Center for Energy Studies






Carbon Regulation: Policies, Trends & Impacts

LPSC ARRA Seminar on Clean Air Markets

February 24, 2011

David E. Dismukes, Ph.D.
Center for Energy Studies
Louisiana State University

Center for Energy Studies

Overview

- Considerable national and international attention has been given to this issue.
- The current increase in energy prices and challenges in supply capabilities confound climate change issues and approaches.
- GHG regulation also raises considerable questions about market organization and structure in restructured energy markets.
- Uncertainty and “policy volatility” creates challenges for the high levels of expensive investment considered needed to address this issue.
- Policies are likely to result in the most dramatic restructuring of energy markets to date.

Policy Approaches for Addressing (Carbon) Emissions

Policy Frameworks

Policy Type	Definition
Carbon Tax	Places a fixed tax on end-user energy usage.
Cap and Trade (Upstream, Carbon Content)	Would require upstream producers of energy resources to acquire credits based upon the carbon content of the fuel mined or produced.
Cap and Trade (Downstream, Emissions Type)	Would require certain emitting sectors to acquire emission credits for fuel burned in production processes.
Standards	Would change the efficiency (emissions) standards of appliances, motors, equipment, automobiles, etc.

LSU Center for Energy Studies

Carbon Policy Tradeoffs

Policies / Criteria	Carbon Tax	Cap & Trade -Upstream- (carbon content)	Cap & Trade -Downstream- (source emissions)	Standards (Vehicles, Appliances, Buildings)
Economic Efficiency	High to Medium – but depends on (1) coverage (2) rate (3) reallocation of tax revenues. Exemptions reduces efficiency.	High to Medium -- depends on potential exemptions, fuel quality issues and adjustments, liquidity. Administrative costs can be lower than downstream C&T.	Medium to Low – addressing transportation is difficult and administratively complex. Sector exemption greatly reduces efficiency. Substitutes and alternatives likely challenged.	Medium to Low – highly dependent upon standards design, timing and implementation.
Applicability and Uniformity	High - without exemptions	Medium to High - Subject to allocations	Medium to Low – depends on sector coverage.	Low – some sectors (residential and commercial) would bear bigger burden.
Gaming Potential	Low	Medium to High – property right is “commoditized.” Regulation of commodity will be an issue.	Medium to High – property right is “commoditized.” Regulation of commodity will be an issue	Medium
Simplicity	High	Medium to Low	Low	Medium to low (from administrative perspective).
Cost Predictability	High	Low, but slightly better with “safety value.”	Low, but slightly better with safety value	High after identification and locked/ramped for fixed period.
Cost Transparency	High	Low	Low	Low
Political Feasibility	Low	Low	High	High

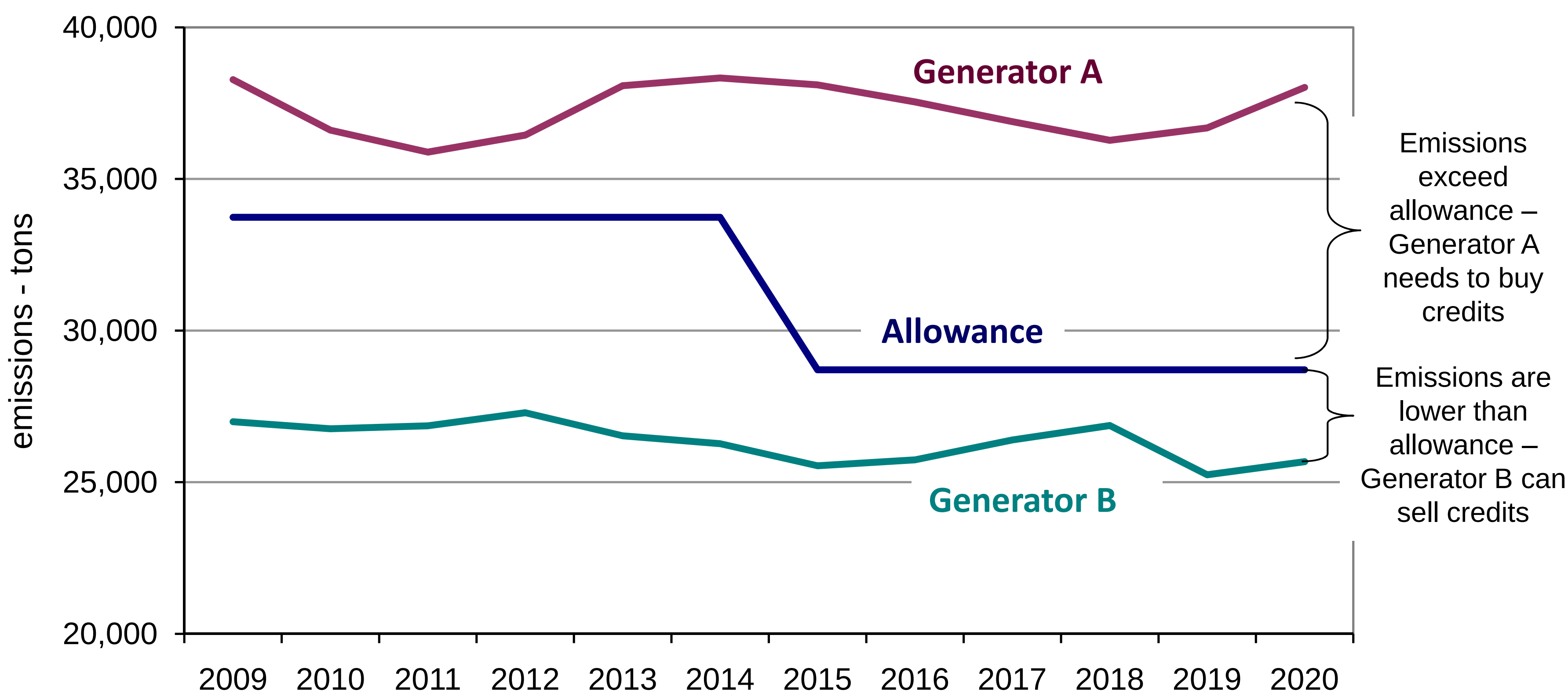
Anticipated Forms of Mitigation

Method	Description	Challenges
Credits & Offsets (Cap & Trade)	Initially allocated/auctioned credits and new offsets developed from mitigation projects	Efficiency of system (credits). Monitoring and verification of offsets.
Capital Investment	Carbon capture and storage	Expensive, uncertain, large supporting infrastructure and institutional support.
Fuel Switching	Nuclear, IGCC, natural gas	Expensive, longer-term investments, questionable development realization (cost, scope, reliability).
Renewables	Biomass, wind, solar, geothermal, hydro	Expensive, varying reliability, uncertainty (cost recovery)
Efficiency Improvements	Automotive Appliances Building measures Demand-Side Mgt. Demand Response	Good short run opportunities, significant, but limited in scope. Also require investment to reach pay-back.

Credits and Offsets

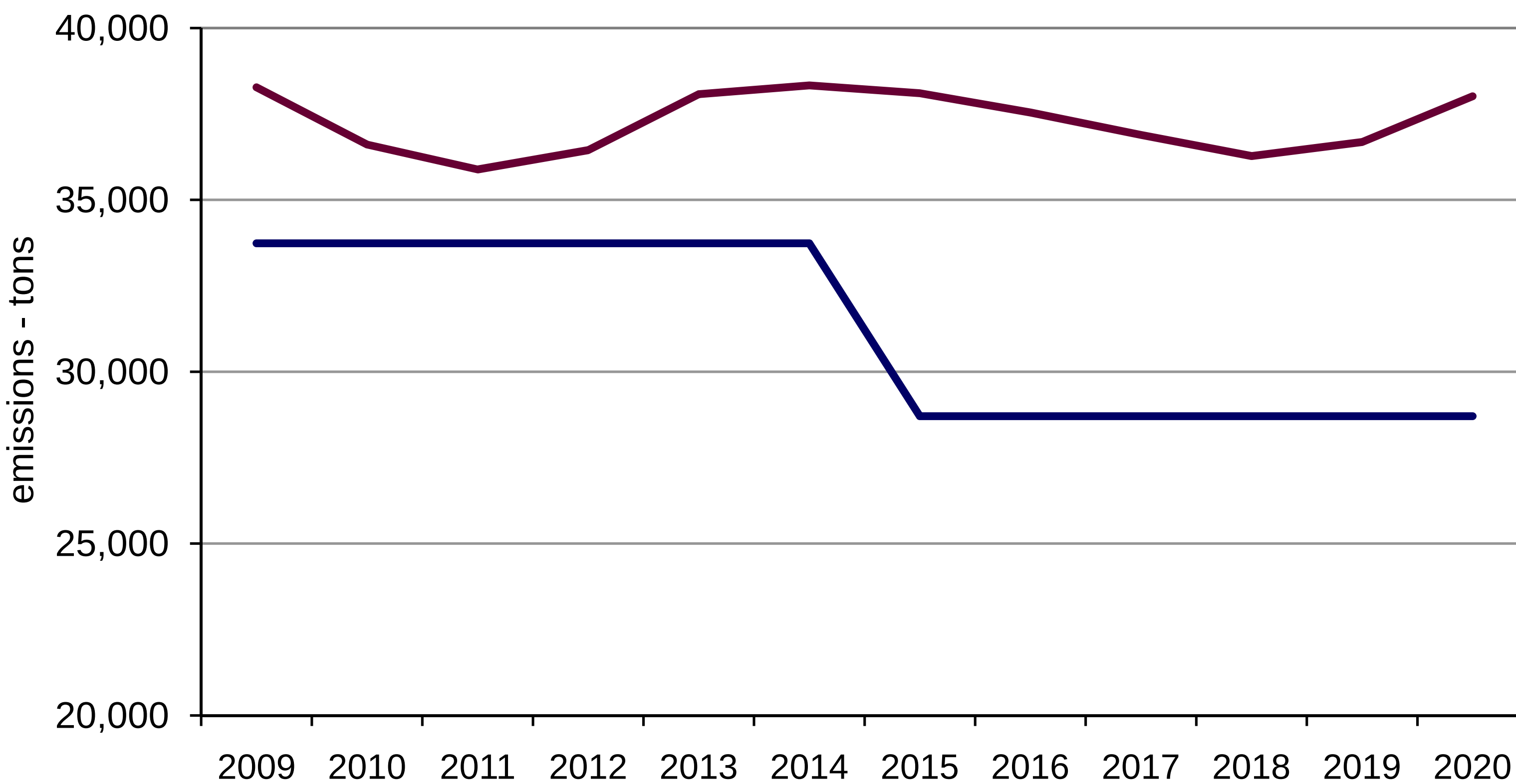
How Does Cap & Trade Work?

Simply speaking, sources "long" on credits will trade with those that are "short."



How Does Cap & Trade Improve Overall Emissions?

Framework creates "scarcity" because the initial regulatory "design" is intentionally "short" in the aggregate. More stringent caps result in more expensive mitigation costs (higher marginal credit prices), other things equal.



Emissions exceed allowance – Shortfall must be made up from:

(1) credit purchases from those facilities individually long ; and/or

(2) capital investments to lower emissions profile.

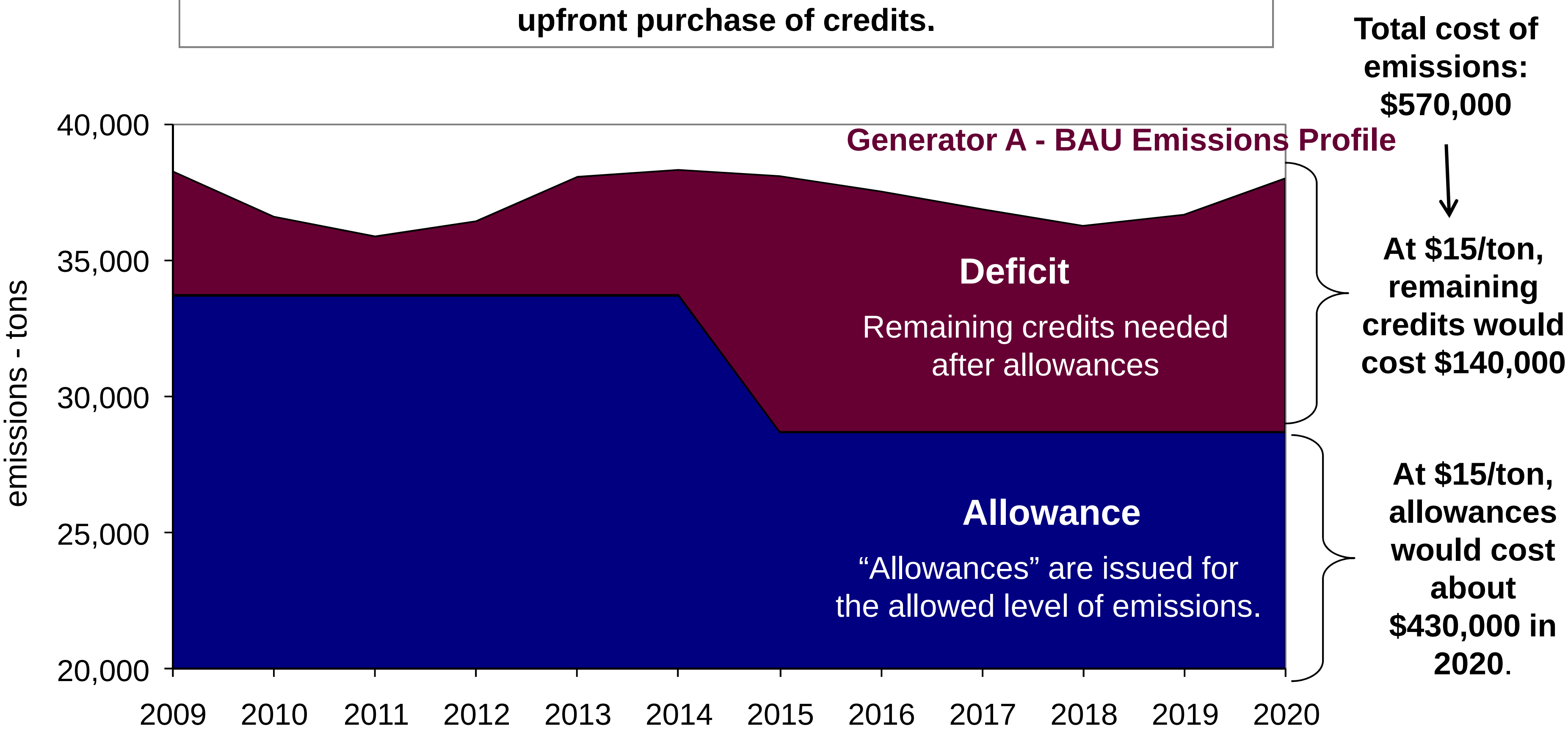
How Are Allowances Determined?

Allowances are offered to participants based upon two different methods.

Allocated	Auction
Regulator makes an administrative determination of who gets allowances.	Market makes the decision about who gets the allowances.
Allocations made on a wide range of considerations and metrics including: Metric (Heat Input, Output) Baselines (Year, Updates) Growth Pool Set-Asides	Periodic auction (think “eBay”) for the credits. Can be done in a variety of methods, but general approach is to allocate credits to those with the highest willingness to pay. There is an important issue associated with what to do with “auction proceeds.” Who gets those?

Auction versus Allowance

An auction system is more expensive because it requires a larger upfront purchase of credits.



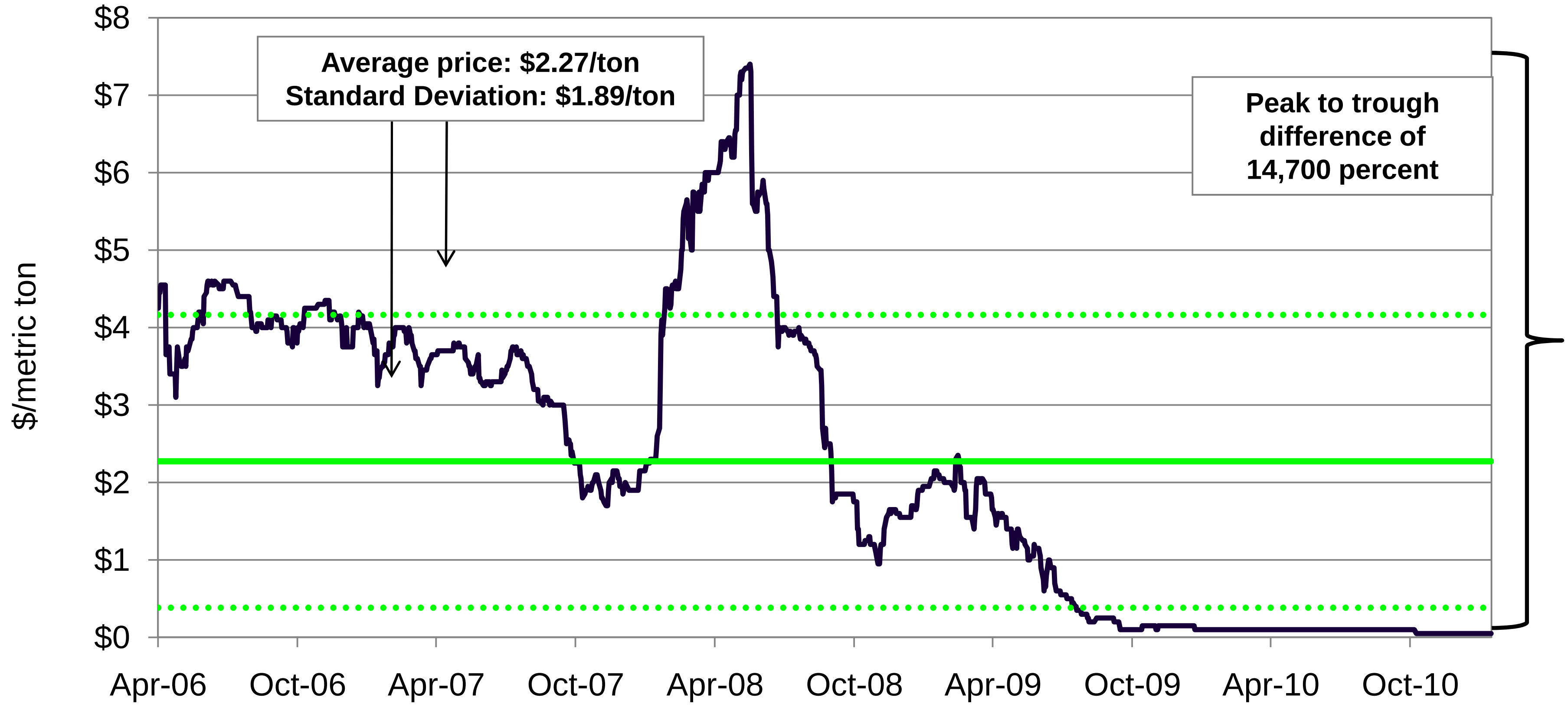
Credits versus Allowances versus Offsets

- **Credits or "certificates" are the legal property rights that can be traded in the market to establish a value for a fixed amount of emissions (in tons). Trades can occur in commodity markets or bilaterally between a willing buyer and seller.**

- **Allowances are the free issuances of credits established by some policy, rule, or both. States can often be given an allowance, which in turn are allocated (in some fashion) to market participants. With auction, allowances are offered to the market to discovery value and collect revenues, which in turn, are invested (in theory) in mitigation technologies or other social goals.**

- **Offsets are another form of credit (1) created by a qualifying reduction in emissions (over compliance) or (2) created by qualifying investment in a technology certified to reduce (or serve as sink) for emissions. Comprised of mandatory and voluntary markets. Allows developer to monetize (and profit from) over-compliance and increases the supply of available credits (liquidity).**

Chicago Climate Exchange Daily Closing Prices



Source: Chicago Climate Exchange.

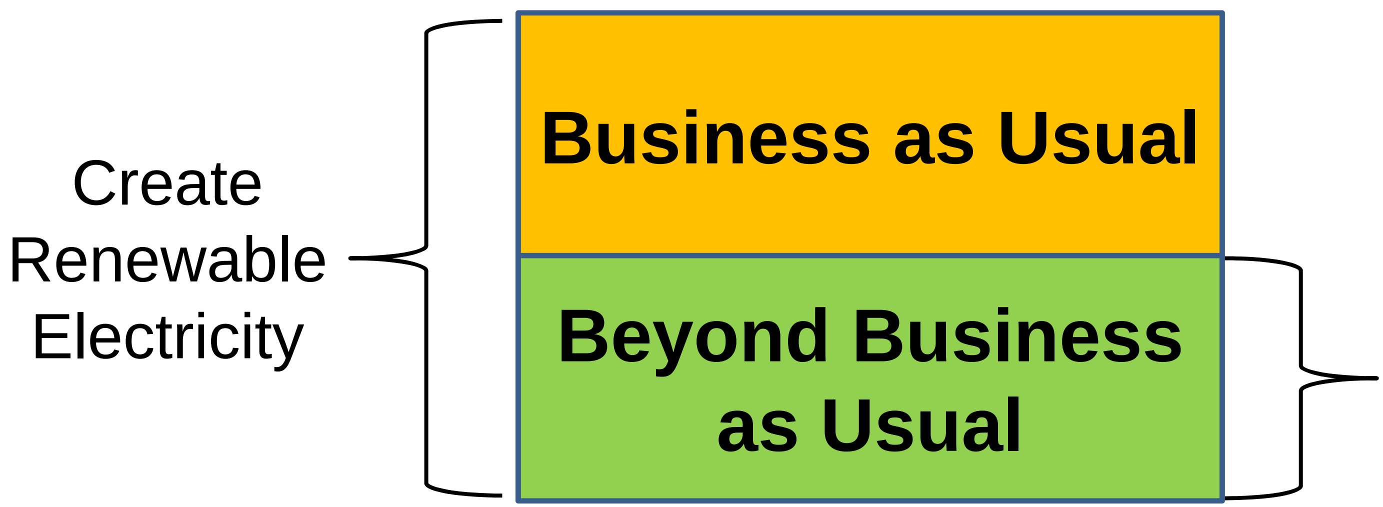
Renewable Energy Credits and Carbon Offsets

Method	Renewable Energy Credits (“REC”)	Carbon Offsets
Type of Projects	RECs only come from renewable energy projects such as solar, wind, geothermal, biofuels, etc.	Offsets can come from renewable projects but also include the collection and storage of carbon through reforestation; ocean and soil collection; and capture and storage efforts.
Units of Measurement	MWh	Metric tons
Design	Forward looking, focused on building a clean energy economy and providing incentives for the creation of renewable energy.	Oriented in the present, dealing with preventing greenhouse gases from entering the atmosphere right now; or removing carbon after it has been released.
Markets	Too many to list	Chicago Climate Exchange, Voluntary Carbon Standard Program
Distribution	Allocated by state or regulatory authority; any amount needed over allocation must be purchased.	Purchased to offset “carbon footprint”

Renewable Energy Credits and Carbon Offsets

RECs can come from any renewable energy project. Offsets can only come from projects that go beyond business-as-usual. When an offset is purchased, the greenhouse gas reductions it represents would never have happened unless the offset was purchased. With RECs, there's no such guarantee. Because of this difference, RECs can only be converted to offsets if they come from a project that goes beyond business-as-usual.

New Renewable Energy Generators



Source: nativeenergy.com

Louisiana Carbon Offset Projects

Louisiana Offset Projects	Operator(s)	Location	Size	Type of Impact	Emissions Impact	
Bayou Pierre Floodplain Project	PowerTree Carbon Company Environmental Synergy Inc.	Red River Valley	500 acres	Absorption	2,000	metric tons per year
Northwest Airlines Forest Carbon Project	The Nature Conservancy	Franklin Parish	524 acres	Absorption	NR	
Bayou Bartholomew Climate Action Project	The Nature Conservancy	Morehouse Parish	247 acres	Absorption	NR	
St. Landry Parish Solid Waste Disposal District	Trinity Carbon Management	Beggs, Louisiana		Methane destruction	>15,000	metric tons per year

Regulatory Issues (Utility and Environment)

- **Under auction or allocation, who's ox gets gored? How are stakeholder interests balanced?**
  - Allocations on emission factors preference big base-load coal generation.
  - Allocations on generation will preference the efficient.
  - Will auctions preference utilities that can securitize purchases with regulated customers?
- **Who gets rewards for "good" pre-regulation decisions and who gets penalties for following the rules when the rules get suddenly changed?**
  - Will this ultimately create prudence issues down in the future?
  - Does this create competitive distortions in wholesale markets? (i.e., utility v. IPP)
- **How does regulator incent credit management? (hoarding, PGA-FAC-type incentives, PBR)**
- **Auction revenues (assume in-state auction): who gets the money? Options:**
  - Offsets to rate case increases
  - Climate related programs (renewables, education, research)
  - Non-climate related programs (low-income or economic development)

Capital Investments

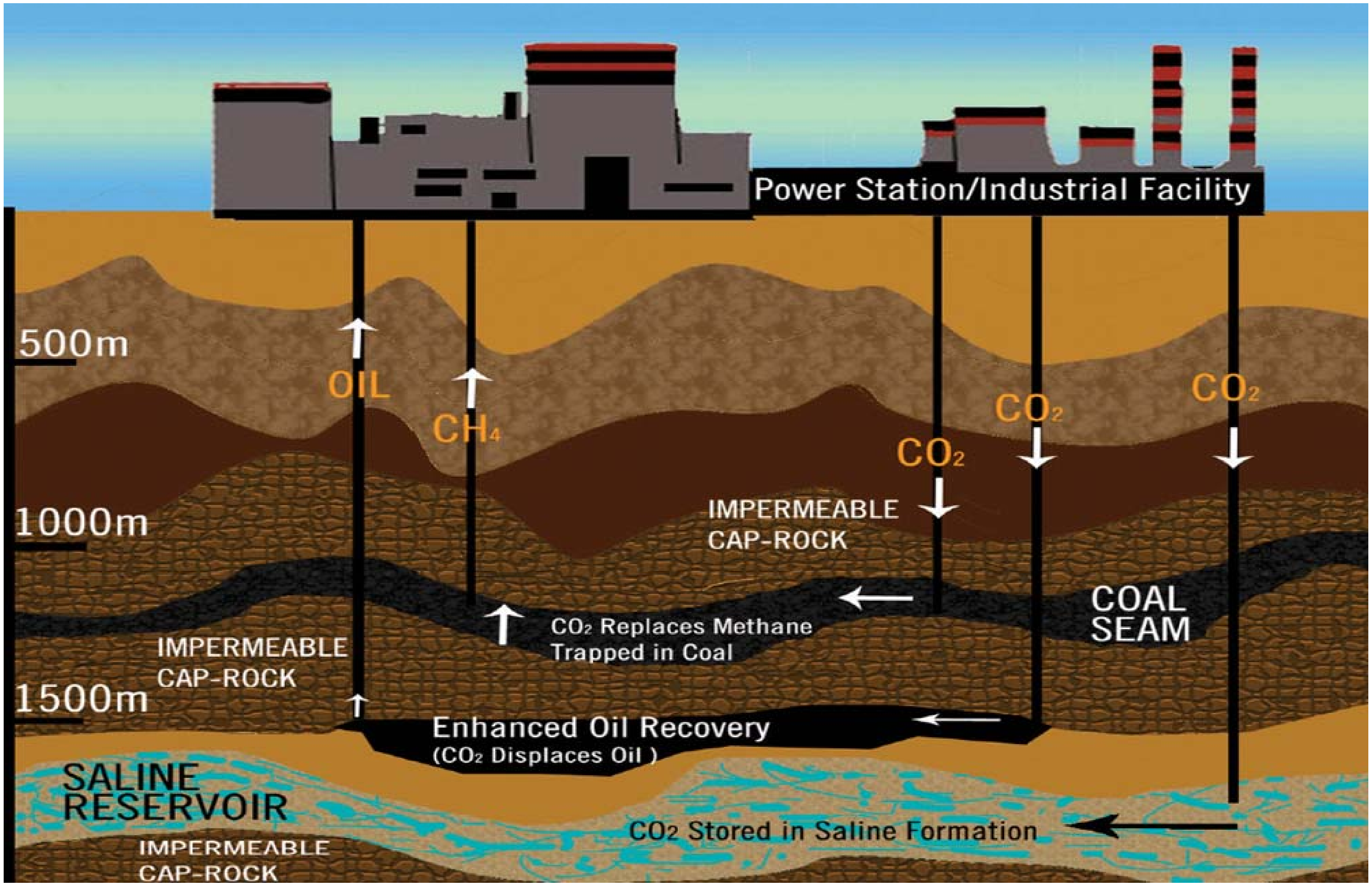
What is Carbon Capture and Storage?

- **Carbon Capture and Storage (“CCS”) is a method of managing and reducing CO_2 in the atmosphere**
- **Carbon dioxide is captured from a power plant or other industrial source, compressed and put in a pipeline where it travels to a nearby oil or gas field or “sequestration site”.**
- **CO_2 can be safely sequestered (or stored) in depleted oil or natural gas fields for an indefinite period of time.**
- **CO_2 can be held underground by the same solid rock layers that have held the trapped oil and gas for millions of years.**

Source: CCS-Education.net

Carbon Capture and Sequestration

Carbon capture and sequestration ("CCS") involves the capture of CO_2 from power plants and other large industrial sources, its transportation to suitable locations, and injection into deep underground geological formations for long-term sequestration.



Big Picture Cost Estimates

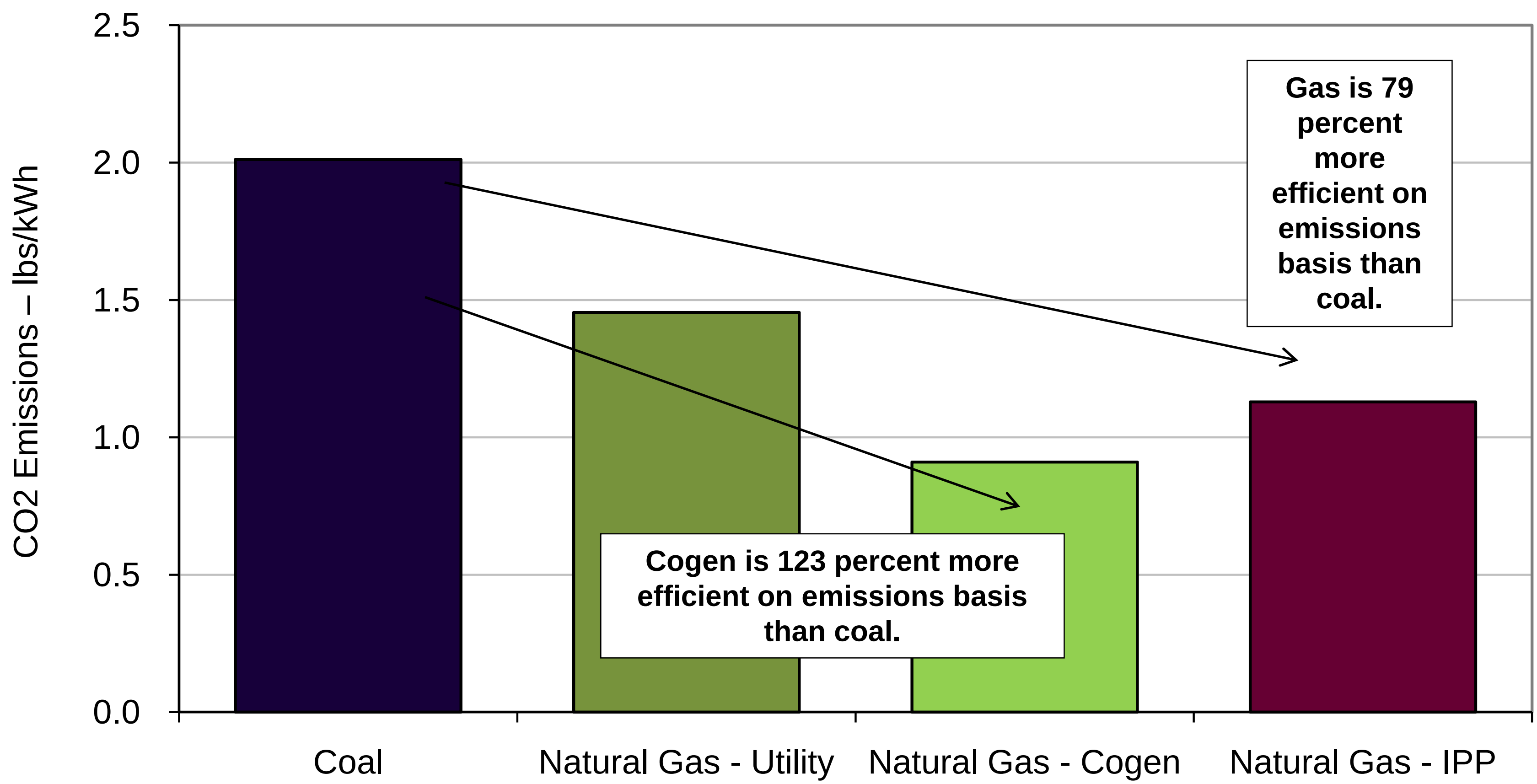
Process	Cost range per metric ton of CO_2 captured	Comments
Capture from power plant	$15.00 - $75.00	Net cost
Transportation	$1.00 - $8.00	Per ~155 miles via pipeline
Geological storage	$0.50 - $8.00	Not including EOR revenue
Monitoring of storage	$0.10 - $0.30	Depending upon regulation
Total estimated costs	$16.60 - $ 91.30	

Source: Intergovernmental Panel on Climate Change, JPMorgan Chase.

Fuel Switching

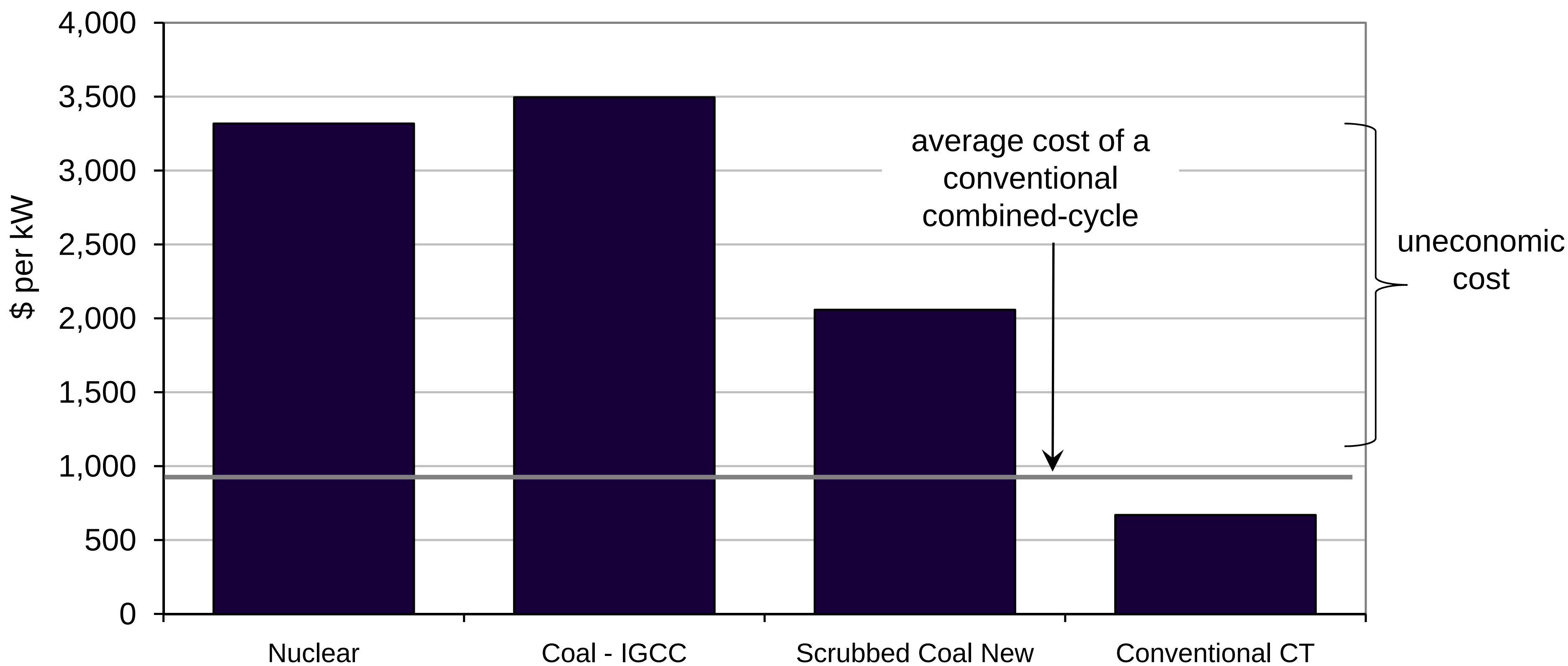
CO2 Emissions Rate by Fuel Type

Coal plants have higher emissions rates than all types of gas plants. Cogeneration and newer gas plants have the lowest overall carbon emission rates.



Total Overnight Cost for New Plants

Resources are typically uneconomic without additional support.

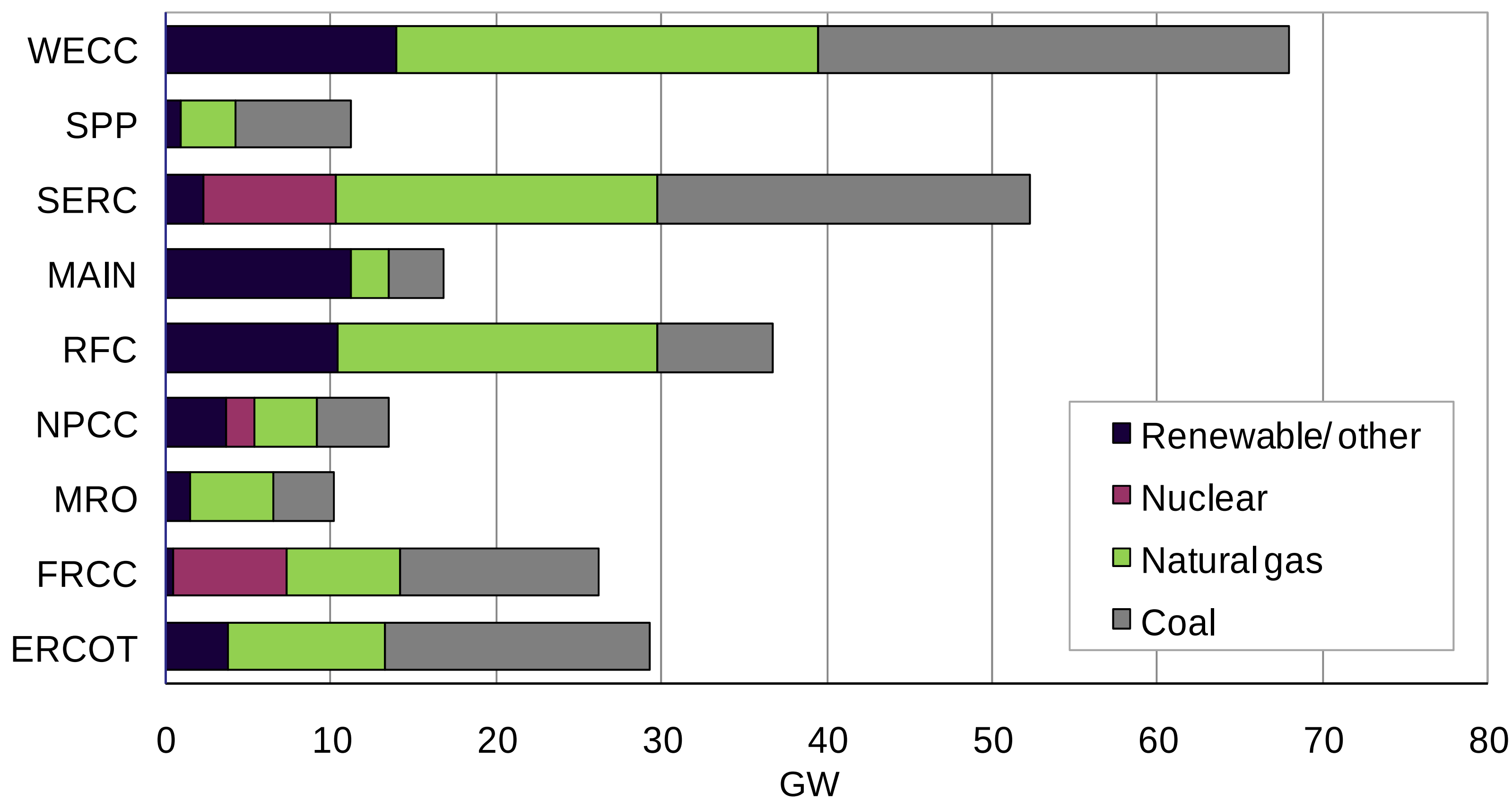


These differentials will have to be recovered from various funding sources

Source: Assumptions to the Annual Energy Outlook 2009, Energy Information Administration, U.S. Department of Energy.

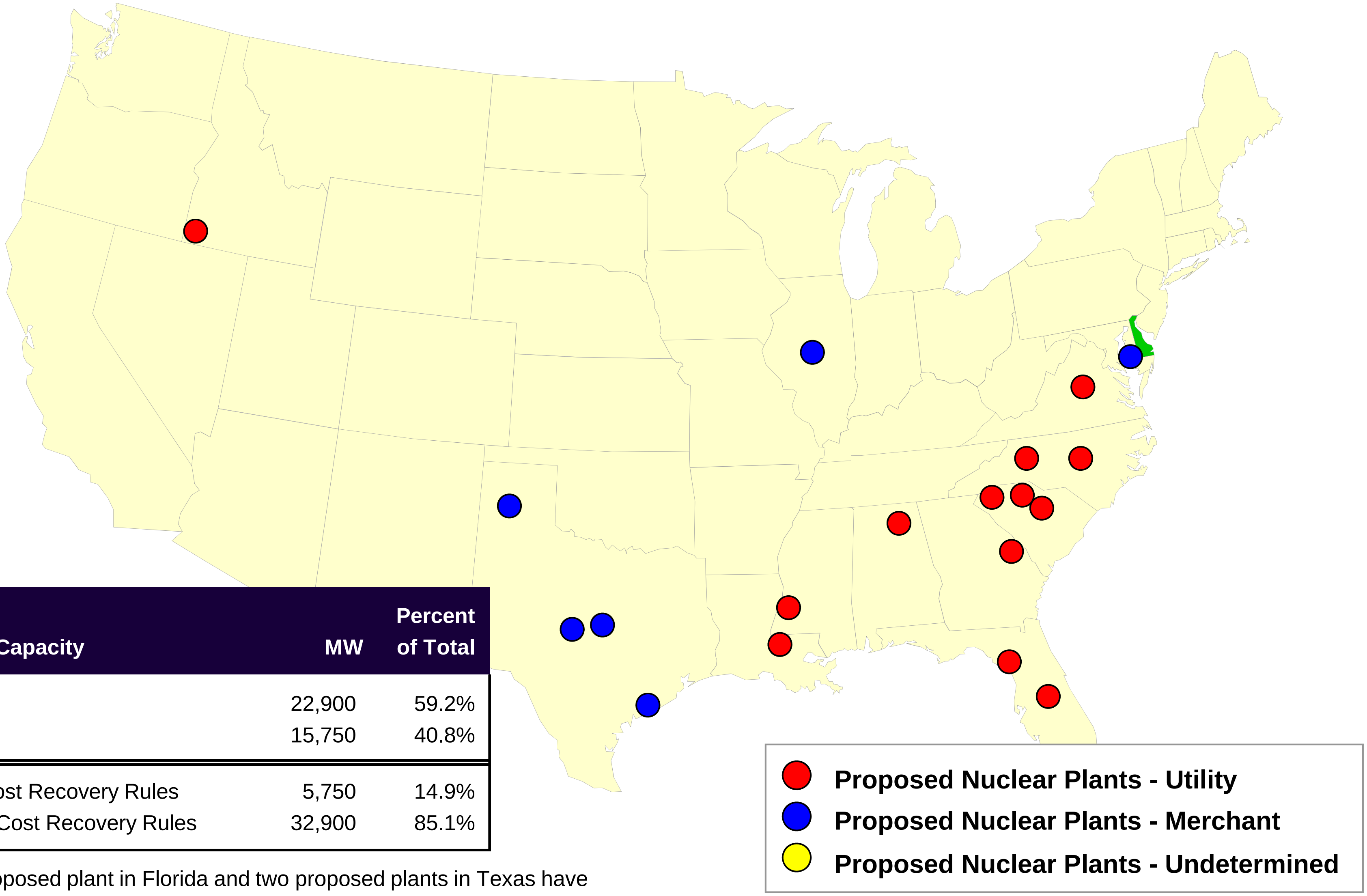
Electric Generation Capacity Additions by Region and Fuel (2007-2030)

All electricity demand regions are expected to need additional, currently unplanned, capacity by 2030. The largest amount of new capacity is expected in the Southeast (FL and SERC), which represents a relatively large and growing share of total U.S. electricity sales and thus requires more capacity than other regions.



Source: Energy Information Administration, U.S. Department of Energy.

Announced Nuclear Plants



Proposed Capacity	MW	Percent of Total
Utility	22,900	59.2%
Merchant	15,750	40.8%
States w/Cost Recovery Rules	5,750	14.9%
States w/o Cost Recovery Rules	32,900	85.1%

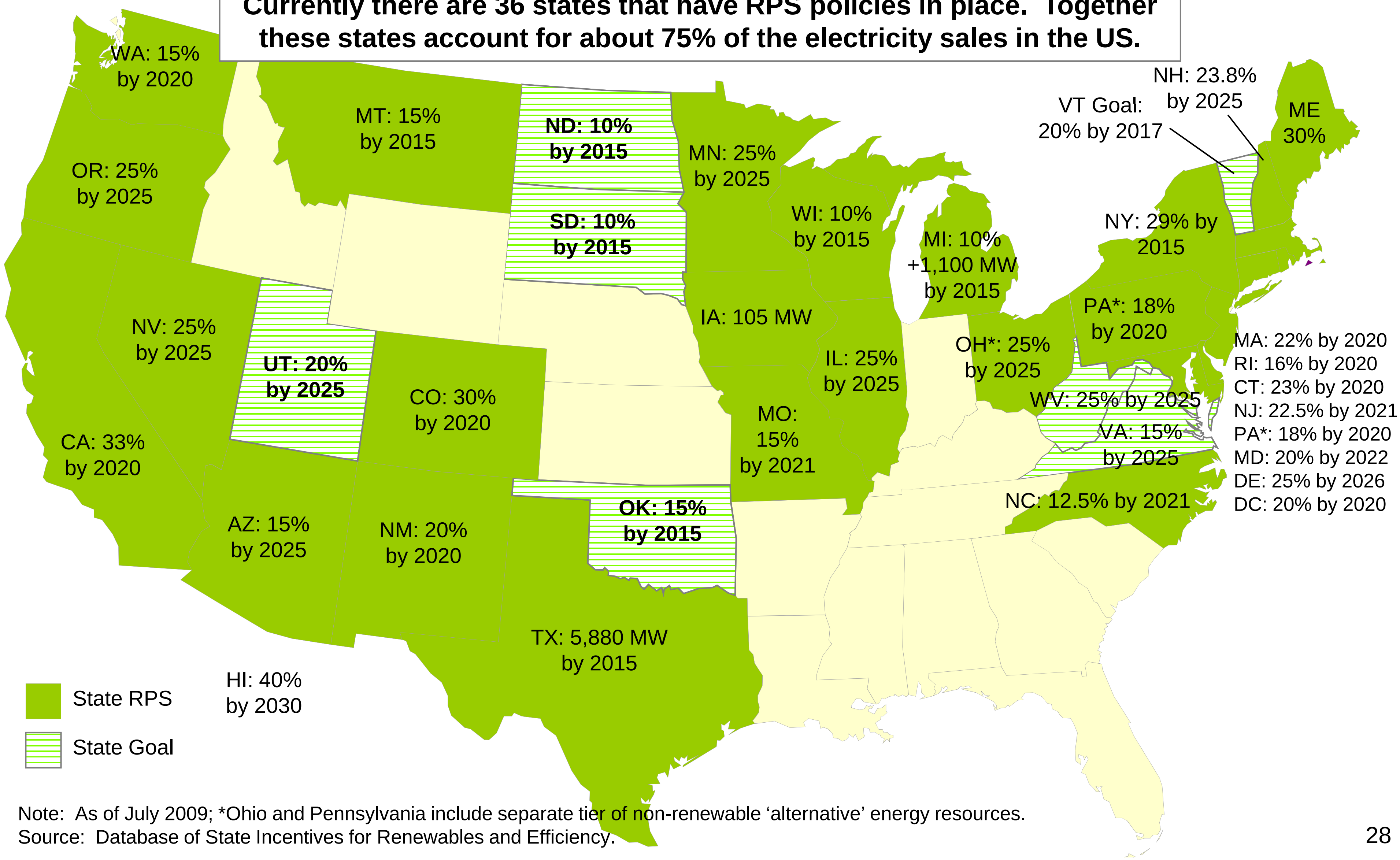
Note: One proposed plant in Florida and two proposed plants in Texas have locations that are yet to be determined.

Source: Energy Information Administration, US Department of Energy; and Nuclear Energy Institute.

Renewables

States with Renewable Portfolio Standards

Currently there are 36 states that have RPS policies in place. Together these states account for about 75% of the electricity sales in the US.

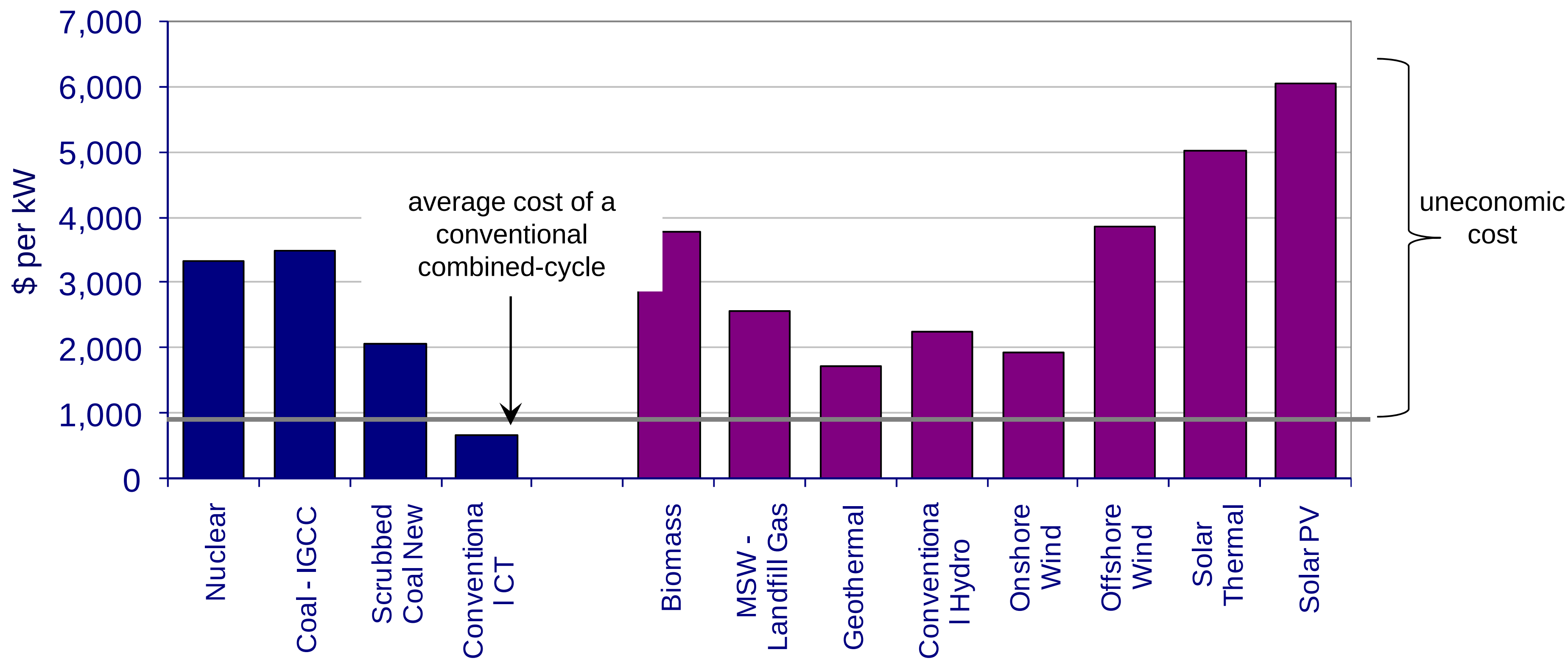


Note: As of July 2009; *Ohio and Pennsylvania include separate tier of non-renewable 'alternative' energy resources.
Source: Database of State Incentives for Renewables and Efficiency.

LSU Center for Energy Studies

Total Overnight Cost for New Plants

Resources are typically uneconomic without additional support

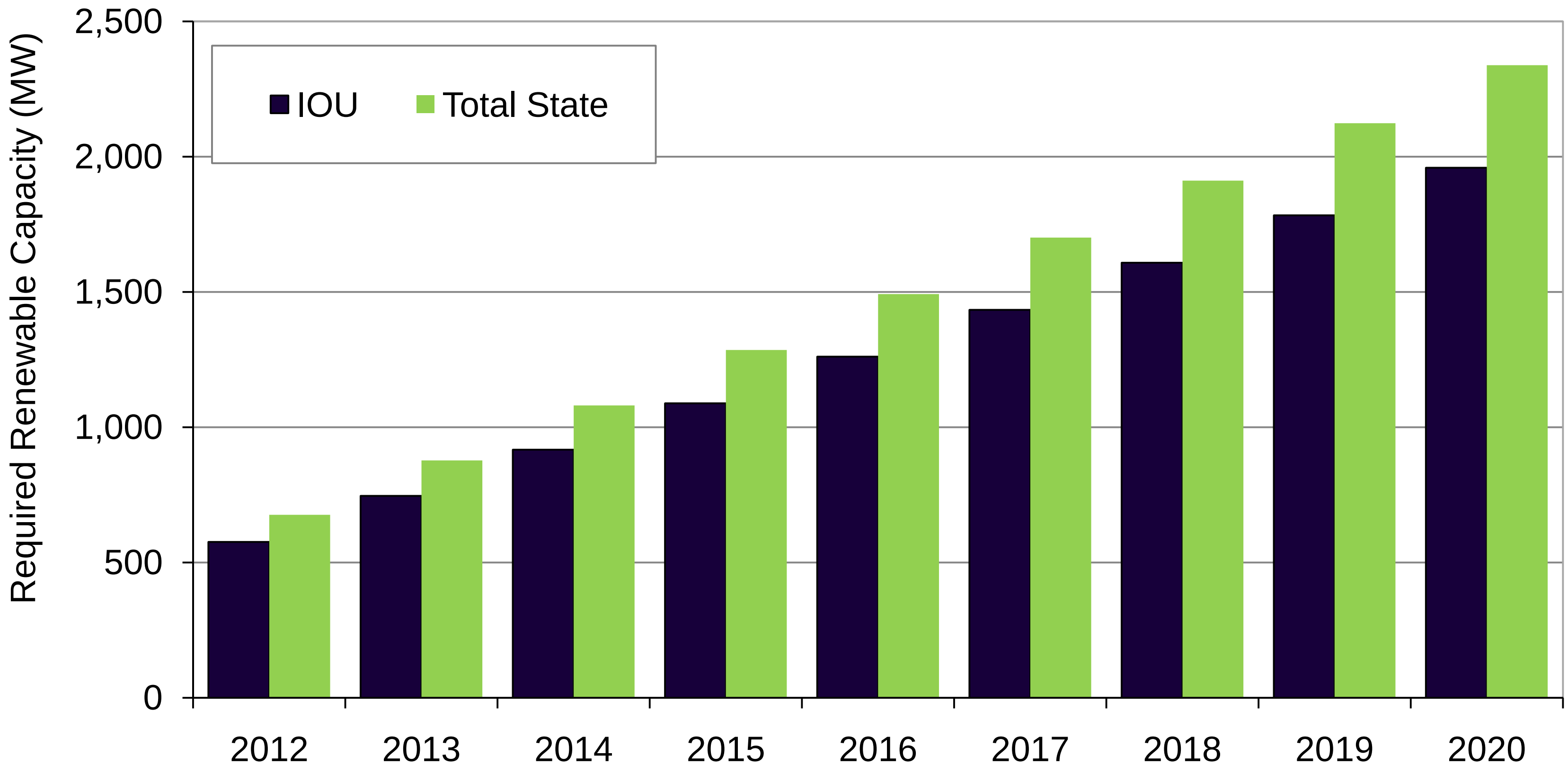


These differentials will have to be recovered from various funding sources

Source: Assumptions to the Annual Energy Outlook 2009, Energy Information Administration, U.S. Department of Energy.

Potential Louisiana RPS Requirements

If generation were to follow current trends and increase each year, the federal RPS would require 1,960 MW of renewable capacity for Louisiana's investor owned utilities and 2,338 MW for the total State, by 2020.



Demand Reduction and Efficiency

What are Utility Conservation Programs

Programs commonly referred to as "demand side management" – attempt to encourage more efficient use of electricity.

Energy efficiency programs: programs that encourage more efficient energy (kWh) consumption or fuel switching (i.e., new natural gas end uses).

Load management programs: programs designed to encourage more efficient peak demand (kW) usage.

Energy Efficiency Resource Standards

ID: Energy Plan sets conservation – DR and EE as priority resources

WA: pursue all cost effective conservation: ~10% by 2025

OR: IOU 2008 goals 34 MW; administered by Energy Trust OR

CA: 8% energy savings; 4,885 MW peak reduction by 2013 (from ‘04)

NV: EE up to 25% of RPS: ~5% electric reduction by 2015

UT: EE earns incentive credits in RE goal

CO:11.5% energy savings by 2020 ~ 3,669 GWh (from ‘08)

NM: 10% retail electric sales savings by 2020 (from ‘05)

NE: Interim Energy Plan stresses multi-sector EE improvements

MI: 1% annual energy savings from prior year’s sales

MN: 1.5% annual savings based on prior 3-years average, to 2015

IA: 5.4% energy savings by 2020 ~ 1.5% annual

WI: RPS requires utility EE

IL: reduce energy use 2% by 2015 and peak 0.1% from prior year

OH: 22% energy savings by 2025 (from ‘09); reduce peak 8% by 2018

KY: proposed RPS-EE to offset 18% of projected 2025 demand

ME: 30% energy savings; 100 MW peak electric reduction by 2020

VT: 11% energy reductions by 2011 (2% annual) administered by Efficiency VT

MA: 25% of electric load from DSR, EE by 2020: capacity and energy

NY: reduce electric use 15% by 2015 from levels projected in 2008

CT:4% energy savings (1.5% annual) and 10% peak reduction by 2010 (from ’07)

RI: reduce 10% of 2006 sales by 2022

NJ: BPU proceeding to reduce consumption, peak

DE: Sustainable Energy Utility charged with 30% energy reduction by 2015

PA: reduce use 3%; peak 4.5% by 2013 as % of 2009-10 sales

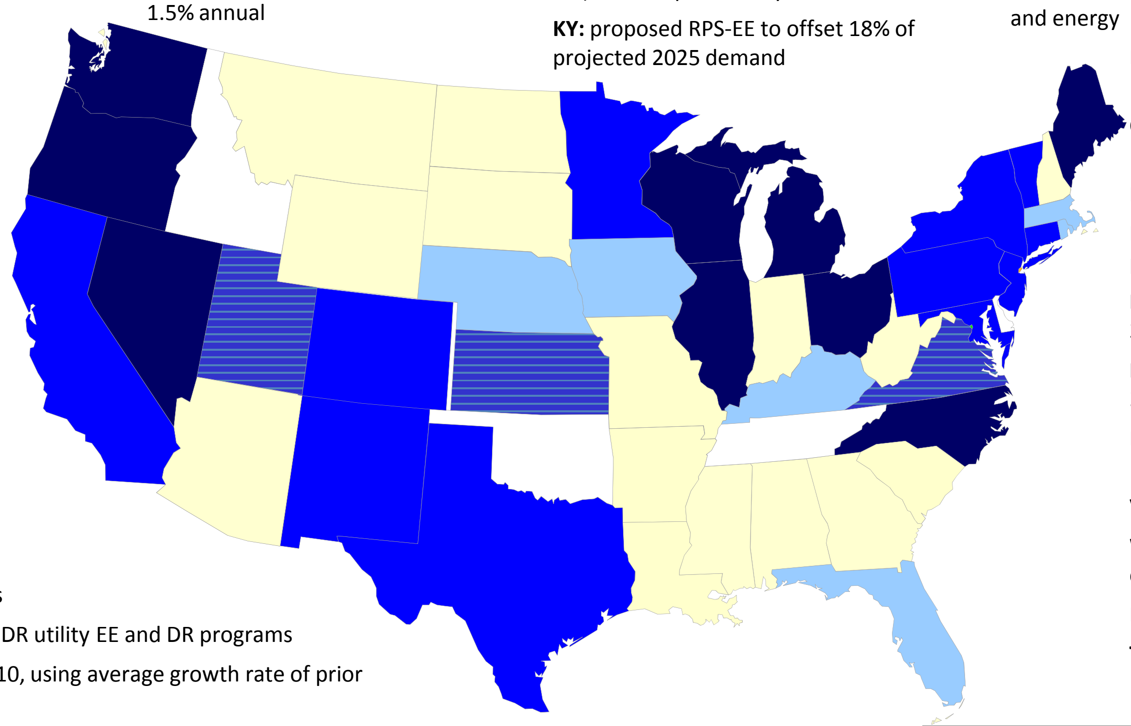
MD: reduce per capita electricity use and peak by 2015 (from ‘07)

VA: reduce electric use 10% by 2022 (from ‘06)

WV: EE & DR earn one credit for each MWh conserved in the 25% by 2025

NC: EE to meet up to 25% of RPS by 2011

TVA: reduce energy use 25% and cut peak 1,400 MW by 2012 (from ’08)



KS: Voluntary utility programs

OK: PSC approved quick-start DR utility EE and DR programs

TX: 20% of load growth by 2010, using average growth rate of prior 5 years

HI: 30% electricity reduction: ~4,300 GWh by 2030 (from ‘09)

- EE only as part of an RPS law, rule or goal
- EERS by regulation or law (stand-alone)
- Voluntary standards (in or out of RPS)
- EE goal proposed/being studied
- Other EE or DSM rule or goal

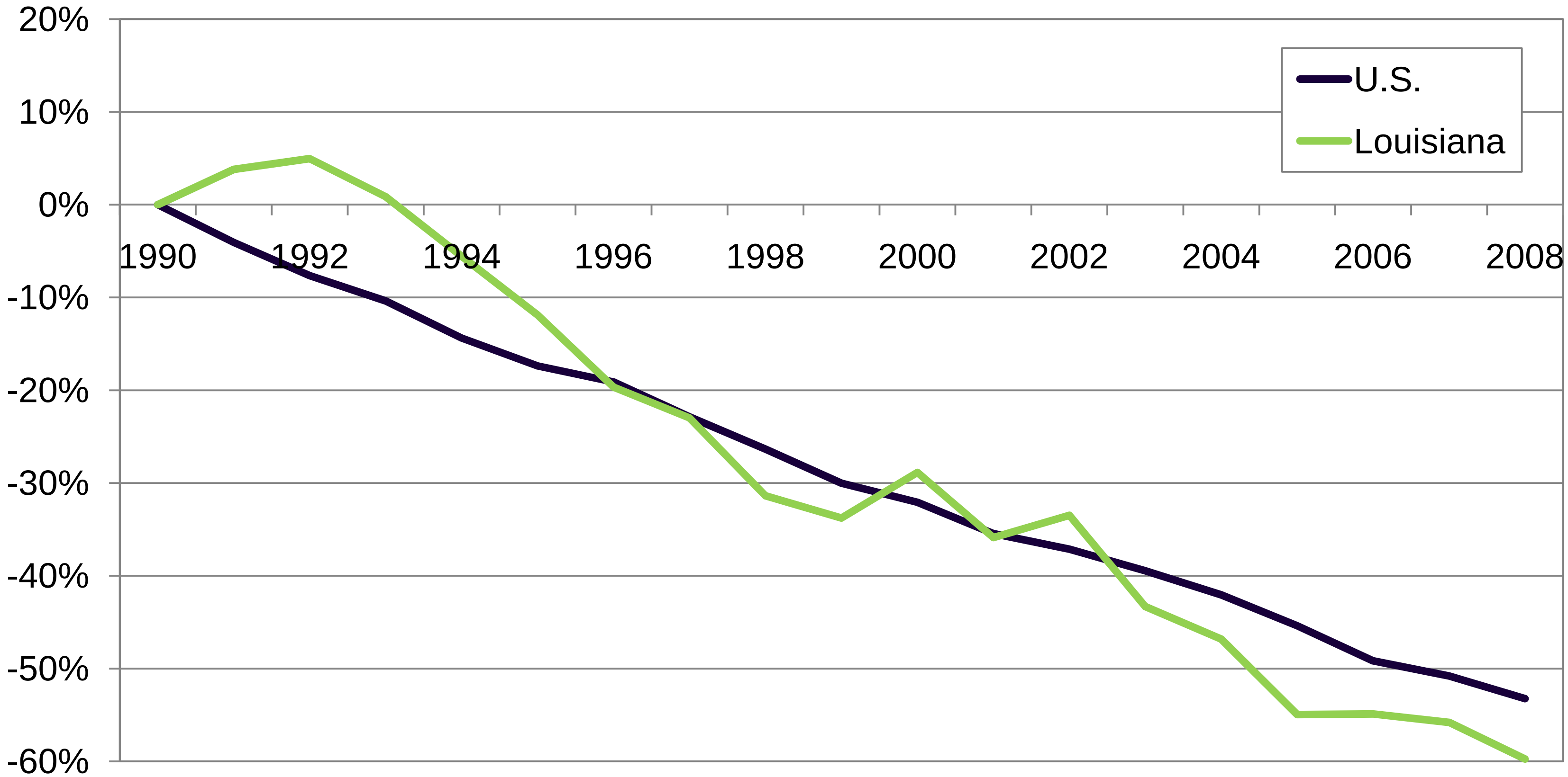
Source: Federal Energy Regulatory Commission

Louisiana CO_2 Emission Trends

LSU Center for Energy Studies

Gross CO2E per GDP and GSP, U.S. and Louisiana

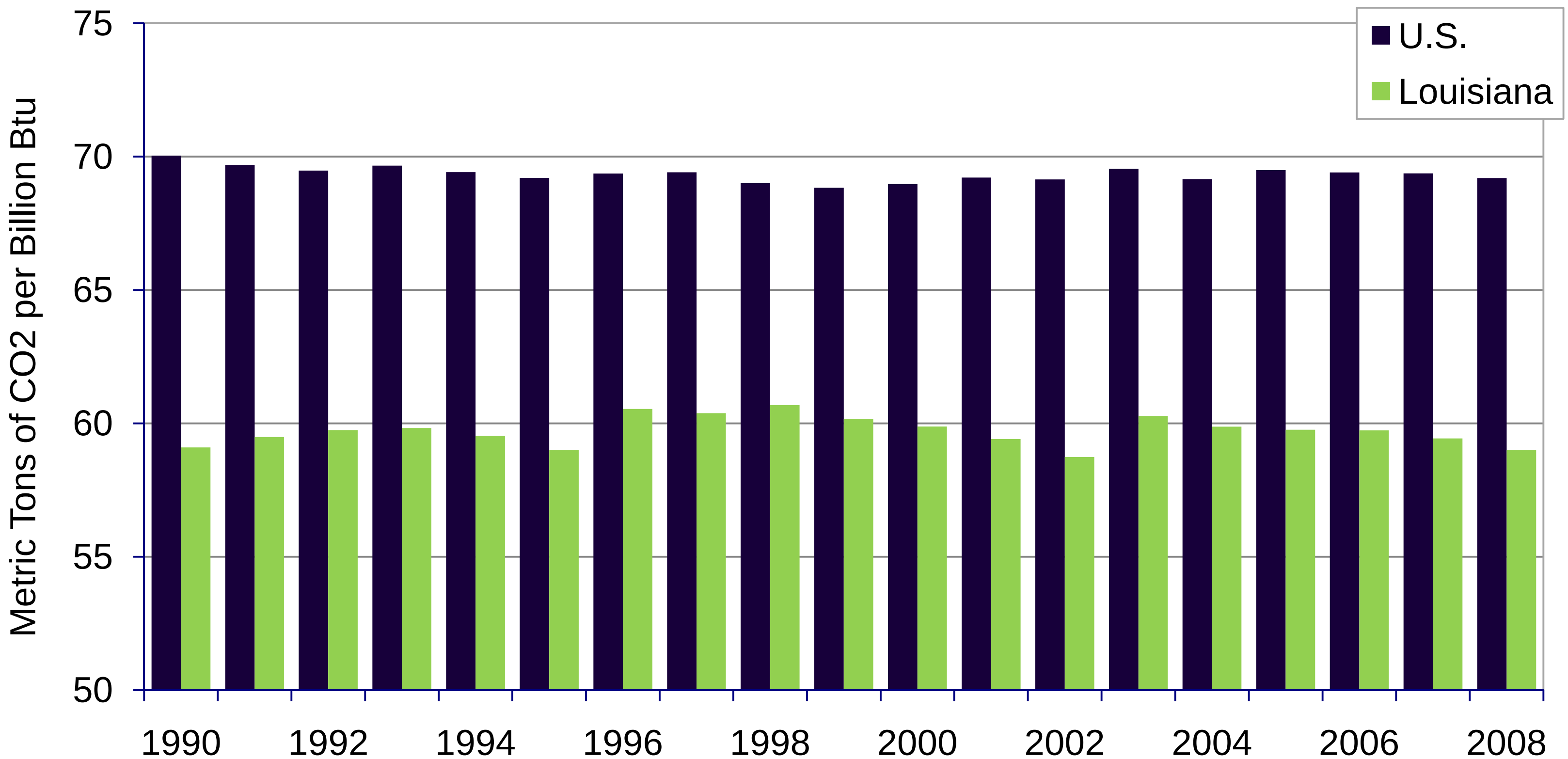
Louisiana has been following emissions reduction trends similar to overall U.S. since 1990.



Source: Energy Information Administration, U.S. Department of Energy; and Bureau of Economic Analysis, U.S. Department of Commerce.

CO2 E per Btu of Fossil Fuel Consumption, Louisiana and U.S.

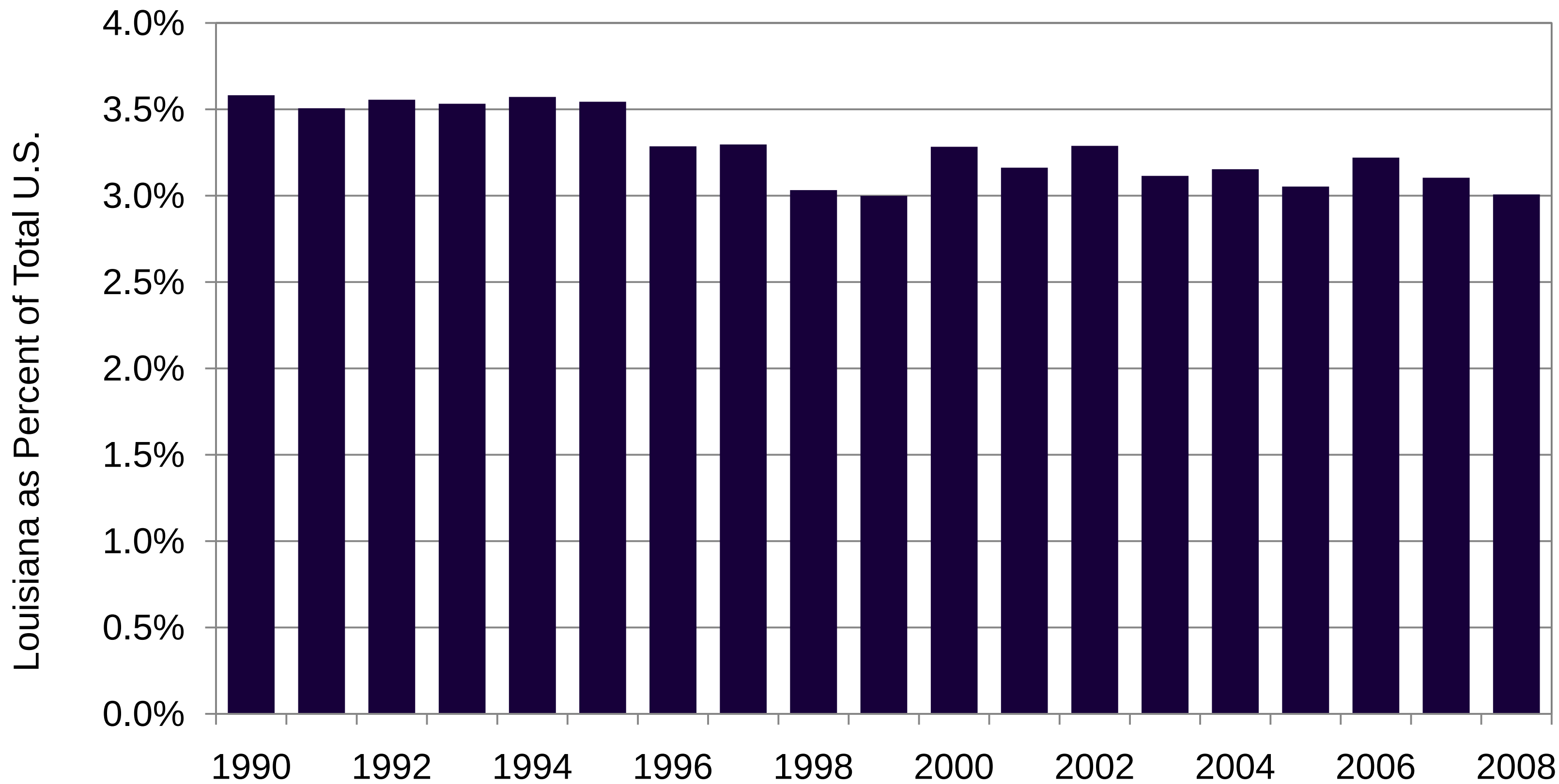
Louisiana tends to be more efficient, however, in emissions per unit of energy consumed.



Source: Energy Information Administration, U.S. Department of Energy.

Louisiana Share of Total U.S. CO2 Emissions

Louisiana's share of U.S. CO2 emissions has been between 3 and 4 percent, but has been falling in recent years.

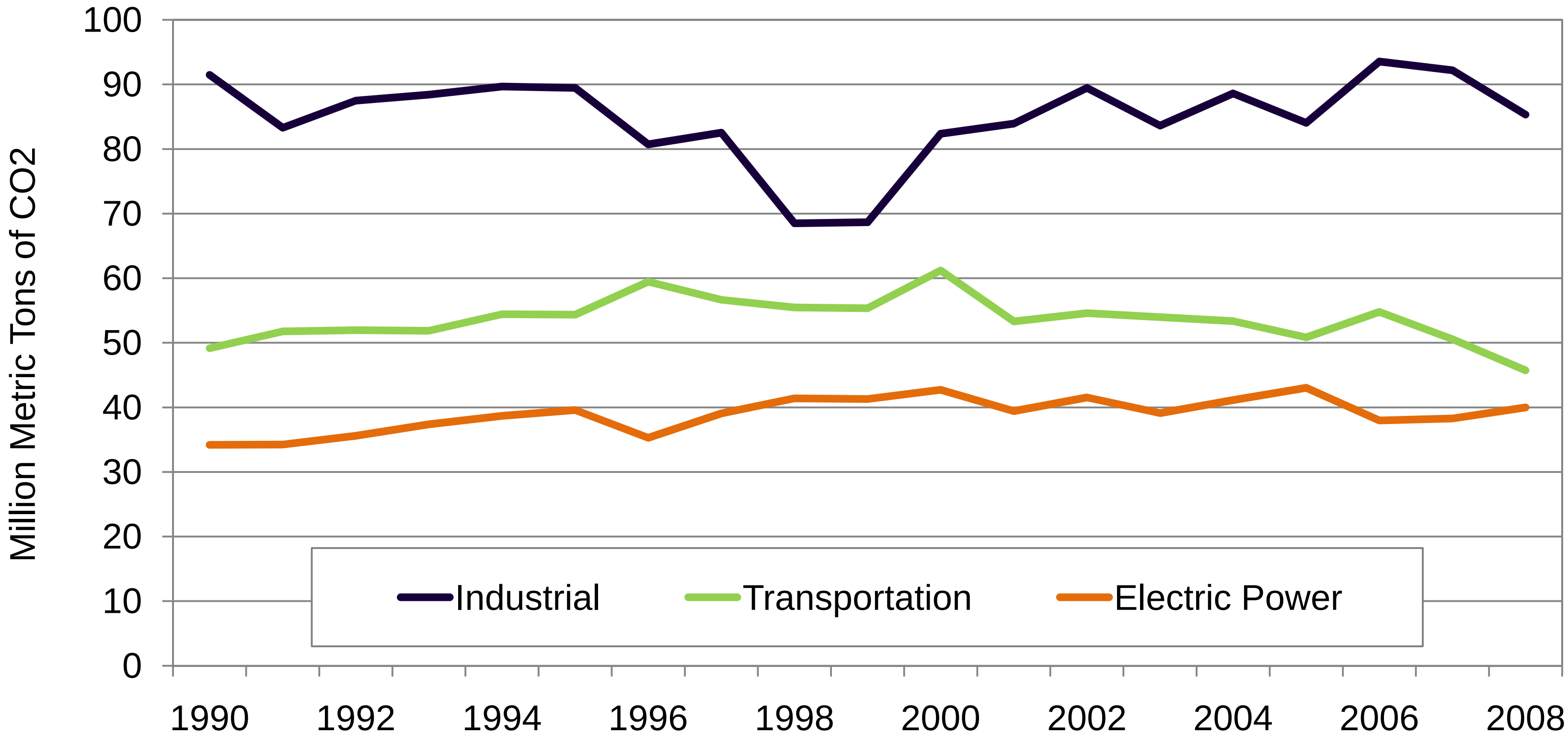


Source: Energy Information Administration, U.S. Department of Energy.

LSU Center for Energy Studies

Louisiana CO2 Emissions per Sector, 1980 – 2005

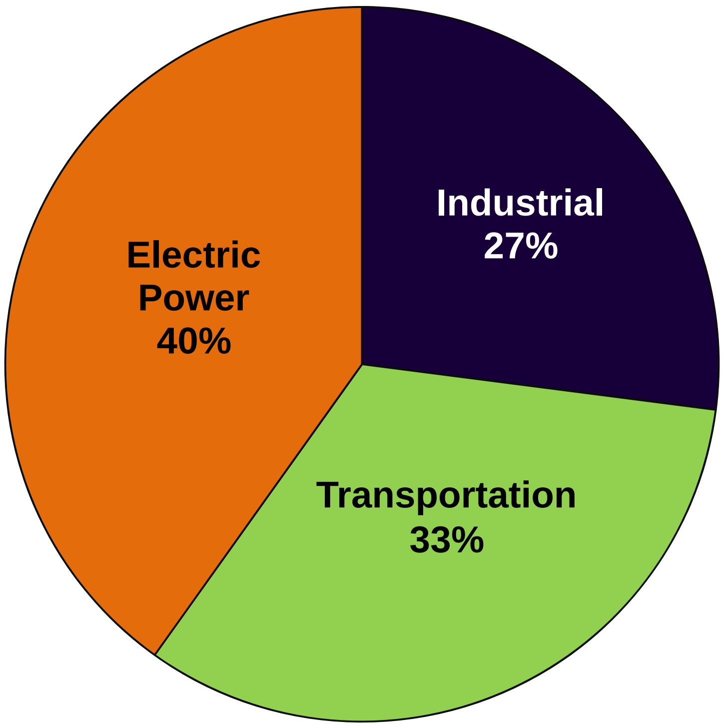
Louisiana carbon emissions have been driven primarily by moderate amounts of growth in transportation and electric power generation sectors.



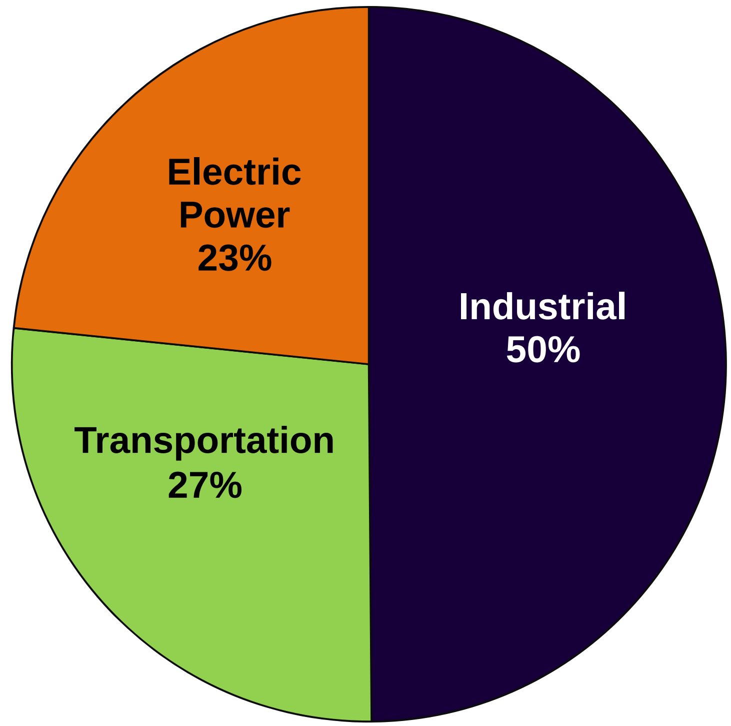
Source: Energy Information Administration, U.S. Department of Energy.

U.S. and Louisiana CO2 Emissions per Sector, 2008

In the U.S., power generation comprises about 40 percent of overall national emissions.



In Louisiana, power generation comprises about 23 percent of overall state emissions.

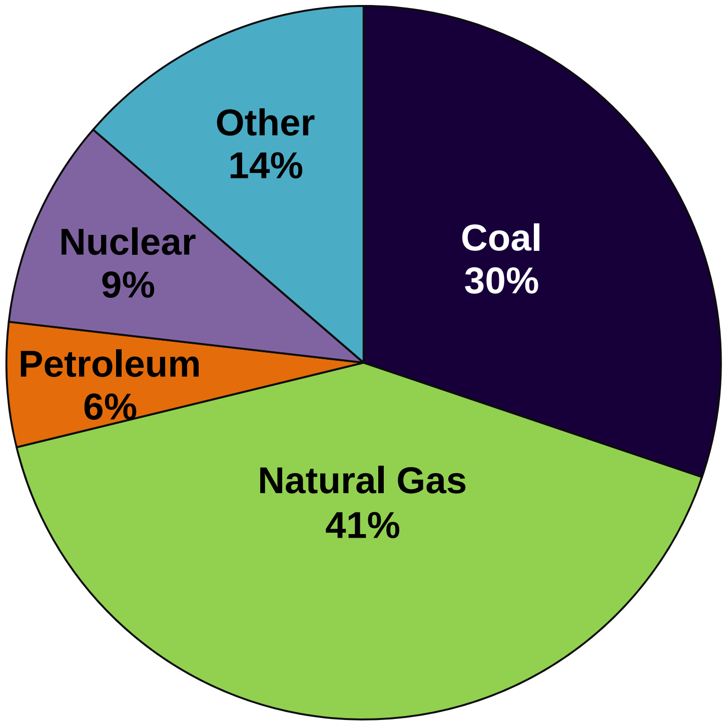


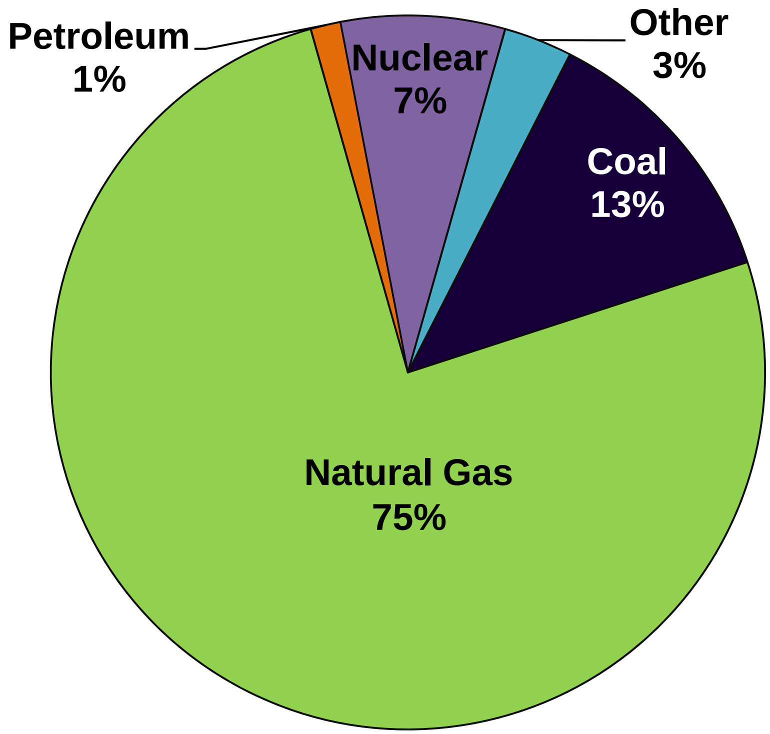
Source: Energy Information Administration, U.S. Department of Energy.

Louisiana and U.S. Electric Power Fuel Mix

In the U.S., coal represents 48 percent of the electric power fuel mix (capacity basis).

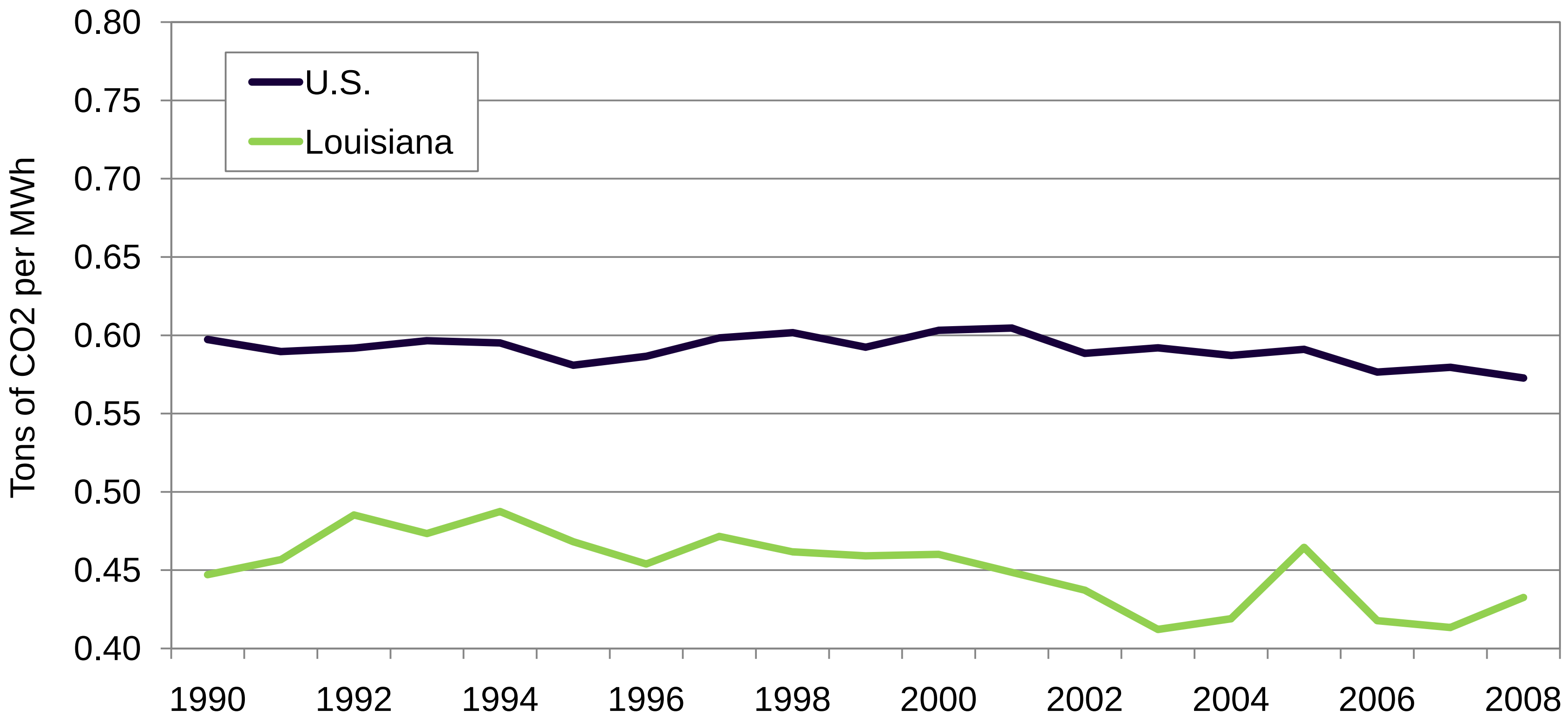
In Louisiana, 75 percent of the electric power generation is fueled by natural gas. Coal only represents 12 percent of the electric power fuel mix (capacity basis).





Source: Energy Information Administration, U.S. Department of Energy

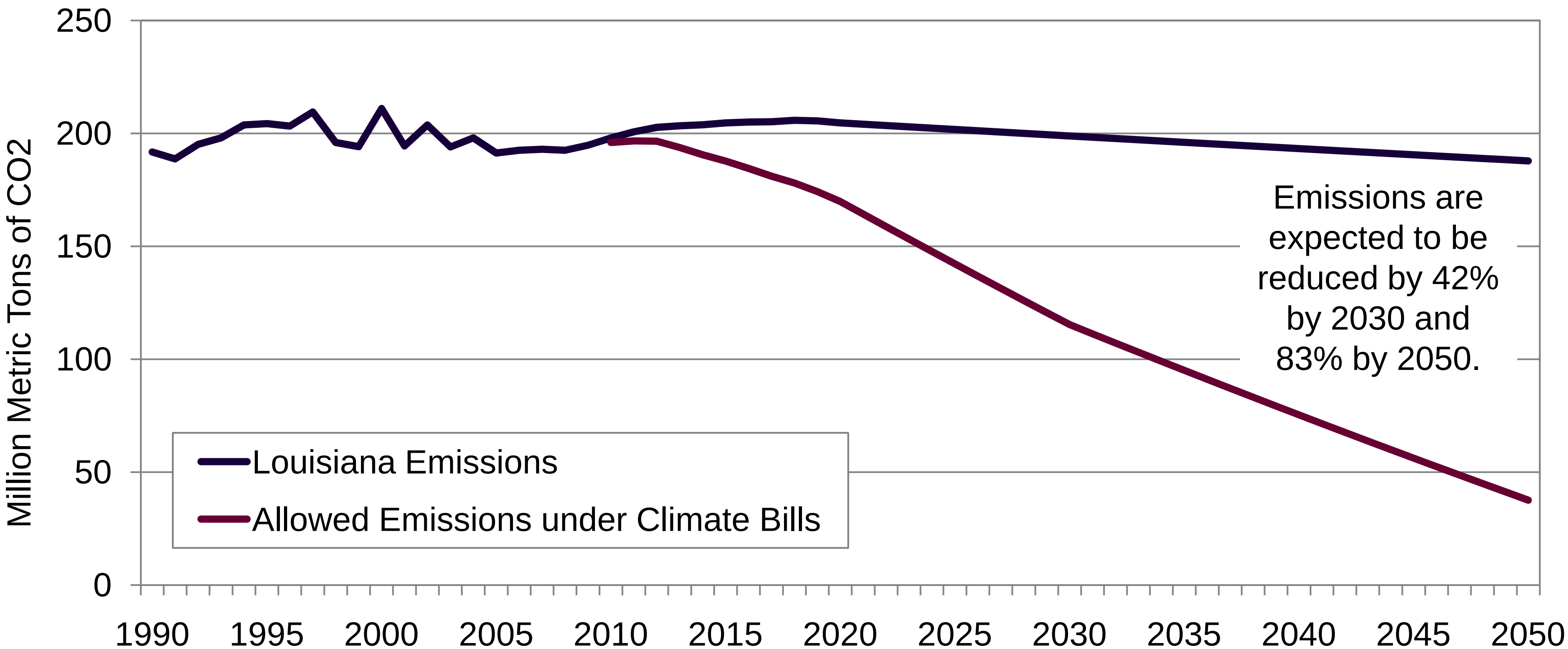
Louisiana and U.S. Electric Power Fuel Mix



Potential Costs to Louisiana

LSU Center for Energy Studies

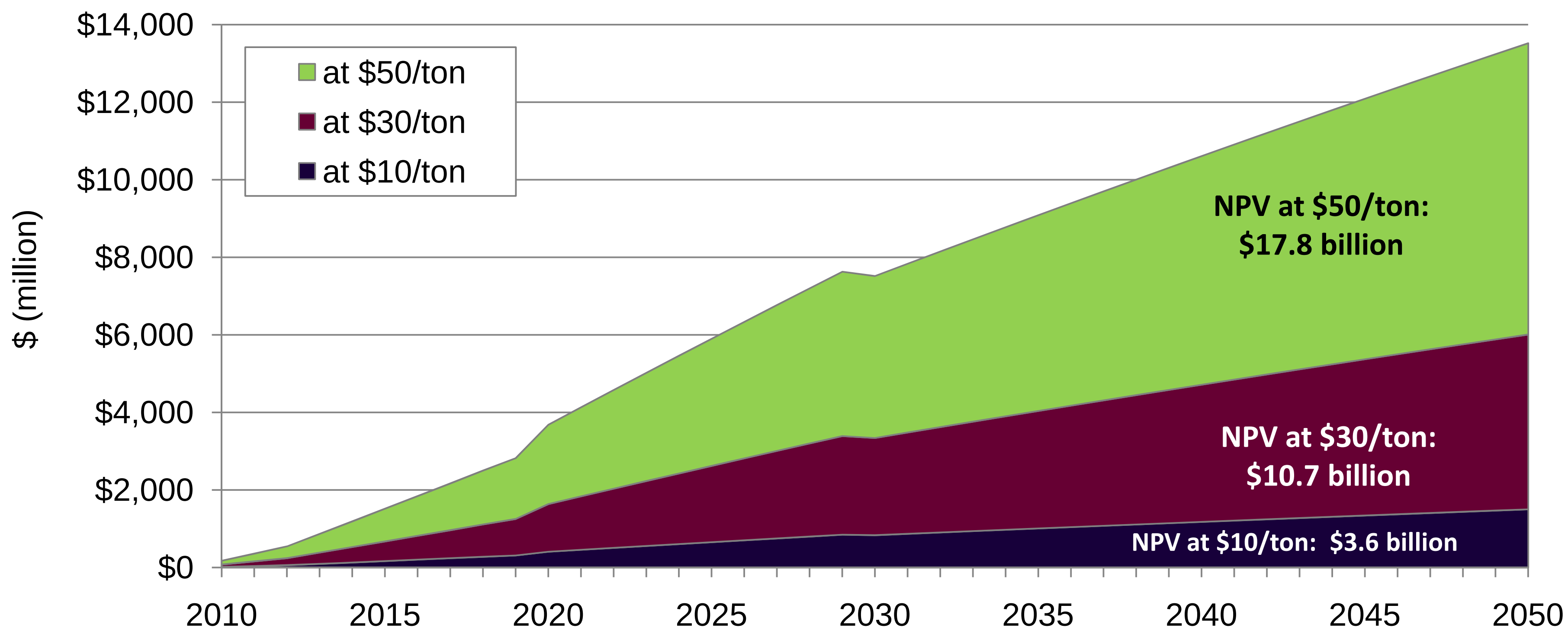
Historic and Projected Louisiana Emissions



Preliminary and Not for Citation

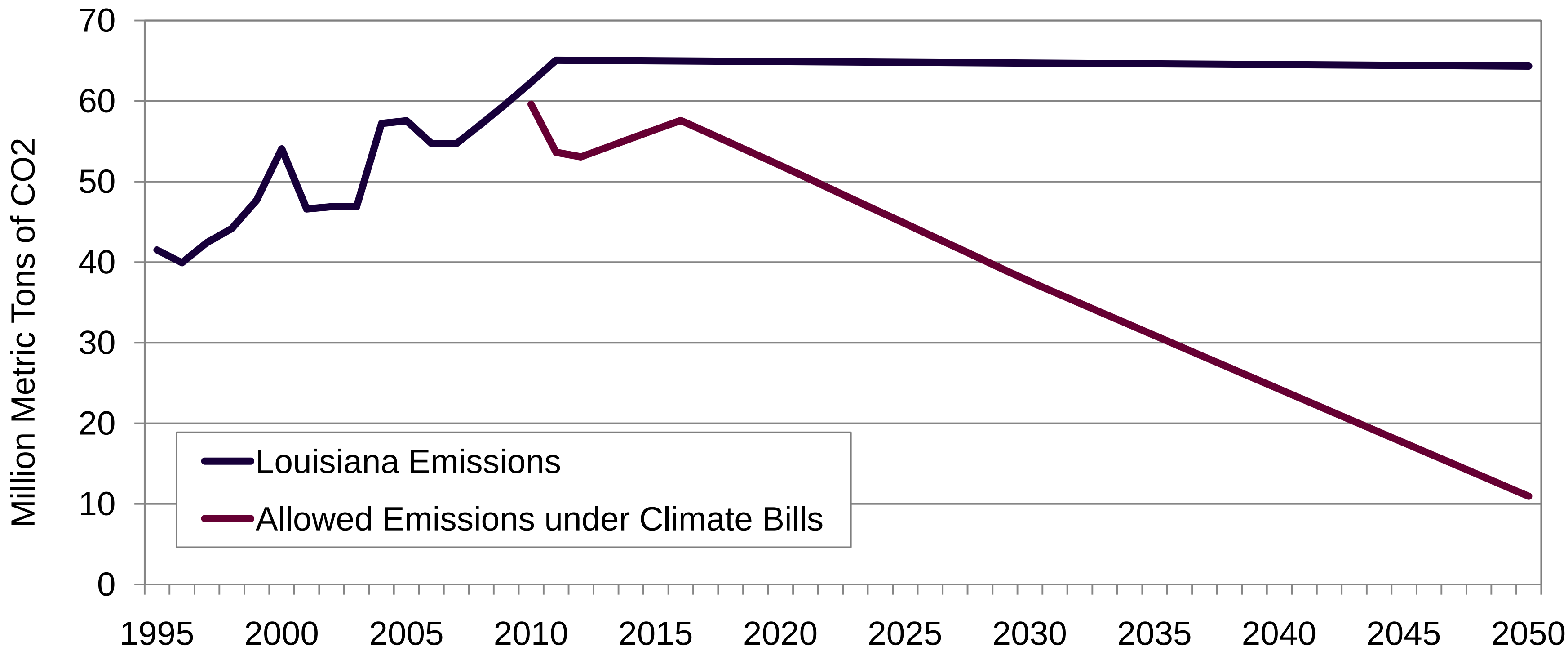
LSU Center for Energy Studies

Estimated Cost of Emission Credit Deficits, Louisiana Total



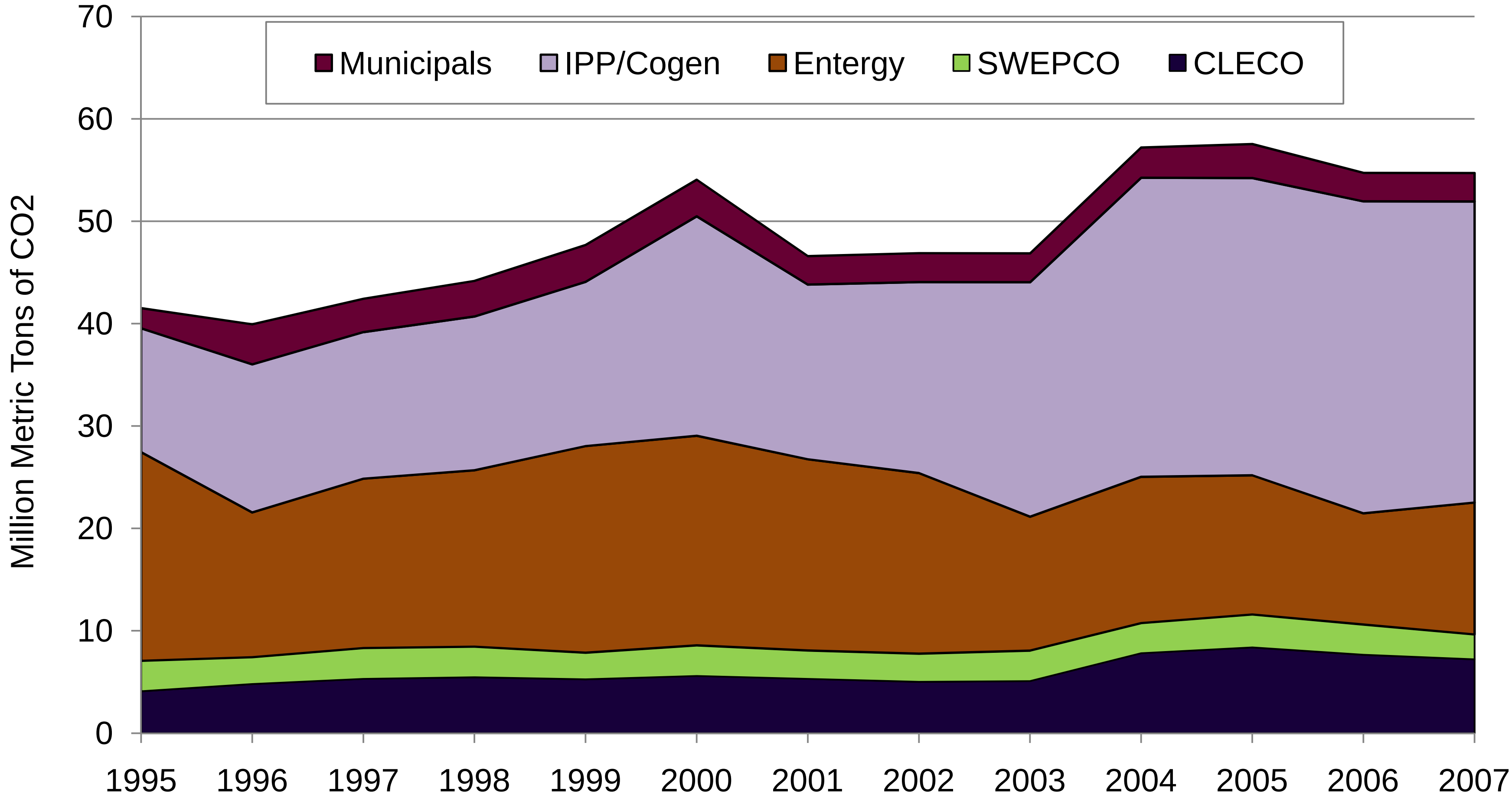
Preliminary and Not for Citation

Historic and Projected Louisiana Emissions – Power Generation



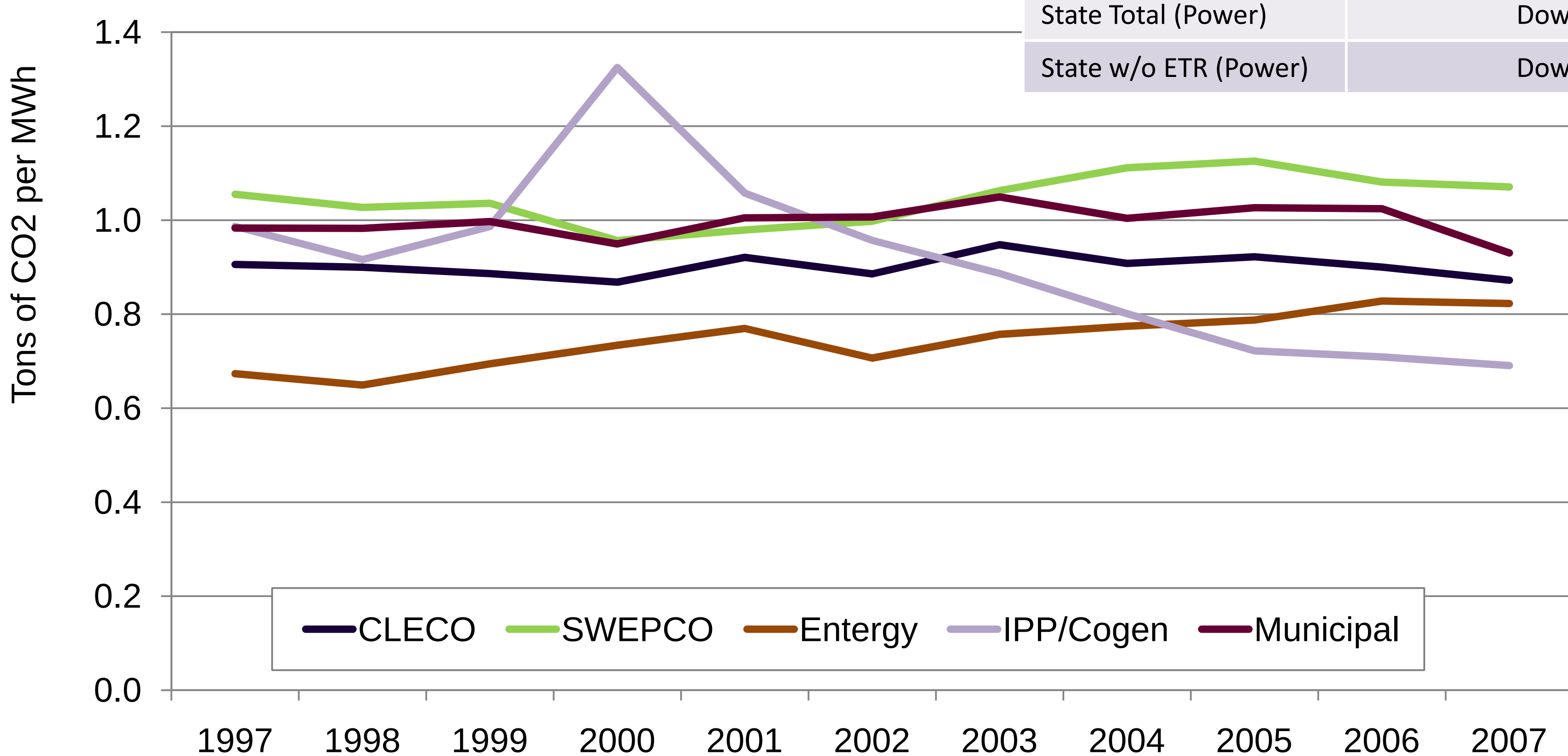
Center for Energy Studies

Louisiana CO2 Emissions by Utility



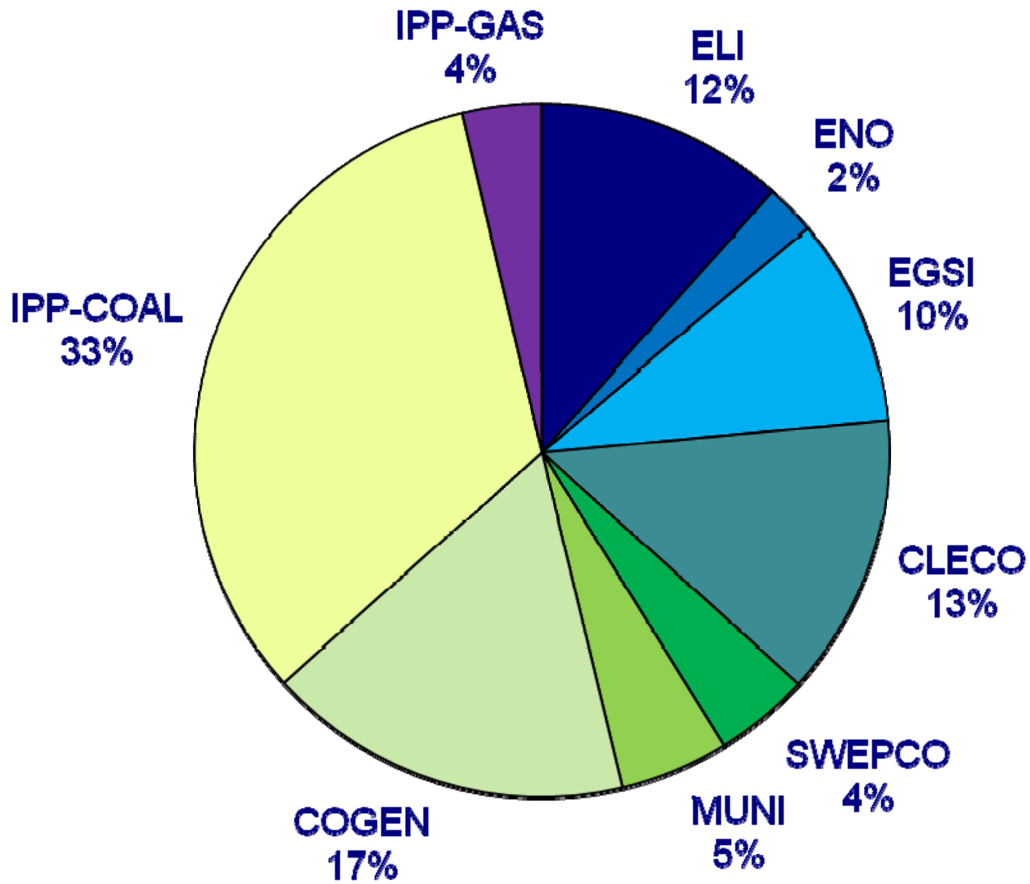
Louisiana CO2 Emissions by Utility, per MWh

Utility	Change
Cleco	Down 3.7%
SWEPCO	Up 1.7%
IPP	Down 30%
Entergy	Up 22%
Munis	Down 5.4%
State Total (Power)	Down 4.7%
State w/o ETR (Power)	Down 9.3%



Louisiana CO2 Emissions by Generator Type

The highest concentration of CO2 emissions are with IPP coal plant. Has significant implications for rural cooperative customers.



Center for Energy Studies

Total CO2 Surplus/Deficit by Year and Utility Growth Case

	Annual CO2 Surplus or Deficit by Utility									
	ELI	ENO	EGSI	CLECO	SWEPCO	MUNI	COGEN	IPP-COAL	IPP-GAS	STATE TOTAL
	(tons)									
2012	(500,441)	(102,878)	(535,624)	(580,615)	(195,601)	(184,388)	(734,628)	(1,393,920)	(160,005)	(4,388,099)
2015	(892,090)	(185,188)	(964,167)	(1,045,157)	(354,882)	(331,913)	(1,422,166)	(2,397,477)	(281,320)	(7,874,361)
2020	(2,234,168)	(364,525)	(1,873,688)	(2,028,156)	(1,117,499)	(651,937)	(2,615,415)	(4,358,474)	(537,728)	(15,781,589)
2025	(2,827,940)	(871,174)	(2,606,150)	(2,831,478)	(1,462,209)	(867,874)	(3,342,109)	(5,387,710)	(707,380)	(20,904,024)
2030	(3,895,585)	(1,162,784)	(3,131,540)	(3,777,193)	(1,778,270)	(1,036,213)	(4,035,466)	(6,279,190)	(876,104)	(25,972,345)
2035	(4,675,083)	(1,406,812)	(3,504,733)	(4,277,071)	(2,019,842)	(1,146,626)	(4,880,040)	(6,880,813)	(997,824)	(29,788,844)
2040	(5,427,784)	(1,685,363)	(3,872,278)	(4,806,203)	(2,856,581)	(1,253,471)	(5,364,271)	(7,466,141)	(1,127,964)	(33,860,056)
2045	(5,857,677)	(1,860,762)	(3,991,927)	(5,026,263)	(3,017,210)	(1,299,380)	(5,608,672)	(7,696,836)	(1,214,330)	(35,573,057)
2050	(6,046,280)	(1,907,695)	(4,052,490)	(5,102,519)	(3,144,094)	(1,326,228)	(5,781,919)	(7,813,607)	(1,290,491)	(36,465,323)

Preliminary and Not for Citation

LSU Center for Energy Studies

Total CO2 Cost by Year and Utility, Growth Case

	Annual Abatement Costs									
	ELI	ENO	EGSI	CLECO	SWEPCO	MUNI	COGEN	IPP-COAL	IPP-GAS	STATE TOTAL
	(million $)									
2012	$ 103.0	$ 21.2	$ 110.2	$ 119.5	$ 40.3	$ 37.9	$ 151.2	$ 286.9	$ 32.9	$903.10
2015	$ 114.9	$ 23.8	$ 124.1	$ 134.6	$ 45.7	$ 42.7	$ 183.1	$ 308.7	$ 36.2	$1,013.87
2020	$ 178.1	$ 29.1	$ 149.4	$ 161.7	$ 89.1	$ 52.0	$ 208.5	$ 347.5	$ 42.9	$1,258.36
2025	$ 201.4	$ 62.0	$ 185.6	$ 201.7	$ 104.1	$ 61.8	$ 238.0	$ 383.7	$ 50.4	$1,488.73
2030	$ 262.8	$ 78.4	$ 211.3	$ 254.8	$ 120.0	$ 69.9	$ 272.3	$ 423.6	$ 59.1	$1,752.26
2035	$ 317.8	$ 95.6	$ 238.2	$ 290.7	$ 137.3	$ 77.9	$ 331.7	$ 467.7	$ 67.8	$2,024.91
2040	$ 375.4	$ 116.6	$ 267.8	$ 332.4	$ 197.6	$ 86.7	$ 371.0	$ 516.4	$ 78.0	$2,341.98
2045	$ 433.9	$ 137.8	$ 295.7	$ 372.3	$ 223.5	$ 96.3	$ 415.5	$ 570.2	$ 90.0	$2,635.13
2050	$ 487.1	$ 153.7	$ 326.5	$ 411.1	$ 253.3	$ 106.8	$ 465.8	$ 629.5	$ 104.0	$2,937.80
NPV:	$1,404.19	$395.16	$1,121.34	$1,320.04	$677.51	$373.20	$1,546.10	$2,364.10	$327.57	$9,529.21

Preliminary and Not for Citation

Note: Assumes credit cost of $15/ton (escalated by 2% per year).

Residential Annual Bill Impact, Growth Case

	Annual Average Ratepayer Impacts (Bill Impact)									
	ELI	ENO	EGSI	CLECO	SWEPCO	MUNI	COGEN	IPP-COAL	IPP-GAS	STATE AVG
	($/bill)									
2012	$56.99	$46.12	$90.82	$207.73	$111.34	$124.90	n.a.	$577.16	n.a.	$177.61
2015	$63.58	$51.78	$102.28	$233.98	$126.26	$140.72	n.a.	$621.02	n.a.	$199.38
2020	$98.55	$63.31	$123.13	$281.08	$246.16	$171.37	n.a.	$699.07	n.a.	$247.47
2025	$111.44	$134.88	$152.96	$350.62	$287.61	$203.67	n.a.	$771.90	n.a.	$292.78
2030	$145.41	$170.55	$174.14	$442.92	$331.53	$230.36	n.a.	$852.16	n.a.	$344.60
2035	$175.84	$207.97	$196.31	$505.33	$379.33	$256.73	n.a.	$940.88	n.a.	$398.19
2040	$207.71	$253.66	$220.71	$577.81	$545.93	$285.73	n.a.	$1,038.85	n.a.	$460.57
2045	$240.08	$299.77	$243.70	$647.17	$617.48	$317.36	n.a.	$1,147.08	n.a.	$518.26
2050	$269.52	$334.36	$269.08	$714.62	$699.81	$351.97	n.a.	$1,266.38	n.a.	$577.77
Percent Increase on a Typical Bill										
2015	3.8%	3.1%	6.1%	13.8%	7.4%	8.3%	n.a.	38.5%	n.a.	11.8%
2020	4.2%	3.4%	6.7%	15.3%	8.3%	9.2%	n.a.	40.6%	n.a.	13.0%
2025	6.3%	4.1%	7.9%	18.0%	15.8%	11.0%	n.a.	44.8%	n.a.	15.9%
2030	7.0%	8.5%	9.6%	22.0%	18.1%	12.8%	n.a.	48.5%	n.a.	18.4%
2035	9.0%	10.5%	10.7%	27.3%	20.4%	14.2%	n.a.	52.5%	n.a.	21.2%
2040	10.6%	12.6%	11.9%	30.5%	22.9%	15.5%	n.a.	56.8%	n.a.	24.0%
2045	12.3%	15.0%	13.1%	34.2%	32.3%	16.9%	n.a.	61.5%	n.a.	27.3%
2050	13.9%	17.4%	14.1%	37.6%	35.8%	18.4%	n.a.	66.6%	n.a.	30.1%

Note: Assumes credit cost of $15/ton (escalated by 2% per year). Assumes a typical bill is $1,500 per year (escalated by 2% per year)

Preliminary and Not for Citation

Industrial Annual Bill Impact, Growth Case

	Annual Average Ratepayer Impacts (Bill Impact)									
	ELI	ENO	EGSI	CLECO	SWEPCO	MUNI	COGEN	IPP-COAL	IPP-GAS	STATE AVG
	($/bill)									
2012	$5,042	$1,273	$10,338	$52,090	$2,957	$111	n.a.	$10,519	n.a.	$11,761
2015	$5,299	$1,351	$10,970	$55,278	$3,163	$118	n.a.	$10,666	n.a.	$12,407
2020	$7,443	$1,492	$11,958	$60,168	$5,586	$130	n.a.	$10,876	n.a.	$13,950
2025	$7,622	$2,885	$13,455	$67,952	$5,913	$140	n.a.	$10,876	n.a.	$15,549
2030	$9,008	$3,304	$13,872	$77,779	$6,170	$144	n.a.	$10,876	n.a.	$17,308
2035	$9,866	$3,647	$14,168	$80,372	$6,396	$145	n.a.	$10,876	n.a.	$17,924
2040	$10,556	$4,027	$14,427	$83,234	$8,336	$146	n.a.	$10,876	n.a.	$18,800
2045	$11,051	$4,313	$14,427	$84,436	$8,541	$147	n.a.	$10,876	n.a.	$19,113
2050	$11,236	$4,356	$14,427	$84,436	$8,767	$148	n.a.	$10,876	n.a.	$19,178

Preliminary and Not for Citation

Note: Assumes credit cost of $15/ton (escalated by 2% per year).

Industrial Annual Bill Impact, Growth Case

	ELI	ENO	EGSI	CLECO	SWEPCO	MUNI	COGEN	IPP-COAL	IPP-GAS	STATE AVG
	Annual Average Ratepayer Impacts (Bill Impact) ($/bill)									
2012	$5,042	$1,273	$10,338	$52,090	$2,957	$111	n.a.	$10,519	n.a.	$11,761
2015	$5,299	$1,351	$10,970	$55,278	$3,163	$118	n.a.	$10,666	n.a.	$12,407
2020	$7,443	$1,492	$11,958	$60,168	$5,586	$130	n.a.	$10,876	n.a.	$13,950
2025	$7,622	$2,885	$13,455	$67,952	$5,913	$140	n.a.	$10,876	n.a.	$15,549
2030	$9,008	$3,304	$13,872	$77,779	$6,170	$144	n.a.	$10,876	n.a.	$17,308
2035	$9,866	$3,647	$14,168	$80,372	$6,396	$145	n.a.	$10,876	n.a.	$17,924
2040	$10,556	$4,027	$14,427	$83,234	$8,336	$146	n.a.	$10,876	n.a.	$18,800
2045	$11,051	$4,313	$14,427	$84,436	$8,541	$147	n.a.	$10,876	n.a.	$19,113
2050	$11,236	$4,356	$14,427	$84,436	$8,767	$148	n.a.	$10,876	n.a.	$19,178
Percent Increase on a Typical Bill										
2012	5.0%	1.3%	10.3%	52.1%	3.0%	0.1%	n.a.	10.5%	n.a.	11.8%
2015	5.2%	1.3%	10.8%	54.2%	3.1%	0.1%	n.a.	10.5%	n.a.	12.2%
2020	7.2%	1.4%	11.5%	57.8%	5.4%	0.1%	n.a.	10.5%	n.a.	13.4%
2025	7.2%	2.7%	12.7%	64.0%	5.6%	0.1%	n.a.	10.2%	n.a.	14.7%
2030	8.3%	3.1%	12.8%	71.9%	5.7%	0.1%	n.a.	10.0%	n.a.	16.0%
2035	8.9%	3.3%	12.8%	72.8%	5.8%	0.1%	n.a.	9.9%	n.a.	16.2%
2040	9.4%	3.6%	12.8%	73.9%	7.4%	0.1%	n.a.	9.7%	n.a.	16.7%
2045	9.6%	3.8%	12.6%	73.5%	7.4%	0.1%	n.a.	9.5%	n.a.	16.6%
2050	9.6%	3.7%	12.3%	72.1%	7.5%	0.1%	n.a.	9.3%	n.a.	16.4%

Note: Assumes credit cost of $15/ton (escalated by 2% per year). Assumes a typical bill is $100,000 per year (escalated by 2% per year)

Preliminary and Not for Citation

Conclusions

The Role of Public Policy in Energy Markets

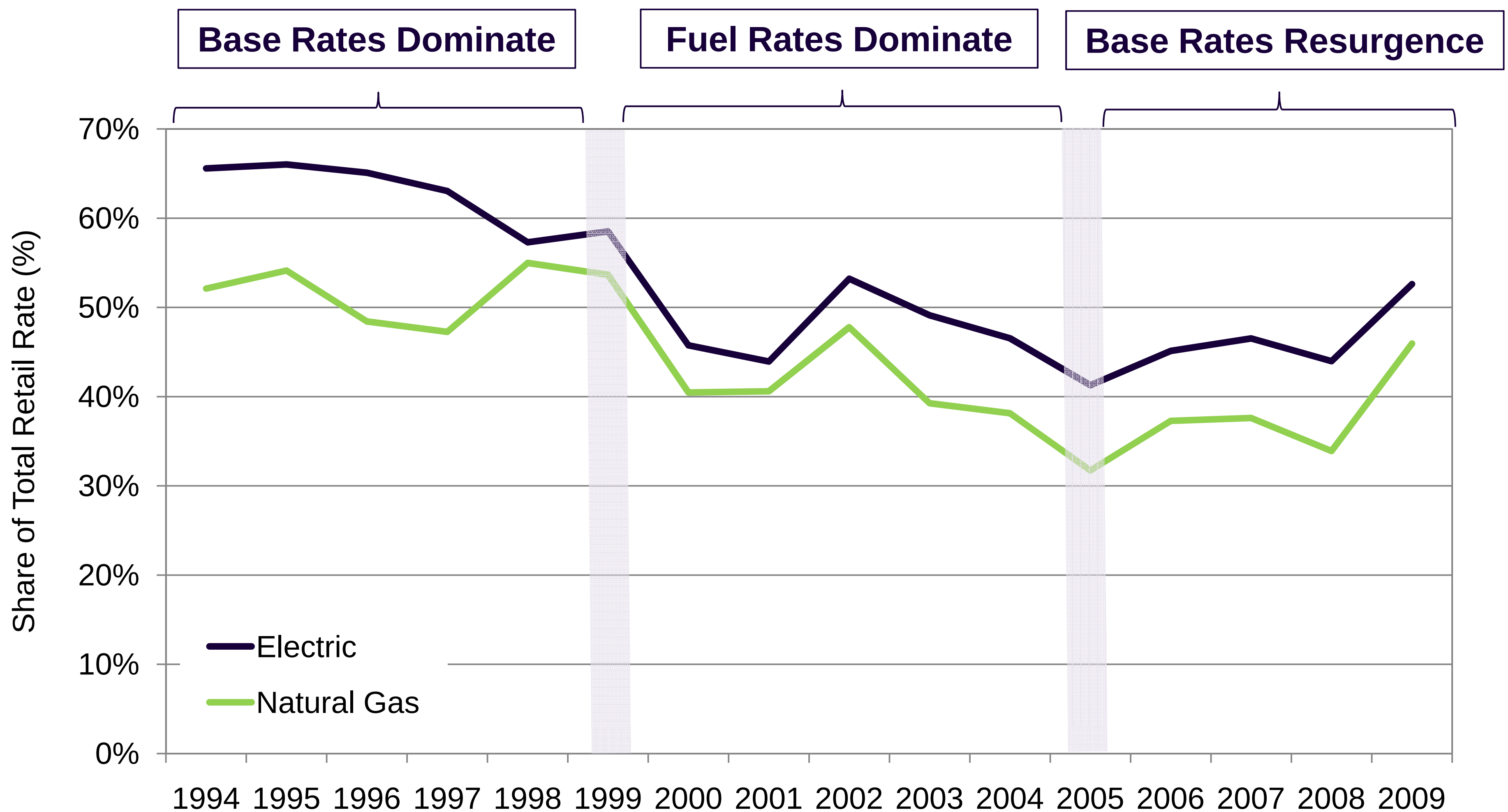
- **Public policy is important in shaping and/or influencing factors that determine energy supply and demand.**
- **Policies, in turn, are a function of the times in which they are developed. For instance:**
  - **1990-2004: Relatively lower energy prices, high capacity/supply availability.**
  - **2004-2009: Relatively high energy prices, tight capacity/supply constraints.**
  - **2010: Depressed prices, depressed demand, uncertainty.**
- **Conventional wisdom in policy formulation (implicit and explicit) has been that markets are not working, or have not worked effectively.**
- **Last five years has been reflected by a significant degree of policy activity to address these perceived market failures.**

Examples of State and Federal Policy Activism

State Policy Activism	Federal Policy Activism
Infrastructure Riders	GHG Regulation/BACT Stds
Generation Preferences and Special Cost Recovery Mechanisms	CAIR/CATR/CAMR
Revenue Decoupling	DOE Appliance Standards
Weather Normalization	EPA Hydro Frac Investigation
Energy Efficiency Goals	GOM Moratorium
Renewable Portfolio Std.	Repeal of Drilling Tax Incentives
Inflation Adjustment Factors	Stimulus Funding -- EE/RE
R & D Programs	Tax Credits -- EE/RE
Societal Benefit Charges	Price Supports/Mandates (Biofuels)

LSU Center for Energy Studies

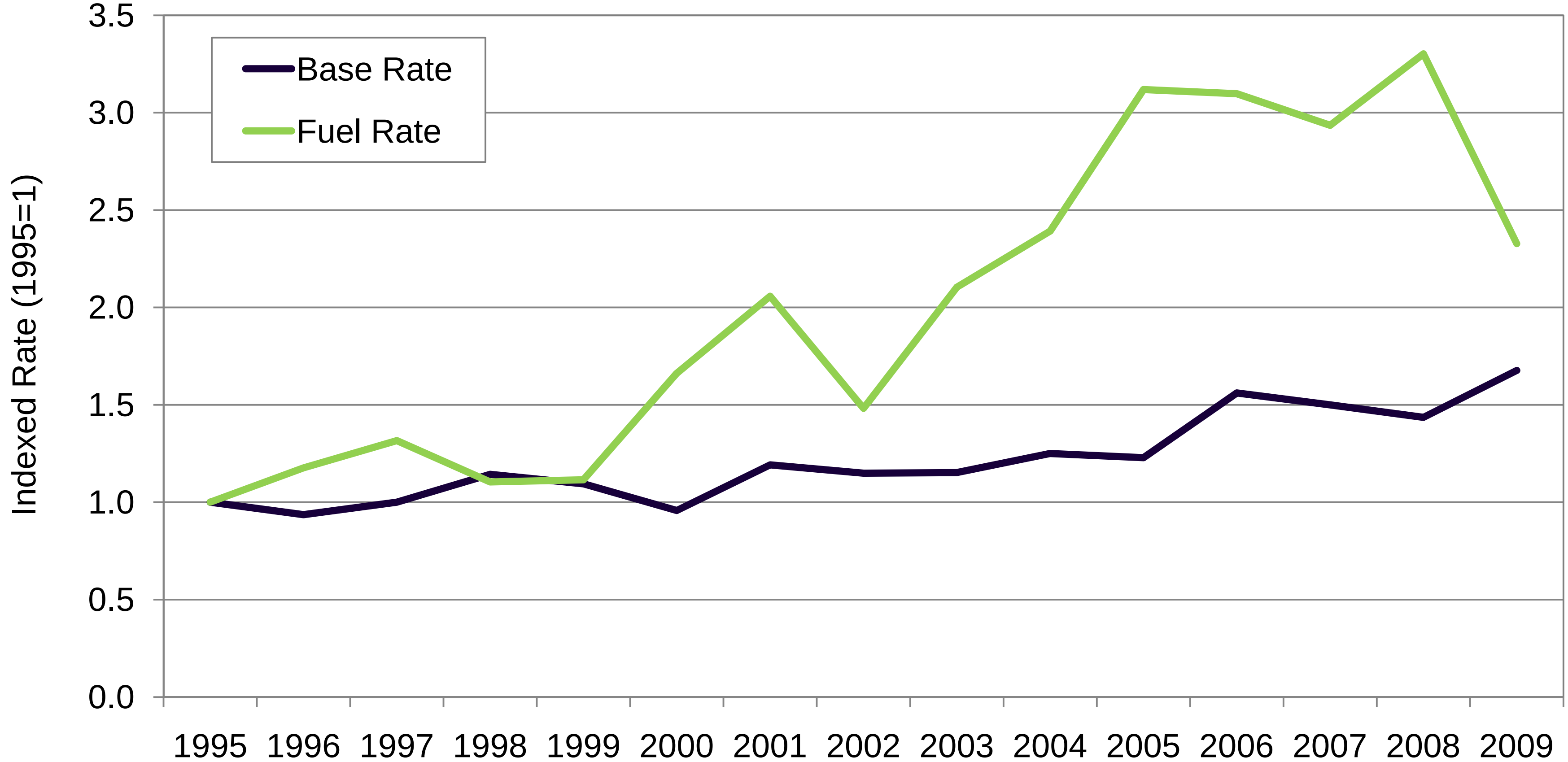
U.S. Base Rates as a Share of Total Retail Rates – Electric and Natural Gas



Source: Federal Energy Regulatory Commission.

Annual Percent Change in Base Rate versus Fuel Rate – Natural Gas

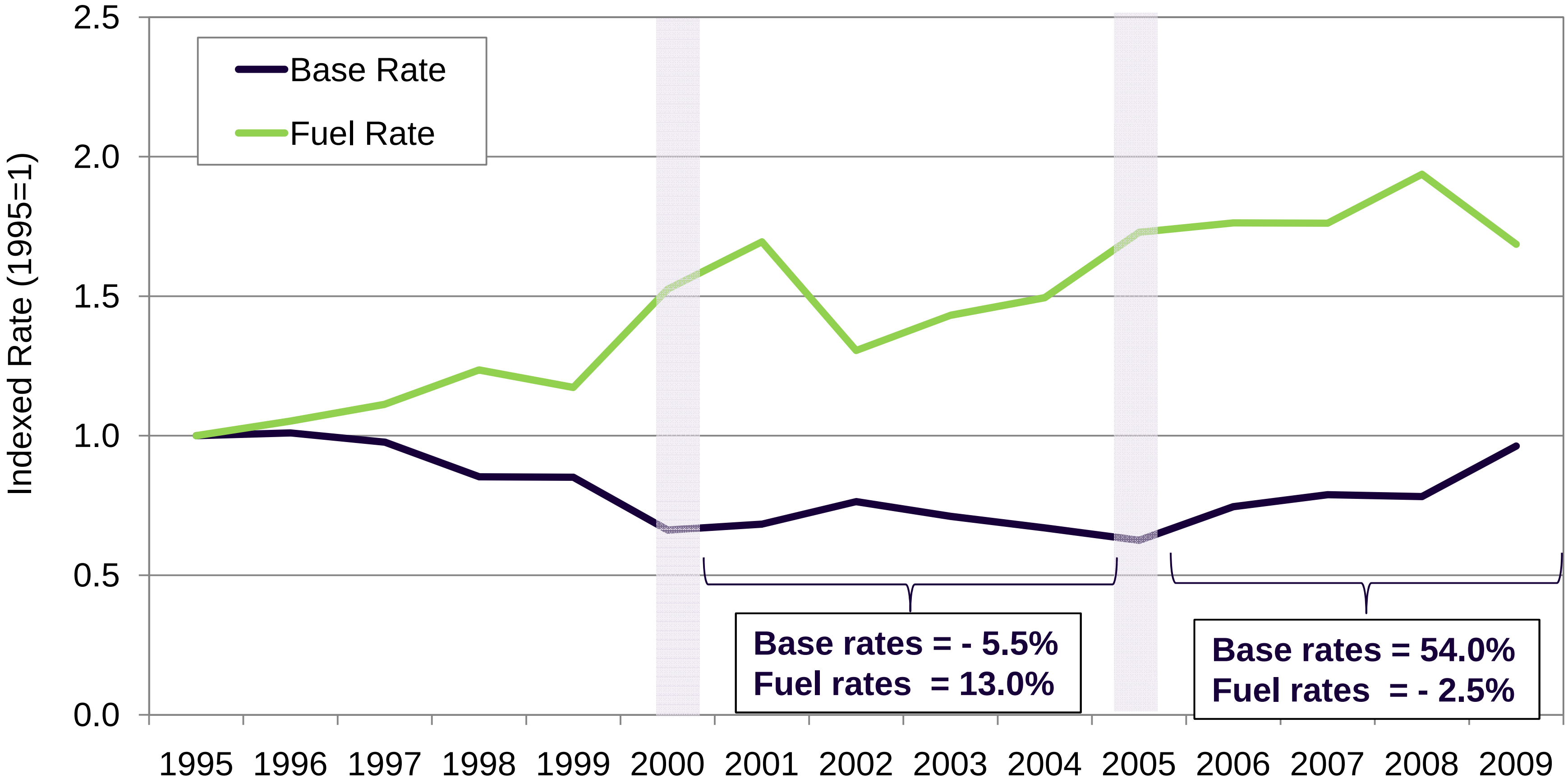
Base rates (gas) have increased by as much as 36 percent since 2005, compared to fuel rates that have decreased by 25 percent.



Source: Federal Energy Regulatory Commission.

Annual Percent Change in Base Rate versus Fuel Rate – Electric

Base rates (electric) are reaching levels comparable to 1995. Base rates have increased by as much as 54 percent since 2005, compared to fuel rates that have actually decreased 2.5 percent.



Source: Federal Energy Regulatory Commission.

Regulatory Issues – Risk and Uncertainty

- **Carbon regulation, and new forms of environmental regulation can lead to both risk and uncertainty.**
  - Risk: quantitatively susceptible measure of the consequences of a bad outcome occurring. (probability of bad event times the consequences of bad event occurring).
  - Uncertainty: subjective measure of the consequences of a bad outcome occurring. (difficulty in discerning probably and/or outcome).
- **There are costs for both risk and uncertainty and one of the biggest, and most important regulatory issues in dealing with these challenges is assigning risk and uncertainty to various parties/stakeholders.**
  - Which parties are best suited to bear the cost of risk and uncertainty?
  - How are parties incented to bear risk and uncertainty? (rates v. ROE)
  - What rewards are offered if any? How does this fit into the existing obligation to serve?
  - Regulators and regulatory risk and uncertainty.
  - What contracting/performance standards are established?

Questions, Comments and Discussion

dismukes@lsu.edu

www.enrg.lsu.edu