Modeling Economic Impacts of Regional Greenhouse Gas Initiatives With a REMI Model

Presented to
RGGI Stakeholders

Presented by
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Economic Development
RESEARCH GROUP

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EDR Group Overview

Economic Development Research Group (EDR Group), formed in 1996, consists of a group of applied economists and regional planners.

A consulting practice that applies appropriate analytical tools to help inform policy decisions related to infrastructure investments, energy, and economic development.

The long-standing economic impact practice of key staff has been built predominantly on applications of the REMI and IMPLAN models.

Related-Policy Experience of EDR Group

Economic Impacts of:

- Demand Side Management (Utilicorp, San Antonio CPS)
- Renewable Energy Opportunities (Iowa Dept. of Natural Resources)
- Energy Efficiency Programs (WI Division of Energy)
- Clear Skies and Carper Amendments (National, multi-reg)
- Coal switching (IL, WV)
- EPA's Ozone & Particulate Regulations (Western US, multi-reg)
- Utility Regulations (Los Angeles, SCAQMD)
- Trip Reduction Program (San Diego, SDAPCD)
- Electric industry restructuring (NY, WY, VT, & national agencies)

Role of the REMI Model in the RGGI Analysis

- Macro-economic forecasting tool [to 2050] –assemble *reference case & alternative forecasts* as related to the Initiative

- Scenario-specific inputs derived predominantly from ICF's IPM model runs (+ other desired aspects developed apart from IPM)

- Identify the economic impacts on businesses & households in each of 12 states (*total impacts, numerous metrics, ripple-effects across model region)* as a result of the initiative

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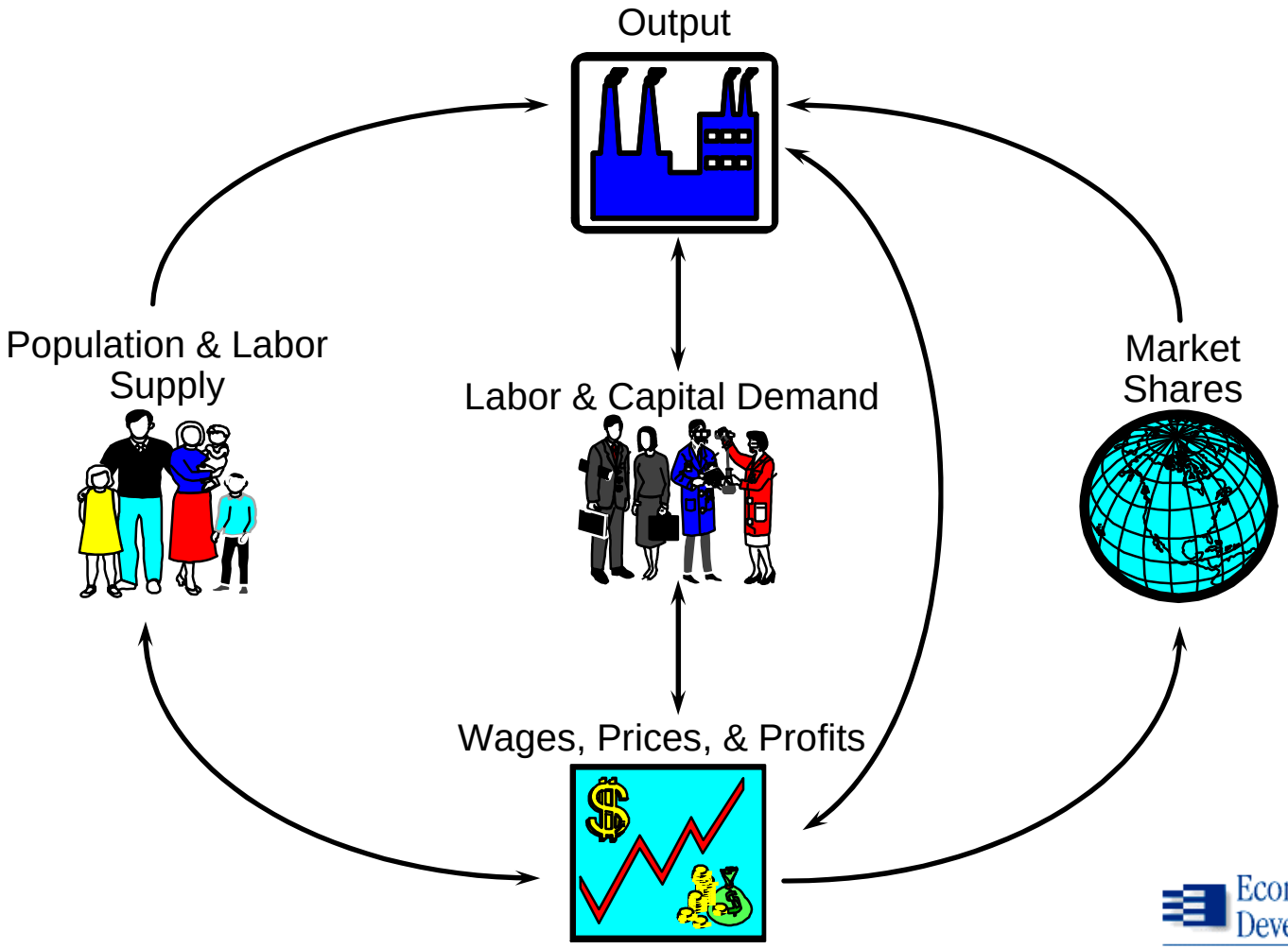
How the REMI Model Makes a Forecast for a Region



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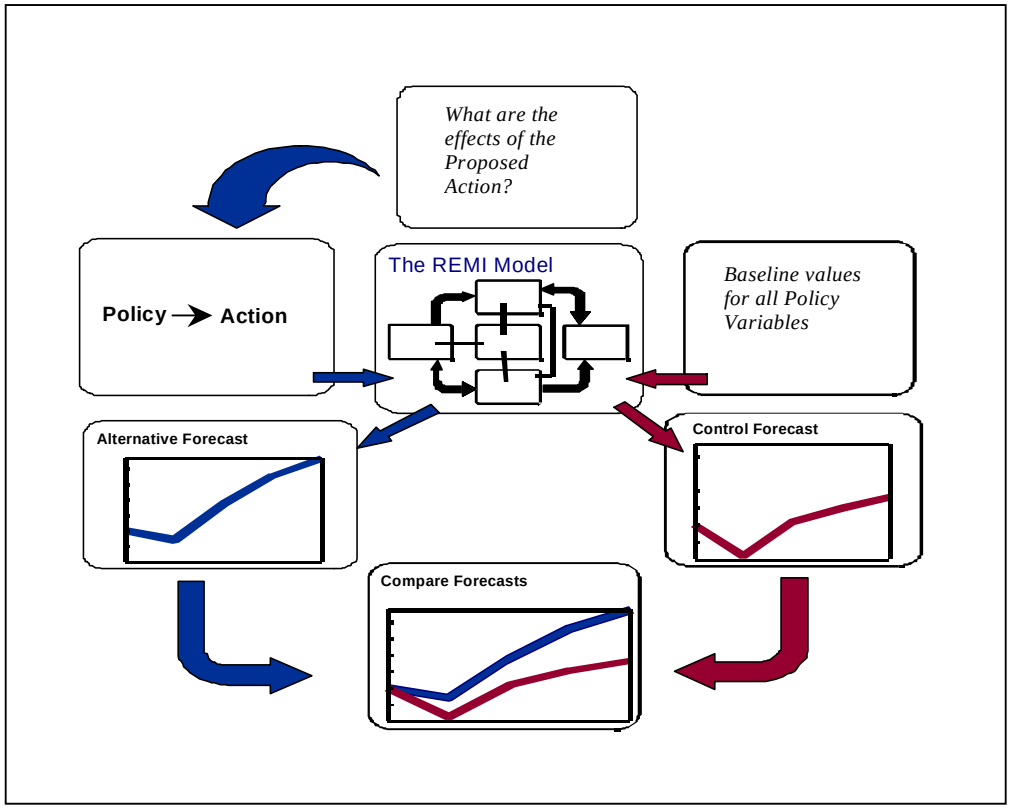
REMI's Impact Analysis Capability



Understanding Key Aspects of the REMI Model

- Retail "*energy*" rates are exogenous to the model
- Treatment of industry-specific electricity purchases (*"fuel" as component of Value-added; implied substitution built-in)*
- Treatment of household sector price changes
- End-user energy demand changes & tie-in to Generating sector
- Implications of primary fuel input mix into Generation process
- Needs to be informed of the timing & types of investments needed for the Electric Generation sector
- Provides built-in construction translator vectors for *New Electric Utility* and *New Gas Utility* facilities (if suitable)

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Integrating REMI Model into the On-going Modeling

- ICF IPM Model designed to capture key responses from electric generation sector under a proposed Initiative
- REMI model provides a tool to trace how this sector's responses transmit economic impacts (re: base) across a 12-state region
- REMI model affords flexibility to *(a) calibrate a consensus base (reference) case from select assumptions of either the IPM model and the SWG* and *(b)* possibly include other aspects of a scenario that are outside the scope of the IPM model

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EDR Group will Support a Comprehensive & Accurate Application of the REMI Model

- $ of Demand to industries related to shifts in regional investment for desired mix of generating capacity
- $ New Demand to industries supplying pollution control devices
- Switching among primary fuels to cleaner inputs (import substitution, renewables)
- $ New Demand to industries supplying components into renewable energy technologies
- Retail Electric Price changes by customer class (other energy types as relevant)
- Air Quality Benefits – deliberate which types warrant introduction to the REMI analysis for added impact generation (e.g. changes in health-related spending)

REMI Model Outputs

- Reported annually by region, for each year in the policy implementation period

- Numerous impact metrics to choose from - *employment, aggregate personal income, gross state product, business sales, export attractiveness w/in region & to ROW, household spending, economic migration*

- State-by-state differentials in changes of retail electric prices, the ability to manufacturer clean technologies, location of plant retirements & new capacity will determine which areas *make-out* better

- We will assist the Economic Impact Sub- group to define a manageable set of result metrics that is most effective for the intended audience(s)

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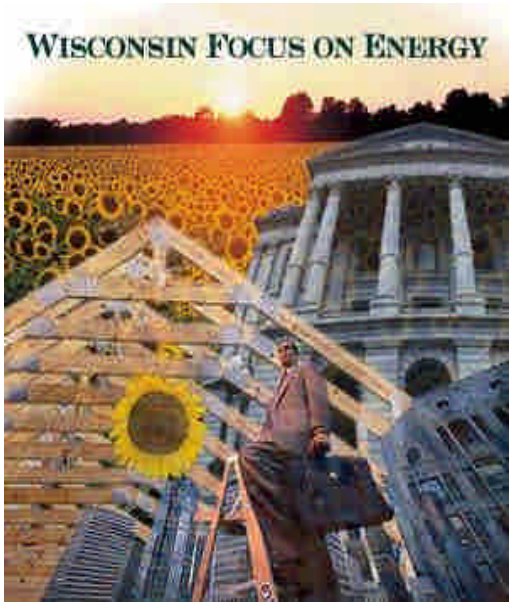
Sample Results from a Prior REMI Analysis :

Wisconsin Energy Programs



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Example of Walking Through the Steps (Wisconsin Pilot)

- Program Spending Impacts
- Equipment Substitution Impacts
- Fuel Substitution Impacts
- Energy Cost Savings Impacts
- Total Change in Economy

Sample Impacts… Program Spending

Funding of $6.2 million/year from benefit charge (C&I part only)

↓

Spending of $6.2 million/year for commercial and industrial program services *(marketing, training, energy audits)*

↓

Net Impact *(1st Year, then declines)*:
+ 158 Jobs
+ $5m/yr total income
+ $7m/yr total output

Industry gaining:
Engineering and
Other Prof. Services

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Sample Impacts…Equipment Substitution

Increase demand for energy-efficient equipment by $870,000/year

↓

Increase locally-made equipment sales by $480,000/year

↓

Net Impact *(1st Year, then declines)*:
+ 11 Jobs/year
+ $0.4m/yr total income
+ $1.1m/yr total output

Breakdown of added local sales:

-Controls	*40%*
-Heating/AC	*5%*
-Insulation	*1%*
-Motors	*11%*
-Lighting	*19%*
-Process Equip	*24%*
Total	*100%*

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Sample Impacts…Fuel Substitution

Reduce electricity spending by
$1.2m/year in yr. 1
to $6.3m/year in yr.10

94% imported power
6% local power

Loss to local fuel/power industry
$ 72,000/year in yr. 1
to $378,000/year in yr.10

Net Impact *(grow over 10 years)*:
- 4 to -15 jobs/yr
-$0.1m to -$1.0m/yr total income
-$0.4m to -$2.1m/yr total output

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Sample Impacts… Energy Cost Savings

***Benefits Charge*: raise business cost of energy by $6.2m/year**

***Energy Savings:* lower business cost of energy by avg $11.3m/year**

Increase business competitiveness
Reduce jobs in fuel industries

Net Impact *(grow over 10 years)*:
+9 to +248 jobs/year
+1m to + $15m total income
+2m to + $31m total output

Net Savings Breakdown	
Motor Vehicles	***26%***
Metal Prod	***25%***
Services+Orgs	***11%***
Chemical Prod	***10%***
Textile Prod	***8%***
Wood Prod	***6%***
Printing	***4%***
-Other	***10%***
TOTAL	***100%***

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Bottom Line Impact Changes Over Time

Table 1. Economic Development Impacts for All Focus on Energy Programs

Year	First Year	Fifth Year	Tenth Year	Sum of 10 years
Impact Without Market Effects				
Job Years	582	1,667	2,401	17,243
Sales generated *(In Millions)*	$43	$125	$190	$1,322
GRP (Value Added)* *(In Millions)*	$24	$78	$123	$824
Disposable income generated** *(In Millions)*	$11	$63	$127	$613
Impact With Market Effects				
Job Years	630	1,774	2,778	18,956
Sales generated *(In Millions)*	$46	$135	$224	$1,483
GRP (Value Added)* *(In Millions)*	$26	$85	$146	$934
Disposable income generated** *(In Millions)*	$11	$66	$149	$779

Note: All dollar amounts are in millions of year 2001 constant dollars.
* GRP = Gross Regional Product, reflecting both net personal incomes to households and net income to businesses.
** Disposable Income reflects both earned income and household savings in energy costs resulting from program participation.

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Value of Focus' Potential Emission Reduction

- WI Generation sectors (elec. & gas)
- Annual targets for NO_x, SO_x, GHG & HG (tons)
- Current Spot & Projected Prices
- YR 1 value between $168k - $278k
- YR 10 value between $1.2m - $2.1m

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Recapping the Role of REMI Analysis

- Describe state-level economic impacts triggered by scenario-specific information from the IPM model
- Illustrate which impacts emanate from the initiative and which result from the economic interactions between states as captured by REMI
- Show how these impacts change over time
- Distinguish aspects of the Initiative that alter the flow of $ in an economy *versus* those that change social benefits

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