

North Carolina Climate Change Interagency Council



Executive Order No. 80: NC's Commitment to Address Climate Change and
Transition to a Clean Energy Economy

4th Meeting

July 16, 2019

Winston – Salem, North Carolina

Meeting Agenda & Objectives

Agency Updates on Oct 1 Deliverables (30 mins)

- a. DEQ – NC Clean Energy Plan (Section 4)
- b. DOT – NC ZEV Plan (Section 5)
- c. DOC – Workforce Assessment (Section 6)
- d. DOA – Motor Fleet ZEV Plan (Section 7)

Section 8 Update - Building Efficiency Improvements (20 mins)

- a. Overview of agency activities (Paul Braese, DPS)
- b. Department of Public Safety plans (Paul Braese, DPS)

Section 9 Update – Climate Science, Impacts, Risks, Adaptation, and Resiliency (40 mins)

- a. NC Climate Science Report (Kenneth Kunkel and Sarah Champion, NCICS; David Easterling, NOAA)
- b. Resiliency Workshops (Sherri Stanley, DEQ)
- c. NCORR Disaster Recovery Task Force (Marlena Byrne, NCORR)
- d. Regional Resiliency Planning Tool (Andrea Eilers, TJCOG)

Break (10 mins)

Public Engagement (30 mins)

Agency Updates on Oct. 1 Deliverables

DEQ, DOT, DOC, DOA



North Carolina Climate Change Interagency Council



Department of Environmental Quality - NC Clean Energy Plan

Sushma Masemore, PE



EO80 DEQ Directive

Section 4

- Develop a North Carolina Clean Energy Plan that fosters and encourages:
 - Utilization of clean energy resources and innovative technologies, and
 - Integration of these resources to facilitate the development of a modern and resilient electric grid.
- Collaborate with stakeholders to increase the utilization of clean energy technologies, energy efficiency measures, and clean transportation solutions.
- Submit the plan to the Governor by **October 1, 2019.**



Clean Energy Plan Development Process

- **General Description of Approach**
 1. Vision building and assessing current landscape for clean energy resources in NC
 2. Examine evolving and changing landscape in the power sector
 3. Develop policy, regulatory, administrative, and program recommendations to achieve the vision



Clean Energy Plan Stakeholder Process

• Public Engagement Methods

Method 1. Six Facilitated Workshops, Raleigh

- Technical guidance and facilitation provided by [Regulatory Assistance Project \(RAP\)](#) and [Rocky Mountain Institute \(RMI\)](#)
- Limited seating to accommodate diverse stakeholder participation
- Request to Participate form required

Method 2. Regional Listening Sessions

| | |
|----------------|--------------|
| Charlotte | Asheville |
| Rocky Mount | Wilmington |
| Hickory | Fayetteville |
| Elizabeth City | Wilmington |
| Greensboro | |

Method 3. Combined with Other Statewide Events

Method 4. Online Input

1. Vision Building and Current Landscape

- *What is NC's vision of a clean energy future, how different is it from the current direction, and how well do current policies, regulatory and business practices help achieve that vision?*

2. Changing Electricity Sector Landscape

- *What policy and technology trends are influencing how we foster clean energy use?*

3. Recommendations for the Clean Energy Plan

- *What policy or regulatory actions should be taken to achieve the clean energy vision?*

Dates and locations posted at
<https://deq.nc.gov/cleanenergy>



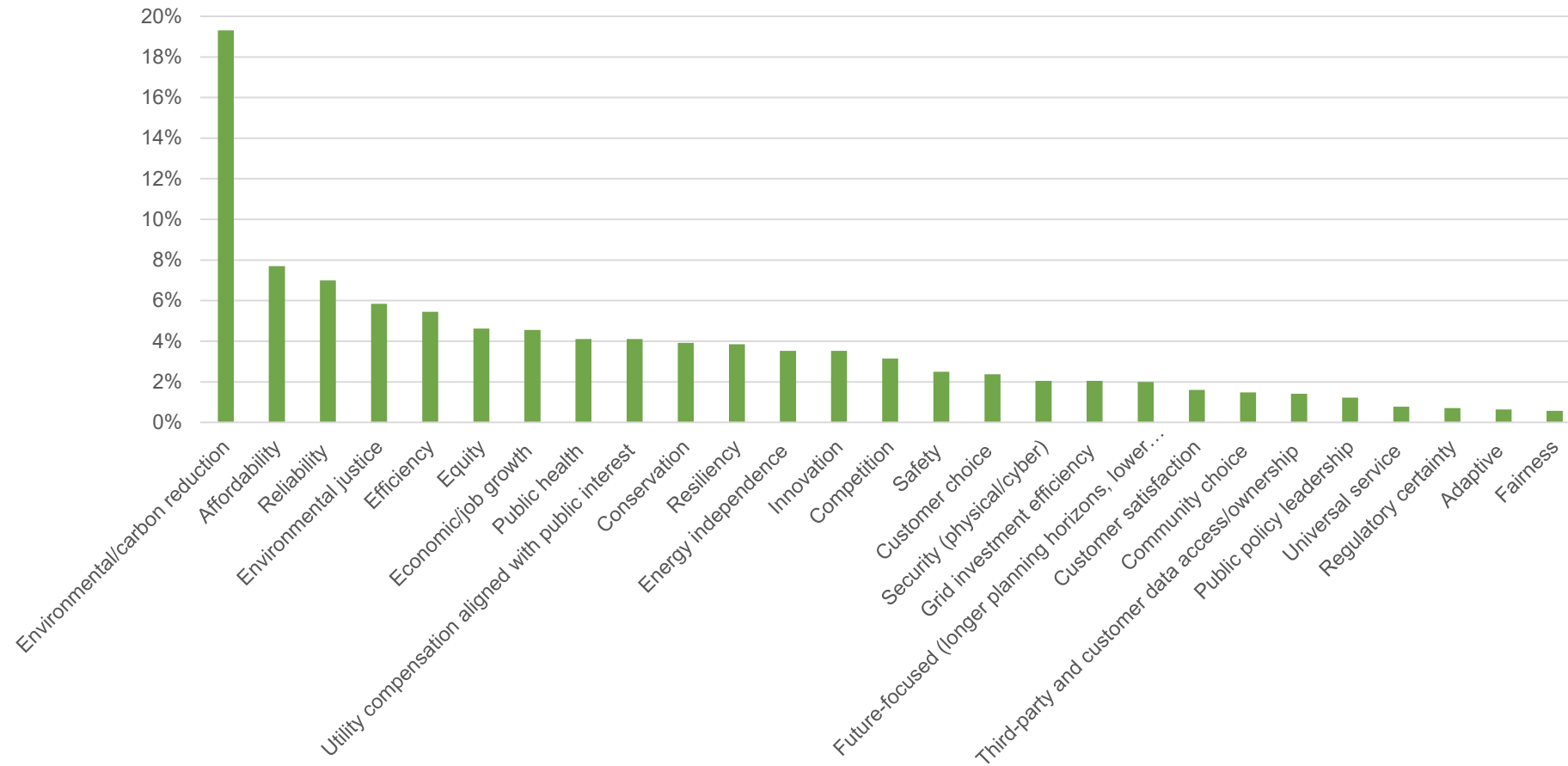
Workshop Presenters



800+ Participants and other Contributors
(includes attendees that attended multiple workshops)



“What do you and/or your organization see as the most important values for the electricity system to uphold and promote going forward?”



Stakeholder Event Details

| Event | Location | Date | Number of Participants |
|---------------------------|----------------|-----------|------------------------|
| Facilitated Workshop 1 | Raleigh | 2/25/19 | 82 |
| NCMA Air Quality Workshop | Hickory | 3/5/19 | 43 |
| Listening Session | Charlotte | 3/8/19 | 38 |
| Listening Session | Asheville | 3/14/19 | 82 |
| NCMA Air Quality Workshop | Raleigh | 3/19/19 | 53 |
| Listening Session | Rocky Mount | 3/19/19 | 13 |
| Listening Session | Fayetteville | 3/25/19 | 11 |
| Listening Session | Wilmington | 3/27/19 | 30 |
| Listening Session | Hickory | 3/29/19 | 23 |
| Facilitated Workshop 2 | Raleigh | 4/1/19 | 72 |
| Listening Session | Elizabeth City | 4/11/19 | 10 |
| Facilitated Workshop 3 | Raleigh | 4/22/19 | 62 |
| ESI Conference | Raleigh | 5/15/19 | 39 |
| Listening Session | Greensboro | 5/17/19 | 61 |
| Facilitated Workshop 4 | Raleigh | 5/22/19 | 62 |
| UNC IE Teacher Workshop | Chapel Hill | 6/25/19 | 18 |
| Facilitated Workshop 5 | Raleigh | 6/26/19 | 67 |
| Facilitated Workshop 6 | Raleigh | 7/24/19 | TBD |
| Online and Direct Input | - | 2/19-7/19 | |

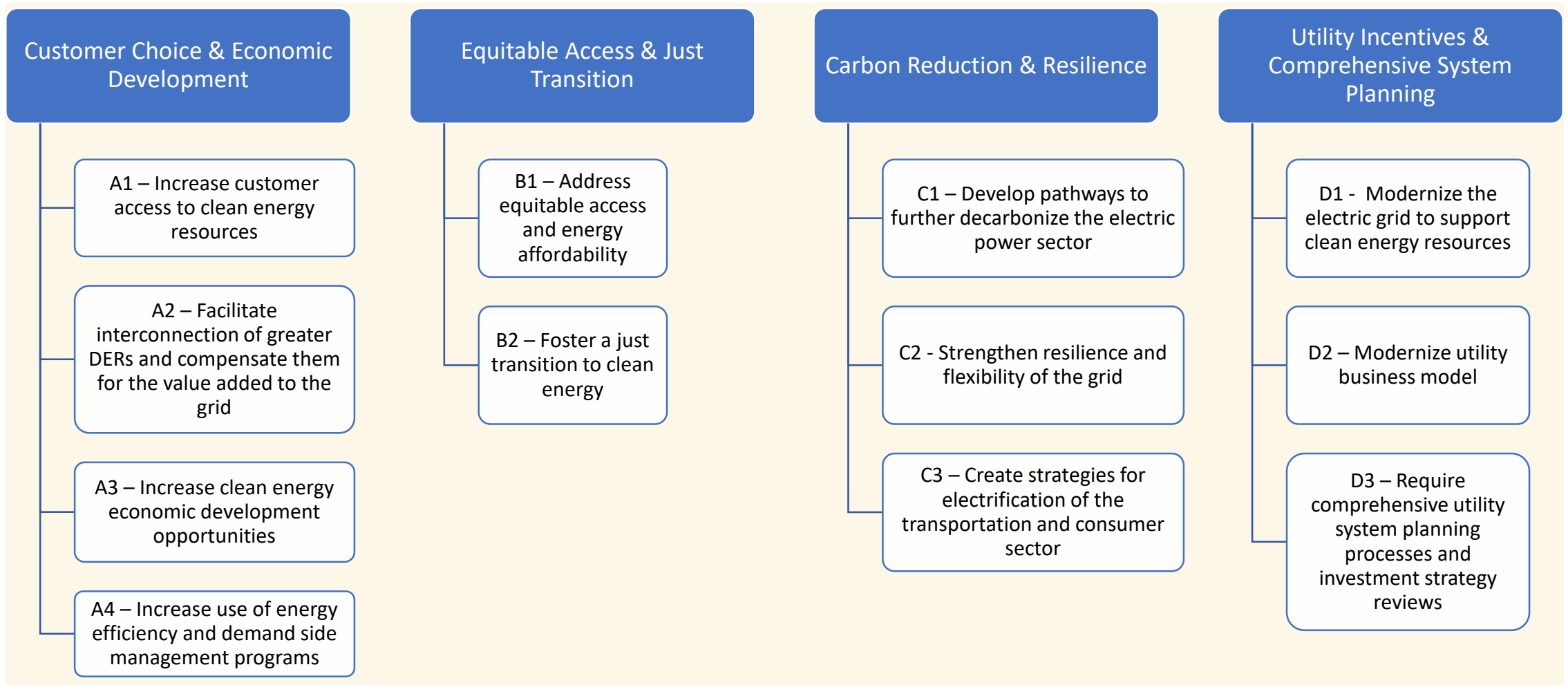


Areas Identified by the Stakeholders to Focus in the Clean Energy Plan

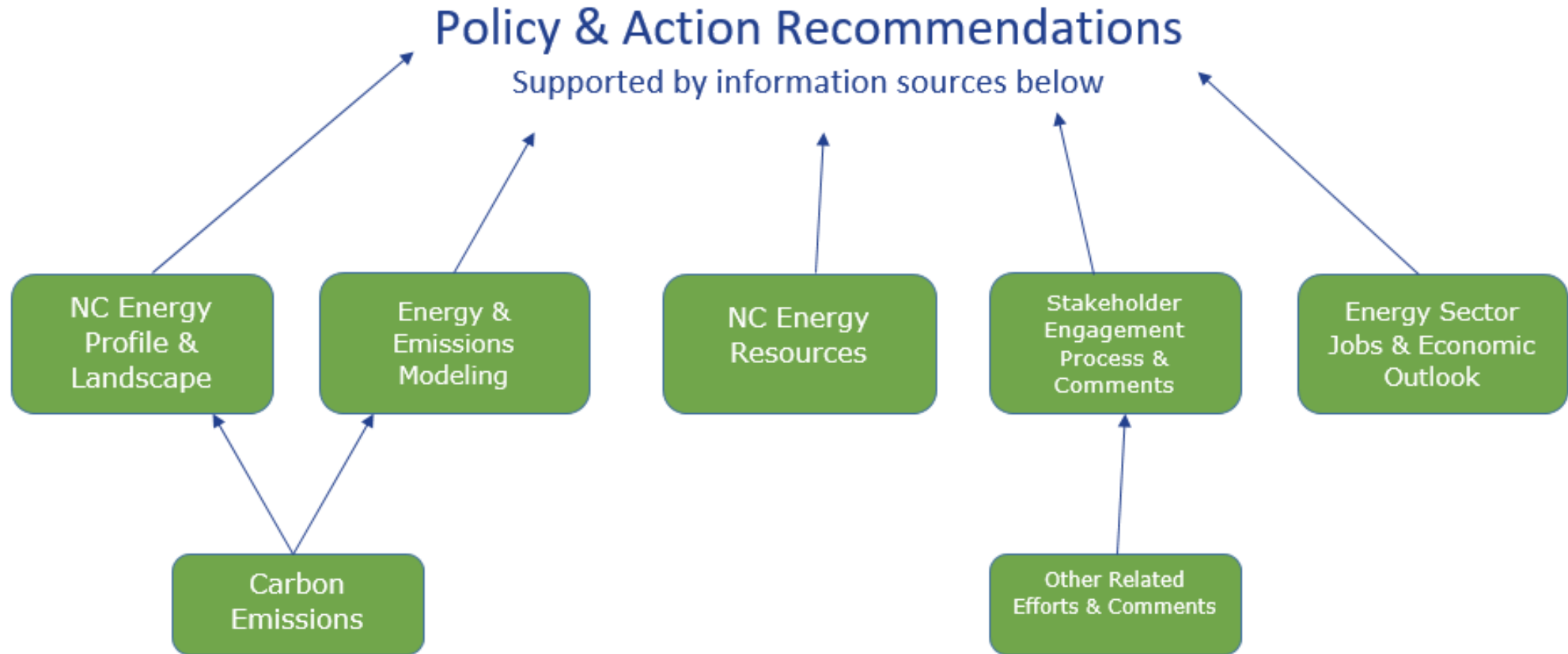
1. Customer access to renewables
2. DER interconnection and compensation
3. Grid modernization to support clean energy
4. Utility business model (e.g., how utilities are currently incentivized)
5. Utility system planning and investment
6. Equitable access and just transition to clean energy
7. Grid resiliency enhancements
8. Clean energy economy
9. Carbon reduction
10. Beneficial Electrification



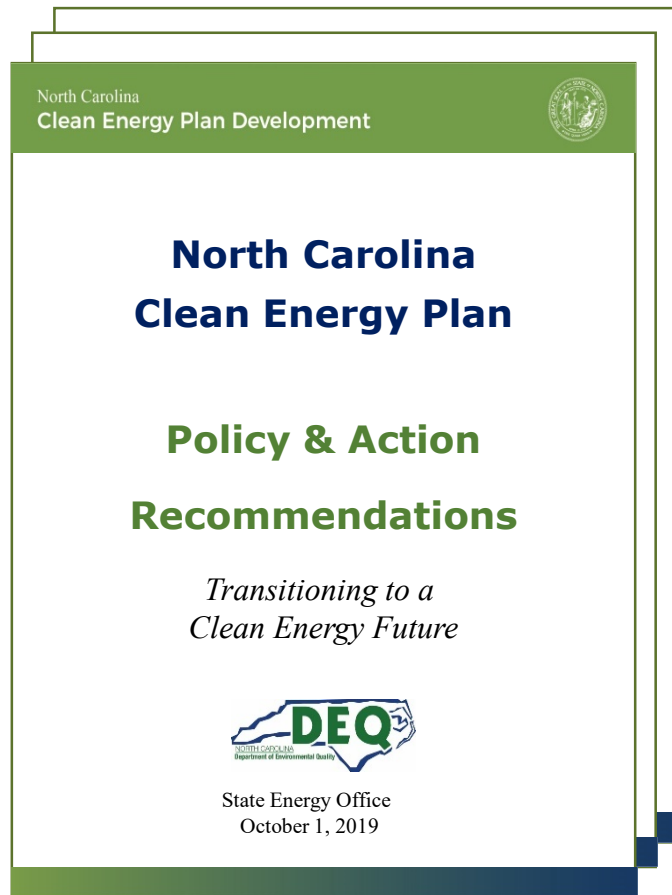
Areas of Recommendation in the Clean Energy Plan



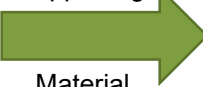
Clean Energy Plan Structure



Plan Layout



Supporting
Material



North Carolina
Clean Energy Plan Development

Current Schedule

July 24 - Workshop #6 - Stakeholders prioritize recommendations

August 12 – September 4 Public Comment Period

End September – Final Plan presented to Climate Council for approval

October 1 – Final Plan submitted to the Governor

Get Involved!

Online Input: <https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-2#facilitated-workshops,-raleigh>

North Carolina

Climate Change Interagency Council



Department of Transportation Zero Emission Vehicle (ZEV) Plan

Colin Mellor



Zero Emission Vehicle (ZEV) Plan Development Process

1. Approach

- ✓ • Build on existing initiatives and data to deliver a ZEV plan
- ✓ • Leverage refined versions of several models already developed to forecast adoption of ZEVs

2. Stakeholder Process

- ✓ • Working team assembled and has begun to identify major stakeholders
- ✓ • This will be a broad, cross-functional and multi-perspective group

Zero Emission Vehicle (ZEV) Plan Development Process

3. Status Update

- ✓ • First working team meeting was in January; data being collected and indexed
- ✓ • Drafting high-level outline of ZEV Plan in February & March

4. Anticipated Timeline

- ✗ • A draft plan for public review by ~~June~~ **July**



ZEV PLAN – ONLINE SURVEY

1 N.C. Clean Energy

WELCOME

North Carolina Is Going Electric!

North Carolina is committed to getting 80,000 Zero Emission Vehicles (ZEVs or all-electric vehicles) on the road by 2025. What will it take for **YOU** to drive an all-electric vehicle?

N.C.'s Commitment

Español

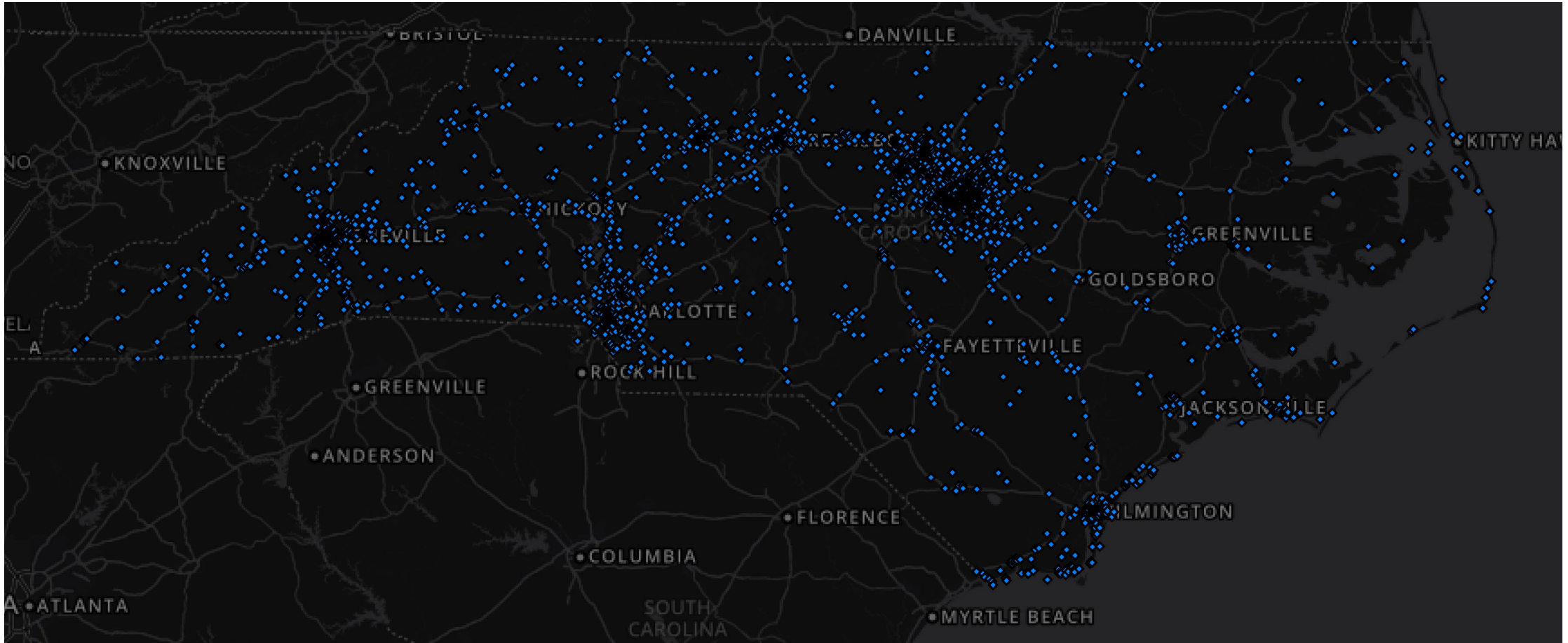
Begin

As recent weather events have grown more frequent and more destructive, North Carolina is becoming more aware of the need to reduce carbon emissions and move toward cleaner energy. Driving an all-electric vehicle helps us meet these goals.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

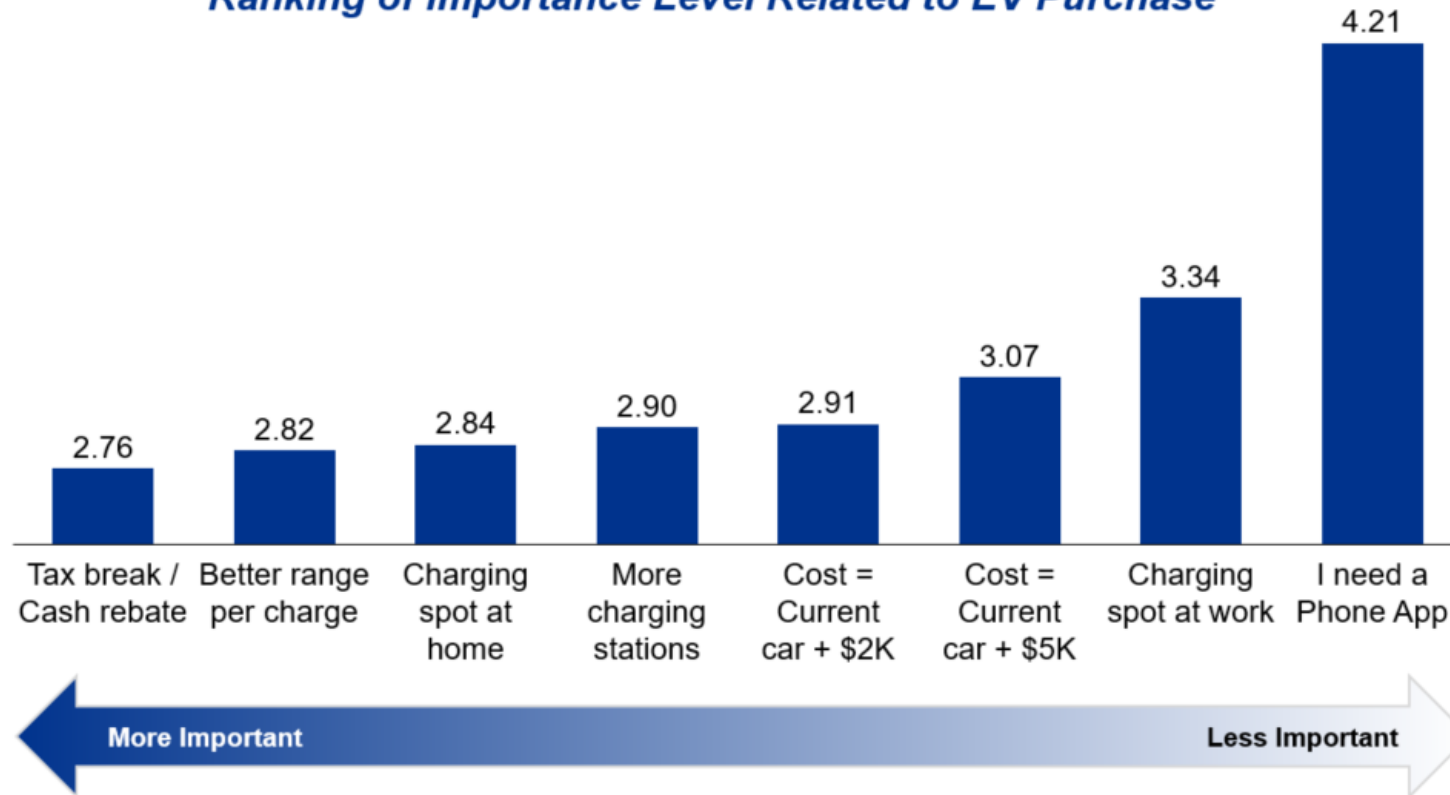


ZEV PLAN – ONLINE SURVEY



ZEV PLAN – ONLINE SURVEY

Ranking of Importance Level Related to EV Purchase



ZEV PLAN – TARGETED STAKEHOLDERS



M.J. Bradley & Associates, LLC



North Carolina
Climate Change Interagency Council

ZEV PLAN – NEXT STEPS

- 2 Week public comment period

<https://www.ncdot.gov/initiatives-policies/environmental/climate-change/Pages/electric-vehicles.aspx>

- August 23 – Final Draft submitted to Climate Change Interagency Council for review
- September – Final Plan submitted to Climate Change Interagency Council for submission to the Governor



North Carolina Climate Change Interagency Council



North Carolina Department of Commerce Clean Energy and Clean Transportation Workforce Assessment Plan

John Hardin



**NORTH CAROLINA
DEPARTMENT of
COMMERCE**

Clean Energy and Clean Transportation Workforce Assessment Process EO80 Section 6

1. General Description of Approach

- Definition & scope of sectors
- Identification of **existing talent pool & future workforce demand**
- Assessment of **employers' current & future workforce skills & training needs**
- Compilation of **educational program offerings, enrollment trends, & work-based learning opportunities**
- Identification of **gaps & areas for improvement** to meet current & future workforce demand
- **Recommended actions** to help North Carolinians develop the required skills & education

2. Public Engagement Process

- Consult with organizations in relevant sectors to identify industries & employers
- Consult with identified employers regarding current & future skill needs as well as challenges
- Consult with education institutions on program offerings, enrollment trends & work-based learning opportunities
- Solicit public comments on draft recommendations before finalizing



Workforce Assessment Process

3. Anticipated Timeline

- **Jan 2019 – Feb 2019:** Consultation with industries, employers & education institutions
- **March 2019 – May 2019:** Data gathering, technical analysis & quantification of findings
- **May 2019 – July 2019:** Draft assessment development
- **Aug 2019 – Sep 2019:** Public comment period
- **Sep 2019:** Revised assessment provided to the Climate Council
- **Oct 2019:** Final assessment submitted to the Governor

4. Communication Method

- Email distribution, press releases, other announcements
- Regular postings on website: <http://www.nccommerce.com>



Workforce Assessment Stakeholders

- Public, private & nonprofit organizations engaged in the **production, transmission, provision, or distribution of clean energy or clean transportation products or services**
- Public, private & nonprofit organizations engaged in the **evaluation or promotion of clean energy or clean transportation products or services**
- Public or private education institutions engaged in **offering educational programs, apprenticeships, or work-based learning opportunities associated with jobs in the clean energy or clean transportation sectors**
- Students or workers with **interest or experience in employment in the energy or clean transportation sectors**
- Other stakeholders as relevant

Workforce Assessment Methodology

Identify Relevant Industries contributing to Clean Energy and Clean Transportation

- Based on literature review & existing data sources, analyzed three broad sectors:
 - **Clean Energy** (20 industries)
 - Power Generation (solar, wind, etc.), Transmission and Distribution, Storage & related Manufacturing, etc.
 - **Energy Efficiency** (33 industries)
 - Construction, Remodeling, Contracting & Manufacturing of efficient products and related Services, etc.
 - **Clean Transportation** (34 industries)
 - Motor Vehicle Parts Manufacturing, Trucking, Rail, Buses & other transportation, etc.

Workforce Assessment Methodology, cont'd

Identify Relevant Occupations within each sector

- Based on staffing patterns of each sector, analyzed occupations comprising $\geq 1\%$ of workers in each industry:
 - **Clean Energy** (~20 occupations)
 - Electricians, Power-Line Installers, Construction Laborers, Operating Engineers, Team Assemblers, etc.
 - **Energy Efficiency** (~20 occupations)
 - Supervisors of Construction, HVAC Mechanics & Installers, Plumbers, Carpenters, Team Assemblers, etc.
 - **Clean Transportation** (~15 occupations)
 - Heavy & Tractor-Trailer Truck Drivers, Light Truck or Delivery Service Drivers, Bus & Truck Mechanics, Bus Drivers, etc.



Workforce Assessment Methodology, cont'd

Identify Relevant Characteristics of each Occupation

- Based on existing data sources, analyzed:
 - Number of existing workers in each occupation
 - Projected growth from 2017 to 2026
 - Minimum educational requirement according to the Bureau of Labor Statistics
 - Average wages
 - Ranking in NC Commerce 5-Star ranking system based on job growth rate, openings & wages
 - Demographic characteristics of workers (age, gender, race, educational attainment)



Workforce Assessment Methodology, cont'd

Measures of Supply of Workers

- Based on existing data sources (Common Follow-up System [CFS]):
 - CFS is a longitudinal system with information on public education & workforce program participants
 - Enrollment & completion in key workforce training & education programs
 - Community college & university programs
 - Registered apprenticeship programs
 - Registered applicants in NCWorks inline
 - Analysis of current employment patterns & source institutions for the selected industries

Measures of Demand for Workers

- Online postings aggregators such as Conference Board's *Help Wanted OnLine*
- Job postings from NCWorks Online
- Feedback from employers & industry associations



Next steps

Finalize Assessment and Post for Public Comment

- Draft Assessment & Recommendations to be posted August 1 at <http://www.nccommerce.com>
- Incorporate Feedback into Final Recommendations to be delivered to Council by October 1



North Carolina Climate Change Interagency Council



North Carolina Department of Administration

Motor Fleet ZEV Implementation Plan

EO 80 Section 7 Update.



North Carolina
Department of Administration

Motor Fleet ZEV Plan Development Process

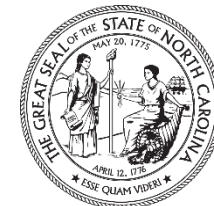
EO80 Section 7

General Description of Approach

- Stakeholder engagement to seek input on ZEV priorities
- Determination of stakeholder issues, barriers, opportunities and support required for ZEV priorities
- Contract with outside consultant (Sawatch Labs) to conduct telematic analysis and scoring of 2,536 vehicles
- Recommend policy and actions needed to support ZEV priorities

Stakeholder Process

- Inform stakeholders of process and goals
- Meetings, teleconferences and surveys
- Data review and conclusions
- Implement program



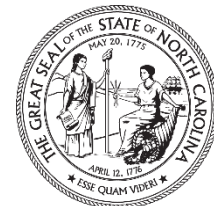
North Carolina
Department of Administration

Motor Fleet ZEV Plan Development Process

EO80 Section 7

Status Update

- Motor Fleet Management is conducting meetings with stakeholders, informing them of options for adding ZEV vehicles right now
- Motor Fleet Management has contracted with Sawatch Labs to conduct the telematic analysis and scoring of 2,536 vehicles.
- State Property Office is providing list of state owned buildings/facilities and existing parking infrastructure statewide. This information will be used for proposed infrastructure development
- State Parking Office is holding continued discussions with charging station vendors and City of Raleigh to consider charging stations options
- Motor Fleet Managing is holding meetings with ZEV vendors to determine the best mix of ZEVs to include in the State's fleet



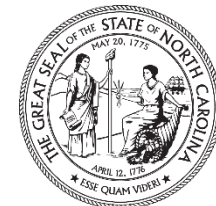
North Carolina
Department of Administration

Motor Fleet ZEV Plan Development Process

EO80 Section 7

The process and final report are to include:

- Analyzing the telematics data of 2500 MFM vehicles over the past 12 months
- Score each vehicle from 0-100 on replacement suitability based on:
 - Overnight parking (time and location consistency)
 - Frequency of all driving that can be completed with a fully charged battery
 - Financial impact of replacement
 - Energy use
- Build future targets to included projection for costs, replacement cycles, and projected EV charging needs.
- Identify optimal locations to install EV charging infrastructure
- Provide a recommended EV model for each target replacement
- Develop a plan for electrification targets for 2020, 2025, 2030 and 2040
- Plan will identify projected greenhouse gas emission reductions if targets are met
- Assign each state agency targets for replacing current fleet vehicles with ZEVs



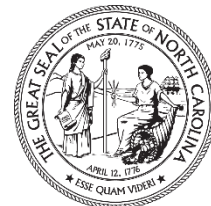
North Carolina
Department of Administration

Motor Fleet ZEV Plan Development Process

EO80 Section 7

Timeline

- January 2019 – May 2019: Stakeholder engagement and information gathering
- May 2019 – August 2019: Data analysis and quantification of economic cost
- September 2019: Draft Plan development and review with stakeholders
- September 2019: Submit Plan to Council to submit to the Governor

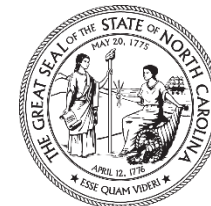


North Carolina
Department of Administration

Motor Fleet ZEV Plan Development Process

EO80 Section 7

- 1. How is the agency evaluating the impacts of climate change on its programs and operations?**
 - DOA's Advocacy groups surveying partners to gauge how climate change will effect operations & working with them on plans to assist
- 2. How is the agency integrating climate change mitigation and adaptation practices into its programs and operations?**
 - P&C Division is designing sustainable procurement practices
 - State Parking is incorporating new and additional charging stations in parking deck designs
- 3. How is the agency prioritizing ZEVs in the purchase or lease of new vehicles and use of ZEVs for agency business travel where feasible?**
 - By using/purchasing ZEVs for all possible functions
- 4. How is the agency supporting state building energy consumption and reduction goals?**
 - Facilities Management Division is upgrading existing state buildings to make them more energy efficient
 - State Construction Division is prioritizing efficiency best practices in new building designs



North Carolina
Department of Administration

Section 8 – Building Efficiency Improvements

Department of Environmental Quality & Department of Public Service



North Carolina Climate Change Interagency Council



Governor Cooper's Executive Order No. 80: Section 8 Update – Building Efficiency Improvements July 16, 2019

Maurice McKinney, CEM, EIT



Section 8 Update – Building Efficiency Improvements

General Description of Approach

- Revise the Comprehensive Program
- Promote best practices for state building energy efficiency and provide training to energy managers and staff
- Adopt a standard methodology for calculating energy consumption per gross square foot and emissions tracking toward reduction goals in Section 1
- Encourage and assist cabinet agencies, universities, K-12, and local government to further reduce energy consumption
- Maintain agency reporting requirements pursuant to G.S. 143-64.12 (a),
 - Biennial Agency Utility Management Plan and annual Agency Utility Reports
 - Annual Utility Report that describes the Comprehensive Program and summarizes achieved reductions in energy consumption

Public Engagement Process

- Meetings, teleconferences, etc. to assist with plan and program development
- Assist agencies and other public building owners in understanding their utility data



Section 8 Update – Building Efficiency Improvements

| Cabinet Agency | Total Square Footage (sq. ft.) | Energy Reduction per sq. ft. (2017-2018 vs 2002-2003) |
|----------------------------------------------|--------------------------------|-------------------------------------------------------|
| Department of Administration | 6,140,901 | -18% |
| Department of Commerce | 261,091 | 25% |
| Department of Environmental Quality | 121,397 | -33% |
| Department of Health and Human Services | 7,422,239 | -30% |
| Department of Information Technology | 163,866 | 29% |
| Department of Natural and Cultural Resources | 3,347,792 | 0 |
| Department of Public Safety | 18,090,092 | -14% |
| Department of Revenue | - | - |
| Department of Transportation | 9,806,630 | -36% |
| Department of Military and Veterans Affairs | - | - |
| Overall | 45,354,008 | -25% |

Schedule



- February 1, 2019, DEQ to develop and submit the Comprehensive Program Report
- January 15, 2019, each cabinet agency to designate an agency energy manager
- March 1, 2019, each cabinet agency to develop and submit an agency utility management plan
- September 1, 2019, each cabinet agency shall submit an agency utility report
- December 1, 2019, DEQ to develop and submit the Comprehensive Program Report
- 2025, 40% energy reduction per square foot from 2002-2003 levels

Learn more at

<https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-1>



Section 8 Update – Building Efficiency Improvements

| Highlights of Cabinet Agencies Plans | |
|--------------------------------------------------------|----------------------------------------------------------|
| Energy audits of facilities | Educational training for staff |
| Lighting upgrades or retrofits to LEDs | Developing master plan for equipment replacement |
| Investigate best method to track utilities | Development of tenant/employee engagement |
| Chiller replacement to more energy efficient equipment | Air handling units' replacement/renovation |
| Reduce usage of excess offices/buildings | Reduce personal appliances |
| Controls improvement | Replace constant speed motors with variable speed drives |

Learn more at

<https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-1>



Thank you!

Maurice McKinney, CEM, EIT

Energy Engineer

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North Carolina Climate Change Interagency Council



Executive Order 80 & Energy/Water Management at NCDPS.

July 16, 2019.

North Carolina Department of Public Safety.



The Strategic Plan: Analysis

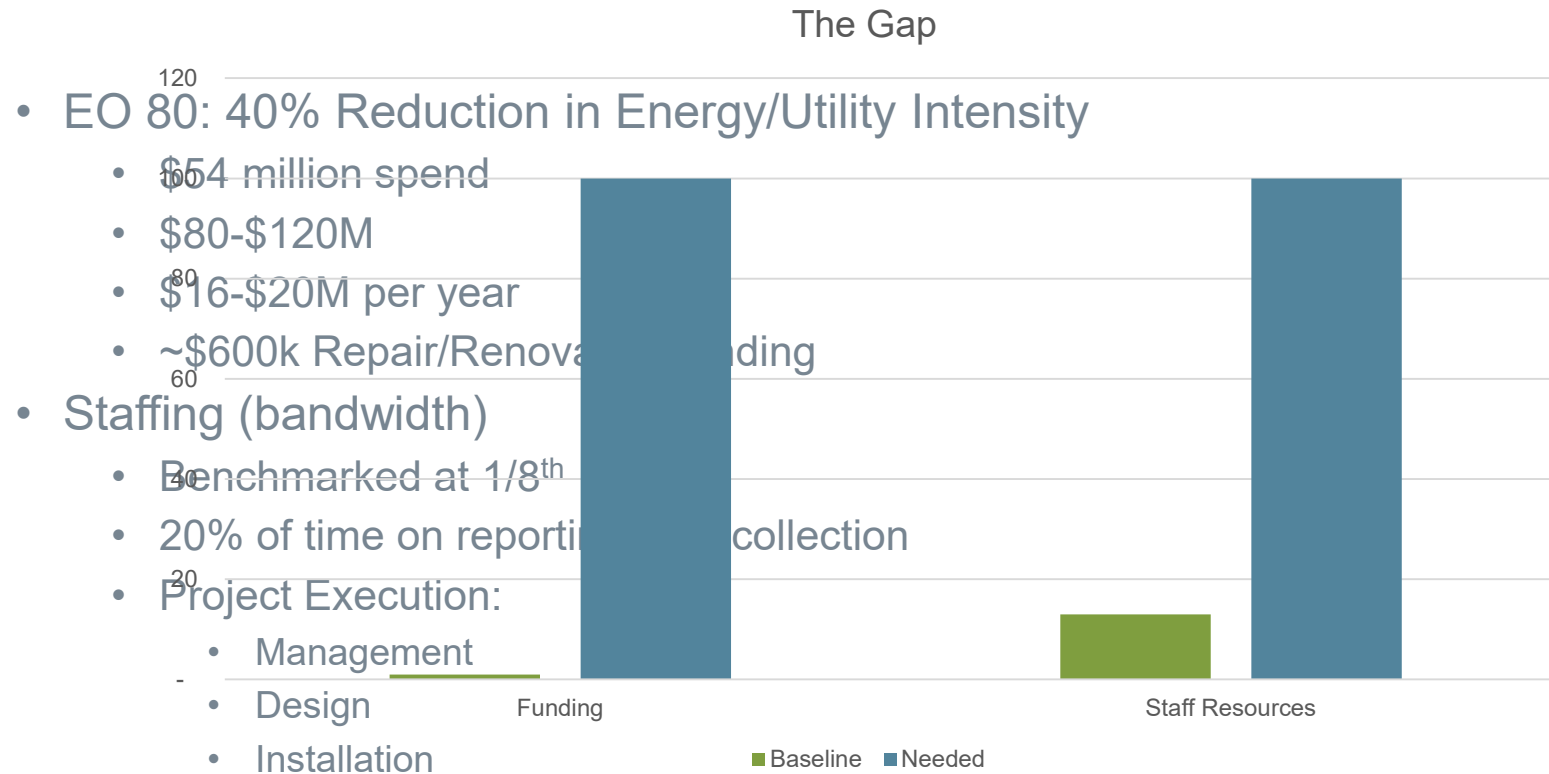
- Driven by Guiding Principles:
 - Improve Safety of Staff & Correctional Officers
 - Improve Comfort/Morale
 - Reduce Maintenance
 - Wise Use of Taxpayer \$\$
 - ROI ~ 10% or better
 - Get it Done!

The Strategic Plan: Analysis

- Based on:
 - The Gap
 - Where we are
 - Where we want or should be
 - Where the Juice is Worth the Squeeze
 - The biggest target
 - Low hanging fruit
 - Easy to implement

The Strategic Plan: Analysis

- Where are the Gaps?

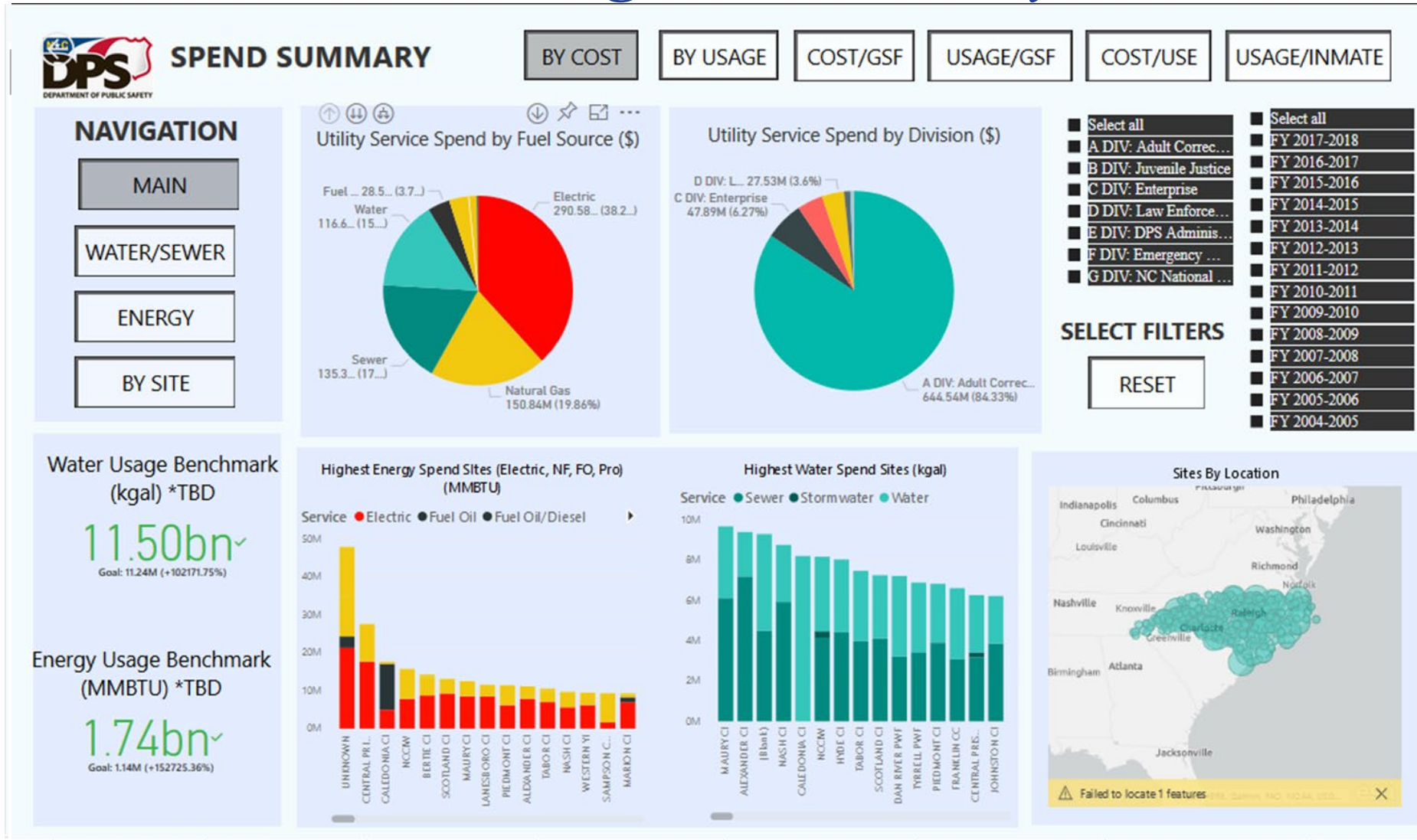


The Strategic Plan: Analysis

- Where the Juice is Worth the Squeeze
 - The biggest target
 - Which Department?
 - Which Utility?
 - Low hanging fruit

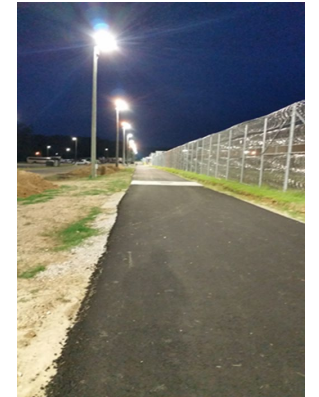
- Easy to implement

The Strategic Plan: Analysis

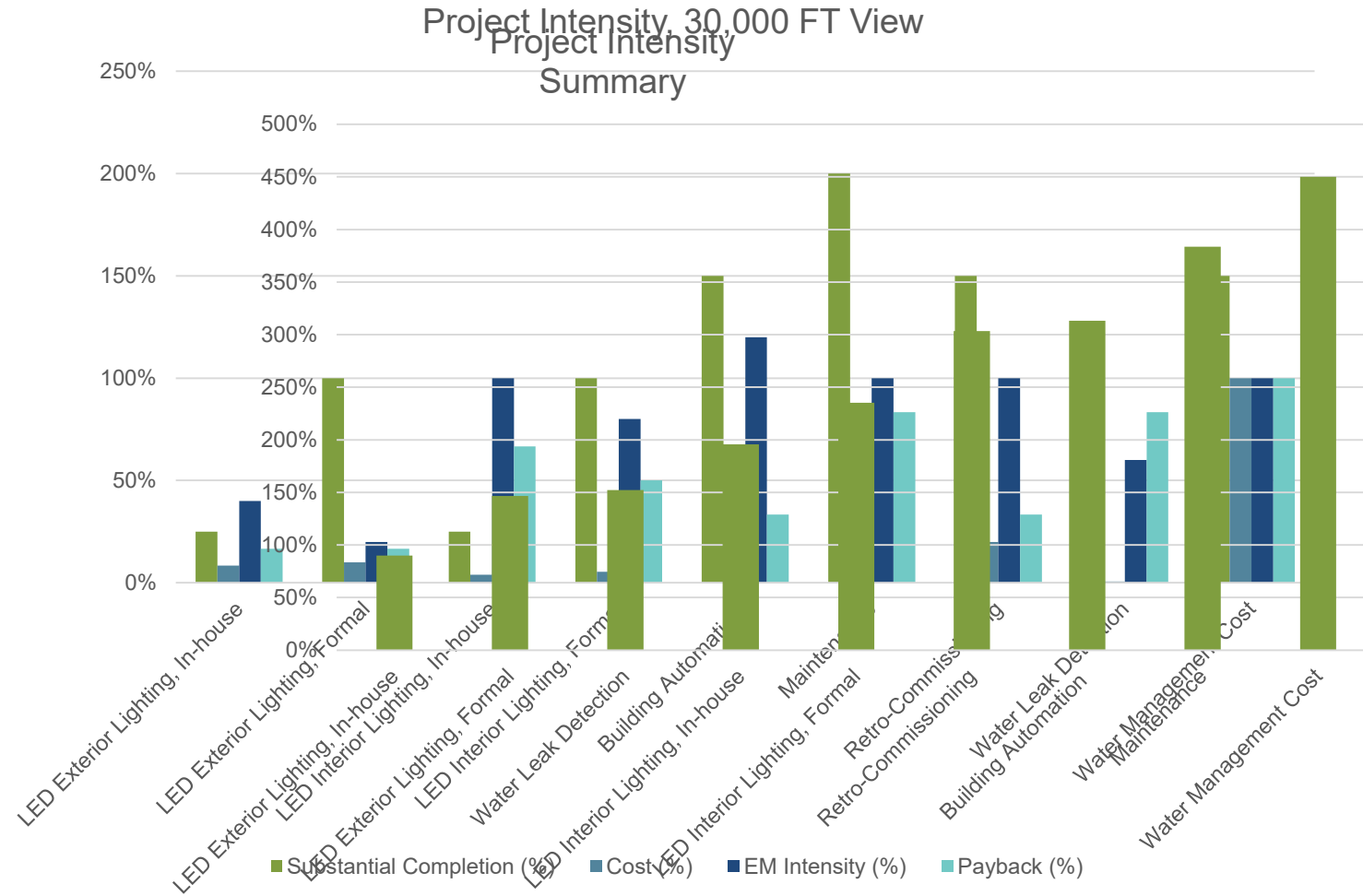


The Strategic Plan: Analysis

- Where the Juice is Worth the Squeeze
 - The biggest target
- Low hanging fruit
 - Maintenance/Retro-Commissioning
 - Building Automation Systems
 - LED Lighting: Inside? Outside?
 - Water Leak Detection
 - Water Management
- Easy to implement



The Strategic Plan: Analysis



The Strategic Plan: The Focus

- How Do You Eat An Elephant?
- One Bite At a Time!

The Strategic Plan: The Focus

- Funding:
 - Takes money to make (save) money
 - Opting Out For Project Funding
- Staff Resources:
 - Temporary Employees
 - Professional Services
 - Interns
- The Management Process:
 - Reporting
 - Project Management



The Strategic Plan: The Focus

- The Spend:
 - The Department: Adult Corrections
 - The Utilities:
 - Electricity
 - Water & Sewer
- The Projects:
 - Exterior LED Lighting
 - Interior LED Lighting
 - Water Leak Detection
 - Building Automation Guidelines
 - Maintenance



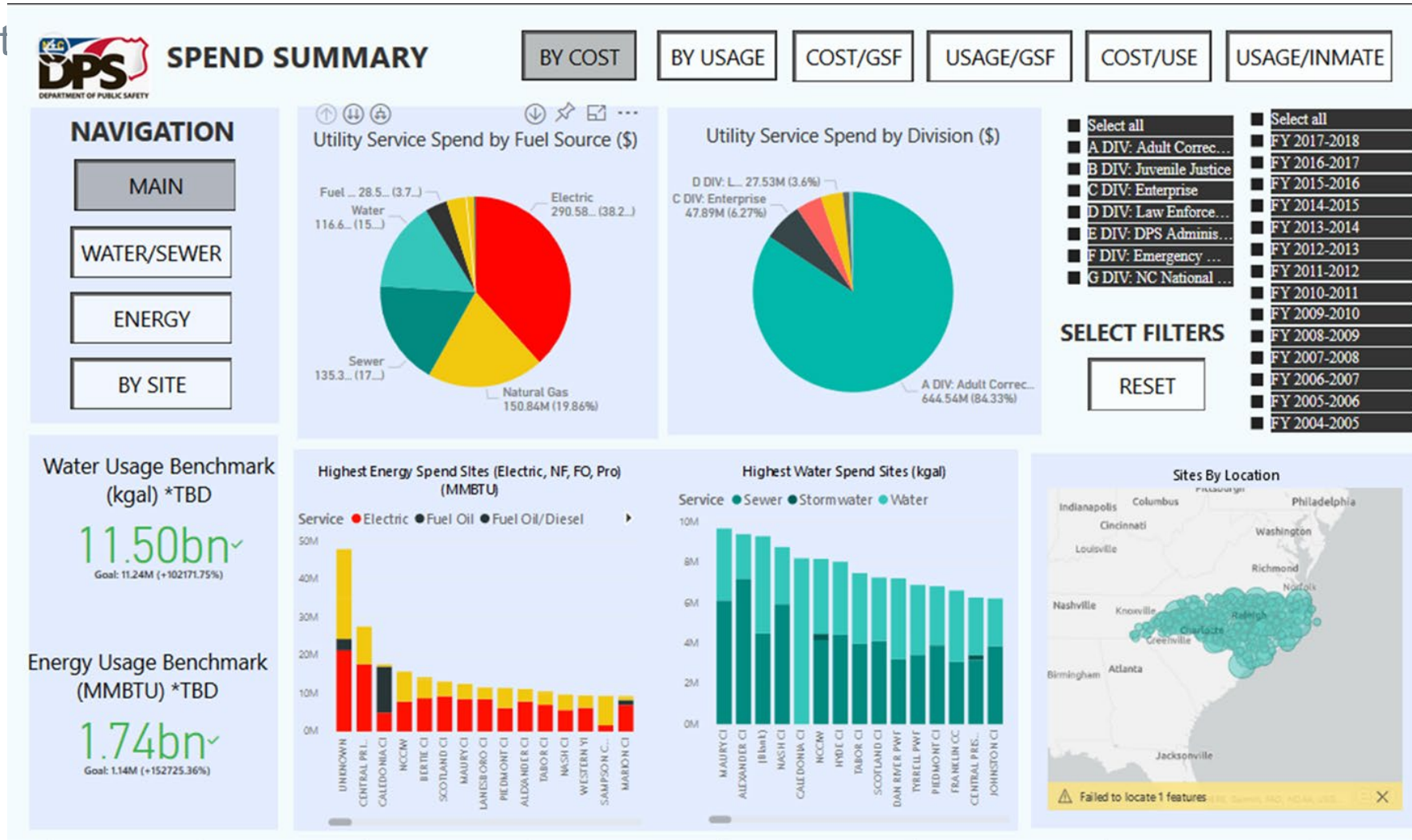
The Results: Where Are We Now

- Funding:
 - Opting Out For Project Funding ~ \$1M
- Staff Resources:
 - Temporary Employees – 1 Project Manager
 - Professional Services - On Boarding
 - Interns
- Management Process:
 - Reporting:
 - Streamline Data Collection & Analysis
 - Dash Board
 - Project Management
 - State Term Contracts



The Results: Where Are We Now

- Report



DEPARTMENT OF PUBLIC SAFETY

PREVENT. PROTECT. PREPARE.

The Results: Where We Are Now

- Projects & Management
 - LED Lighting, Interior: Foothills CI
 - Project Substantially Complete
 - Savings/Year:
 - ~\$17,400
 - ~265,200 kwh
 - Nash CI: Leak Detection & Repair
 - ~(\$595,300) Losses Water/Sewer/Energy
 - ~\$285,600 Could Be Reimbursed
 - Building Automation: Standardized:
 - Design Guidelines in Place:
 - Graphics
 - Sequence of Operations
 - Specifications
 - Data To Monitor



The Results: Where We Are Now

- Projects & Management
 - LED Lighting, Exterior
 - Term Contract
 - Temporary Staff
 - In-House Project Management & Installation
 - Professional Services to Accelerate Fixture Lighting Replacement Packages
 - 5 Sites Substantially Complete
 - 9 Sites Ready for Purchase & Install
 - 14 Sites “Design Development” Status
 - Savings (By June 2020)/Year:
 - ~3,480,600 kwh/year
 - ~288,200/year
 - Corresponding GHG Emissions Reductions



The Results: Where We Are Now

- Before



- After



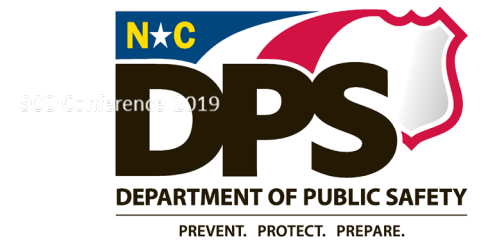
The Results: Where We Are Now

- Before

- After

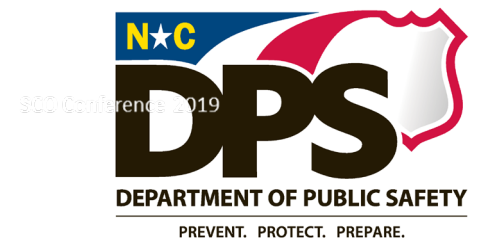
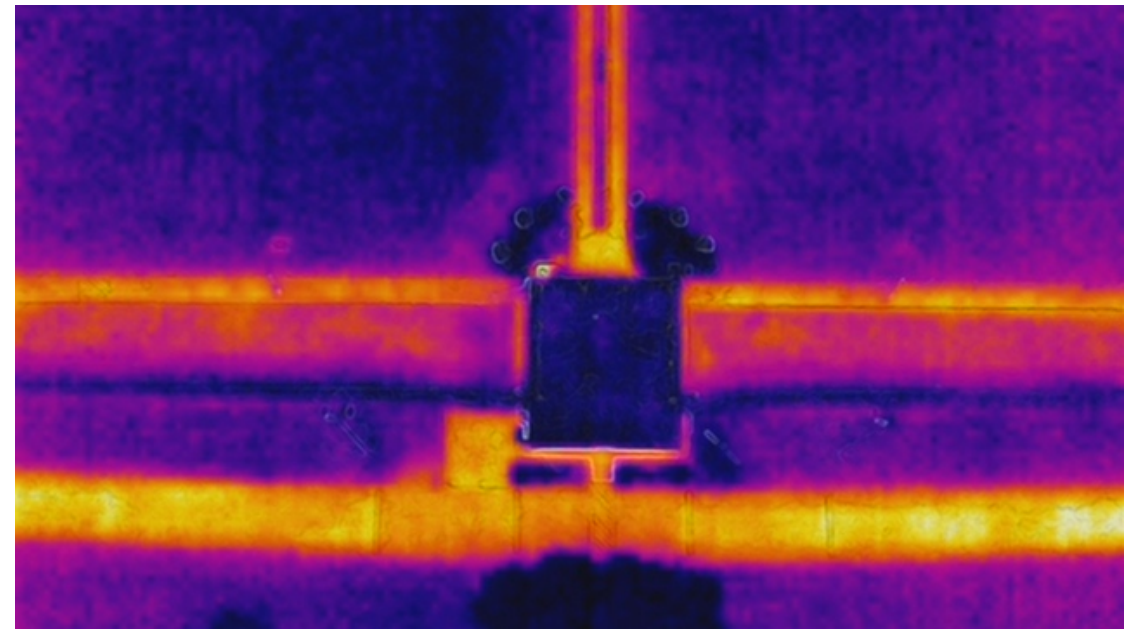


The Results: Where We Are Now



300 Contributions 2019

The Results: Where We Are Now



The Results: Where We Are Now

- Before



- After



The Future

- Exterior LED Retrofits:
 - BY July 2020:
 - Exterior LED Lighting
 - All 63 Sites Project Packages Ready For Issue to Maintenance
 - Additional 10 Sites Substantially Complete
 - Interior LED Lighting @ 3 Additional Sites
 - Streamline Water Leak Detection Program
 - Building Automation Systems:
 - Centralized Monitoring
 - Data Analytics & Diagnostics
 - 3 System Designs



The Future

- Exterior LED Retrofits:
 - BY July 2020:
 - Exterior LED Lighting
 - All 63 Sites with Fixture Selections (ready to order)
 - Additional 10 Sites Substantially Complete
 - Interior LED Lighting @ 3 Additional Sites
 - Streamline Water Leak Detection Program
 - Building Automation Systems:
 - Centralized Monitoring
 - Data Analytics & Diagnostics
 - 3 System Designs
 - ? ~ HB 1292



The Future

- Motor Fleet
- Natural & Working Lands
- Resiliency

Stay Tuned....

Thank You!

Section 9 – Climate Science, Impacts, Risks, Adaptation, and Resiliency

Department of Environmental Quality



Directives

Department of Environmental Quality & Cabinet Agencies

- **N.C. Climate Risk Assessment and Resiliency Plan** - provide a scientific assessment of current and projected climate impacts on North Carolina and prioritize effective resiliency strategies. **Due Mar. 1, 2020.**

All Cabinet Agencies - Assess and Address Climate Change

- Evaluate the impacts of climate change on agency programs and operations
- Integrate climate change mitigation and adaptation practices into agency programs and operations
- Support communities and sectors vulnerable to climate change impacts



Goals

Goal 1: Develop an updated Climate Science Assessment for NC

Goal 2: Assess vulnerability to climate change

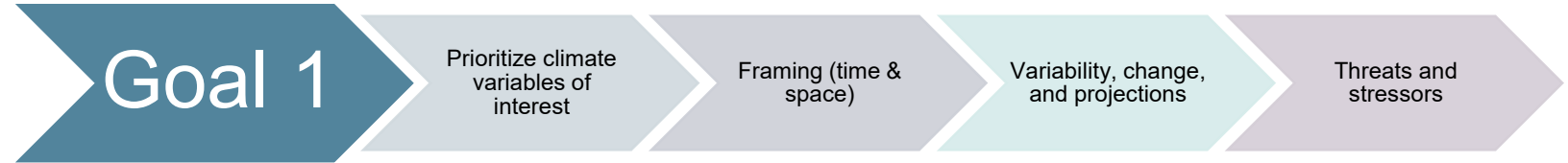
Goal 3: Develop a NC Climate Risk Assessment and Resiliency Plan

Goal 4: Assist interested local communities develop resiliency strategies



Approach

Assess Climate Related Threats



Assess Vulnerability and Risk



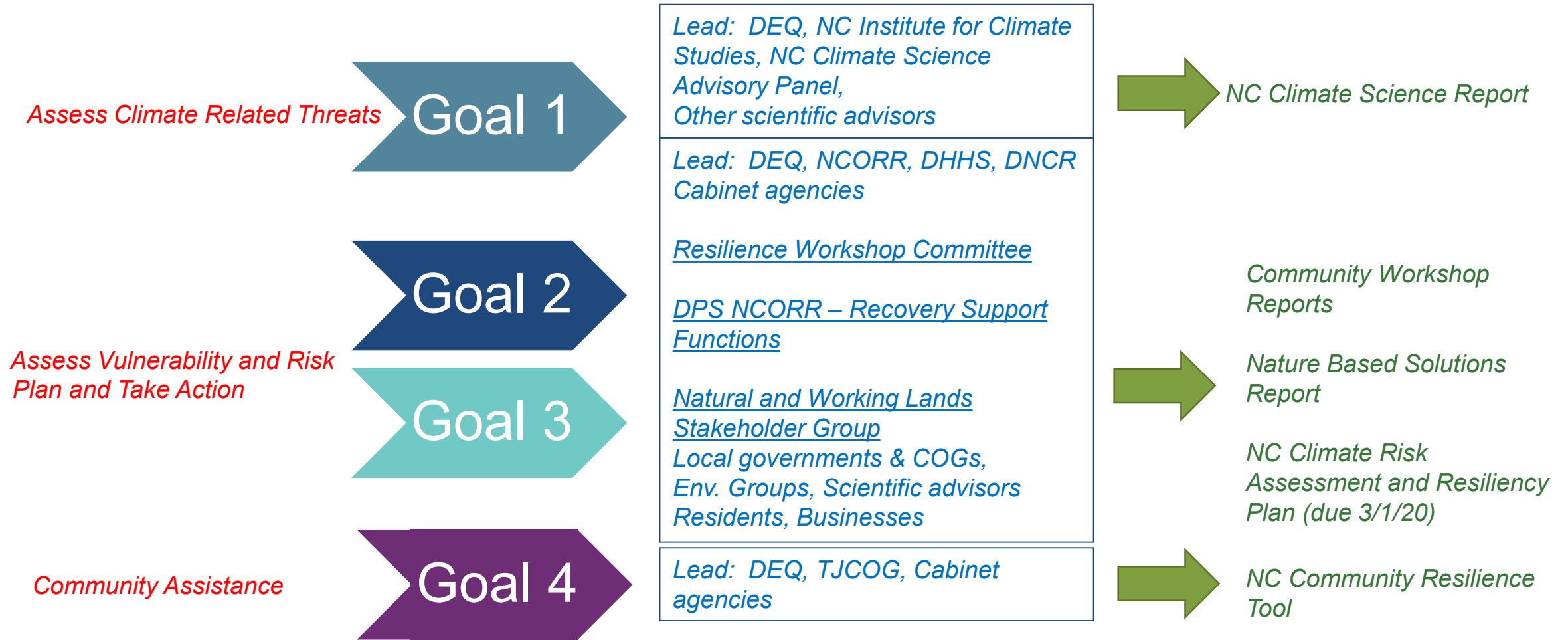
Plan and Take Action



Community Assistance



Current Plans



NC Executive Order 80 - Section 9

NC Climate Science Report Update

NC Climate Change Interagency Council Meeting
July 16, 2019 | Winston - Salem, NC

**Kenneth E. Kunkel¹, David R. Easterling²,
Sarah M. Champion¹, Jenny P. Dissen¹, Otis B. Brown¹**

*¹North Carolina Institute for Climate Studies, North Carolina State University
NOAA Cooperative Institute for Satellite Earth System Studies (CISESS)*

²NOAA National Centers for Environmental Information, US Global Change Research Program



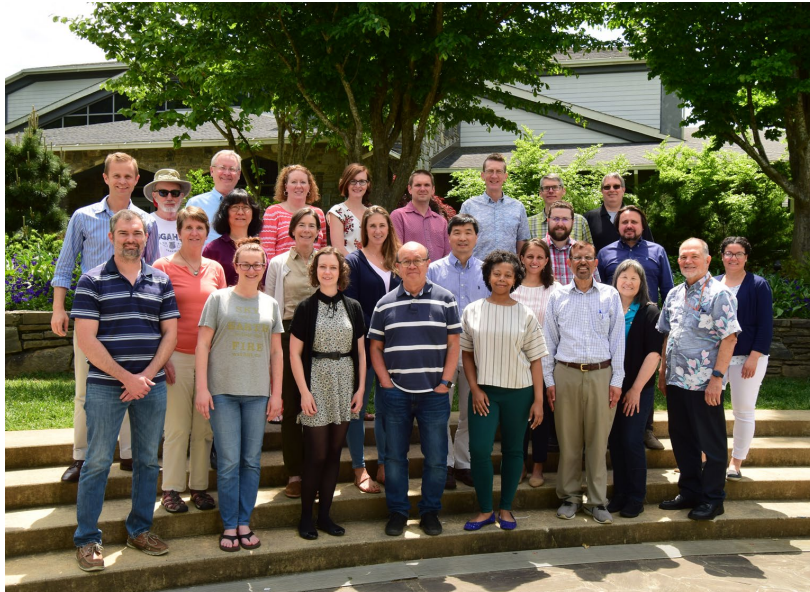
Agenda

- ❖ **NCICS - Who We Are**
- ❖ **NC Climate Science Report (NC CSR) Updates**
 - ❖ Guiding Principles and Integrity for Information Quality
 - ❖ Climate Science Advisory Panel
 - ❖ Timeline
- ❖ **NC Climate Science Report Outline**

Who We Are

North Carolina Institute for Climate Studies Cooperative Institute for Satellite Earth System Studies

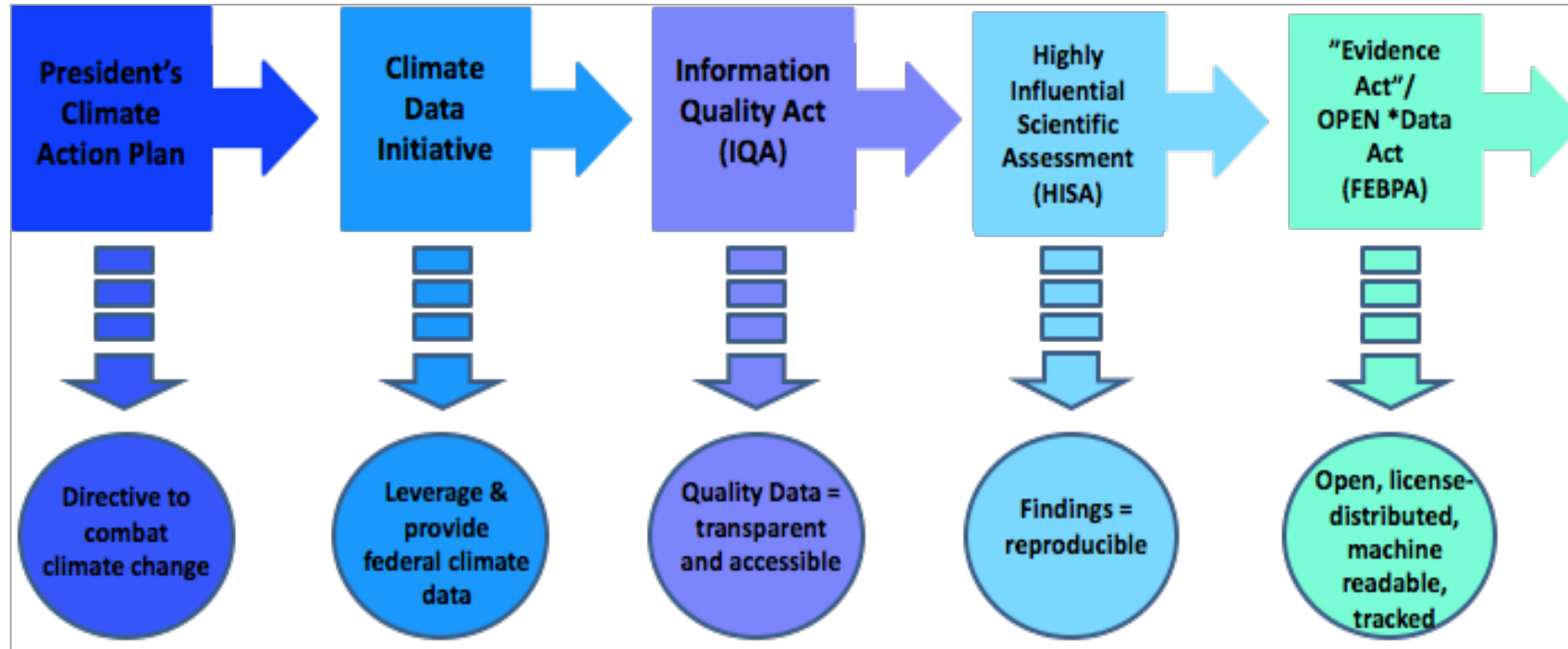
ncics.org/cisess.org



- ❖ NCICS' primary activity is the Cooperative Institute for Satellite Earth System Studies (CISESS)—a NOAA/NC State University Cooperative Institute
- ❖ Co-located with NOAA's National Centers for Environmental Information (NCEI) in Asheville, North Carolina
- ❖ CISESS is a multidisciplinary team of experts collaborating in climate and satellite research to support NCEI's "research to operations" strategy
 - ❖ Includes the NOAA Technical Support Unit for the National Climate Assessment

NC CSR: Information Quality & Integrity

NC CSR will use the National Climate Assessment Guiding Principles and the Extensive Peer-Reviewed Findings



- NCICS will ensure the NC CSR complies with federal mandates
- Ensures highest information integrity

NC CSR: Climate Science Advisory Panel

| NAME | UNIVERSITY |
|------------------|----------------------------------------------------------------------|
| Ana Barros | Duke University |
| Reide Corbett | Eastern Carolina University - Coastal Studies Institute |
| Kathie Dello | NC State University / NC State Climate Office |
| David Easterling | NOAA National Centers for Environmental Information |
| Charles Konrad | University of North Carolina-Chapel Hill |
| Kenneth Kunkel | North Carolina Institute for Climate Studies / NCSU |
| Gary Lackmann | North Carolina State University |
| Wenhong Li | Duke University |
| Rick Luettich | University of North Carolina-Chapel Hill Institute of Marine Science |
| Douglas Miller | University of North Carolina-Asheville |
| Baker Perry | Appalachian State University |
| Walter Robinson | NC State University (NC State Climate Office) |
| Adam Terando | Southeast Climate Adaptation Science Center / NCSU / USGS |

NC CSR: Timeline



NC CSR: Outline

1. **Global State of the Science**
2. Historical Changes in Southeast and NC
3. Projections for NC

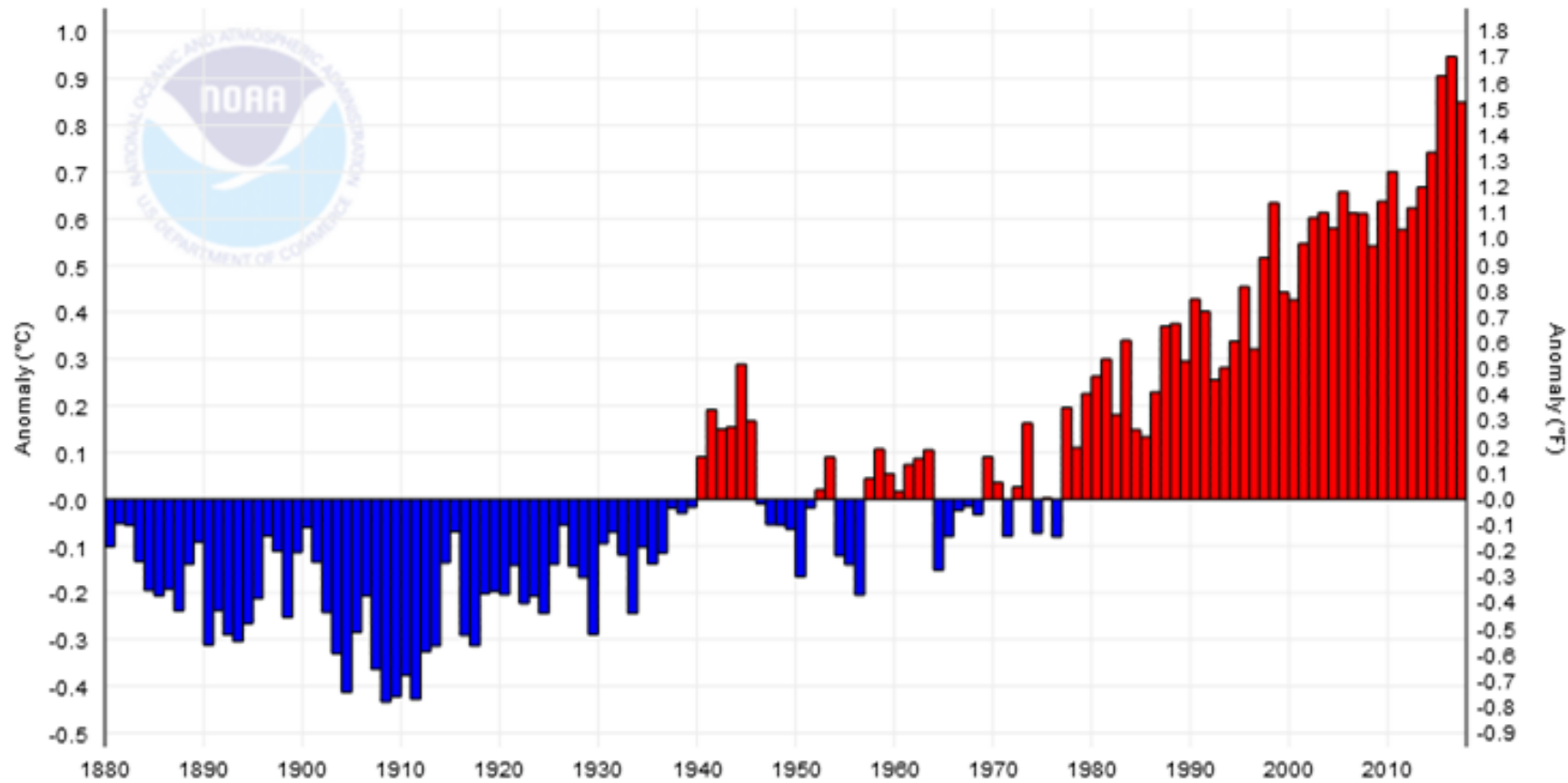
Executive Order 80 - Section 9
North Carolina Climate Science Report

North Carolina Institute for Climate Studies /
North Carolina State University
December 2019

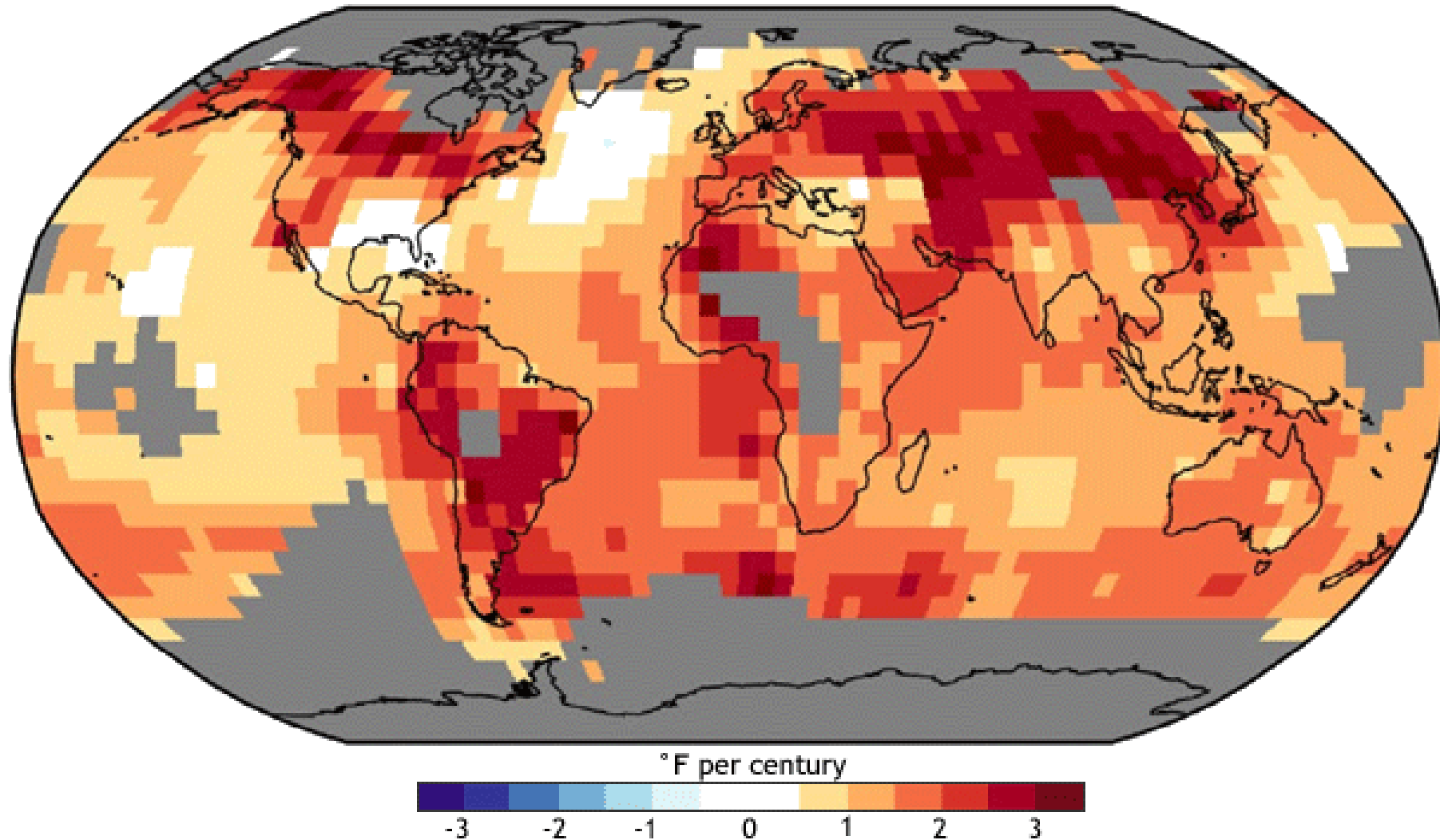
- ILLUSTRATIVE -

2018 Was 4th Warmest Year on Record

Global Land and Ocean Temperature Anomalies, January-December

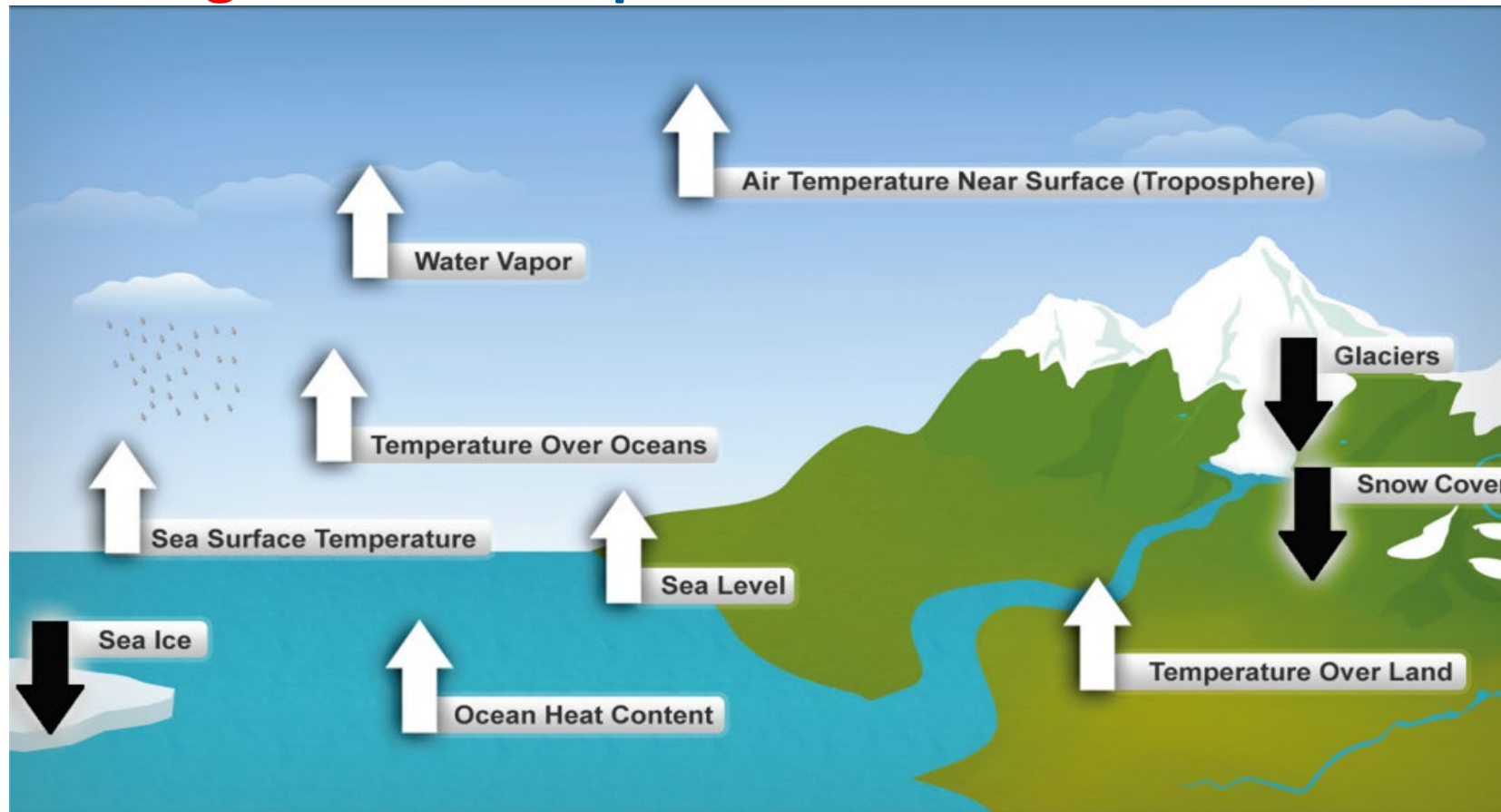


Where Has It Warmed? Annual Temperature Trends 1901-2017

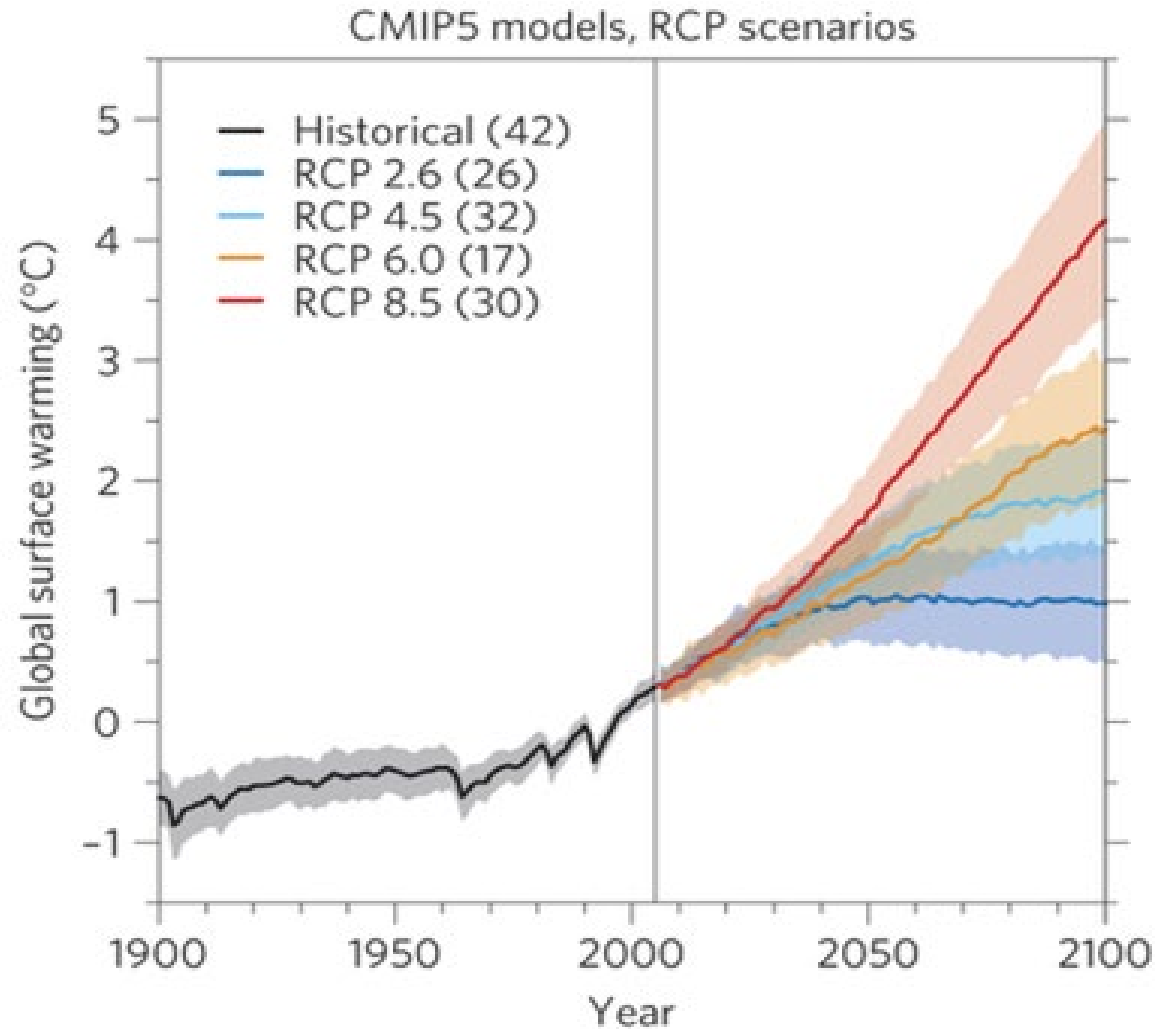


Indicators of a Changing Climate

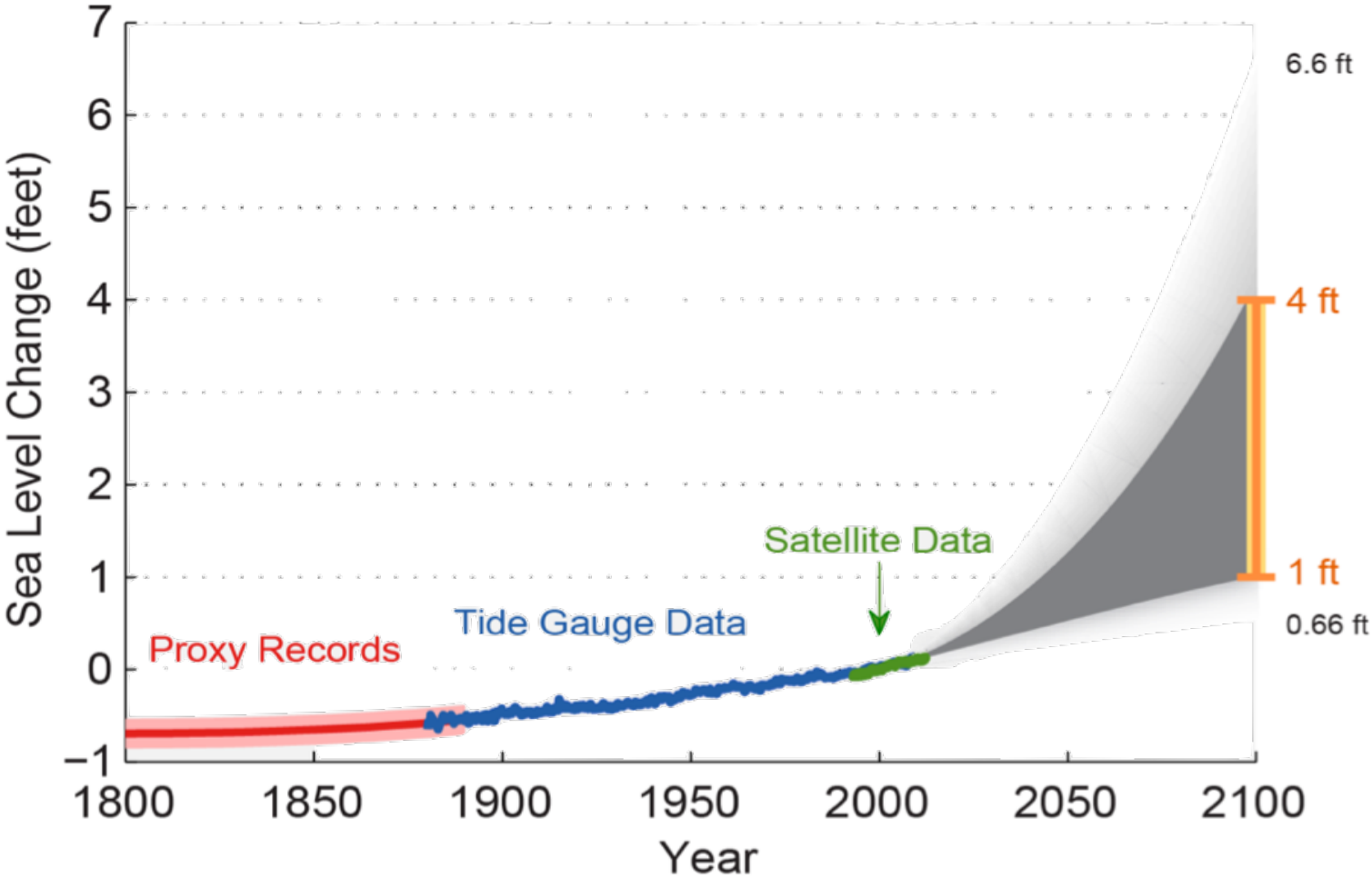
All indicators expected to **increase** in a warming world are **increasing** and those expected to **decrease** are **decreasing**



Future Projections



Projected Changes in Global Sea Level



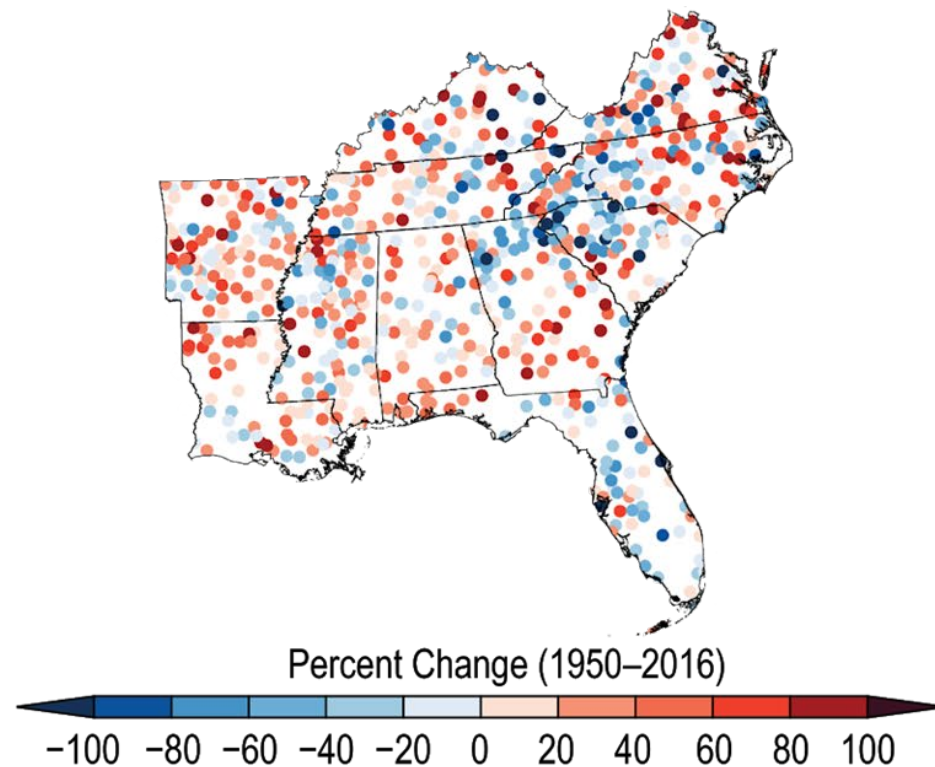
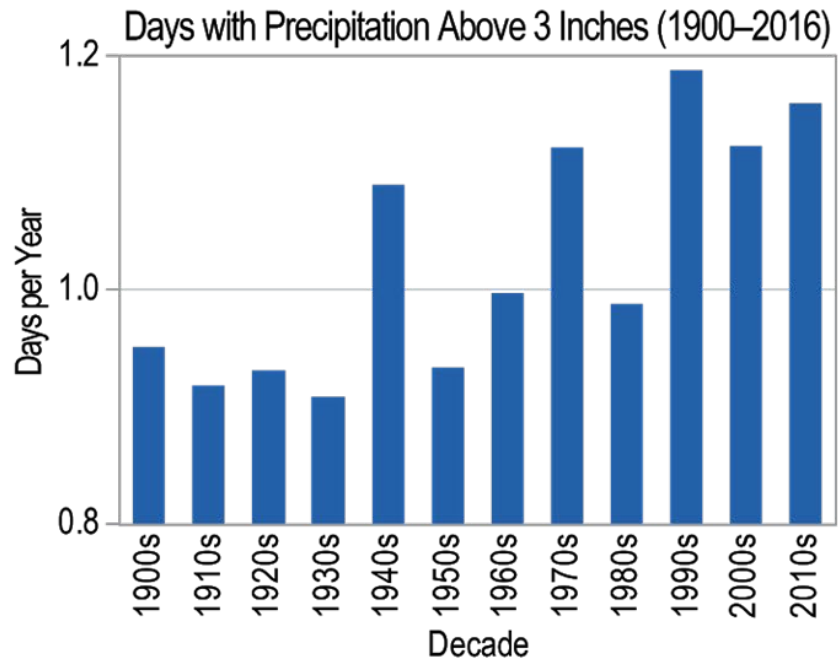
NC CSR: Outline Historical Trends

1. Global State of the Science
- 2. Historical Changes in Southeast and NC**
 - Regional
 - Southeast and North Carolina
 - Coastal, Piedmont, Mountains
 - Temperature and Precipitation
3. Projections for NC

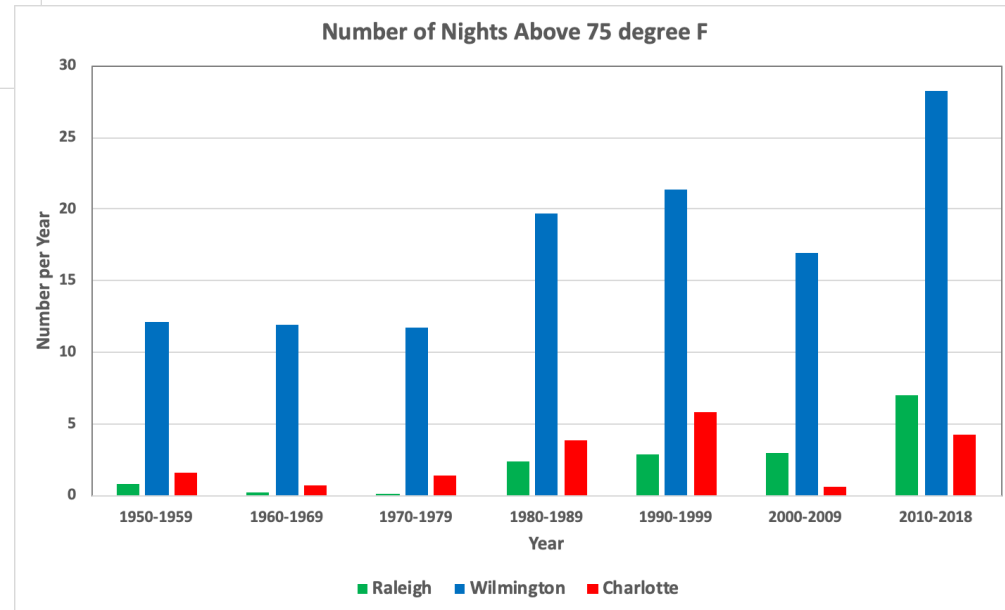
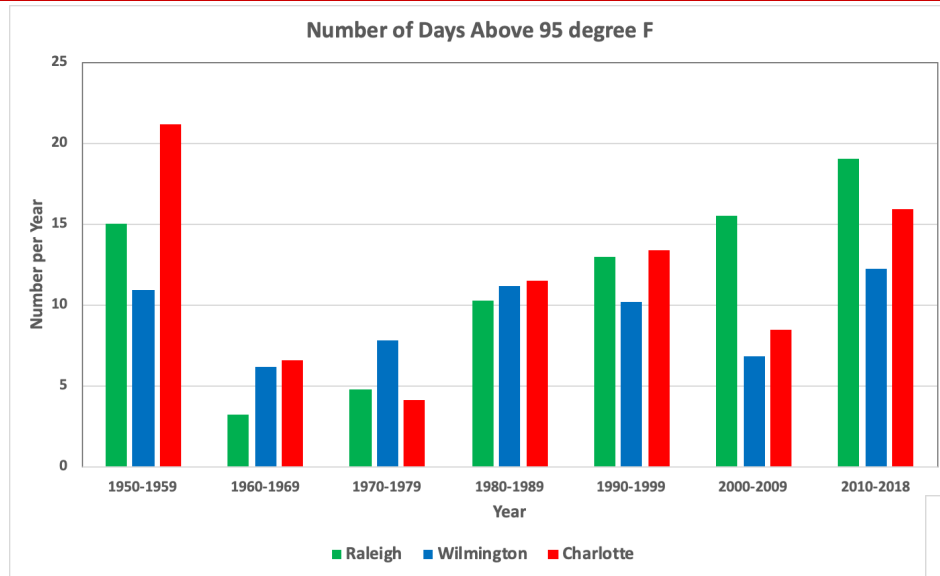
Executive Order 80 - Section 9
North Carolina Climate Science Report

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December 2019

Trends in 3 Inch Storms in Southeast US

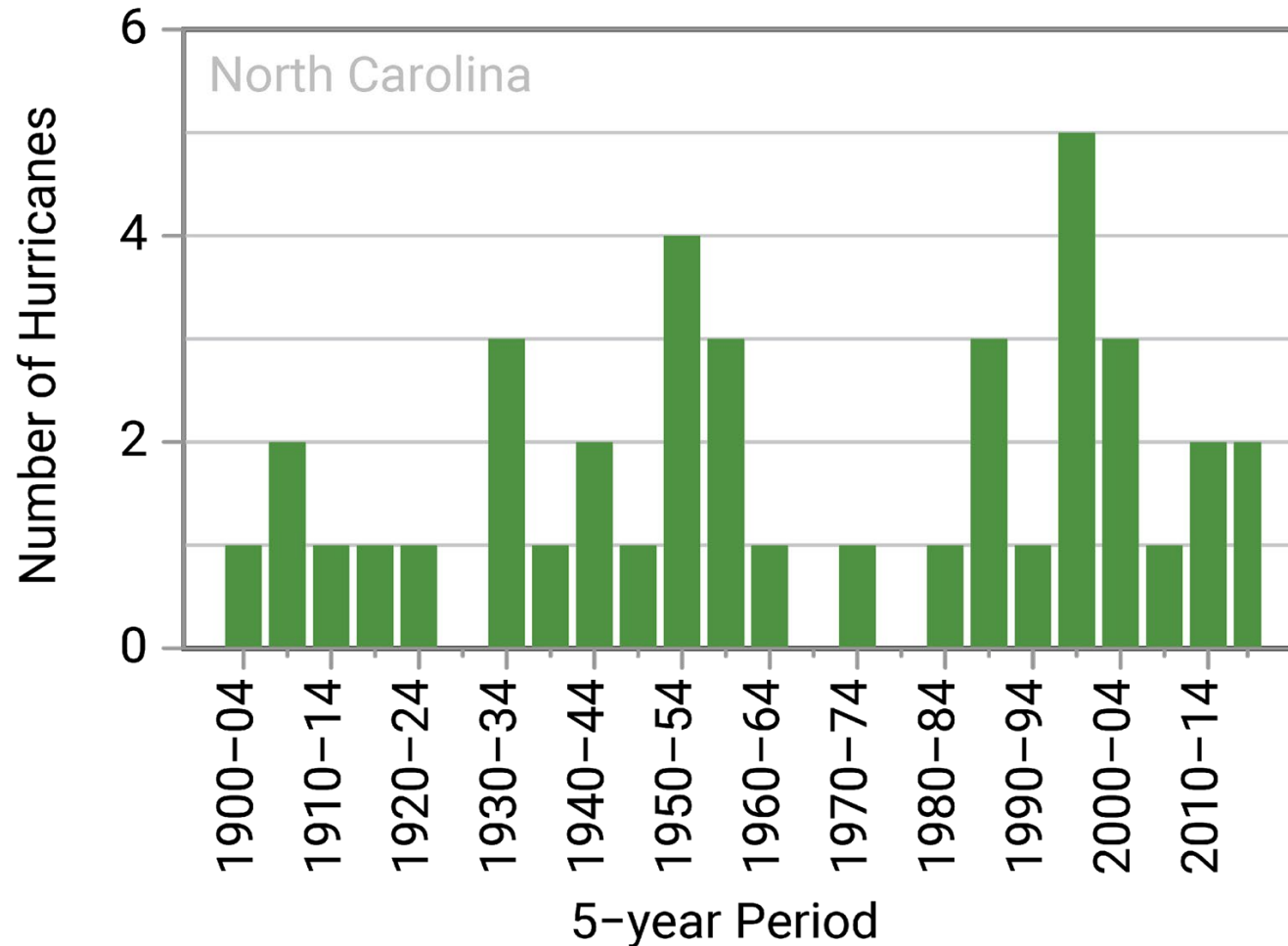


NC Hot Days and Nights



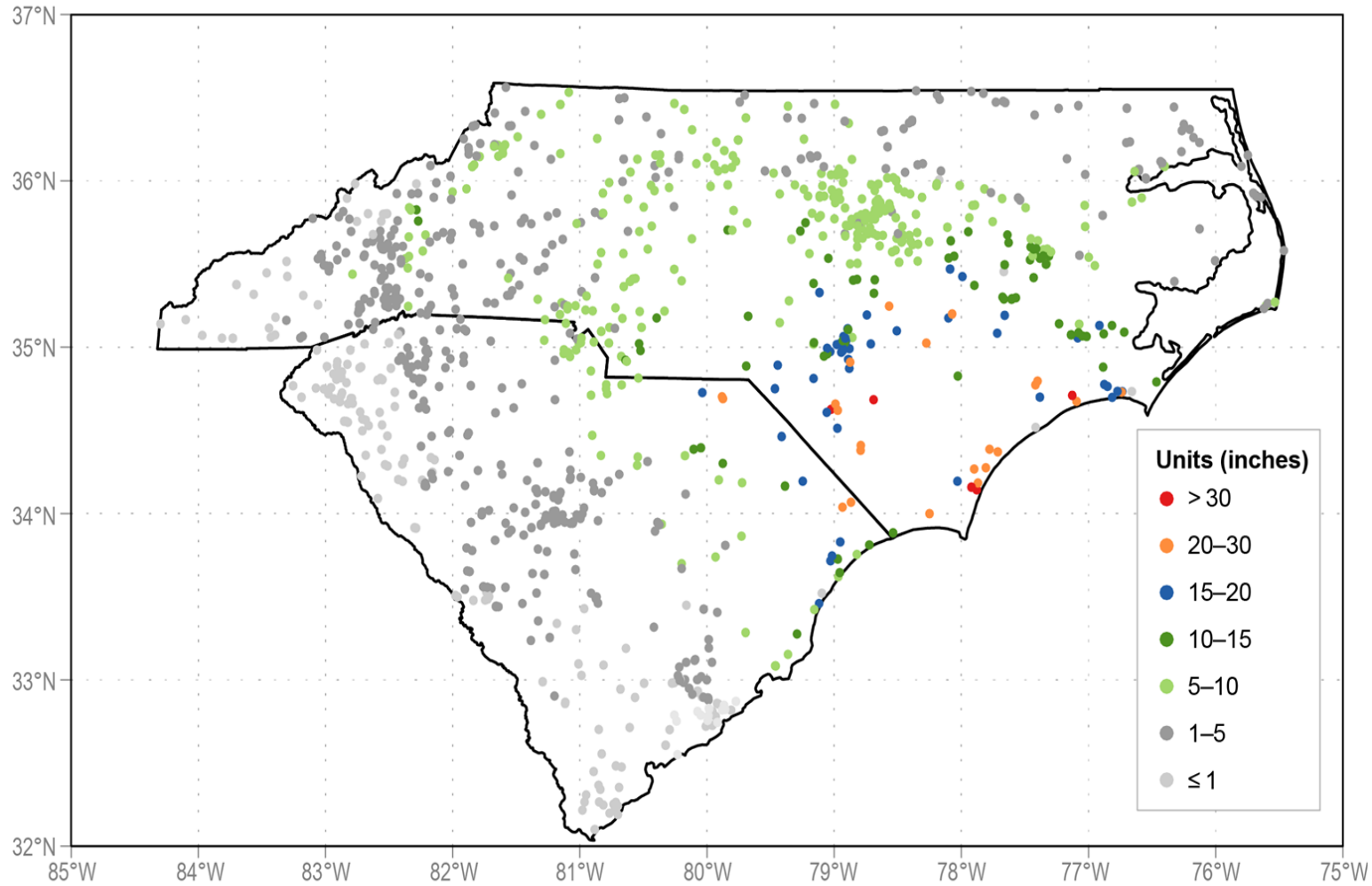
NC Hurricanes

Total Hurricane Events in North Carolina



Hurricane Florence

Rainfall: September 24–27, 2018



NC CSR: Outline Historical Trends

1. Global State of the Science
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**Executive Order 80 - Section 9
North Carolina Climate Science Report**

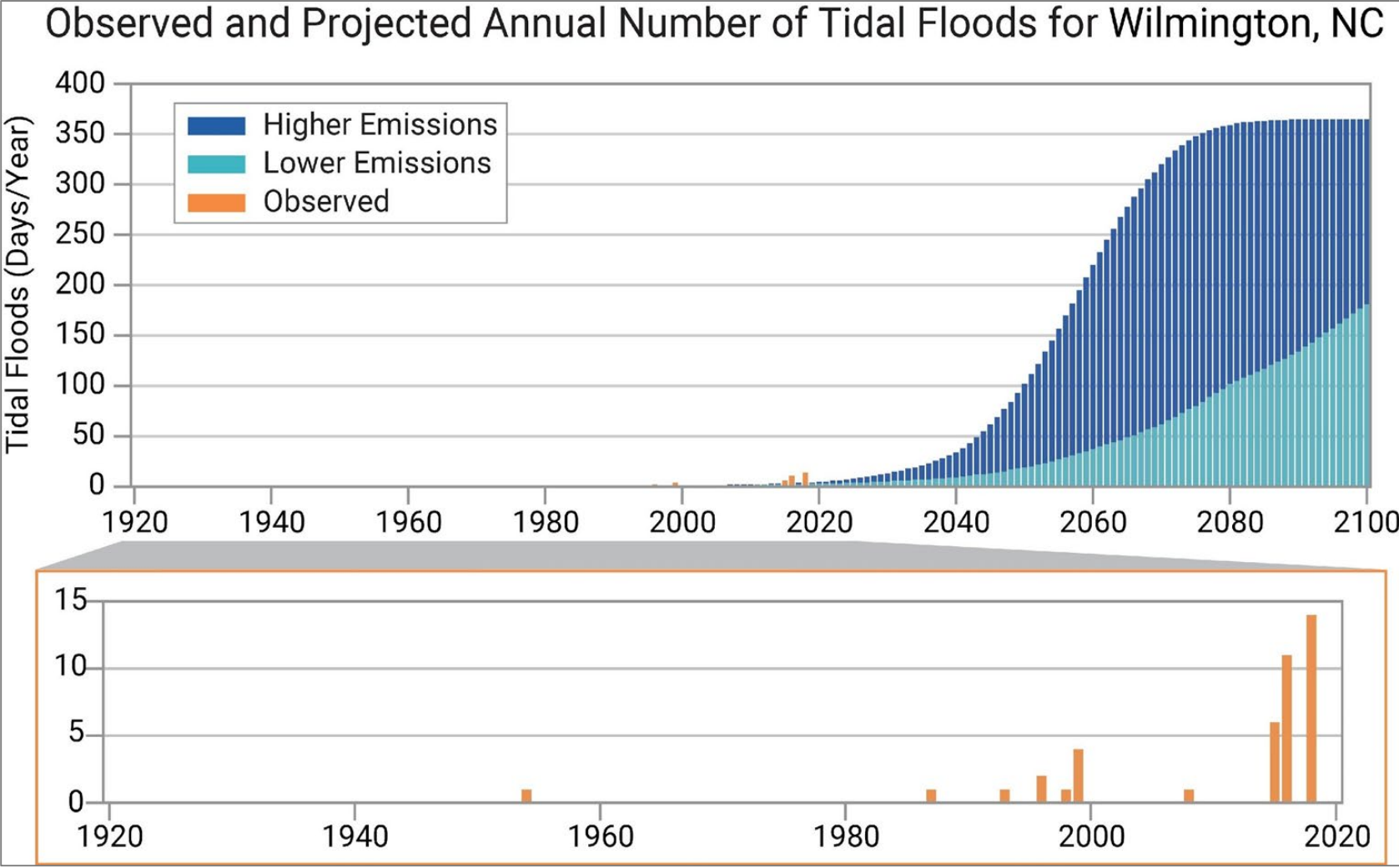
North Carolina Institute for Climate Studies /
North Carolina State University
December 2019

Projections of Future Climate

- Temperature
 - Average and extreme conditions
- Precipitation
 - Average and extreme conditions
- Storms
 - Hurricanes, Winter Coastal Storms, Thunderstorms, Snowstorms, Ice storms,
- Sea Level



Projected Change in Tidal Flooding



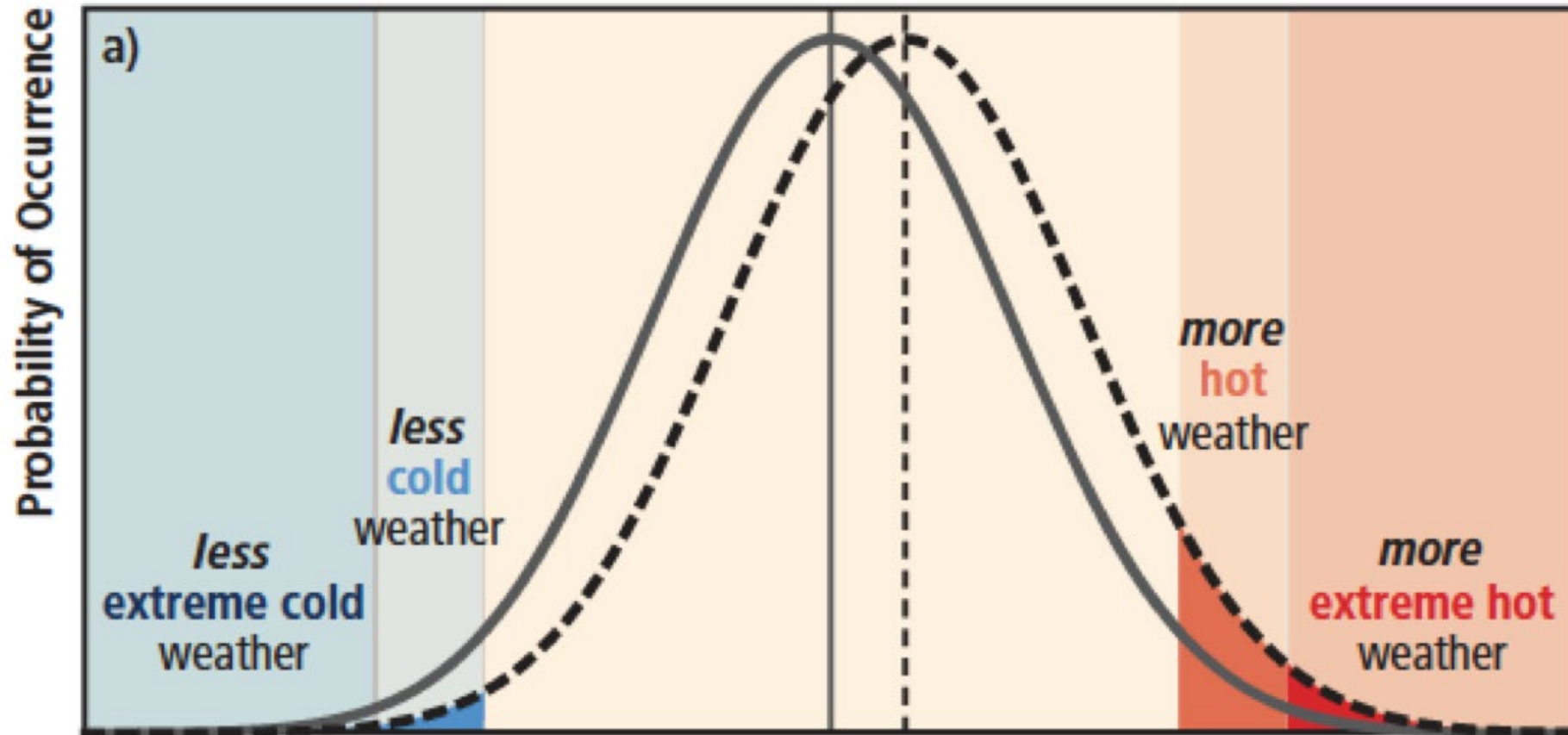
Next Steps

- **Continued engagement with Cabinet Designees and other key stakeholders**
- **Collaborate with CSAP**
- **Finalize NC CSR Outline**
 - Analysis
 - Report Writing

Thank you

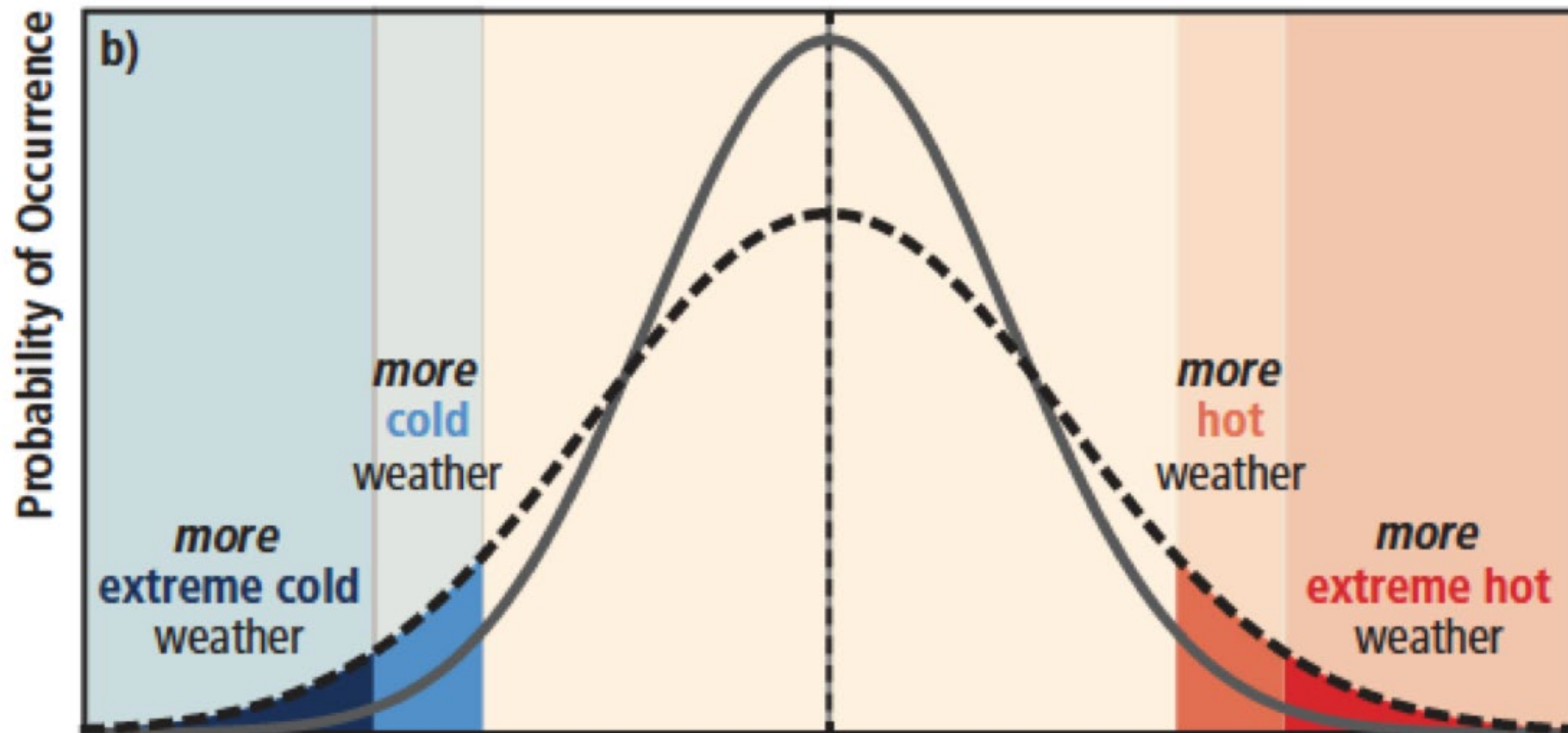
- **NC CSR Management Team**
 - DEQ: Sushma Masemore, Tancred Miller, Tira Beckham
 - NCICS: Kenneth Kunkel, Otis Brown, Sarah Champion, Jenny Dissen, NCICS TSU Team
 - NOAA NCEI: David Easterling
 - Climate Science Advisory Panel Members
- **EO80 Section 9 Working Group Leads**

Shifted Mean



Source:
IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation

Increased Variability



Source:
IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation

North Carolina Climate Change Interagency Council



Proposed Resiliency Workshops for North Carolina Climate Risk Assessment and Resiliency Plan

July 16, 2019

Department of Environmental Quality



Coastal Workshops

Coastal Workshops:

- May 2, 2019 - Elizabeth City
- May 14, 2019 – Wilmington
- June 11 -12, 2019 – Resiliency Summit, Havelock

Audience:

- local government staff (land use/ community planners, hazard mitigation planners, floodplain managers, emergency managers, stormwater managers, natural resource managers, engineers, public works officials, zoning and permitting officials, and county and municipal leaders)
- other private, public, and non-profit stakeholders interested in building resilience

Goals: Convene stakeholders to

- Learn about the latest climate science available for the state,
- Share regional climate change and resiliency challenges,
- Generate strategies that could be implemented at the local level, and
- Generate recommendations that could be implemented at the state level.

Structure:

- Morning: Informative – EO 80, climate data relative to region, regional experiences/successes
- Afternoon: Facilitated discussion on top priorities and challenges for increasing long-term resilience



Proposed Piedmont and Mountain Workshops

Additional Workshops Planned for Piedmont and Mountains

- Conduct 2 workshops in piedmont
- Conduct 2 workshops in mountains
- Consider local and regional climate change and resiliency impacts to the people and to the natural and built infrastructure
- Gather stakeholder input that will aid cabinet agencies in developing their portions of plan

Planning Committee

- Form planning committee to determine time, date, locations, venues, format, funding, speakers, stakeholders, etc.
- Send names and contact info for your planning committee representative by Friday, July 19, 2019. (We have names from Commerce and Public Safety already.)
- Sherri Stanley – sherri.stanley@ncdenr.gov (919) 707-8235
- Tira Beckham – tira.beckham@ncdenr.gov (919) 707-8757



Other Proposed Planning Committee Partners

Partners

- Cabinet Agencies
- Local/Tribal Governments and Councils of Government
- University/Academic
- Community Organizations
- Non-Profit Organizations
- Businesses

Proposed Sectors and Focus Areas

- People - Public Health, Public Safety, Cultural Heritage
- Economy – Tourism, Insurance, Agriculture, Community and Business
- Built Environment - Transportation, Coastal Resources and Structures, Water Resources, Dams and Water management, State Property
- Natural Environment - Wetland Ecosystems, Aquatic Ecosystems, Upland Ecosystems



Timeline

- July 19, 2019 Names of Workshop Planning Committee representatives to DEQ
- July 2019 First Meeting of Workshop Planning Committee
- Summer 2019 Subsequent Workshop Planning Committee Meetings (as needed)
- Summer 2019 Individual Regional Workshop Planning Committee Meetings
- Early November 2019 Begin Stakeholder Engagement Workshops
- Late November 2019 Complete Stakeholder Engagement Workshops

*Questions?
Interested in Participating in Workshops?*

Sherri Stanley

sherri.stanley@ncdenr.gov

(919) 707-8235

Tira Beckham

tira.beckham@ncdenr.gov

(919) 707-8757



North Carolina Climate Change Interagency Council



North Carolina State Disaster Recovery Task Force

July 16, 2019

North Carolina Office of Recovery and Resiliency (NCOORR)

Marlena Byrne, Deputy Chief Resilience Officer



NORTH CAROLINA OFFICE OF RECOVERY AND RESILIENCY

State Disaster Recovery Task Force

- *Mission:* To **address the unmet needs** of communities affected by past disasters **and build resiliency** across state agencies and nongovernmental organizations for future events.
- The **State Disaster Recovery Framework** defines the Task Force and establishes twelve subcommittees, also referred to as “**Recovery Support Functions**” (RSFs).
- The RSFs are comprised of various **state and local agencies, nonprofits, and community organizations** active in disaster recovery and resilience building.
- The RSFs provide **technical expertise and policy direction** to NC Emergency Management and NC Office of Recovery and Resiliency.

Recovery Support Functions (RSFs)

- RSF 1: Emergency Management
- RSF 2: Communications and Intergovernmental Relations
- RSF 3: Non-Profit and Volunteerism
- RSF 4: Health and Human Services
- RSF 5: Transportation and Infrastructure
- RSF 6: Business and Workforce Development
- RSF 7: Environmental Preservation
- RSF 8: Housing
- RSF 9: Agriculture
- RSF 10: Cultural Resources
- RSF 11: Education
- RSF 12: Long-Term Community Planning, Capacity Building, and Resiliency

Deputy Chief Resilience Officers as RSF Coordinators

Marlena Byrne

Marlena.Byrne@ncdps.gov

(984) 833-4369

- RSF 1: Emergency Management
- RSF 2: Communication & Intergovernmental Relations
- RSF 5: Transportation & Infrastructure
- RSF 7: Environmental Preservation
- RSF 9: Agriculture
- RSF 10: Cultural Resources

Amanda Martin

Amanda.Martin@ncdps.gov

(984) 833-4360

- RSF 3: Non-Profit & Volunteerism
- RSF 4: Health & Human Services
- RSF 6: Business & Workforce Development
- RSF 8: Housing
- RSF 11: Education
- RSF 12: Long-Term Community Planning, Capacity Building & Resiliency



NORTH CAROLINA OFFICE OF RECOVERY AND RESILIENCY

Community Resilience Assessment Modeling: A Tool for a Statewide Approach

Andrea Eilers
Energy and Environment Program Manager
Triangle J Council of Governments

Triangle Regional Resilience Assessment

Cooperative partnership among the Towns of Cary and Chapel Hill, the Cities of Durham and Raleigh, Durham County, and Orange County

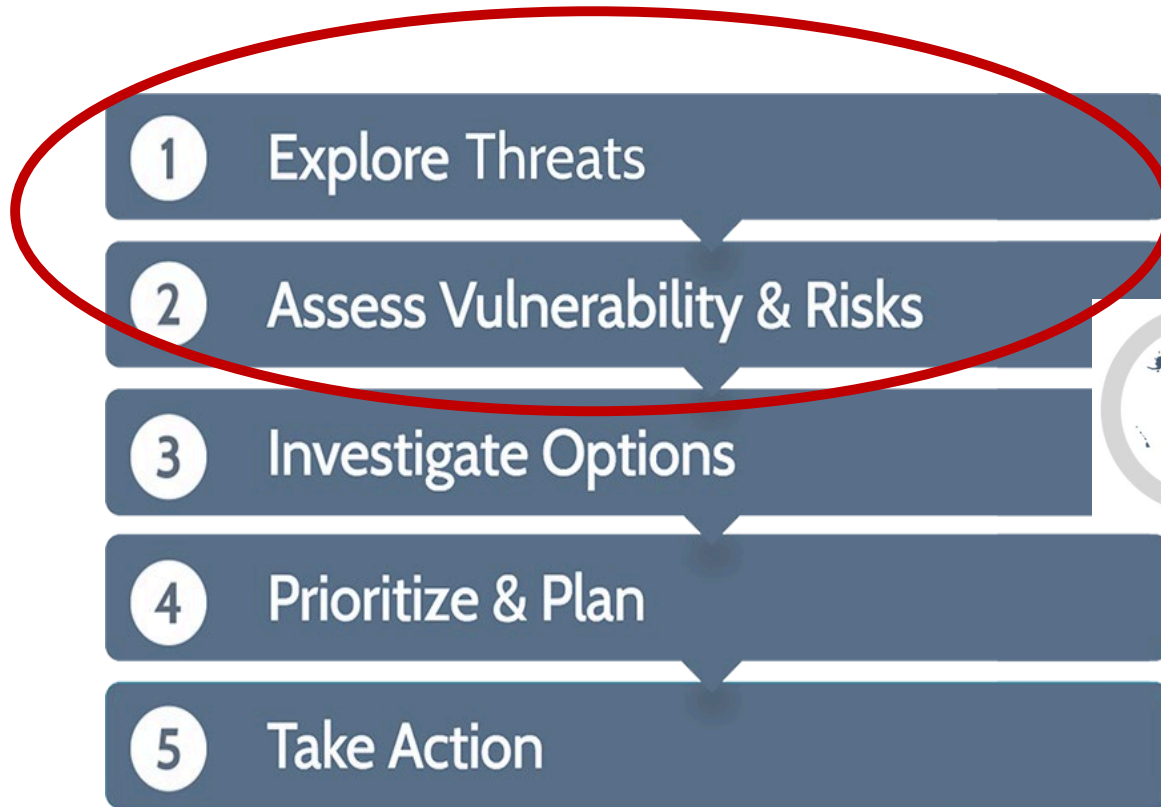
Developed a comprehensive assessment exploring how and where the region's assets—people, property, services, and infrastructure—are impacted by potential changes related to increasing extreme precipitation, increasing temperature and temperature variability, increasing frequency and duration of drought events, and robust population growth.

Follows the process described in the U.S. Climate Resilience Toolkit and utilizes local, state, and federal datasets to identify impacts, vulnerabilities, and resiliency strategies

Actionable, effective, and implementable for all communities individually as well as regionally; illustrates how a **quantified assessment model** could be developed for all communities, regardless of resources, to utilize across the state.



Quantified Assessment in the Steps to Resilience



U.S. Climate
Resilience Toolkit
 [toolkit.climate.gov](https://www.toolkit.climate.gov)



Quantified Assessment: Vulnerability/Risk

Vulnerability

- Potential impact (sensitivity)
- Adaptive capacity (elevated?)

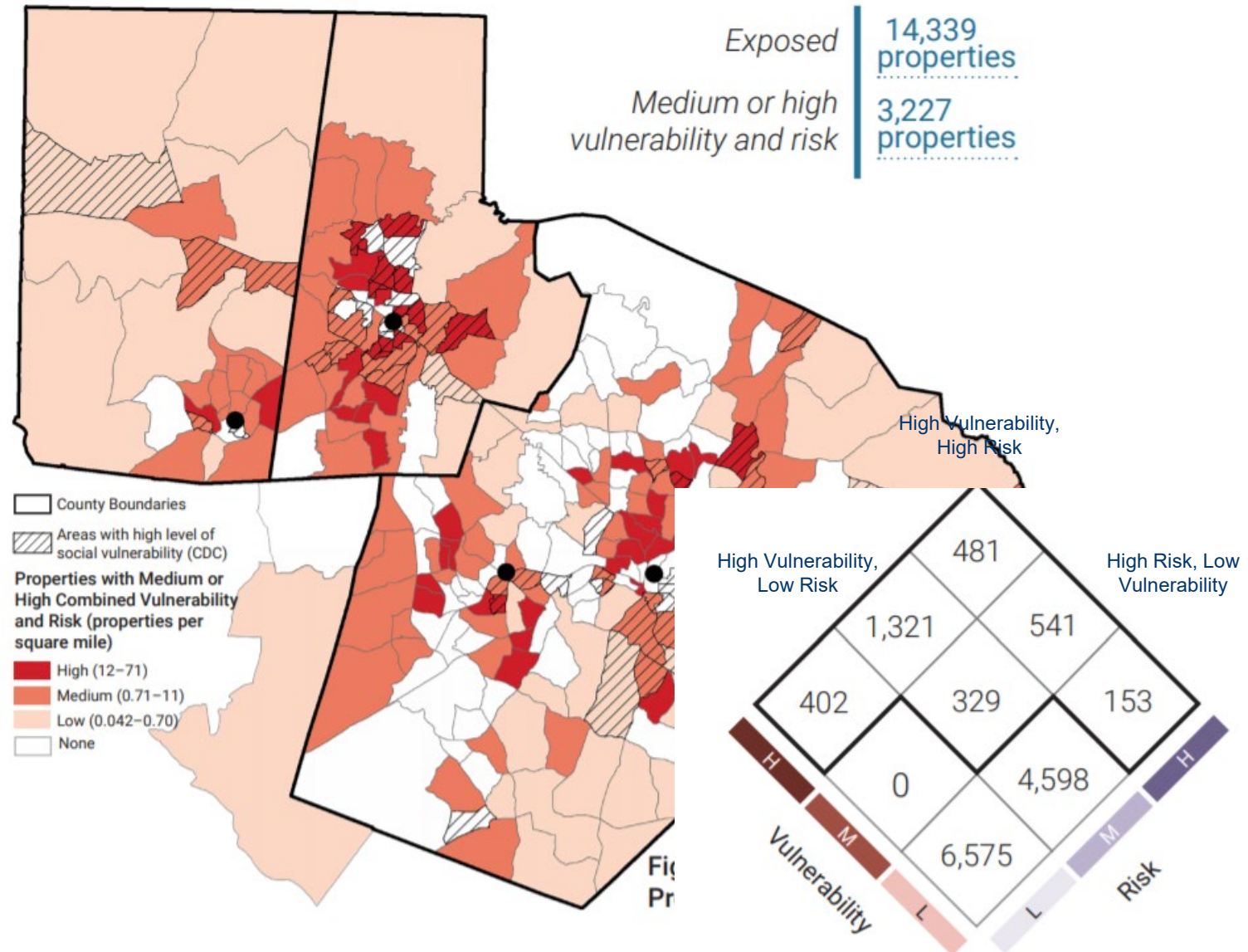
Risk

- Probability (of occurrence)
- Consequence (loss of life/property)



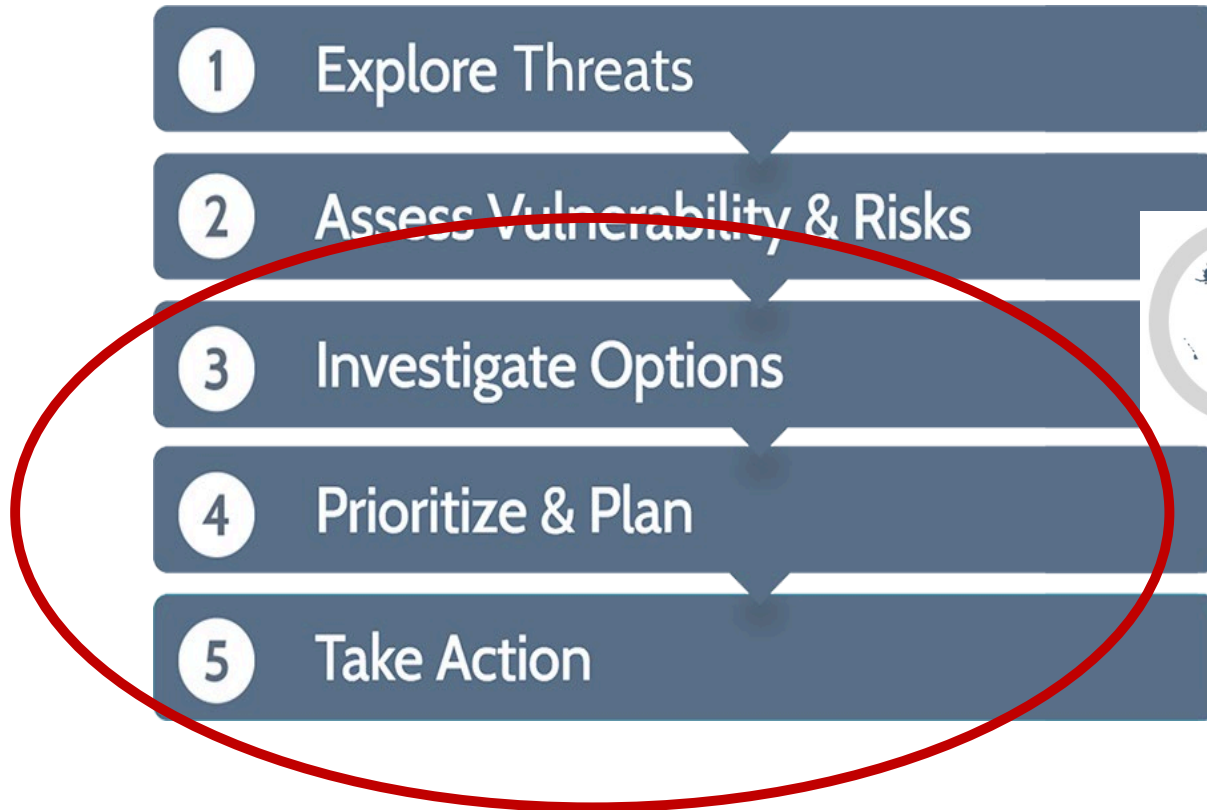
More than a Hazard Mitigation Plan!

Example: Residential Property and Flooding





Framework and Guidance to Empower Communities to Resilience



U.S. Climate Resilience Toolkit

[toolkit.climate.gov](https://www.toolkit.climate.gov)



An Assessment Framework for All

While the TRRP was conducted in a resource-rich area, the process can be distilled into an equitable framework of data sources, analytical tools, and assessment guidelines to allow other regions, counties, or municipalities to create their own resiliency assessment.

A Quantified Assessment Tool can be developed that includes a comprehensive list of data and potential asset risk/vulnerability pairs which will allow the framework to be applied in any area across the state.

The tool will include consideration of assets **relevant to each agency** and can be tailored to meet concerns of the range of communities and regional organizations across North Carolina.

The tool will be public and open-source, supplemented with an associated framework of guidance documents, methodology, core data, and other resources.

Alleviates significant resources burdens from communities, allowing them to focus on identifying, prioritizing, and implementing resiliency improvements.

The Need for Resilience Assessments



From EO80: DEQ, with the support of Cabinet agencies and with informed by stakeholder engagement, shall prepare a NC Climate Risk Assessment and Resiliency Plan



From EO80: The Council shall support communities that are interested in **assessing** risks and vulnerabilities to natural and built infrastructure and in **developing** community-level adaptation and resiliency plans



From USEDA: Resilience Assessments required in Comprehensive Economic Development Strategies (CEDs): As a baseline, USEDA suggests a two-pronged approach to help **identify** and **counter** the vulnerabilities that each region may face



From the Triangle Regional Resilience Assessment Partners, the Piedmont Triad Regional Council, and many other stakeholders across the state: We Need This Too!



Questions?

<https://www.tjcog.org/regional-resiliency-assessment.aspx>

Andrea Eilers
Energy and Environment Program Manager
Triangle J Council of Governments
(o) 919-558-2705
aeilers@tjcog.org

BREAK

Please return in 10 minutes



Public Engagement

Individuals and organizations may provide input to cabinet agencies on their implementation of EO 80

(Limit: 2 minutes)

