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Cal/EPA's Approach to Quantifying Jobs from Renewable Energy

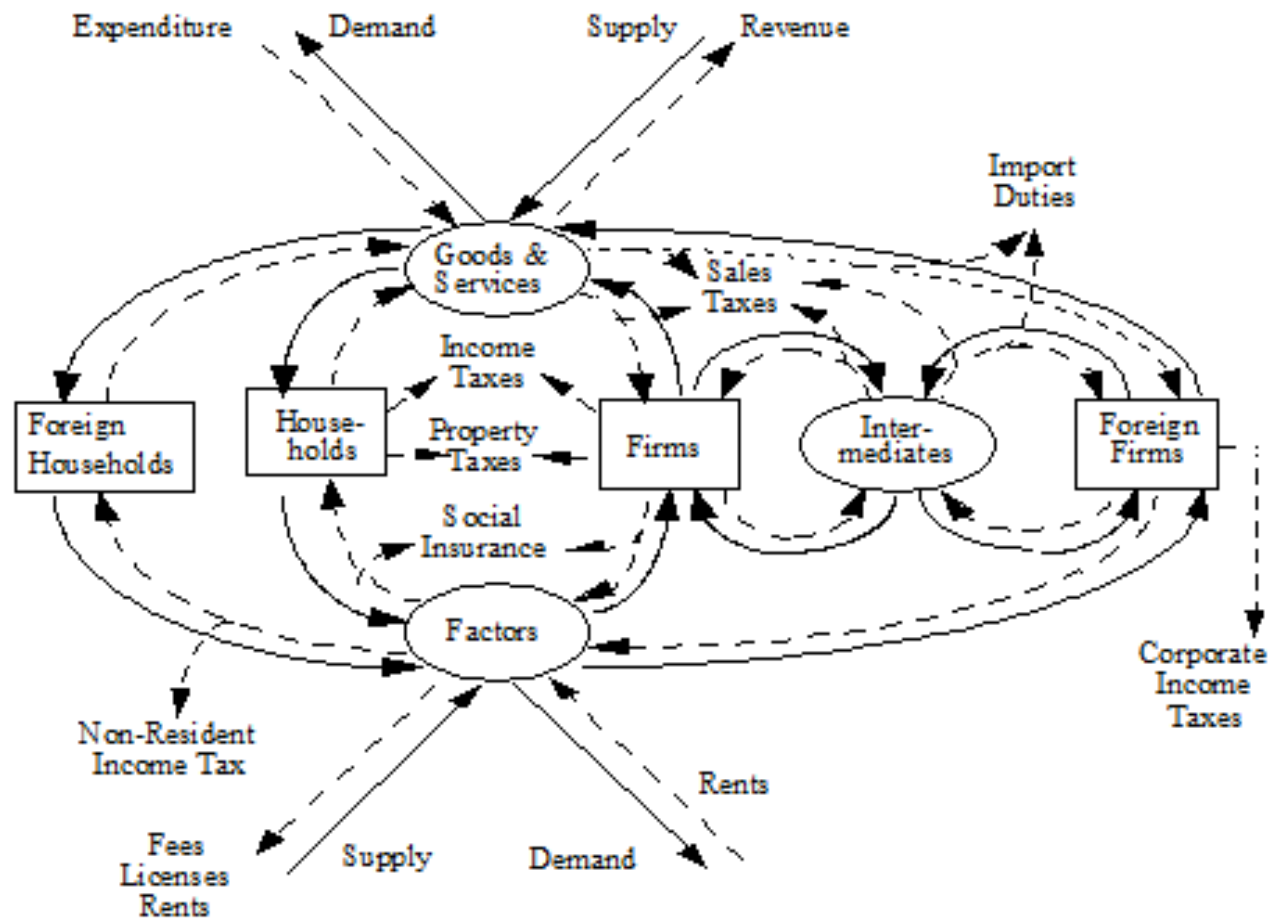
**IEPR Lead Commissioner Workshop
Jobs and Renewable Energy in California
May 30, 2012**

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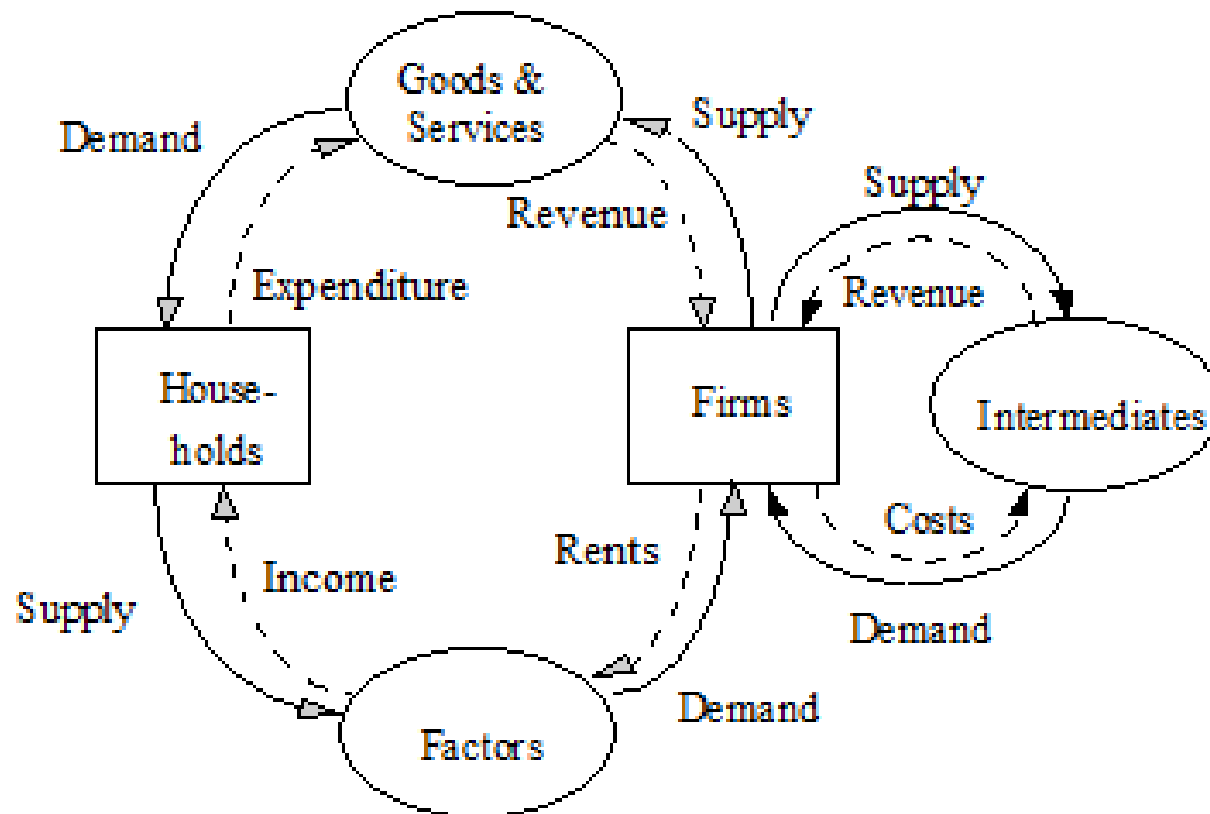
Background

- ARB uses E-DRAM for economic impact analysis
 - E-DRAM is a model of the California economy
 - Used for major regulations and plans
 - State Implementation Plan
 - Goods Movement
 - Scoping Plan, Renewable Energy, Cap-and-Trade
- Analysis compares business-as-usual to policy
 - Scenario inputs are costs and savings of policy
 - Outputs include Gross State Product, Personal Income, Jobs

E-DRAM

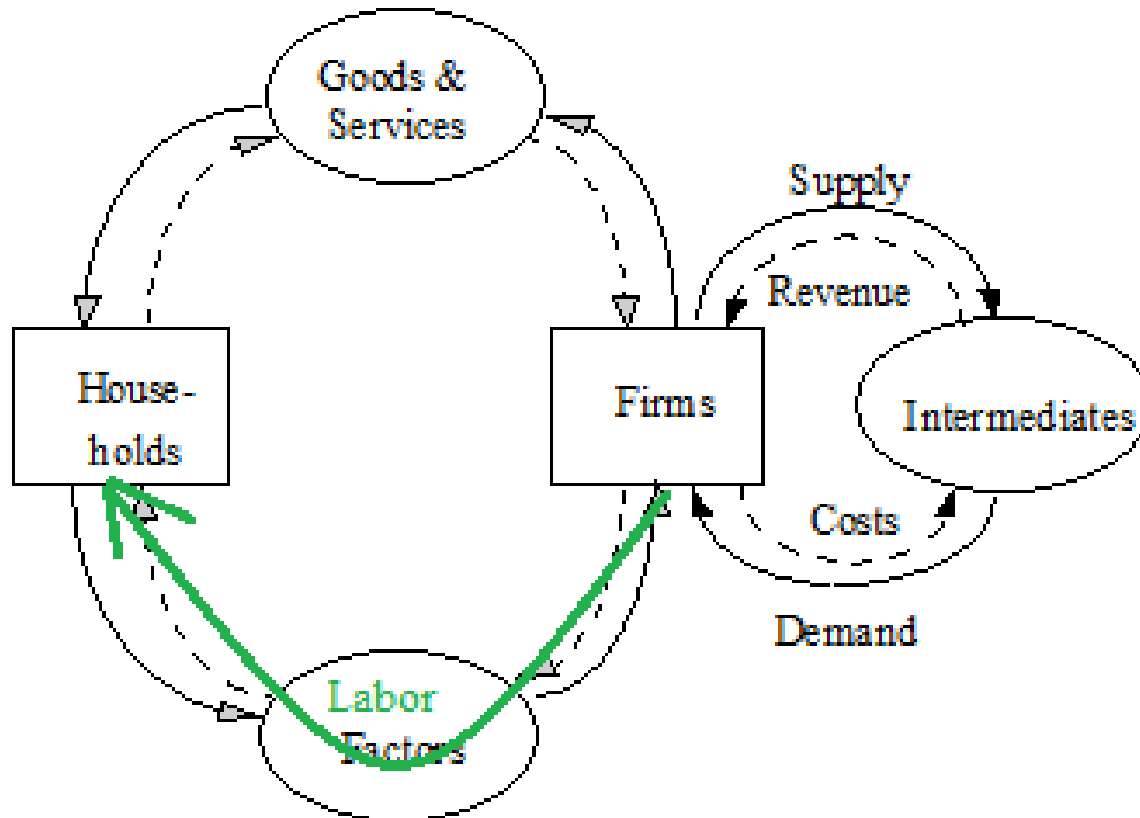


E-DRAM: Households and Firms



E-DRAM: Direct Jobs

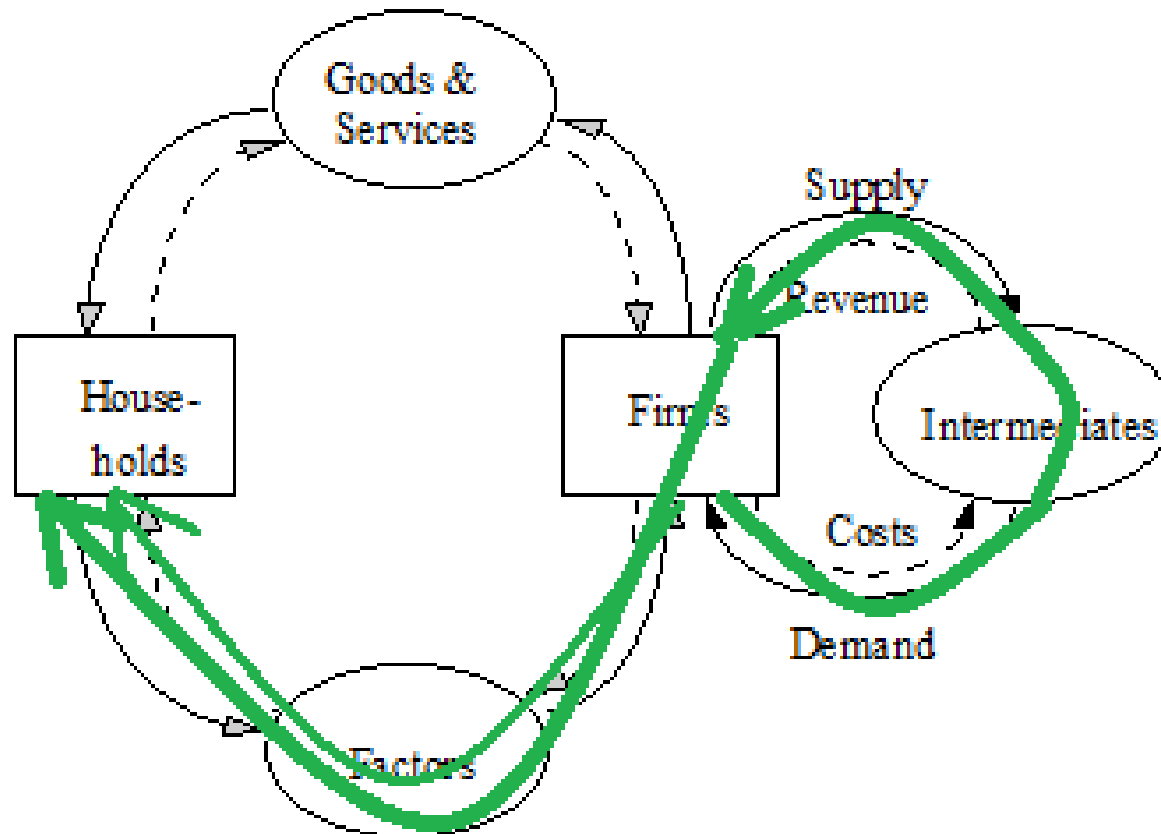
Direct jobs are those that result directly from the investment that is made.



E-DRAM:

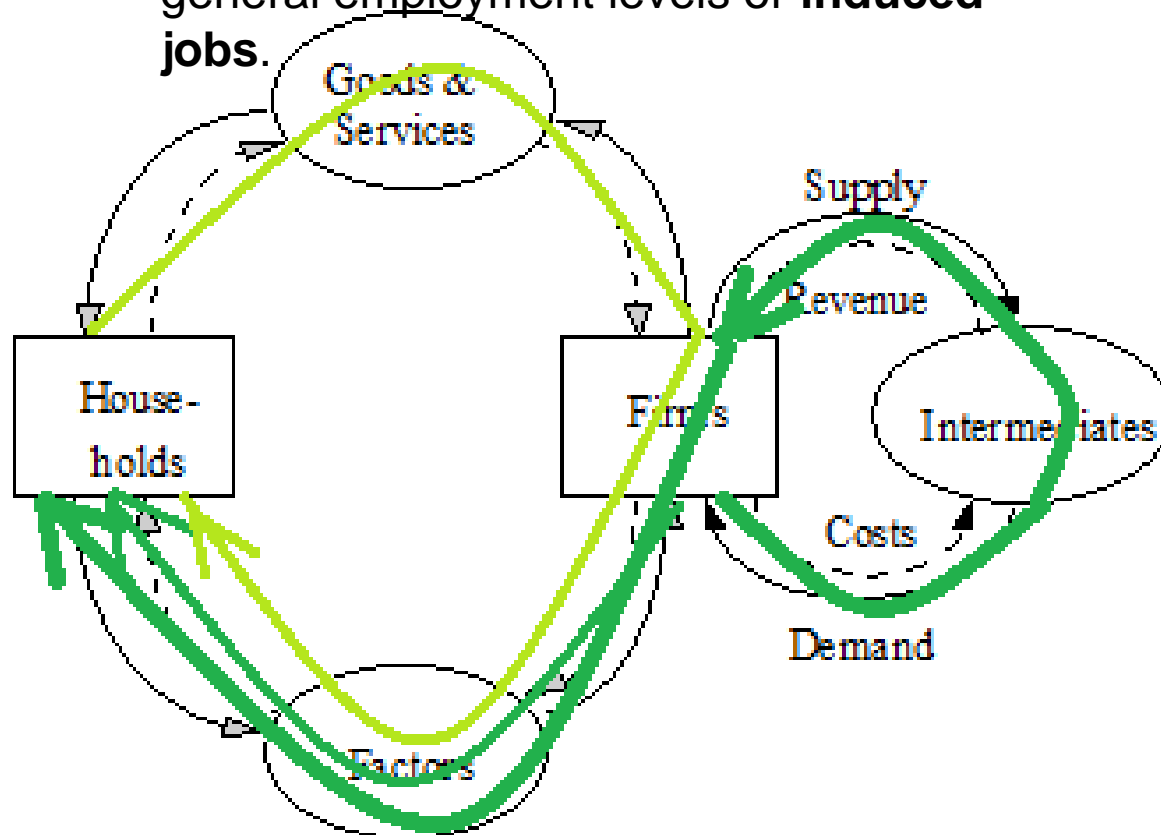
Direct and Indirect Jobs

Indirect jobs result from connections through a supply chain.



E-DRAM: Direct, Indirect and Induced Jobs

The increased spending in the general economy from wages and profits of direct and indirect jobs leads to increases in general employment levels or **induced jobs**.



ARB's Estimates for Renewable Energy: Renewable Electricity Standard

- Executive Order S-21-09, September 2009, directed ARB to adopt a regulation by July 2010, with a 33 percent renewable energy target.
- ARB produced a staff report in June 2010, calling the target the Renewable Electricity Standard. ARB adopted the regulation in July 2010.
- SBX1-2, signed in April 2011, assigns most of the program, now called Renewables Portfolio Standard, to CPUC and the California Energy Commission.

ARB's Estimates for Renewable Energy: Some Cost Considerations

- Cost-effectiveness of Renewable Electricity Standard: about \$200 per Metric Ton CO₂-equivalent
- Residential customer bill impact: \$3 to \$10 per month

ARB's Estimates for Renewable Energy: Inputs to E-DRAM, Net Costs in 2020

Scenario	To-Sector	From-Sector	Input 33%-20% (\$ billion)
High Load	Agriculture	Electricity	0.336 – 0.336
High Load	Construction	Electricity	2.749 – 1.438
High Load	Manufacturing	Electricity	5.046 – 2.285
High Load	Fuel Extraction	Electricity	-2.743 – (-1.794)
Low Load	Agriculture	Electricity	0.336 – 0.336
Low Load	Construction	Electricity	2.311 – 1.288
Low Load	Manufacturing	Electricity	4.428 – 1.920
Low Load	Fuel Extraction	Electricity	-2.305 – (-1.544)

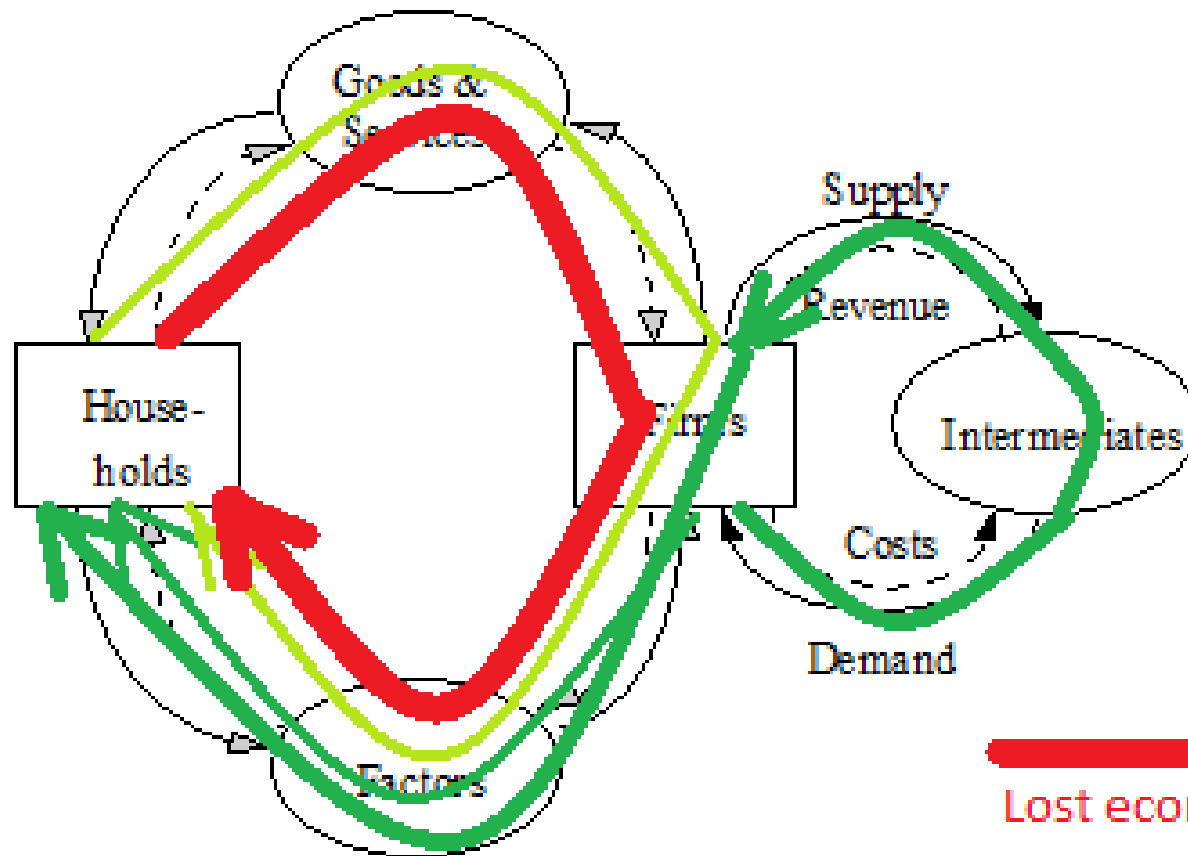
ARB's Estimates for Renewable Energy: Outputs from E-DRAM, Job Impacts in 2020

Scenario	Sector	Incremental Impact (thousands of job-years)
High Load	Electricity, Agriculture, Construction, Manufacturing, Fuel Extraction	+10
High Load	All Employment	-15
Low Load	Electricity, Agriculture, Construction, Manufacturing, Fuel Extraction	+8
Low Load	All Employment	-14

California Clean Energy Future: Preliminary Estimates of Job Creation

- Renewable Energy:
 - Direct, indirect, induced jobs:
 - 93,765 to 163,555 job-years, 2011-2020
- Solar Photovoltaic:
 - Utility scale, 0.69 Job-years per GWh
 - Large commercial, 0.97 Job-years per GWh
 - Residential, 1.31 Job-years per GWh

What is Missing from the CCEF Preliminary Estimates



Conclusions

- As long as renewable energy is more expensive than gas generation, the net jobs impact is likely to be negative.
- The cost of renewable energy is likely to continue coming down, so the economic impacts are getting smaller in magnitude.
- In any case, the impact on the California economy is very small. Also, negative job impacts do not indicate layoffs but a slight decrease in the growth of employment.