

American Energy Has Always Operated with Government Involvement

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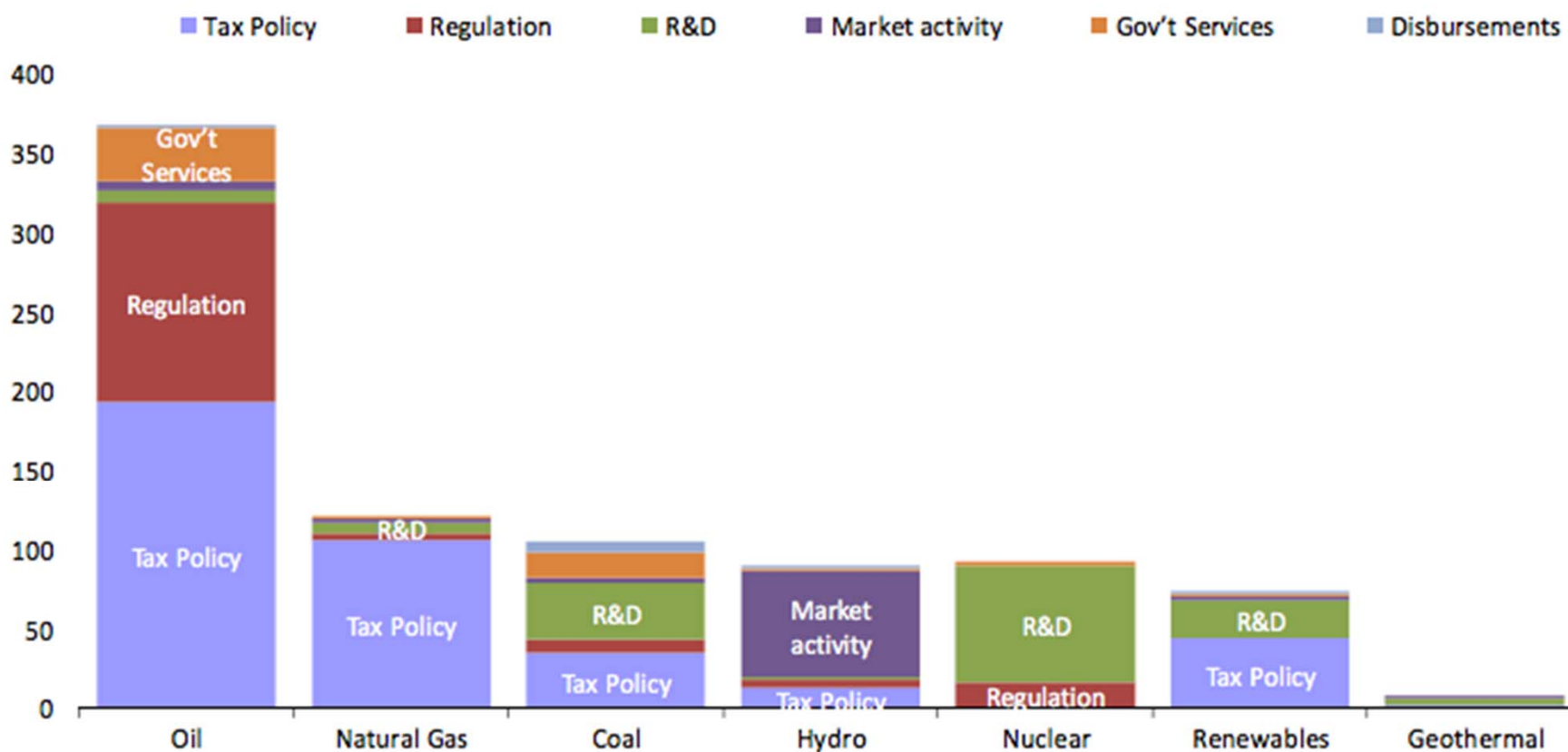
“Some argue that the consumer can purchase warmth or work or mobility at less cost by means of coal or oil or nuclear energy than by means of sunshine or wind or biomass. The argument concludes that this fact, in and of itself, relegates renewable energy resources to a small place in the national energy budget. The argument would be valid if energy prices were set in perfectly competitive markets. They are not. The costs of energy production have been underwritten unevenly among energy resources by the Federal Government.”

— August 1981 report of the DOE
Battelle Pacific Northwest National Laboratory

No Such Thing as an Un-Subsidized Unit of Energy

Comparison of Federal Expenditures for Energy Development, 1950–2010

(Billions of 2010 Dollars)

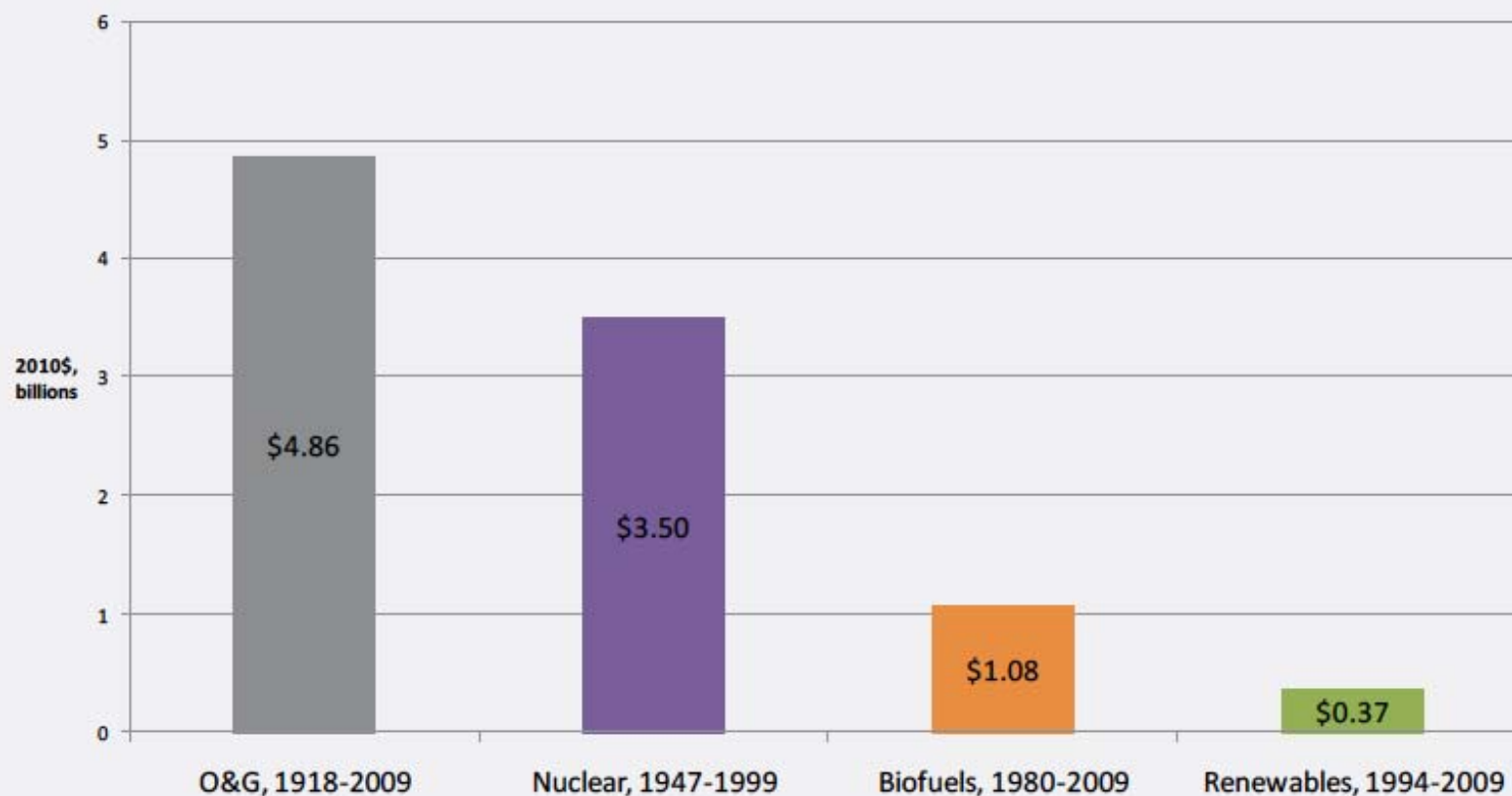


National Priorities Beat Market Ideology

- Jobs
- National Security
- Economic Development
- Climate Action
- Low Prices for Other Sectors of the Economy
- Price Support for Certain Consumers (Low Income)
- Public Health
- Trade
- Taxable Revenue
- Alternative Income (Land rent to farmers for wind.)
- Land Development

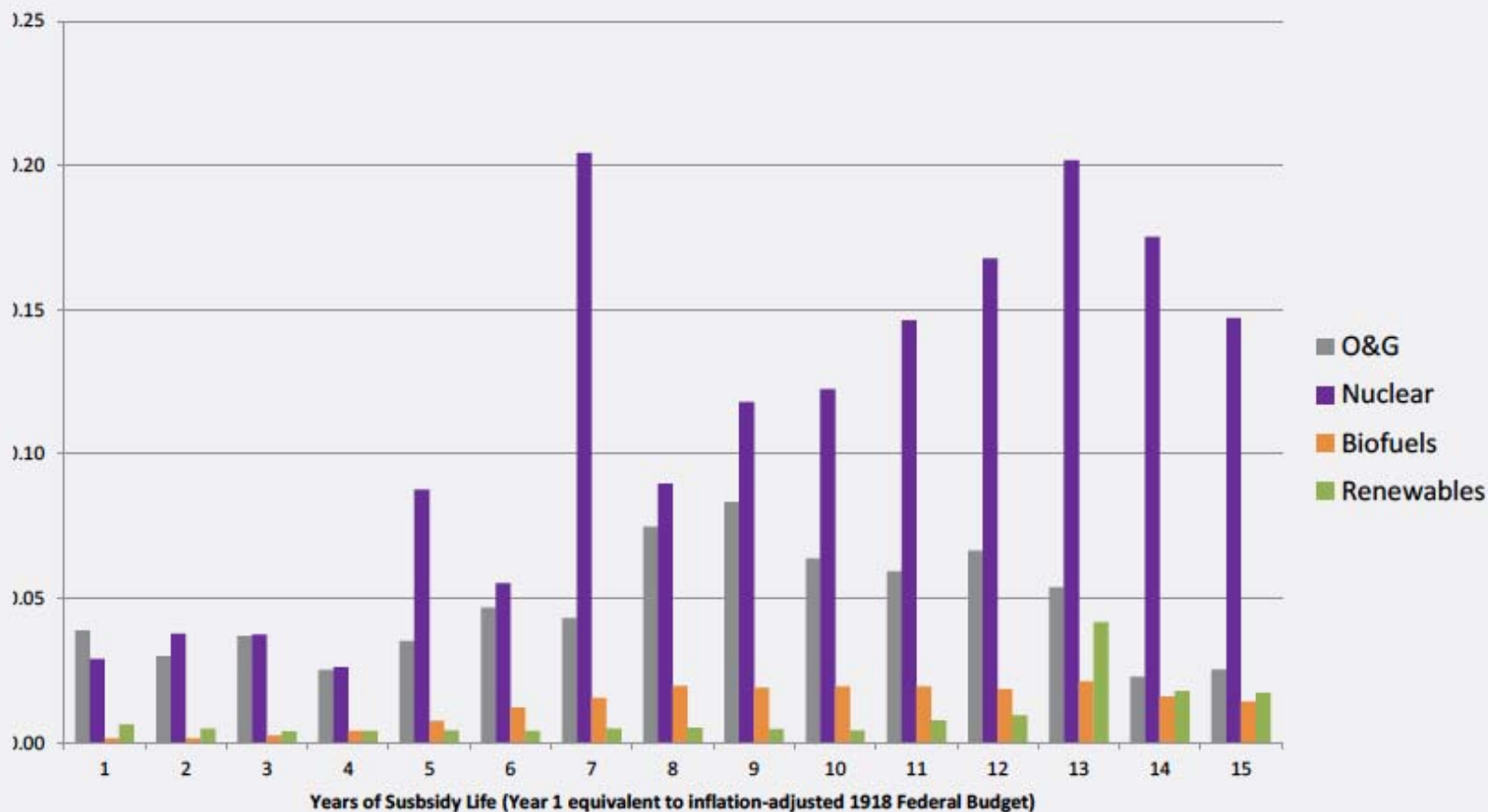
Historical Support for Energy

**Historical Average of Annual Energy Subsidies:
A Century of Federal Support**

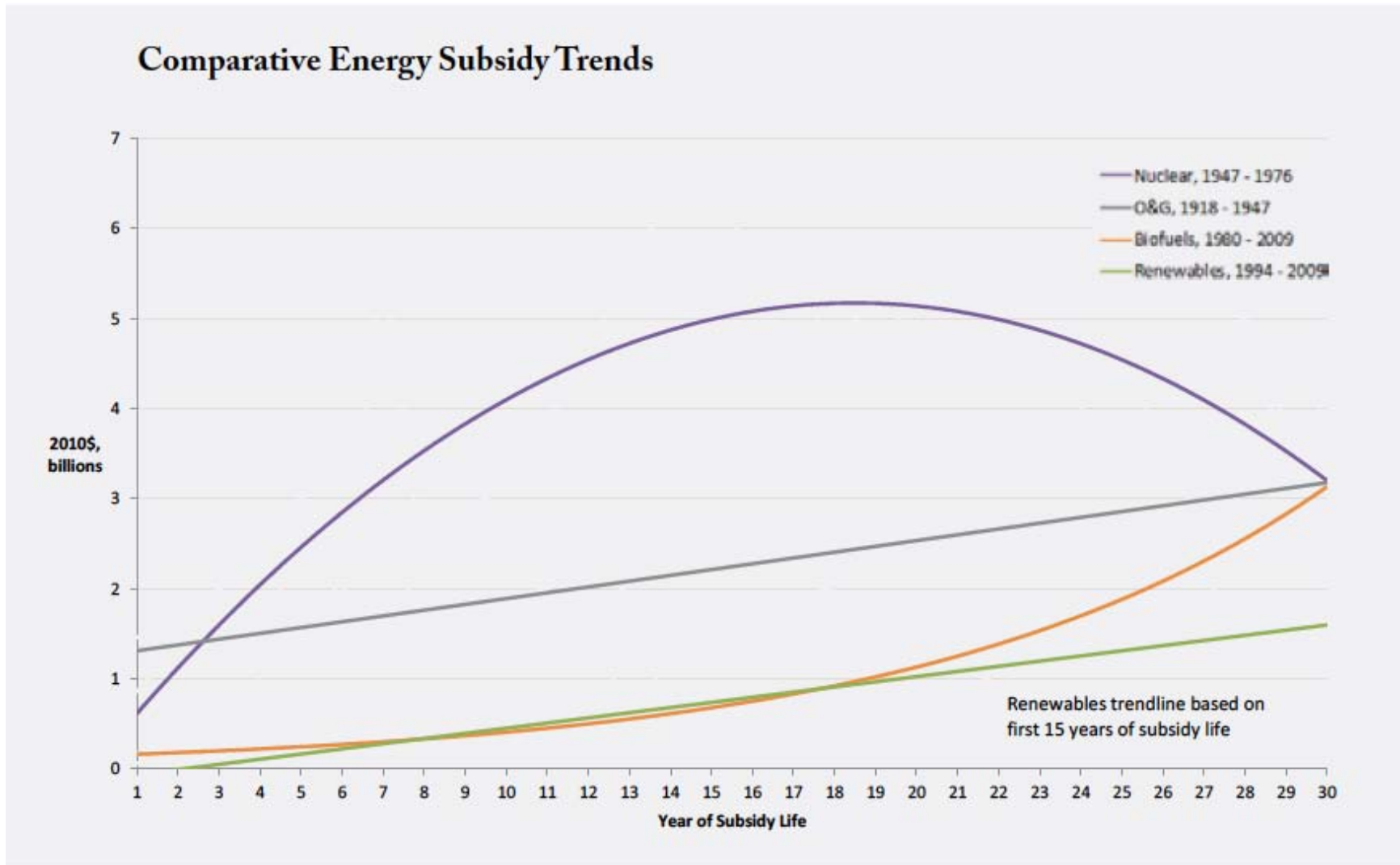


Historical Support for Energy

Energy Subsidies as Percentage of Federal Budget



Historical Support for Energy



Examples of Coal-Specific Policy Support

- Below-market Land Grants
 - Preemption Act of 1841; Homestead Act of 1862; Timber and Stone Act of 1878, current below-market royalties;
 - Estimated at \$25B a year in inflation-adjusted dollars;
- Tariffs on imports
 - First tariff on imported coal dated from 1789 until 1842;
- State-specific policies
 - Pennsylvania exempted anthracite from taxation, subsidized smelters to promote usage and used corporate charters to grant exclusive coal field franchises;
 - Geological surveys paid by government provided at no cost to coal companies;
- Railroads. (No debate about whether government supported railroads.)
- Navigable rivers. Army Corps of Engineers Locks and Dams;
- USGS, OSM, DOL MSHA, DOE “clean coal” support, mining agencies, etc..
- Capacity markets in FERC jurisdictions;

It's an economics conference so.... externalities!

“Particle pollution from power plants is estimated to kill approximately 13,000 people a year.”

-American Lung Association

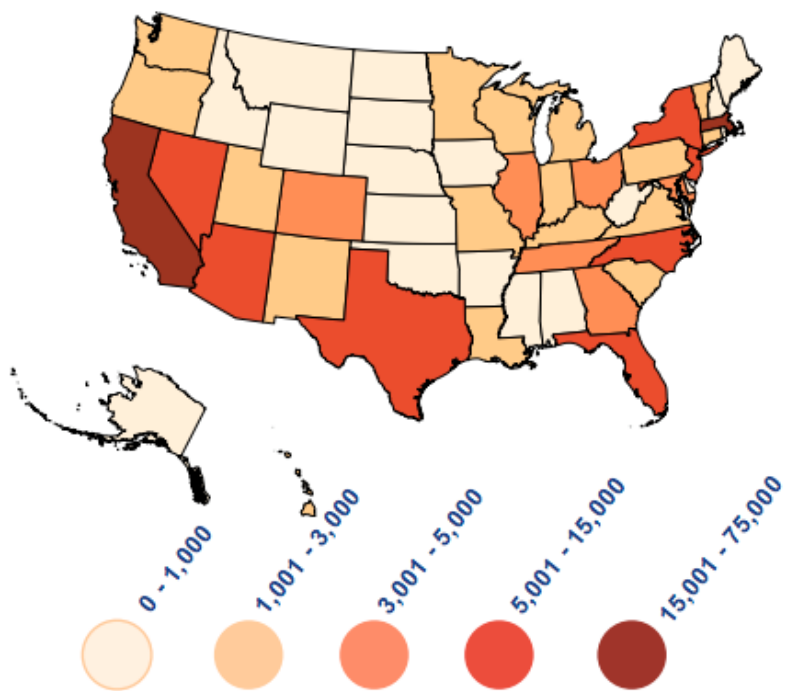
“We estimate that the life cycle effects of coal and the waste stream generated are costing the U.S. public **a third to over one-half of a trillion dollars** annually. Many of these so-called externalities are, moreover, cumulative. Accounting for the damages conservatively doubles to triples the price of electricity from coal per kWh generated...”

-Annals of the New York Academy of Science. Paul R. Epstein (Harvard), et. al. 2011. ***Full cost accounting for the life cycle of coal*** in “Ecological Economics Reviews.” 1219.

These are textbook classic negative externalities ...literally in econ textbooks.

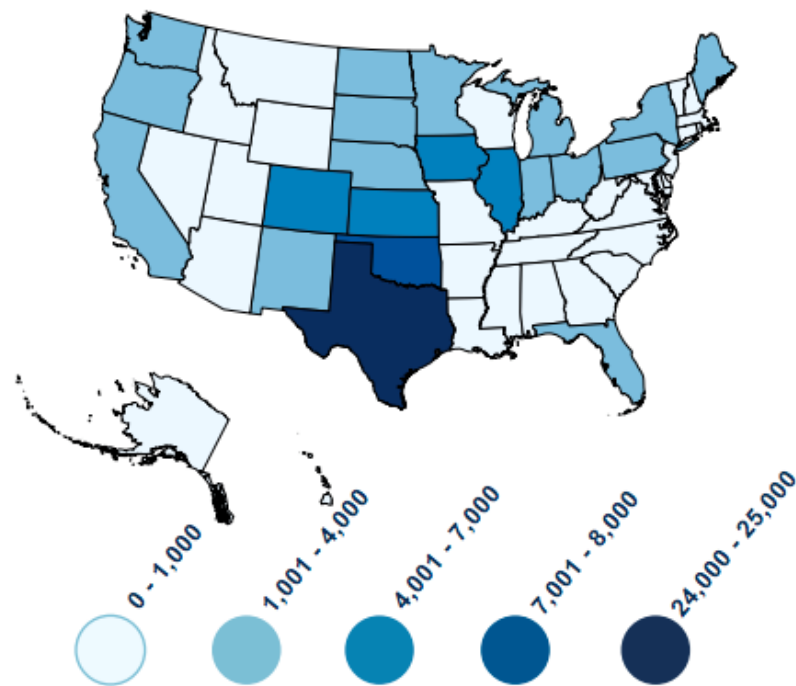
Positive Externalities for Renewables > Clean Air

Fig. 2 SOLAR JOBS DISTRIBUTION BY STATE



Source: The Solar Foundation, 2015

Fig. 3 WIND JOBS DISTRIBUTION BY STATE



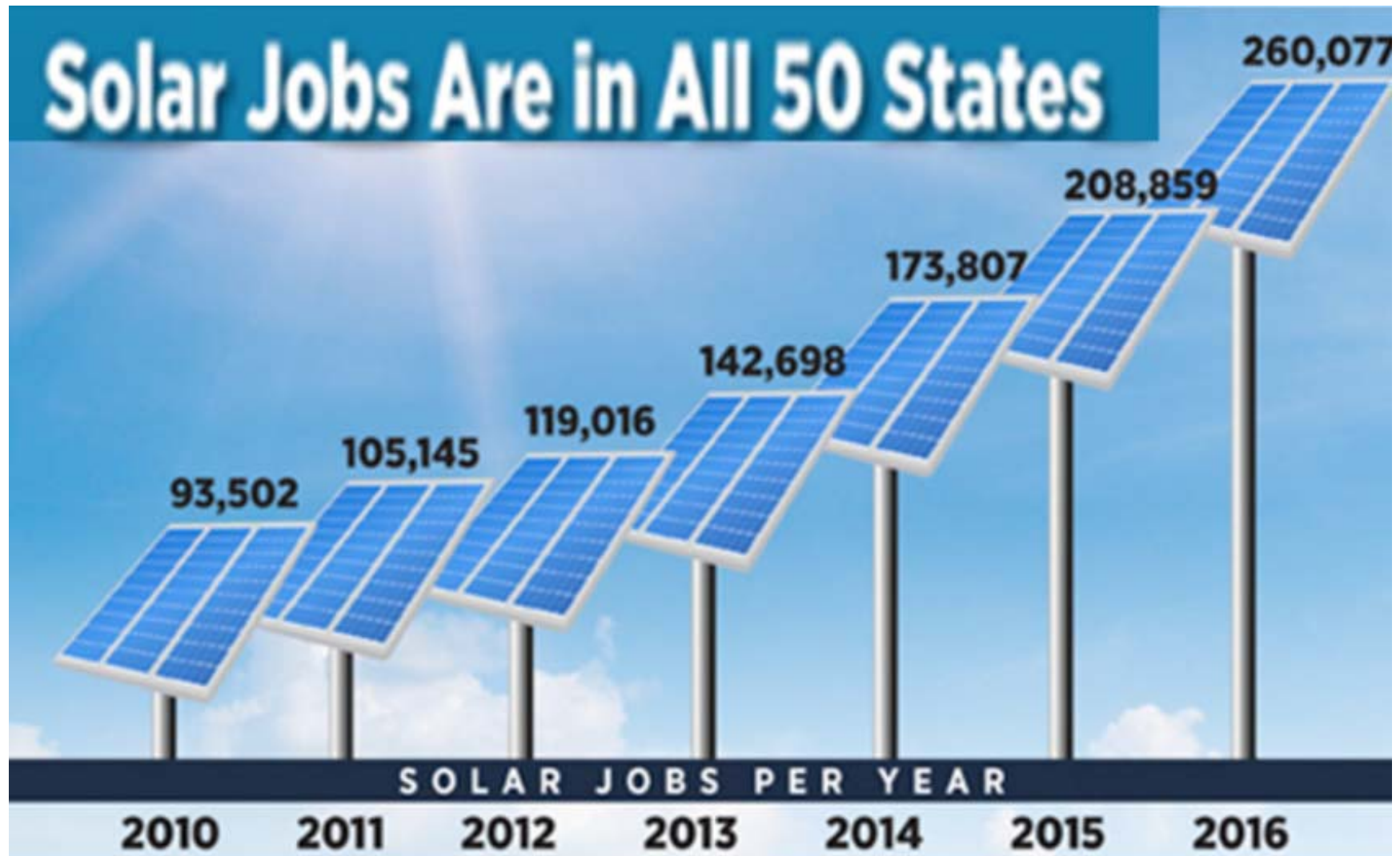
Source: The Wind Energy Association, 2015

These are textbook classic positive externalities.

Renewable Energy Job Boom is Historical In Scale

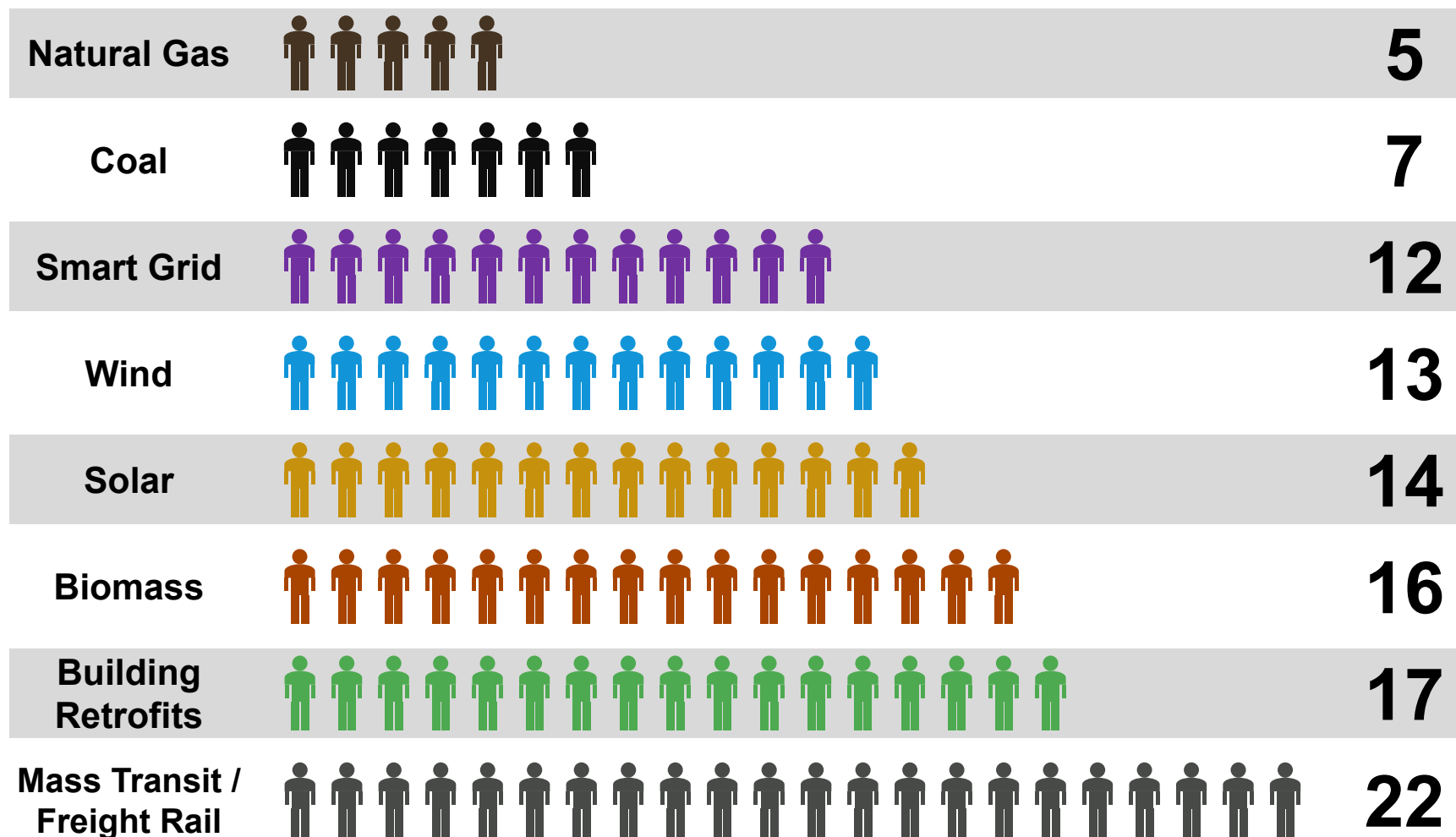
- 1 in 50 new US jobs were in the solar industry
- Solar jobs have increased > 20% per year for the past 4 years
- Wind jobs increased 20% from 2015 to 2016
- The solar industry employs > 2x as many Americans as the entire coal industry and just as many Americans as the natural gas industry*
- Renewable energy is becoming a major engine for U.S. employment: In recent years, jobs in solar and wind energy are growing about 12 times faster than the rest of the U.S. economy**

Booming Solar Jobs



Cleantech Investment Outperforms on Job Creation

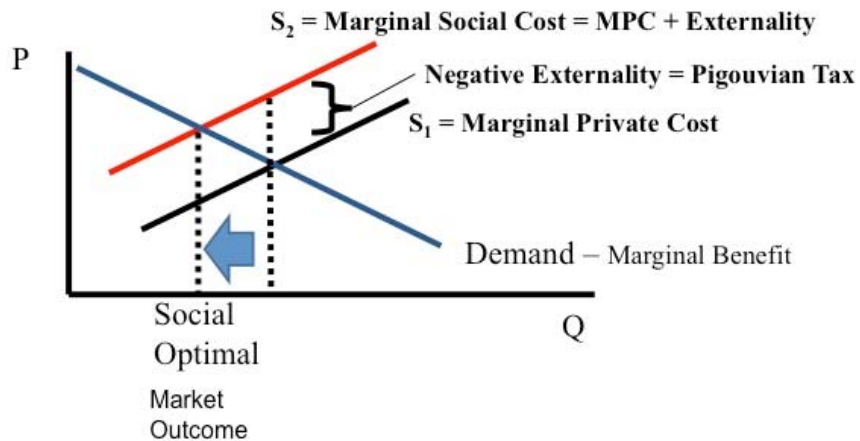
Invest \$1,000,000 in the following industries, you get this many jobs:



Return to Economics 101

Two Choices—Tax or Subsidy

Pigouvian Tax



Pigouvian Subsidy

