11.482J / 1.825J / ESD.193J Regional Socioeconomic Impact Analyses and Modeling
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Seminar:
Analysis Tools to Assess Economic Impacts and Opportunities

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Topics

1. ***Input-Output*** **Models**
2. ***Simulation*** **Models**
3. ***Competitive Market*** **Analysis**
4. ***Economic Opportunity*** **Models**
5. **Matching Models to Analysis Scenarios**

(1) INPUT-OUTPUT MODELS

- Inter-Industry Technology Matrix,
  Buy and Sell Matrices
- Regional Purchase Coefficients
  based on Location Quotients (Ratio of Local to National Industry Intensity), adjusted for cross-purchasing
- Assumes that future gains/losses of output or demand will affect suppliers and worker income re-spending in proportion to current patterns

Input-Output Multiplier Models

- BEA (US), RIMS, IMPLAN, survey-based local studies
- Trace Inter-Industry Buying & Selling impacts of exogenous growth or decline in given industries
- Reflect Current Technologies and Local Purchasing

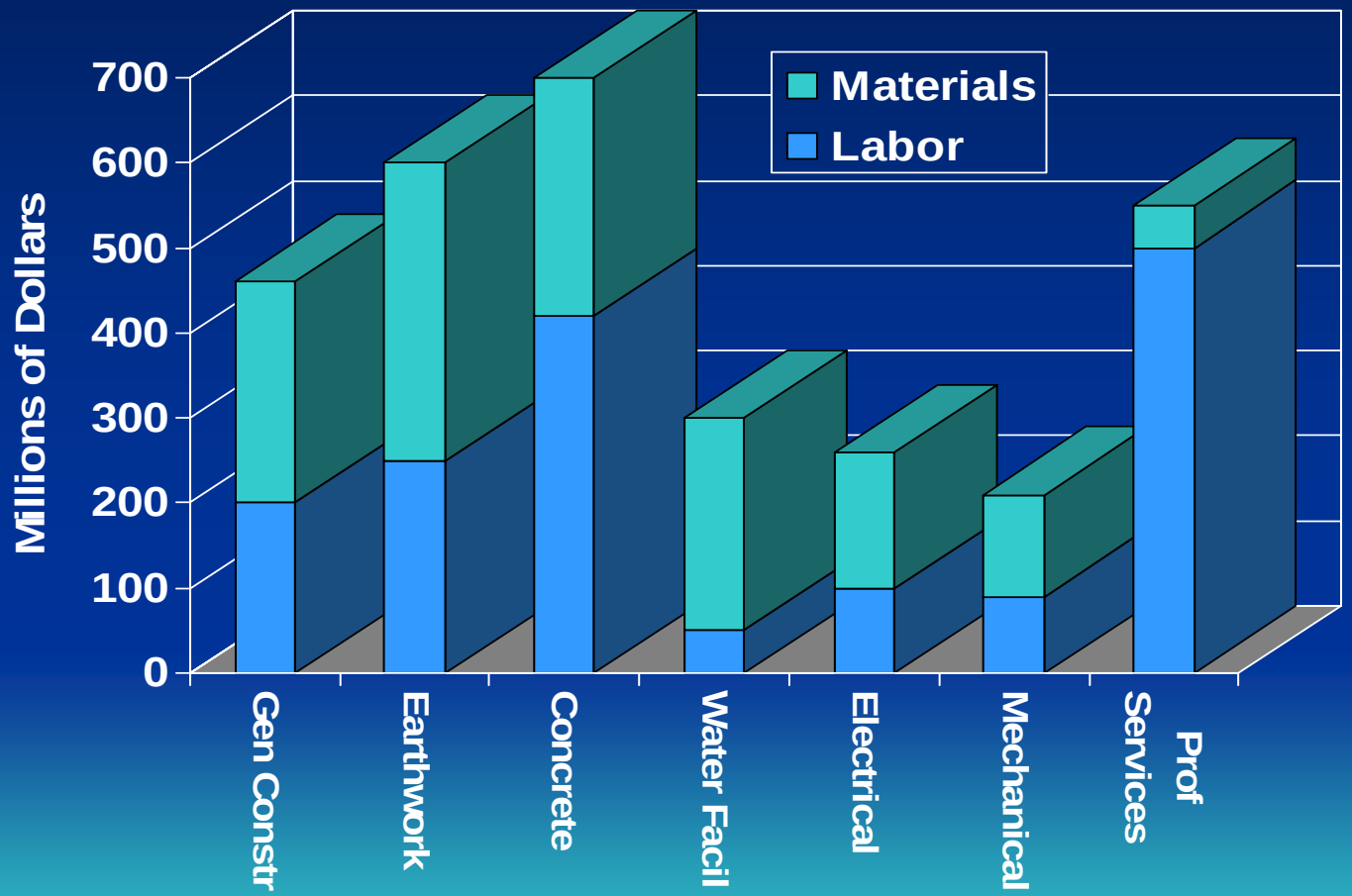
Can be used to Assess:

- Current Economic Role (Contribution) of an Existing Industry, Facility or Program
- Expected Impact of a Change in Output (Business Opening, Closing, Expansion, Contraction)
- Expected Impact of a Change in Spending and Sources for Purchases

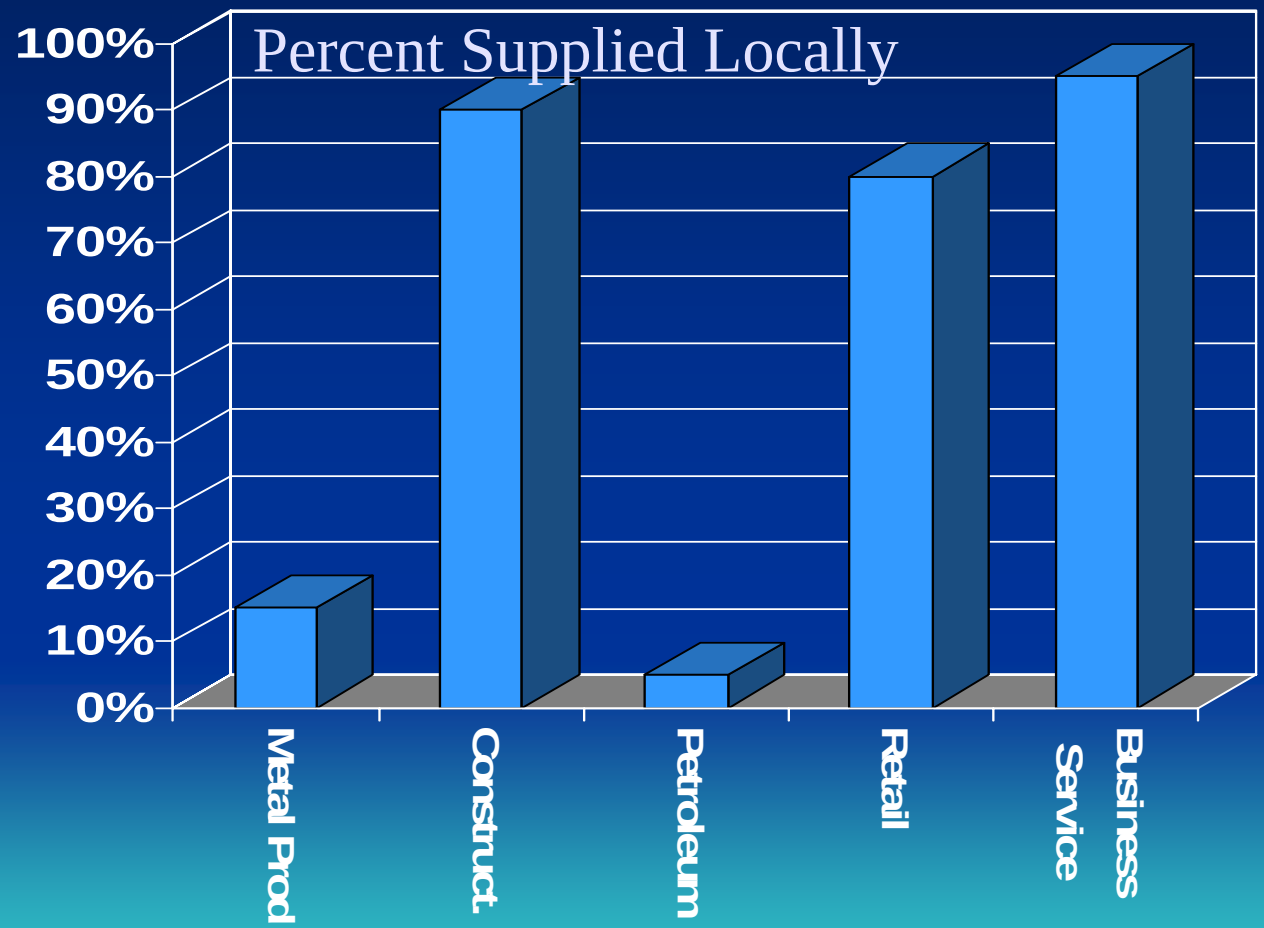
Spending Case Study
(requires I-O Model)

Economic Impact of the Boston Harbor Project

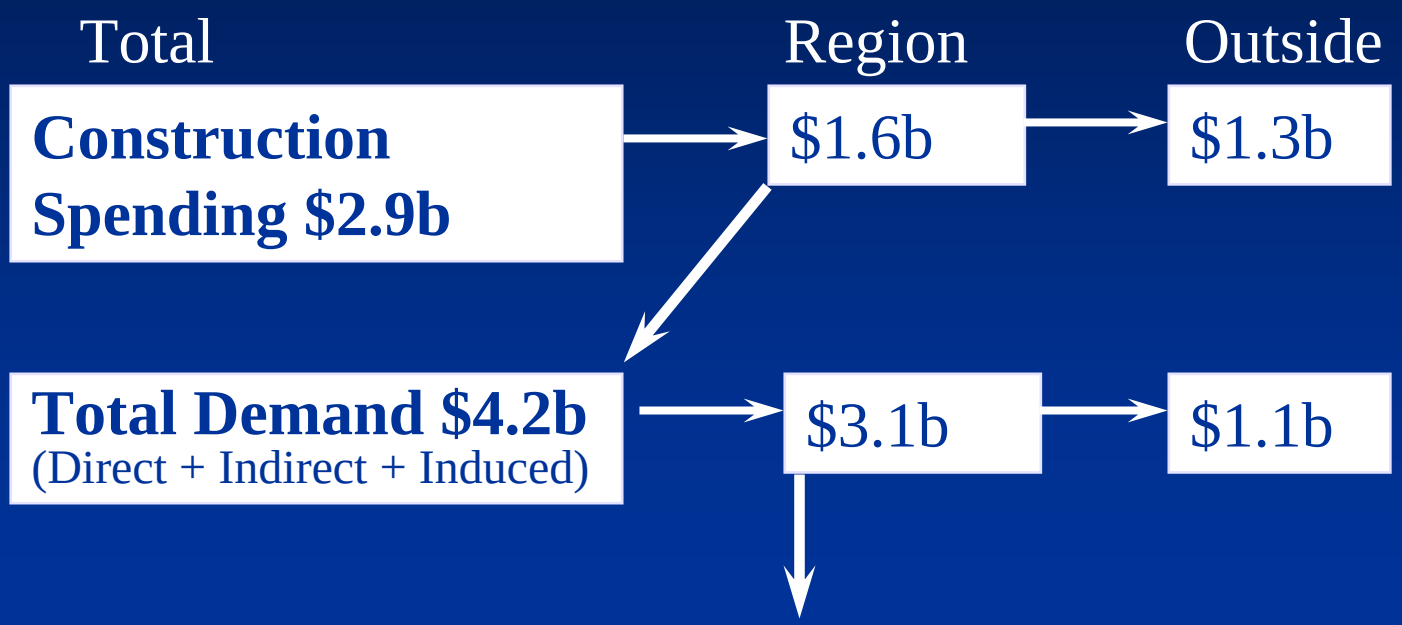
Construction Budget



Regional Purchases



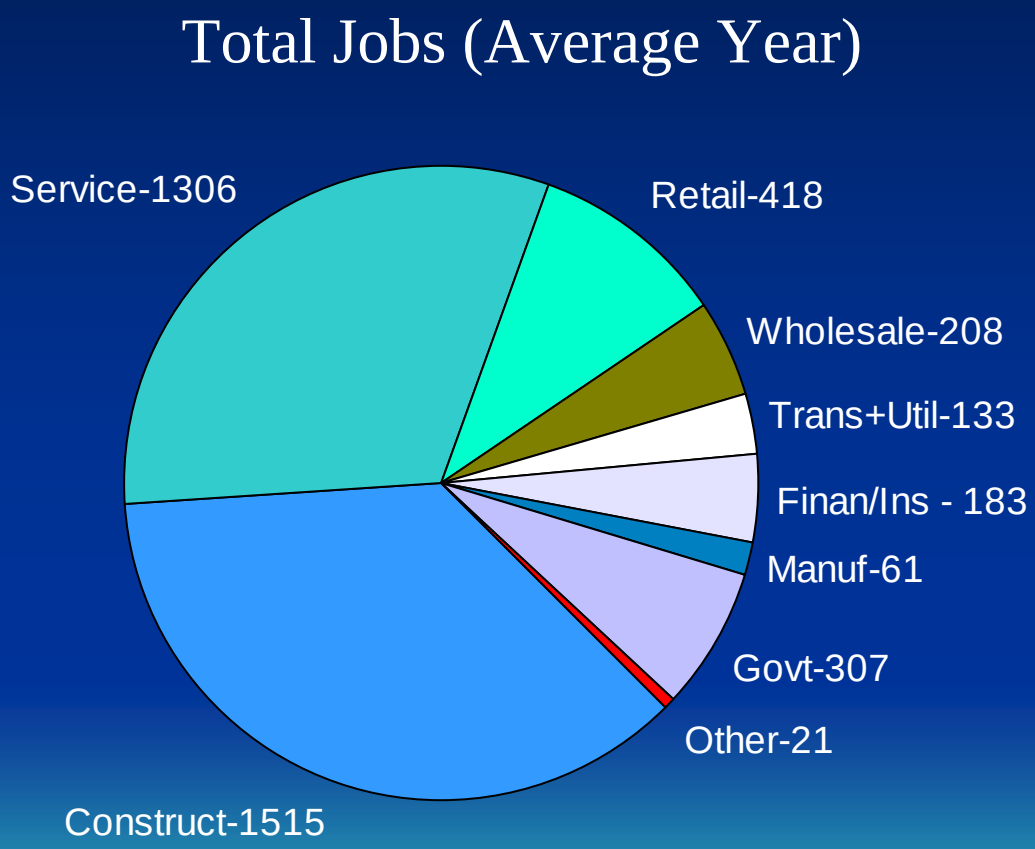
Impact Flowchart



Total Metro Benefit over 10 years:

- 4,000 - 9,000 jobs/yr (total 41,000 person-yrs)
- $300m - $700m sales/yr (total $ 3.1b sales)
- $200m - $400m income/yr (total $ 1.9b income)

Breakdown of Impacts
requires IMPLAN type model



Limitation of I-O Models

- Not dynamic – no time dimension for response
- No effect of crowding out, excess demand to constrain large growth
- No cost responsiveness
- Assumes fixed Location Quotients (local shares)

(2) ECON SIMULATION MODELS

- Include I-O Matrices and Regional Purchase Coefficients as given
- Add Year-by-Year forecasting
- Add Labor, Housing Price / cost responses
- Add Migration Responses
- Allows for future effects on suppliers and worker income to shift with changes in supply and demand for labor and capital

Regional Simulation Models

- REMI, REDYN, INFORUM, FAIR, REAL MODEL
- Forecast Base Case vs. Future Scenario: *price/cost mechanism as "Feedback Loops" to mitigate impacts*
- Reflect Current Technologies and Local Purchasing

Can be used to Assess:

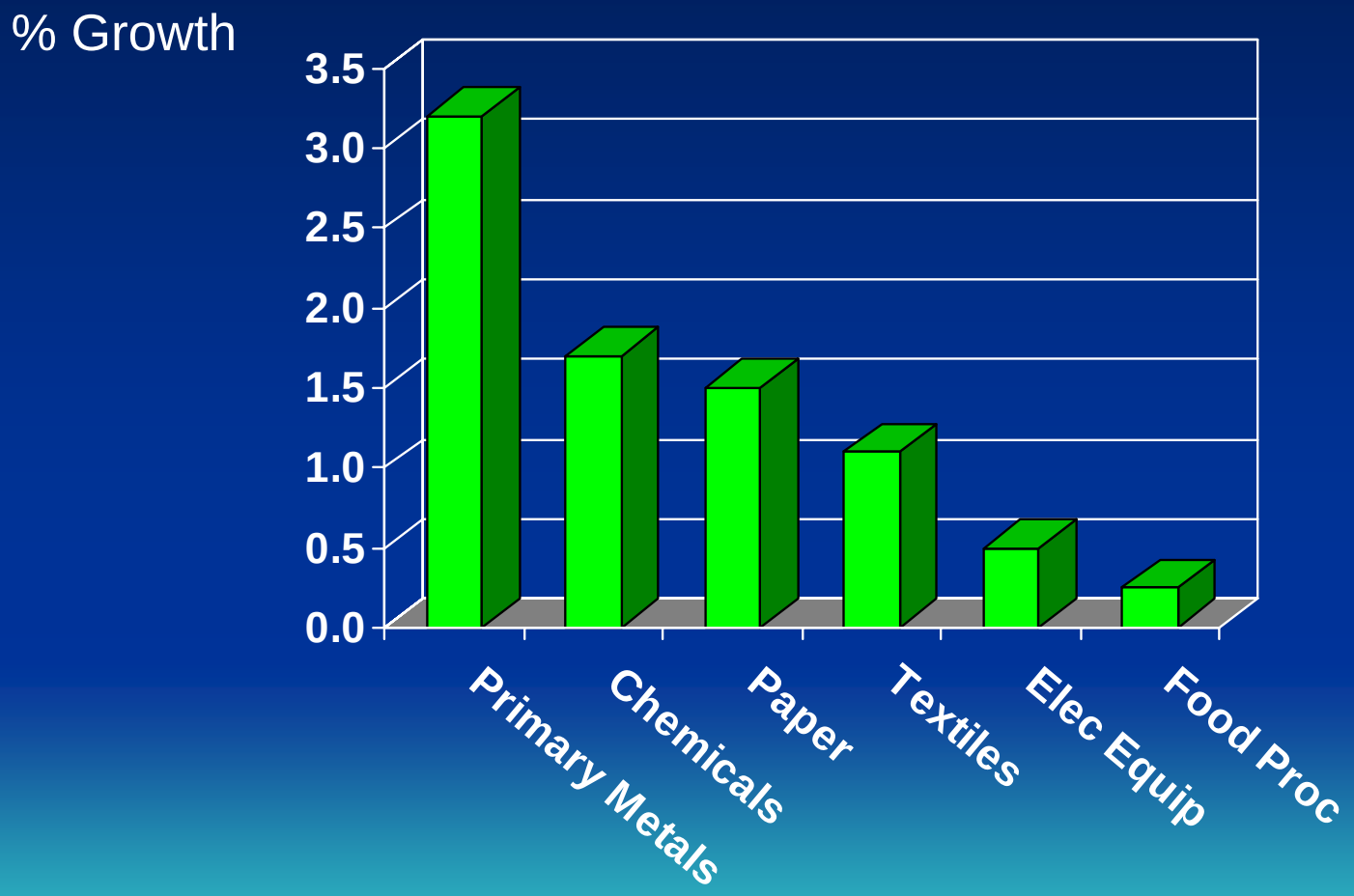
- Response to Proposed Changes in Taxes, Prices or Local Costs
- Response to Changes in Business Output (Opening, Closing, Growth) or Spending *esp. when effects are large enough to shift labor or material prices.*

Energy Case Study

(requires regional simulation model)

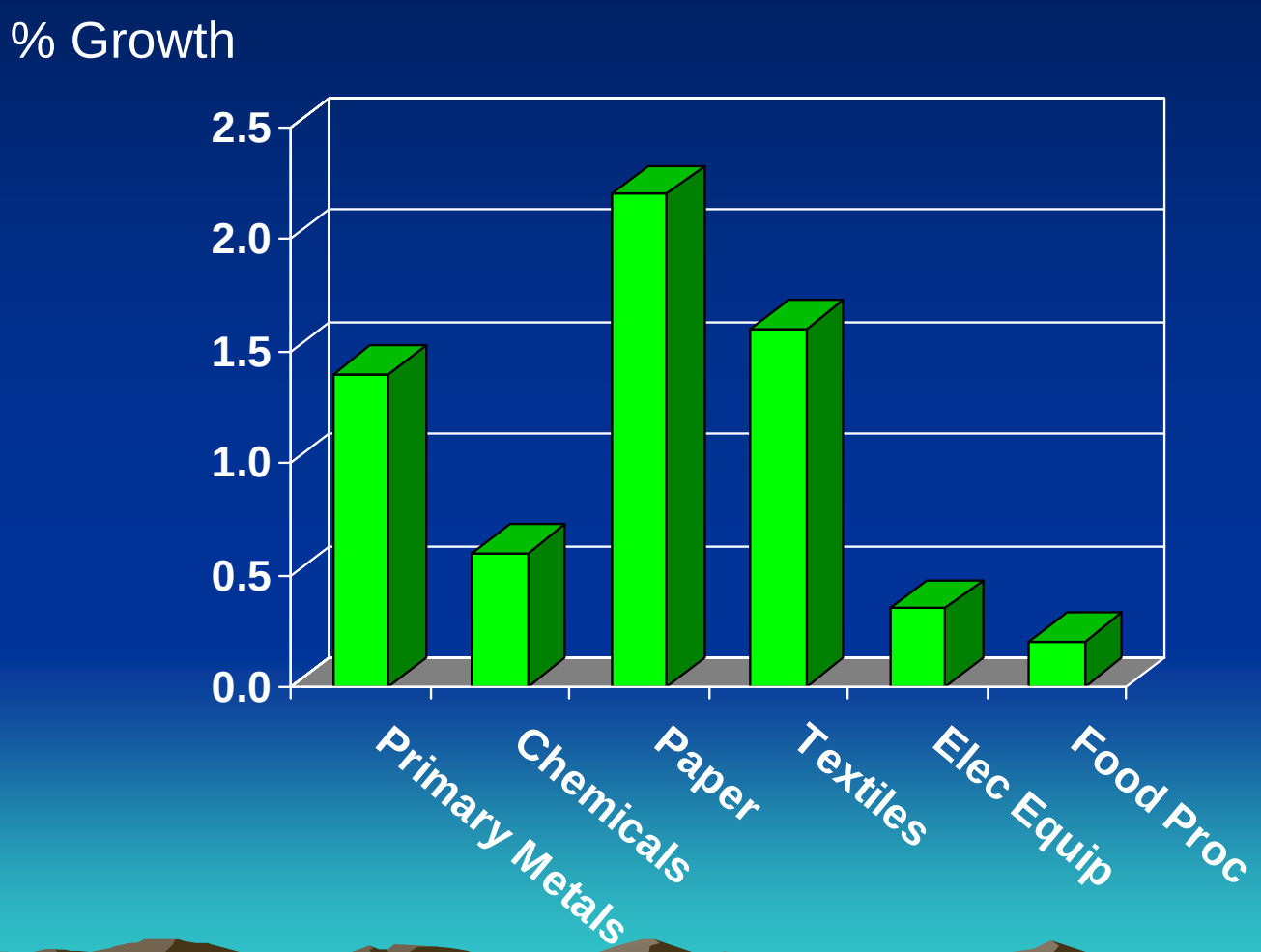
Economic Impact of Iowa Energy Policies

Electricity % of Total Production Cost



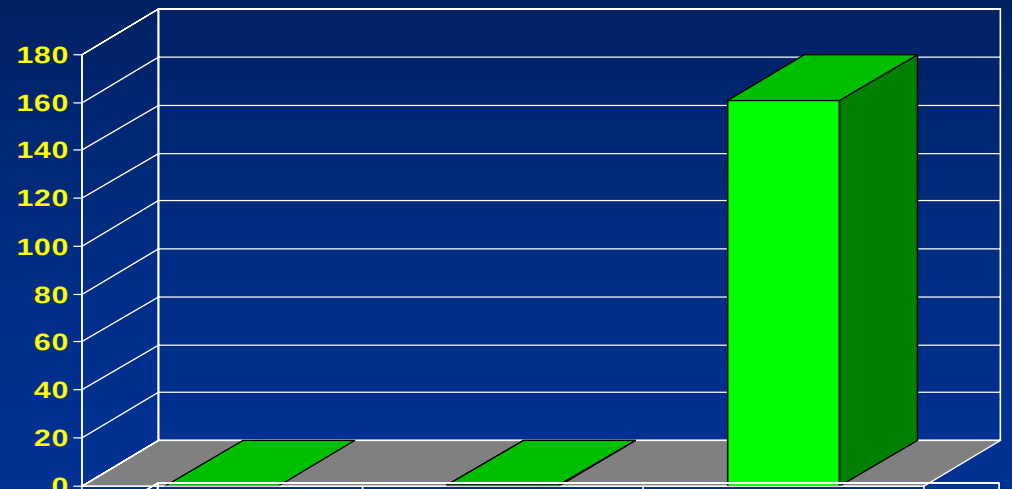
Sensitivity to Electric Cost Change

(Graph of Response to 20% Electric Cost Savings)

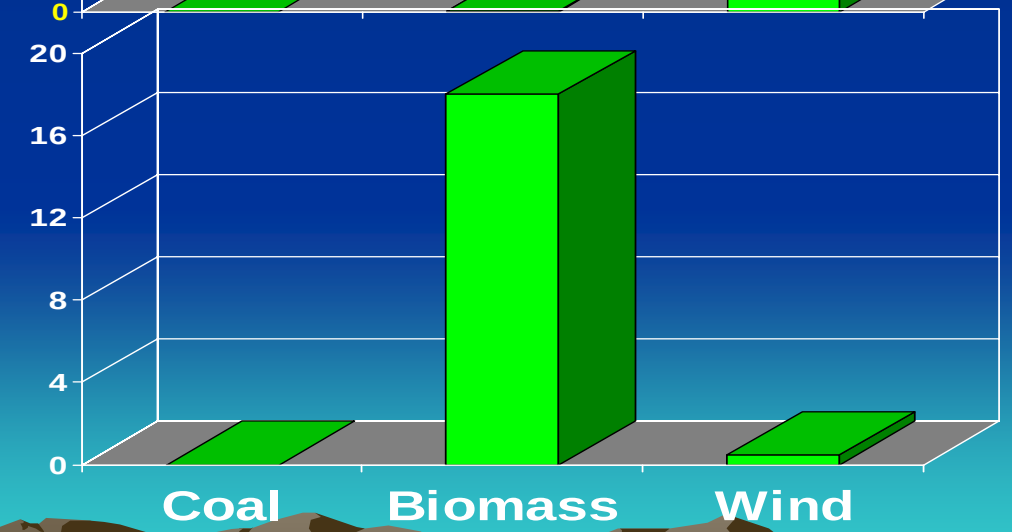


Direct Econ Effect: Renewable Power

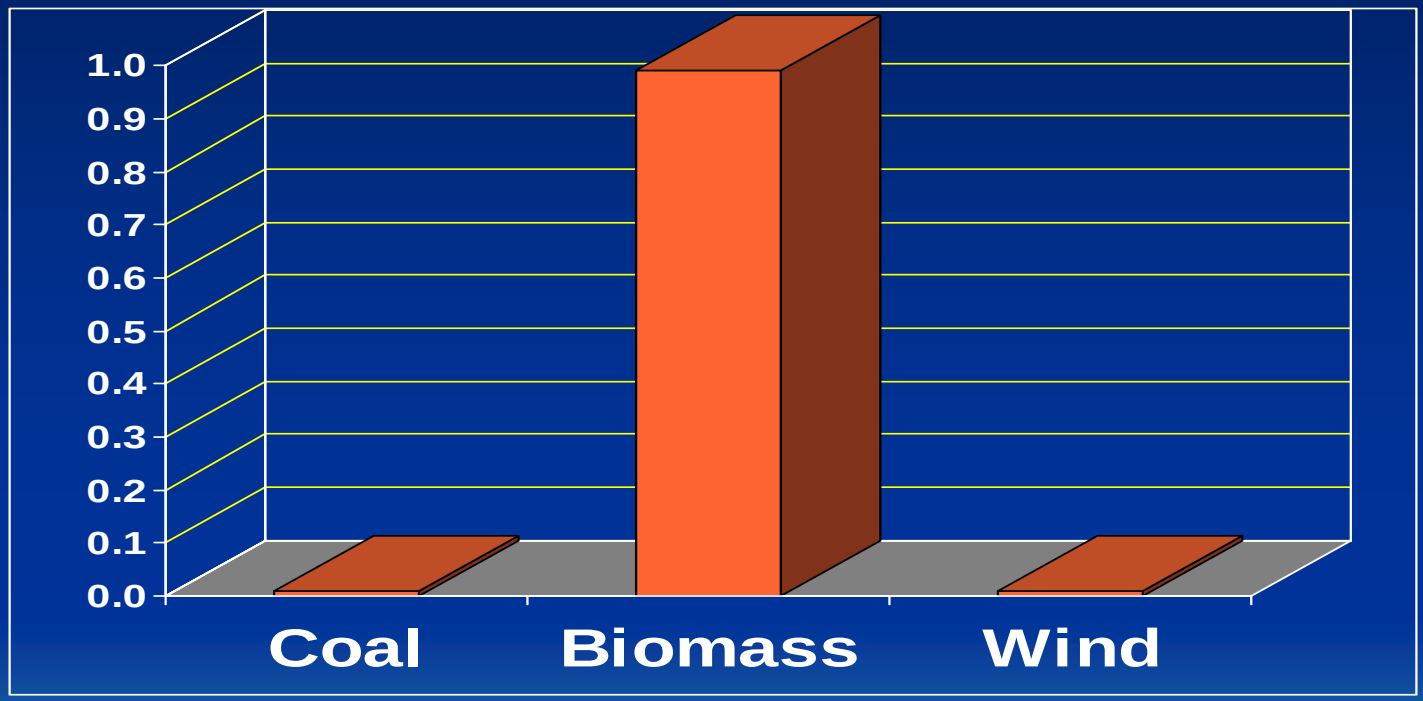
Added Plant Cost (per 100kW)



Change in Annual Cost (1B kWh)

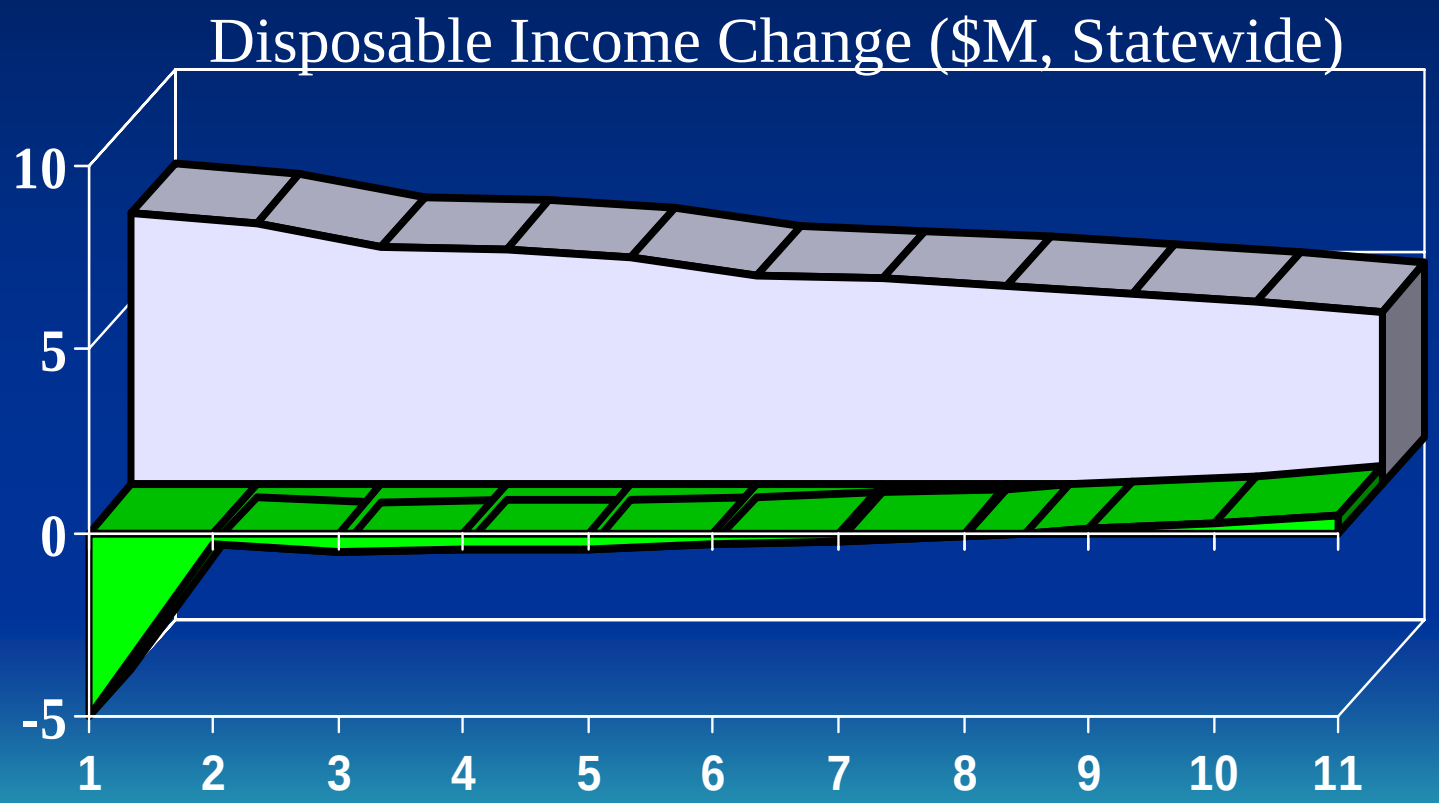


Regional Purchase Coefficients



REMI Model Forecast:

1% of Iowa Electricity from Renewables

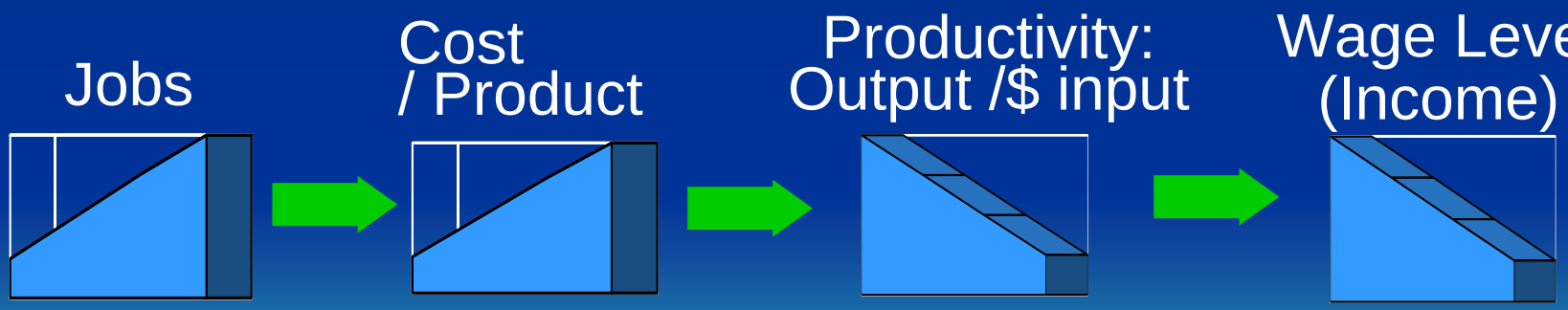


Value of a Simulation Model: Price Effects

(REMI -- Handling of Jobs vs. Income)

Example of Program to Maximize Jobs …

-Just Ban Excavating Equipment and give Everyone a Shovel!



… Actual Result is a Overall Loss of Income !!!

Limitation of Simulation Model

- Linear – no thresholds – prices respond proportionately to demand changes
- Assumes generally fixed Location Quotients (local shares)
- Economic geography (if any) scaled by distance
- No recognition of international trade, supply chain connectivity
- No recognition of education, infrastructure, other quality features among market competitors

(3) COMPETITIVE MARKET ANALYSIS

Surveys & Statistics: Stated & Revealed Preferences

(1) Assess Demand for Product/Service

(2) Assess Supply of Competitors & Strength/Weakness

(3) Estimate Market Capture for New Product/Service

Can be used to Assess:

- **Development Feasibility**
- **Product/Service Use Level**
- **Customer Characteristics (Local vs. Non-Local)**

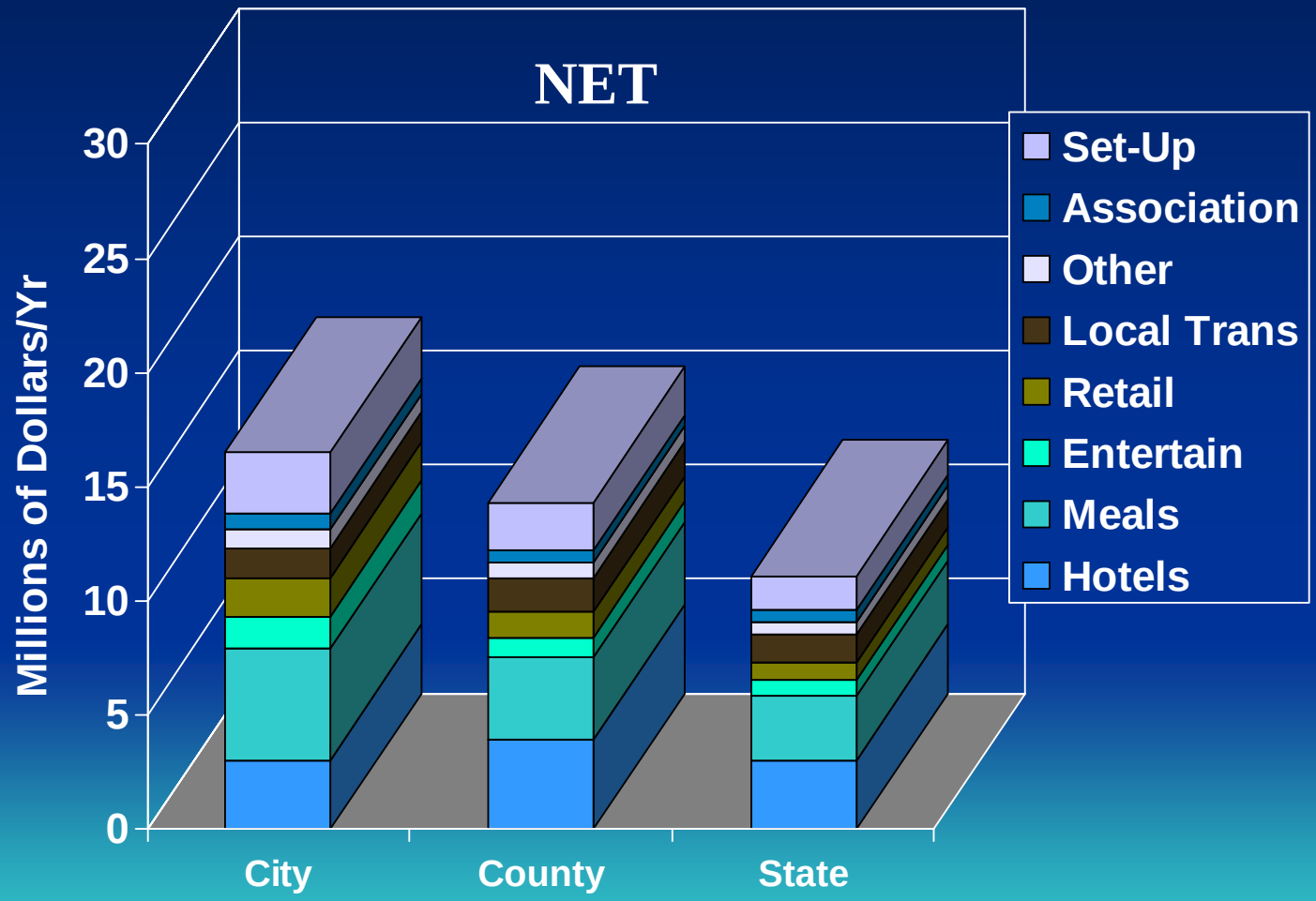
Needed to Build Exogenous Inputs to Econ (I-O and Simulation) Models

Convention/Visitor Case Study

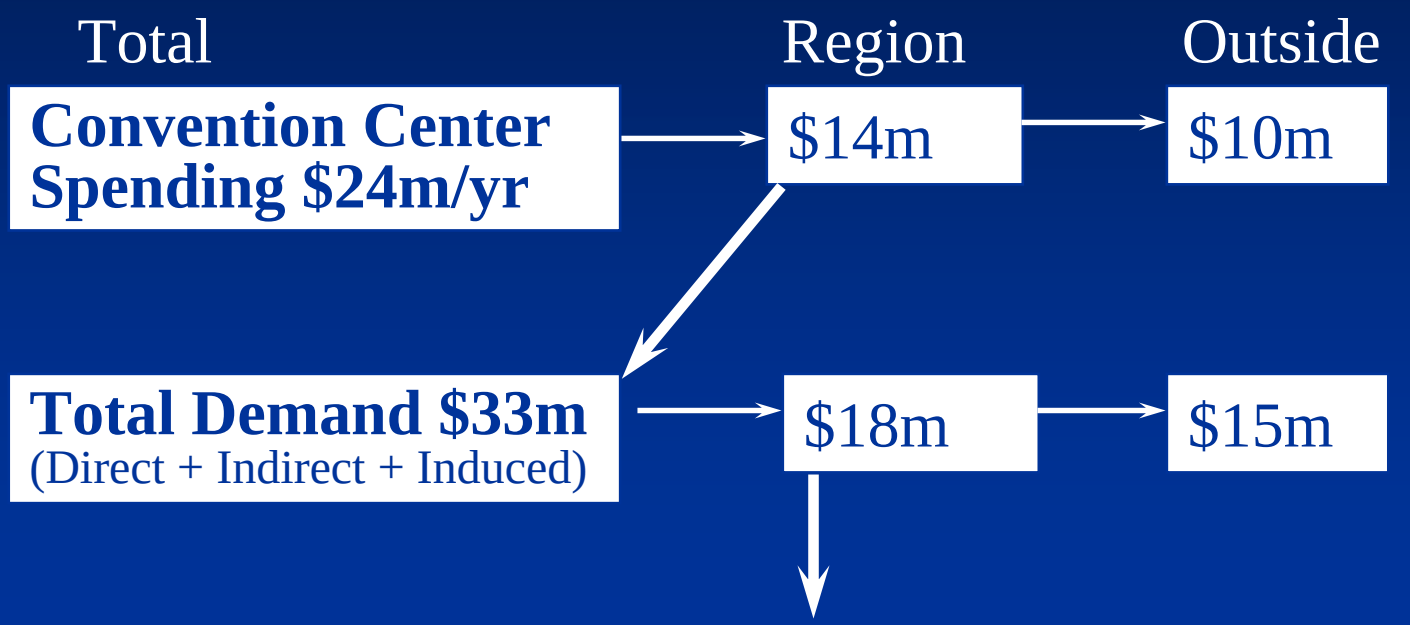
(requires market study plus I-O or Simulation)

Economic Impact of Portland, Maine Convention Center

Market Study: Amount of Convention Visitors & Spending Pattern



I-O Tables: Operations Impact



Total County Benefit over 20 years:
- 450 jobs/yr (total 9,000 person-years)
- $18m sales/yr (total $360m sales)
- $10m income/yr (total $200m)

Overall Financial Feasibility

(requires Fiscal Model)

(4) ECON OPPORTUNITY MODEL

- Assumption: “The role of economic developers is to make traditional economic models wrong” *- G. Weisbrod*
- Use “Benchmarking” to neighbors / competitors instead of comparing to national averages
- Use LQ to identify gaps in potential mix rather than current import/export roles
- Assess strengths and weaknesses relating to Quality, Scale and Connections (rel to competitors) rather than only Prices / Costs rel to US as in econ simulation models.

Economic Opportunity Model

- Rate availability and quality of factors that are *Not Covered* by regional economic models
- Identify how they affect economic development opportunities

Can be used to:

- Target opportunities for additional economic growth
- Tailor projects and programs to address current deficiencies holding back further economic growth
- Assess risk / uncertainty associated with future project/program scenarios

LEAP
Local Economic Assessment Package

Factors Affecting Business Attraction Competitiveness but missing in I-O or Simulation models:

- Accessibility to Airport
- Type of Air Service
- Access to Marine Port
- Access to Rail Freight
- Access to Interstate Hwy
- Labor Market Size
- Labor Market Education
- Delivery Area Market
- Broadband Penetration
- Tourism / Visitor Attraction
- International Export Base
- Business Cluster Integration
- Housing and Utility Costs
- Industrial Parks (features) *
- Office Facilities (features) *
- Downtown Image *
- Business Support Programs*

** = site assessment worksheet rating*

Combining LQ and SS in Comparison to Competitors

- Local industry is ***strong*** *in mix and growth trend*
- Local industry is ***strong***, could have ***potential*** for more growth
- Local industry is ***underperforming***; opportunity for growth
- New ***emerging local industry***, candidate for nurturing
- ***Weak*** local sector, but ***some opportunity*** for growth
- Industry is ***threatened locally***, candidate for attention
- Industry is in ***national decline***, candidate for diversification
- ***Unstable*** national industry; opportunity for growth but some risk
- ***Weak*** local sector in national ***decline***

Other factors to consider:

Growth & Gap Remaining

Additional Growth & Gap

Diagnose Competitiveness

Elements not in I-O Models

Comparison of Factors

Bundles of Tools in LEAP

(1) Economic Base Assessment – evaluation tool to rate current economic performance and trends

(2) Targeting Diagnostics **–**diagnostic tool to target prospective industries for further growth & attraction

(3) Policy Analysis – analysis tool to assess consequences of future scenarios & public actions

Uses of Econ Opportunity Models

Areas seeking to:

- Diversify their economic base
- Become more attractive to growth industries
- Expand job quality & pay level
- Reduce dependence on stagnant or declining industries
- Improve business stability by enhancing supporting & complementary activities

ADE-2
Airport Development Economics Model

Factors Affecting Airport Business Attraction:

Airport Activity
- Passenger & Freight Mix
- Flight Routes

Regional Economy
- Population Size
- Employment/ Industry Mix
- Specialization: Tourism, Education, Research, Financial, etc.

Airport Function

Commuter, Hub, Gateway, Maintenance

Airport Area Setting
- Land Available
- Land Use Pattern
- Access to City Center
- Office Parks Areas
- Other Area Specialization

Lessons

Don’t Ignore the nature (*adequacy* and *quality*) of local facilities & services in addition to cost factors -- they can dramatically affect opportunities and impacts.

Set up the right order for analysis. First decide on the *Policy Issue*. Then apply appropriate analysis tools to fit the policy issue (not the reverse).