Great Lakes Region Pollution Prevention Roundtable
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Developing Pollution Prevention strategies for the New York/New Jersey Harbor

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Industrial Ecology

- **Goals of IE:**
  - Materials and energy optimization
  - Ecological and human health
  - Environmental equity
- **Systems-based approach**
  - Model the flow, transformation and dissipation of energy and materials through various systems (industrial systems, business and consumer communities, ecological systems) [Descriptive]
  - Seeks to optimize the total industrial materials cycle from virgin material to finished product to waste disposal in order to lessen the impact of these processes on the environment [Prescriptive]
- **Analytical tools**:
  - Material flows, substance flow assessments
  - Life cycle analysis
  - Design for the environment, life cycle design

Overall Goals of Project:

- **Identify the locations in five toxicant cycles (Hg, Cd, PCBs, dioxins and PAHs) where pollution prevention (P2) would most efficiently contribute to long-term reductions in loadings to the harbor**

- **Develop practical P2 strategies that address toxicant releases / emissions**

- **Encourage implementation of the recommended actions by integrating stakeholders into the research and policy process**
  - Stakeholders Consortium includes: environmental groups, industries, trade associations, labor, academia and government

Step 1: Research

- **Identify sources**, flows and sinks for contaminants through the region including products, processes and sectors that produce, use and/or release these contaminants
- **Develop a Substance Flow Assessment** , quantifying contaminant flows and transformations (from extraction, production, consumption, to post-consumption, including disposal rates) [Industrial Ecology assessment]
- **Quantify contaminant flows in and out of the Harbor** – through air, water and land [Harbor Mass Balance]

Understanding contaminant movements (PCBs)

Closed Applications:
Dielectric Fluids, Light Ballasts, Electromagnets

Partially closed Applic.
Fluids (Hydraulic, Heat transfer) Switches,

Open Applic.
Inks,Lubricants, Wax, Flame Retard., Adhesives, Surface coatings,

Inadvertent Production

Waste:
Spills, Dredging, Decommissioned Equip. Building demolition

Recycling Operations:
Mineral oil
Carbonless copy paper
Plastics

Products made w/ recycled materials

Industrial Dumpsites

Interim Storage & Permanent Disposal

Landfills POTWs WTE

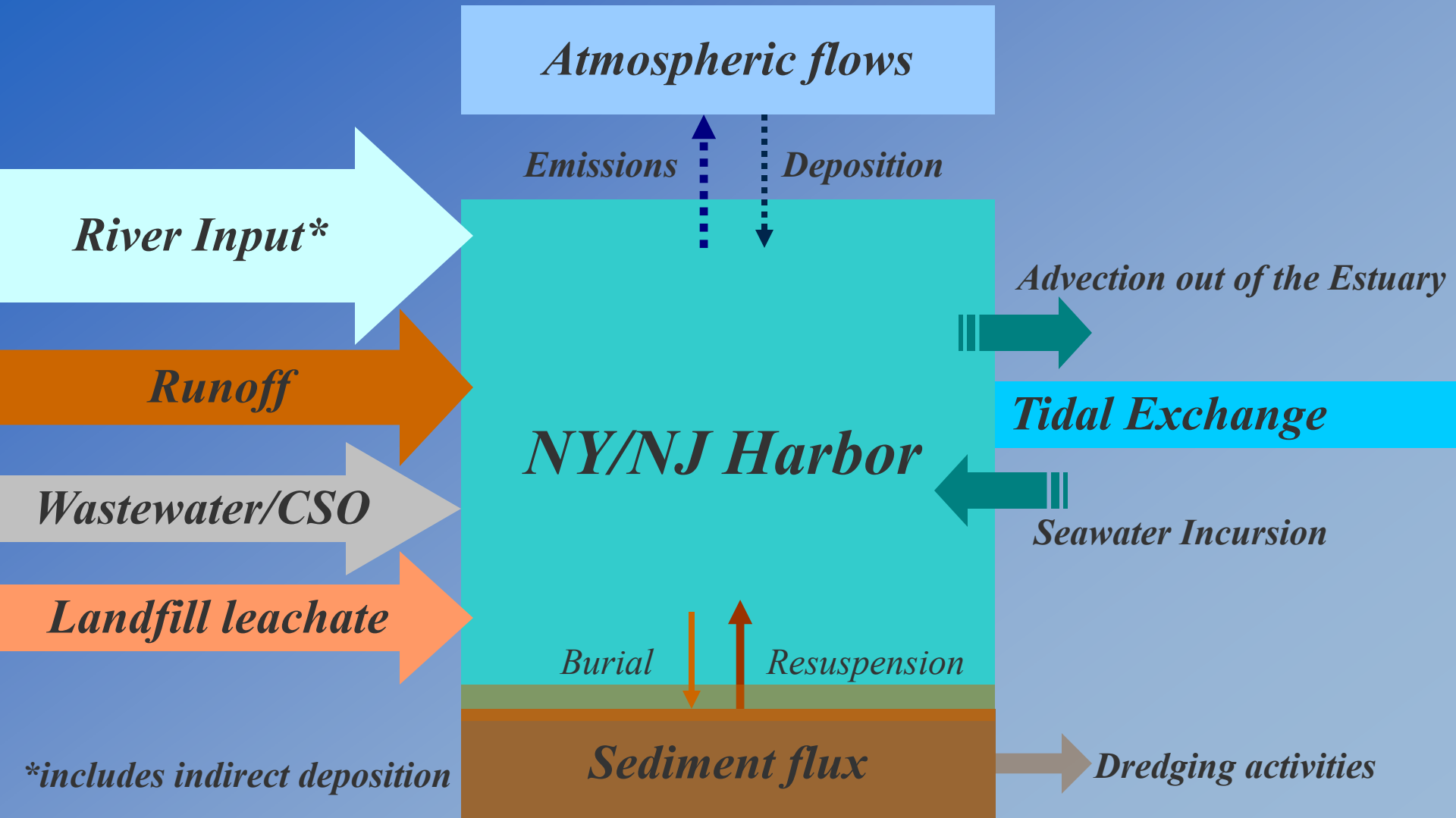
Soil

Air

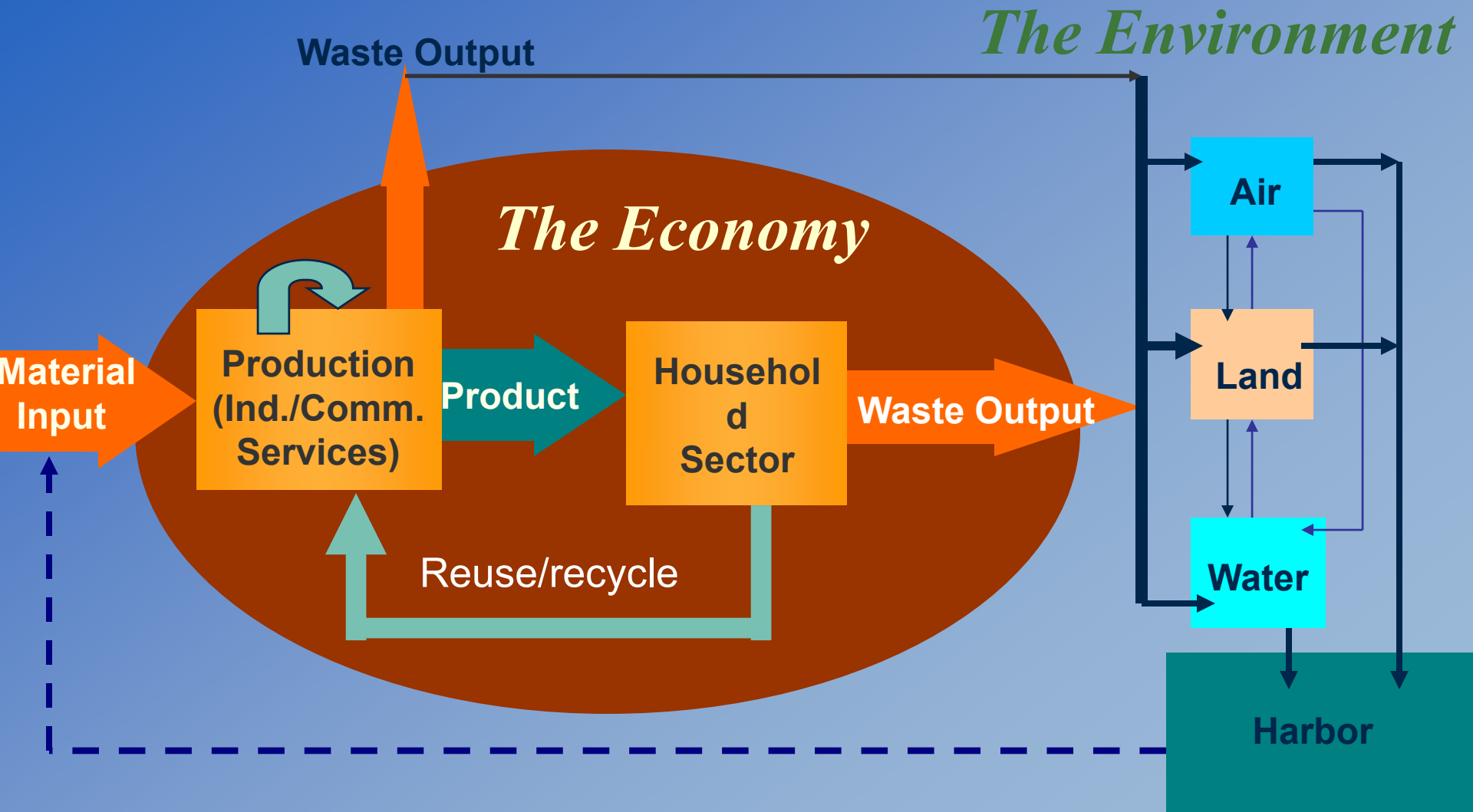
Water

Food

Mass balance for NY/NJ Harbor



Modeling system interactions



Step 2: Developing policy recommendations

- **Identify P2 strategies that result in the greatest reductions**
- **Develop P2 recommendations with Consortium**
  - Find leverage points for intervention. Identify economic sectors, substitute materials, technologies and/or alternative practices that provide effective leverage for policy tools.
  - Public Opinion Survey / Sector meetings
  - Determined total costs associated with P2 plan
- **Implementation**
  - Identify partners
  - Public Outreach
  - Voluntary actions & challenges

Wastewater releases: primary versus final outflows

measuring devices
instruments
laboratories
dental clinics

Chemicals
reagents
vaccines

POTW

SEWER

amalgams

15-30%

Harbor

Sludge
(70-85%)

Fertilizer, burial, WTE

cleansing agents
thermometers
human waste

Summary: Value added of IE

- Material Flow analysis complements environmental MB assessments
- Tracing contaminants back to the primary sources
- IE inventory helpful to identify all contaminant sources, including the cumulative effect of small quantity generators (SQG), not just LQG
- Capacity to identify and involve all agents and to balance the policy debate.
- Using indicators (environmental, socio-economic) enriches the policy debate

Data availability/requirements

- **Mercury, Cadmium**
  - Still commercialized (produced, used)
  - National Material Flows Available from US Geological Service
  - Industry data by sectors; some data by products
- **PCBs**
  - Production is banned but still inadvertently produced and used in products
  - No regional material flow analysis
  - National Inventories from 1980s only
- **Dioxin, PAHs**
  - Not commercialized, (by-product)
  - No national/regional material flow analysis, only emissions inventory

Industrial Ecology Resources

The Journal of Industrial Ecology:

http://mitpress.mit.edu/catalog/item/default.asp?ttype+4&tid=32

Pollution Prevention and Industrial Ecology:

www.umich.edu/~nppcpub/resources/ResLists/Ind.Ec.html

Industrial Ecology Compendium:

www.umich.edu/~nppcpub/resources/compedia/ind.ecol.html

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