



REEM – Renewable Energy Efficiency Modeling

REEM is EDR Group’s analysis framework for assessing the economic development of renewable energy and energy efficiency programs. It calculates the impacts on jobs, income, GDP (value-added) and output by industry for counties, states, or regions throughout the US. It can be used for conducting economic impact and benefit-cost analysis for several types of energy investments including: (a) new or modified generation facilities, (b) energy efficiency programs and (c) improvements in transmission and distribution. It uses sophisticated techniques for measuring the effects of technology-specific investments and policy-induced changes on the functioning of the energy market on a regional economy.

The model is applicable for areas that intend to explore strategies for future energy improvements or measure the impacts of existing programs. Any of these pieces may be used separately or together--depending on the user’s wishes.

REEM for Different Technologies

The *REEM* framework is designed around a set of investment sub-modules. The framework incorporates technology-specific assumptions (based upon our prior work and research) as defaults while some aspects can be over-written by the user. This facilitates a more accurate analysis than when aggregating investment dollars too broadly. This approach also allows for the evaluation of several types of projects at once.

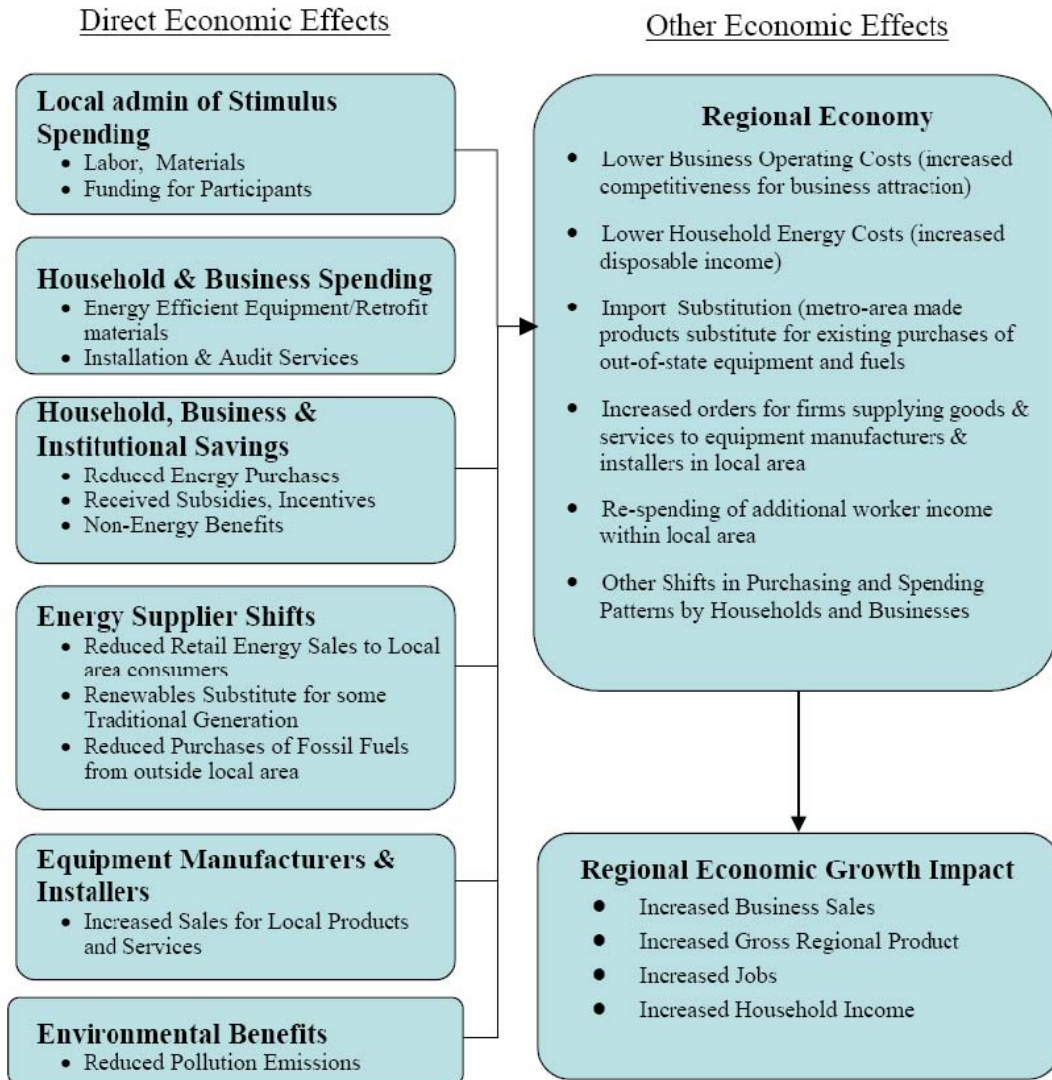
Technologies Covered by REEM

<u>Energy Facilities</u>	<u>Energy Retrofits</u>
<i>Renewable Generation</i> <ul style="list-style-type: none"> • Landfill Gas • Biomass • Solar • Wind • Other (hydro, geothermal) 	<i>Energy Efficiency</i> <ul style="list-style-type: none"> • Envelope/Insulation • HVAC • Motors • Lighting • Appliances
<i>Transmission & Distribution</i>	

How REEM Quantifies the Effects of Energy Programs

The stimulus from energy investments are translated into direct economic impacts (which in turn generate spin-off impacts) in the local economy in the following ways:

REEM Framework for Energy Impact Analysis
(Developed by Economic Development Research Group, Inc.)



How REEM Measures the Total Impacts on the Economy

The information for each technology must be provided for base and alternative scenarios. The **base scenario** may be either doing nothing (“no build”) or investing in traditional sources. The **alternative scenario** represents investments made in renewable energy or efficiency programs. The system then determines the economic impacts and benefit-cost based on the difference between the alternative and base scenarios.

Economic Impact Analysis

This measures the total activity generated by the energy in the local economy. Construction of energy facilities can generate significant impact in the local economy by using **local equipment and labor**. In a

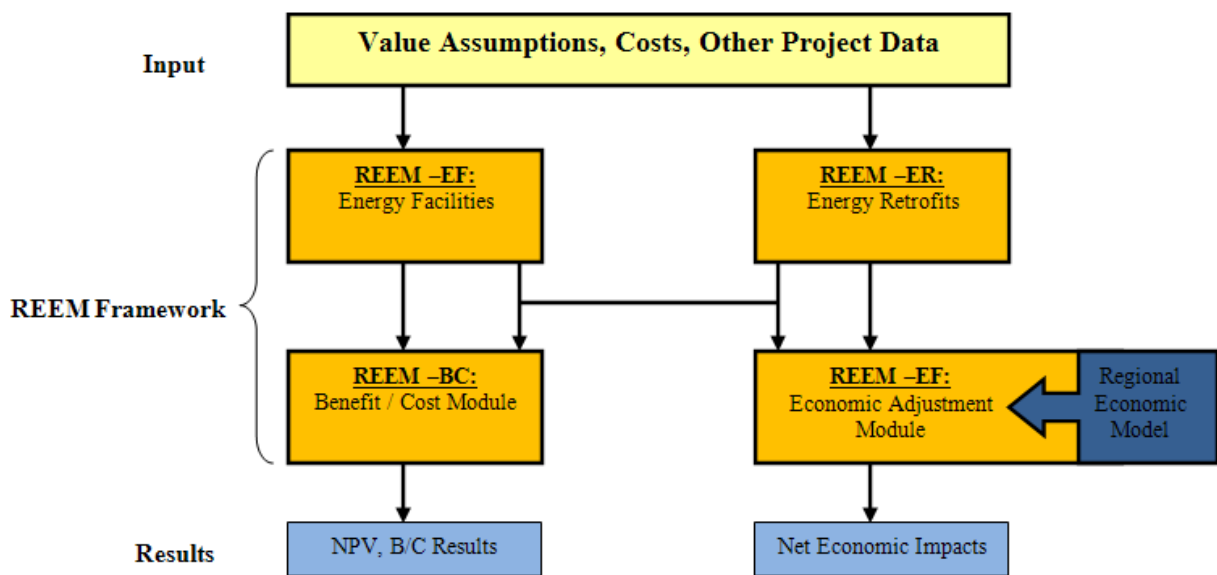
similar manner, energy retrofits create impact at the outset if they use local equipment (e.g. appliances) and labor for installation. Once the both types of projects are complete, however, they may be responsible for **energy savings** throughout their useful lives. For energy facilities, this savings comes in the form of avoided energy generation and transmission; displacing that which came from a traditional source. For energy retrofits, this savings arises from customers using less energy through equipment improvements or changes in behavior. In both cases, energy savings accrues to households and businesses, stimulating the economy through additional consumer spending and cost savings for production, respectively.

Benefit-Cost Analysis

This measures net social gains and losses caused by a project. The benefits of projects may be comprised of **net energy savings** (dollar value of kW and kWh saved), **emissions savings** (dollar value of tons emitted), and economic impacts from **new business attracted** due to the project. The costs of the project are comprised of those paid by the user and the amount of public dollars funding the investment.

The flow of the model and list of results are shown below:

Components of REEM Model



Model Results

- **Direct Construction Impacts** – the initial stimulus of construction and installation on the local economy (by industry).
- **Direct Energy and Emissions Savings** – the dollar value of savings in kW, kWh and emissions (broken out by industry and households).
- **Direct On-going Impacts** – the stimulus generated throughout the life of the project through operations, maintenance and purchases of feedstock (by industry).
- **Short-term Economic Impacts** -the economic impacts by industry from the construction (*energy facilities*) or installation (*energy retrofits*) of a project (for one analysis year).
- **Long-term Economic Impacts** – the economic impacts by industry from the on-going operations, maintenance, energy savings and emissions savings from the project (for one analysis year).
- **Total Economic Impacts** – the summation of economic impacts presented for each year of the project’s useful life.
- **Societal Benefit-Cost** – net present value of benefits (net energy savings, emissions savings), costs (net user costs, program spending) and the ratio of the two.
- **Expanded Benefit-Cost** – net present value of benefits from a regional perspective (counting the economic value of net energy savings, emissions savings and growth in value added income), costs (net user costs, program spending) and the ratio of the two.