Recycling Industrial Land for Urban Redevelopment

Workshop on Global Innovations
World Bank
June 19, 2009
Definition of Brownfields and Land Recycling

• Definition of *brownfield*: “Abandoned, idle or underutilized commercial or industrial properties where past actions have caused known or suspected environmental contamination, but where there is an active potential for redevelopment”

• Types of brownfields:
  – abandoned industrial and railroad facilities, or traditional manufacturing plants under operation with signs of pollution
  – small commercial lots (e.g., gas stations or laundry businesses)

• Definition of *land recycling*: Land recycling is a more comprehensive goal than brownfield clean-up. It integrates clean-up with new urban development planning and investments.
Typical Characteristics of Brownfield and Land Recycling Sites

- They are located in urban areas near transport, workers and customers
  - Visible to local communities
  - There are thousands of brownfield sites, both large and small
- They are barriers to redevelopment
  - Liability Concerns
    - Owners and Developers
    - Industry and government largely unaware of environmental consequences
  - Waste Products
    - Process Residuals, Metals, Steel Slag
    - Industrial Chemicals and Solvents
- Open Dumping in General
  - Unlined Pits, Dumps, Landfills
Unintended Consequences of Brownfields

• Environmental Contamination
  – Groundwater PCE, TCE
  – Soil (heavy metals, petroleum)
• Impacts
  – Human health
  – Local ecology
• Community Concern
  – Residents and Workers
  – Appeals to Government and Media
• Wasted and often abandoned land in land-scarce urban areas
Objectives of Land recycling

• Improve the environment and human health
• Remove stigma associated with environmental contamination
• Reverse neighborhood un-employment and blight
• Increase property values and property tax revenues
• Achieve significant savings in infrastructure investment, due to using under-utilized existing infrastructure
• Stimulate economic growth
• Create environmental jobs
• Increase land availability and reduce pressure to develop greenfield sites.
Examples of Abandoned Sites, U.S.A.

- Brier Hill Works Steel - Youngstown, OH
- Bethlehem Steel -- Pittsburgh, PA
- Mining Sites -- Utah
- Industrial Sites
Land Recycling Efforts in the U.S.

- Public Sector
  - Federal, State, and Local Programs to promote recycling
  - Grants to cities and towns for economic redevelopment
- “Brownfield developers”
  - Investments in land recycling
- Liability Reduction
  - Private-sector insurance to protect developers
  - Mechanisms to manage risk and to control cleanup costs
- Resident Cooperation
  - Local communities involved in planning
- Cleanup Technology Development
  - Research into environmental remediation technologies
Case Study - Manufacturing Plant, California

- 50 hectares, 100,000m² of buildings
- Heavily contaminated buildings (Asbestos, Lead, and PCBs)
- Heavily contaminated soil and water (50,000 Gallons Oil, 500,000 kgs VOCs, Lead, Arsenic, and Cyanide)
- In a residential community, adjacent to transportation

- 500,000 mt material moved to off-site landfill
- Vapor extraction system and pump and treat system installed
- $125 million spent (but the U.S. has learned ways to cut costs)

Result: land sold and redeveloped
China has large-scale land contamination

- “Invisible pollution” – an estimated 100,000 km² of China’s land is contaminated (National Soil Survey)
- “Deindustrialization” – the result of industrial relocation
- Simultaneous economic restructuring and boom in housing markets
- Underlying strong urban growth, projected to continue to 2025 and beyond
- Need for land-use changes (away from industry) in old city centers:
  - Apartments, office buildings, public buildings, shopping centers, parks, etc.
  - New public-transit and other infrastructure demand resulting from new land uses
Examples of Abandoned Sites, China

Capital Iron and Steel Making Plant, Beijing
- The 2nd largest steel producer in China
- Large scale--District wide
- Land area: 76 million square feet

Shenyang Metallurgic Plant, Liaoning Province
- Location: within the city’s 1st ring road
- Plant closed in 1999
- Land area: 4 million square feet
Challenges to achieving brownfield redevelopment

- **Policy constraints**
  - Complexity and uncertainty of regulatory approval process
  - Liability risks
  - Applicable standards

- **Financing constraints**
  - Cost of remediation
  - Difficulty obtaining financing

- **Technical constraints**
  - Limited knowledge on cost-effective clean-up technologies

- **Institutional constraints**
  - Monitoring and management of contaminated sites
  - Stakeholder concerns/opposition
Possible Elements of a Brownfield Clean-up Project (1)

1. Planning of site-specific clean-up operations that:
   – use latest clean-up technologies, especially bio-remediation (micro-organisms, fungi, worms, grasses -- all quite cost-effective)
   – maximize clean-up economies of scale, using regional waste management infrastructure;
   – meet all applicable environmental standards;
   – minimize long-term site management and monitoring costs

2. Financing of brown-field clean-up investment costs

3. Financing of subsequent urban infrastructure requirements, such as sites and services (streets, public transport, lighting, water, electricity)
Possible Elements of a Brownfield Clean-up Project (2)

4. Conducting urban land use planning in the context of projected growth
   – physical growth (projected population and housing/commercial needs)
   – economic growth (e.g., local manufacturing vs. service sector needs)

5. Developing national and/or provincial financial instruments and policy incentives for brownfield redevelopment

6. Developing national and/or provincial land decontamination standards – specific to proposed land use and type of contaminant

7. Supporting institutional strengthening/capacity-building
# Expected Benefits of a Sample Project

<table>
<thead>
<tr>
<th>Economic benefits</th>
<th>Social benefits</th>
<th>Ecological benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• To attract investment</td>
<td>• To increase job opportunities</td>
<td>• To improve the quality of the urban environment</td>
</tr>
<tr>
<td>• To increase tax revenue</td>
<td>• To increase the affordability of residents’ housing</td>
<td>• To reduce greenhouse gas emissions</td>
</tr>
<tr>
<td>• To improve the City’s competitiveness</td>
<td>• To improve the quality of life of residents</td>
<td>• To take urban development pressure off of green-space</td>
</tr>
<tr>
<td>• To increase the value of real property</td>
<td>• To mitigate human health risks</td>
<td></td>
</tr>
<tr>
<td>• To improve use efficiency of city infrastructure and city land resources.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you

For materials used in this presentation, the World Bank gives thanks to:

– the Land Recycling team at the Department of Urban Studies and Planning, Massachusetts Institute of Technology, led by Prof. Karen Polenske, and includes Ms. Li Xin, Mr. Chen Zhiyu, and Mr. James Hamilton

– the British Columbia Brownfield Renewal, Canada