
Session 12:

Mega-Cities and Environment

1.463 Globalization of the Engineering
& Construction Industry

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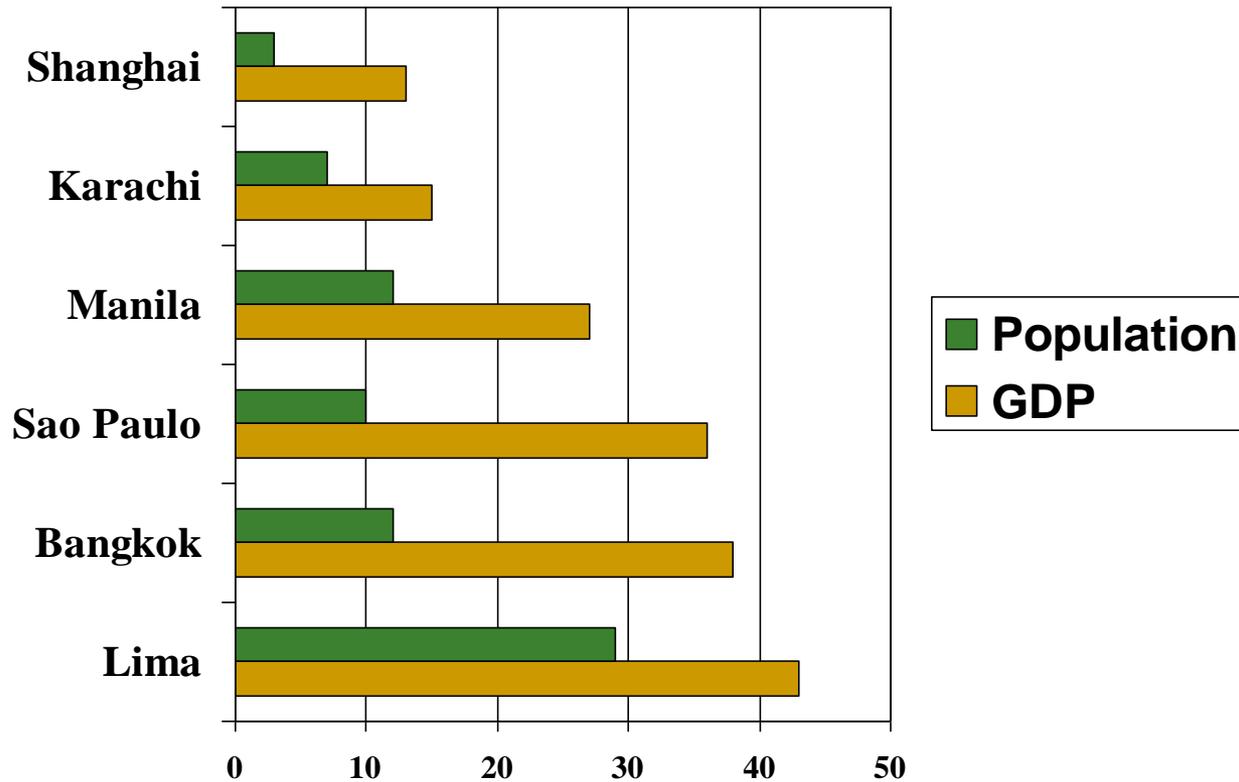
Issues for Global Climate Change Accords

- Efficiency
 - Lowering emissions in least cost way: quota trading
- Equity
 - Local v. global problems
 - Mismatch among past & future responsibility, costs to prevent & damages from climate change
- Efficacy
 - Impact = f (Technology, Activity,...)
 - Controlling global carbon stock v. income/resource redistribution

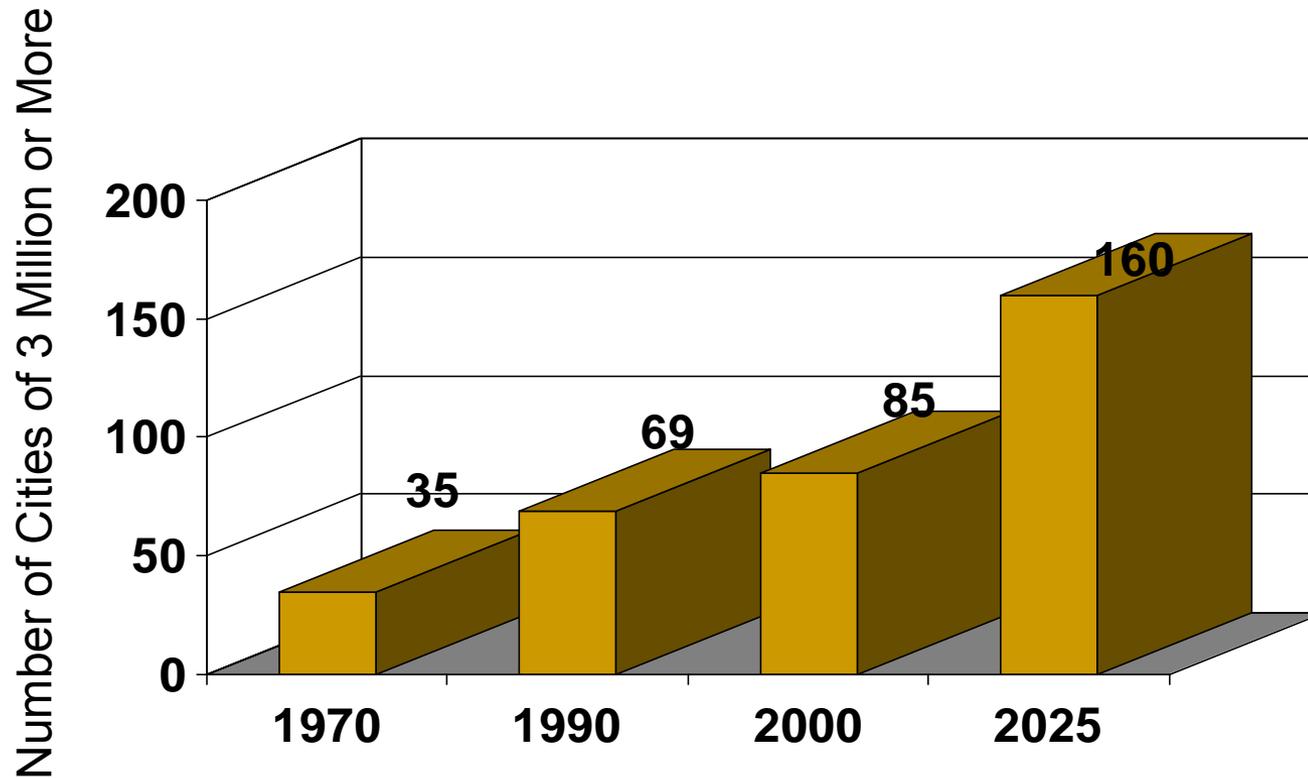
Importance of Cities

- Population Centers
- Economic Centers
- Power Centers
- Major Polluters

Cities' Share of National Totals



Growth of Big Cities



Service & Infrastructures in Urban Context

Mobility		Transport
Energy		Power
Information		Communication
Shelter		Buildings
Economy		Commercial Complexes

Categories of Environmental Policy Instruments

- Regulatory Instruments = Command and Control
- Economic Instruments = Market-based Instruments
- Environmental Awareness = Suasive Instruments

Transport Alternatives for Improving Quality of Urban Environment

- Technology Focus: Increasing Efficiency
- Policy Focus: Discouraging Polluting Activities

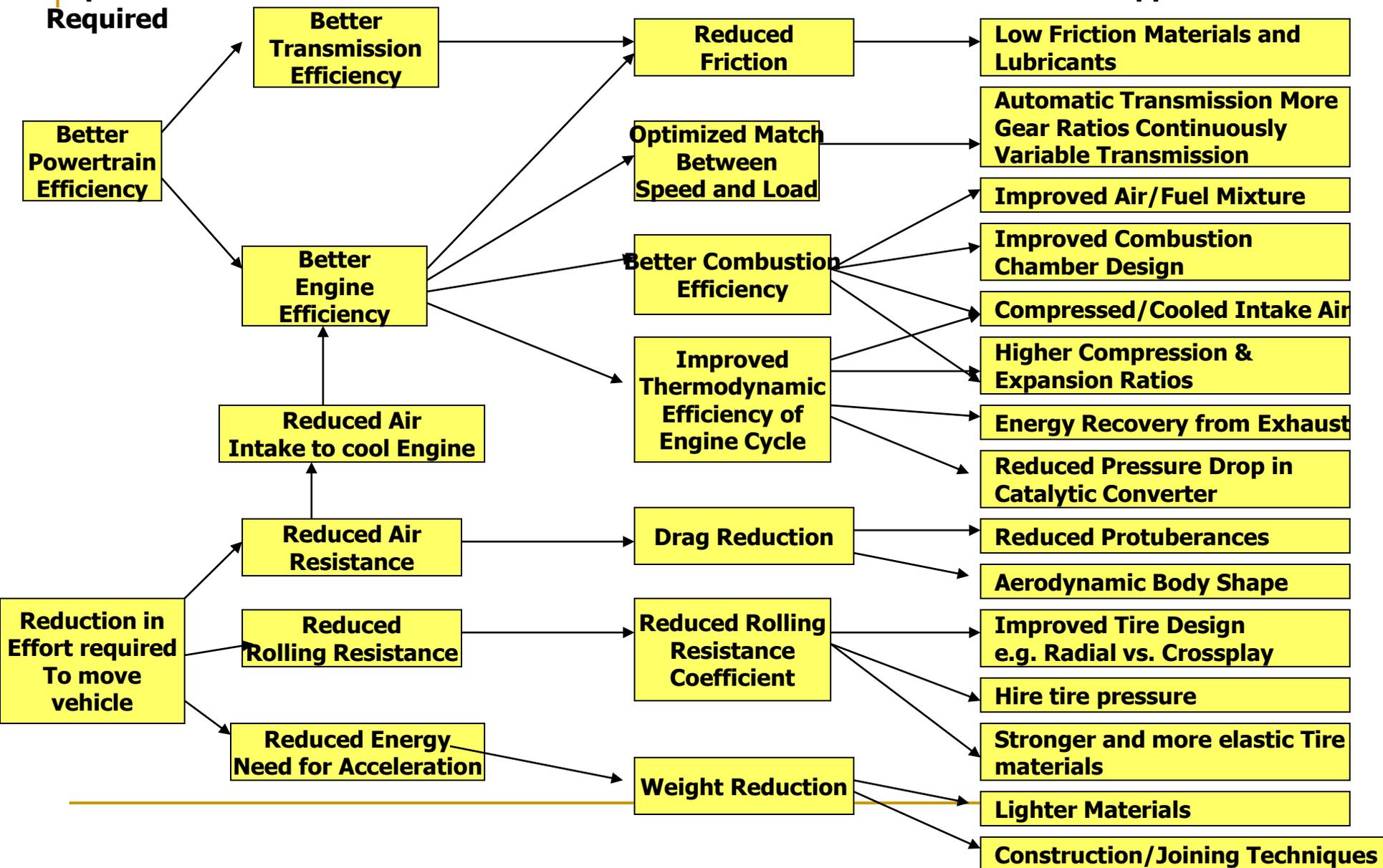
Technology Focus

- Vehicle Technology
 - Fuel Efficiency
 - Emissions controls
- Fuel Technology
 - Cleaner hydrocarbons
 - Alternative Fuels: electricity
- Alternative Technology
 - Mass Transit
 - Telecommunications, IT

Technical Approaches to Reducing Car Energy Use & GHG Emissions

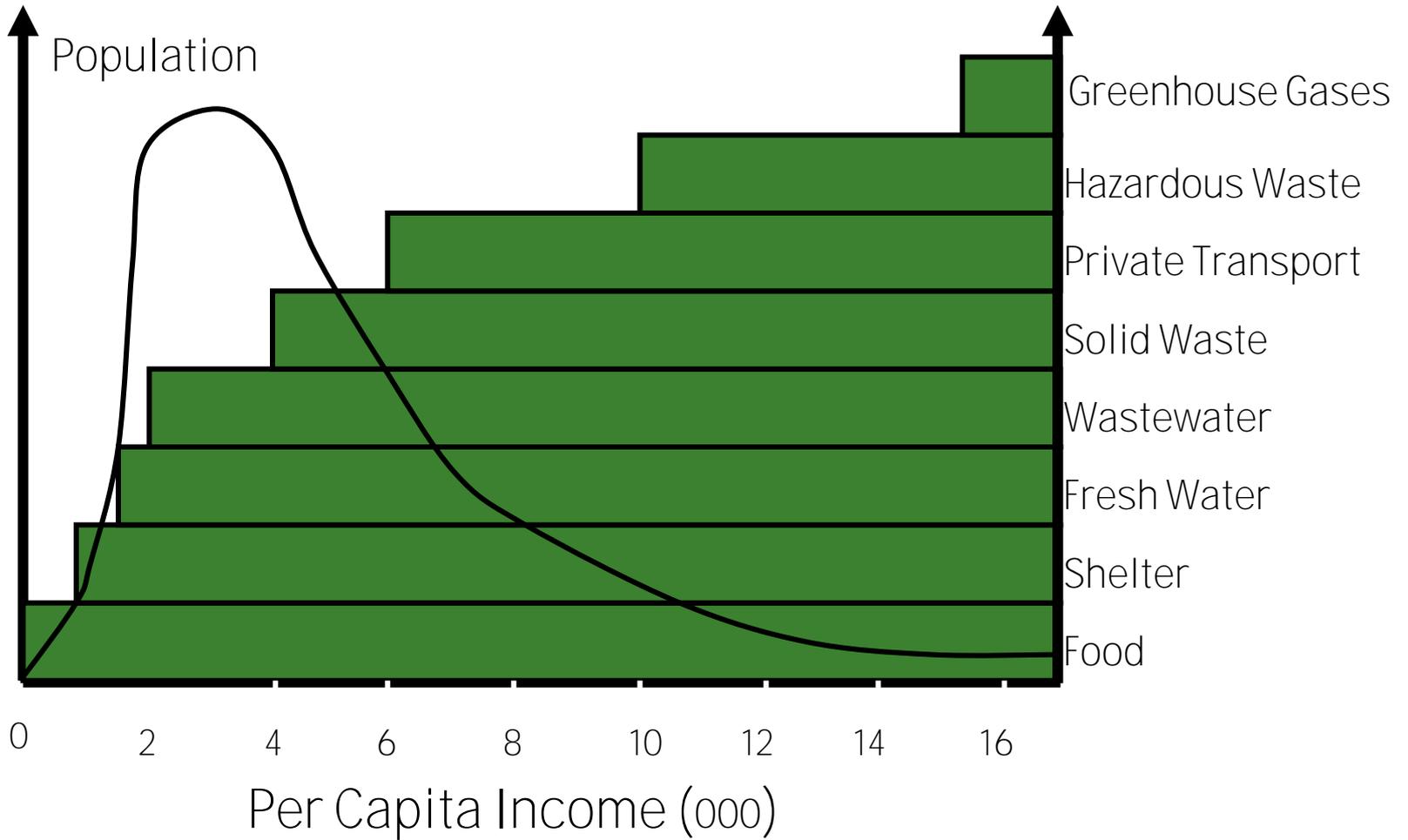
Improvement
Required

Technical Approach



Policy Focus

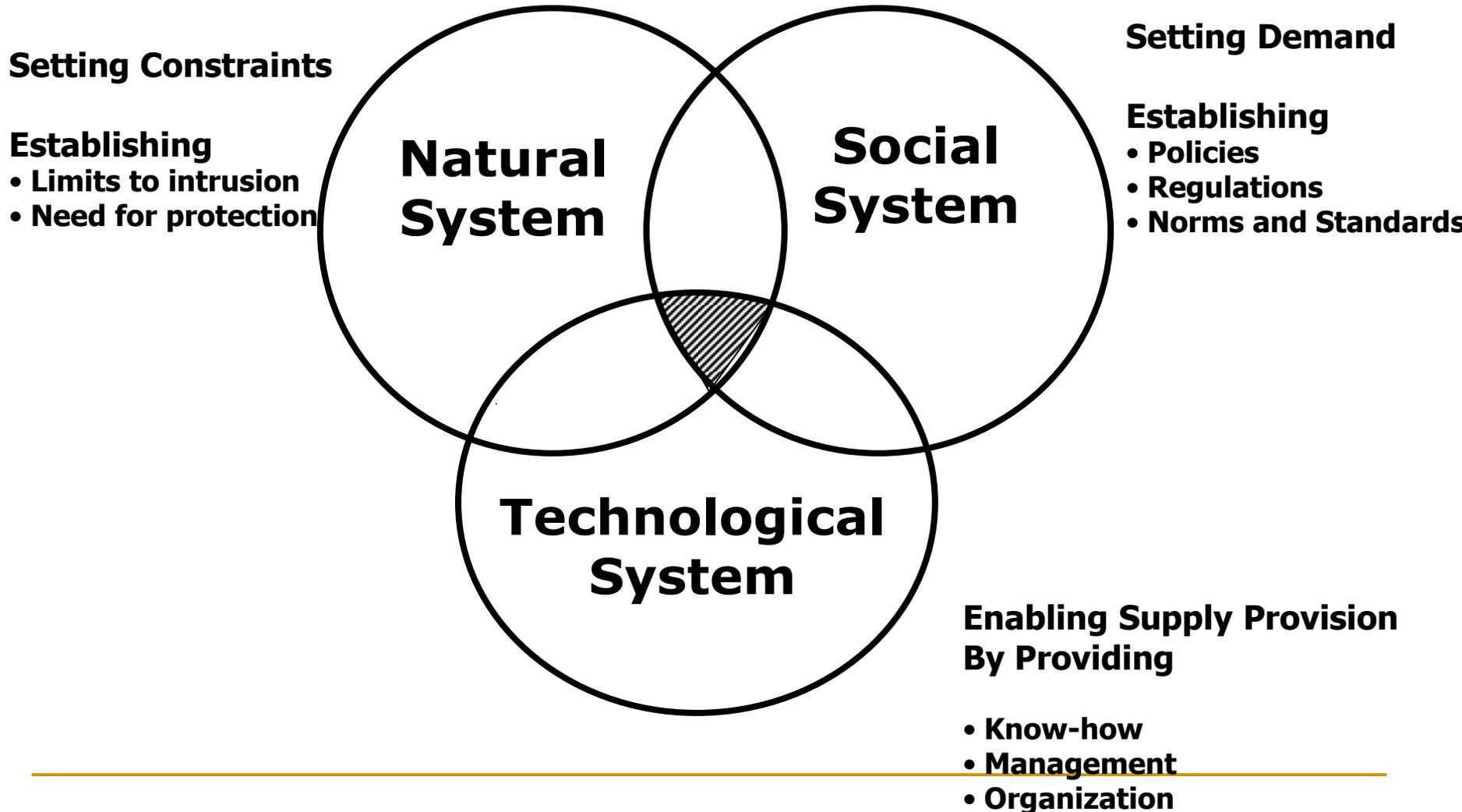
- Price Mechanisms
 - Charges
 - Subsidies
- Regulations
 - Emissions/Efficiency Standards
- Management
 - Better Traffic Management (e.g. I.T.S.)
 - Modal Shift
 - Better land use



Global Institutional Barriers

- Global Pollutant
 - Collective emissions matter and compliance must be by consensus
- *Intergenerational Equity*
 - Impact occurs in the future
- *Intragenerational Equity*
 - Costs of CO₂ reduction and past and current responsibility vary across countries
 - Impact varies across countries.

Built Environment



Municipal Activities

- Energy Consumption
 - Mobile
 - Stationary

- Water
 - Clean Water
 - Waste Water Treatment

- Municipal Solid Waste (MSW)
 - Solid Waste
 - Hazardous Waste

MASDAR CITY

Mission

- To create a prototypical and sustainable city where residents and commuters live the highest quality of life with the lowest environmental footprint

Goals

- To be a benchmark for other cities
- To show people to live sustainably
- To show businesses how to operate sustainably
- To attract innovation and investment
- To be a city where businesses want to come and people want to live

Sustainability Metrics

- Zero Carbon
- Zero Waste
- High Quality of Life

DESIGN PRINCIPLES

- Achieve one planet living principles
- Emulate traditional Arabic city designs
- Realize highest levels of resource efficiency
- Improve quality of life in a city (car free, convenient, compact, safe)
- Maximize the benefits of sustainable technologies through an integrated planning and design approach

Key Features

Transportation

- Deploy an integrated transportation system utilizing personal rapid transit system which, together with pedestrian and public transit methods, will move people, goods, and emergency services in a multi-level, barrier-free environment.
- Build a city where people can live and work without the need for personal vehicle.
- Create the World's first carbon-neutral and emission-free large-scale transportation system.

Energy

- Achieve Carbon Neutrality from day one with a target of Zero Carbon
- Exceed world class standards for energy efficiency
- Lead the World with the demonstration of technology to reduce energy consumption
- Supply 100% of energy needs using state-of-the-art renewable energy technologies (e.g., photovoltaics, concentrating solar power, waste to energy)
- Supply renewable energy to the grid to provide regional carbon reduction benefits.

Key Features (cont.)

Waste

- Provide an environment that enables a zero waste lifestyle through the reduction, reuse, recycling, and recovery of waste materials
- Promote behaviors that achieve a zero waste lifestyle
- Maximize the elimination of waste with the ultimate goal of zero waste to landfills
- Stimulate local and regional markets for material reuse and the provision of recycled feedstock for industry: cradle-to-cradle flow of materials
- Utilize organic and residual waste for energy production and compost
- Target 90% waste diversion from landfills during construction.

Water

- Reduce domestic water consumption to 80 liters per capita per day compared to 120 to 180 liters per capita per day for other high performing systems.
- Utilize a broad array of water use reduction technologies including high efficiency appliances, grey and black water recycling, landscaping with low water use native plants, seawater greenhouses, des catchers, and rainwater recovery.
- Minimize the need for desalination as a source of water
- Maximize use of local water resources

Planning

- Improve Microclimate using
 - Well distributed green spaces
 - Continuous garden arteries
 - Maximized street shading
 - Traditional wind towers
- Enhance mobility and access using
 - Personal Rapid Transit PRT system
 - Future local and regional mass transportation system connections
 - Dynamic spine organization
- Integrate services and functions (housing, retail, civic, educational and workplace)
 - Digital facilities and municipal services management
 - Regional resource management (waste, water, energy and transportation)

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