Egypt's Policies and Measures for Sustainable Transport

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Hydrogen Fuel Cells and Alternatives in the Transport and Energy Sectors: Issues for Developing Countries

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Egypt's Current Situation of the Transport Sector

- The largest population in the Arab world.
- Population is growing by some 1 to 1.5 million people per year, expected to reach 80 million by 2015.
- Transport sector is responsible for 28 % of the final energy consumption.
- Growth of transport energy consumption is the highest among other sectors (6.2% pa).

Egypt's Current Situation of the Transport Sector (2)

- Transport sector produces about 25 % of the energy related CO2 emissions
- Among non-Annex I countries, Egypt ranks 15th in terms of CO2 emissions (127.2 million tons of CO2 per year).
- Growing rate of private vehicles ownership.

Egypt's Current Situation of the Transport Sector (3)

- 90% of all the freight is transported by road transport system.
- To reduce pressure of growing urban population in old Cairo, new urban settlements around Cairo were developed since 1970s.
- The principles of sustainable transport have not been fully integrated into the urban planning of these new settlements.

The Situation in Cairo

- Greater Cairo is one of the world's mega-cities with a population of more than 17 million.
- Demand for mobility has greatly outpaced the capacity of the public transportation system.
- The gap has been primarily filled with shared taxis (informal transport) and use of private cars.

The Situation in Cairo (2)

- **Traffic congestion.**
- **Baseline scenario through 2022:**
  - **Average trip speed of all modes will drop from current 19.0 km/h to 11.6 km/h.**
  - **Average commuting time will increase from current 37 minutes to 100 minutes.**
- **Air Quality deterioration**

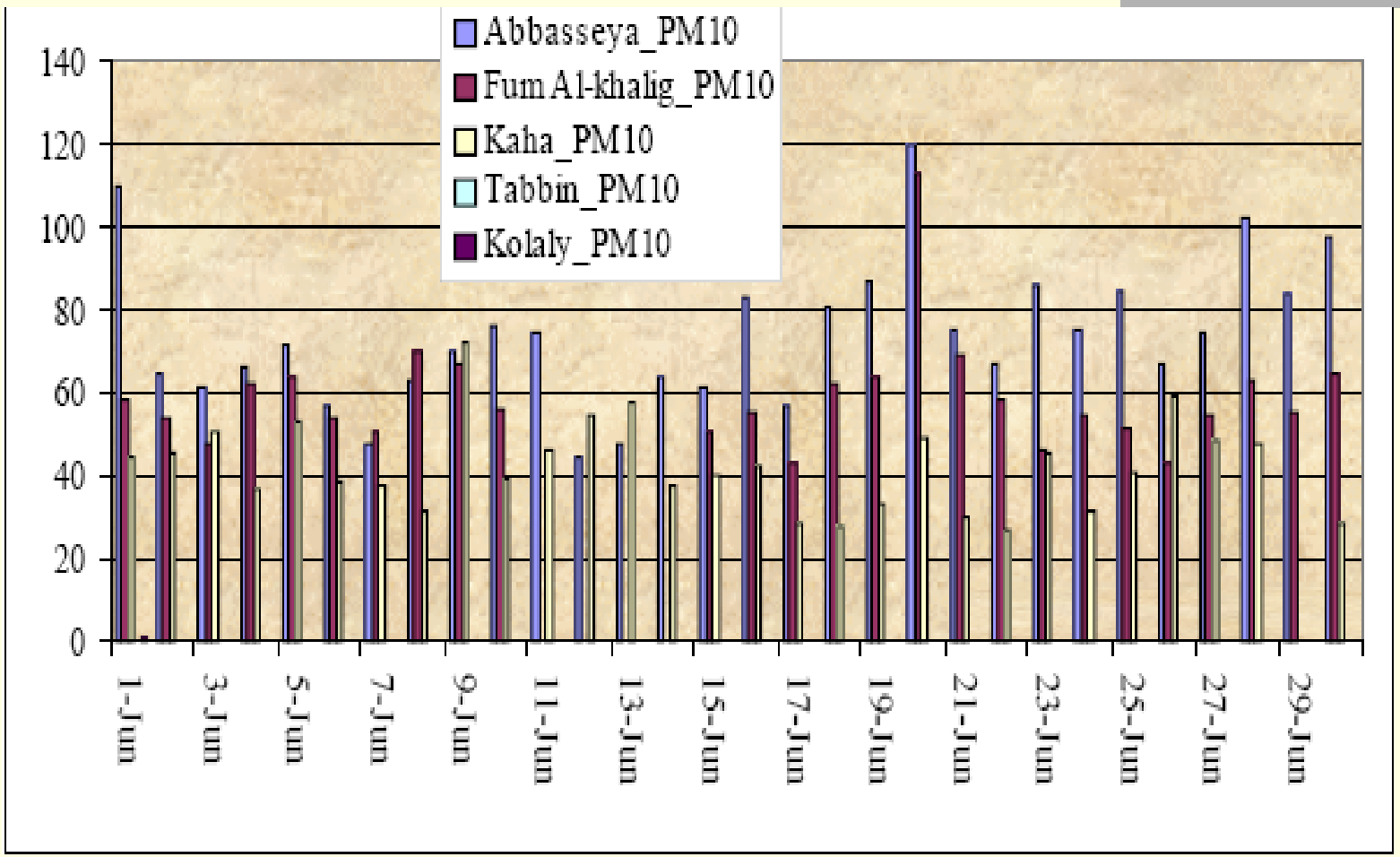
Air Quality problems in Cairo

Ref: US EIA

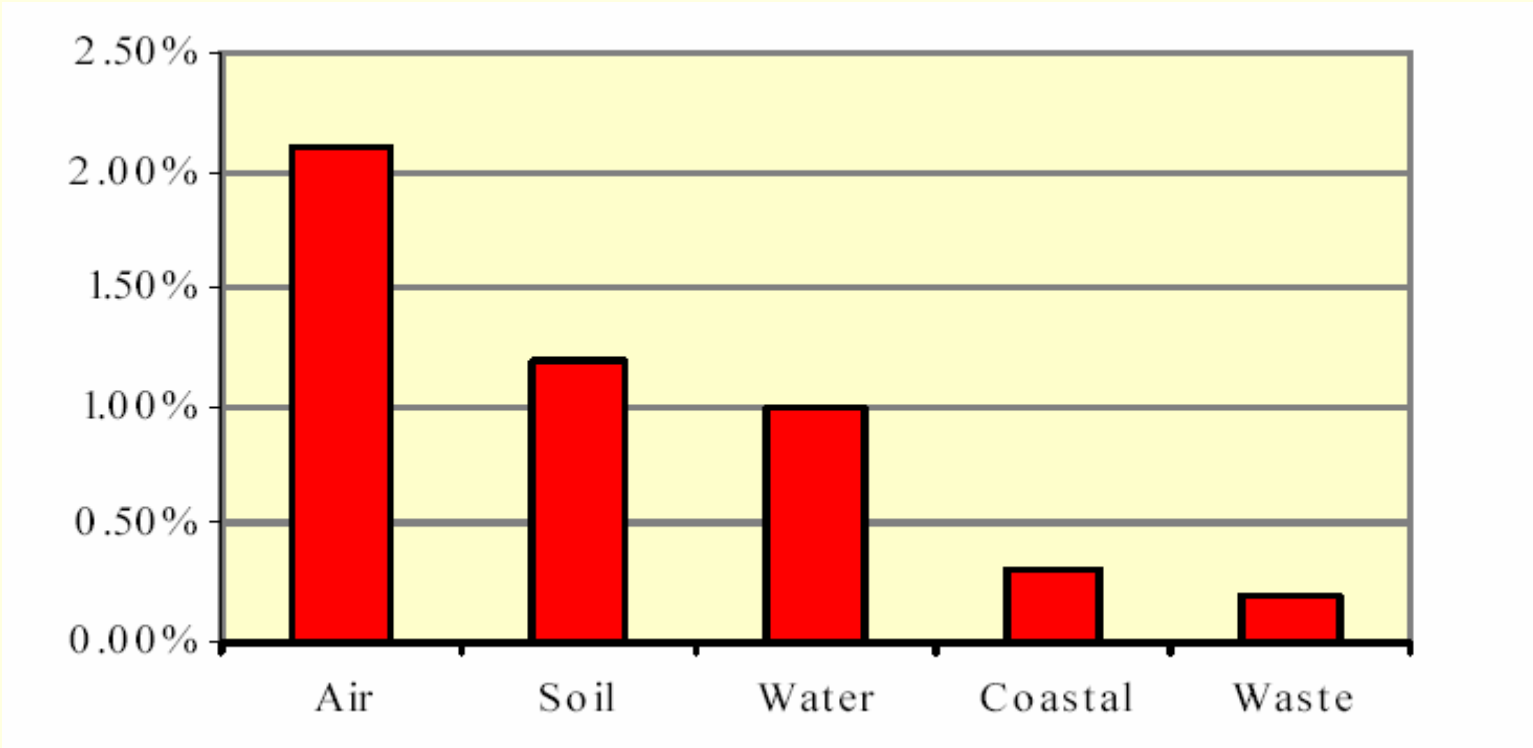
Air Quality problems in Cairo

- Mobile emissions are one of the major sources of air pollution.
- Cairo is surrounded with two industrial areas from north and south.
- PM10 is the most critical air quality problem.
- Lead has been a critical air quality problem, mainly due to secondary lead smelters.

PM10 concentrations in Cairo (June 2005)

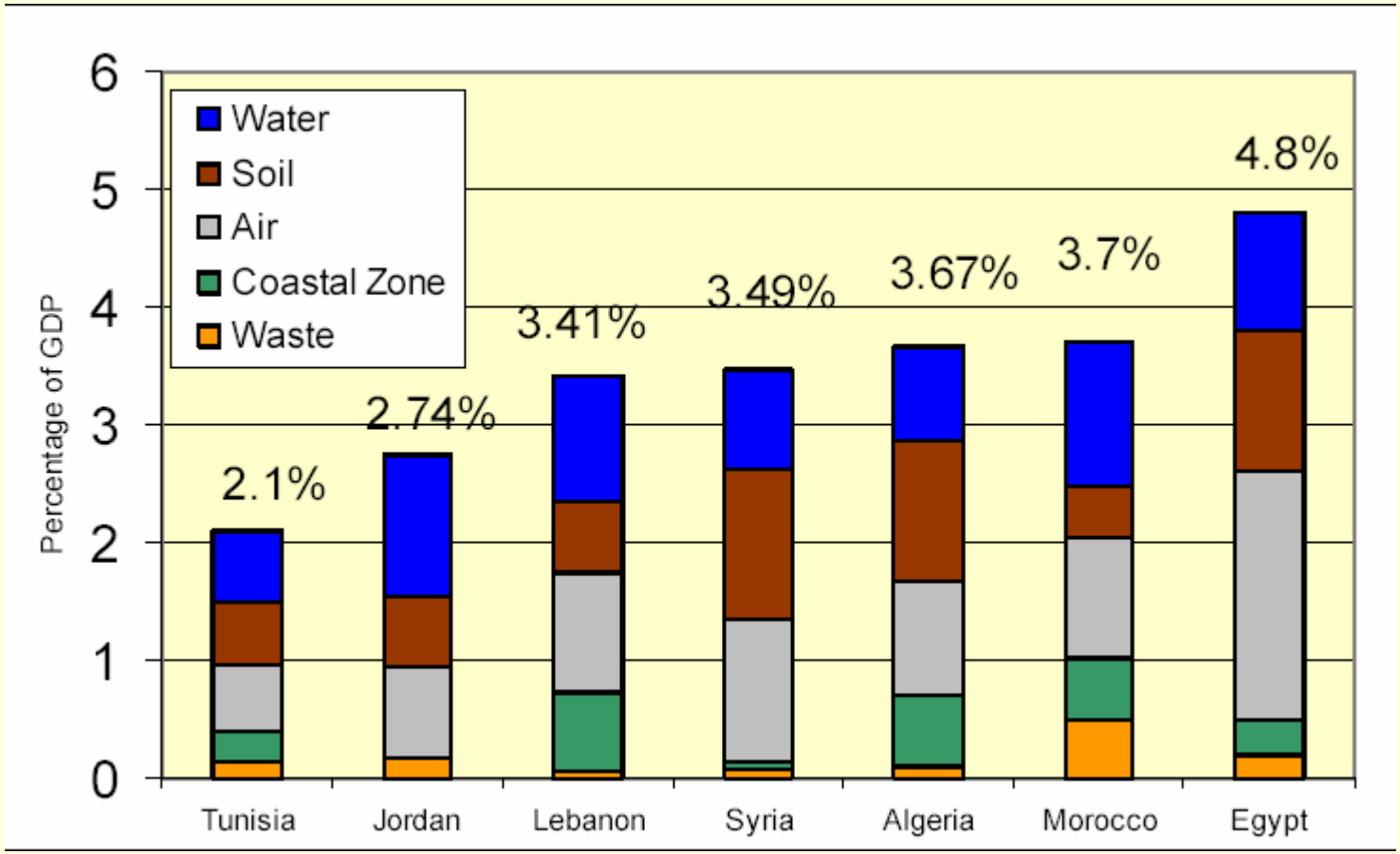


Annual cost of environmental degradation (mean estimate as % of GDP)



Reference: WB

The Cost of Environmental Degradation as a Percentage of GDP



Reference: WB

Estimated Cost of Environmental Degradation in Selected Countries

OECD Countries	1-2%
Tunisia	2.1%
Mexico	3.3%
Lebanon	3.4%
India	4.5%
Egypt	4.8%
China	8.0%

Ref. WB

Air Quality Management Program

- Revisit air quality standards of Environmental Law 4 for 1994.
- Phasing out of leaded gasoline (90 %)
- Relocation of a major lead smelters away from Cairo.
- Enforcement of vehicle emissions standards.
- Self monitoring of emissions of large industries (Cement)

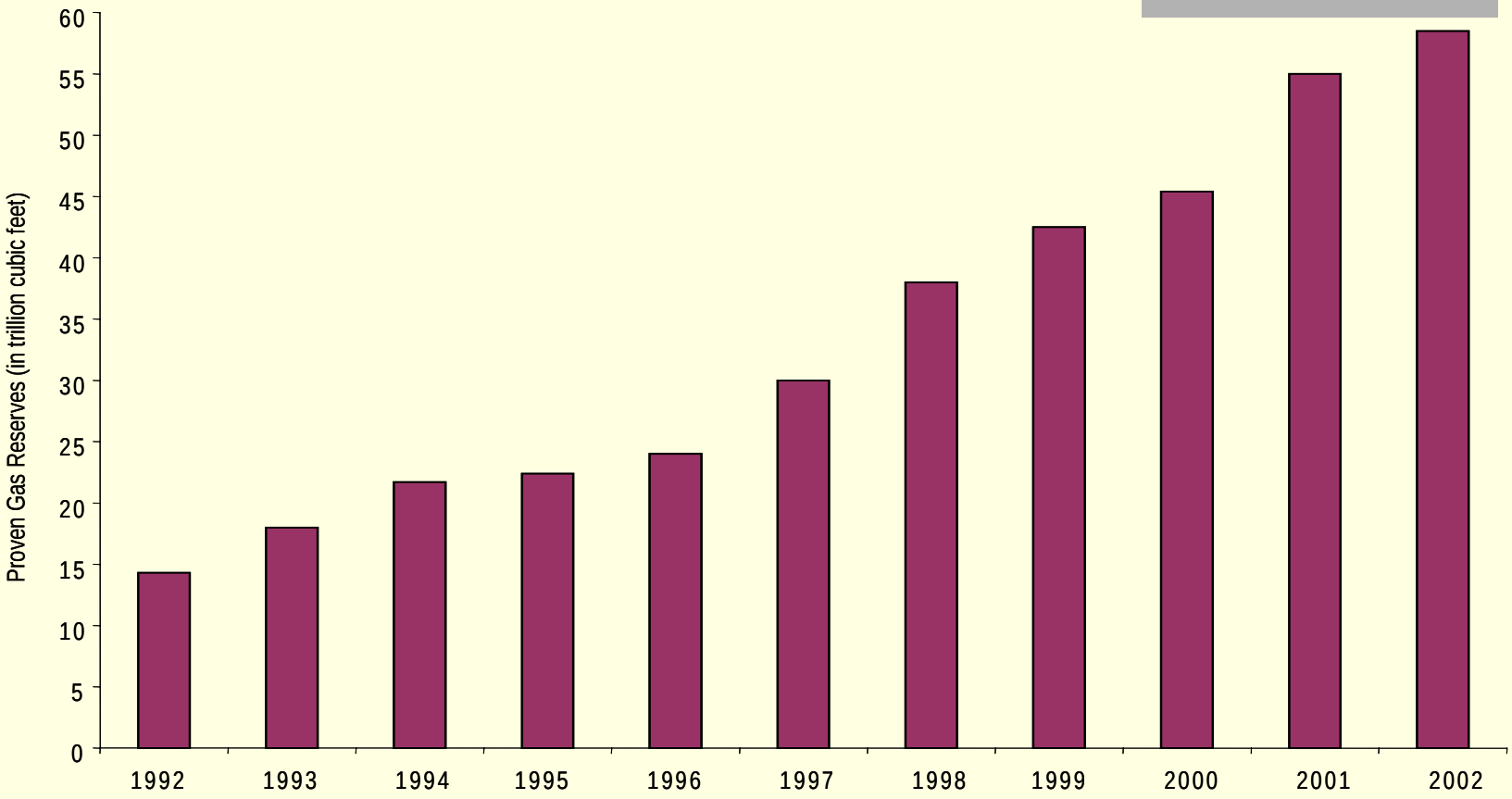
Air Quality Management Program (2)

- Switching to Natural Gas in power, industry, residential sector, and transport.
- Policies to remove old fleet of vehicles from the streets.
- Promote public transport: Expansion of underground Metro.
- Enhancement of solid waste management: ban open-air burning of solid waste.

Egypt's Climate Change Action Plan

- Promote use of clean fuels, such as compressed natural gas (CNG) and hydrogen.
- Review and revise current vehicle emission limits in the Environmental Law #4 for more stringent standards
- Impose vehicle emission testing as a pre-requirement for vehicle license issuance or renewal.
- Retrofit or replace two-stroke engines of motorcycles by four-stroke engines with CNG as fuel.
- Introduce traffic management plans to reduce urban transport congestion and vehicle on-road time.
- Conduct public awareness campaigns on air pollution.
- Expand the current underground electric metro system in three stages to cover the greater Cairo, including Cairo airport.
- Increase the use of River Nile for public transport.

Proven Natural Gas Reserves in Egypt (TCF)



CNG in Transport

- A government policy since the early 1990s.
- 6 CNG companies (Sept., 2005)
- 93 CNG fueling stations (Sept., 2005).
- 60,000 CNG vehicles are in use (May 2005).

Local capabilities to support Fuel Cell technologies: Rationale for GEF funding

- A well established Bus manufacturing industry.
- Extensive experience of operating refineries, petrochemical complexes, fertilizer plants including H2 production.
- Experience in building and operation of Natural Gas distribution networks that could be extended to H2 distribution systems.
- Extensive education and research system to produce needed professionals and human resources.

Existing Hydrogen Production Capabilities

- KIMA plant (in Aswan) uses hydropower to produce H2 by electrolysis.
- Fertilizer plants (in Alex., Talkha, Suez) are producing H2 by Natural Gas reforming.
- 8 major oil refineries (in Alex., Cairo, Suez) are producing H2 for their own use by Natural Gas reforming.

Commercialization Barriers

- High initial cost of the GEF demonstration project (23.5 m US$ for 8 Buses).
- Technology uncertainties.
- Public acceptance of H2.
- Short of qualified human resources to serve the industry in the short term.
- Lack of proper regulatory framework.
- Lack of proper infrastructure.

Egypt's Planned Sustainable Transport Project

- A new project approved for GEF funding.
- Integrating sustainable transport planning principles into general urban planning.
- Facilitating modal shift to less polluting forms of public transportation.
- Promotion of non-motorized transport facilities in middle size provincial cities.
- Traffic Management and Traffic Demand Management to discourage individual use of private cars.

Why Egypt declined from the Fuel Cell program?

- **Policy considerations:**
  - **Recommendation from UNDP-GEF due to early implementation problems in Brazil and Mexico.**
  - **It was focused on single technology driven approach lacking an integrated strategy.**
  - **To give more time to commercialization of the ongoing CNG program.**
  - **To give more time to demonstration of Hybrid electric buses.**
  - **It is too early for Egypt.**

Why Egypt declined from the Fuel Cell program? (2)

- **Technical and Economic Issues**
  - **High capital cost of the fuel cell demo.**
  - **Lack of H2 distribution infrastructure.**
  - **Lack of support from technology providers in cost sharing.**
  - **Lack of public/private partnerships.**

Thank you