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January 21, 2011

MEMORANDUM

TO: Power Committee

FROM: Massoud Jourabchi

SUBJECT: Energy Efficiency and Jobs

At the December Power Committee meeting, Council Member Yost asked if Council staff was tracking the energy efficiency jobs created as a result of the 6th Power Plan conservation targets.

I conducted some research on the job impacts of energy efficiency initiatives. This presentation will discuss: why and how investment in energy efficiency creates jobs, how the 6th Power Plan estimates of job impacts were made, and review some of the current activities in the measurement of energy efficiency employment.

Our analysis shows that the overall total job impact of efficiency measures is positive but small and over the 20 year plan period it increases regional employment by less than 1% (an additional 43,000-47,000 jobs by 2030 compared to base employment forecast of 7,000,000 jobs by 2030).

February 8th, 2011
Massoud Jourabchi

Energy Efficiency and Jobs

making invisible visible



Today's Presentation

- How energy efficiency creates jobs
- Measurement/assessment of energy efficiency jobs
- Analysis behind the 6th Plan estimates of energy efficiency and jobs
- Current energy efficiency and jobs measurement activities
 - Federal and State activities
- Summary

How does efficiency leads to more jobs?

- When retrofitting an existing building with high efficiency windows, the window manufacturer orders more raw material, hires more workers, designers, etc. This leads to more jobs, some local, some out of state.
- Over time the employment impact of making windows more efficient may be small as these efficient windows become standard installation windows.
- Although net impacts may be small:
 - Skill set and pay for the new jobs have moved up
 - Over time, as ratepayers see lower electricity bills and spend that money in the rest of the economy, more economy-wide jobs are created.
- The economic impact of investing in energy efficiency depends on how it compares with the supply side options.

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Measuring Energy Efficiency Jobs

- The energy efficiency services industry is a diffuse industry
- There are some jobs that can easily be identified as efficiency jobs:
 - Weatherization
 - Energy Auditing
 - Building commissioning/implementation (PECI)
 - Conservation program/policy management (ETO, NEEA, T&C)
- However, there are many more jobs that cannot:
 - Designers/architects
 - Skilled labor/installers
 - Engineering ,
 - Marketing

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How are job impact assessments typically made?

➤ Short-term

- Before investment is made
 - Using rules-of-thumb
 - Using sophisticated economic models describing the relationship between industries in a region with industries outside the region (input-output models)
- After investment is made
 - Requires tracking the direct measurement
 - Assessment of indirect impacts requires estimation

➤ Long-term

- Using sophisticated economic models of the regional economy

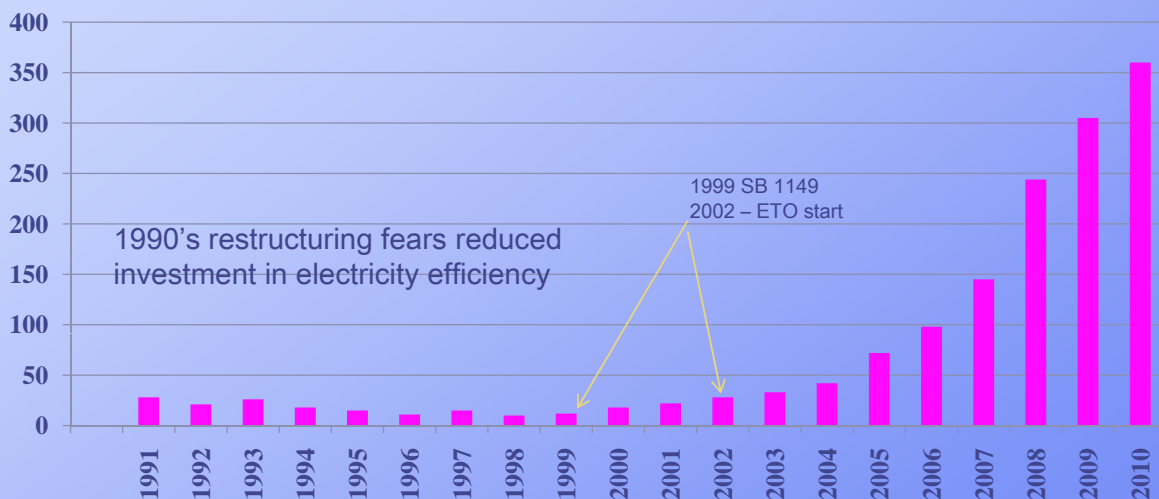
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Example of Direct Measurement

Employment History of
one Energy Efficiency Implementation Company

Number of PECEI Employees



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Job impact of energy efficiency services depends on measures and delivery mechanisms

Jobs Impact per MWa of Savings	Codes and Standards Local/state/Federal	Utility Programs New Construction	Utility Programs ESCO/ Retrofit
Residential	Minimal	Low	Higher
Commercial	Minimal	Low	Higher
Industrial	Minimal	Low	Higher

Prior to implementation, not knowing the exact measures and delivery mechanism would make the estimation task difficult. However, we may be able to compare supply options and efficiency options.

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Comparison of Demand and Supply-side Options Average Employment Over Life of Investment (Jobs/MWa)

Generation technology and (capacity factor)	Manufacturing, Construction, Installation Phase	Operations & Maintenance/fuel processing Phase	Total employment
Solar PV (21%)***	~6	1.2-4.8	< 7-11
Wind Power(35%)***	0.4-2.5	0.27	< 0.7-2.78
Biomass (85%) ***	0.4	0.38-2.44	< 0.8-2.84
Coal-fired (80%) ***	0.27	0.74	< 1
Natural Gas fired *** (85%)	0.25	0.7	< 1
Efficiency (6 th plan)	~17 (range) *	NA*	7**
Efficiency (6 th plan)	3.5 (jobs/\$m)		

* Depends on measures and delivery mechanism- based on impact from BETC/RETC

** Based on long-term cumulative increase in disposable income of consumers

*** For supply options, utility revenue requirements can increase, rather than decrease, resulting in lower jobs than shown in the long-run.

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Approach Behind the 6th Plan's Estimates of Efficiency Jobs

- Reviewed existing research on efficiency and jobs
- Located a good study candidate for our purpose
- Extrapolated the findings from that study to the 6th Plan targets.

- Dangers of using other studies
 - Often the published material does not reflect all the underlying assumptions
 - Structural differences in the state economies makes transferability of the results difficult and dangerous.

- However, given the time and resource constraints we identified a “reasonable” existing work and used it as basis of our analysis for the 6th plan.

- We used the findings of the analysis that was commissioned by Oregon Department of Energy, for economic evaluation of the Business Energy Tax Credit (BETC) and Residential Energy Tax Credit (RETC) programs for years 2007 and 2008.

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Analysis Used in the 6th Plan

- We analyzed the mix of conservation measures that the 6th Plan is targeting
- Compared it to the mix of eligible measures in the Oregon's BETC and RETC programs.
- We believe the mix of eligible measures for BETC and RETC programs represent a similar mix to the targeted conservation measures.
- Impacts of the renewables component of the BETC and RETC programs were excluded.

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How was the investment impact of ODOE's programs analyzed?

Step 1) Base case was created where: BETC and RETC tax credit dollar amounts were spent on general Oregon government programs.

Step 2) BETC/RECT Conservation programs case was created where :

- Detailed measure spending data were linked to spending in various business sectors
- Energy savings were estimates, broken by fuel types, and used to:
 - Reduce revenue of utilities, refiners...
 - Increase income of households and output of businesses

State employment for each case is used to calculate gross and net job impacts .

- The gross impact is employment under conservation program case
- Net employment are those over and above the Base case.

That analysis showed that investing \$1 million dollars in conservation measures can lead to:

- Gross employment impact of 12 jobs
- Net employment of about 4 jobs.

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How was the disposable income impact of savings resulting from ODOE programs analyzed?

- Input-output model for state of Oregon was used
 - Residential/business energy costs were reduced
 - All other costs were kept constant
 - Customers disposable income was increased.
- Finding was that \$1 million dollars in energy cost savings created an *estimated* 12 jobs
- *Over the long-term, shifts in regional economy and changes in efficiency of other regions will alter these employment impacts.*

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Estimated 6th Plan Targets Over the Next 20 Years

- From the BETC and RETC programs, we took:
 - Short-term impact ~ 4 net jobs per million dollars of investment
 - Long-term ~ 12 jobs per million dollars on change in disposable income
- The 6th Plan targets and impact can be summarized as:
 - Conservation target ~ 6,000 MWa
 - Utility + customer investments ~ \$20 billion
 - Increase in disposable income ~ \$25 billion
(difference between Least Risk and No Conservation Cases)

But Keep in mind that **Employment impact is highly dependent on the measure type and delivery mechanism**

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So with all the caveats, applying BETC and RETC results to the 6th Plan conservation investments show:

	Net Employment Impact
Short-term Employment Impact	3,539-6,370 Jobs Depending on level of conservation in a given year
Cumulative impact due to increase in disposable income by (2030)*	47,000-62,000 Jobs** Depending on treatment of CO2 costs. Higher impact if CO2 cost is included in the utility bill.

* Comparison of Least Risk to No Conservation case. Shifts in regional economy and changes in efficiency of other regions will alter these employment impacts.

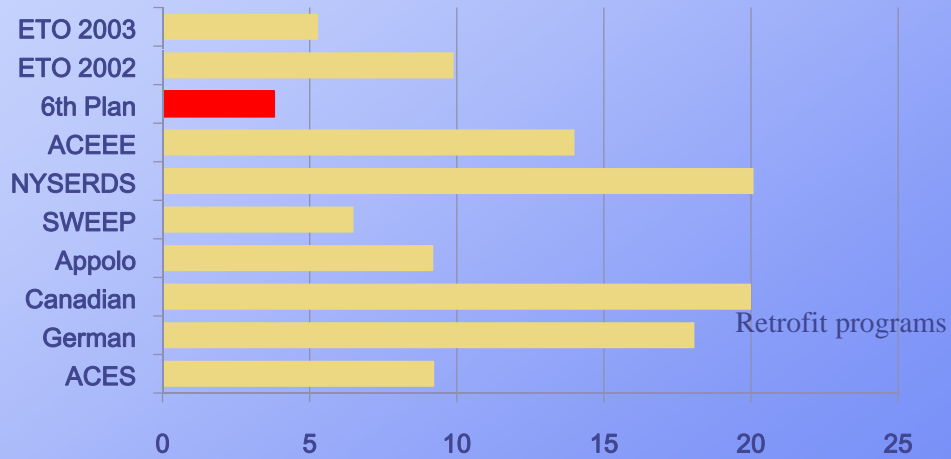
** 43,000 jobs if existing \$300 million dollars for conservation is deducted from the bills

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Were the estimates we used reasonable? Short-term Impacts

Jobs/Million dollars of Investment



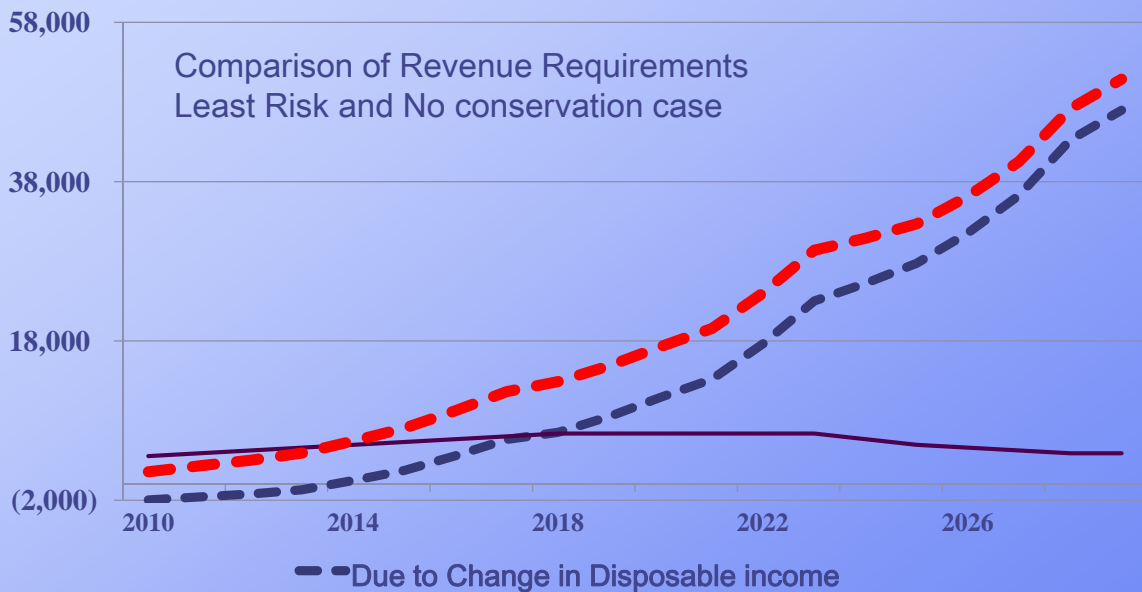
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Even with the Long-term impact of higher disposable income on jobs, the increase in jobs is a small portion of overall jobs

~ 0.7% higher employment by 2030

Excluding CO2 costs



— Due to Change in Disposable income

— Due to Conservation Measures

— Total Net Employment

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Long-term View on Energy Efficiency and Jobs

- Given low level of investment in energy efficiency and the defuse nature of the industry there has not been much effort to measure and monitor efficiency jobs.
- However, recently there has been a number of efforts at the national and regional level to measure contribution of green jobs and energy efficiency jobs in the economy.
 - **BLS Green Jobs Initiative**
 - Washington state 2008 and 2009 Green Economy Jobs
 - Idaho state (green Jobs survey – due Spring 2011)
 - Montana (green Jobs in Montana)
 - Oregon (the greening of Oregon’s Workforce)
 - NEET identified workforce issues as a target area for development
- Continuation of these efforts should help with monitoring the employment impact of investment in efficiency as well as meeting the workforce requirement of the future.

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Current Partial Estimates for State Surveys of Green Economy and Energy Efficiency Jobs

	2008-2009	Percent of state employment
Washington	~ 100,000 Green ~40,000 Efficiency	~3% ~1.2%
Oregon	50,000+ Green ~14,000+ Efficiency	~3% ~1.2%
Idaho	TBD	
Montana	~4000-22000 Green	

Number of jobs shown in the table are survey-driven and are most likely underestimated, especially for the efficiency jobs.

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In Summary

- **Power Act has no mandate for job creation**
- **Electric power industry has been a capital intensive industry. Employment in the industry has been a small piece ~ 0.2% of the overall regional employment.**
- **Investment in energy efficiency could add to the labor intensity of the power sector, but even with the 6th plan's targets the additional jobs created in the region are small, higher by less than 0.7% in 20 years from now.**
- **No matter what type of analysis is used, the exact impact can not be known.**
- **Largest employment impact is from small, but accumulating increase in disposable income.**
- **Energy efficiency services industry needs to define and track the invisible efficiency jobs in order to make the invisible visible.**