

Energy Efficiency in the North Carolina Industrial Sector

NC State Energy Office - Department of Environmental Quality

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Topics Covered

- NC Industrial Energy Policy & Emissions Overview
- Drivers of Industrial Energy Savings
- Case Studies
- Barriers

NC Statutory Obligations and Executive Directives to Cut Emissions

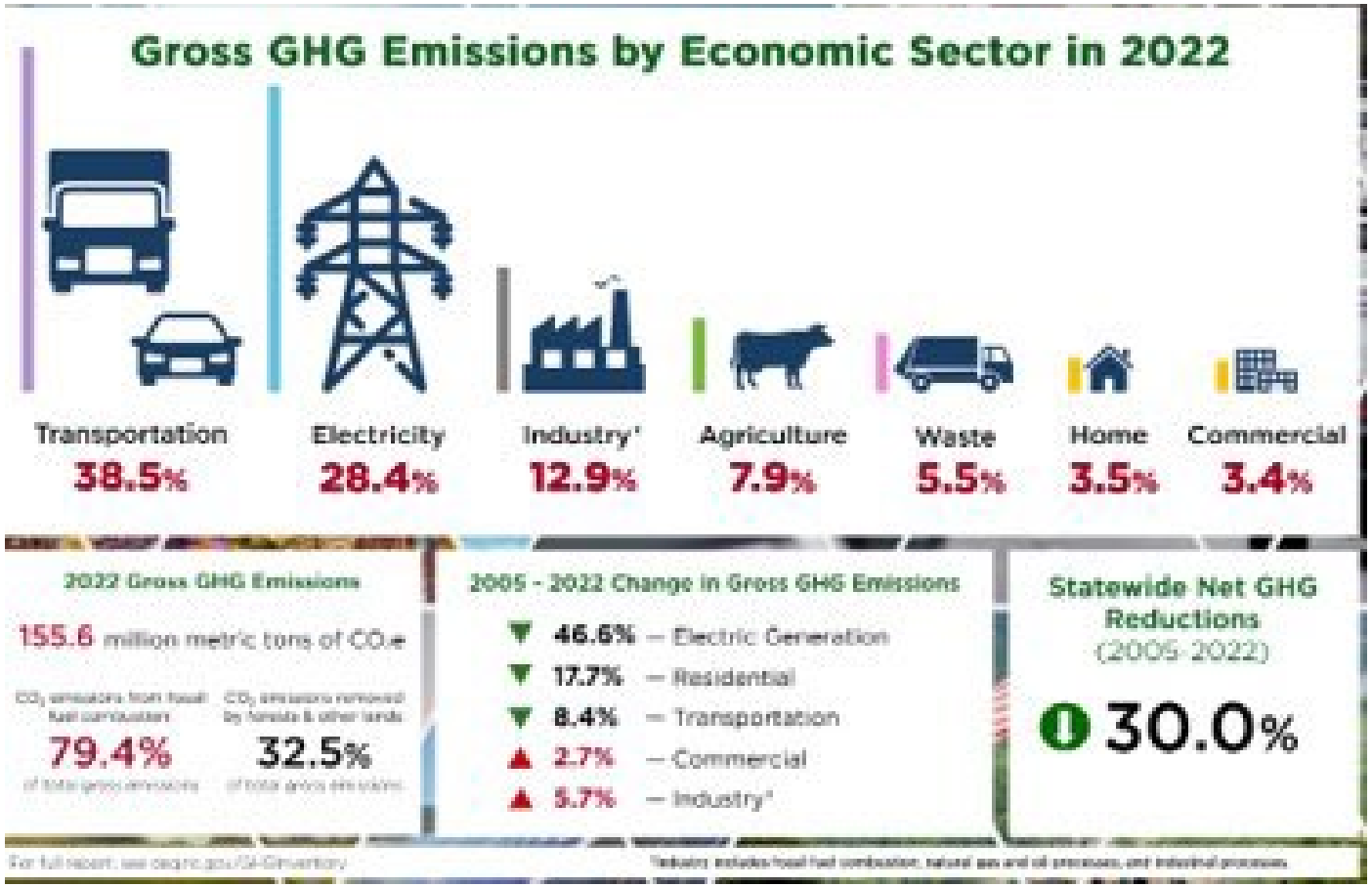
State Statutes

- 2001, "Business Energy Improvement Loan Program" or G.S. 143-345.16 to .18, established a program at the SEO offering low-cost financing for energy efficiency projects.
- S.L. 2007-397: "NC REPS", established a renewable energy portfolio standard. Eliminated tax on sale of energy to manufacturers.
- SL 2017-192: "Competitive Energy Solutions for NC", restructured PURPA, created the Competitive Procurement of Renewable Energy Framework, and established the "Green Source Advantage Program at Duke Energy"
- S.L. 2021-165: "Energy Solutions for North Carolina Act", set statutory carbon reduction targets for the state Investor Owned Utility.
- S.L. 2024-44: "Commercial Property Assessed Capital Expenditure (C-PACE) Program"

Executive Directives

- EO 80 (2018) – Original Climate Goals
- Reduce statewide GHG emissions 40% below 2005 levels by 2025
- Increase EV registrations
- Reduce energy use in state-owned buildings 40% from 2002–03 baseline
- Established:
  - Climate Change Interagency Council
  - Clean Energy Plan
  - Zero-Emission Vehicle Plan
  - Clean energy workforce assessment
  - State EV motor fleet plan
- EO 246 (2022) – Updated Targets
  - Replaced EO 80
  - Updated reduction goals to:
    - 50% below 2005 levels by 2030
    - Net-zero emissions by 2050

North Carolina Emissions Inventory



- NC Greenhouse Gas Inventory (2026 Update)
- Residential, commercial, and industrial combustion:
  - 20.57 MMTCO_2e (13% of 2022 gross emissions)
  - Industrial sector responsible for ~50% of this share
- Industrial processes:
  - 8.53 MMTCO_2e (6% of emissions)
  - Industrial process emissions have doubled (from 4.34 to 8.64) since 2005 due to increased use of HFCs and PFCs (substitutes for ozone-depleting substances)

North Carolina Department of Environmental Quality, Division of Air Quality. North Carolina Greenhouse Gas Inventory (1990–2050). January 31, 2026.



Case Studies

- Selected from NC facilities engaged in DEQ's voluntary Environmental Improvement Programs (ESI)
- 44% response rate provided a meaningful cross-section of industrial operations in the state
- Case studies highlight the diversity of energy needs and barriers across sectors
- Findings illustrate common challenges, opportunities, and sector-specific patterns

Manufacturing & Materials Sector

- Aerospace
- Automotive
- Paper/personal hygiene

Pharmaceuticals & Food

- Pharmaceutical
- Food/beverage



Manufacturing & Materials Sector

- **Energy Profile**
  - High-temperature thermal processes (curing, drying, pressing, extrusion)
  - Significant reliance on steam, natural gas, and electric heating systems
  - Large continuous-operation production lines sensitive to downtime
- **Common Barriers**
  - Aging thermal systems with declining efficiency
  - High capital costs for rebuilds, retrofits, and modernization
  - Limited feasibility of clean-fuel alternatives due to supply + permitting gaps
  - Corporate ROI thresholds delaying non-critical upgrades
- **Efficiency Upgrade Projects Reported**
  - Lighting and HVAC efficiency improvements
  - Incremental upgrades to boilers, ovens, and compressed-air systems
  - Chiller and cooling-system improvements reducing energy + water intensity

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Pharmaceuticals & Food Sector



- **Energy Profile**
  - Strictly regulated thermal systems (sterilization, distillation, cooking)
  - Heavy refrigeration loads requiring uninterrupted operation
  - High water usage for processing, cooling, and sanitation
- **Common Barriers**
  - Grid-reliability concerns limiting electrification options
  - High-cost equipment, requiring stringent revalidation
  - Limited alternative fuels - hydrogen, biomass, or biogas - availability
  - Escalating water + sewer development fees impacting expansion
- **Efficiency Upgrade Projects Reported**
  - Steam-system optimization and refrigeration-efficiency upgrades
  - Water-reuse systems reducing both water and energy demand
  - Detailed thermal mapping and pinch analyses to identify retrofit potential

Drivers of Industrial Energy Savings



CORPORATE EMISSIONS TARGETS

COST SAVINGS & OPERATIONAL RESILIENCE

UTILITY INCENTIVES (LIMITED AWARENESS)

FEDERAL IRA INCENTIVES (UNDERUTILIZED)

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Barriers

HIGH CAPITAL COSTS FOR UPGRADES

LIMITED STATE INCENTIVES

GRID CONSTRAINTS & SLOW PERMITTING

HYDROGEN/BIOMASS/ BIOGAS SUPPLY CHAIN GAPS

CORPORATE ROI & BUDGET CYCLES

ENERGY MARKET STRUCTURE

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Thank you!

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