

Assessment Tool and Visualization for Regional Supply Chain Impacts

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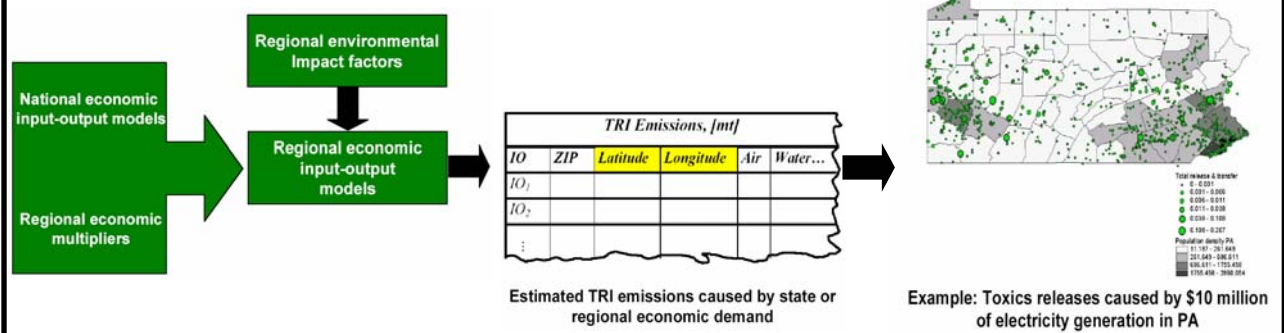
Objectives

Create a decision-support and visualization tool to examine the spatial distribution of supply chain environmental impacts and sustainability implications of production and services. The models would represent supply chain impacts for over 400 sectors in each U.S. state or region. Users could simulate purchases from any sector or combination of sectors.

Approach

Develop U.S. regional economic input-output models with environmental impact factors. The models can be used to estimate impacts for new investments and facility locations. Data are developed from Census and EPA public databases. Environmental effects quantified include electricity use, toxic emissions, and hazardous waste generation.

Structure of Regional Model and Results



Example for Model Application:

Toxic Air Emissions Caused by Annual Electricity Generation in Far West Region

- Far West: AK, CA, HI, NV, OR, WA
- Total annual net electricity generation in 2002: 384,593,775 MWh
- Average wholesale price: \$8/kWh
- Final demand, $F = \$30,767$ million
- $X_j^{FW} = (I - D_{kj}^{FW})^{-1} * F$
- X_j^{FW} = sectoral outputs required to produce F
- I = identity matrix
- D_{kj}^{FW} = direct requirement coefficients matrix for Far West region
- Electric utilities **reported** total toxic air emissions in 2002, [mt] = 2,178
- **Reported** toxic air emissions for “Power generation and supply” sector in 2002, [mt] = 1,725
- **Estimated** toxic air emissions for “Power generation and supply” sector in 2002, [mt] = 1,713

CHEMICAL NAME	Total Air reported, [mt]	Total Air estimated, [mt]
SULFURIC ACID	873	882
HYDROCHLORIC ACID	445	427
HYDROGEN FLUORIDE	140	142
AMMONIA	117	110
BARIUM COMPOUNDS	40	41
NICKEL COMPOUNDS	33	33
LEAD COMPOUNDS	28	28
MOLYBDENUM TRIOXIDE	28	28
COBALT COMPOUNDS	5	5
MANGANESE COMPOUNDS	3	3

Comparison of top 10 toxic emissions reported and estimated in 2002

Significant Results To Date

- Regional input-output models for Pennsylvania and all eight BEA regions
- Regional toxics release impact factors
- Case study: Estimating Toxic Air Emissions Caused by the Annual Electricity Generation in Far West Economic Region for Year 2002

Further Information

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