



cleanenergy.org

Southern Alliance for
Clean Energy



NC Global Warming Cornerstones

**Legislative Commission on Global
Climate Change
November 2008**

Overview



Energy Efficiency



Clean Energy

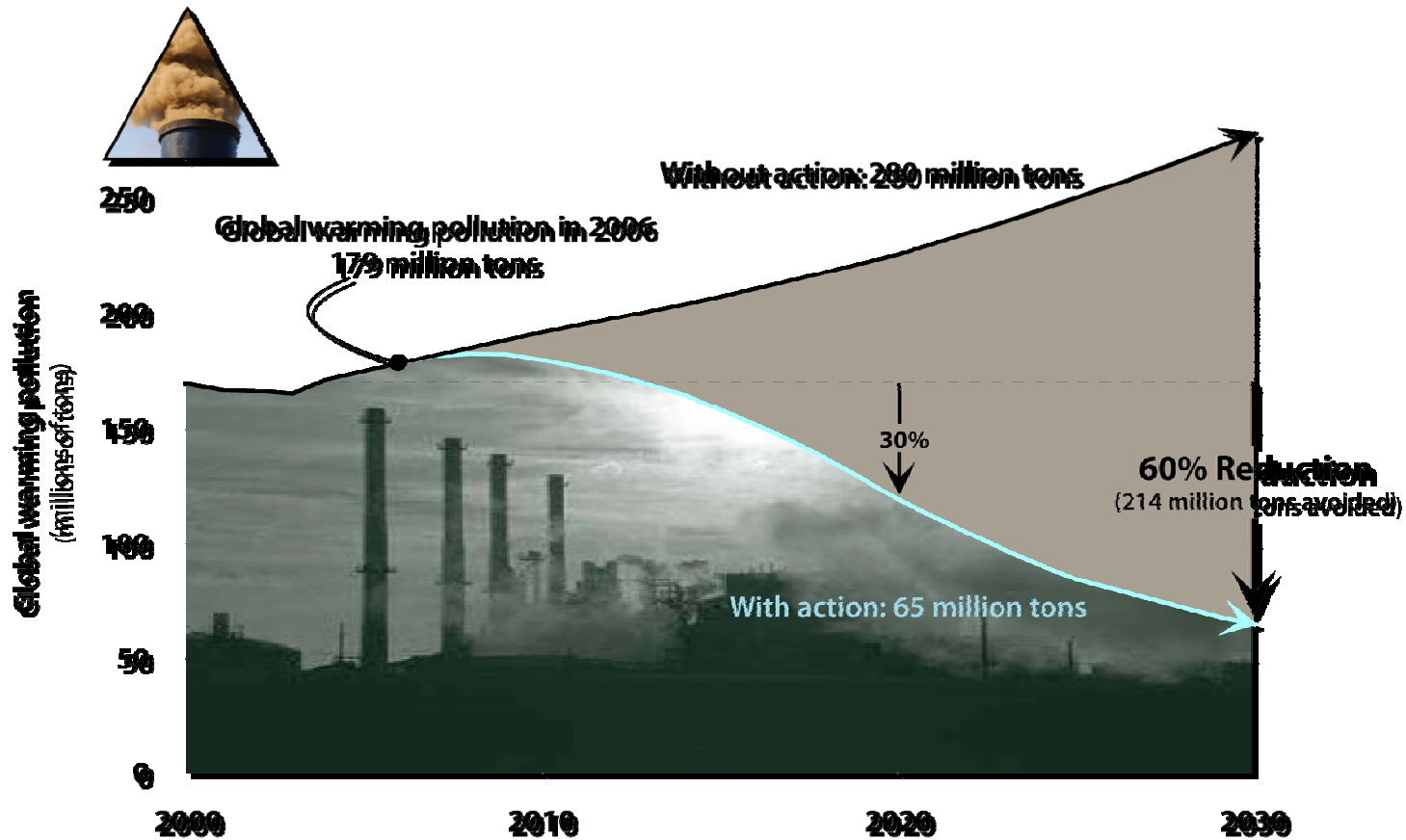


Pollution Capture



Long-Range Planning

Goal: 60% Reduction by 2030

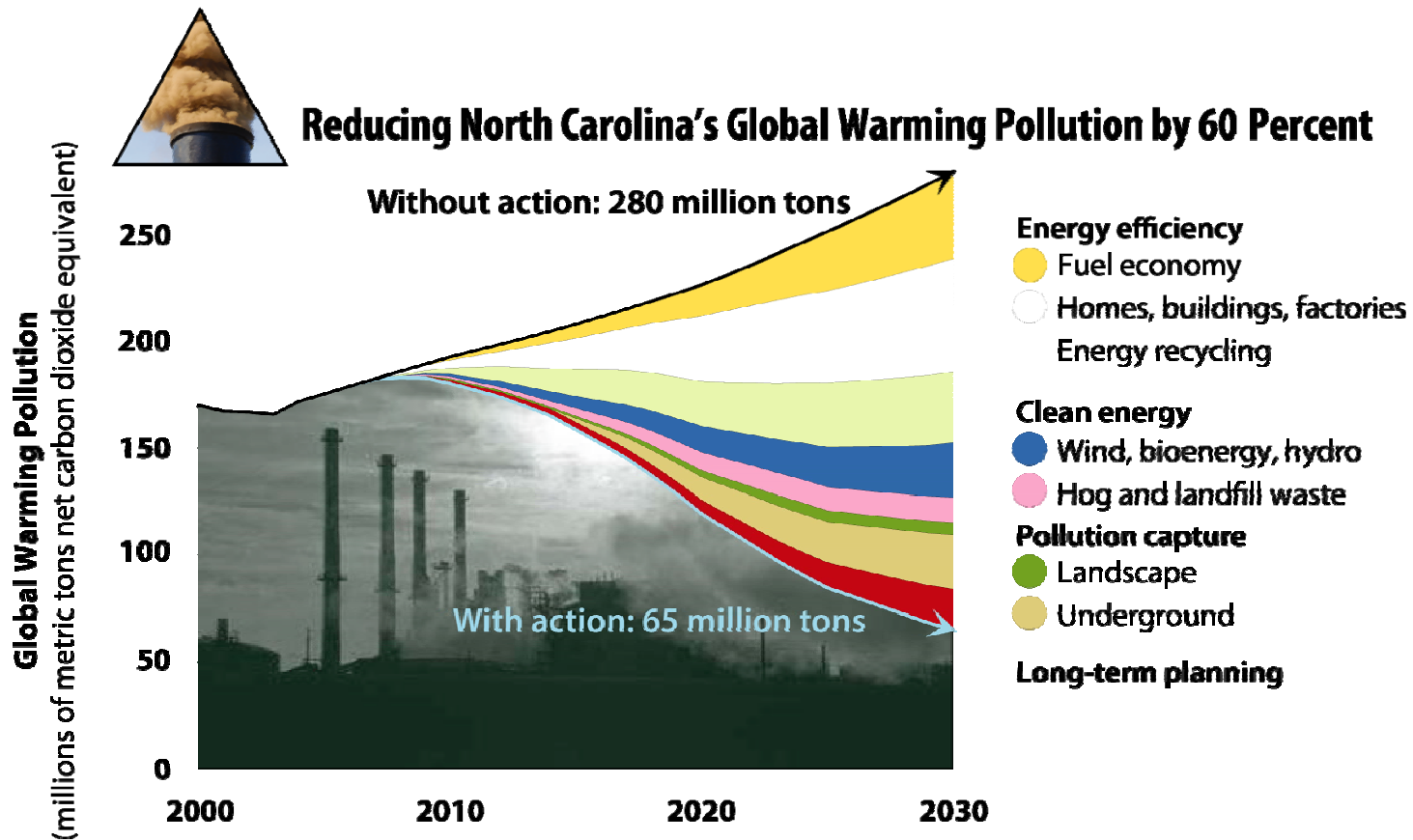


CAPAG ↔ Cornerstones

Year	CAPAG (million tons CO ₂ equiv.)	Cornerstones (million tons CO ₂ equiv.)
1990 – actual	136	n/a
2000 – actual	180	170
2010 – forecast	215	192
2020 – forecast	256	226
2020 – with policies	137	119
<i>Reduction vs 2000</i>	<i>24%</i>	<i>30%</i>

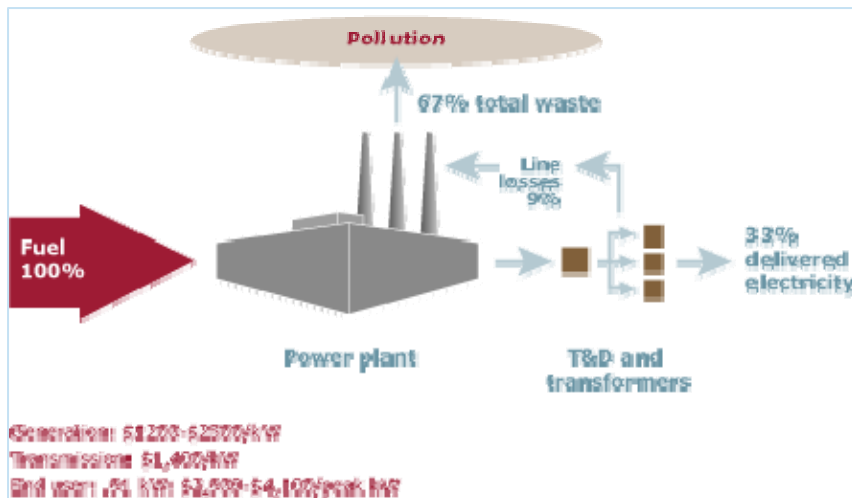
- **Cornerstones** draws on the CAPAG report, but includes updated data.
- Updated data and other adjustments resulted in lower emissions growth.
- **Cornerstones** urges somewhat more rapid and expansive policies.

Energy Efficiency: Highest Priority

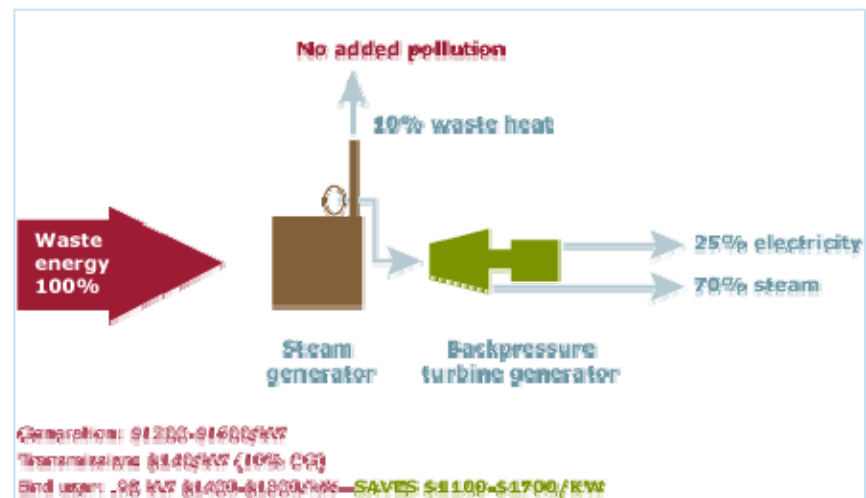


Energy Recycling

Conventional Central Generation

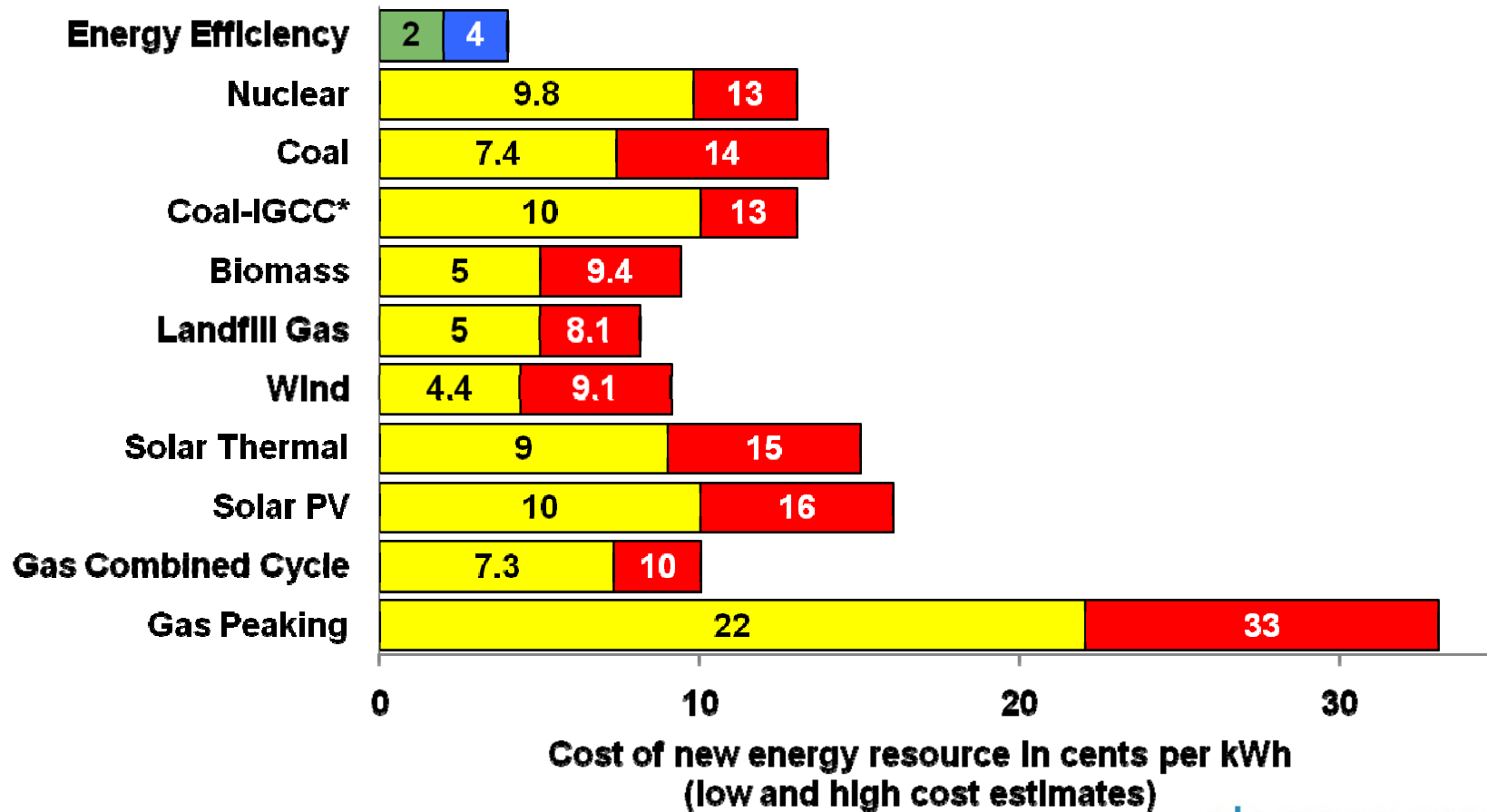


Recycled Energy (at user sites)



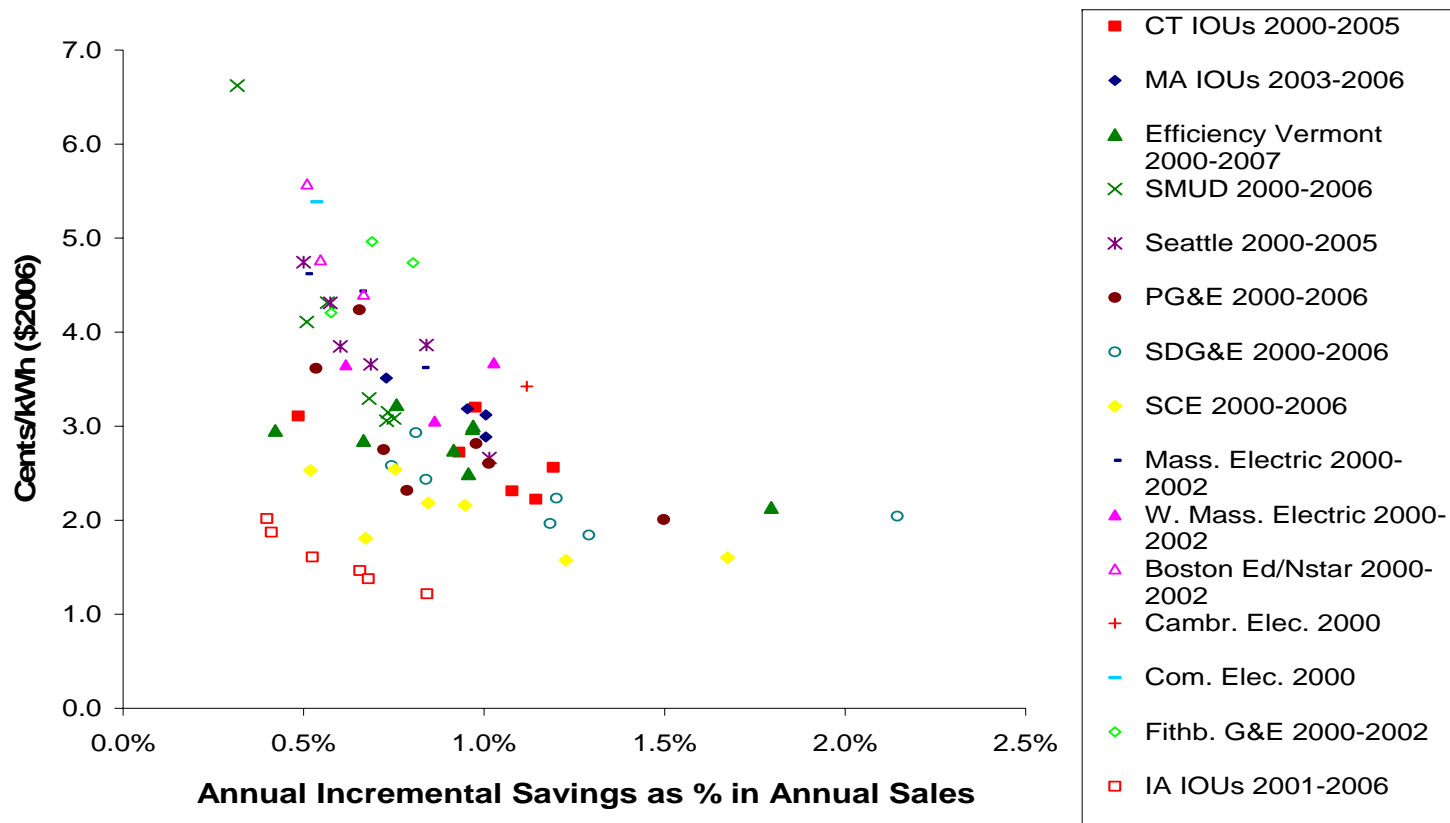
Illustrations courtesy of Recycled Energy Development, LLC

\$EE << \$Generation



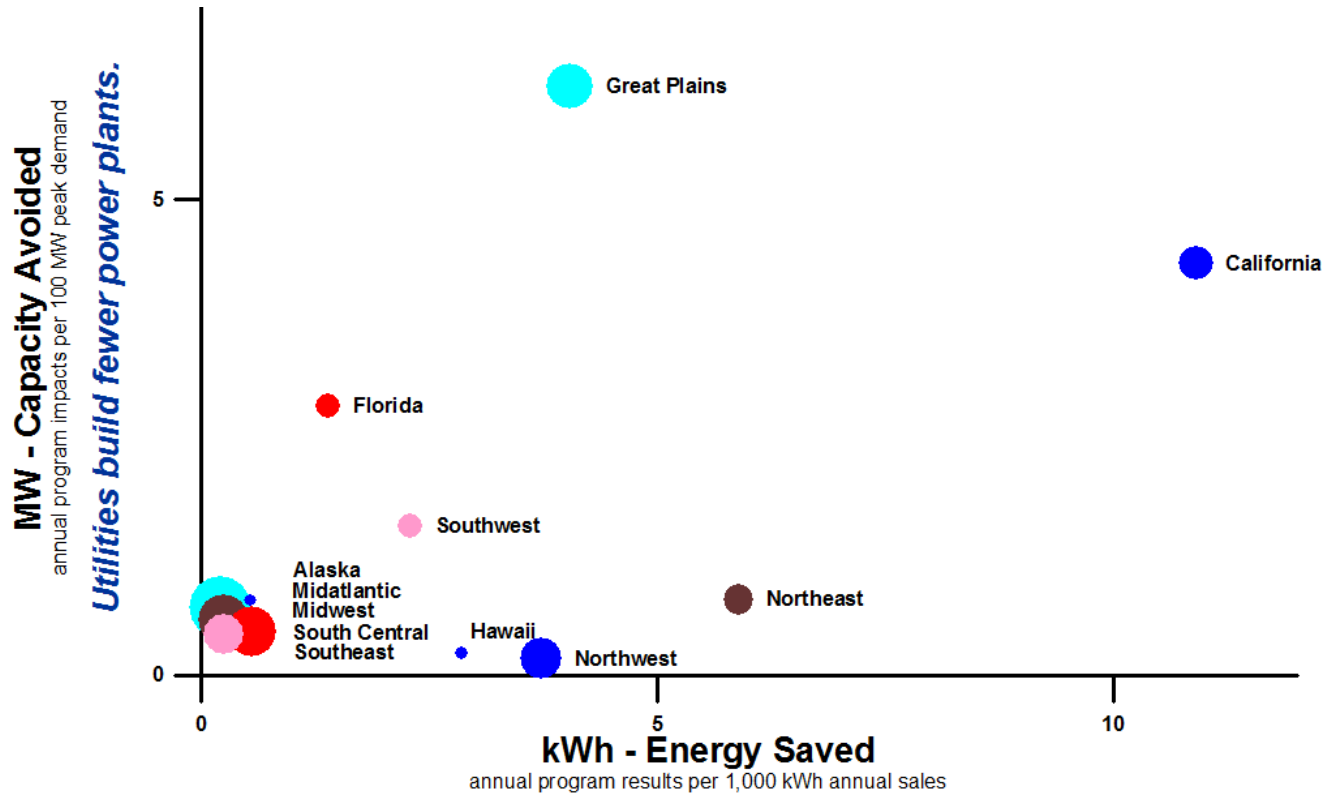
Source: Lazard 2008

Larger Savings → Lower Cost



Source: Synapse Energy Economics

Florida Emphasizes Capacity Savings over Energy Savings



Customers buy less electricity, cause less global warming pollution.

Source: SACE analysis of Energy Information Administration data (2005-06)

Achieving Energy Efficiency



- **Homes, businesses and factories @ 2 - 4 ¢ / kWh**
 - Building codes, appliance/equipment standards
 - Energy Efficiency Resource Standard (RPS / EPS / REPS)
 - Rate structure reform (decoupling)
 - New utility programs

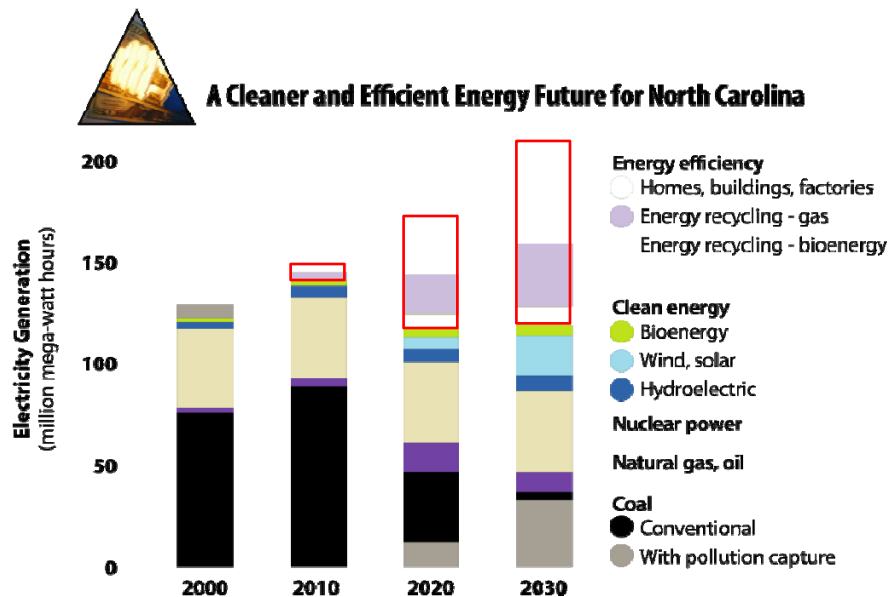


- **Energy recycling (CHP)**
 - Rate structure reform (decoupling, interconnection)
 - State outreach



- **Fuel economy**
 - Plug-in hybrid electric vehicle technology development
 - California vehicle emissions standards
 - Federal fuel economy standards

Energy Efficiency Helps Out

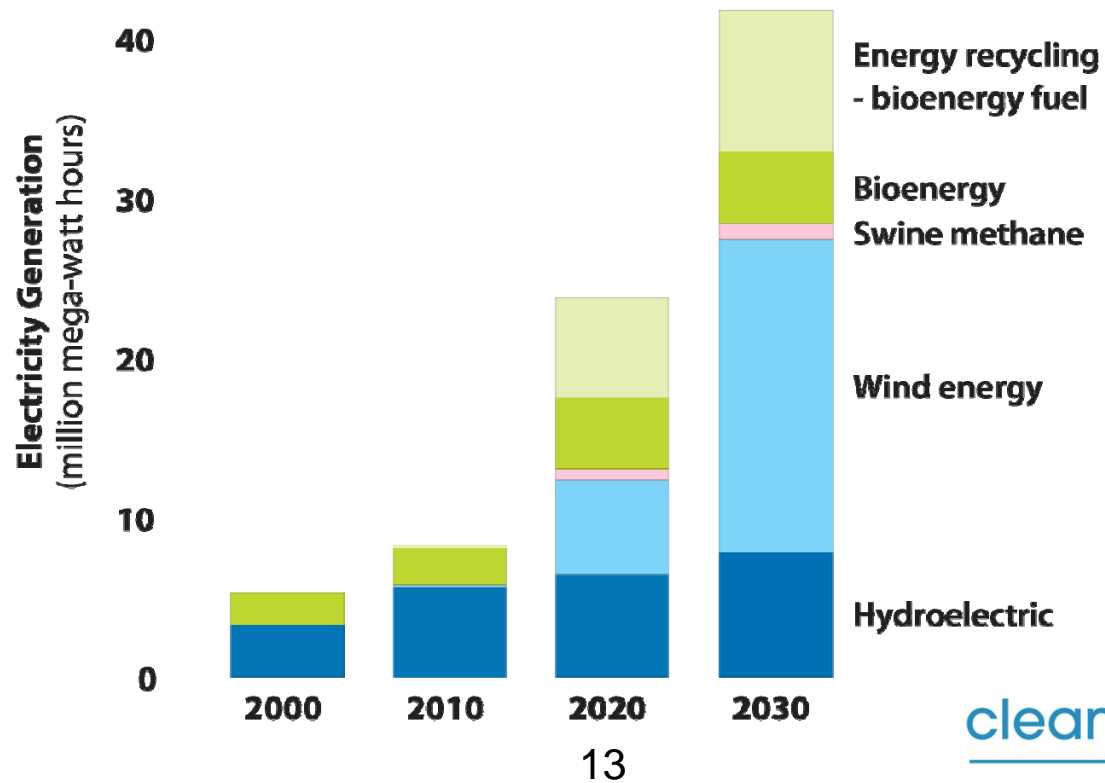


- **Less electricity demand →**
 - easier to reach renewable goals
 - lower cost generation solutions
 - saves critical resources (water)
- **Energy recycling (CHP / waste heat recovery) →**
 - lower grid infrastructure costs
 - Solar, etc. a better “fit”
- **Less fuel demand →**
 - easier to reach biofuels goals
 - less air pollution

Clean Energy: Electricity



Clean Energy for North Carolina – Over 40 Million MWh by 2030



Clean Energy: Wind

- **Ridge tops in WNC:**
 - Most cost-effective
 - 11 million MWh potential at low impact sites
- **Offshore wind:**
 - Enormous potential
 - Less cost than nuclear power
 - Unclear permitting process
- **20 million MWh by 2030:**
 - <10% of feasible generation
 - < 5% of theoretical potential



Low-impact Hydroelectric

- **Today: 5 million MWh**
- **2030: 7 million MWh**
- **Resources:**
 - Upgrades of existing dams
 - Small “low-head” (no dam) projects
 - Many projects best suited for third parties, not utilities



Photo courtesy of Energy Systems and Design

Clean Energy: Biopower

- **Today: 2 million MWh**
- **2030: 14 million MWh**
- **Resources:**
 - Agricultural and wood wastes
 - Energy crops grown on disused land

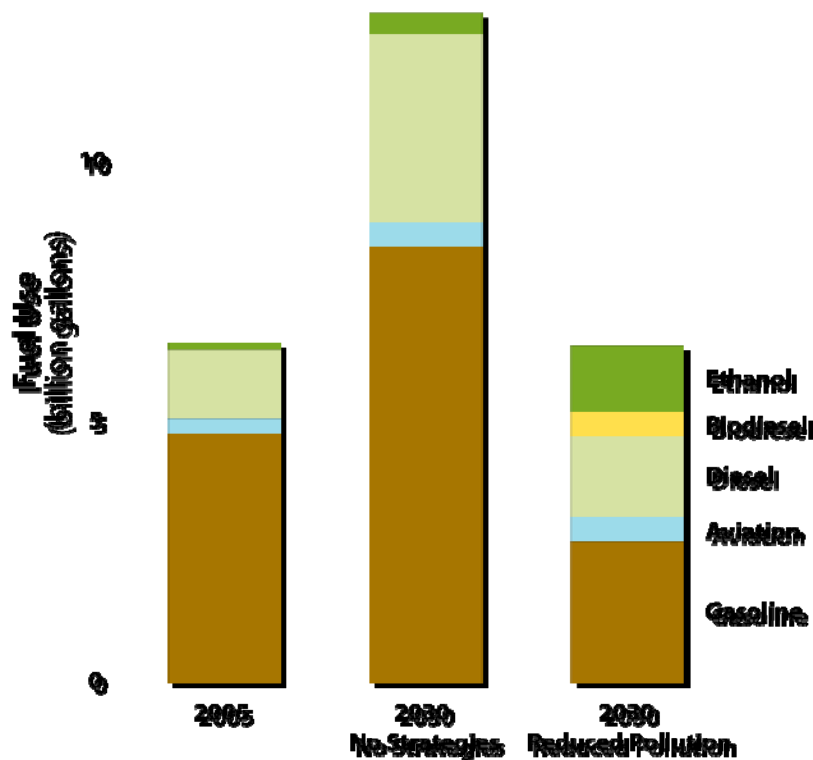


Clean Energy: Solar



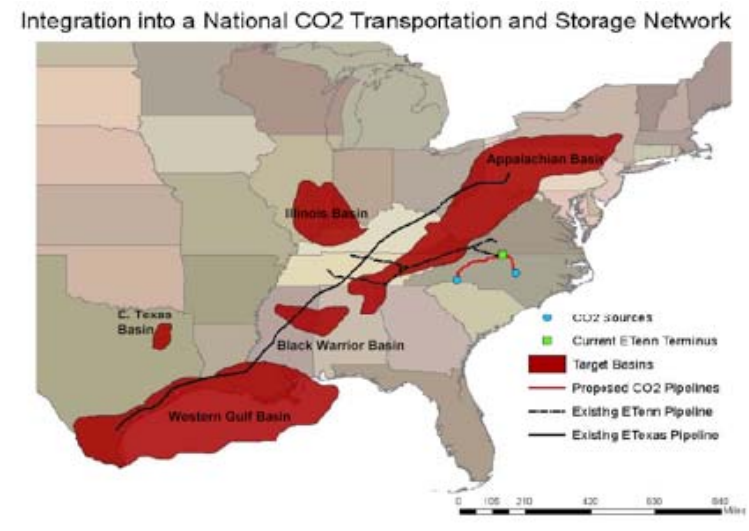
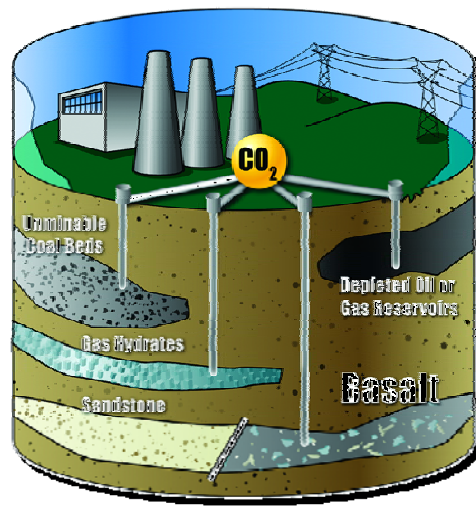
- **Solar hot water**
 - Cost-effective
 - Rapid growth
- **REPS carve-out driving PV**
 - Small-scale (homes)
 - Pilot utility projects
- **Customers face problems**
 - Net metering gets an “F”
 - REPS-driven projects should deliver solutions

Clean Energy: Fuels



- Regionally-produced biofuels
- Can supply 25-30% of demand
 - Depends on meeting efficiency targets
- Pollution reduction achieved with:
 - Biodiesel (waste oil, oilseeds)
 - Cellulosic ethanol

Pollution Capture: Geologic

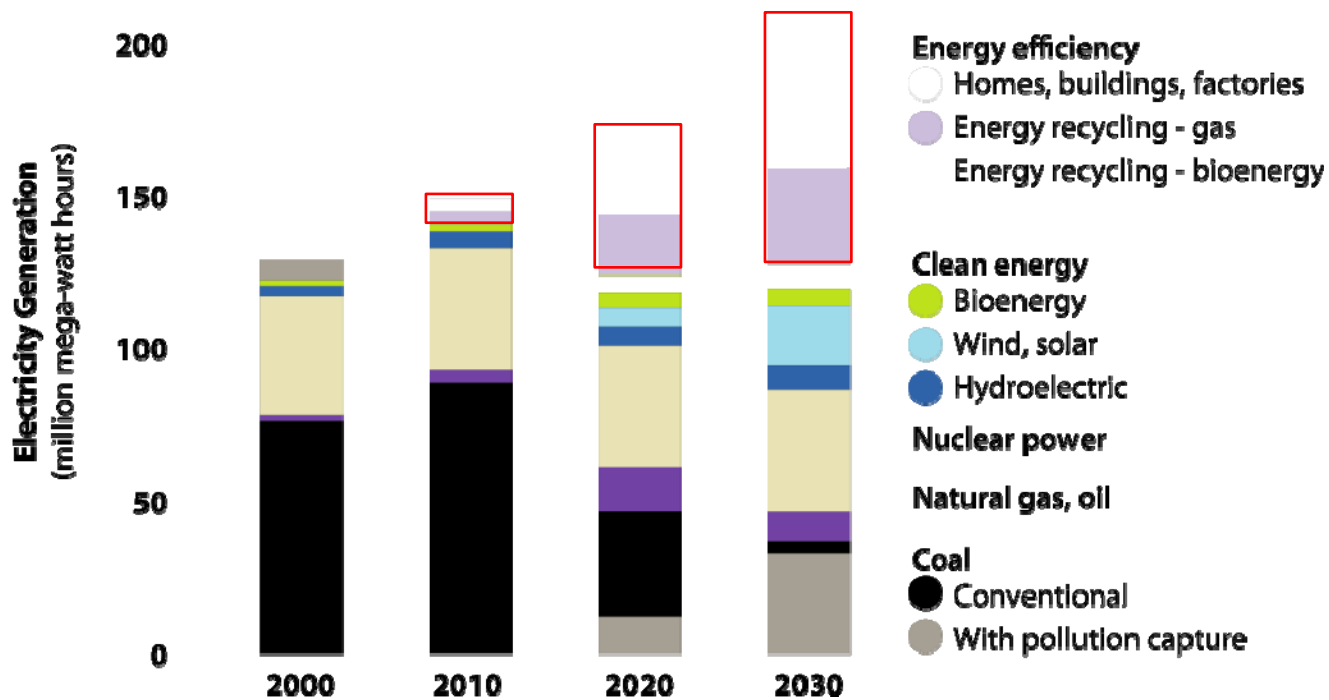


- Capture-capable coal plants send CO2 to TN or offshore
- Pipeline cost less than 15% total project cost
- With efficiency and clean energy, cost could be \$800 million
- This is less than 1 cent per kWh generated electricity

Foundation for a Clean Energy Future



A Cleaner and Efficient Energy Future for North Carolina



Pollution Capture: Landscape



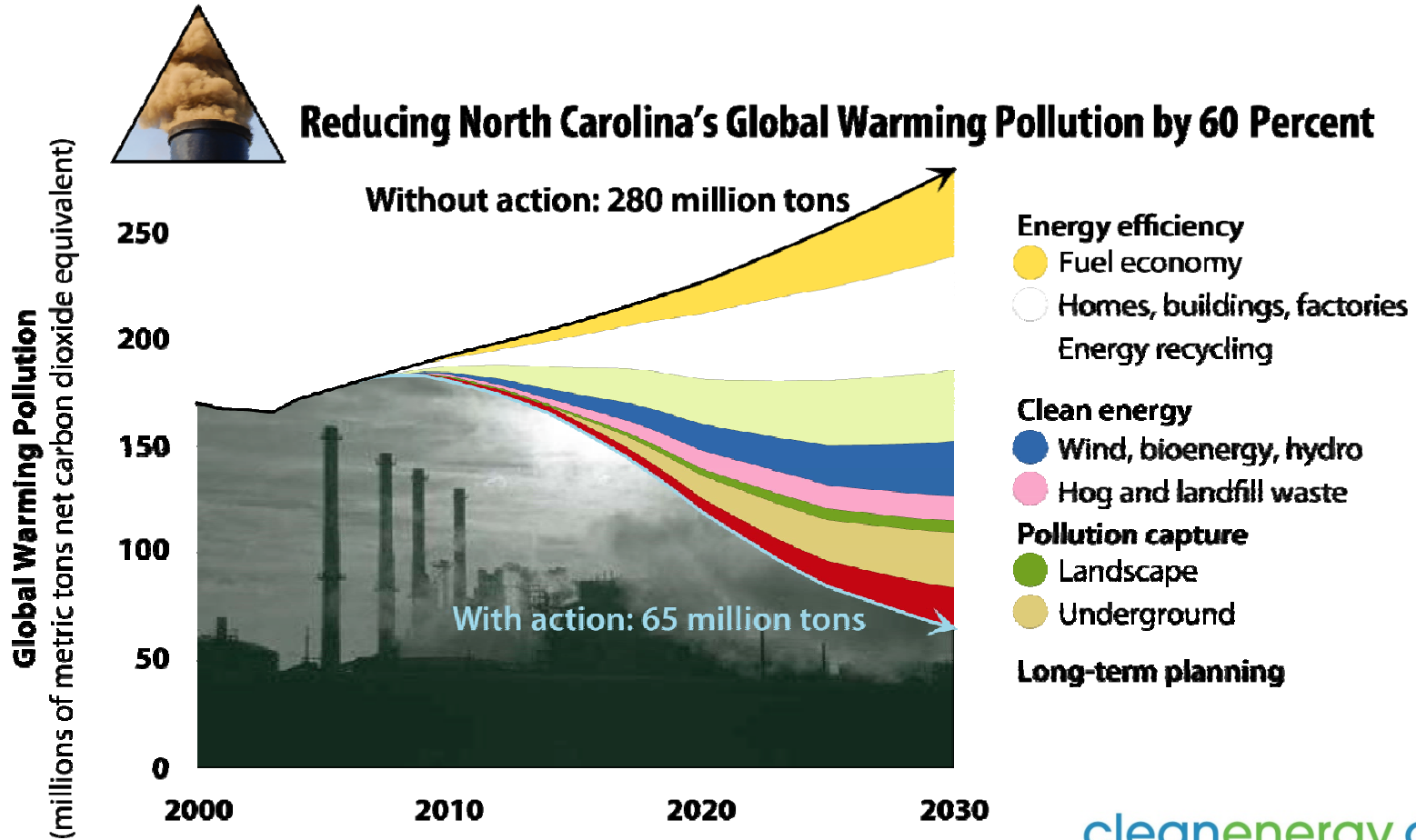
**Improved
Management Practices**

Photos courtesy of Alabama NRCS and University of Bayreuth



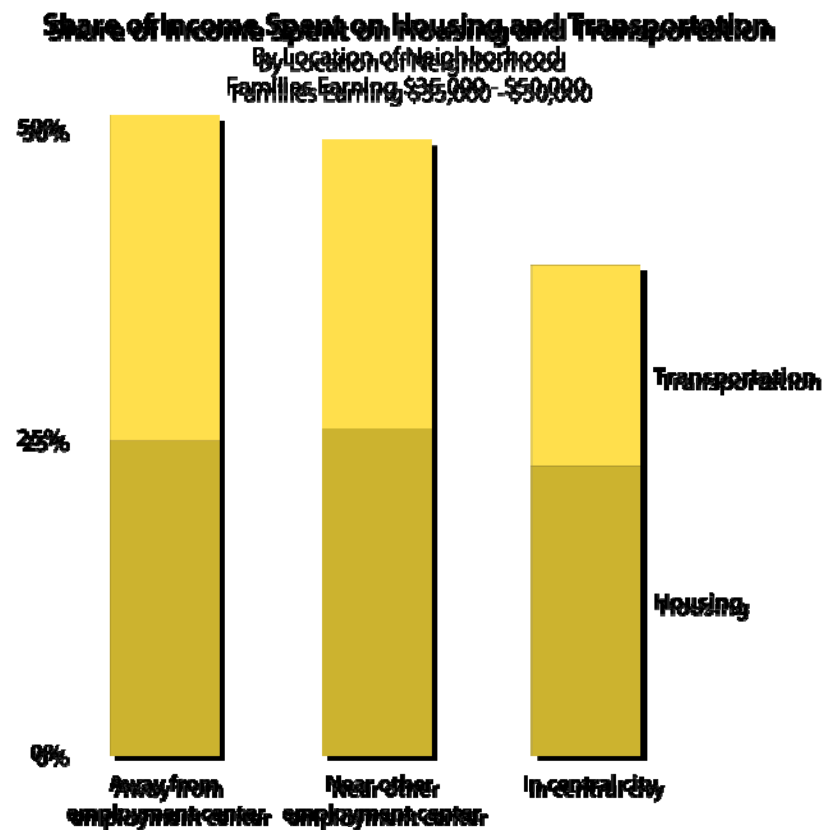
Biochar R&D

Long-term Planning



Planning for Family Budgets

- Housing + transportation costs are lower in central cities

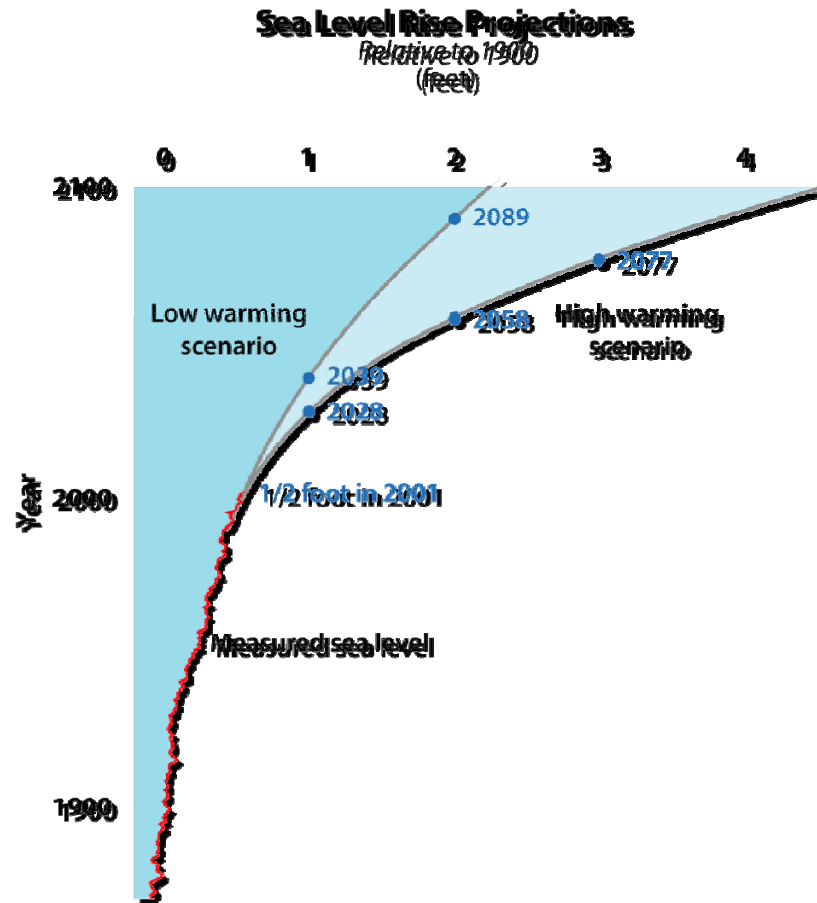


Source: Center for Housing Policy

Long-Range Planning for a Changed North Carolina



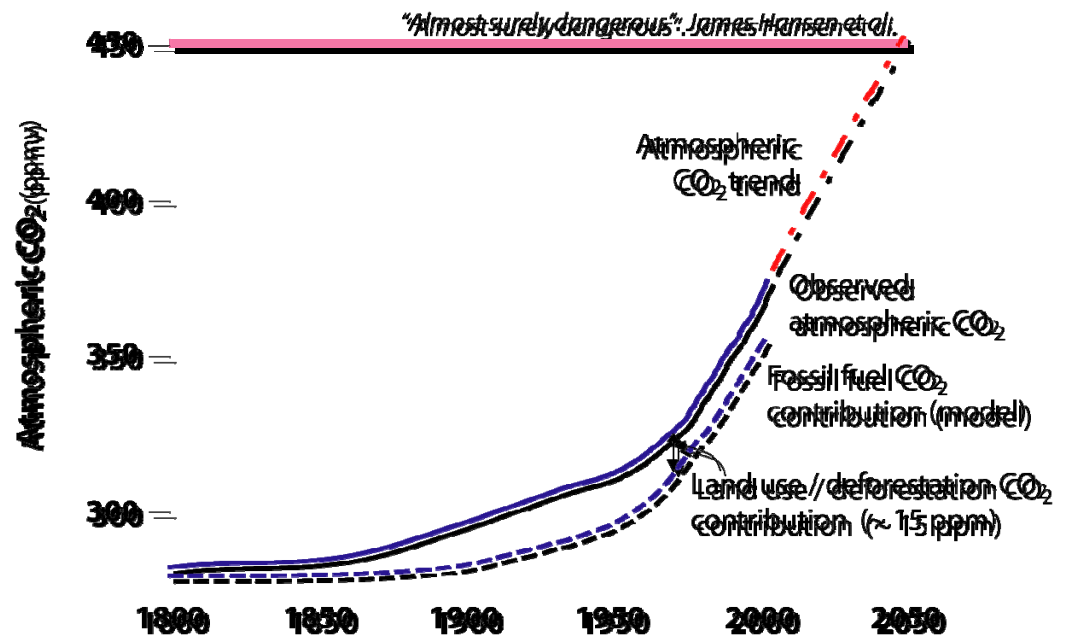
Sea Level Rise



Source: Rahmstorf, *Science* (2007).

Where does 60% lead?

- **Stabilize emissions to reach 450 ppm by 2050?**
 - No ☹️
 - emissions flatten out from 2030 to 2050
- **Is 450 ppm by 2050 enough?**
 - Maybe not, Hansen talking about needing to stabilize at 350 ppm now
- **But . . . 2 decades gives us time to find better solutions**
 - (fingers crossed)



Source: Kharecha and Hansen, *Global Biogeochemical Cycles* (2007), and Hansen et al., *Atmospheric Chemistry and Physics* (2007).

Cornerstones



Pollution Reduction Strategies



Projections for 2030

reductions in millions of tons

Energy efficiency	126.6
Homes, buildings and factories	52.9
Energy recycling	33.1
Fuel economy	40.6
Clean energy	37.2
Wind, bioenergy and hydroelectric	25.6
Methane to energy (hog and landfill waste)	11.6
Pollution capture	31.1
Carbon enrichment of landscape	5.5
Underground storage of global warming pollution	25.5
Long-range planning	19.0
Total for 60% reduction	213.9

Action Today



Pollution reduction areas	Our 2020 targets	Initial actions
Energy efficiency - electricity demand reduction	<ul style="list-style-type: none"> ❖ 18% residential ❖ 18% commercial ❖ 14% industrial 	<ul style="list-style-type: none"> ❖ NC law – 5% energy efficiency by 2021 ❖ New utility proposals ❖ Utility commission review
Energy efficiency - natural gas, other fuels demand reduction	<ul style="list-style-type: none"> ❖ 18% residential ❖ 18% commercial ❖ 14% industrial 	<ul style="list-style-type: none"> ❖ No pending NC action
Energy efficiency - fuel economy	<ul style="list-style-type: none"> ❖ 16% reduction in fuel per mile (increase from 25 to 39 mpg by 2030) 	<ul style="list-style-type: none"> ❖ No pending NC action ❖ 2007 Energy Bill raises fuel economy standards
Energy efficiency - energy recycling	<ul style="list-style-type: none"> ❖ 15% of energy supply 	<ul style="list-style-type: none"> ❖ No pending NC action
 Clean energy - electricity	<ul style="list-style-type: none"> ❖ 16% of electricity supply ❖ Ridge and coastal law for wind projects 	<ul style="list-style-type: none"> ❖ NC law – 7.5% renewable by 2021 ❖ US Congress considering renewable energy standard
Clean energy - biofuels	<ul style="list-style-type: none"> ❖ 18% of fuel supply ❖ 71% hog methane capture and use for electric generation 	<ul style="list-style-type: none"> ❖ NC law – support for biofuels center ❖ Hog methane systems eligible for grants, higher electricity purchase price
 Pollution capture - underground storage	<ul style="list-style-type: none"> ❖ State permitting requirement for new plants to capture and store pollution 	<ul style="list-style-type: none"> ❖ No pending NC action

Legislative Action

- **Energy Efficiency**
 - Appliance standards / building energy codes (adopted, need action)
 - State efficiency standard (go beyond REPS)
 - Natural gas efficiency program
 - Energy recycling program (study & net metering recommendations adopted, need action)
- **Clean Energy**
 - Law and programs to foster inland and offshore wind
- **Pollution Capture**
 - State permitting requirement (CO₂ emission limit)
- **Research and Policy Questions**
 - State funding and policy leadership

Contact Information

John D. Wilson
Director of Research
wilson@jdwilson.net

Ulla-Britt Reeves
Regional Program Director
ureeves@cleanenergy.org

828-254-6776

<http://www.cleanenergy.org/hottopics/index.cfm?id=88>