
The Power in Your Future
Climate Change, Energy Policies and You

"With a shortage of electric capacity, huge increases in demand for power, and the cost of climate change, we have the making of

A PERFECT STORM!"

GLENN ENGLISH, CEO
NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Terms & Abbreviations

- Renewable Energy = RE
- Energy Efficiency = EE
- Climate Change = CC
- Renewable Portfolio Standard = RPS
- Carbon Dioxide = CO_2
- Sulfur Dioxide = SO_2
- Nitrogen Oxide = NOx
- FGD = Flue Gas Desulfurization

What factors are shaping the debate on our energy future?

- Global climate change (CC) debate
- Rising levels of greenhouse gases may be linked to global warming.
- Imported fuel dependency.
- Reliance on coal for electric generation -- major CO_2 emitter.
- Need to increase renewable energy to reduce CO_2.
- Possible CO_2 tax or Cap-and-Trade system.
- New coal/nuclear base load is needed

Special challenges in Ohio

- Buckeye State significantly affected by federal CC legislation
- Ohio General Assembly new Energy Bill might include a Renewable Portfolio Standard (RPS)
- RPS means utilities adding wind, solar or other renewable energy

Renewable energy (RE) is not an issue Electric Cooperatives can ignore!

Gov. Strickland's Energy Bill recognizes the self-regulated, member-owned nature of Ohio's electric cooperatives. This will exempt us from RPS requirements BUT…

- Many electric cooperative members want RE in the power they purchase.
- Ohio electric cooperatives developing some RE in local projects.
- RE demonstrates stewardship.

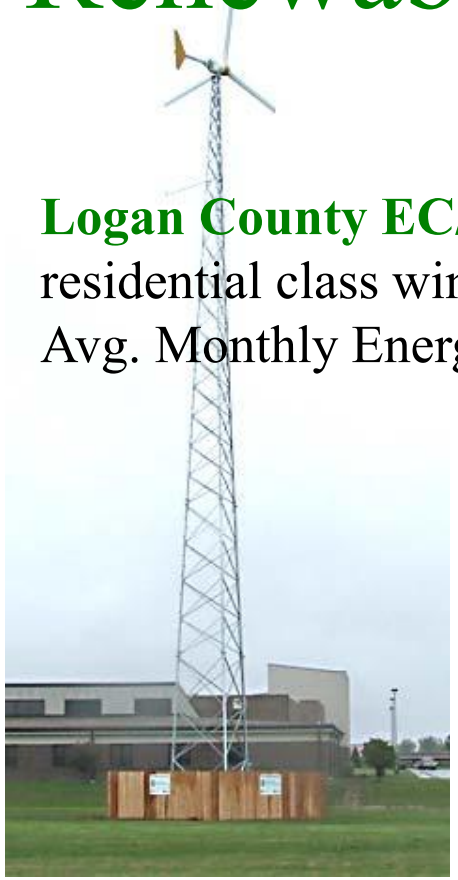
RE potential in Ohio

- Biomass digesters
- Solar panels
- Wind turbines
- Landfill methane
- Run-of-river hydro (uses existing dams)

- ≤25 KW residential distributed generation
- EnviroWatts Program

EnviroWatts℠
Earth Friendly Energy Alternatives

Renewable projects…



Logan County EC/Indian Lake HS
residential class wind turbine
Avg. Monthly Energy Output 583 kWh

Butler REC/Miami University solar panels
Avg. Monthly Energy Output 250 kWh

Auglaize County
Wenning Poultry Farm – Biodigester
Est. Avg. Monthly Energy Output 1.8 megawatts

EnviroWatts℠
Earth Friendly Energy Alternatives

Renewable Energy won't be enough!
U.S. Energy Consumption:

- 98.2 quadrillion Btus* annually
- 40% petroleum
- 23% coal
- 23% natural gas
- 8% nuclear
- 4% hydro and other

** Total combined including transportation*

Renewable Energy is not a 'silver bullet'

- Wind and solar power is **LESS THAN ONE HALF OF ONE-PERCENT** of national energy mix
- Doubling RE will have a **SMALLER *NET EFFECT*** on energy consumption and CO_2 emissions than reported

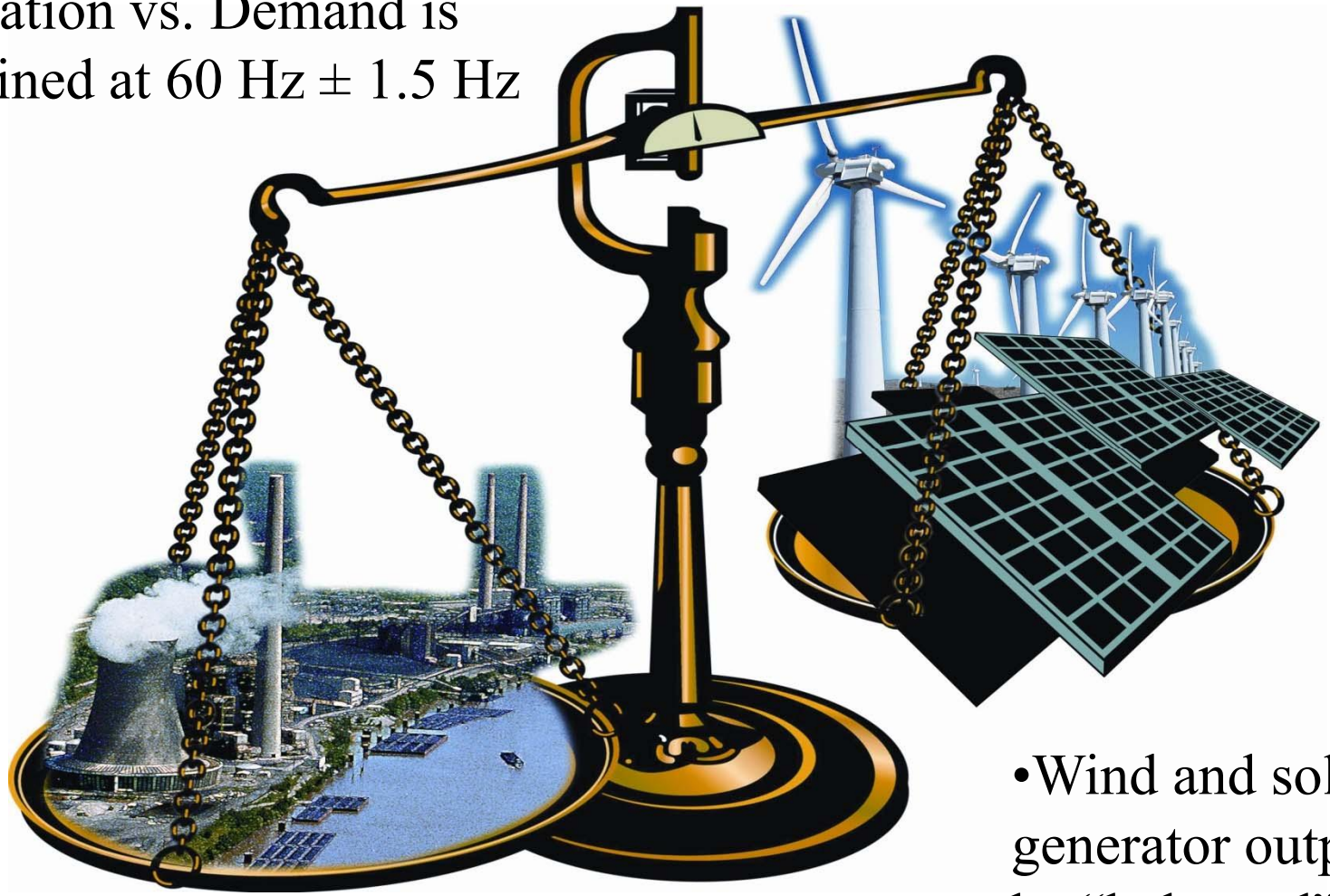
RE carries a hefty price tag…

- Equipment and material costs soaring due to international demand
- Community/environmental opposition
- Transmission must be addressed to get RE output on to the grid

- RE is intermittent output and must be balanced by swing generation
- Who'll pay for standby power?

Grid "Balance"

•Generation vs. Demand is maintained at 60 Hz ± 1.5 Hz



•Wind and solar generator output must be "balanced" with swing generators

Unrealistic Wind Expectations

Environment Ohio says 20 percent of Ohio's electricity can come from wind turbines on Lake Erie

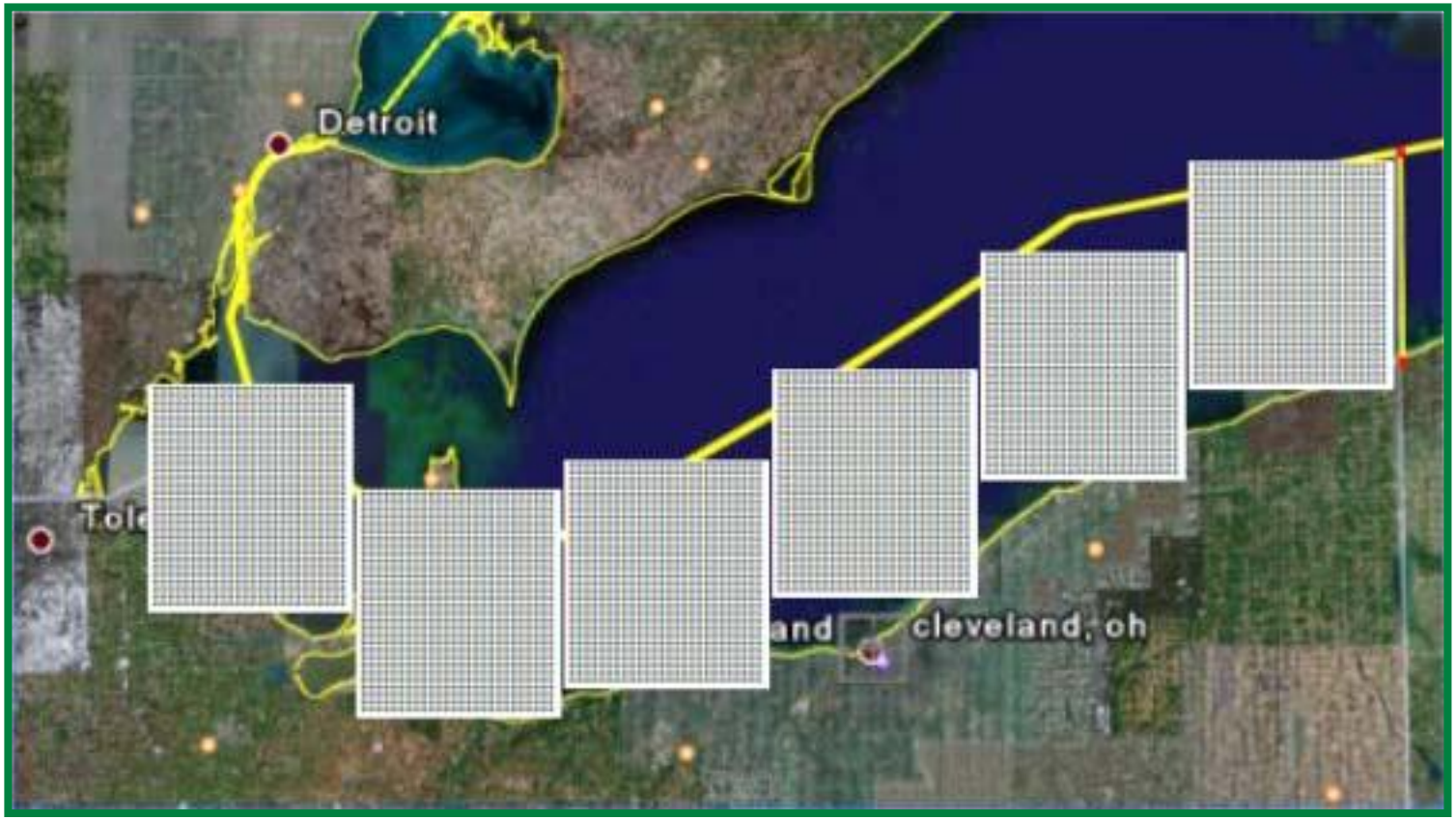
Ohio's Annual Electric Use	160 million MWH*
20 percent of Annual Electric Use	32 million MWH
2 MW Wind Turbine Output	6,154 MWH
Number of Wind Turbines Needed	5,200

*EIA/DOE Data Tables for 2005

** Based on 35% Annual Capacity Factor

5,200 Wind Turbines
In Ohio's portion of Lake Erie

30 Wind Turbines North-South by
175 Wind Turbines East-West



Wind Turbine Costs in Ohio

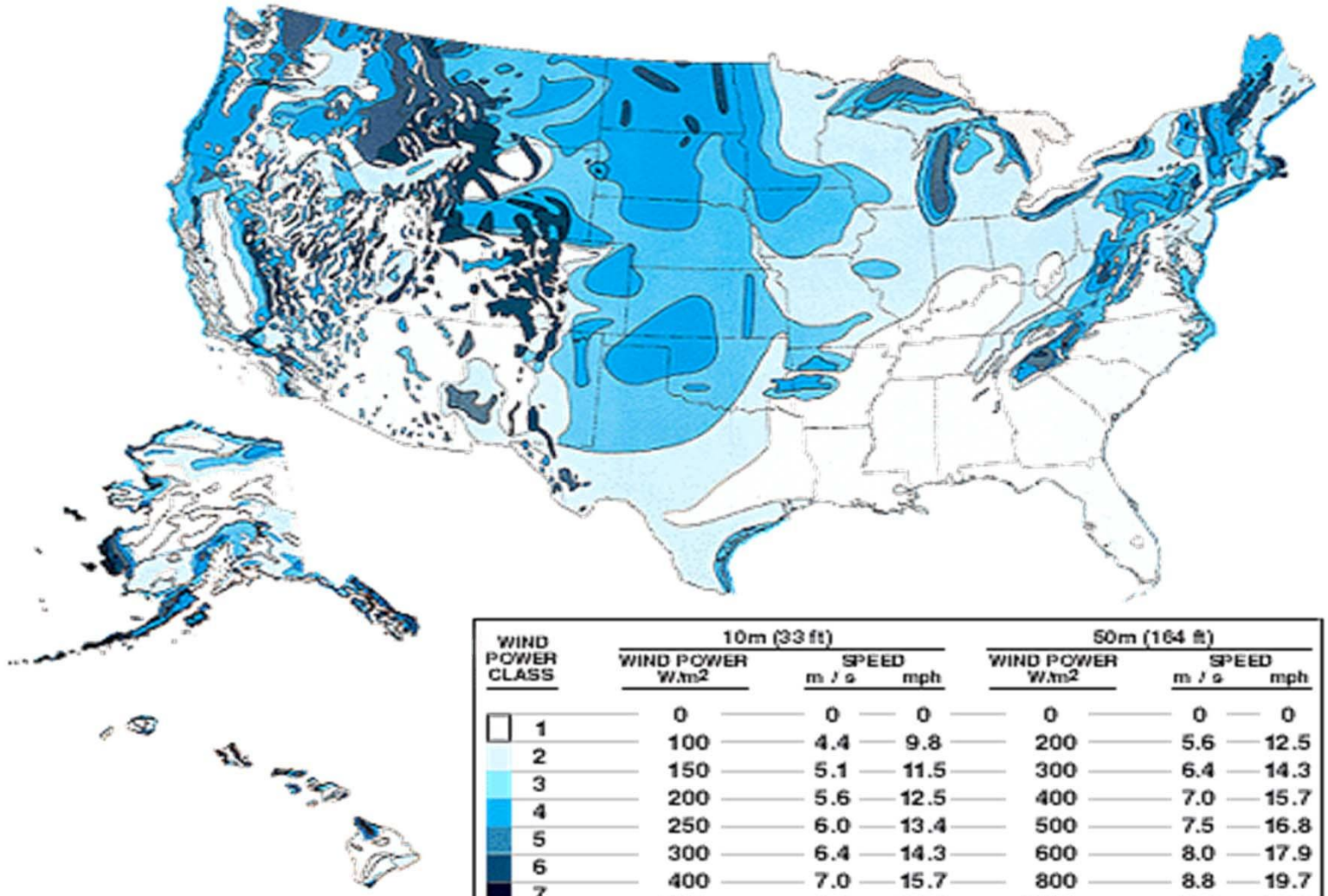
- $2,000/KW per turbine
  Gross cost – 10¢/Kilowatt hour
- Replacing 10% of Buckeye Power's generation with wind turbines would require:

  260 2-MW turbines
  Total cost $1 Billion
  50-acre per turbine
  13,000 total acres
- 20-25 percent capacity factor
- $17/month added to average electric bill

Despite RE limitations, we will need all the energy we can generate in the coming years!

- Help offset CO_2 emissions
- Diversified energy portfolios good idea in long run
- Reduces dependence on foreign fuel
- Huge investments in transmission grid required

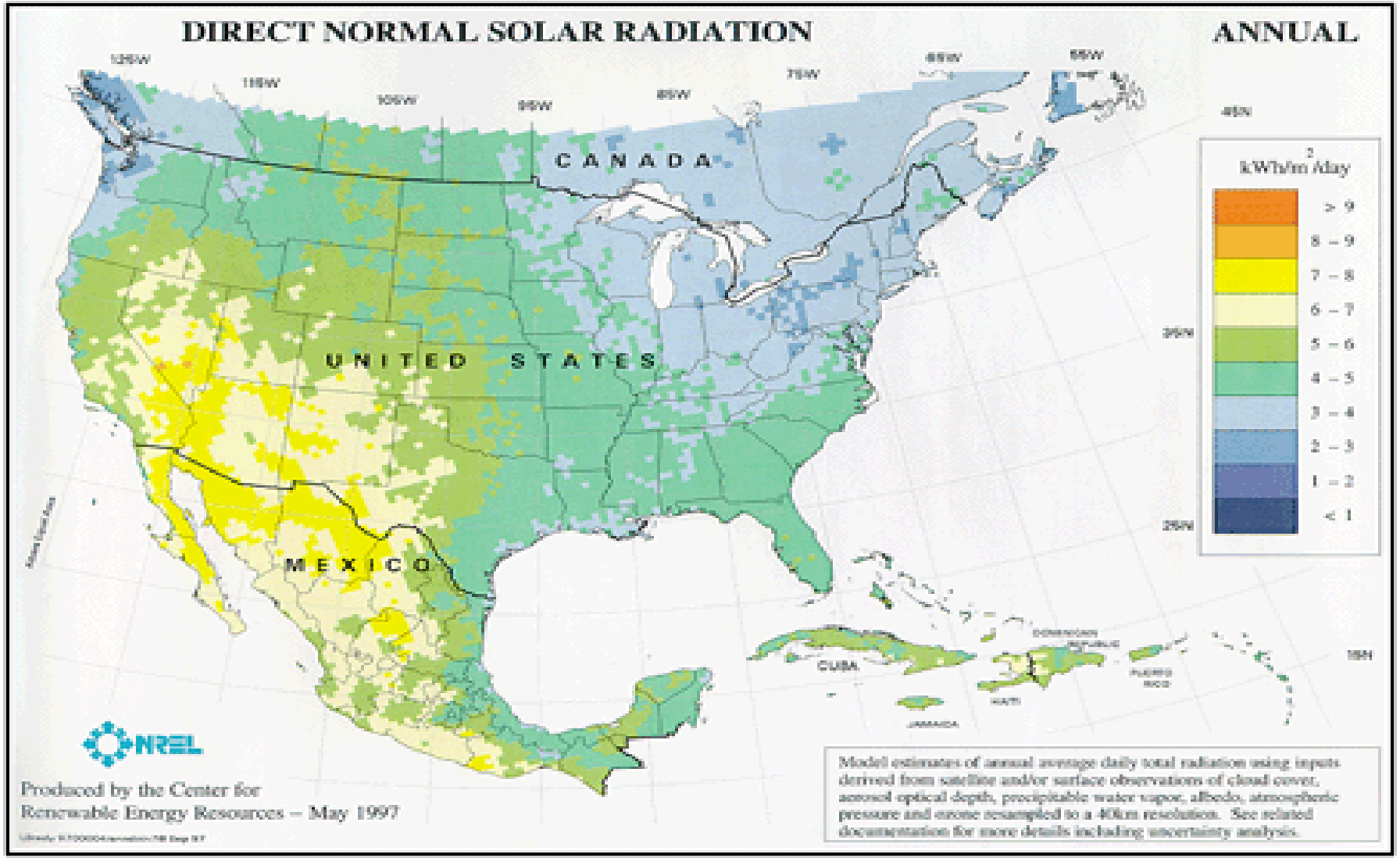
Wind Power Map



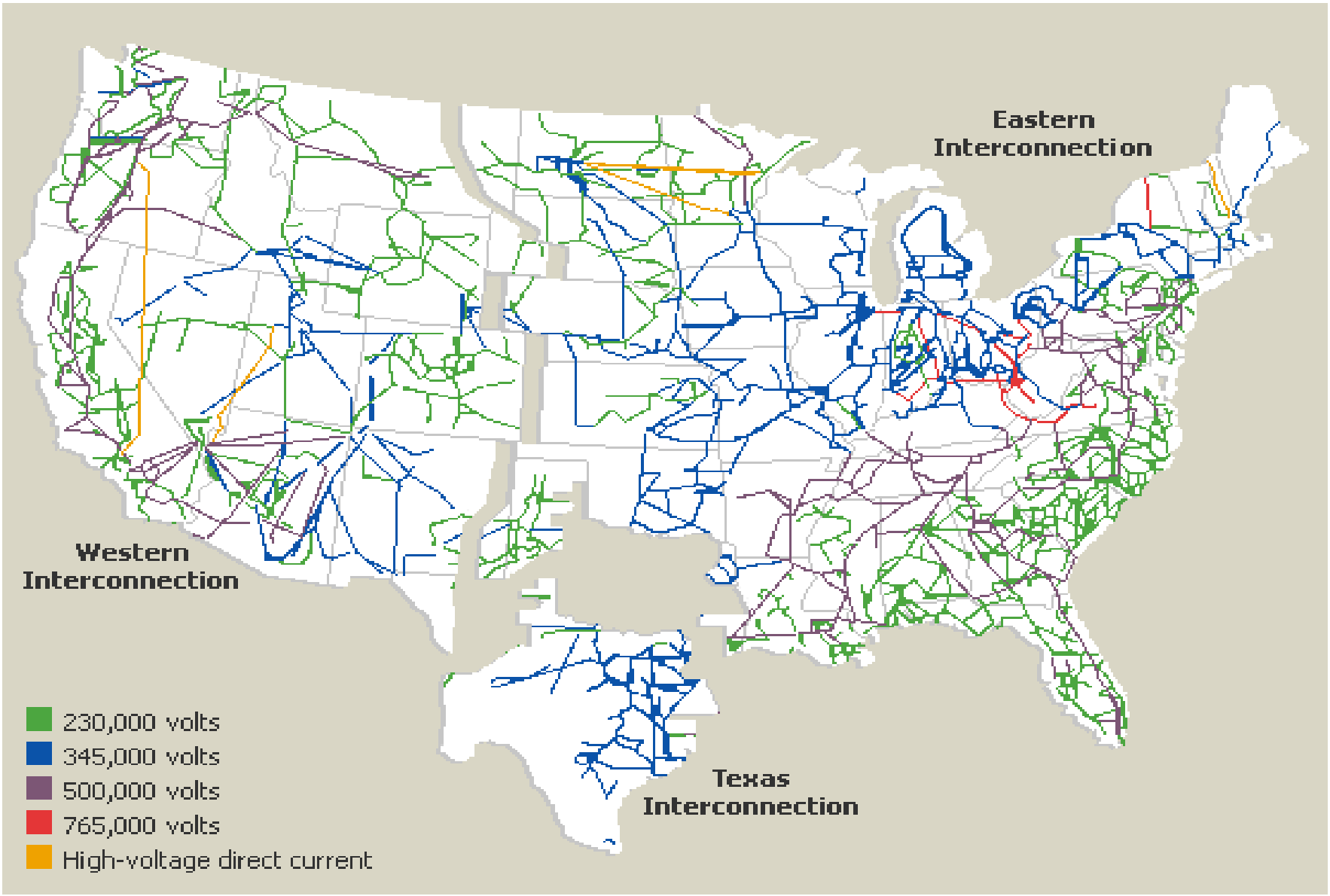
WIND POWER CLASS	10m (33 ft) WIND POWER W/m2	10m (33 ft) SPEED m/s	10m (33 ft) SPEED mph	50m (164 ft) WIND POWER W/m2	50m (164 ft) SPEED m/s	50m (164 ft) SPEED mph
1	0	0	0	0	0	0
2	100	4.4	9.8	200	5.6	12.5
3	150	5.1	11.5	300	6.4	14.3
4	200	5.6	12.5	400	7.0	15.7
5	250	6.0	13.4	500	7.5	16.8
6	300	6.4	14.3	600	8.0	17.9
7	400	7.0	15.7	800	8.8	19.7
	1000	9.4	21.1	2000	11.9	26.6

RIDGE CREST ESTIMATES (LOCAL RELIEF > 1000 FT)

Direct Solar Radiation

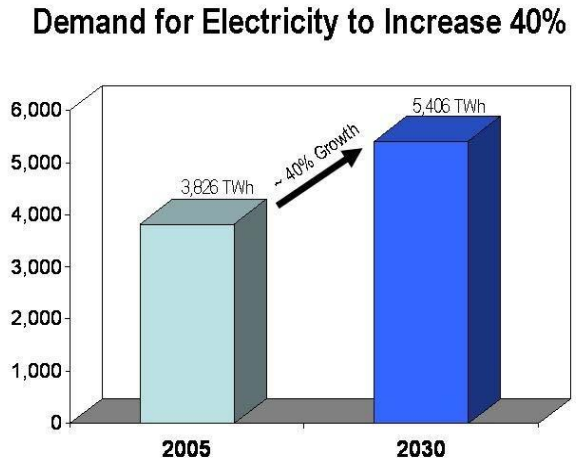


Transmission Grid's Gridlock



Electricity demand will soon outpace base load generation!

- **U.S. electricity demand UP 136% since 1970**
- **Electricity demand will GROW 40% in 26 years!**



EIA (the Energy Information Administration) is projecting that demand for electricity will increase approx. 40% over the next 25 years.

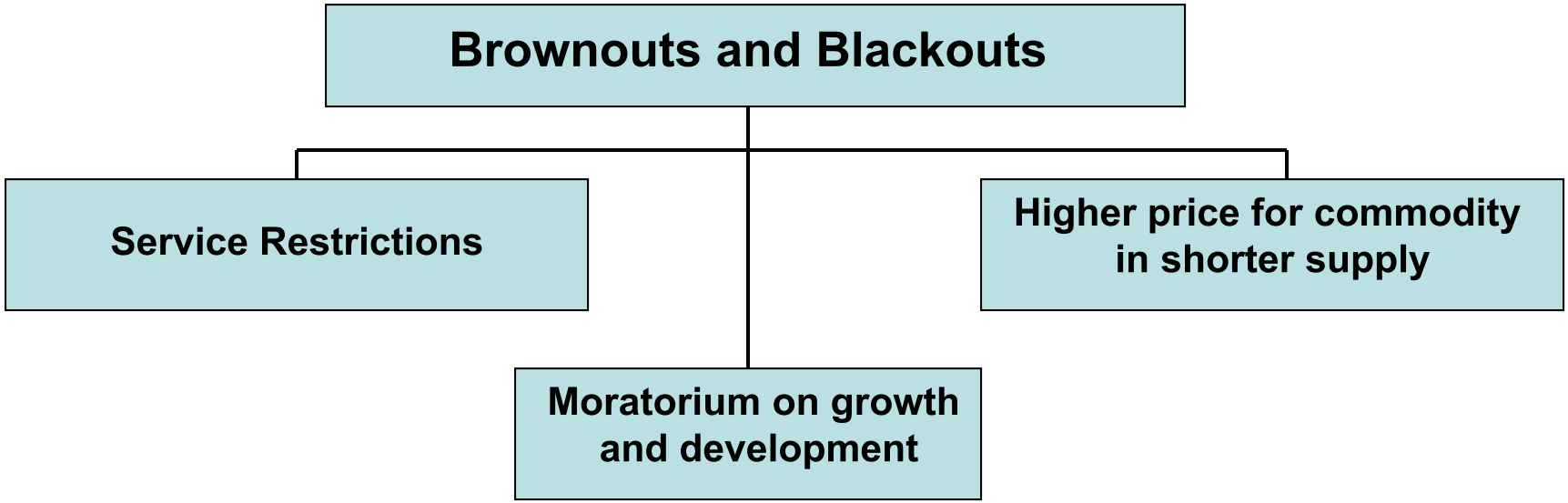
- **Electric industry's generating capacity will increase only 8.5% over the same period.** – *North American Reliability Corporation*
- **Reason = Uncertainty**

Source: EIA Annual Energy 2007 Outlook Assumptions, Reference Case Table A8, Total Net Generation.

What about new supplies?
Little new base load generation coming on-line or planned…

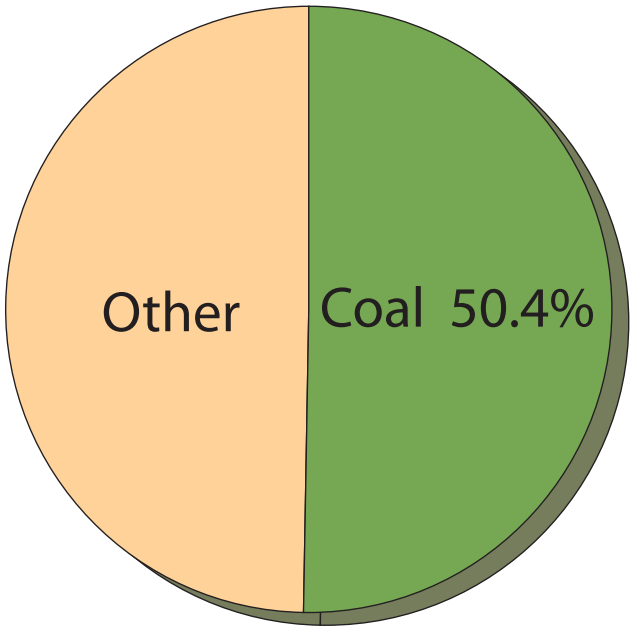
- Uncertainty over CO_2 legislation, technology and cost.
- Environmental groups oppose coal and nuclear power plants.
- Regulatory and legal hurdles mounting.

Base load generation shortfall may result in:

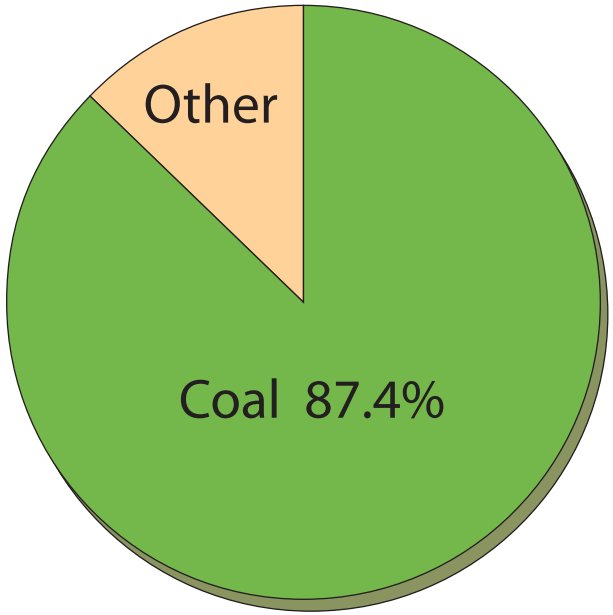


Why Coal?
It generates your power!

U.S.



Ohio



1,000 kWh = 1 Ton CO_2 emissions

U.S. DOE - EIA 2006

Abundant, Cheap & Domestic

What Role for coal?

Problem -- burning coal produces SO_2, NOx, mercury, particulates, and CO_2. Technology exists to clean up most flue gases.

No type of technology is available to capture CO_2.. Sequestration might not be ready until 2020 or later!

Coal keeps the lights on!

Today, more than 95% of the coal mined in the U.S. is used domestically for a single purpose: generation of electricity.

-- From the 'Coal Leader,' June-July, 2007

- 300 million residential "solar roofs" to replace coal generation.
- 860,000 utility scale wind turbines to equal coal generation.

Buckeye Power's 2199 MW generating capacity:

- **Cardinal Station units 2 & 3 = 1230 MW of coal base load**
- **OVEC (Kyger Creek & Clifty Creek) = 203 MW coal base load**
- **Mone & Greenville plants = 711 MW of gas peaking**
- **New York Power Authority (hydro) = 55 MW**

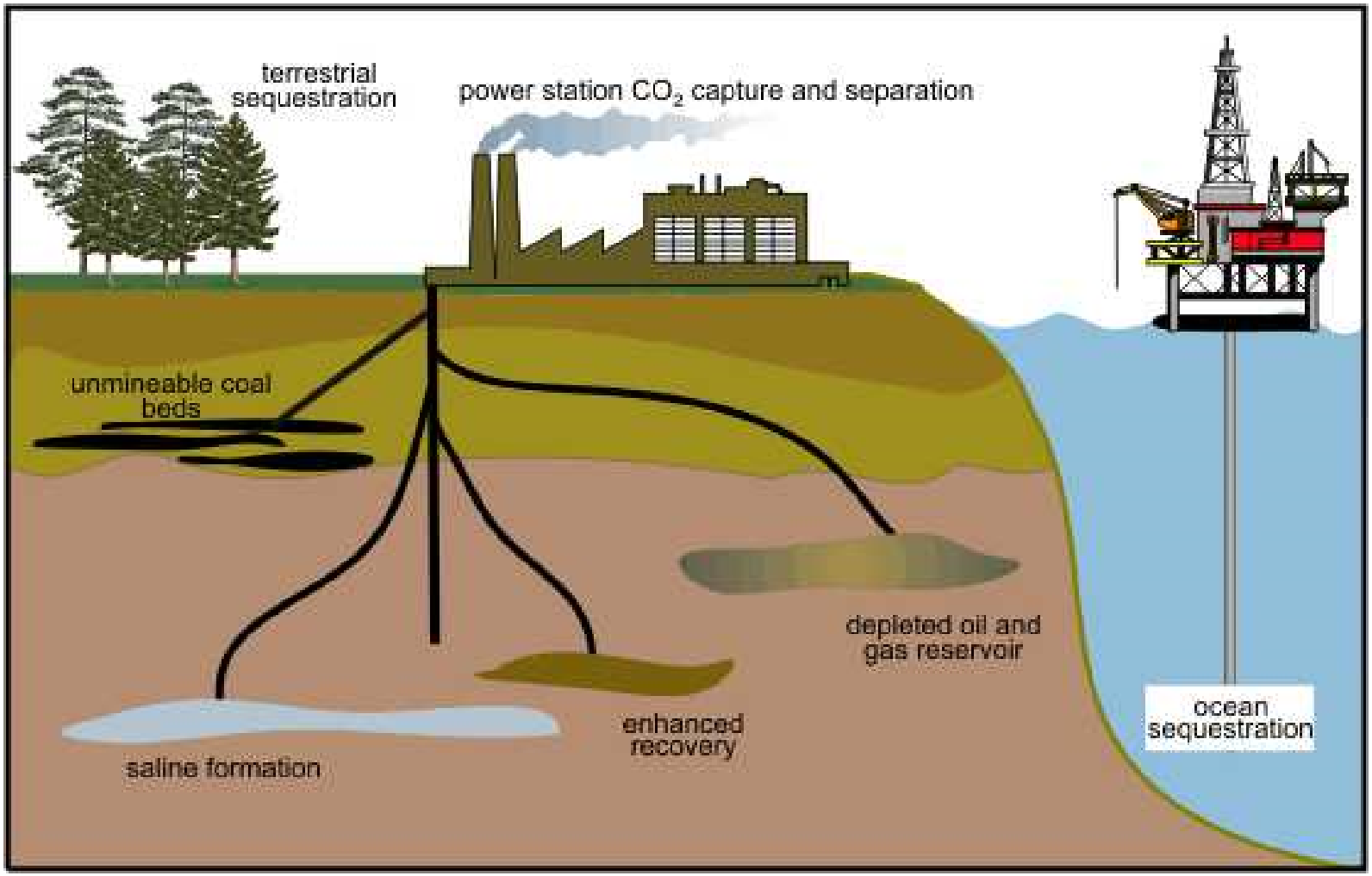
Renewable energy generation is coming on-line
with large and small projects across Ohio,
but **COAL** is **THE FUEL** that powers electric cooperatives.

Coal-fired plants can be modified to burn cleaner

- Flue gas desulfurization units (FGDs), scrubbers, and precipitators remove SO_2, NOx, and particulates.
- Buckeye Power retrofitted Cardinal Station Unit 2 – one of cleanest coal-fired generators in the world; Unit 3 is next.
- **$700 MILLION!!!**
- Wholesale rates up 1.5 cents per kWh
- CO_2 may be next, possibly in 2020-2030. **Maybe……**

Carbon Sequestration???

However…Requires 30% of power plant capacity



Bio Fuels from Algae???

A possible alternative for CO_2 capture

Biodiesel

Algae = 3,000-8,000 gal/acre

Corn = 18 gal/acre

Soybeans = 48 gal/acre

Ethanol

Corn = 370 gal/acre

Sugar Beet = 714 gal/acre

Switch grass = 1,150 gal/acre

Source: Global Petroleum Club

Arizona Public Service Co. test project with Green Fuel Technologies of Cambridge, MA

Avoids Food vs. Fuel Issues

Many believe coal-fired power plants should be shut down…

- Co-op members still owe **$1 BILLION** for Buckeye's coal plants
- Only realistic alternative today is nuclear base load generation

Coal is too valuable
a domestic resource to abandon…
Our energy security depends on it.

- The USA is the 'Saudi Arabia' of coal into the 23rd century
- With technology, coal can produce electricity cleanly, but…
- New technology solutions takes time – probably 20 years, and…

•R&D $$$ needed!

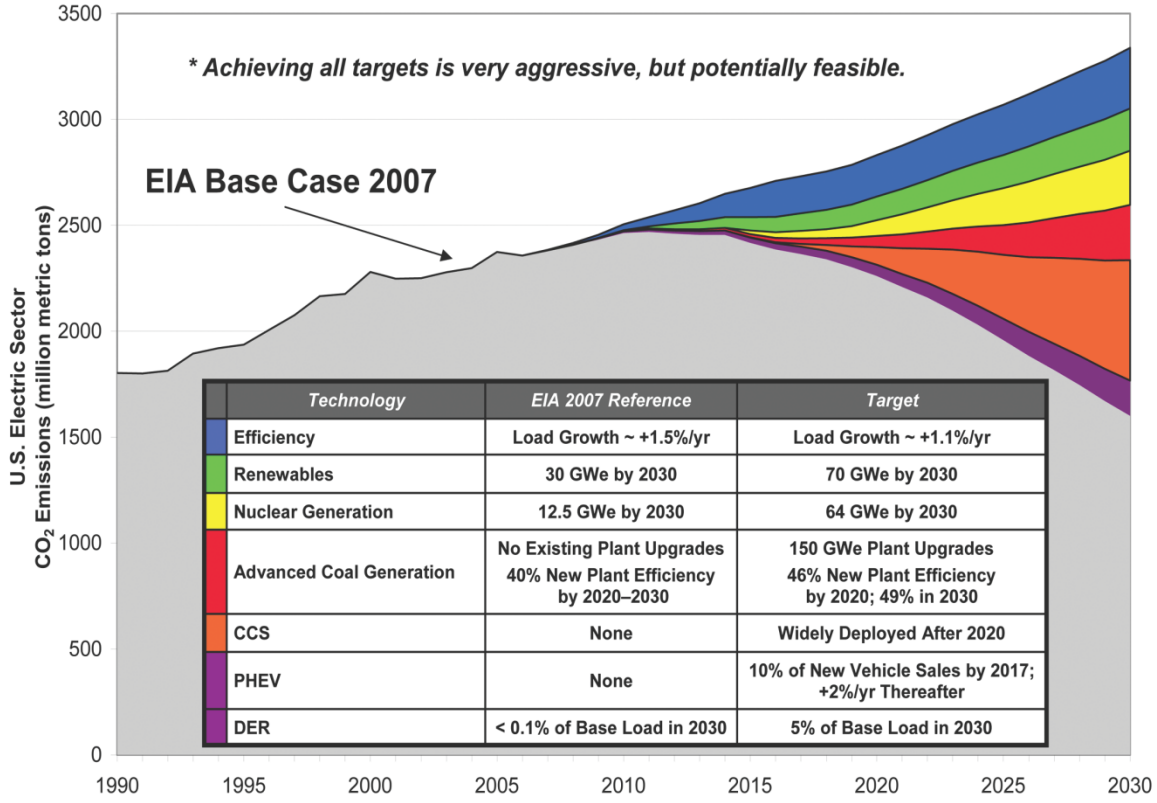
•EPRI estimates $30-$50 billion/25 years
•R&D rate impact 2.5%

The Electric Power Research Institute (EPRI)

PRISM Analysis

shows a way to reduce CO2 emissions without placing an undue burden on the American economy or affecting our quality of life

By combining advanced coal generation (new and retrofit), renewable energy sources, nuclear power, clean coal power plants (with CO_2 capture and storage), energy efficiency measures, Plug-In Hybrid Electric Vehicles, and Distributed Generation.



Technology	EIA 2007 Reference	Target
Efficiency	Load Growth ~ +1.5%/yr	Load Growth ~ +1.1%/yr
Renewables	30 GWe by 2030	70 GWe by 2030
Nuclear Generation	12.5 GWe by 2030	64 GWe by 2030
Advanced Coal Generation	No Existing Plant Upgrades 40% New Plant Efficiency by 2020–2030	150 GWe Plant Upgrades 46% New Plant Efficiency by 2020; 49% in 2030
CCS	None	Widely Deployed After 2020
PHEV	None	10% of New Vehicle Sales by 2017; +2%/yr Thereafter
DER	< 0.1% of Base Load in 2030	5% of Base Load in 2030

Attempts to legislate climate change policy could lead to economic disaster in the U.S.

•Whether or not they trust in the science of global warming, lawmakers feel compelled to act quickly

•Hastily drafted and ill considered climate change bill may be worse than the problem they are trying to solve…

The real 'inconvenient truth' has the potential to cost every American household!

Costs of CC Legislation

Climate change proposals currently circulating in Congress, if passed, could result in a 50-80 percent increase in wholesale power costs by the year 2020!

(Analysis by Charles River Associates)

A CO_2 tax of $50 per ton will add 5¢ to the wholesale rate for a kilowatt-hour of electricity… a 100 percent increase for Ohio electric cooperative consumers!

(Rep. John Dingell's carbon-tax proposal)

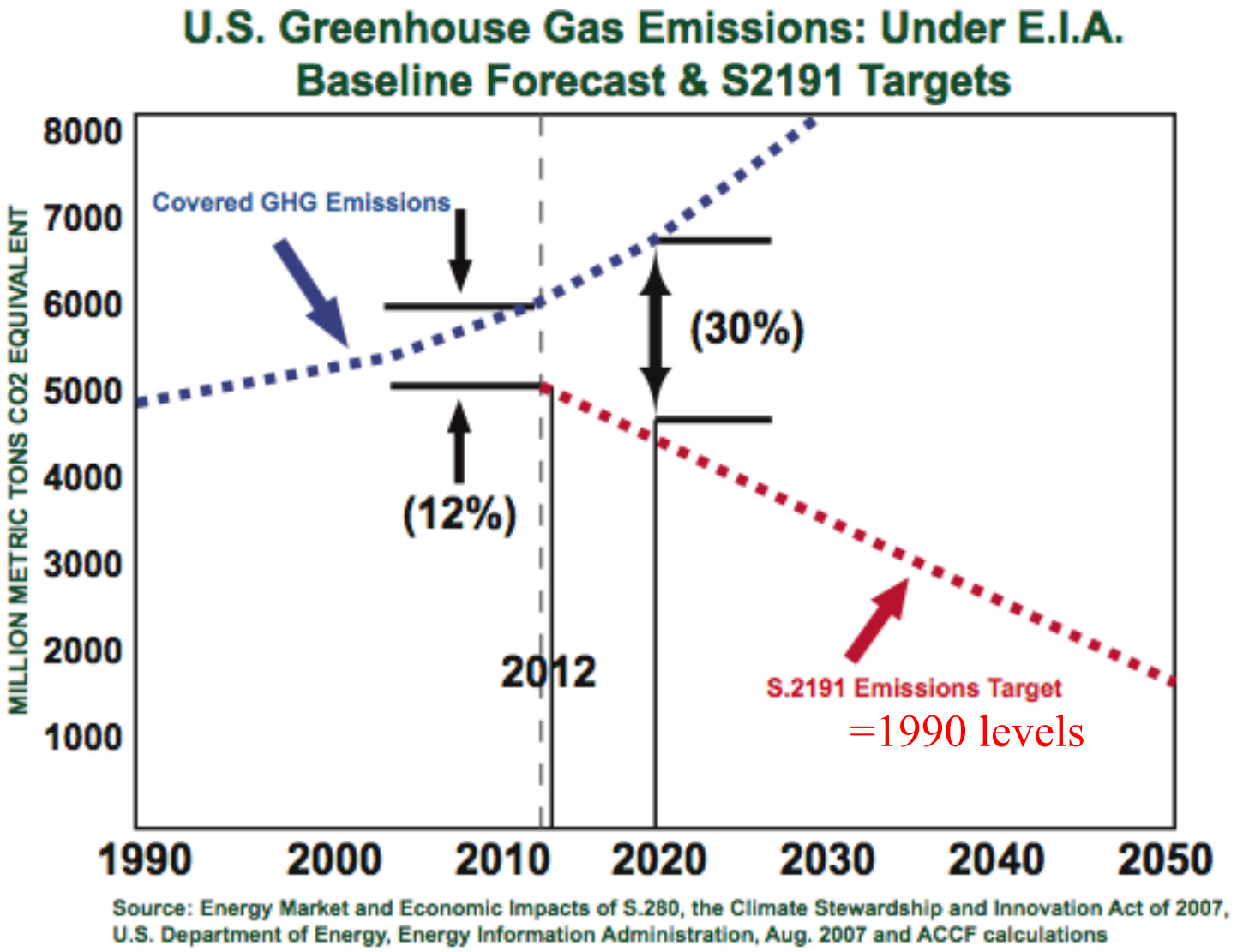
'Diverse, widespread, and fundamental change will occur in economic activity…'

(Charles River Associates)

"Lieberman-Warner Climate Security Act of 2007" (S.2191)

– approved 12/5/07 by the *Senate Committee on Environment and Public Works* and forwarded To the full Senate.

S.2191 requires substantial reductions In "covered emissions"



Emission Allowance Allocation SCHEME in S.2191

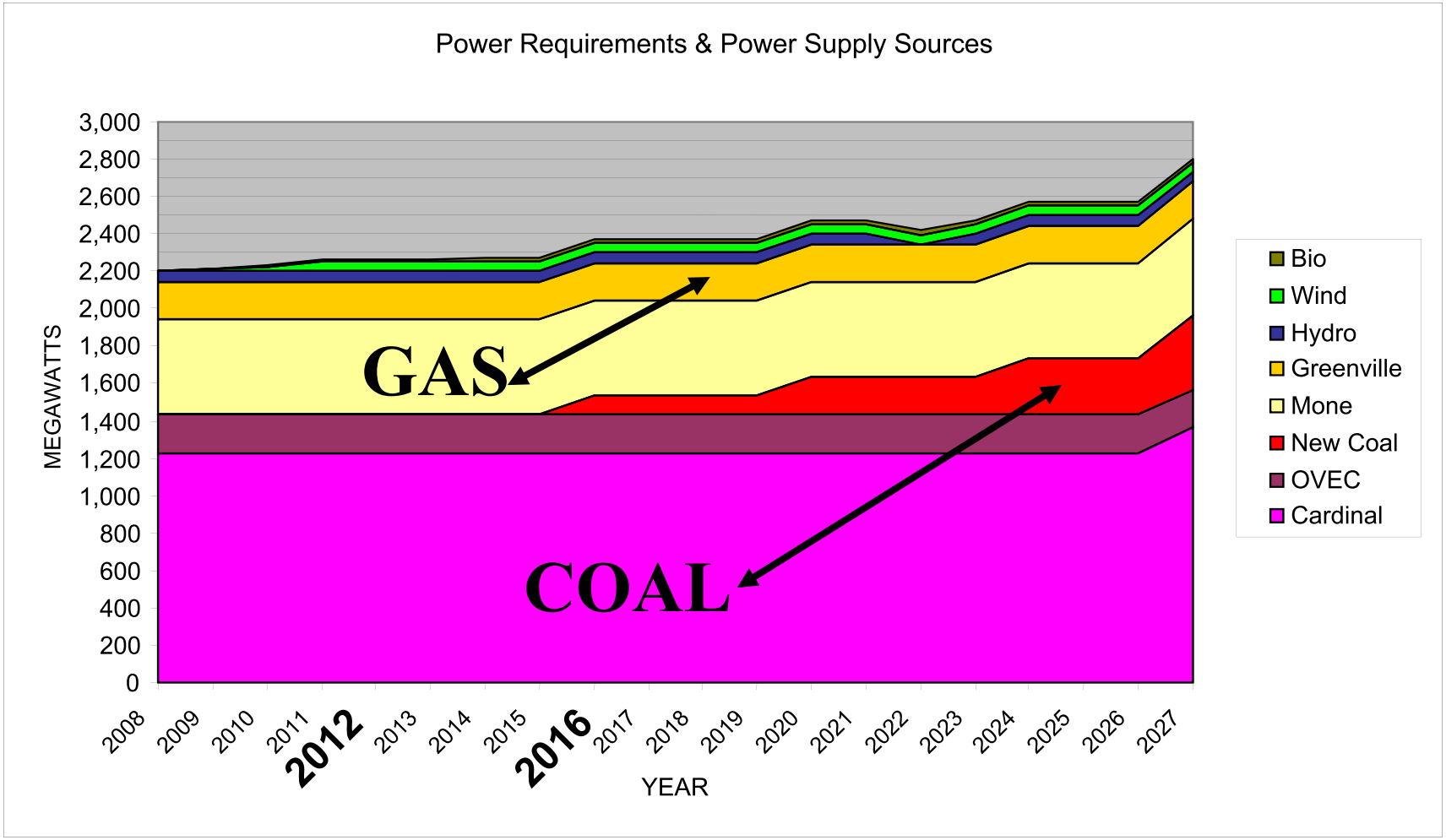
Electric generation sector produces **40%** of emissions, but gets only **19%** of allowances in 2012… and none after 2035! How will generators make up the balance? **BUY THEM IN THE AUCTION…**	Local utilities, called 'load-serving entities,' will receive **10%** of total emission allowances.	Industrial sector, directly linked to the health of the economy, will get **20%,** but when these are gone in 2035, where will the jobs go ? OVERSEAS ???	States share in **5%** of GHG emission allowances for energy efficiency programs, public transportation, and to mitigate the impact on low-income citizens.
Domestic agriculture and forestry will receive **5%** of the allowance total.	'Forest Carbon Activities' in foreign nations qualify for **3%** of the allowances!	'Tribal Communities' are earmarked for **0.5%** of the overall allocation.	**24%** of the allowances **AUCTIONED** by the Climate Change Credit Corporation.

S. 2191 cap & trade concerns

- The "Cap" = *maximum of "covered"* CO_2 *emission allowances allowed when the law is enacted*
- *5,200 million metric tons of* $C0_2$ *= "Cap"*

- *The number of available* CO_2 *permits decline each year creating a <u>legislated shortage</u>*
- *2012 electric utilities get 19% of total allowances, but emit 40% of* CO_2 *with no growth allowance*
- *Like a 'musical chairs' game… fewer chairs (allowances) every year drives up price as <u>fewer</u> permits are "traded"*
- *19% in effect until 2016, then <u>decrease</u> 1% each year to zero by 2035*

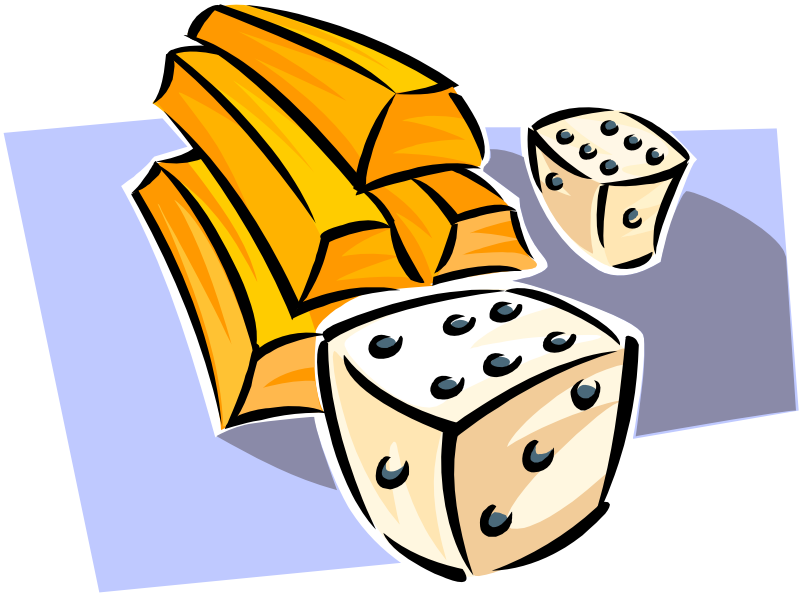
Buckeye Power Future Generation Needs



CO_2 'hard' cap is like rolling the dice

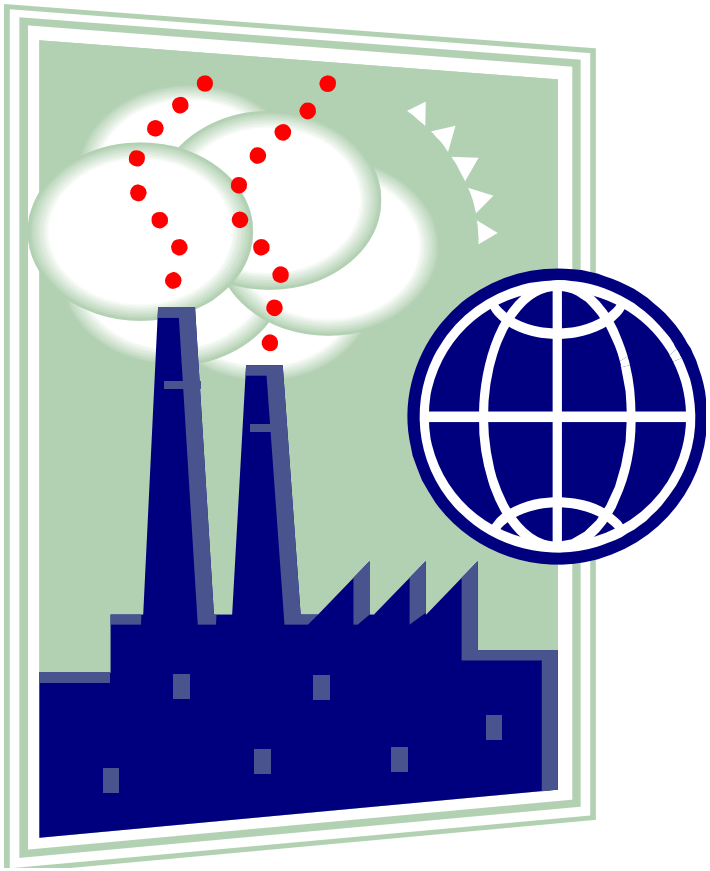
- Unlike a carbon tax, there would be no upper limit on the price of CO_2 allowances
- Emitters (electric companies) pass along costs as the declining cap forces allowance prices up
- How high? As high as necessary to reduce CO_2 emitting energy resources
- The cost for consumers will skyrocket without a **SAFETY VALVE**
- Who pays?

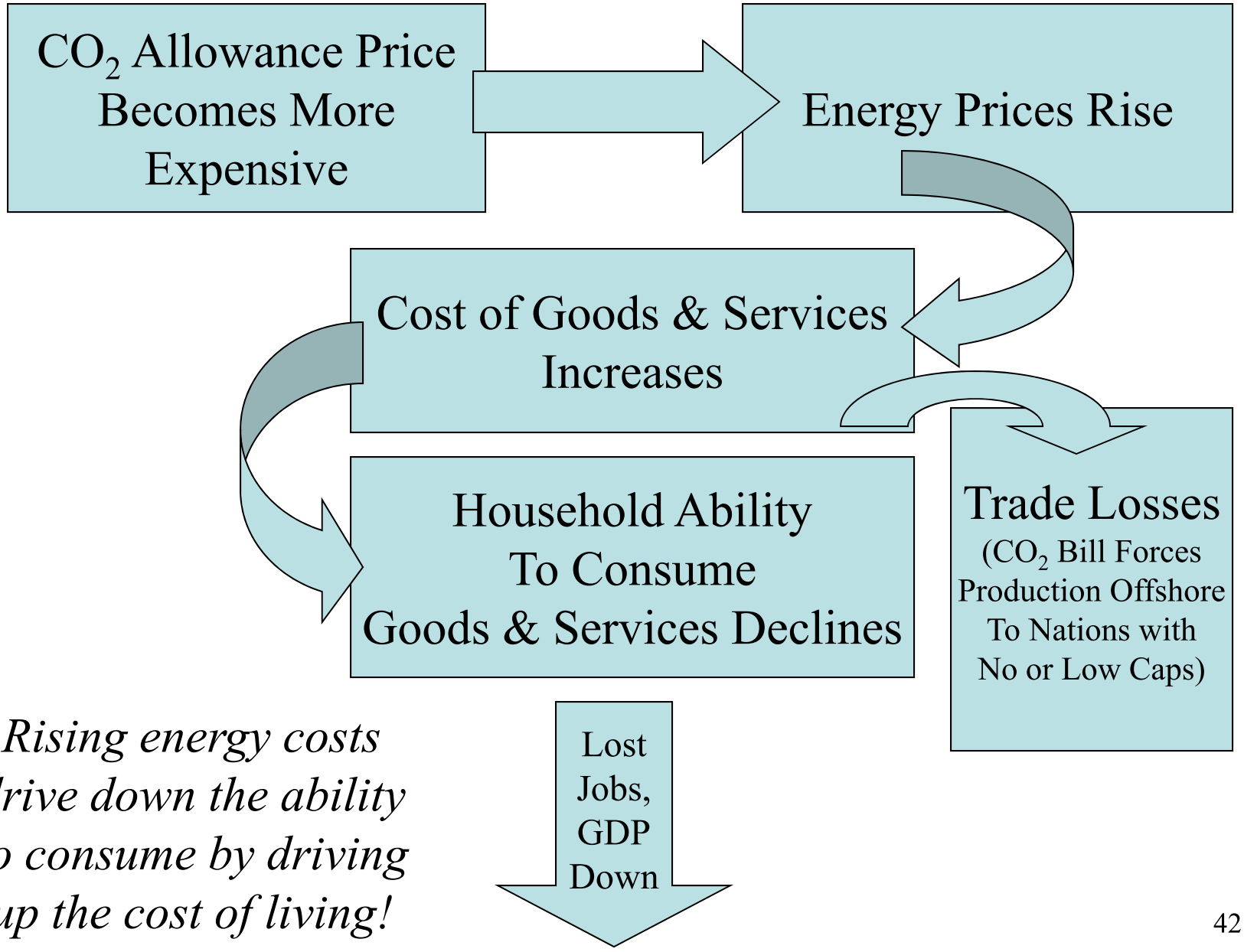
CONSUMERS



Who wins and who loses?

- Aggressive CO_2 reductions in the U.S. **won't offset** global greenhouse gas emissions if all countries don't play!
- China – one new coal plant every week!
- India and other emerging Asia economies aren't far behind increasing pollution
- Little or no environmental technology employed by these countries!





Rising energy costs drive down the ability to consume by driving up the cost of living!

S.2191 will increase fossil fuels prices

MIT estimates
CO_2 at $55/ton in 2015 (1)

Affect of CO_2 Adder	
1 gallon of gasoline	$ 0.49
1 gallon of diesel	$ 0.56
1000 ft3 of natural gas	$ 3.03
1 kw-hr from U.S. gen mix	$ 0.03
1 kw-hr from coal	$ 0.06

(1) "Assessment of U.S. Cap-and-Trade Proposals" MIT Report Issued by Joint Program on the Science and Policy of Global Change, April 2007

Affect of $55/ton CO_2 on The *typical* U.S. household

- $30–$60/month more for electricity
- $30–$50/more for gasoline
- $30–$50/month more for heating

TOTAL = $90–$160/month

Projected economic impact of Lieberman-Warner (S.2191) A

- **1-2% annual decline in GDP from pre-CO_2 cap levels…**
- **Household consumption of goods and services declines $4-$6 trillion…**
- **Reduction in annual per household spending of $750-$1,400 in 2015, up to $2,150 in 2030, and $3,000 in 2050**

Projected economic impact of Lieberman-Warner (S.2191) B

- **An estimated $300 billion per year for CO_2 allocations (emission permits)…**

  Equivalent to the current U.S. Defense Department budget or one half of Social Security transfer payments! *(Charles River Associates)*

- **By 2015 1.2 to 2.3 million net job losses and by 2020 1.5 to 3.4 million net job losses after adding in new "green jobs."**

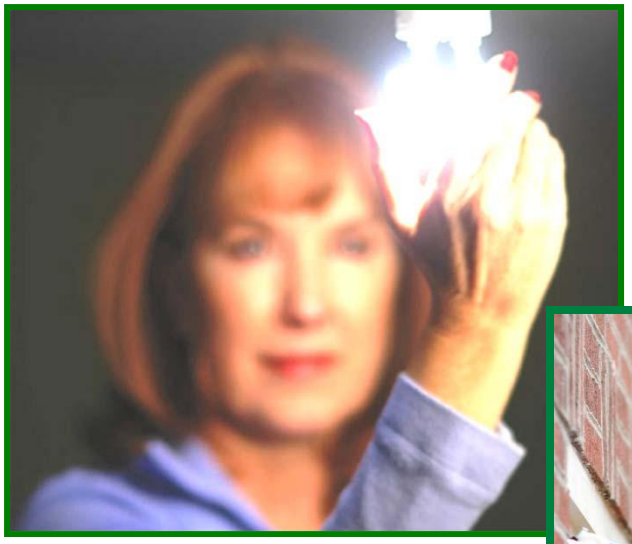
(Anne E. Smith, Ph.D S2191 testimony)

Higher energy prices will hurt economic development in rural communities

- **Costs will be borne disproportionately by households below $45,000/yr. in combined income.**
- **Low-income households will have more difficulty paying bills.**
- **Discretionary spending in the local economy will be reduced.**
- **Marginal businesses may not survive.**
- **Existing energy intensive businesses will leave – new ones won't come.**

What can I do?

Invest in Energy Efficiency



- Appliances and lighting
- Heating/cooling
- Insulation
- Weather-stripping
- Caulking
- Participate in Load management programs

Potential 9% Demand Savings over 20 years

Let's get REALLY serious about energy efficiency

- Conduct an EE audit of your home after consulting with your Electric Cooperative's Energy Services Advisor
- If Ohio is serious about energy efficiency,

  then Enforce Ohio building code

  -- 2006 International Energy Conservation Code adopted Jan. 1, 2008

  -- Yet not every Ohio county requires residential building inspections
- Houses and other buildings for sale should be energy-audited with blower door tests. Energy audit reports should be part of the real estate listing.

Keep informed on energy issues and state/national energy policies…

- **Oppose** unreasonable mandates that drive up price of electricity, impact standard of living, that do not address need for affordable energy and damage the national economy
- We still need affordable and abundant energy
- We need long-term strategy based on **reasonable** objectives, not frenzy and fear… and the plan must be flexible as knowledge and technology changes
- Remind legislators that energy and economy are interwoven. "Do no harm."

What else can you do? Become proactive!

- Sign up for the "Take Action" program
- Consider membership in the Co-op Owners for Political Action Committee **(ACRE)**
- Write/call your federal & state legislators

Niagara Falls NY – 1911

The next Ice Age predicted…

Message to federal legislators Re: Climate Change legislation

- Not all scientists agree with alarmist view of impending climate catastrophe
- Go Slow – do no harm to U.S. Economy and energy consumers
- U.S. reducing CO_2 will not reduce global CO_2 levels
- It will send American jobs to countries who don't play by same rules
- Consumers still need affordable electric bills.
- Carbon taxes or CO_2 allowances must have a $$$ ceiling

Message to federal legislators Re: Climate Change legislation

- CO_2 can be reduced, given time to develop new technology
- Adopt **realistic** reduction goals, based on best current technology available
- Provide funding for R & D of clean energy technologies -- renewables, bio fuels, clean coal, etc.
- Long-Term Answer = Make "Clean Energy" the cheaper alternative, rather than make "Dirty Energy" more expensive

QUESTIONS ? ? ?

"We in America do not have government by the majority but government by the majority that participate"

Thomas Jefferson, 1803

What is ACRE®

- Action Committee for Rural Electrification

- The political action committee (PAC) of the nation's electric cooperatives.

- Organized in 1966 to enable electric cooperative leaders and consumers to contribute campaign funds to candidates seeking federal legislative office.

What does ACRE® do?

Support political candidates who will speak for and protect the interests of electric cooperatives.