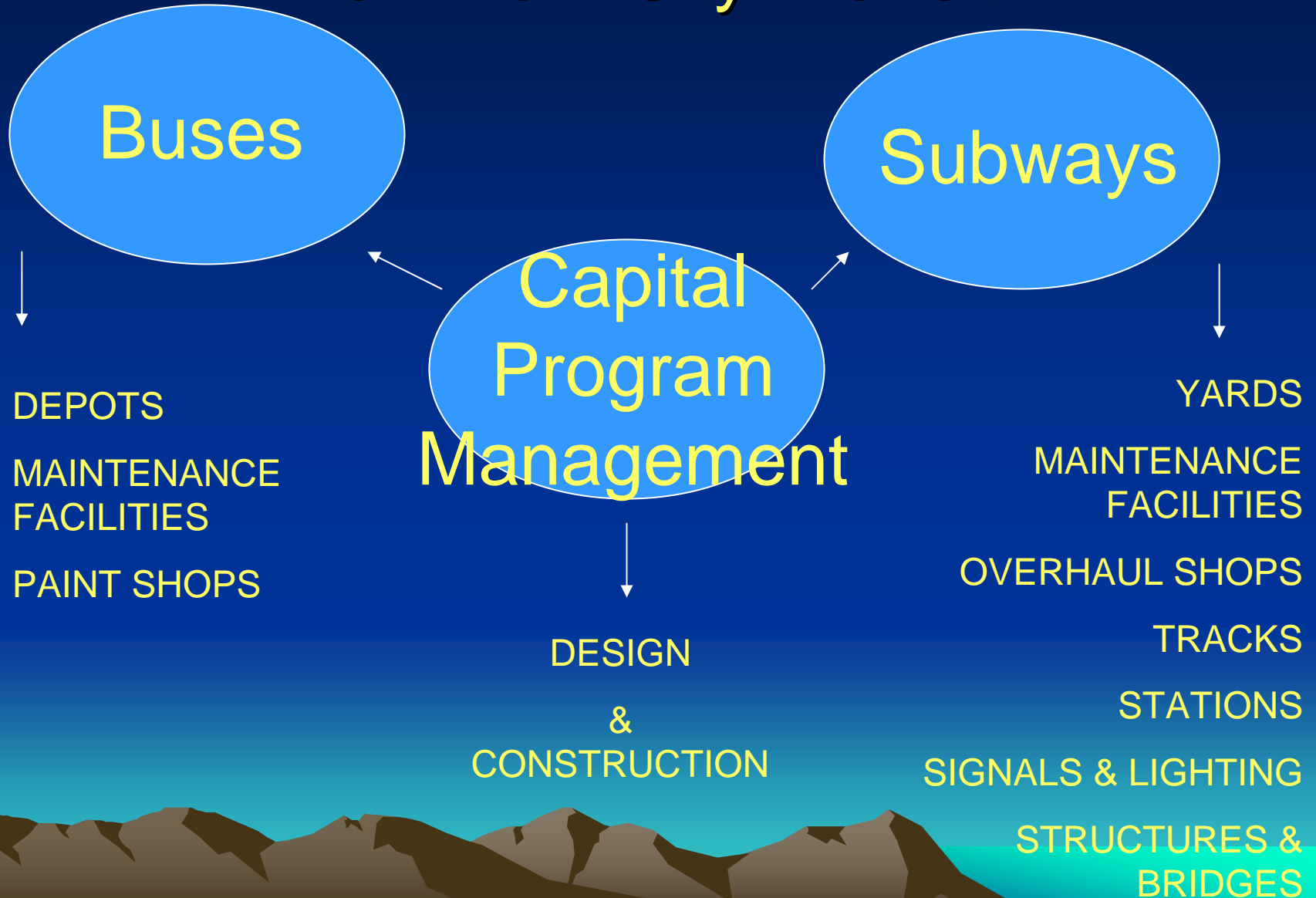
20 Train maintenance facilities

20 Bus Maintenance facilities

468 Train Stations

24/7

Major Departments of New York City Transit



Capital Program Management (CPM) Overview

- Service Department
- Design and Construction Management Department that manages and maintains the infrastructure that supports the mass transit system
- Manages 2.1 Billion dollars in capital projects annually
- 1600 employees, mainly engineers and architects



Challenge – For CPM to Bring the System to a State of Good Repair

Circa 1970

- 
- A photograph of a train car at a station platform, heavily covered in graffiti. The train car is blue and white, with various tags and artwork. The platform is made of concrete and has a metal railing. In the background, there are bare trees and a clear sky. The text "Cypress Hills" is visible on the side of the train car. The overall scene is a typical urban transit environment from the early 1970s.
- Accomplish while recognizing and acknowledging the importance of environmental protection and preservation
 - Uphold and exemplify sustained ecological, economic and social value

Cypress Hill Station Circa 2000



Inheriting Historic Problems

- Future challenges married to previous practices
- Practices of yesteryears no longer acceptable

Examples:

- Leaking Underground Storage Tanks
- Spills
- High energy consumptions
- Air emissions (VOC from painting)
- Hazardous waste generation
- Environmental risk (lead, asbestos)
- Construction site environmental impact (dust, noise, emissions).



Need to Improve Environmental Management

- Negative public media coverage concerning environment compliance
- Reoccurring environmental mismanagement
- Associated environmental liability
- Increasing cost of operations
 - Millions in hazardous waste abatement and disposal annually
 - Insurance
 - Health



Choosing Between Solutions

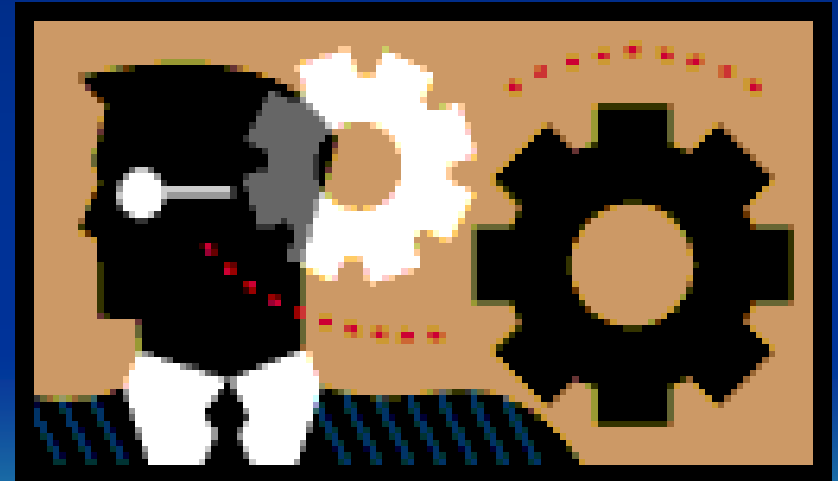
- Meet minimum legal requirements and satisfy public demands
- Surpass minimum legal requirements and exceed public's expectation



Choosing Between Solutions

- Raise the bar on environmental management
- Obtain management resolve
- Pursue ISO14001

Environmental
Management



Business Rationale for ISO 14001

- Keeping abreast with industry challenges
- Effective “environmental accountability”
- Need to reduce environmental risk
- Need to reduce cost
- Need to reduce liability



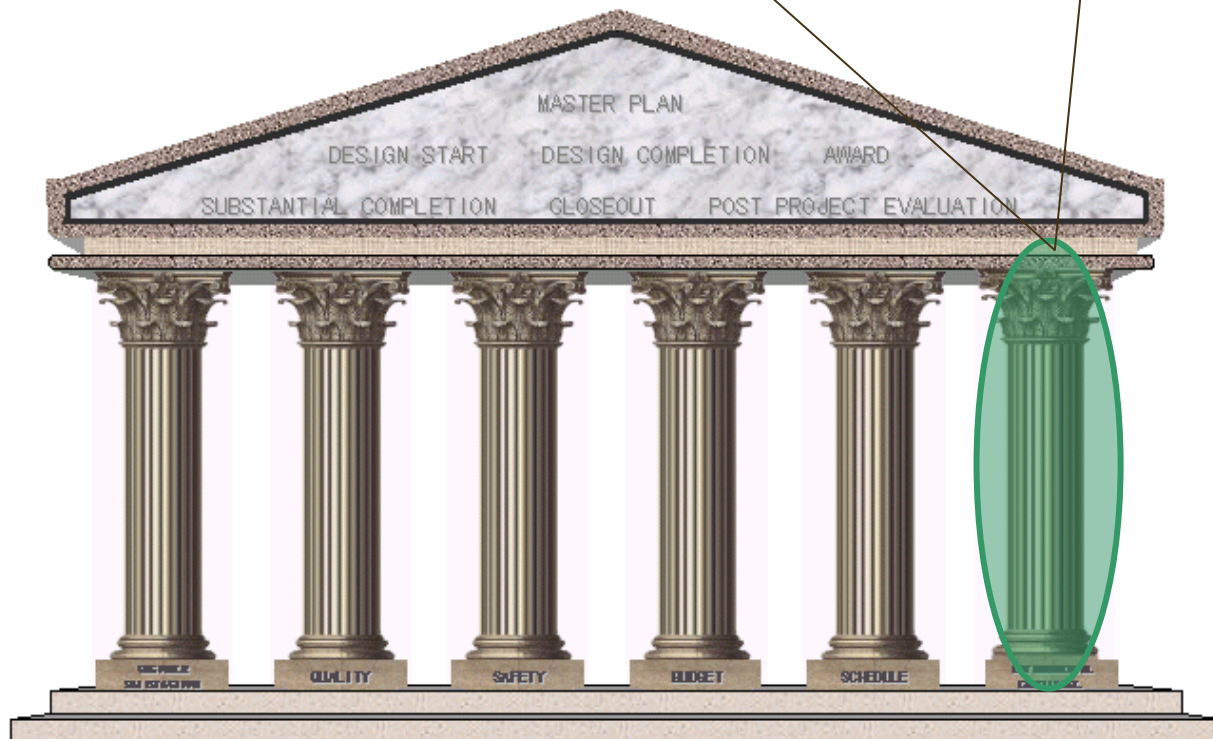
Social Rationale for ISO 14001

- Willingness to improve environmental performance
- Need to assure better relations with the public and community within which we operate
- Willingness to instill “change”
- Need to establish a legacy of environmental excellence



Establishing A Corporate Pillar Of Environmental Excellence

The pillar of Environmental Excellence is seen as an integral part of our business for the rebuilding and improvement of the NYC Transit system



Budget Schedule Quality Safety Customer Satisfaction

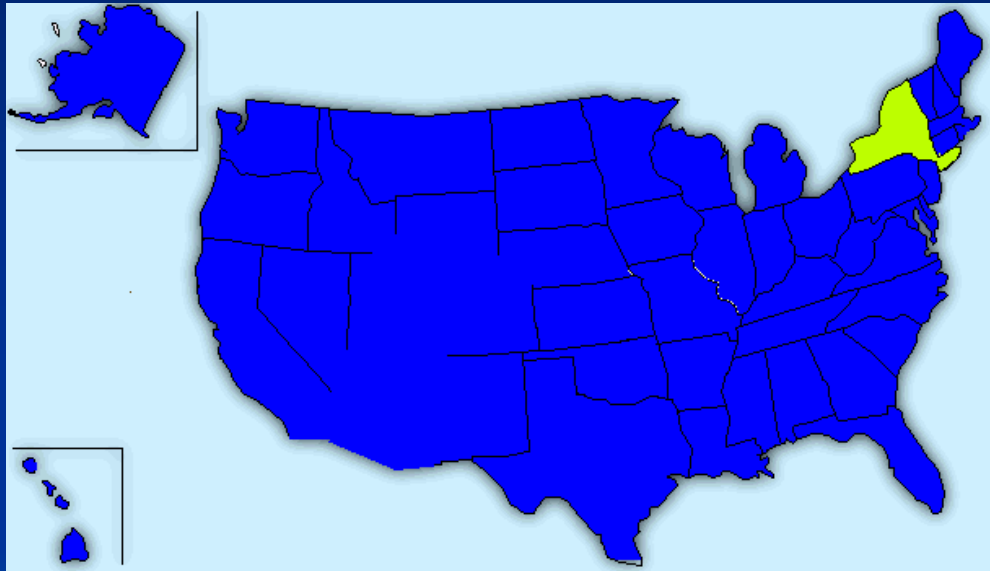
NYC Transit EMS Story

- Develop Environmental Policy
- Identifying aspects and impacts
- Set Objectives and Targets
- Implement EMS
- Achieve ISO14001 Certification



March 1999 ISO 14001 Certification

- 1st public sector entity in the United States



- Part of a US EPA pilot to ascertain benefits of EMS Implementation

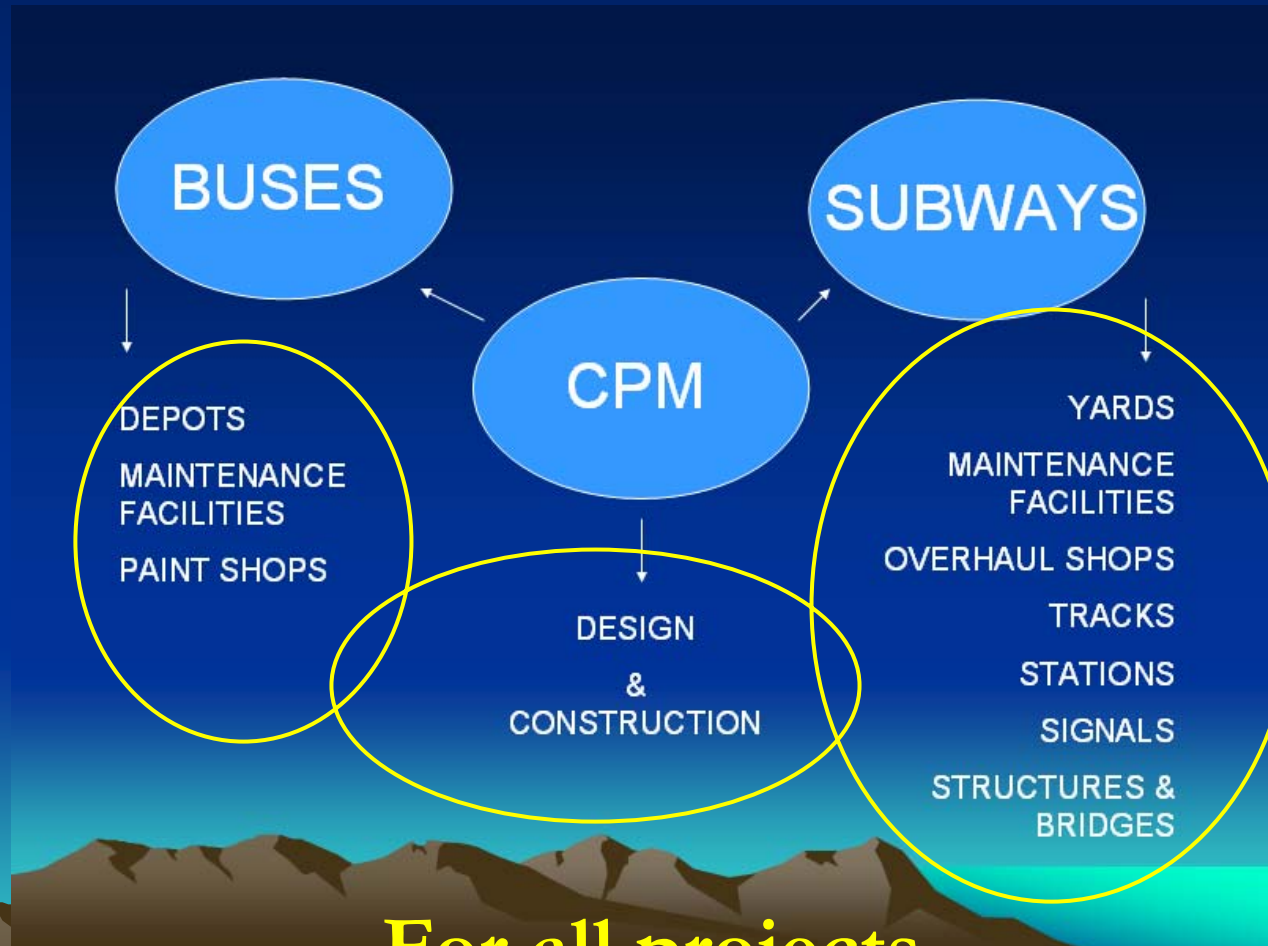
Identifying Environmental Aspects

Root of most environmental concerns were identifiably linked to several key areas:

- Facility & Infrastructure Design and Construction
- Associated process operations and maintenance
- Maintaining the existing 100 year old mass transit infrastructure (hazard abatement)



Reduction in Environmental Footprint as a Measure Of Design



For all projects

2000 Objectives & Targets

- Develop protocol for High Performance Design for the Environment (DfE) and introduce into each discipline by June 30, 2000

DfE



Design for the Environment

- Birth of “Green” Designs at New York City Transit
- Applying Green Designs to all capital projects



Environmentally Responsive Designs

- Control point source and non-point source pollution through better design and engineering
- Potential for Design and Construction to play a more proactive role in pollution prevention
 - Historically conducted without rigorous long-term environment planning
 - Viewed as the source point for factoring out environmental concerns

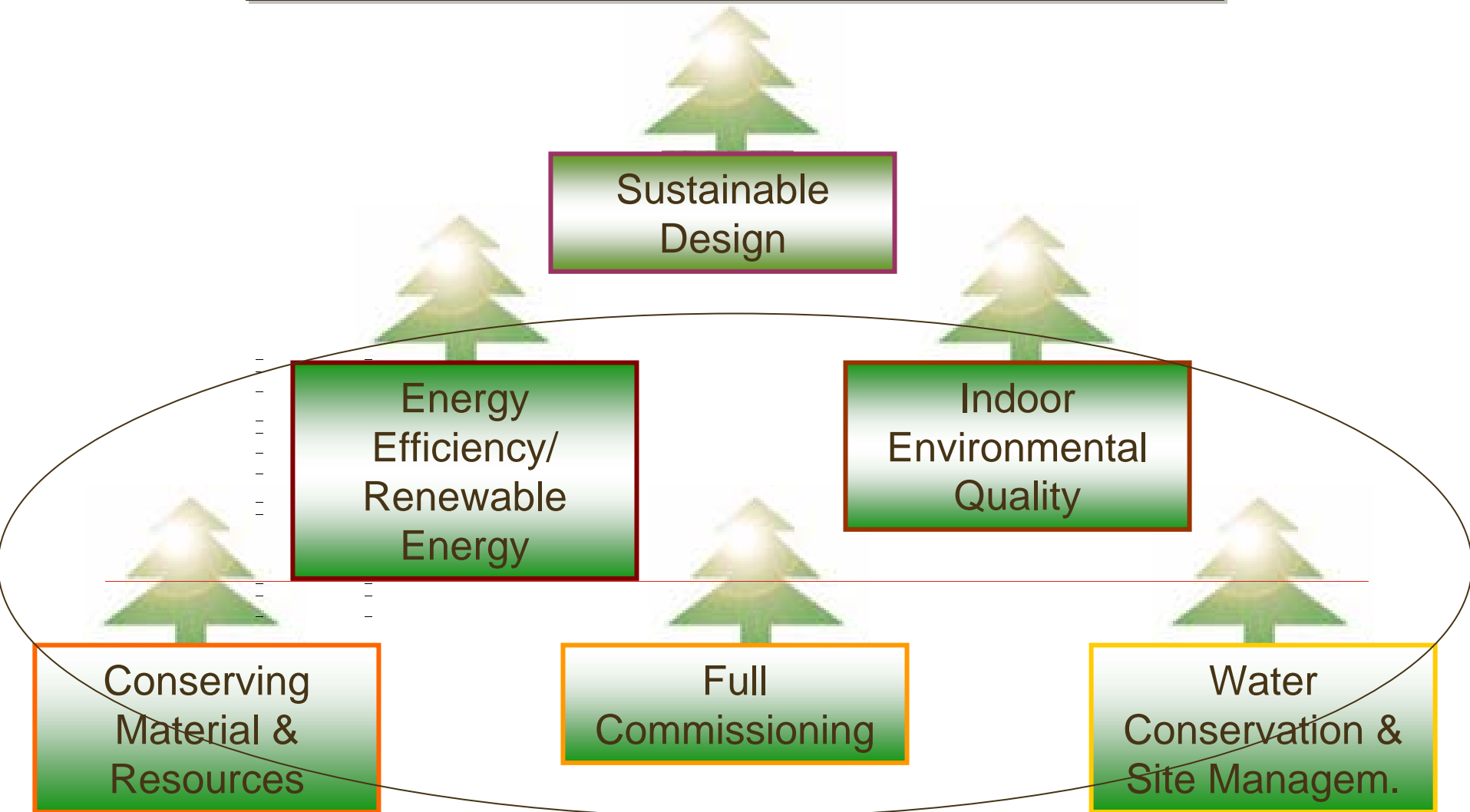


Scope of DfE

- All Capital Project from Tunnels to Train Yards

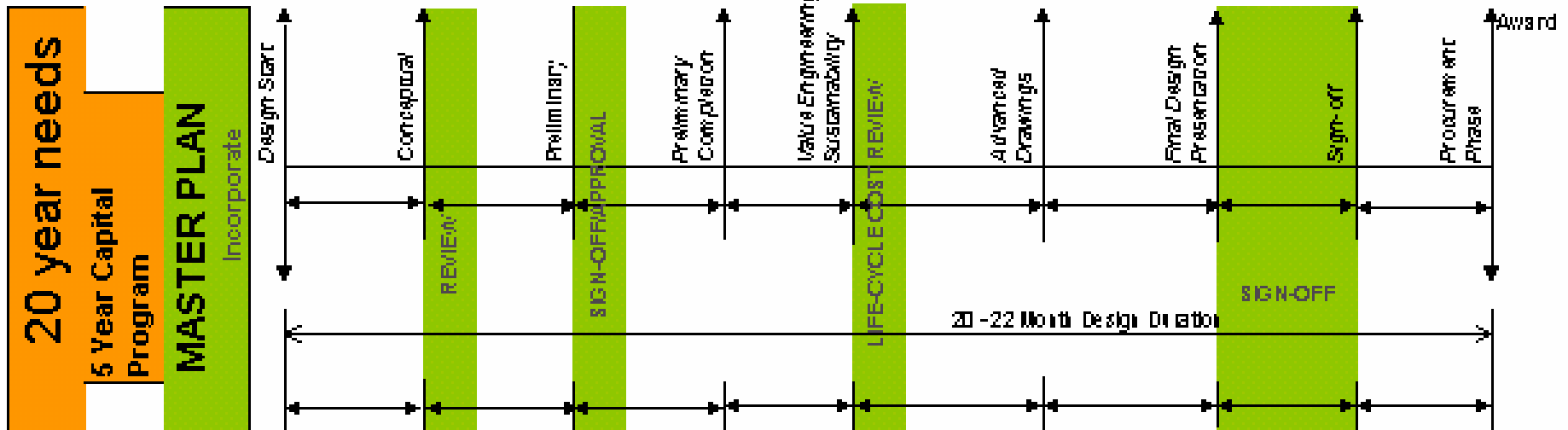


DfE ELEMENTS (NYCT Green Guidelines)

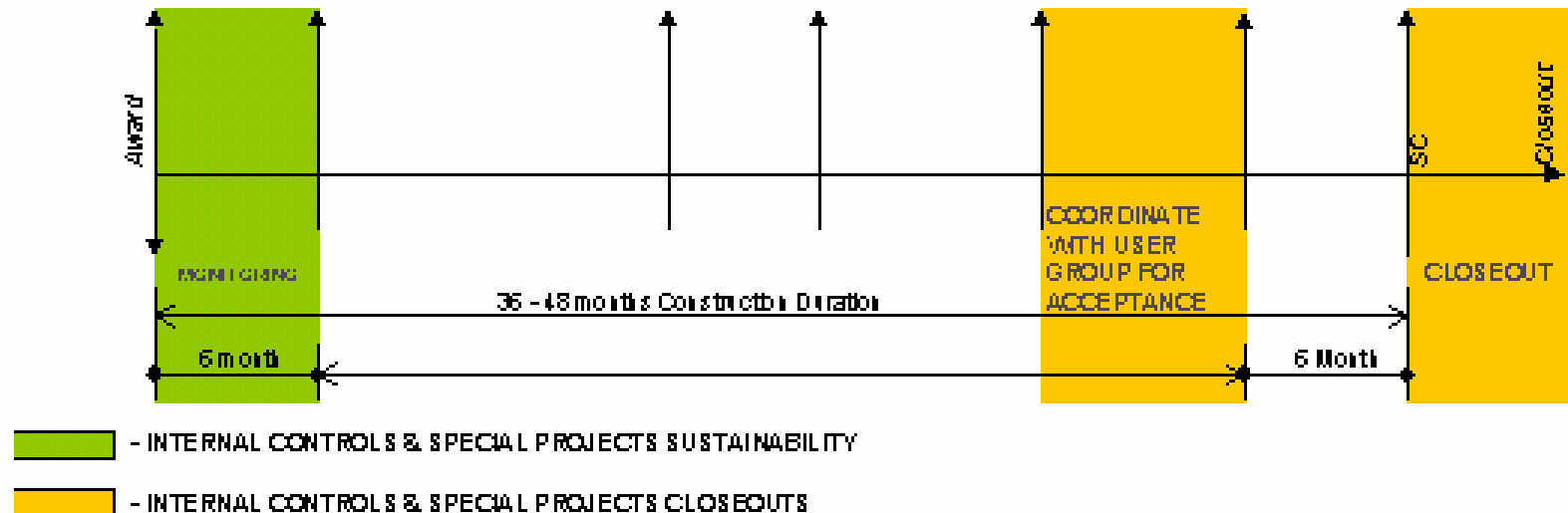


Circa 2000

DESIGN PHASE



CONSTRUCTION PHASE



AREAS OF SUSTAINABILITY DURING A PROJECT'S LIFE

Stillwell Avenue Terminal Station

Circa 1999



Translucent 145kW Photovoltaic Canopy

Aiming For LEED Silver Certification – Corona Shop Circa 2002

- 30% better than code for energy efficiency
- Optimize natural ventilation and natural day lighting
- Alternative power sources – PV's and fuel cells
- Harnessing rain water for washing trains
- Selection of eco-friendly building materials
- Waste Management and recycling
- ULSD



Central Bus Maintenance Facility & Depot Circa 2003

- 30% better than code for energy efficiency
- Optimize natural ventilation and natural day lighting

- 
- An architectural rendering of a large, modern bus maintenance facility and depot. The building is a long, rectangular structure with a flat roof and large windows. It is surrounded by a parking lot with several buses and cars. The rendering is shown from an elevated perspective, showing the building's layout and its integration with the surrounding urban environment.
- Alternative power sources – PV's and fuel cells
 - Harnessing rain water for washing trains
 - Selection of eco-friendly building materials

Roosevelt Avenue/74th Street Circa 2000



Conceptual Design

Roosevelt Avenue/74th Street

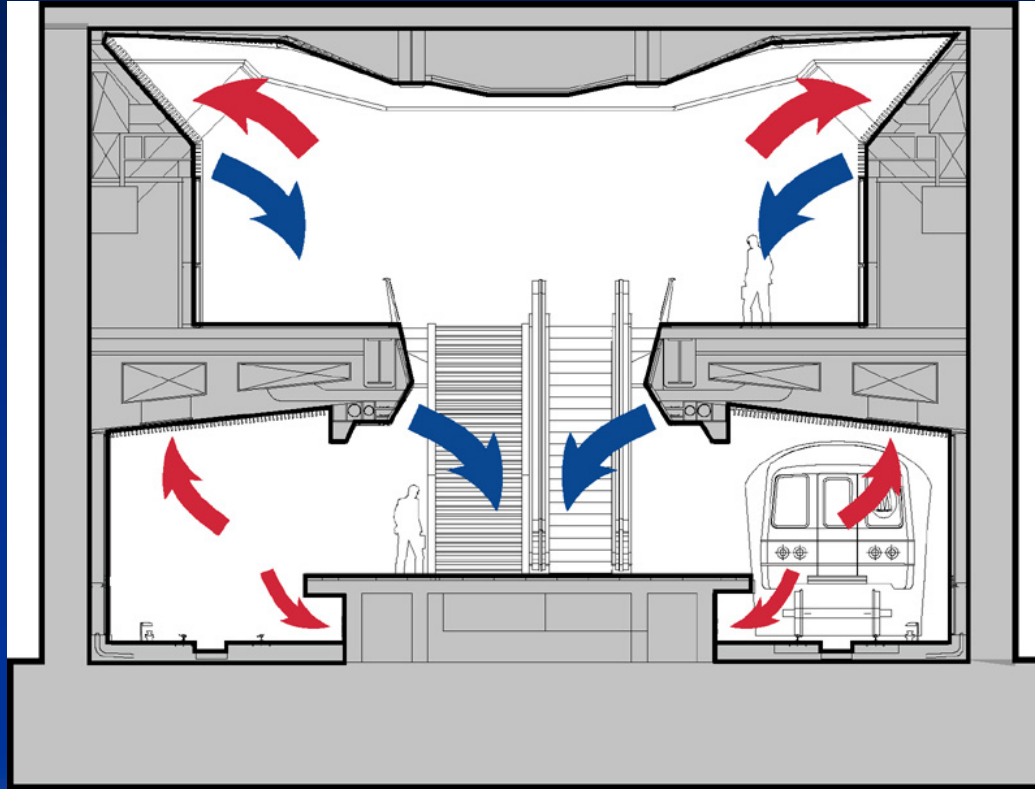
Circa 2003



Roosevelt Avenue/74th Street Circa 2003

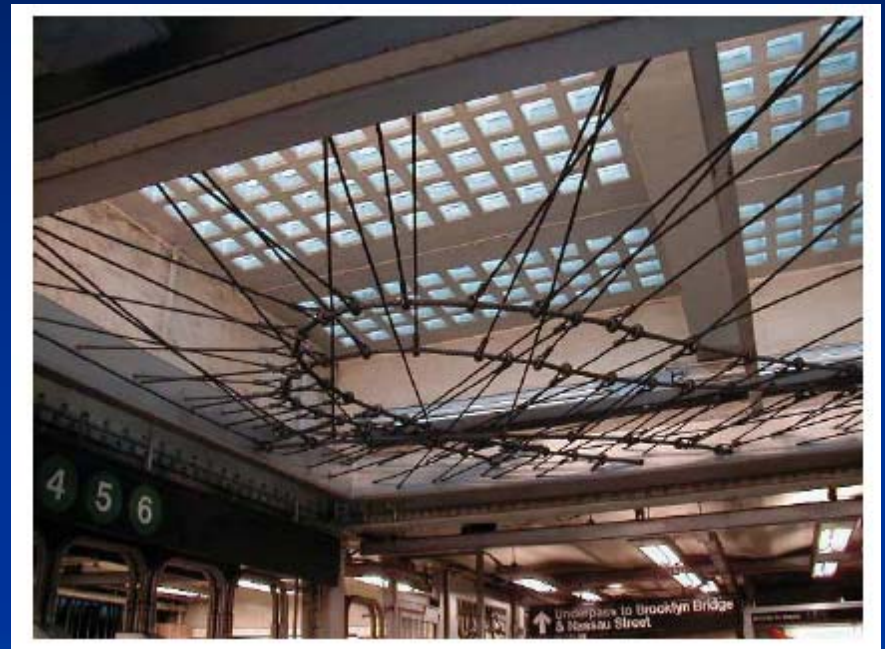
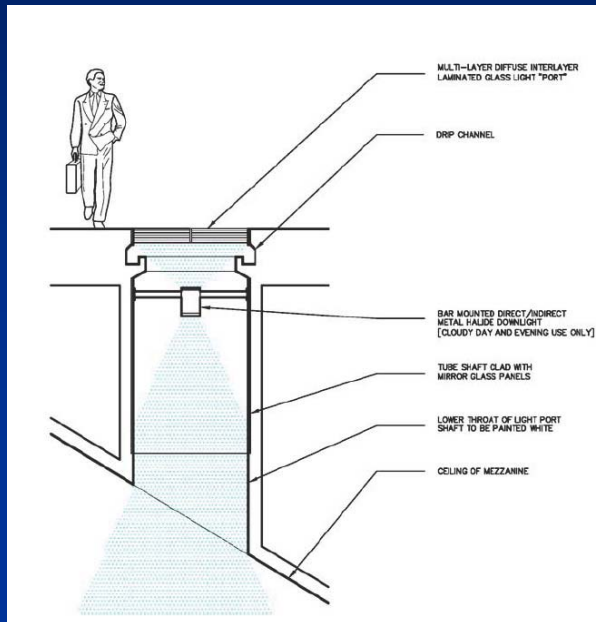


2nd Avenue Subway Reducing Cooling Loads



Station cooling loads are greatly reduced by extracting hot air from stations

2nd Avenue Subway Increased Natural Lighting & Energy Efficiency



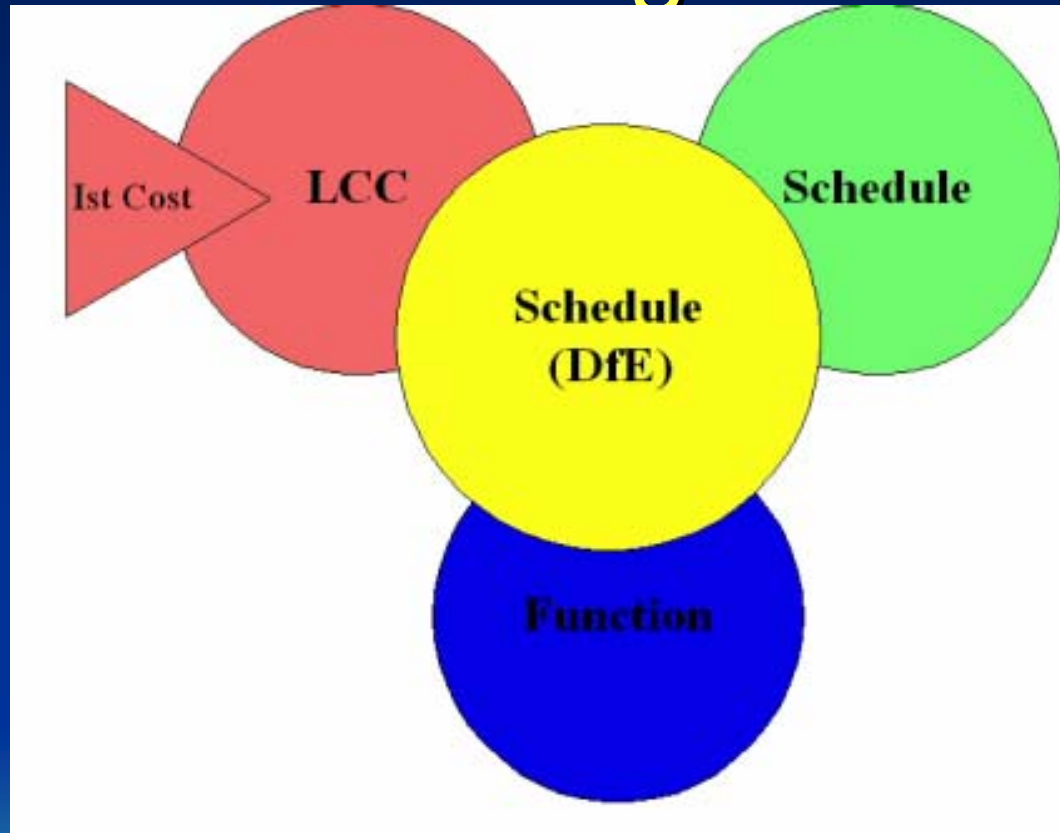
Station Lighting is designed around a power consumption which requires 20% improvement over current code.

All Projects - Material Selection

- Concrete Composition: R&D to formulate “green” concrete possibly using fly-ash, blast furnace slag and SAS spoils
- High Recycled Content: Materials with high-recycled content, such as structural steel with and aluminum will be specified















Using Life Cycle Analysis And Costing



GREEN DECISION MODEL

Cost-Benefit analysis Decision Model

Energy Efficiency					
	Increased First Cost	Payback Period	Health Benefit	Productivity Benefit	Future Cost Avoidance
Use DOE-2 or similar computer models as an important interactive design tool.		0-1			
Provide integrated Photovoltaic (PV) panels for both roof and façade surfaces.		<10			
Use double-glazed units with Low-E glass as the minimum standard for all windows and exterior glazing.		1-2			
Provide daylight dimming in shop and office areas.					
Incorporate the use of natural lighting and ventilation into the design.		1-2			
Evaluate opportunities for heat recovery for the outside air system		2-3			

Cost-Benefit analysis Decision Models

INDOOR ENVIRONMENTAL QUALITY

CONSERVATION OF MATERIALS

WATER AND SITE MANAGEMENT

OPERATIONS AND MAINTANCE



2001 Objectives & Targets

- Incorporate Waste Management Guidelines in selected projects



Demolition Waste Recycling



At Roosevelt 86% recycled

–concrete	1869 Metric tons
–steel	112 Metric tons
–wood	17 Metric tons
–landfill	313 Metric tons

NYCTA Contract #A-35936
Roosevelt Ave (IND) / 74th St - Broadway (IRT)
092 Date: August 31, 2001
75th Street @ 1441+40, L/SW:
Second & first floor demolition

Demolition Waste Recycling



At Stillwell 85% recycled

-Concrete 4554 Metric tons

-Steel 351 Metric tons

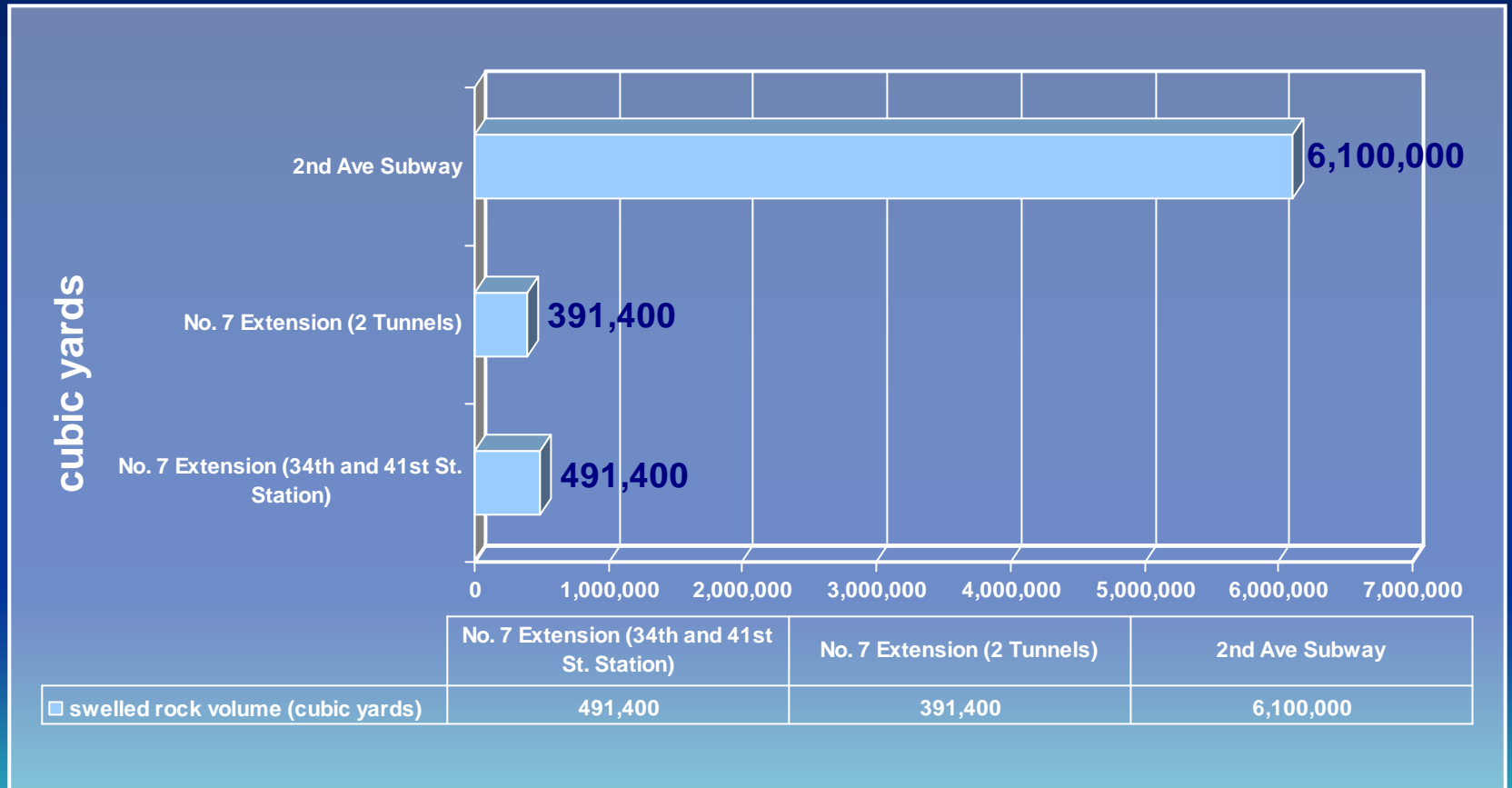
-Debris 859 Metric tons

Beneficial Reuse of Spoils

- 2001 O&T of Waste Management was key to inspiring the beneficial use of spoils from major tunneling projects in Manhattan



Beneficial Reuse of Spoils



EMS and Waste Management

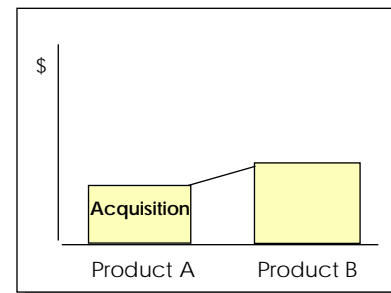
- Sets higher standards for spoils management and air quality
- 35 000 (20 cu. Yards) trucks trips required through out project
- Clean fuel burning truck fleet
- ULSD with diesel oxidation catalyst
- CNG



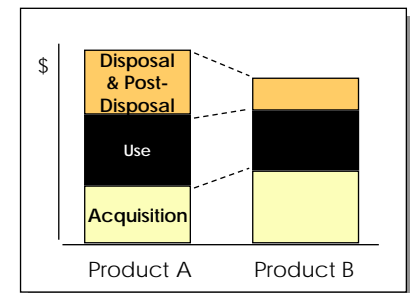
2001 Objectives & Targets

- Create Eco-purchasing/ greening of supply chain awareness

The Best Choice is Not Always Obvious



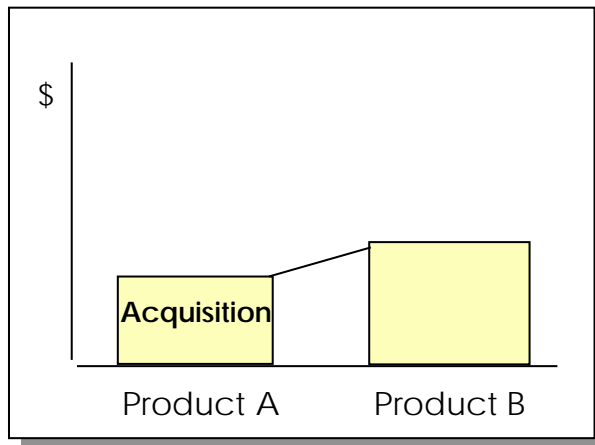
If only acquisition costs are considered, Product A seems like the better choice.



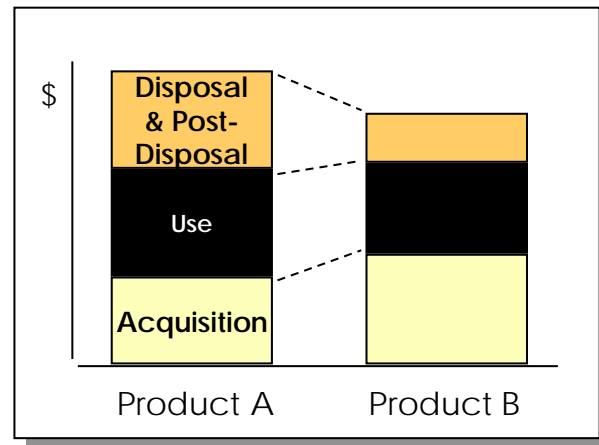
In the long run, Product B is more cost-effective.

Eco-Procurement

The Best Choice is Not Always Obvious



If only acquisition costs are considered, Product A seems like the better choice.



In the long run, Product B is more cost-effective.

Pollution Prevention through Eco-Procurement

- NYC Transit's Green Construction Product Database
- Buying Energy Star & Energy Efficient
- Procuring Alternative Fuel Vehicles
- EPA's Comprehensive Procurement Guidelines

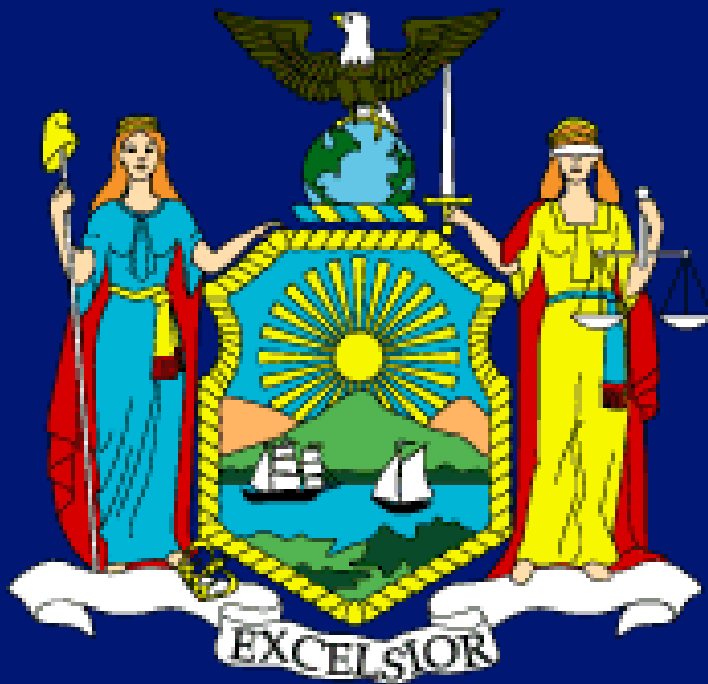


Alternative Fuel Vehicles Procurement



2002 Objectives & Targets

- Create awareness for State Executive Order on Energy efficiency/conservation



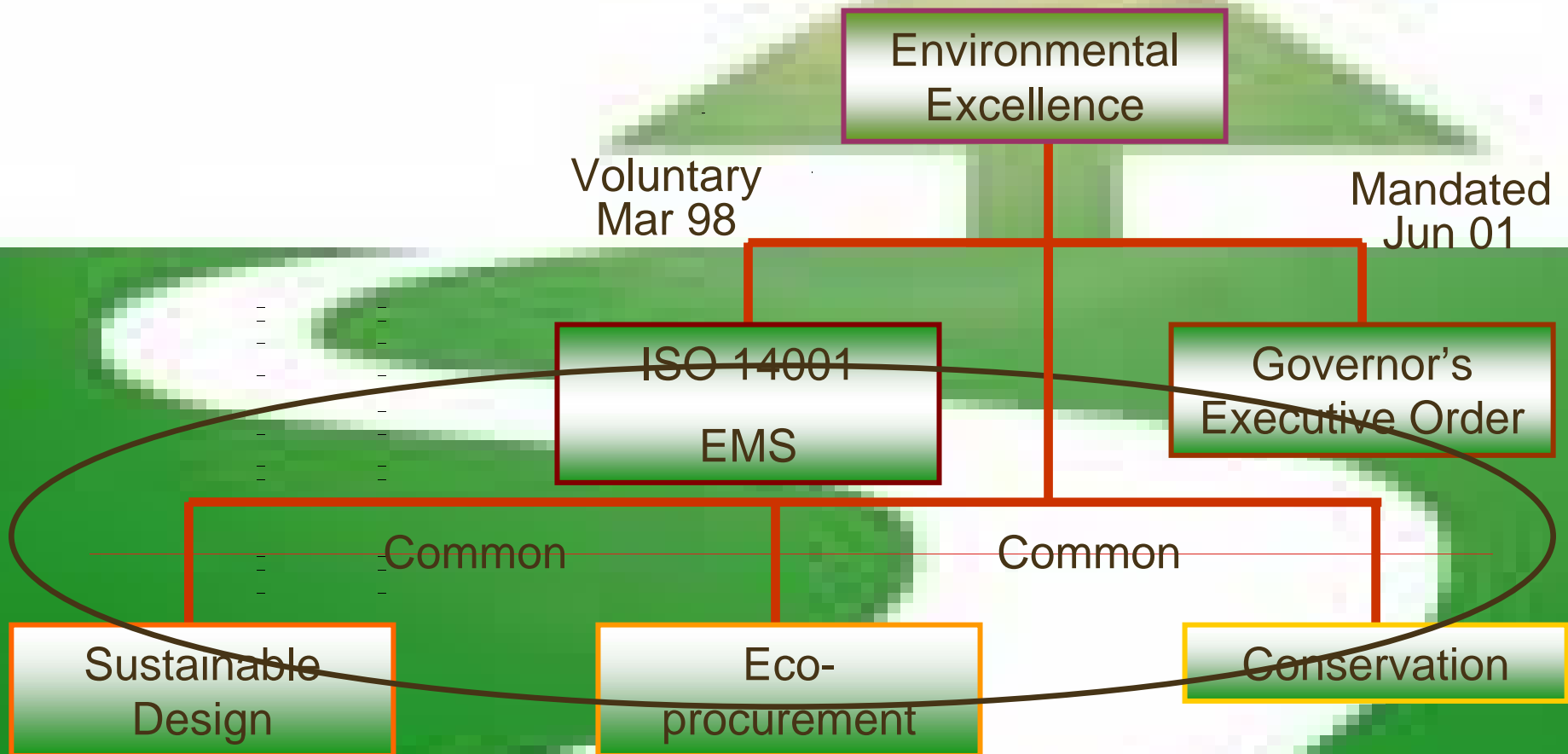
EO111

Executive Order 111

- EMS enabled preparation for implementing a 2001 State Executive Order on the environment
- Assumed a leadership role state-wide with our 3 year head start
- Stand out as a lead and very proactive agency when it comes to green buildings, eco-procurement & conservation

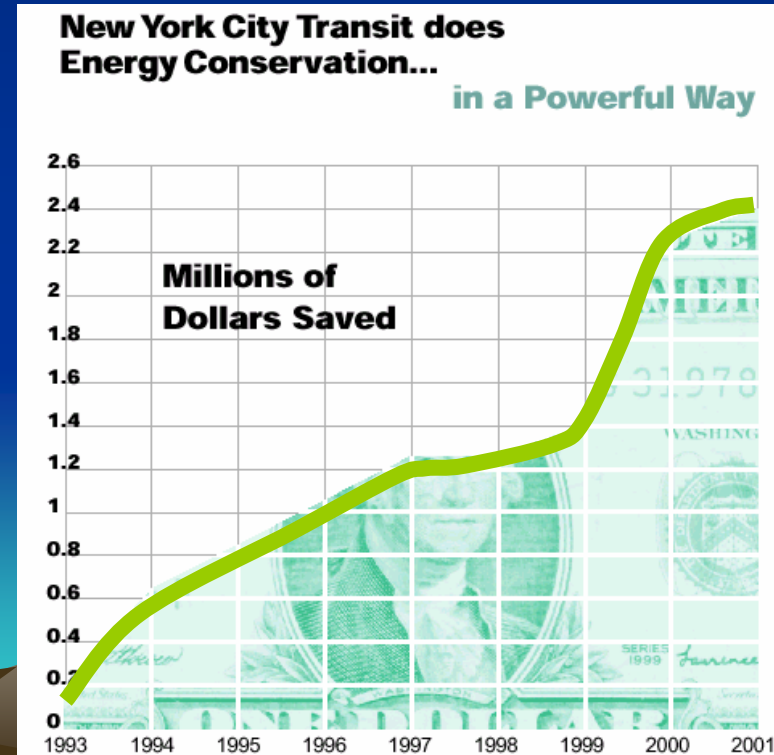


ISO 14001 EMS and Government Mandates



Energy Conservation Strategies

- Exploring New Energy Saving Technologies
- Remote Energy Monitoring
- Flywheel testing
- Thyristor Rectifier testing
- Humped tracks
- Aluminium contact rails
- Energy Savers
- Facility audits





Energy conservation through better designs

Flywheel Energy System



**Stores excess 3rd rail voltage
for later use**

Water Conservation Strategies

- Water Conservation and Reclamation
- Rain Water Harnessing



2003 Objectives & Targets

- Implement Construction for Environment (CfE) during the construction phase for projects for the 2000-2004 Capital Program

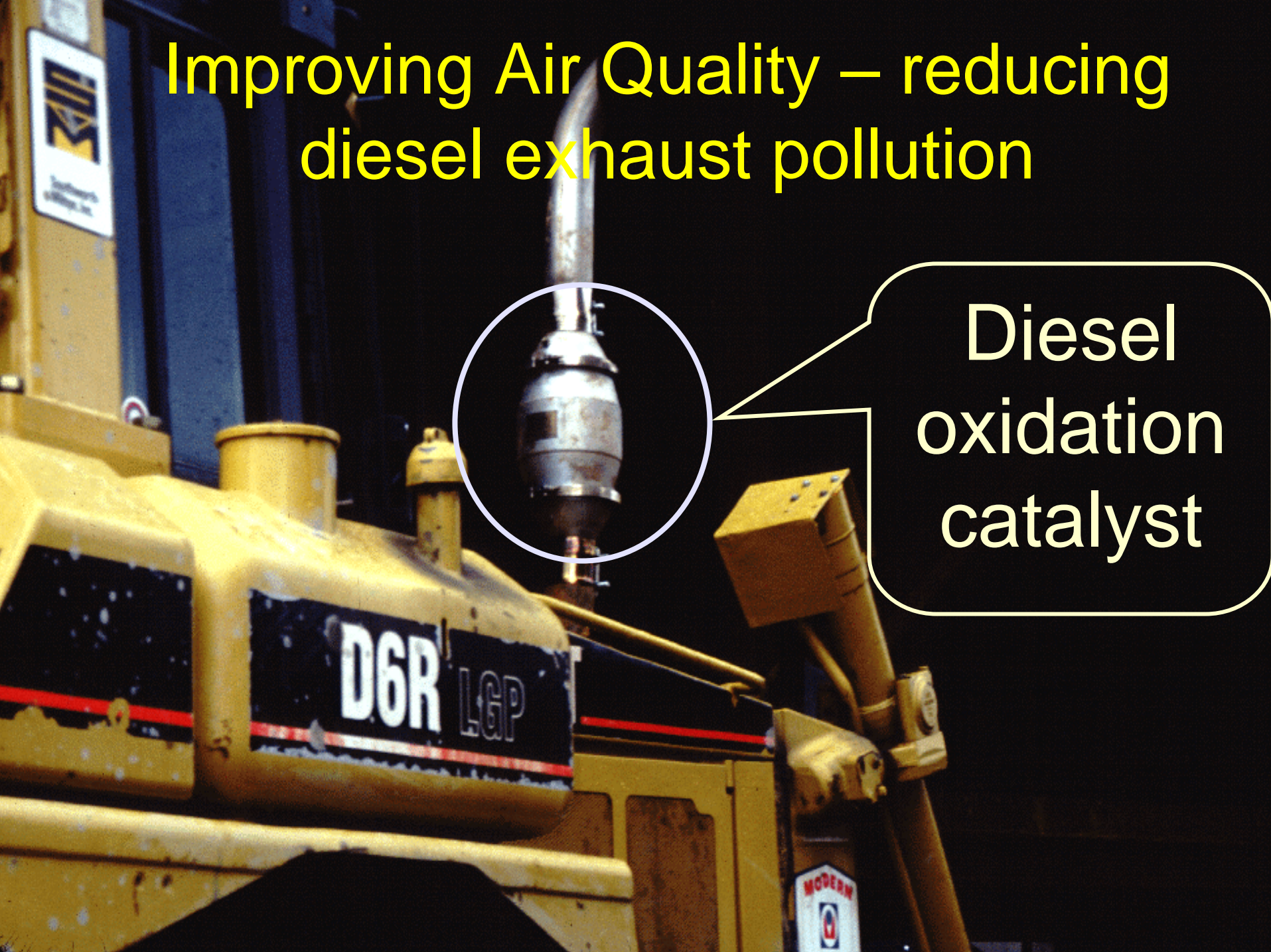
CfE



CfE - Reducing Community Impact

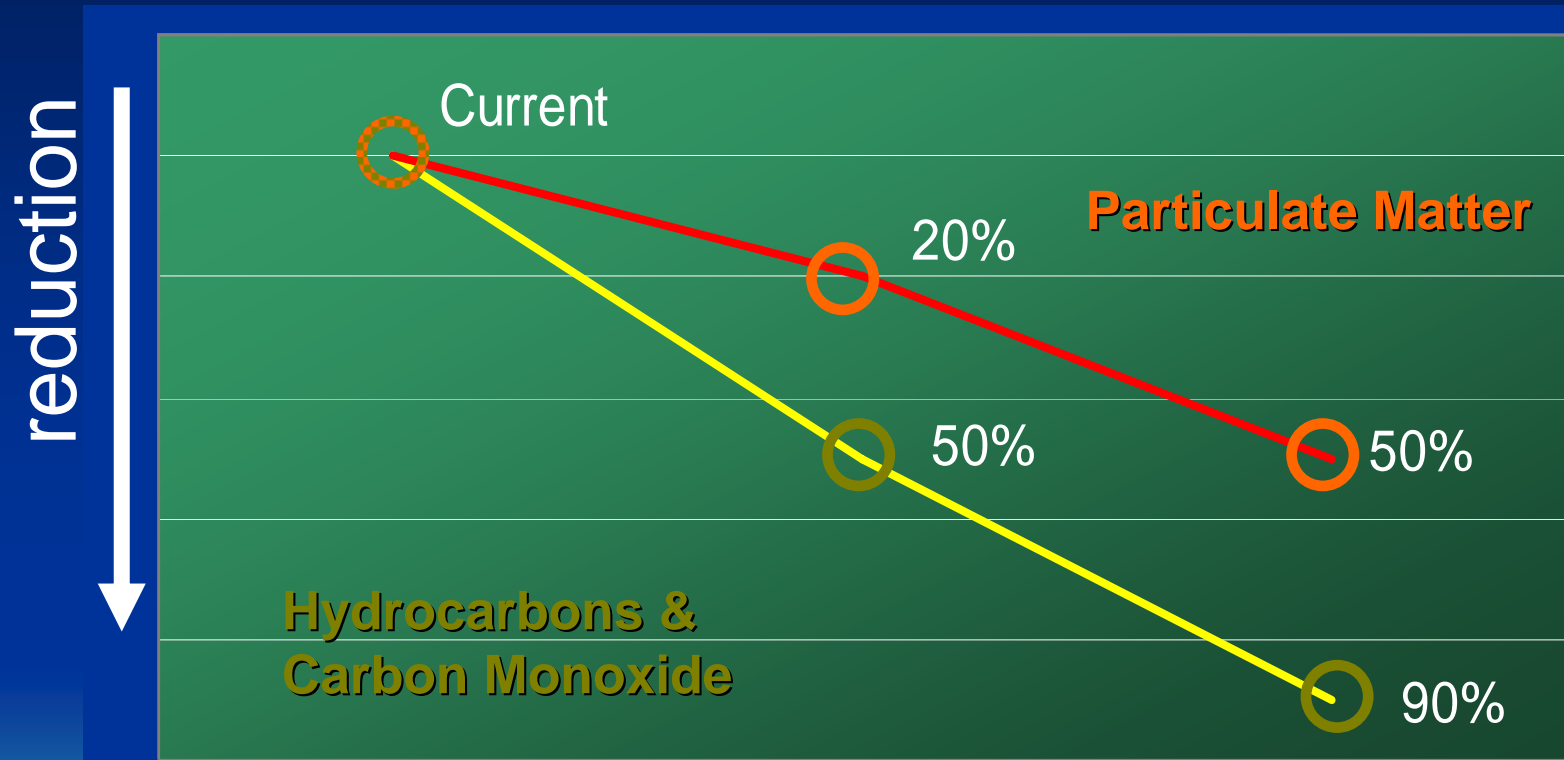


Improving Air Quality – reducing diesel exhaust pollution



Diesel
oxidation
catalyst

Improving Air Quality



2200 gallons 15 ppm diesel used on non-road vehicles at pilot construction site

2003 Objectives & Targets

- Monitor Design for Environment solutions for the planned System Expansion and Lower Manhattan Transit Projects



DfE Decision Model

Second Avenue Subway

Design for the Environment Management Matrix

Main Report

Rating Legend

- Water
- Energy
- Materials
- Indoor Environment
- Operation and Maintenance

Status Legend

- Idea
- Feasibility Assessment
- Approval
- Design Implementation
- Contract Incorporation

Topic	Link	Detailed Reference	Rating	Start Date	Finish Date	Status	Comments
A. Track Alignment							
Chris Bennett							
Sustainable Objective		In section 2.1 of the Interim Report, consider listing "Energy Conservation" or "Maximize sustainable design" as one (ninth) objective.		7/18/2002	8/5/2002		Accepted in discussion with Bill Norquist and Chris Bennett, who will add it to the final report.
Humped Tracks		Consider optimizing the vertical alignment of the tracks to conserve energy expenditure. The resulting profile will have higher plateaus at the stations and valleys in between.		7/18/2002			This topic has found significant incorporation in the alignment from September 3, 2002. William Norquist is also looking into the possibility of humping the tracks asymmetrically to further optimize their effectiveness. The asymmetrical loading will only be viable in areas where northbound and southbound tracks do not need to be on the same elevation.
Horizontal Geometry		Consider adding a criterion to section 9.2.4 to state that radii of curvatures should be maximized in order to reduce friction and consequent wear and tear and noise.		7/18/2002			
Intermodal Connections		Consider optimizing connections to other modes of transportation, such as: Whitehall Ferries and the proposed east-west pedestrian mover for lower Manhattan. Coordinate with Lower Manhattan Development Corporation. See a similar topic in the Station Entrances area.		7/18/2002			The downtown transportation hub and adjunct east-west people mover has attracted the first tranche of federal funds for lower Manhattan's reconstruction. The current scheme stops short of the 2 Ave. alignment. Appropriate steps should be taken in the design to facilitate a future connection at Seaport station. Refer to the attached link.

Start and Finish Dates

Idea

Hyperlinked reference.

Rating

Progress

Comments

Detailed Reference

2003 Objectives & Targets

- Obtain Corporate Acceptance of Sustainability



Sustainable Development – a Major Milestone for NYCT

- EMS paved the way for sound environmental management at NYCT
- Senior management's resolve to further environmental commitment
- Extension to sustainable development
- Corporate reporting on social, economic and environmental indicators



Advantages of having an Environmental Management System

- EMS is all voluntary supporting and supplementing environmental compliance
- Stimulates continual improvements
- Continual Improvement affords pollution prevention



Advantages of having an Environmental Management System

- Pollution prevention sustains proactive environmental management
- Proactive environmental management drives cost avoidance
- Cost Avoidance maintains economic competitiveness



Advantages of having an Environmental Management System

- You don't get ISO14001 simply to comply with regulatory requirements
- ISO 14001 is responsible for inspiring innovative areas of environmental management within NYCT
 - Green Buildings
 - Eco-Procurement
 - Conservation of energy and natural resources



Creating a legacy of Environmental Excellence

- Always room for continual improvements
 - Forward moving development of O&T
 - Broadening scope of undertaking
 - Learning while improving
 - Evolving environmentally, economically and socially



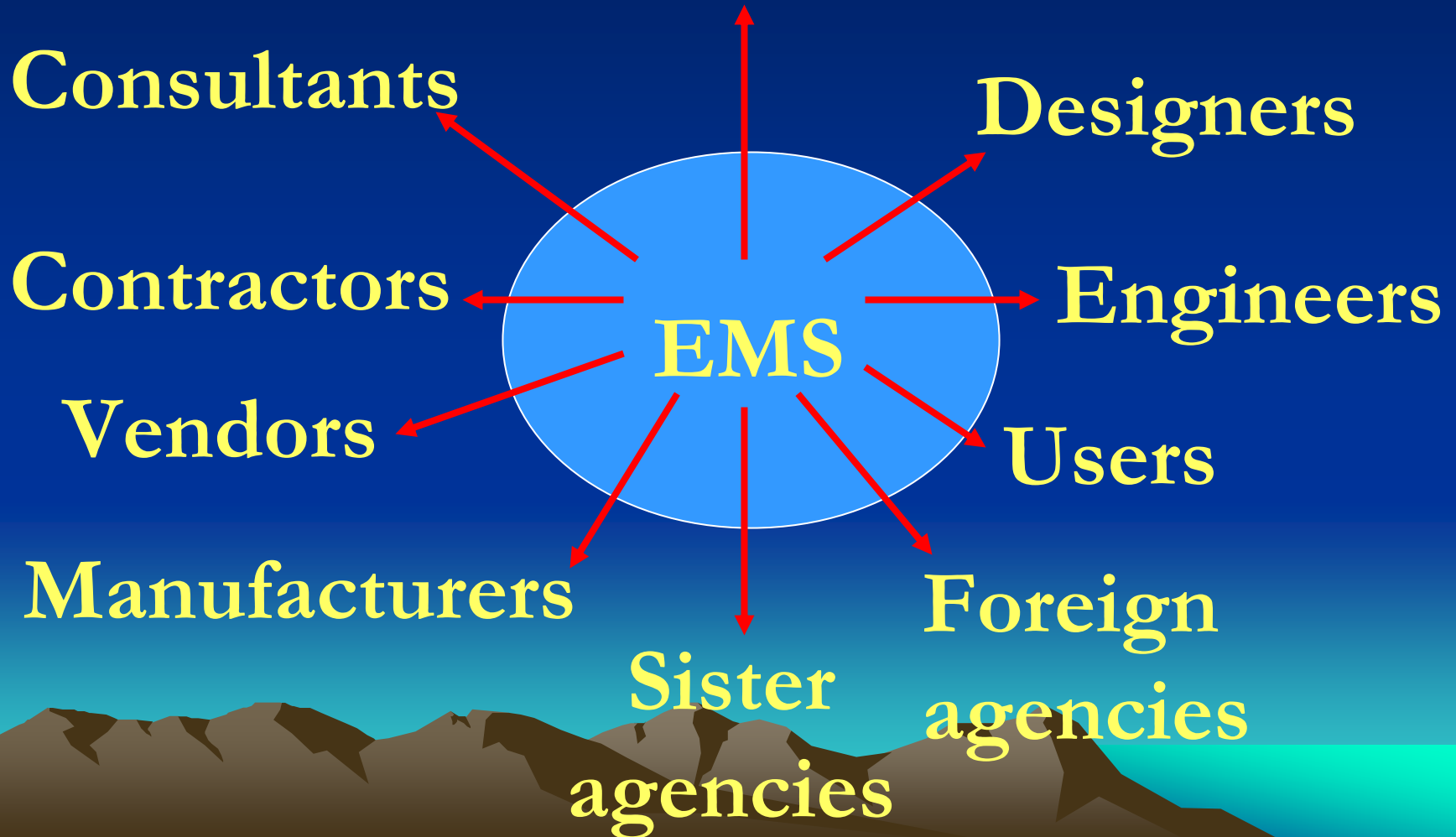
Summary of why EMS is important for the Organization

- Assists in meeting corporate objectives without impacting the environment
- Commits organization environmentally to reduce risk
- Sets short and long term goals and objectives
- Assures continual improvements parallel to management and administrative realignment
- Assist in attaining economic advantage
- Supports global commitment to sustainable development



EMS influences Beneficial Change

Upper Management

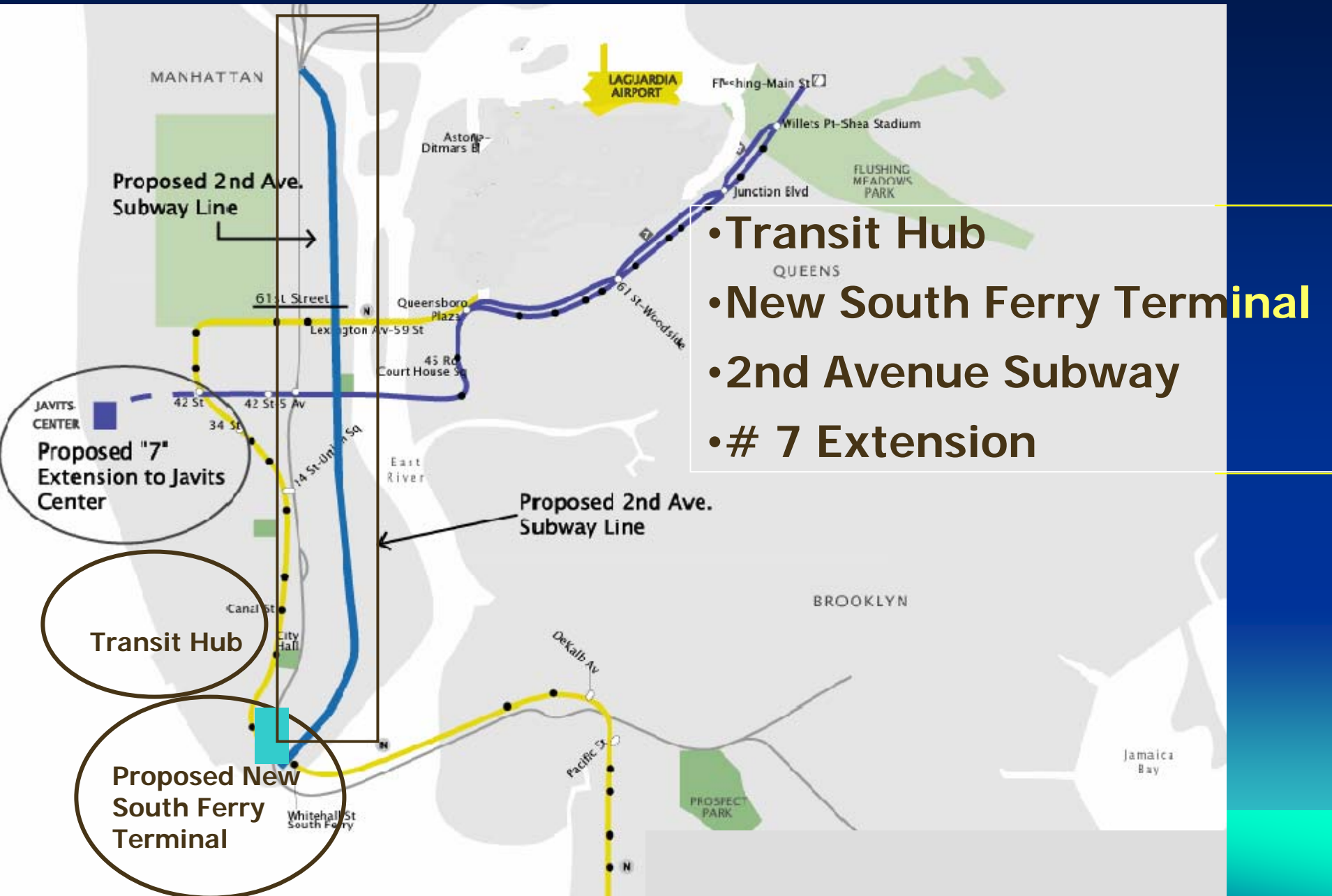


2004 Objectives & Targets (Proposed)

- Green all 2005 – 2009 capital plan projects (Lower Manhattan projects)
- Monitor all projects in construction phase
- Expand the scope of energy conservation to include all process type facilities
- Explore the feasibility of new abatement and remediation technologies



Shaping The Future - Green



Reducing Environmental Footprint



New York City Transit Today from Yesterday

- A significant difference
- Moving towards a cost effective, socially responsible and environmentally sustainable future



Cypress Hill Station Circa 2000



Roosevelt Avenue/74 Street Circa 2004



OUR GLOBAL COMMITMENT

Sustainable Mass Transit

