

North Carolina

Climate Action Plan Advisory Group

Agriculture, Forestry, and Waste
Management
Technical Work Group
Teleconference Meeting #1

April 13, 2006



Today's Agenda

- Call to order
- Introduction of Technical Work Group (TWG) members
- Review of TWG organization and logistics
- Review and discussion of list of potential state actions
- Review and discussion of the draft North Carolina greenhouse gas (GHG) emissions inventory and forecast for Agriculture, Forestry, and Waste Management
- Discussion of next steps toward identification of priorities for analysis of options
- Call to the public
- Proposed agenda items for next meeting
- Announcements

Part 1 - TWG Process

- Schedule
- TWG roles
- Tasks

CAPAG Schedule

- CAPAG meetings through 2007
- TWG discussions between CAPAG meetings
- Final Work Products
 - Proposed policy recommendations
 - GHG inventory & forecast
 - Final Report to DENR

Sector Based TWGs

- Energy Supply (power generation)
- Residential, Commercial, Industrial (energy use and industrial process)
- Transportation and Land Use
- Agriculture and Forestry
- Cross Cutting Issues (reporting, registries, education)

Roles & Responsibilities

- DENR convenes CAPAG
- CAPAG makes recommendations to DENR and supports Legislative Commission
- Technical work groups advise CAPAG
- Public input to CAPAG and TWGs
- CCS provides facilitation, technical analysis to CAPAG and TWGs, final report to DENR

TWG Tasks

- Identify potential policy options
- Identify early priority options for analysis
- Craft straw proposals for mitigation options, including policy design and implementation methods
- Approve methods for cost-benefit analysis
- Assist with data and analysis
- Assist with evaluation of additional issues, such as co-benefits, detailed cost breakdowns, as needed
- Identify and develop alternative approaches for policy options, as needed
- Contribute to drafting of language for the final report

First TWG Meetings

- Review/expand list of potential options
- Review emissions inventory & forecast
- Identify initial priorities for analysis
- Review proposed technical work plan and meeting schedule
- Prepare suggestions for next CAPAG meeting

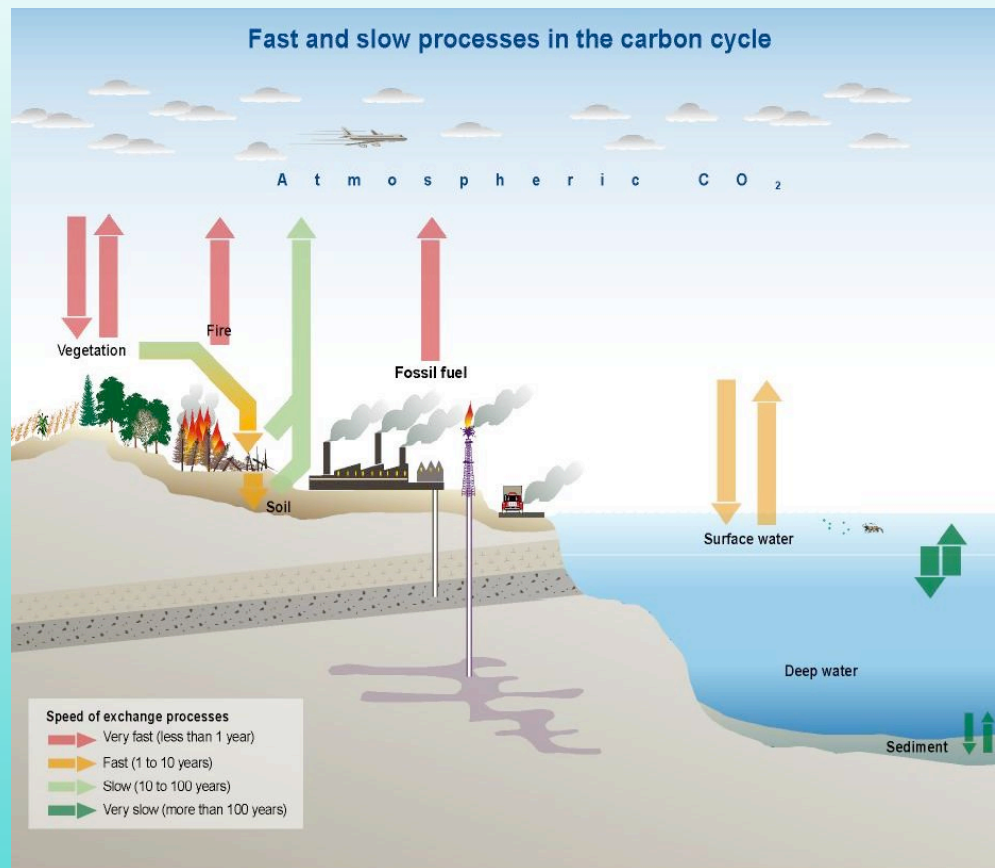
DENR/CAPAG Assistance to Study Commission

- Provides inputs and responses to fact finding requirements of Section 5 - b, c, d, f...
 - Emissions assessments
 - Potential policy actions
 - Potential implementation mechanisms
 - Economic analysis of policy options
 - Alternatives to address potential conflicts
- Responds to questions of the Commission as they relate to state policy actions

Part 2 - GHG Mitigation Options

- Sector based actions
- Implementation mechanisms

Carbon Cycle



GHG Pathways

- CO₂
 - Photosynthesis > carbon pools > combustion > dispersion
- CH₄
 - Plant/animal organic matter > anaerobic decomposition > dispersion
 - Carbon pools > carbon combustion & fugitive release > dispersion
- N₂O
 - Carbon combustion > dispersion
 - Nitrogen deposition > decomposition > dispersion
 - Nitrogen fixing plants > nitrification > dispersion
- HFC's, SFC's, PFC's (ODS)
 - Chemical manufacturing > fugitive release, process dispersion
- Black Carbon
 - Carbon pools > combustion > dispersion

Mitigation Sectors

- Agriculture
- Forestry
- Electricity and Fuel Production
- Residential, Commercial, Industrial (Energy Use and Industrial Process)
- Transportation and Land Use
- Waste Management

Implementation Mechanisms

- Voluntary Agreements
- Technical Assistance
- Information and Education
- Financial Incentives
- Codes and Standards
- Market Based Approaches
- Reporting and Registries
- Others...

Key Actions... Agriculture

- Protect farmland
- Expand soil carbon storage
- Expand renewable energy production
- Reduce process/waste emissions
- Increase energy recapture and reuse
- Improve feed efficiency
- Reduce food delivery/transportation emissions

Key Actions... Forestry

- Protect forestland
- Restore and expand healthy forests
- Improve forest regeneration and stocking
- Expand sustainable harvested wood products
- Expand wood products for building materials
- Expand renewable biomass energy production
- Reduce wood products process emission
- Increase reuse and energy recapture

Key Actions... Waste Management

- Expand solid and liquid waste energy recovery
- Expand low emitting waste storage
- Expand source reduction, reuse, recycling
- Expand energy efficient processing of waste

Part 3 - NC GHG Inventory & Forecast

- Overview
- Preliminary findings for Agriculture, Forestry, and Waste Management

NC GHG Emissions

- Inventory and Reference Case Projections 1990-2020 to support mitigation planning
 - Initial estimates by CCS for further discussion and revision
 - Not a baseline for reporting or compliance
 - Provided in transparent, review draft format
 - Uses best available references and assumptions
 - Results may change with modification of data sources, methods, assumptions

Coverage

- Six gases per U.S. EPA and UNFCCC guidelines
 - Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF₆)
 - Black Carbon not included at this time
- All major emitting sectors
 - Electricity Consumption (production + imports)
 - Residential, Commercial, Industrial (RCI) –
 - Fuel Use & Natural Gas Transmission / Distribution Systems
 - Industrial Processes
 - Transportation
 - Agriculture and Forestry
 - Waste Management

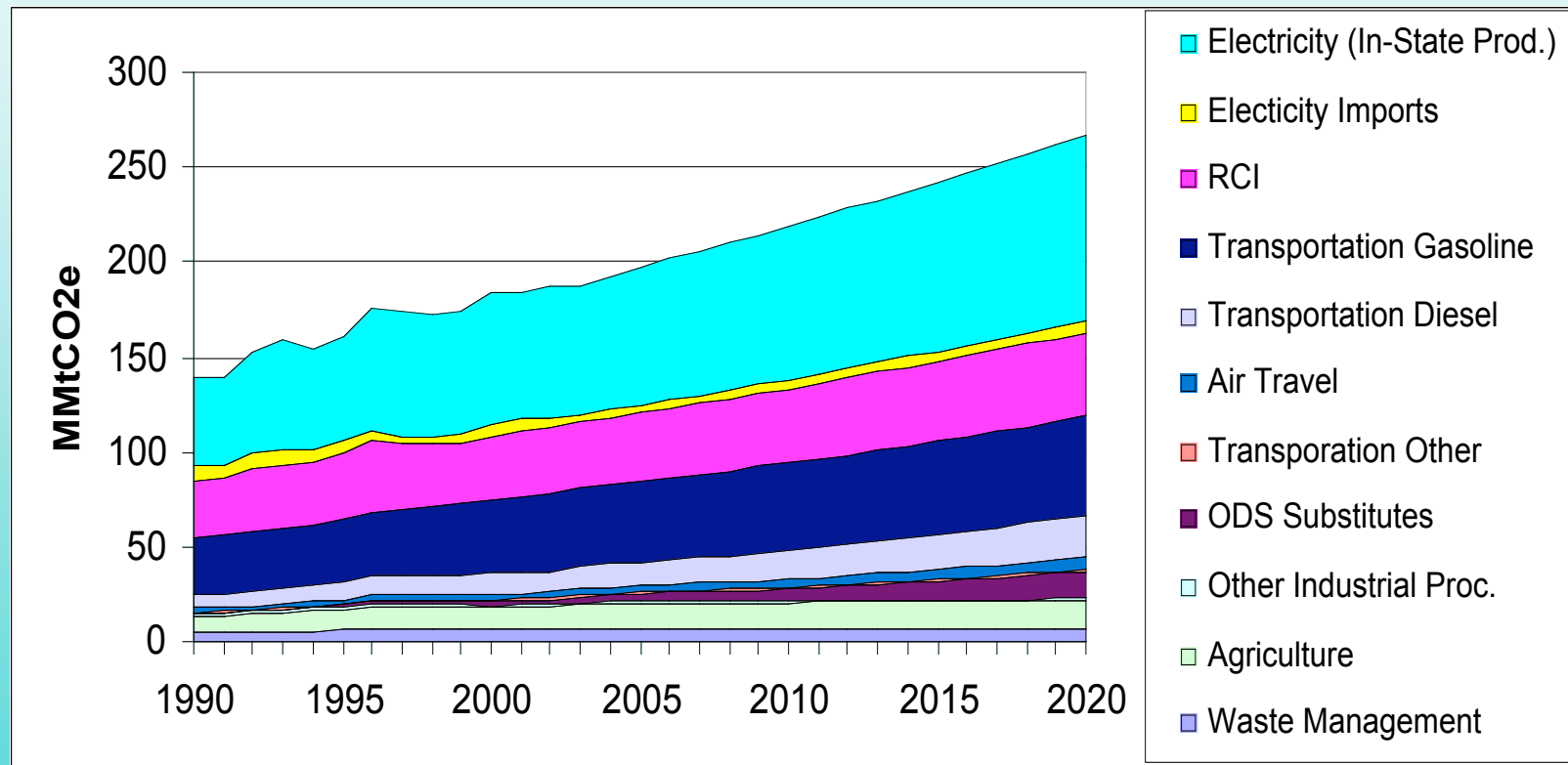
Inventory Approach

- Historical estimates from 1990-2000 or the most recent year possible
- Standard U.S. EPA and UN methodologies, guidelines, and tools, augmented as needed for North Carolina
- Emphasis on transparency, consistency, and significance
- Preference for North Carolina or regional data, where available
- Consumption and production-basis emissions from electricity and heat generation
- Simplified approach used for initial analysis to support general planning needs
- All units expressed as million metric tons carbon dioxide equivalent (MMTCO₂e)

Projection Approach

- Forecast of emissions from most recent year to years 2010 and 2020
- Reference case assumes no major changes from business-as-usual
 - Includes approved policies and actions
 - Typically assumes constant technology and market choices
 - Uses extrapolation where modeling is not available
- Emissions growth driven by many factors

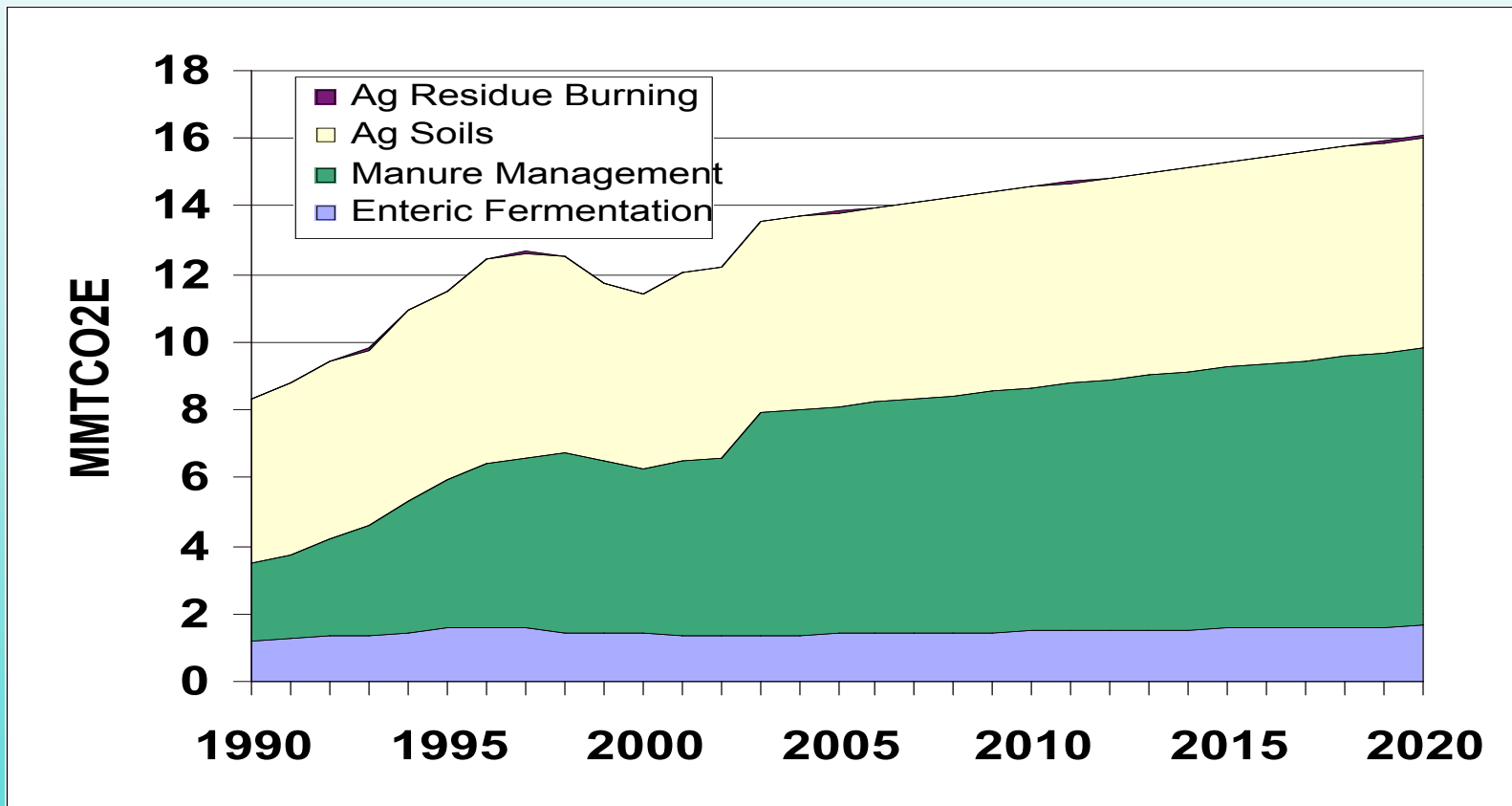
NC GHG Emissions 1990-2020



Agriculture

- Emission Sources:
 - Enteric fermentation from animals (CH₄)
 - Primarily cattle
 - Manure management (CH₄, N₂O)
 - Cattle, swine, poultry, sheep, goats, horses
 - Agricultural soils (N₂O)
 - Plant residues & legumes
 - Fertilizer application (synthetic & organic)
 - Agricultural residue burning (CH₄, N₂O)

Agriculture



Agriculture

- Inventory (1990–2002):
 - Data Sources
 - NC data for crop acreage and animal populations
 - USDA National Agriculture Statistical Service
 - Emission factors and other data (e.g., animal mass) from EPA's SGIT
 - Methods
 - SGIT
 - Emissions = Activity x EF x GWP

Agriculture

- Ref. Case Projections (2003–2020):
 - Data Sources and Methods
 - Growth factors calculated from 1990 to 2000 NC population data from USDA National Agriculture Statistical Service
 - Swine populations held constant at 2000 level
 - August 1997 moratorium on new and expanded swine farms with 250 or more hogs

Agriculture

- Key Assumptions and Uncertainties
 - Reference Case Projections
 - Growth factors based on USDA National Agriculture Statistical Service data – are these realistic for North Carolina through 2020?
 - Will moratorium on new and expanded swine farms be lifted sometime before 2020?

Forestry

- Emission Sources and Sinks:
 - Forested land = 56% of NC land area
 - Emissions based on carbon stock changes
 - Four carbon accounts:
 - Live and dead standing trees
 - Forest floor and coarse woody debris
 - Soils
 - Wood products and landfills

Forestry

NC Emissions and Sinks	1990-2000
Live and Dead Standing Trees	-6.9
Forest floor and coarse woody debris	-0.8
Soils	-3.1
Wood products and landfills	-13.0
Total	-23.7

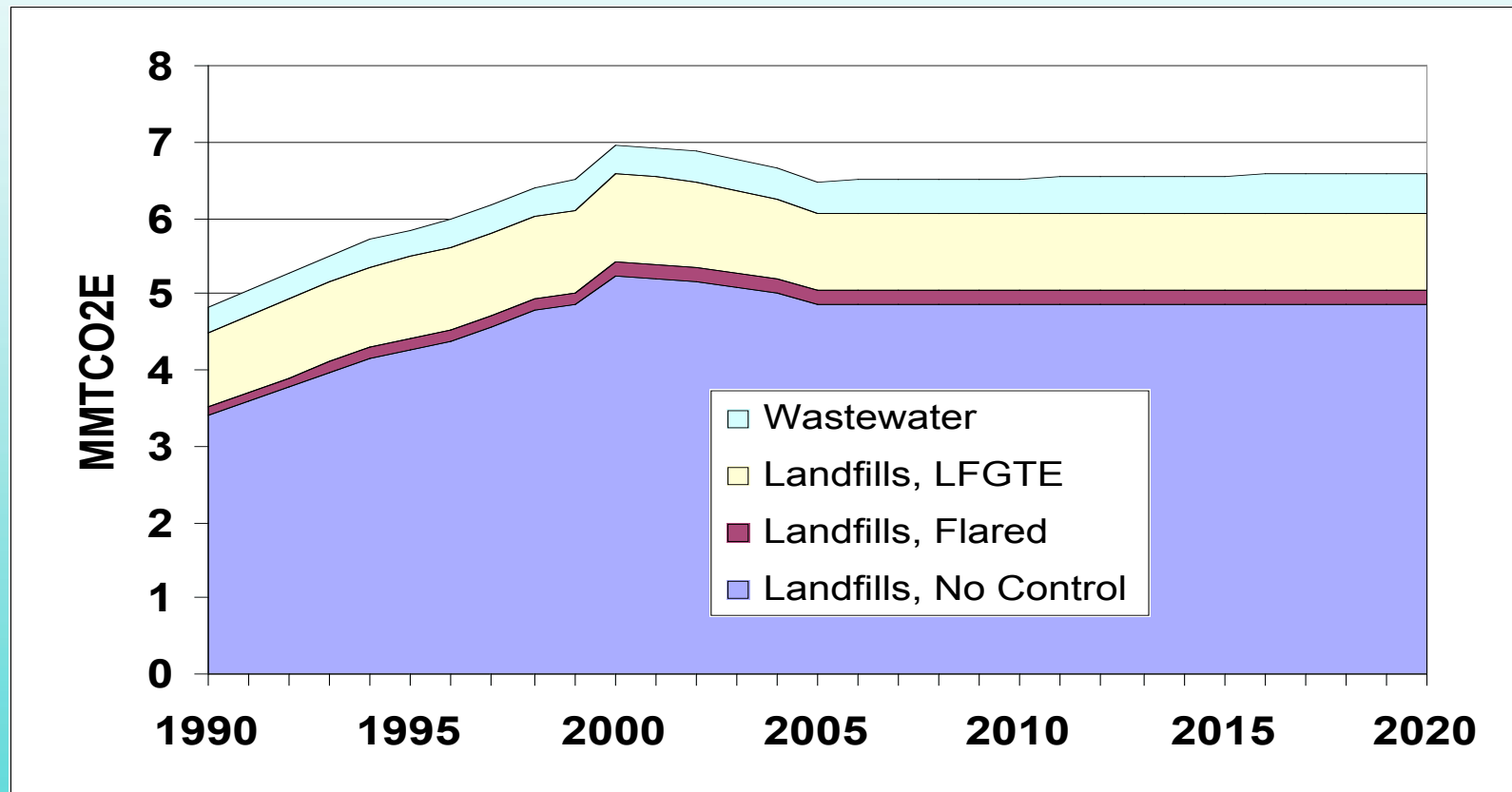
Forestry

- Inventory (1990 and 2000):
 - Data Sources
 - U.S. Forest Service data from Forest Carbon Model (FORCARB) based on FIA data from years 1987-1997
 - Methods
 - Carbon stock changes, plus estimated flows from soil carbon and harvested wood products
- Ref. Case Projections (2001–2020):
 - Held constant at 1987-1997 rates

Waste Management

- Emission Sources:
 - Wastewater
 - Uncontrolled Landfills
 - Landfills with Landfill Gas Collection System and Flare
 - Landfills with Landfill Gas Collection System and Landfill-Gas-to-Energy Plant (LFGTE)

Waste Management



Waste Management

- Inventory (1990–2005):
 - Data Sources
 - NC OSBM Population Estimates
 - EPA Landfill Methane Outreach Program (LMOP) Database

Waste Management

- Inventory (1990–2005):
 - Methods
 - Wastewater
 - Emissions = Pop. x Per Capita BOD (kg/day) x Fraction of BOD anaerobically digested x 365 Days/Year x Emission Factor

Waste Management

- Inventory (1990–2005):
 - Methods
 - Landfills
 - Classify landfills as small or large (large defined as greater than 1.1 million tons waste-in-place)
 - Emissions calculated using regression equation specific to large or small landfills
 - » Emissions = (No. of Landfills x Y-intercept) + (Slope x Waste-in-Place)
 - Controlled Landfills
 - Collection efficiency assumed to be 75%

Waste Management

- Ref. Case Projections (2006–2020):
 - Data Sources
 - NC OSBM Population Projections
 - Methods
 - Wastewater
 - Assumed to grow at same rate as population
 - Landfills
 - No Growth
 - » Historical emissions do not follow population
 - » Per capita CH₄ emissions expected to decline due to Federal requirements (NSPS and Emission Guidelines)

Waste Management

- Key Uncertainties
 - Landfill Activity
 - Landfill Gas Recovery Data
 - Landfill and Wastewater Emission Factors
 - Affects of Federal Landfill Requirements

Public Input, Announcements

Next TWG Call

- Agenda
 - Further review of mitigation options list
 - Further review of inventory and forecast
- Time and date