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Southern Alliance for Clean Energy

NC Global Warming Cornerstones

Legislative Commission on Global Climate Change

November 2008

Overview

Energy Efficiency

Clean Energy

Long-Range Planning

Pollution Capture

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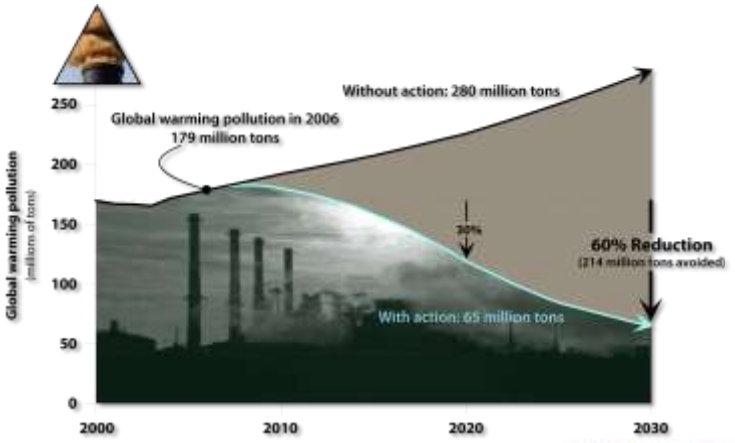
Goal: 60% Reduction by 2030



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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
Reduction vs 2000	*24%*	*30%*

- ***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.**

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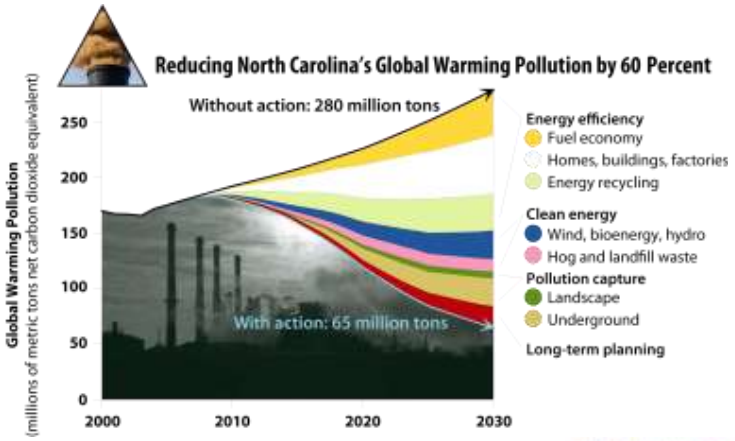
Energy Efficiency: Highest Priority



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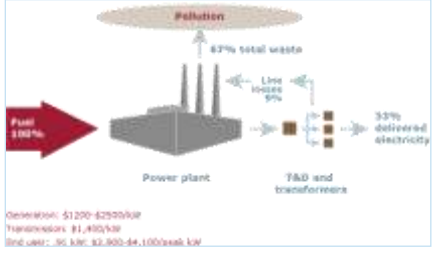
Energy Recycling

Conventional Central Generation

Recycled Energy (at user sites)



Illustrations courtesy of Recycled Energy Development, LLC

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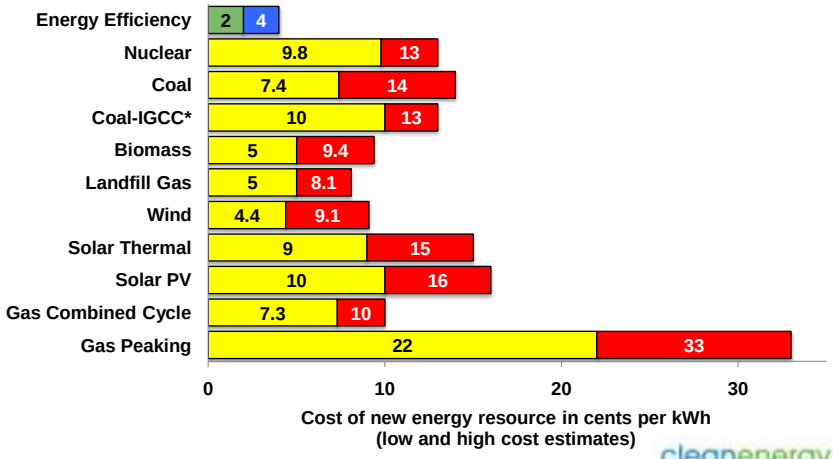
$EE << $Generation



Source: Lazard 2008

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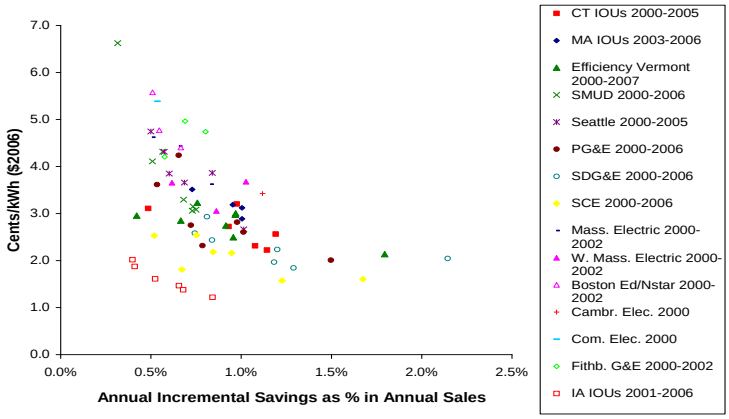
Larger Savings → Lower Cost



Source: Synapse Energy Economics

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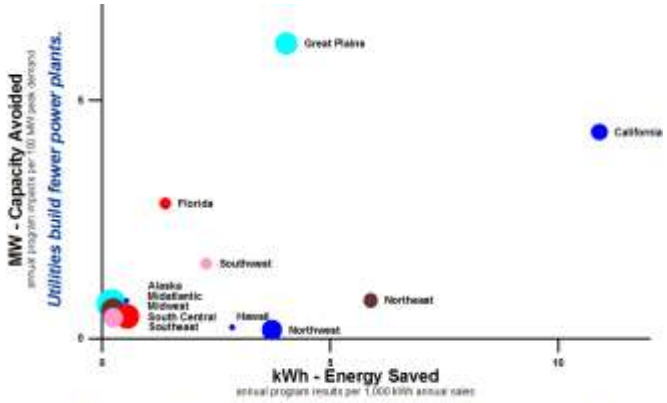
Florida Emphasizes Capacity Savings over Energy Savings



Customers buy less electricity, cause less global warming pollution.

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

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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

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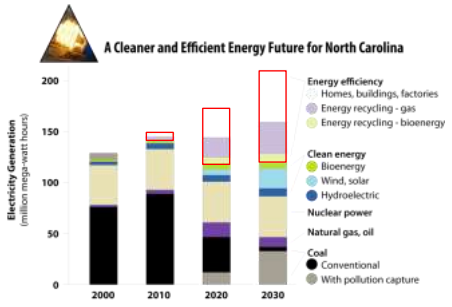
Energy Efficiency Helps Out



- **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

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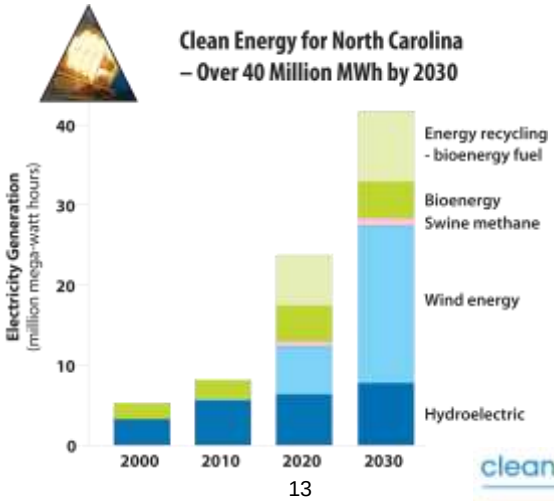
Clean Energy: Electricity



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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

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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

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Clean Energy: Biopower

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

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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

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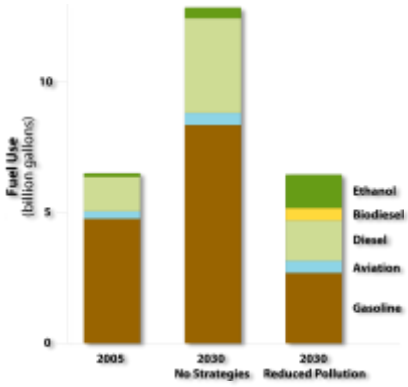
Clean Energy: Fuels



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

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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**

Illustrations courtesy of Pacific Northwest National Laboratory and Nicholas Institute for Environmental Policy Solutions, Duke University

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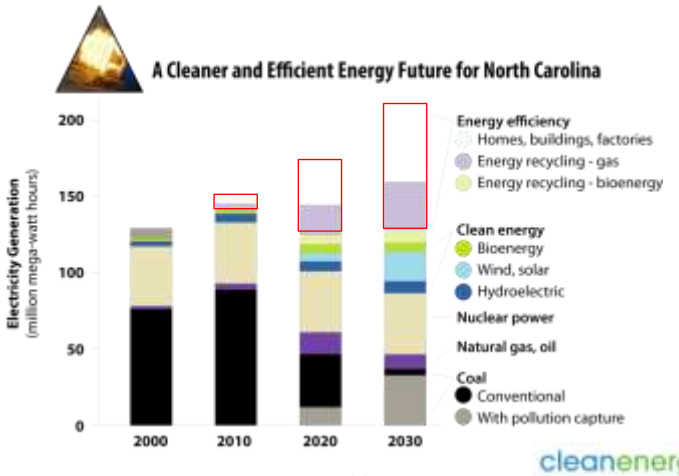
Foundation for a Clean Energy Future



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Pollution Capture: Landscape

Improved Management Practices

Biochar R&D

Photos courtesy of Alabama NRCS and University of Bayreuth

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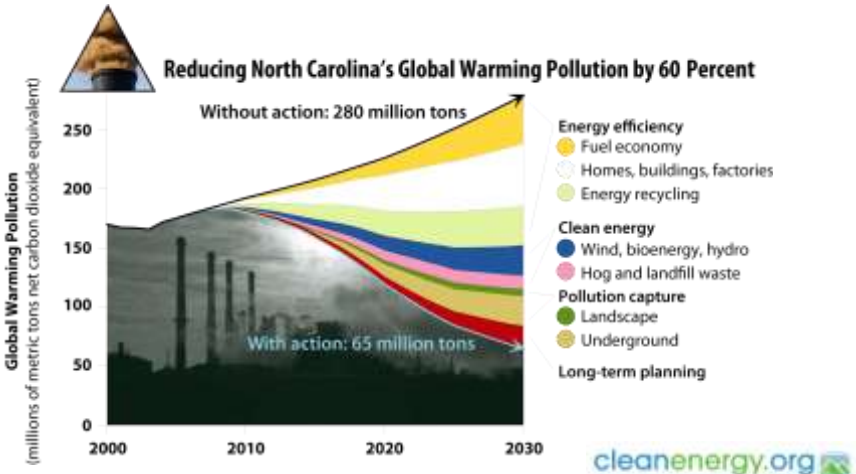
Long-term Planning



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Planning for Family Budgets

- **Housing + transportation costs are lower in central cities**

Source: Center for Housing Policy

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Long-Range Planning for a Changed North Carolina

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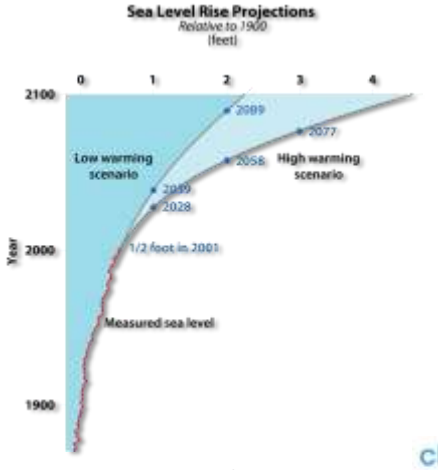
Sea Level Rise



Source: Rahmstorf, *Science* (2007).

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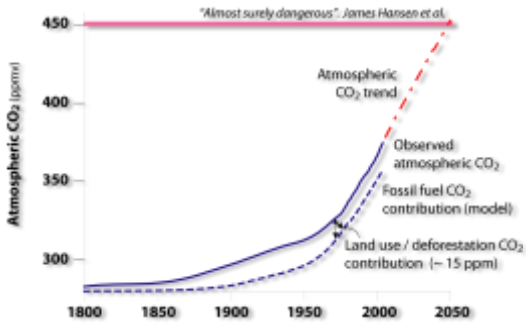
Where does 60% lead?

- **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).

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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**

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Action Today

Pollution reduction areas	Our 2020 targets	Initial actions
Energy efficiency - electricity demand reduction	❖ 18% residential ❖ 18% commercial ❖ 14% industrial	❖ NC law – 5% energy efficiency by 2021 ❖ New utility proposals ❖ Utility commission review
Energy efficiency - natural gas, other fuels demand reduction	❖ 18% residential ❖ 18% commercial ❖ 14% industrial	❖ No pending NC action
Energy efficiency - fuel economy	❖ 16% reduction in fuel per mile (increase from 25 to 39 mpg by 2030)	❖ No pending NC action ❖ 2007 Energy Bill raises fuel economy standards
Energy efficiency - energy recycling	❖ 15% of energy supply	❖ No pending NC action
Clean energy - electricity	❖ 16% of electricity supply ❖ Ridge and coastal law for wind projects	❖ NC law – 7.5% renewable by 2021 ❖ US Congress considering renewable energy standard
Clean energy - biofuels	❖ 18% of fuel supply ❖ 71% hog methane capture and use for electric generation	❖ NC law – support for biofuels center ❖ Hog methane systems eligible for grants, higher electricity purchase price
Pollution capture - underground storage	❖ State permitting requirement for new plants to capture and store pollution	❖ No pending NC action

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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 (CO_2 emission limit)
- **Research and Policy Questions**
  - State funding and policy leadership

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

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