

# Exploring Economic Impacts of Long-Term California Energy Scenarios

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## Key Takeaways

- Large macroeconomic benefits of new energy investment (direct) and expenditure shifting (indirect)
- Decarbonization is likely to have positive economic benefits for Disadvantaged Communities in California
- Public health benefits are of comparable magnitude as the required energy system investments.

Two recent studies by our group:

1. Economic impacts of California's Long-Term Energy Strategy (LTES) funded by the California Energy Commission
2. Economic impacts of regional market integration funded by California ISO



# Macroeconomic Impacts of Decarbonization

**Economic Effects of PATHWAYS 2030/2050  
Decarbonization Scenarios  
(2015 \$ billion, difference from baseline)**

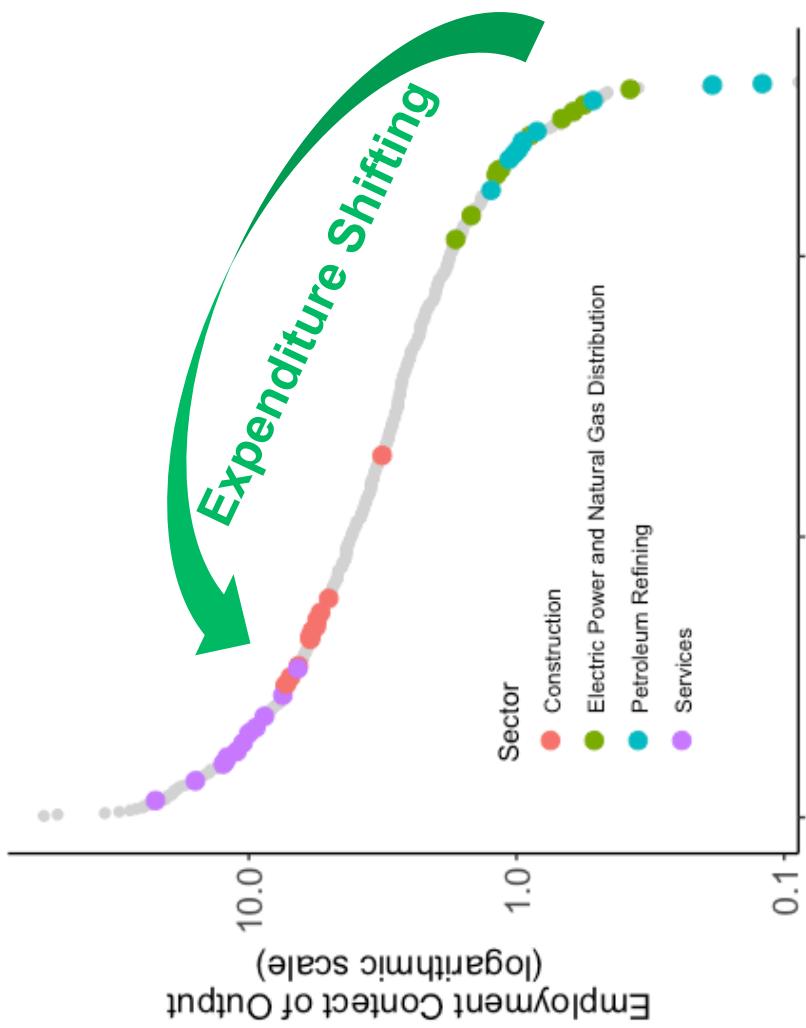
	2030	2050
Gross State Product	2.11% (\$117)	8.92% (\$1,110)
Real Output	2.12% (\$175)	8.23% (\$1,532)
Employment (,000)	2.11% (576)	7.32% (3,299)
Real Income	1.10% (\$133)	5.61% (\$1,094)
State Revenue	2.41% (\$16)	8.13% (\$127)

- Large stimulus effects to the economy
- Overall job creation is substantial and diverse (across sectors)
- Most new jobs are in services and construction which have strong in-state multipliers.
- Power sector and building efficiency investments create both short and long run jobs

PATHWAYS scenarios include investments and fuel savings in electric power sector, vehicles, household and commercial building efficiency.



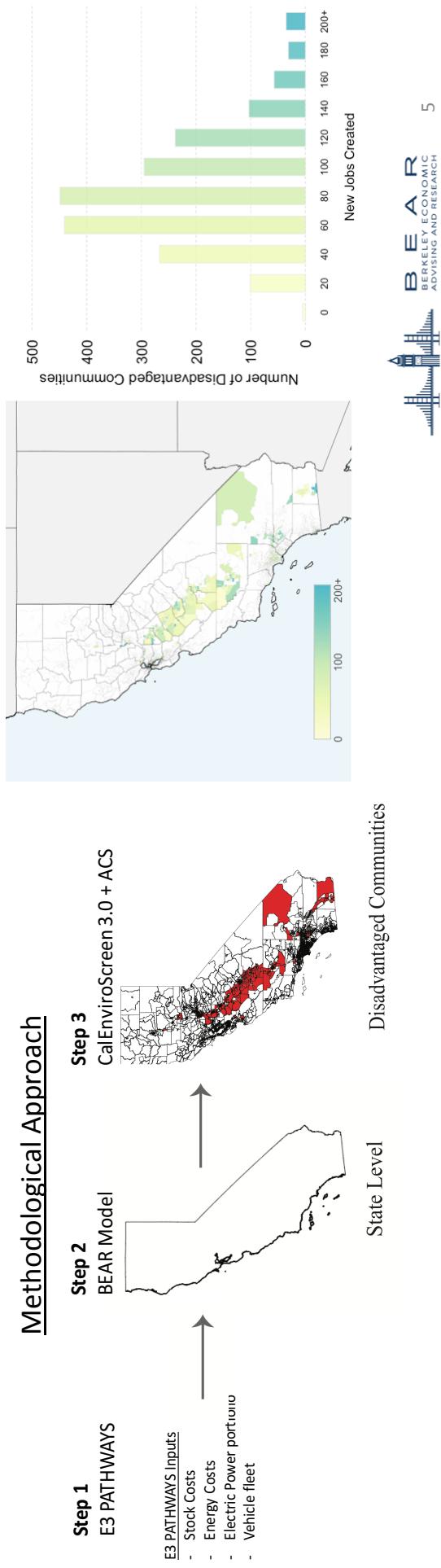
# Why it works?



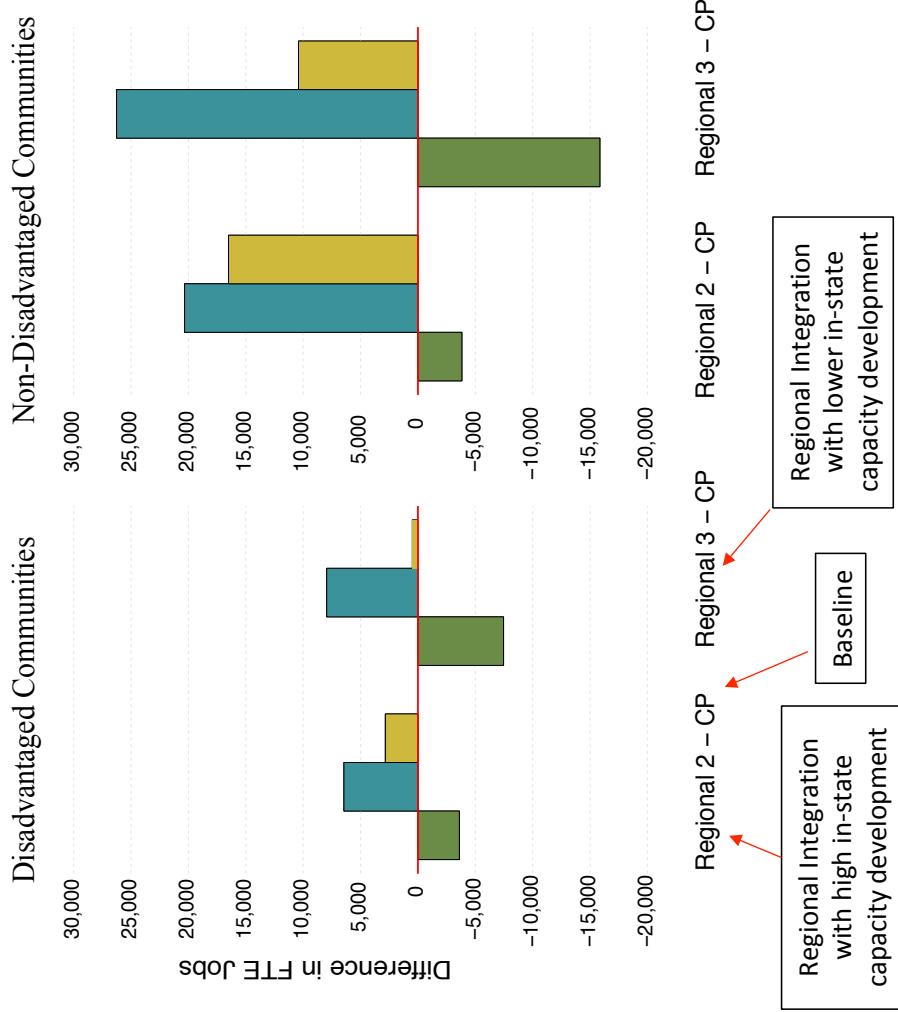
1. Investment in new energy technologies creates direct Keynesian expenditure effects.
  - Renewable electric power
  - Electric vehicles
  - Household and building efficiency durable/capital goods
2. Promoting energy efficiency and lower energy expenditures saves money for households and businesses. These savings are diverted to other expenditures, primarily in-state service sectors.
3. Regional integration important for controlling ratepayer costs.

# Economic Impact of Decarbonization on Disadvantaged Communities

- Decarbonization policies stimulate overall CA economy, but DACs experience relatively larger employment effects
  - 2030: 170k more jobs created in DACs and 406k more jobs created in non-DACs
  - 2050: 964k more jobs created in DACs and 2,336k more jobs created in non-DACs



# Employment Effects of Regional Integration in 2030



1. Region electric power market integration can have substantial employment effects in DACs due to ratepayer savings.
2. The saving approximately offsets lower employment growth from in-state renewable capacity development.

# Public Health Benefits of Decarbonization

- Recent work highlights substantial health benefits associated with emissions reductions

- Averted Mortality Benefits in California:

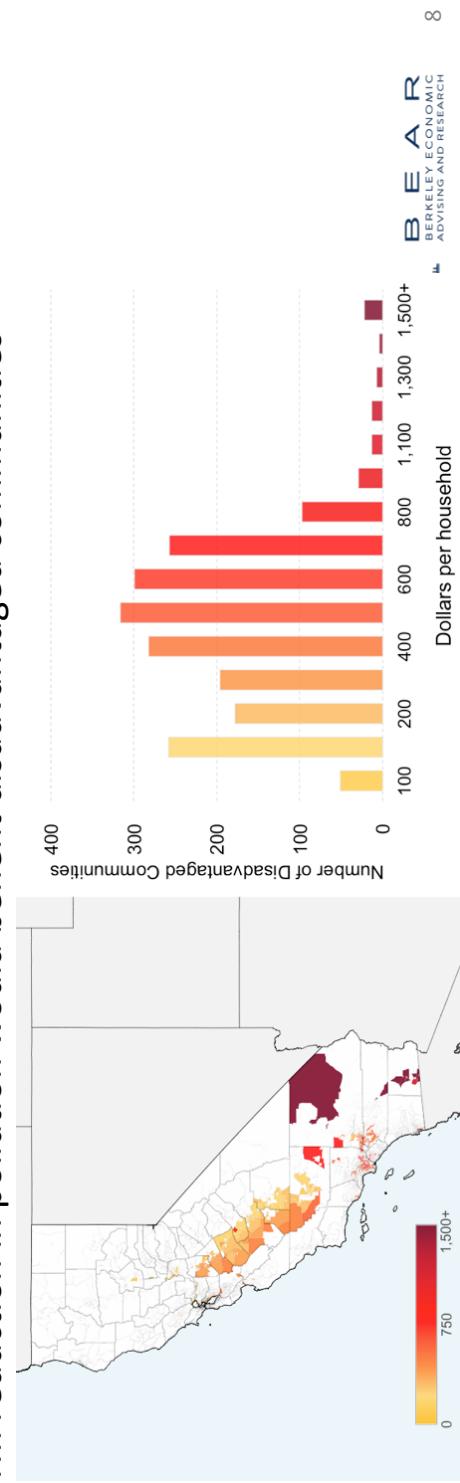
- CARB 2030 Scoping Plan: \$1-2 billion
- Zhang et al. (2017): \$3-4 billion (RCP 4.5)
- Zapata et al. (2017): \$11-20 billion (RCP 8.5)

- Averted morbidity costs in California are uncertain but likely to be of equal or greater value

- Benefits from averted mortality and morbidity alone appear to offset considerable percentage of capital costs associated with 2030/2050 decarbonization strategies

# Public Health Benefits in Disadvantaged Communities

- Using estimates of mortality and morbidity benefits from domestic GHG reductions in the energy sector (Zhang et al. 2017), we value annual health benefits by 2030 at:
  - \$581 averted health costs for DAC households
  - \$494 averted health costs for non-DAC households
- Health benefits (averted costs) are higher in DACs because baseline exposures and disease burdens are higher
- Even uniform reduction in pollution would benefit disadvantaged communities



## Questions?

## Contact Information

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