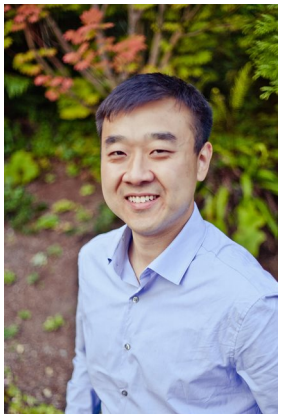
Innovations in Taxes

using carbon pricing to grow economic value

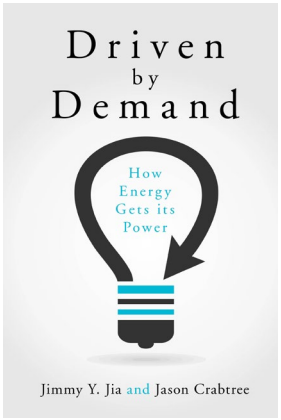
Jimmy Jia
jimmy@jimmyjia.com
Last Edit: April 14, 2019

Hi! – I'm Jimmy



- CEO, Distributed Energy Management
- Board, CleanTech Alliance

- BS, MS, MIT Material Science
- MBA, Oxford University



- Author, *Driven by Demand*
- Speaker and Lecturer

- Energy pervades everything we do.
- How should we interact with it?

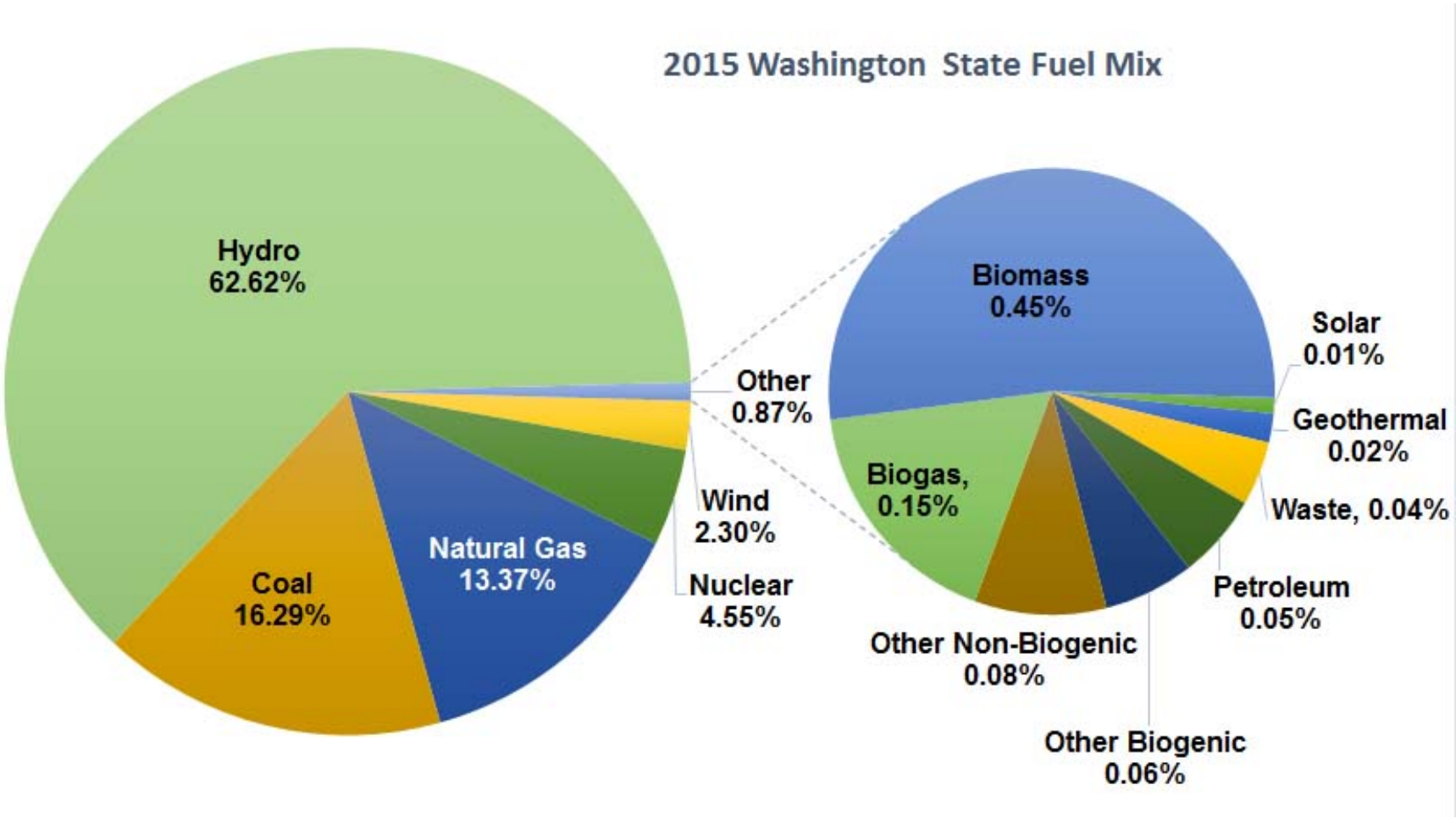
Introductions

- Name, organization, role.
- What expertise you bring to class.
- What is a question or quandary that you would like to have answered?

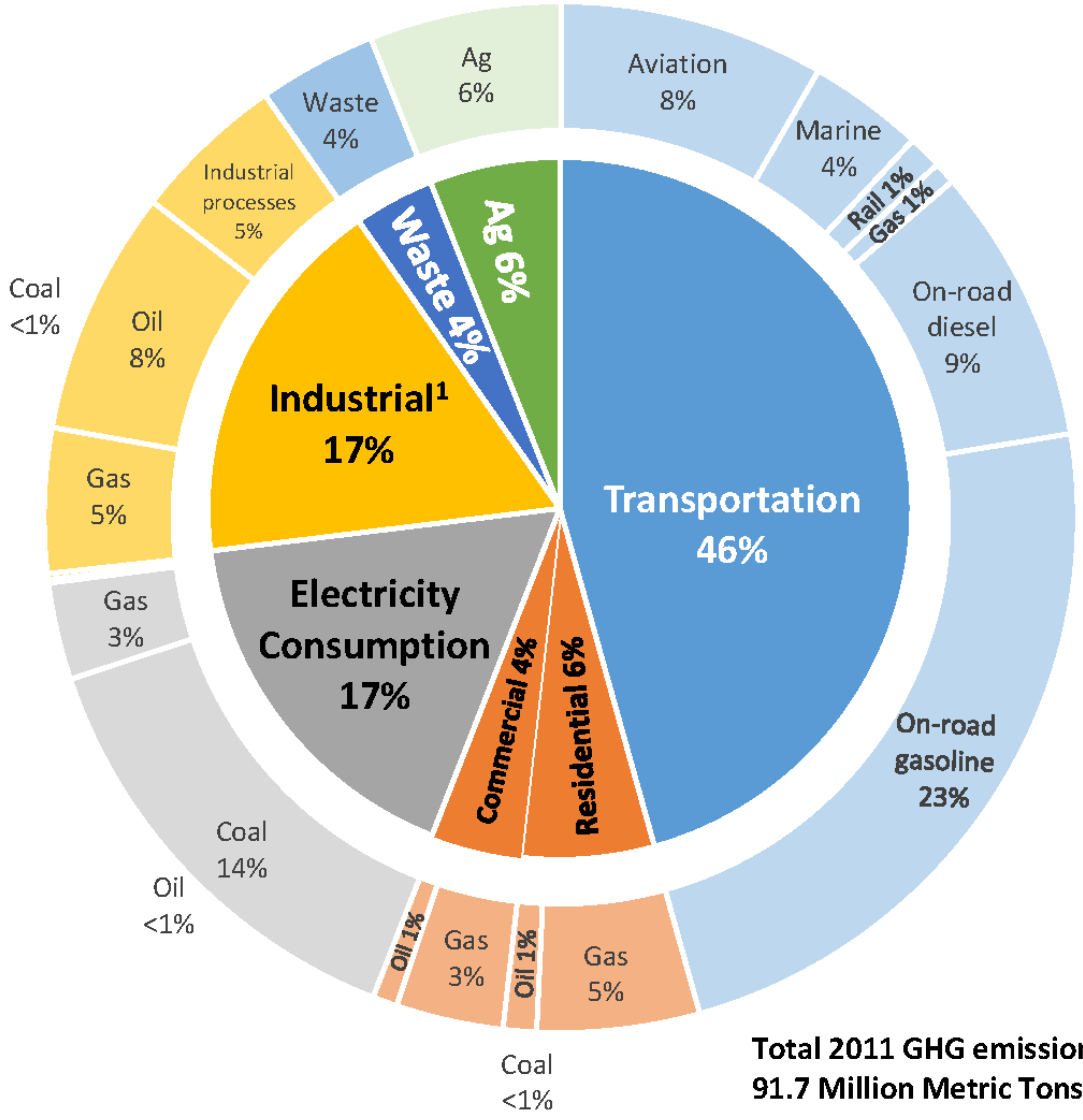
Case Study: WA State

- 2012: Gov. Jay Inslee wins election on a clean energy platform.
- 2013-2015: Multiple efforts fail the Republican-led Senate.
- 2015: Executive Order for a Cap-&-Trade Scheme
- 2016: Voters reject Initiatve-732, Carbon Tax
- 2017: WA Business Alliance asked to draft a carbon policy for an initiative

WA Fuel Mix


2015 Washington State Fuel Mix
Hydro
62.62%
Coal
16.29%
Natural Gas
13.37%
Nuclear
4.55%
Wind
2.30%
Other
0.87%
Biomass
0.45%
Biogas,
0.15%
Other Non-Biogenic
0.08%
Other Biogenic
0.06%
Petroleum
0.05%
Waste, 0.04%
Geothermal
0.02%
Solar
0.01%

WA Carbon Makeup



Total 2011 GHG emissions:
91.7 Million Metric Tons CO_2e

WA Political Makeup

	Democrat	Republican
Governor	Jay Inslee	
State Senate	24	24 + 1 ind.
State Legislature	50	48

WABA's Primary Goal:

Design a set of mechanisms that...

- ***Work Product*** *Accelerate reduction of long-term cumulative GHG emissions from Washington state activities at the lowest cost, thereby achieving the state's 2035 goal while maintaining compatibility with 2050 "Deep Decarbonization Pathways".*

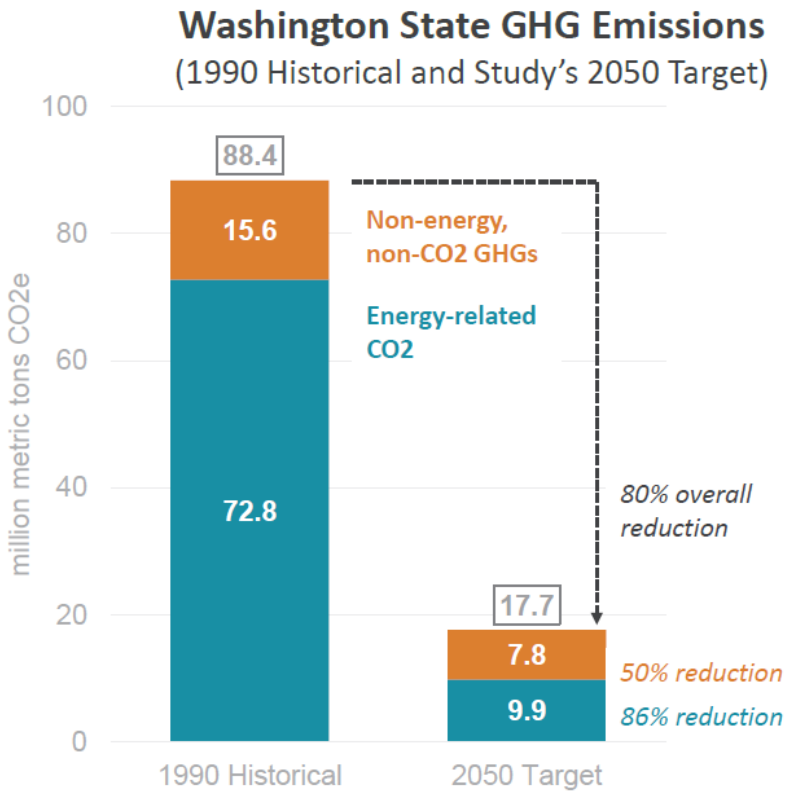
- ***Timing*** *Enabling language in time for whatever bill emerges for passage in 2018 legislative session.*

Secondary Goals

1. Maintain stable, reliable and affordable energy;
2. Avoid incentivizing a net transfer of emissions out of state (“leakage”);
3. Avoid increase or stimulate decrease, in emissions and energy costs within economically distressed communities;
4. Encourage entrepreneurialism, innovation, and investment that can benefit our goals, over a wide range of technologies;
5. Avoid distressing sensitive businesses in Washington;
6. Maximize independence from political manipulation;
7. Serve as model for roll-out to other states;
8. Provide transparent and accurate reporting
9. Method and approach that is adaptable and revised as part of robust system design;
10. Boost jobs and economic growth, particularly those in rural areas and manufacturing industries.

WA Deep Decarbonization Goals

- Washington Business Alliance (WABA) has a strong history of business/environmental concerns.
- WABA is helping to lead a business-friendly approach to dep de-carbonization of WA's economy.
- A draft proposal to be completed by 2018.



Our time together

- Learn how energy and carbon works
- Learn now taxes affect behaviors
- Learn how carbon taxes can affect behavior
- Share best practices

Course Outline

TODAY

- Introduction: Fundamentals on energy and taxes
- Module 1: Mechanisms of taxation
- Module 2: Behavior change due to taxes

TOMORROW

- Module 3: Public benefits
- Module 4: De-risking the future
- Exam

Learning Objectives

- What is Energy?
- What is Carbon?
- What are Taxes?
- What are their intersection?

Forms of Energy

Photo

Thermal

Chemical

Mechanical

Electric

Forms of Energy

Photo

Thermal

Chemical

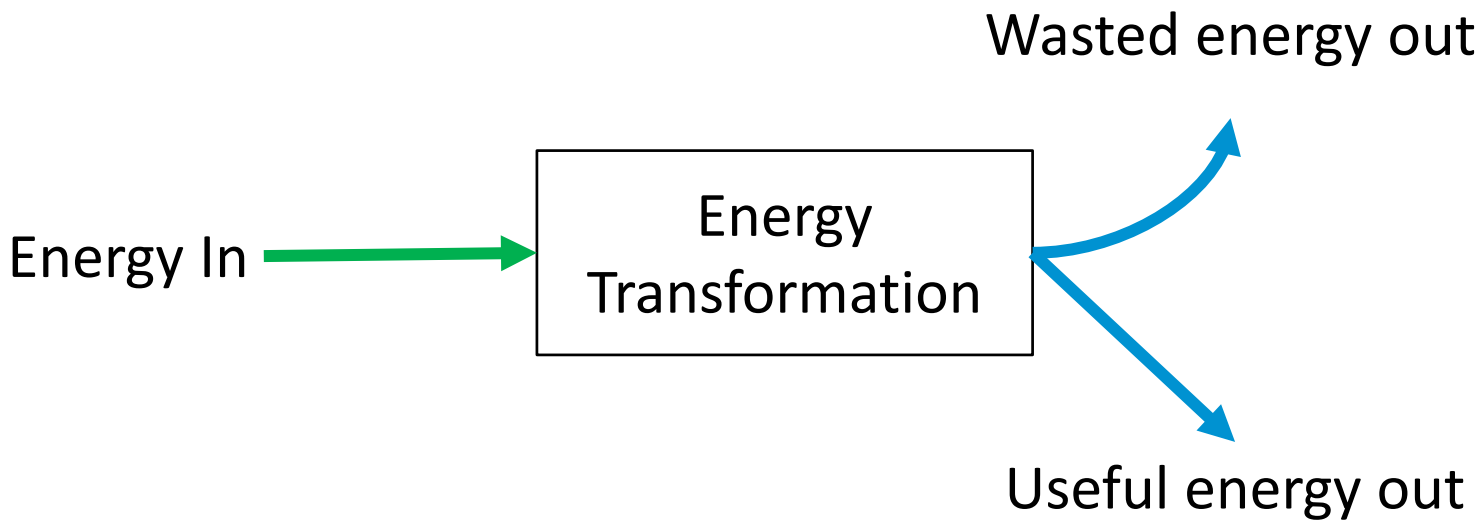
Common Confusion

Energy and Electricity are different

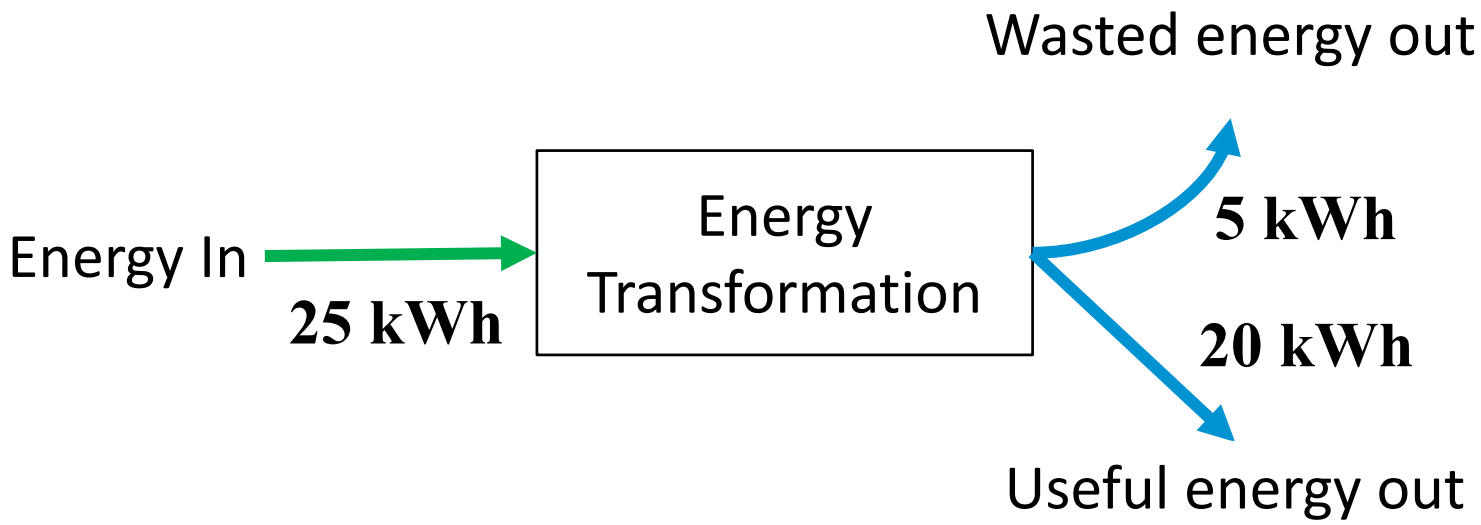
Mechanical

Electric

Three laws of thermodynamics

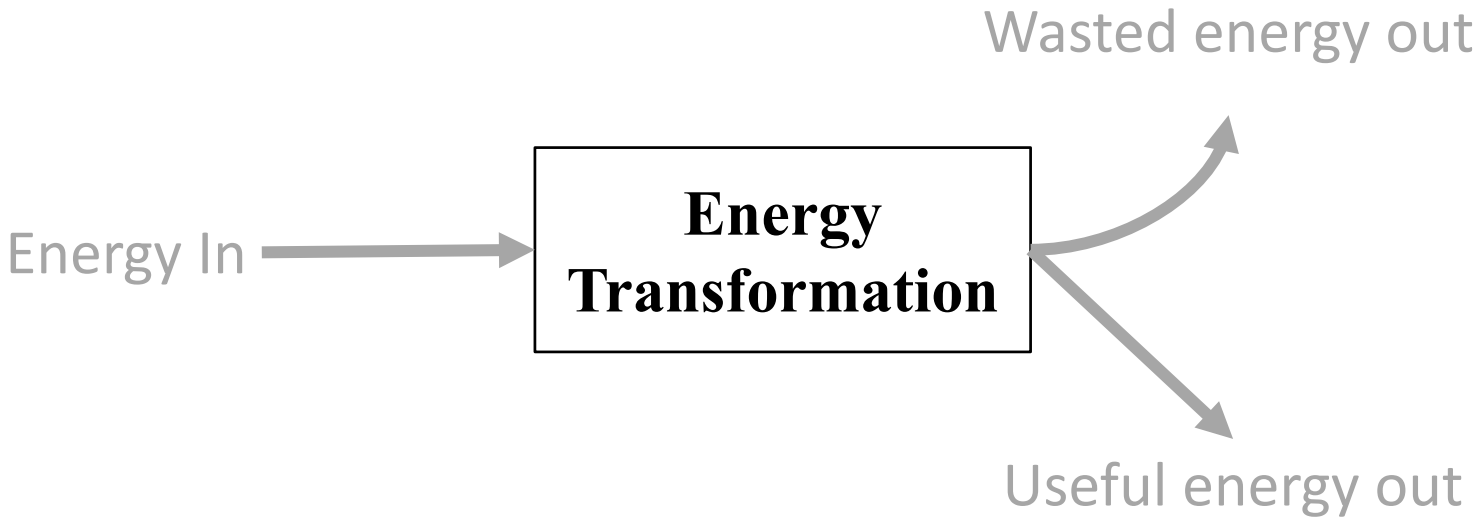


First Law: Energy is always in balance



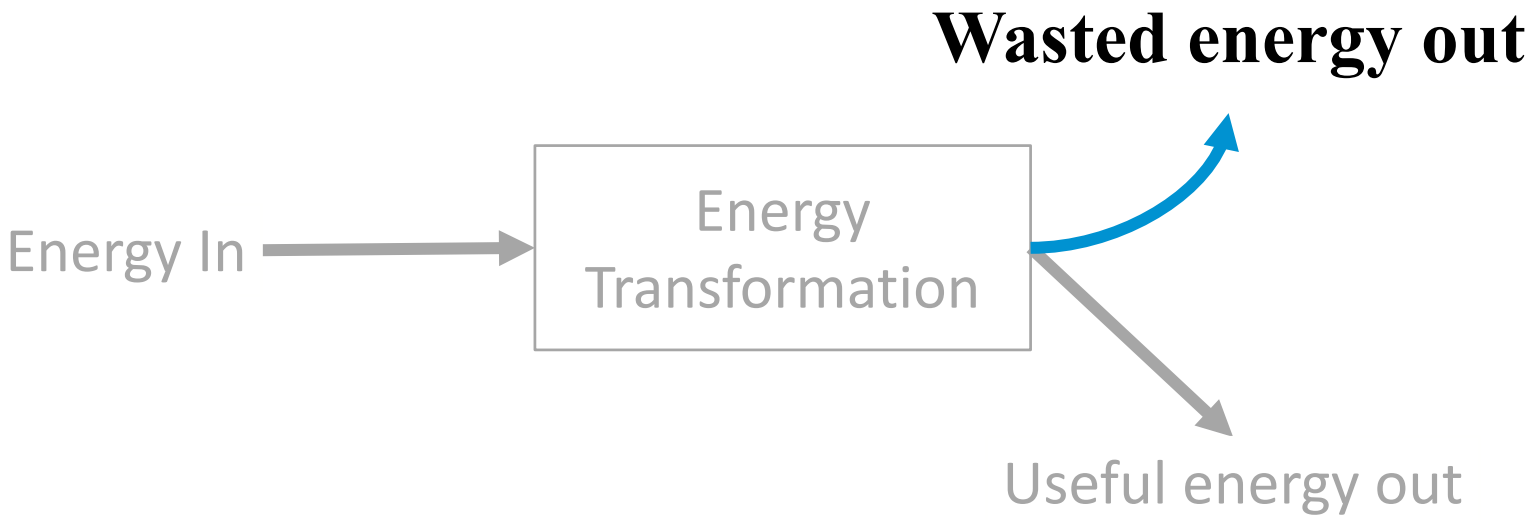
[Energy in] = [Useful energy out] + [Wasted energy out]

Second Law:
Energy transforms between forms



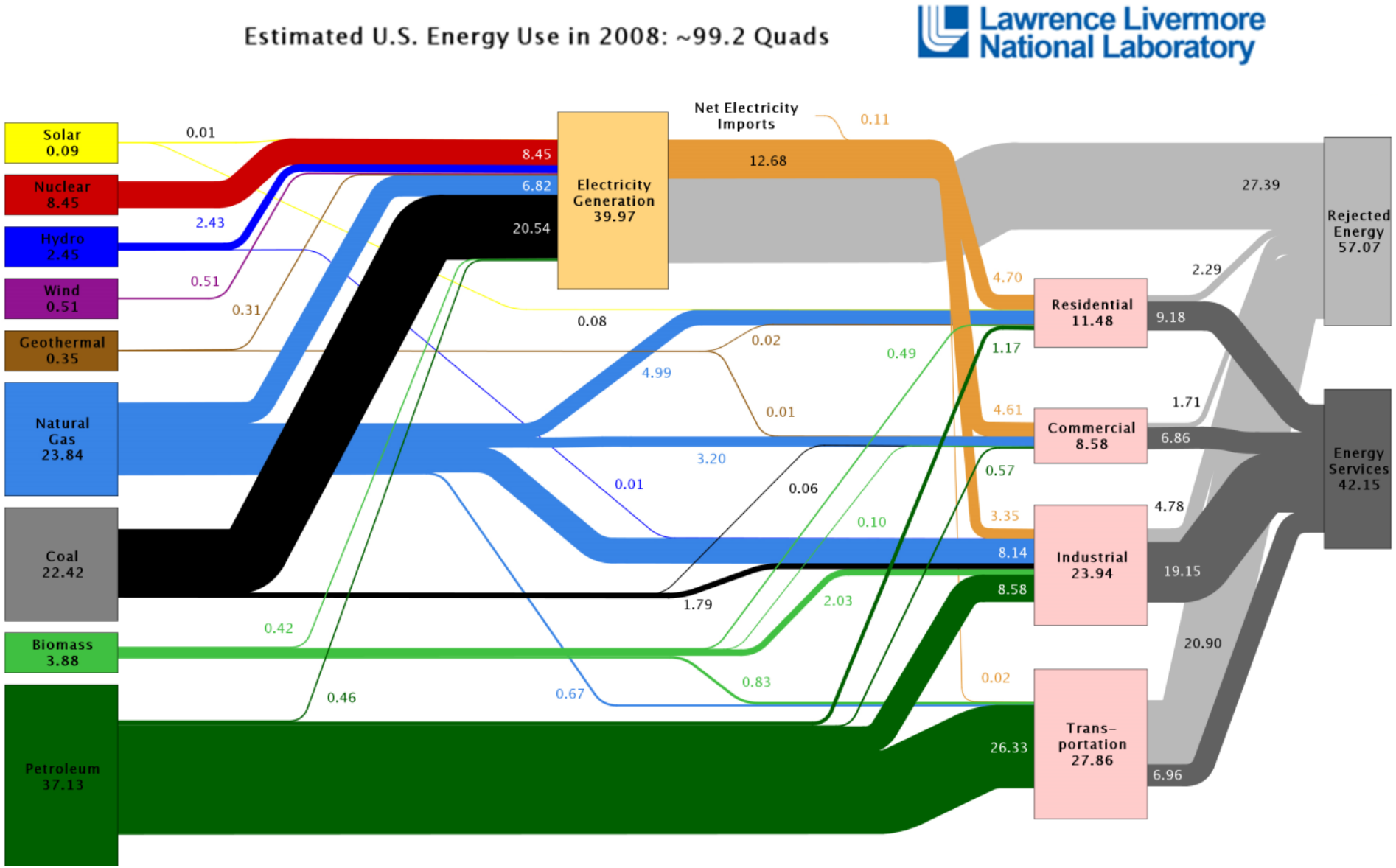
From	With	To
Light	Solar Cell	Electricity
Electricity	Stove	Heat
Petroleum	Engine	Motion

Third Law: There will always be loss

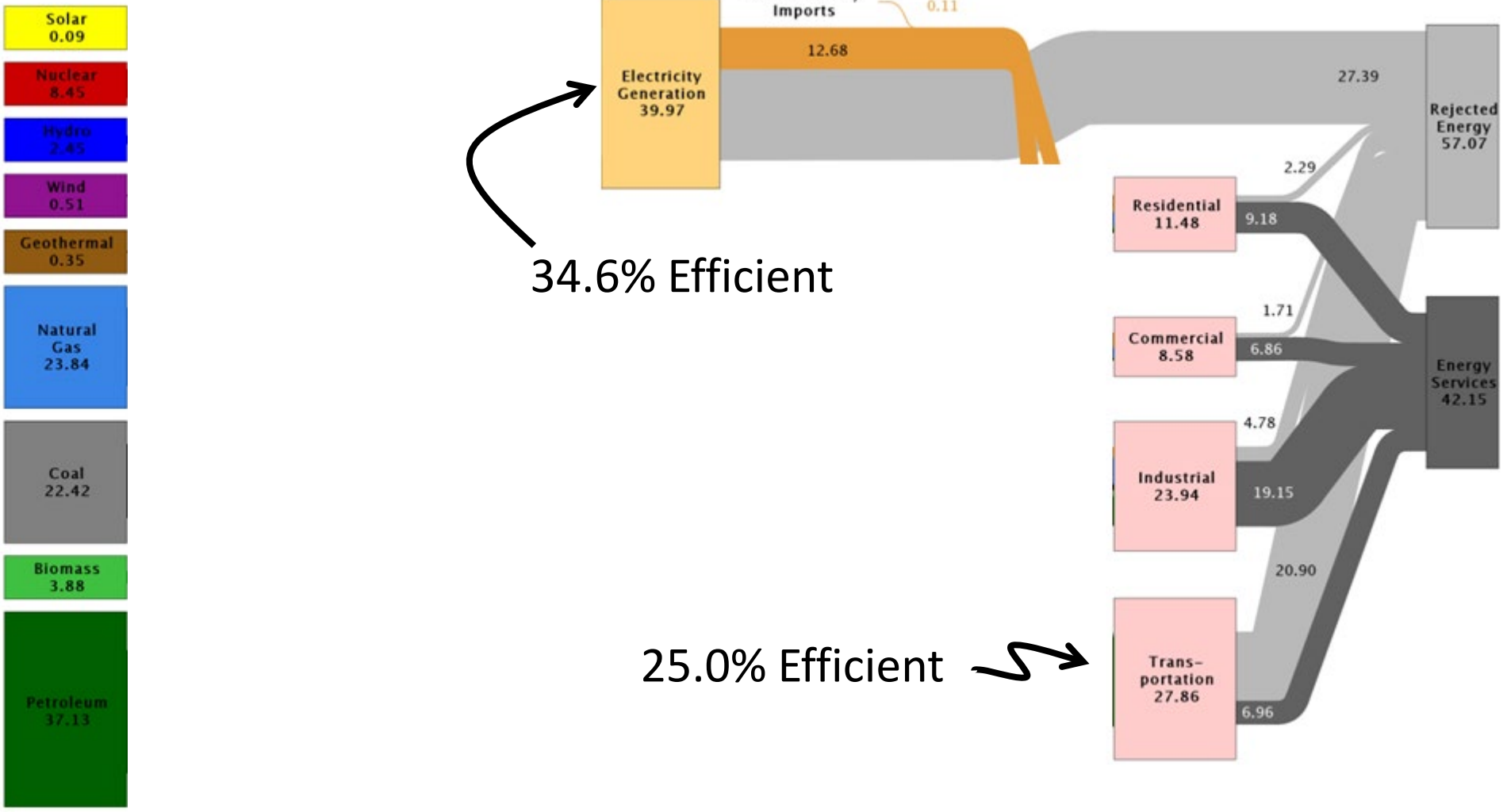


$$\frac{\text{Useful Energy Out}}{\text{Energy In}} = \text{Efficiency}$$

Energy Balance of the USA



How efficient are we?



Where's the Carbon?

Wasted Energy Out

The Pollution

Energy In

The fuel

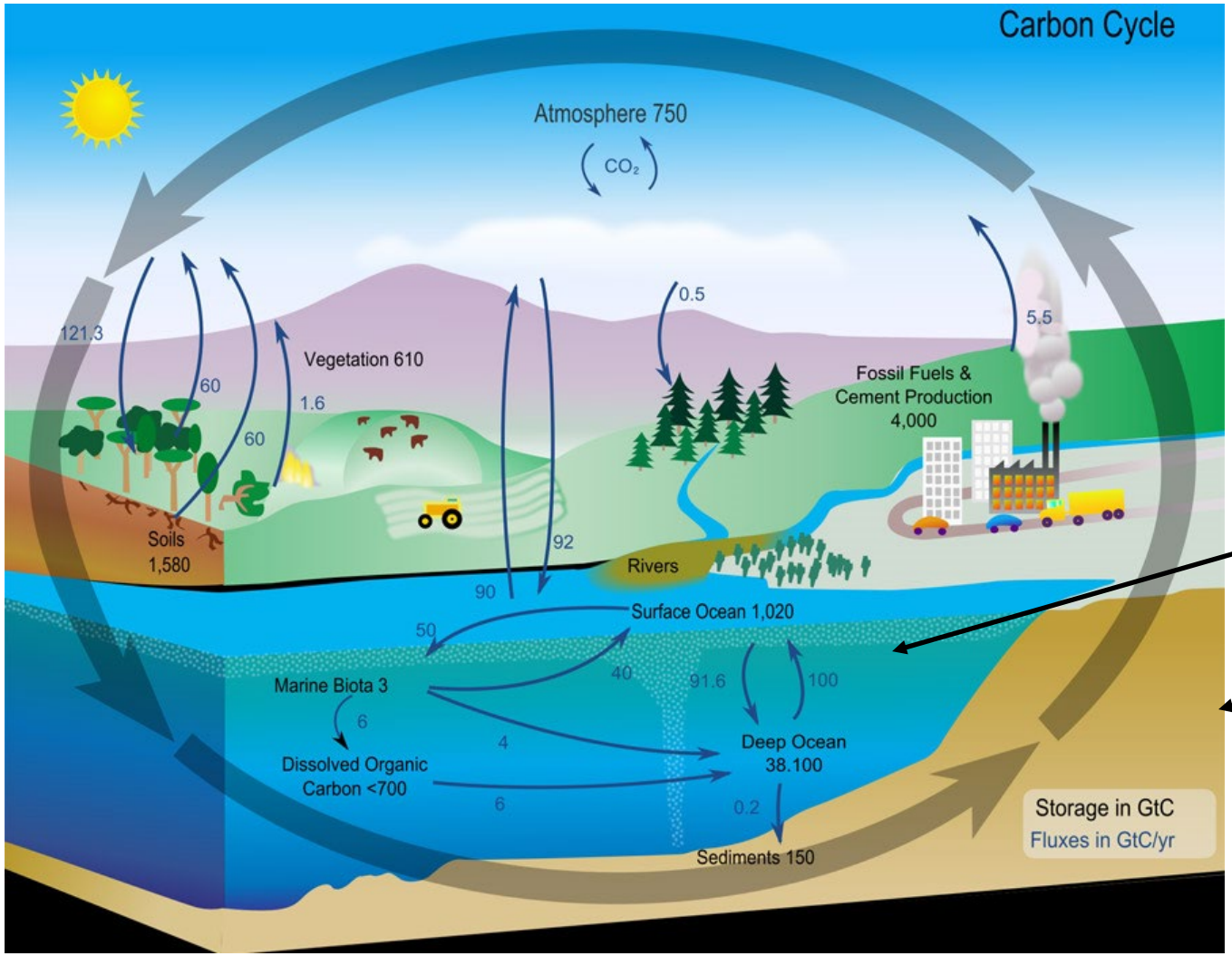
Energy Transformation

The Machine

Useful Energy Out

The Economic Value

What is the carbon cycle?



Atmosphere

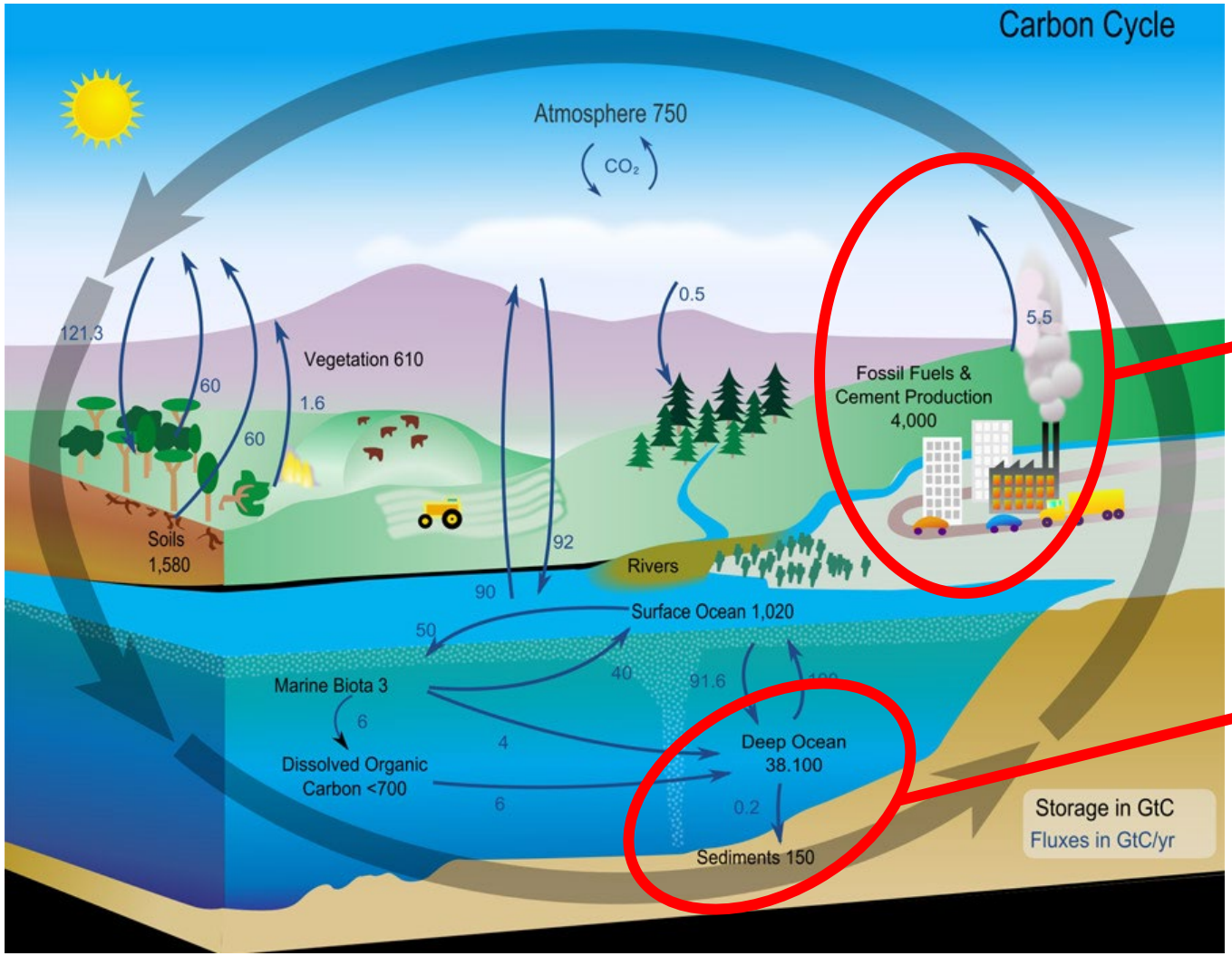
Terrestrial

Oceanic

Geological

The Problem:

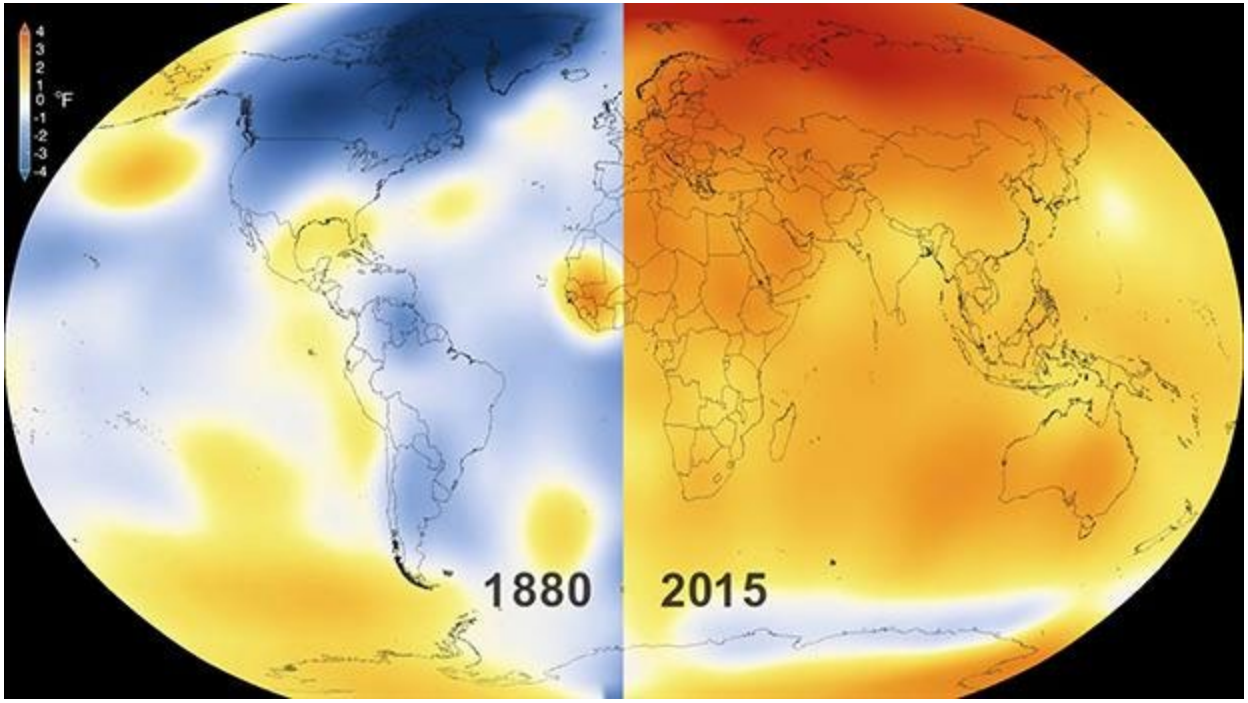
More is released than is absorbed



5.5 GtC/Yr
Produced by
fossil fuels

0.2 GtC/Yr
Absorbed into
geology

Causes changes in global atmospheric temperature



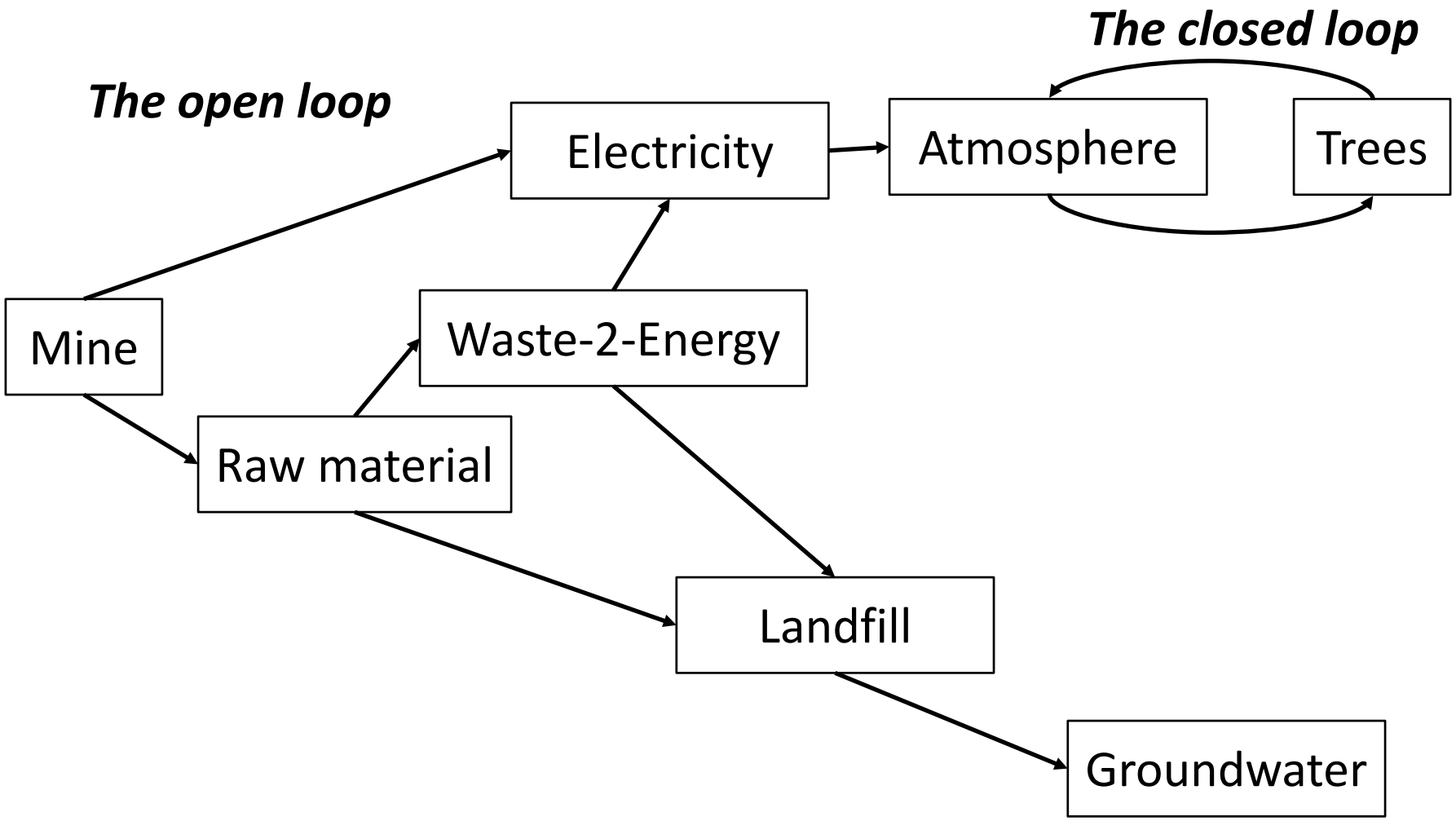
http://www.telegraph.co.uk/news/2017/06/02/animation-100-years-global-warming-less-minute/

What are Carbon *equivalents*?

- CO_2e is the equivalent amount of CO2 that needs to be released.
- Global Warming Potential – Time-integrated factor of warming

GWP	Lifetime (years)	GWP	
		20 years	100 years
Methane	12.4	86	34
HFC-134a (hydrofluorocarbon)	13.4	3790	1550
CFC-11 (chlorofluorocarbon)	45.0	7020	5350
Nitrous oxide (N_2O)	121.0	268	298
Carbon tetrafluoride (CF_4)	50000	4950	7350

The risk: A continuous change of atmosphere



What are Taxes?

- Raise revenue → income, sales tax
- Change behavior → cigarette tax
- Allocation of capital → Public spending priorities

Tax by Design

(i) The subjects of every state ought to contribute towards the support of the government, as nearly as possible, in ***proportion to their respective abilities*** ...

(ii) The tax which the individual is bound to pay ought to be ***certain and not arbitrary*** ...

(iii) Every tax ought to be levied at the time, or in the manner, in which it is most likely to be ***convenient for the contributor*** to pay it.

(iv) Every tax ought to be so contrived as to take out of the pockets ***as little as possible***, over and above that which it brings into the public treasury of the state.

Additional Tax Design Points

- the ***negative eff***ects of the tax system on welfare and economic efficiency—***they should be minimized***;

- ***administration and compliance costs***—all things equal, a system that ***costs less to operate*** is preferable;

- fairness other than in the distributional sense—for example, fairness of procedure, avoidance of discrimination, and ***fairness with respect to legitimate expectations***;

- ***transparency***—a tax system that people can understand is preferable to one that taxes by 'stealth'.

Source vs. Sink

Table 11.2. Greenhouse gas emissions by source and by end user, 2006

Source	Emissions ($MtCO_2e$)
Power stations	185
Transport	153
Industry	122
Residential	85
Agriculture	45
Services	28
Waste management	22
Refineries	16
Land use change	–2

End user	Emissions ($MtCO_2e$)
Business	211
Transport	158
Residential	156
Agriculture	52
Public	22
Waste management	22
Industrial process	18
Exports	16
Land use change	–2

Note: $MtCO_2e$ = million tonnes of carbon dioxide equivalent.

Source: Committee on Climate Change, 2008, xxiii.

James Mirrlees et. al. Tax by Design Oxford UP 2011

Nexus of energy, carbon and taxes

Wasted Energy Out

Carbon Pricing

Energy In

Production Tax

Excise Tax

Energy Transformation

Value Added Tax

Useful Energy Out

User Fee

Sales Tax

In Summary – Best Practices

- ***ENERGY*** is always in balance. What we do on one side will always affect the other.

- ***CARBON*** is a pollutant of our conventional energy system that can be mitigated from the supply-side or demand-side.

- ***TAXES*** can be used to mitigate bad behavior, encourage positive behavior, and drive investments for innovation.

We will seek best-practices across a variety of sectors to glean lessons for what a carbon-pricing system could look like.

Questions