

# ***COMPARING ENERGY EFFICIENCY, RENEWABLE ENERGY, AND GENERATION***

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*ACEEE Energy Efficiency as a Resource,  
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David Juri Freeman

Lisa A. Skumatz, Ph.D.

Skumatz Economic Research Associates, Inc.

762 Eldorado Drive, Superior, CO 80027

303/494-1178 email: [skumatz@serainc.com](mailto:skumatz@serainc.com)

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# *TOPICS*

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- What we know already
- GHG emissions
- Programs analysis
  - Normalized results
- Other considerations
- Implications

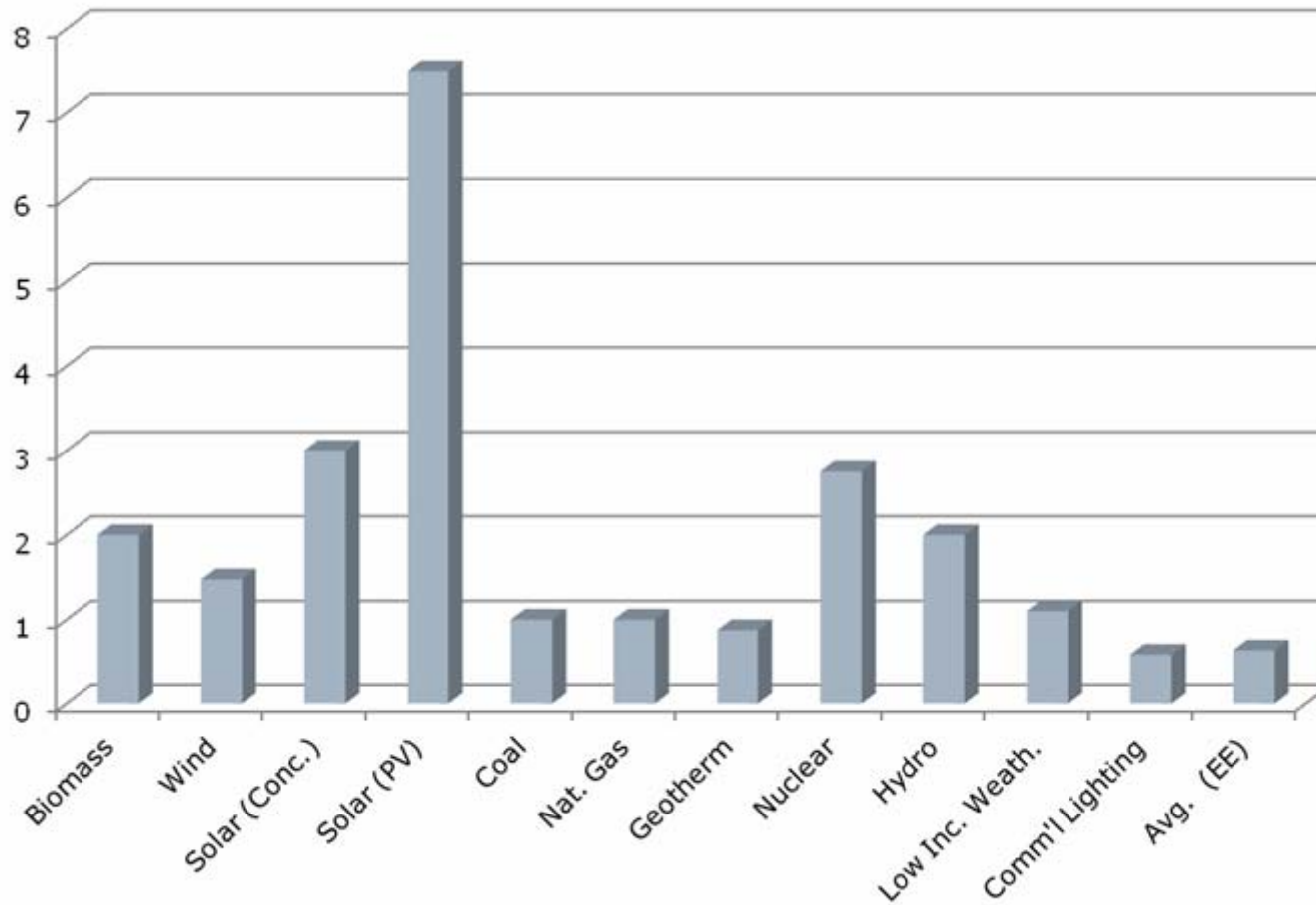
# WHAT WE KNOW...

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*... if cost per kWh were the only consideration.*



# RELATIVE COST PER kWh



Normalized coal=1

Source: ACEEE, NRDC, SERA, and others

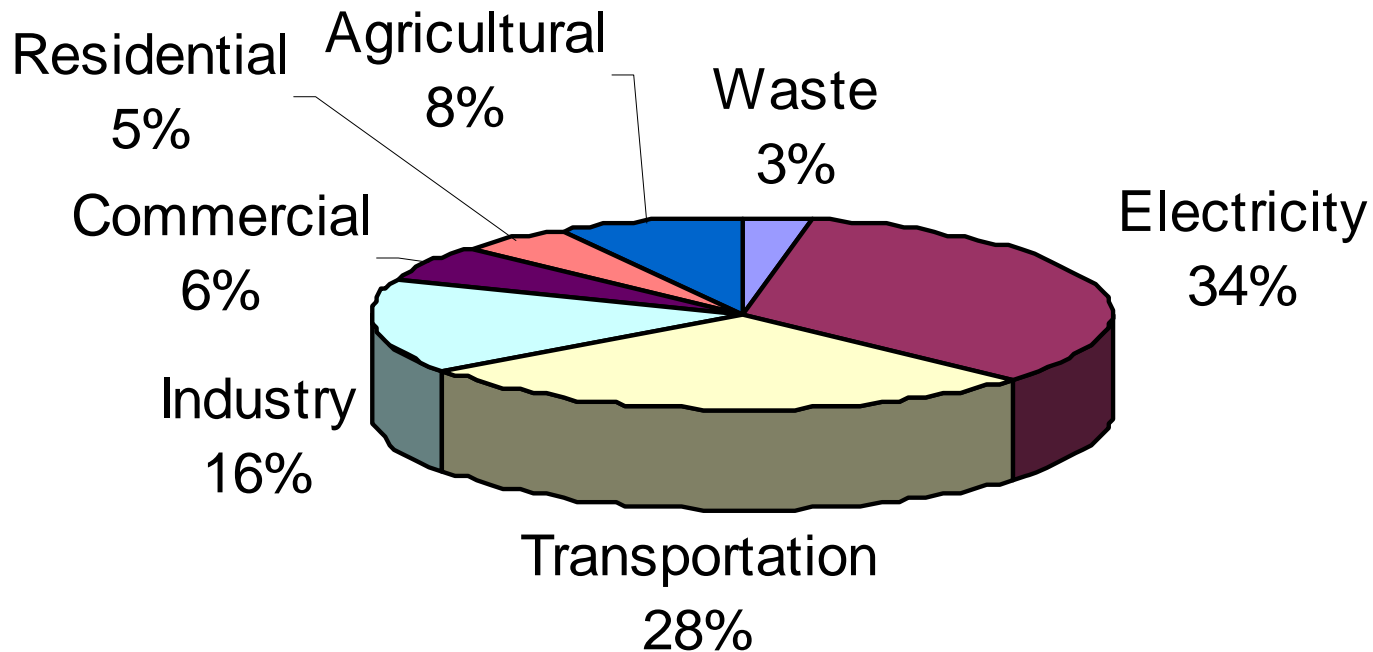
***IF GOAL IS MTCE ...***

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*..... at least partly...*

# US GREENHOUSE GAS EMISSIONS SOURCES - CONVENTIONAL

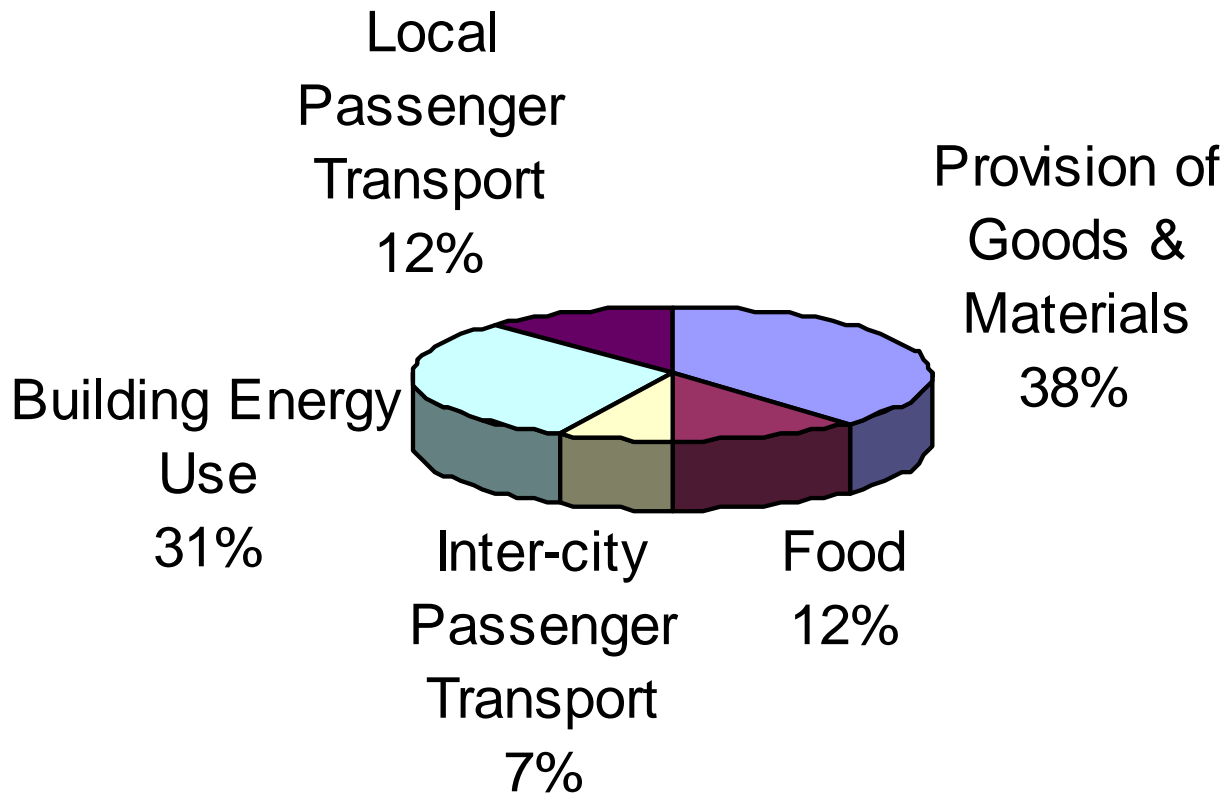
*Electricity, building energy use responsible for about 1/3 of GHG emissions*



Source: USEPA, 2005

# US GREENHOUSE GAS EMISSIONS SOURCES - REVISED

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Source: USEPA 2009

# ***GOAL – REDUCE MTCE***

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- Historic takeaways –
  - Prioritized actions in energy efficiency (EE), transportation
  
- But are all kWh equal? On what terms?
  - cost hierarchy?
  - other factors?
  - ...Move beyond B/C ratio





# ENERGY PROGRAMS ANALYZED



Residential  
Weatherization  
(Res EE)

Commercial Lighting  
(Coml EE)



Wind



Solar



# ANALYSIS STEPS

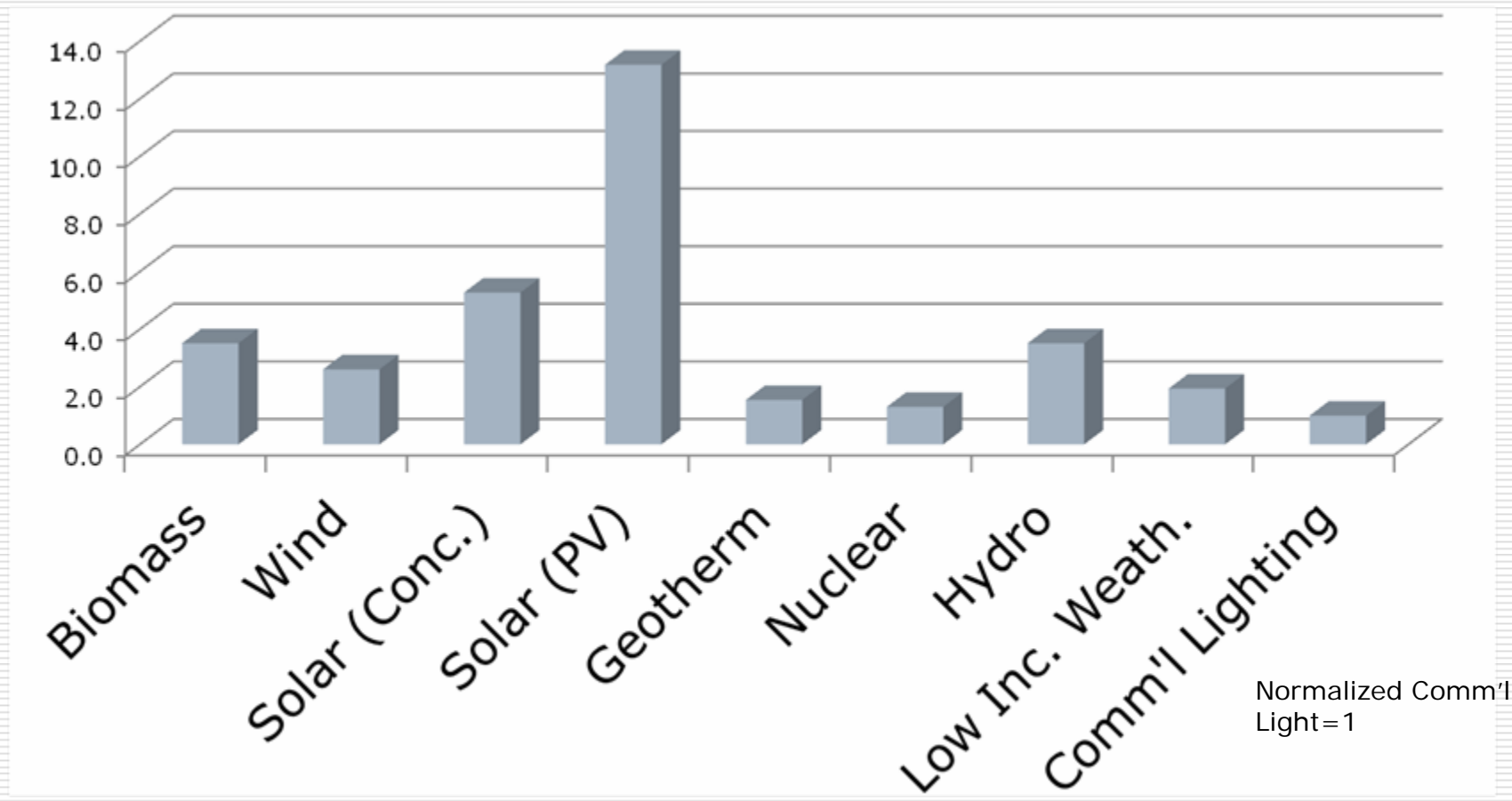
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- Data on costs, energy savings, peak & base generation fuels, other
- Modeled
  - associated MTCE, MTCO<sub>2</sub>e) emissions reductions (base case “generation”)
  - job creation, output impacts (same base case)
- Computed costs / MTCE, jobs / MTCE
- Results “normalized” for policy focus
- Purpose NOT to highlight / criticize specific programs...

# ***MTCE RESULTS***

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# RELATIVE COST PER MTCE



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# ***COST / MTCE RESULTS***

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- EE programs are relatively cheaper per MTCE
- Variations from:
  - Program costs
  - Local generation mix
- Does anyone care about GHG- What matters now?





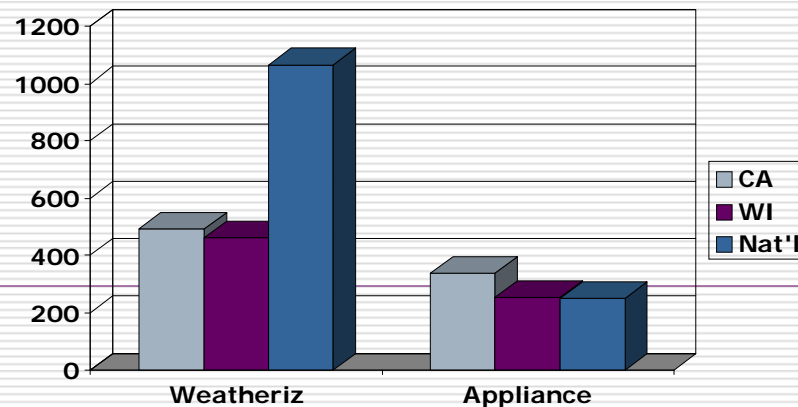
# ***RELATIVE JOB IMPACTS***

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# ***JOB CREATION ALSO DIFFERENTIATES PROGRAMS***

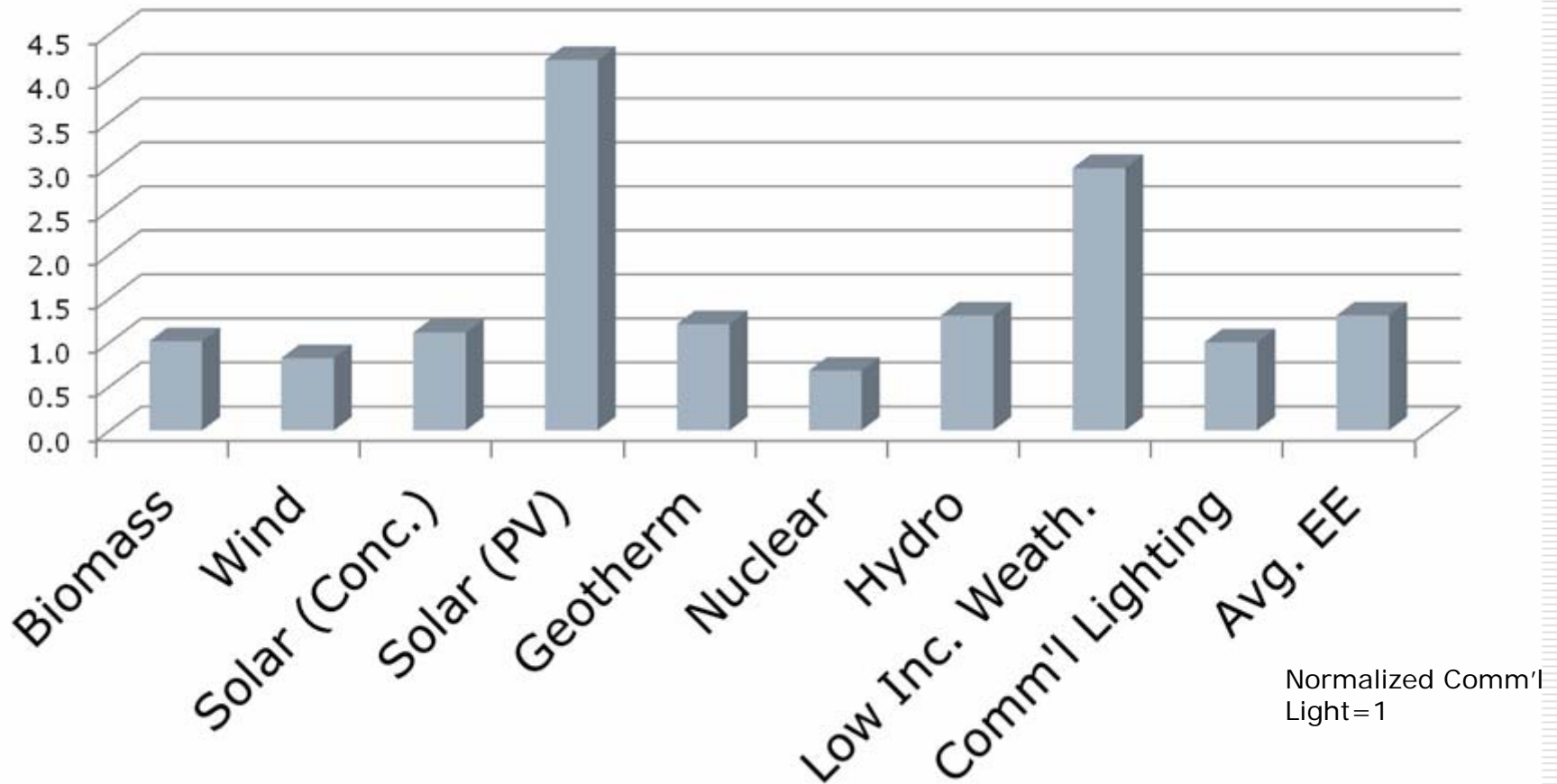
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- Direct install, broad programs create more jobs
- Fewer jobs from appliance programs
  - No installation
  - Equipment not all made in US or the relevant state
- Recession...



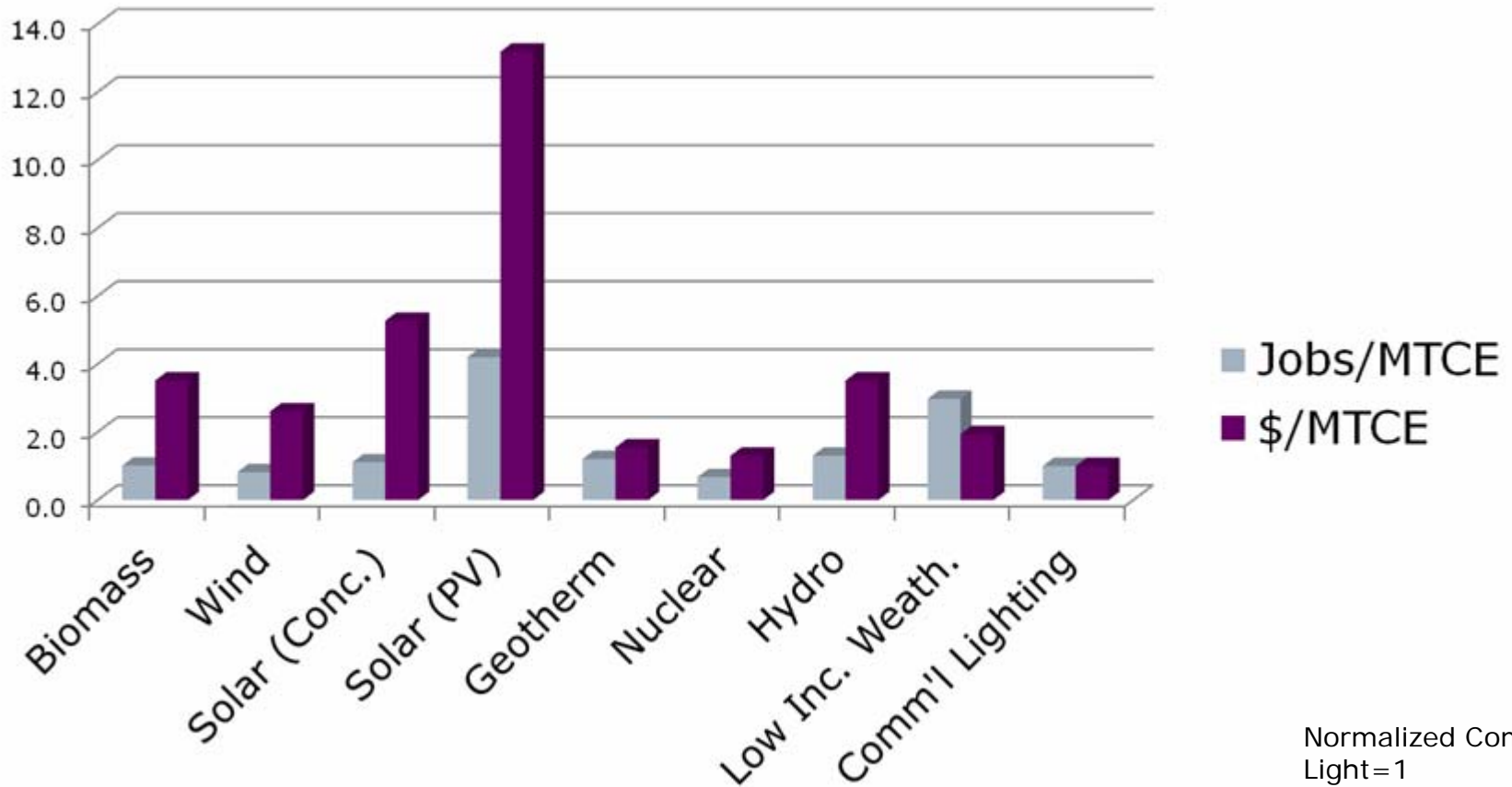


# RELATIVE JOBS PER MTCE



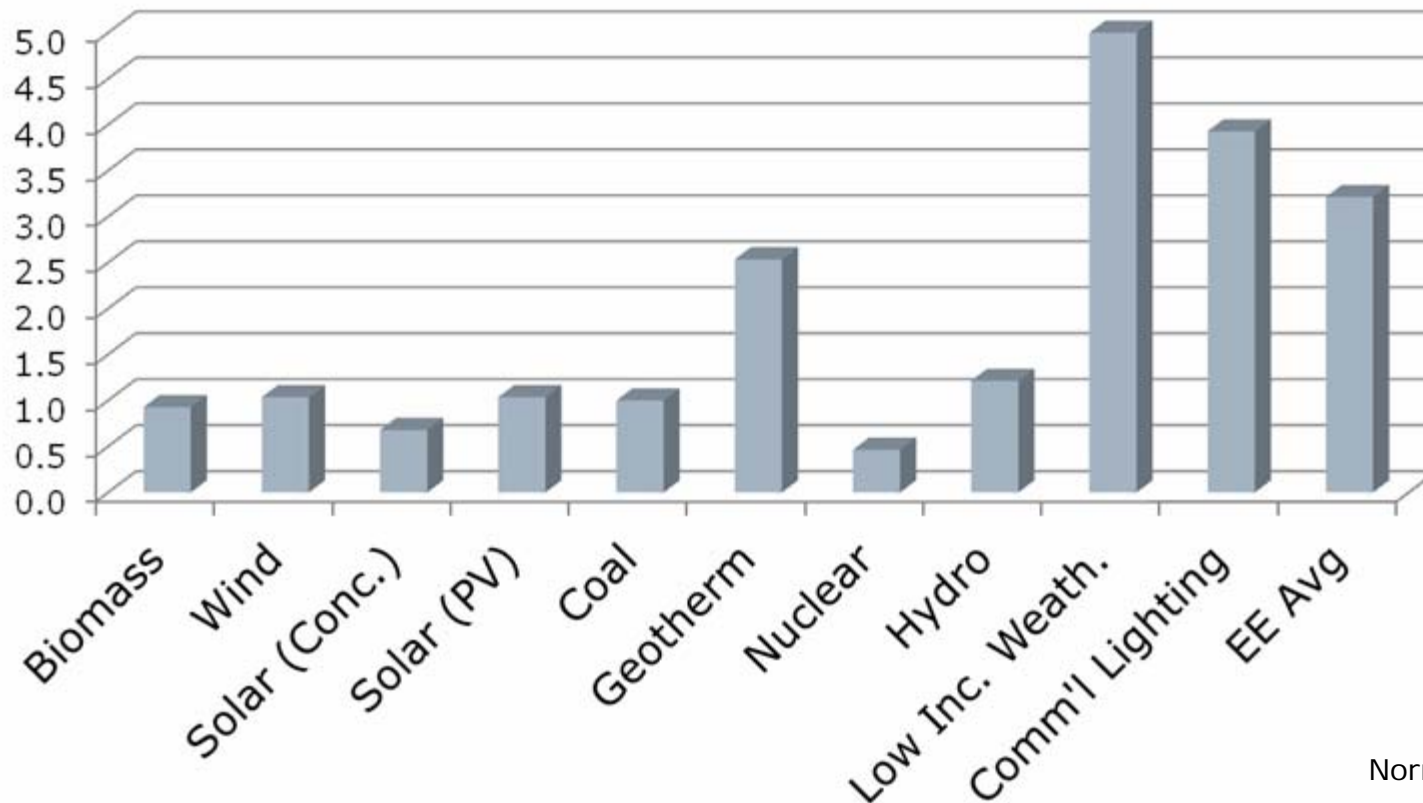
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# RELATIVE COST & JOBS PER MTCE



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# RELATIVE COST JOBS / \$1M



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# ***OTHER PERSPECTIVE / CONSIDERATIONS***

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City / County point of view...

# ***MULTIPLE WAYS TO ACHIEVE GHG REDUCTIONS***

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- Cities / counties may also consider recycling, transportation, other strategies
- Conducted similar analysis of recycling programs

# *PROGRAMS MODELED*

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## □ Solid waste:

1. Pay-as-you-throw (PAYT)
2. Residential curbside recycling (CS Recy.)
3. Yard waste (composting not AD)

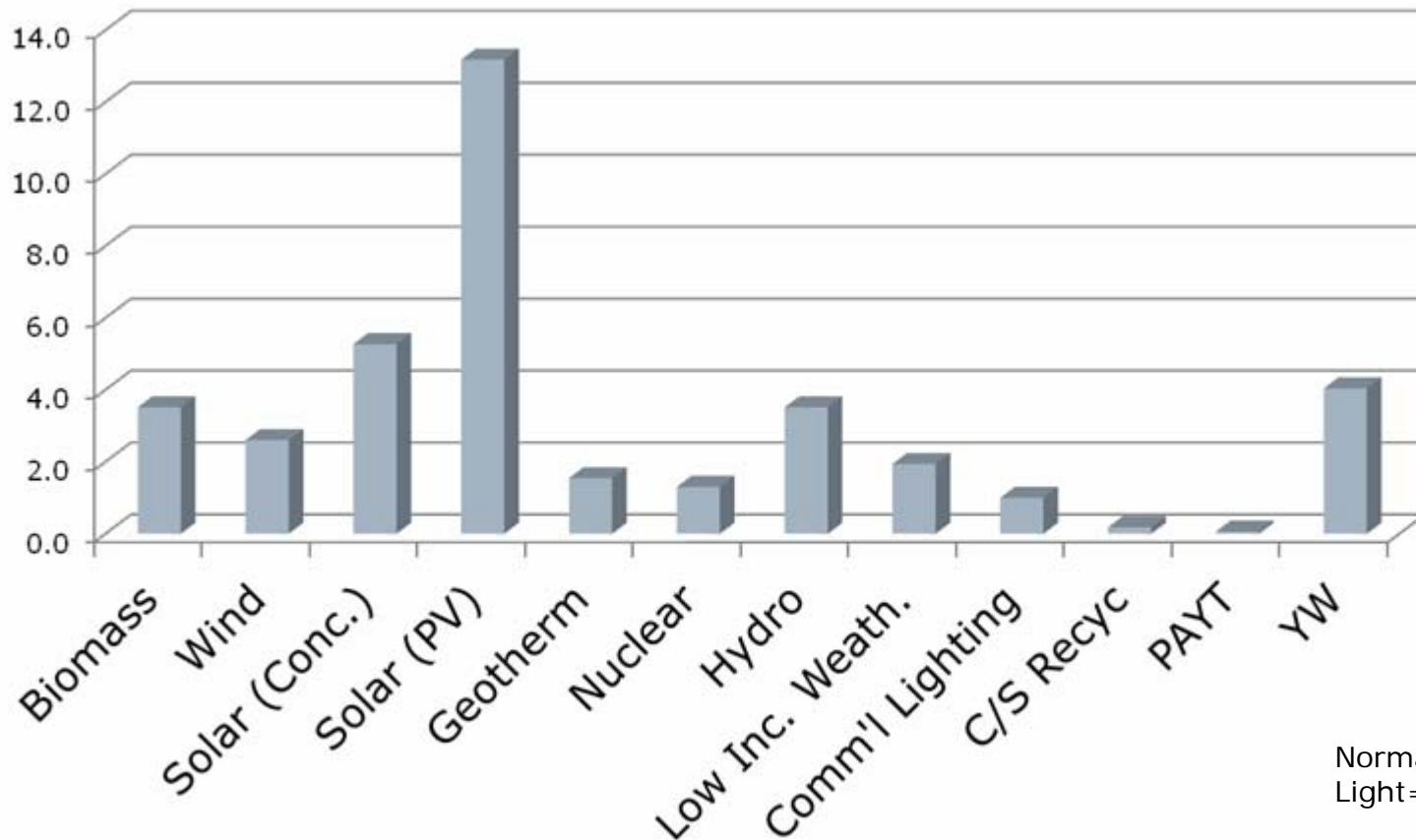


# *CALCULATION APPROACH*

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- Collected data on impacts and costs
  - Tons
  - kWh
- GHG
  - Modeling approaches
  - Base (landfilling)
- Results “normalized” for policy focus

# RELATIVE COST MTCE

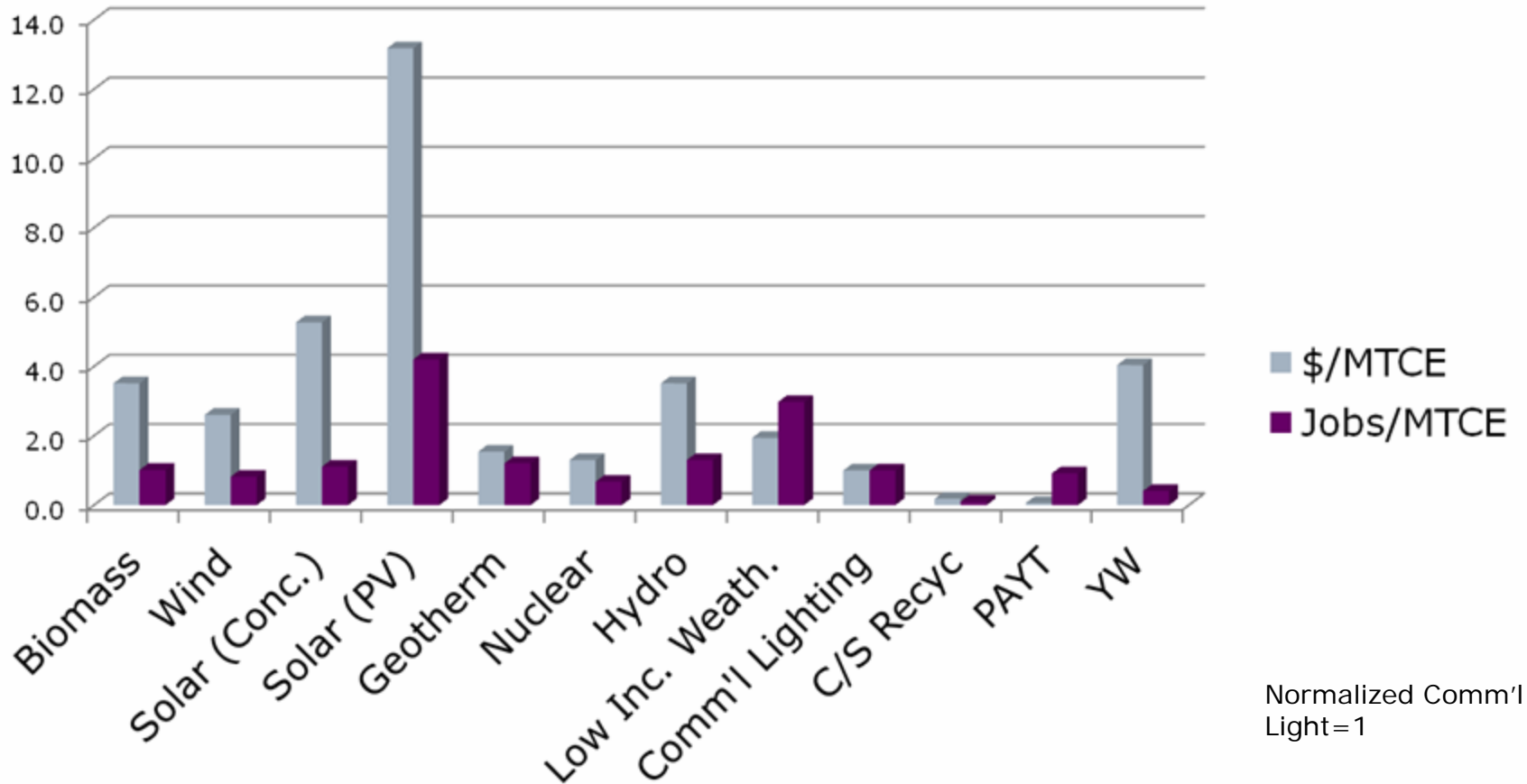


Normalized Comm'l  
Light=1

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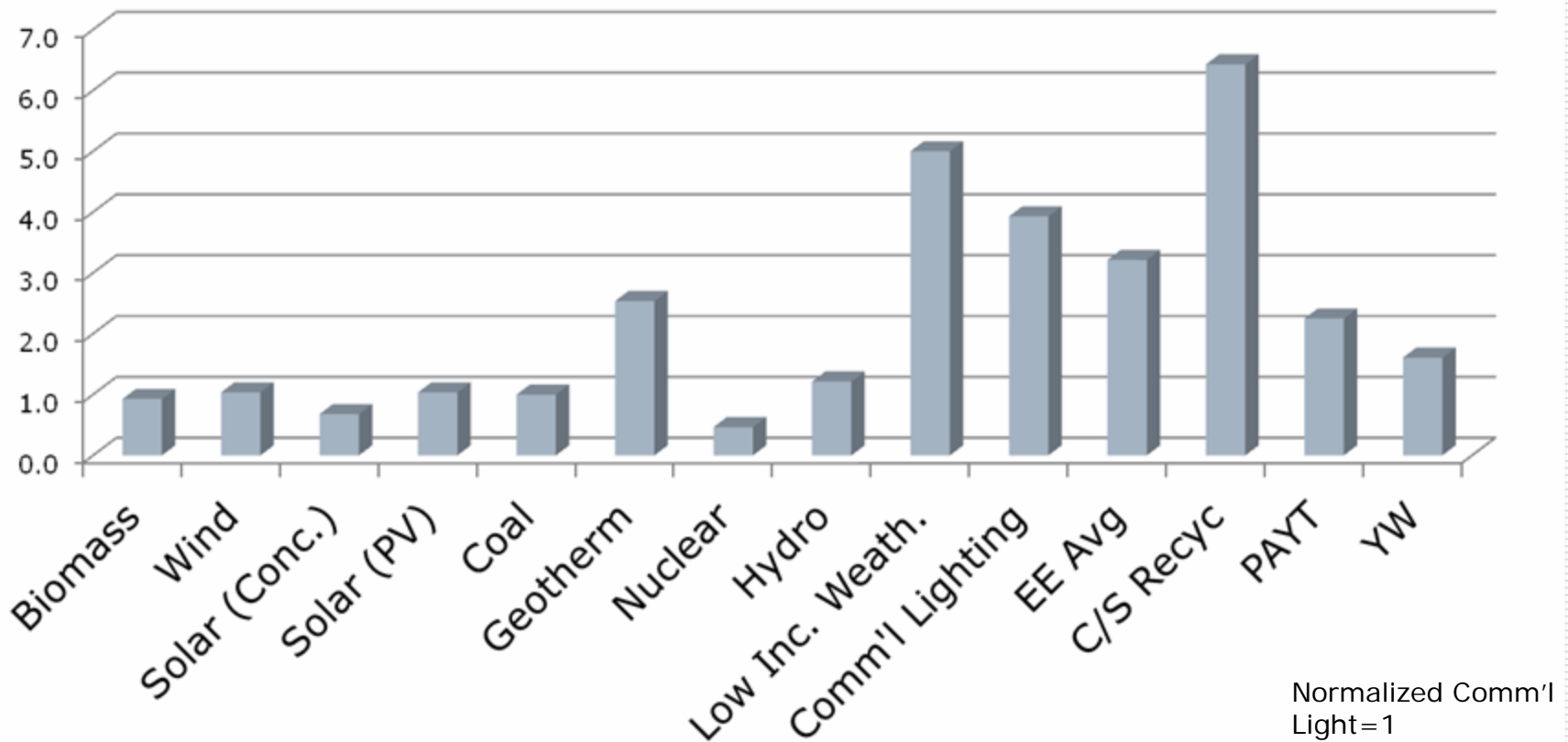


# RELATIVE COST, JOBS PER MTCE FOR RECYCLING & ENERGY



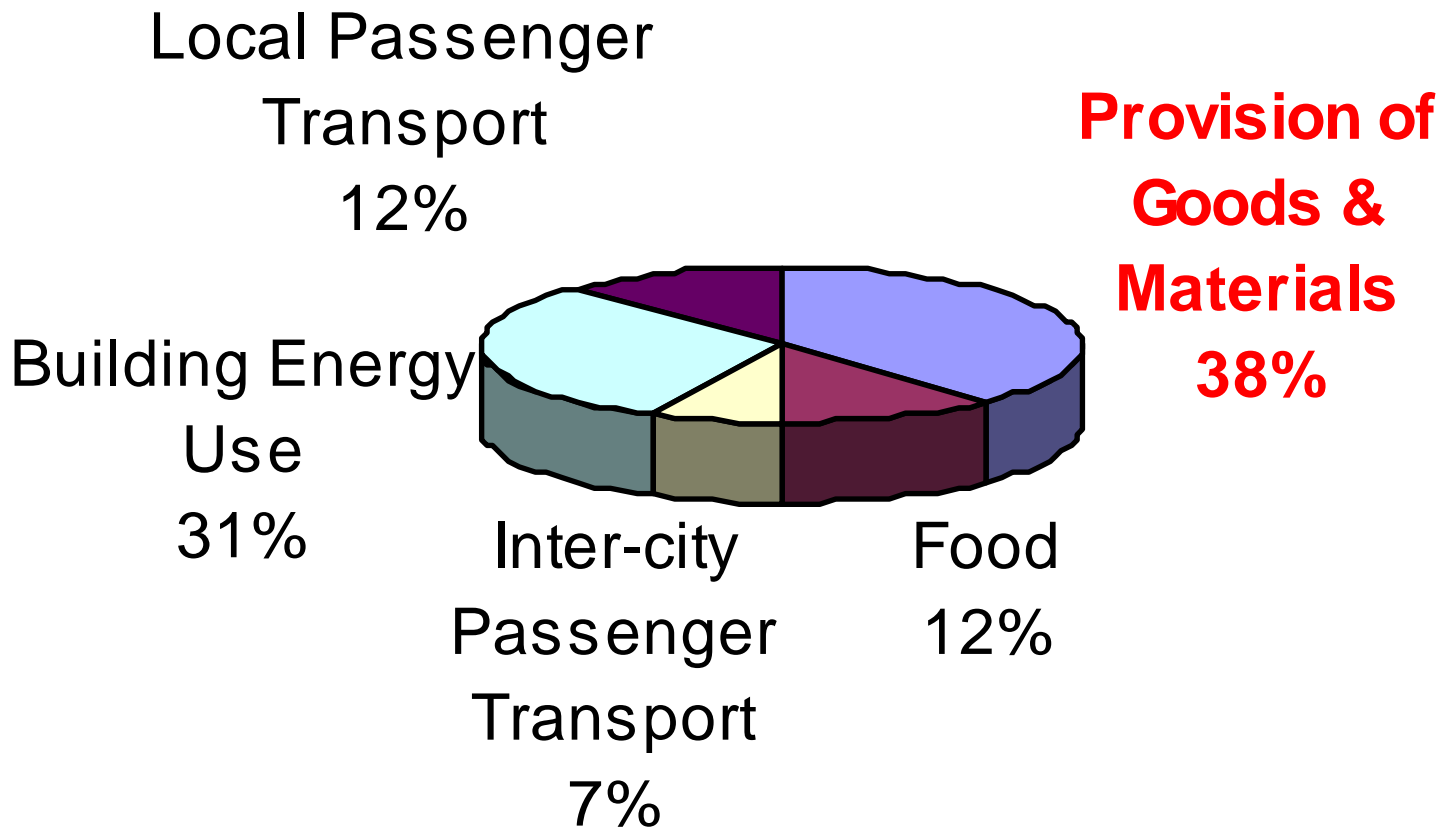
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# RELATIVE COST, JOBS PER MTCE FOR RECYCLING & ENERGY



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# US GREENHOUSE GAS EMISSIONS (REVISED)

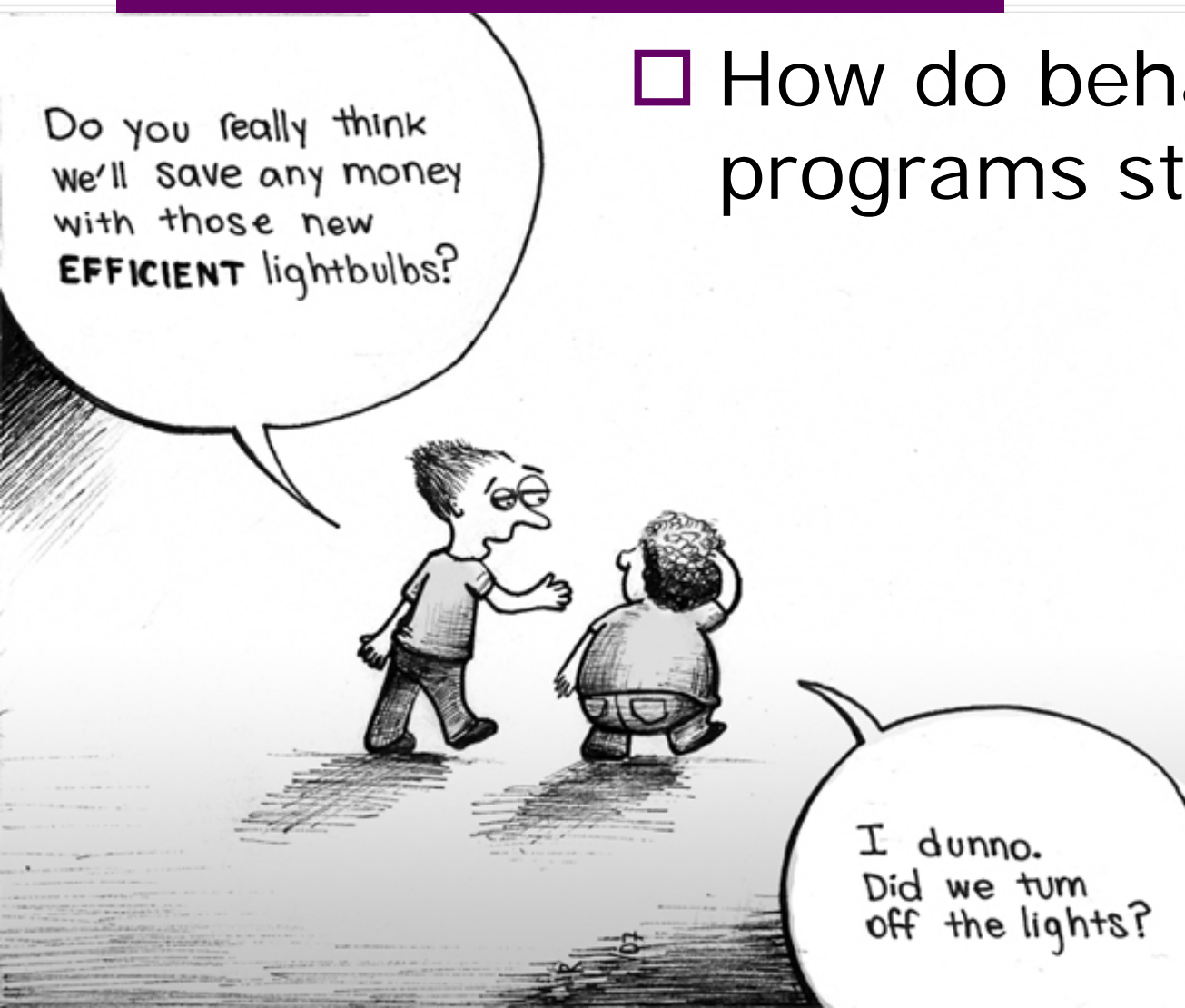


Source: USEPA, from Allaway (ORDEQ)

# OTHER PROGRAM CONSIDERATIONS

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- How do behavior based programs stack-up



Do you really think we'll save any money with those new **EFFICIENT** lightbulbs?

I dunno.  
Did we turn off the lights?

# *CONCLUSIONS / IMPLICATIONS*

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# *CONCLUSIONS / IMPLICATIONS*

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- Other considerations
  - Generation mix, region, ramp-up, behavior, EUL
- GHG objectives
  - Move beyond B/C and consider optimization
- Measurable, variable results for different programs –
  - GHG,
  - Job performance

# ***CONTACT INFORMATION***

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*David Juri Freeman*

*Lisa A. Skumatz, Ph.D.*

*Skumatz Economic Research Associates (SERA)*

*762 Eldorado Drive, Superior, CO 80027*

*Phone: 303/494-1178*

*Email: [skumatz@serainc.com](mailto:skumatz@serainc.com)*

*Web [www.serainc.com](http://www.serainc.com)*