Regional Perspective on Emissions Inventories: Update from MARAMA

EPA Emissions Inventory Conference
Baltimore, MD
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Presented by Susan S.G. Wierman
MARAMA Executive Director

Thanks to MARAMA staff members
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Regional Inventory Basics

- Purpose: Regional air quality modeling—ozone, PM, regional haze
- Collaborative approach
- Key sectors for improvement in our region:
  - EGUs
  - Oil & Gas
  - Mobile

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Modeling inventories focus on attainment deadlines

- 75 ppb ozone NAAQS (adopted in 2008)
  - 2017 - SIPs due for Moderate areas (NY/NJ/CT)
  - Modeling requirements include:
    - Base year **2011**
    - Moderate Attainment by July **2018** (2015-17 data)
- PM NAAQS deadlines 2015, 2019, 2021, 2025 depending on severity and whether annual or 24-hour standard

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Future deadlines uncertain

- 70 ppb ozone NAAQS (adopted in 2015)
  - Transport & infrastructure SIPs due 10/2018 (all states) – EPA and/or state/regional modeling needed
    - Likely based on current 2011 → 2023 inventories
  - ***If*** designations complete by Oct 2017
    - Marginal attainment by **2020**
    - Moderate by **2023**
  - ***However***, designations in some areas may be delayed
    - Attainment dates????
  - Next base year: **2016** using 2014 and 2016 inputs

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Modeling for regional haze plans

- Visibility calculated in 5-year averages
  - Baseline is 2000-2004 so 2002 EI is midpoint
- First round SIPs: progress goals for 2018
  - **2002** baseline inventory projected to **2018**
- Five-year progress reports
  - **2007** inventory → **2017** & **2020** projections
- Second round SIPs: progress goals for 2028
  - **2011** inventory → **2028** projection (MANE-VU), or
  - **2014** inventory → **2016** & **2028** projections?

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Summary: inventory years for regional modeling

- ***DONE*** **-** 2011 base year
  - Projected to 2018, 2020, 2023, and 2028

- ***NEXT*** **-** 2014 plus 2016 base year data
  - Projected to 2028 for regional haze SIPs
  - And 2020/2023/other for ozone SIPs

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Approach: Work Efficiently

- MARAMA adapted EPA's Emissions Modeling Framework tool (EMF) to
  - organize point & area source emissions data,
  - apply growth and control factors for future years,
  - share regional data with states/local agencies
- Use EPA data as much as possible but update as requested by state/local agencies
  - E.g., EPA shared model platform for 2023
  - Major changes: EGU emissions forecast, drop CPP

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Approach: Work Collaboratively

Regionally, inter-regionally & nationally

- MARAMA states – Improve Oil & Gas inventory
- NE States & OTC – Regional modeling inventory
- Inter-regional – Develop ERTAC EGU forecast
- Nationally –
  - Collaborate on Oil & Gas calculation tool
  - Provide feedback on MOVES runs
  - Participate on Nonpoint tool development

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Briefly Discuss 3 Key Sectors

EGUs

Oil & Gas

Mobile

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Improving EGU Emissions Projections

- ERTAC EGU forecasting tool
  - Collaborative development
  - Relies on state input
  - Ongoing leadership from MJOs and states
- EGU projections by ERTAC more realistic than EPA's projections using IPM
  - Coordinate with EPA CAMD to build support for EPA SIP approval process by regional offices
  - Version 2.5L2 is currently in use

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How does ERTAC EGU work?

1. Starting point: Base Year Hourly CEM data by region
   - 2007 and 2011 CEM data developed as base years by ERTAC team starting with EPA CAMD data
2. States provide info: new units, shut downs, controls & other changes for future years
   - State input on emissions rates is critical

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How does ERTAC EGU work?

3. Regional growth in generation based on:

   Base load demand – US DOE Energy Information Administration (EIA) Annual Energy Outlook (AEO)

   Peak demand – North American Electric Reliability Corporation (NERC)

4. Future hourly estimates per unit

   Distribution of regional generation among existing and new units based on state-supplied information.

   Temporal profile matches meteorology of base year

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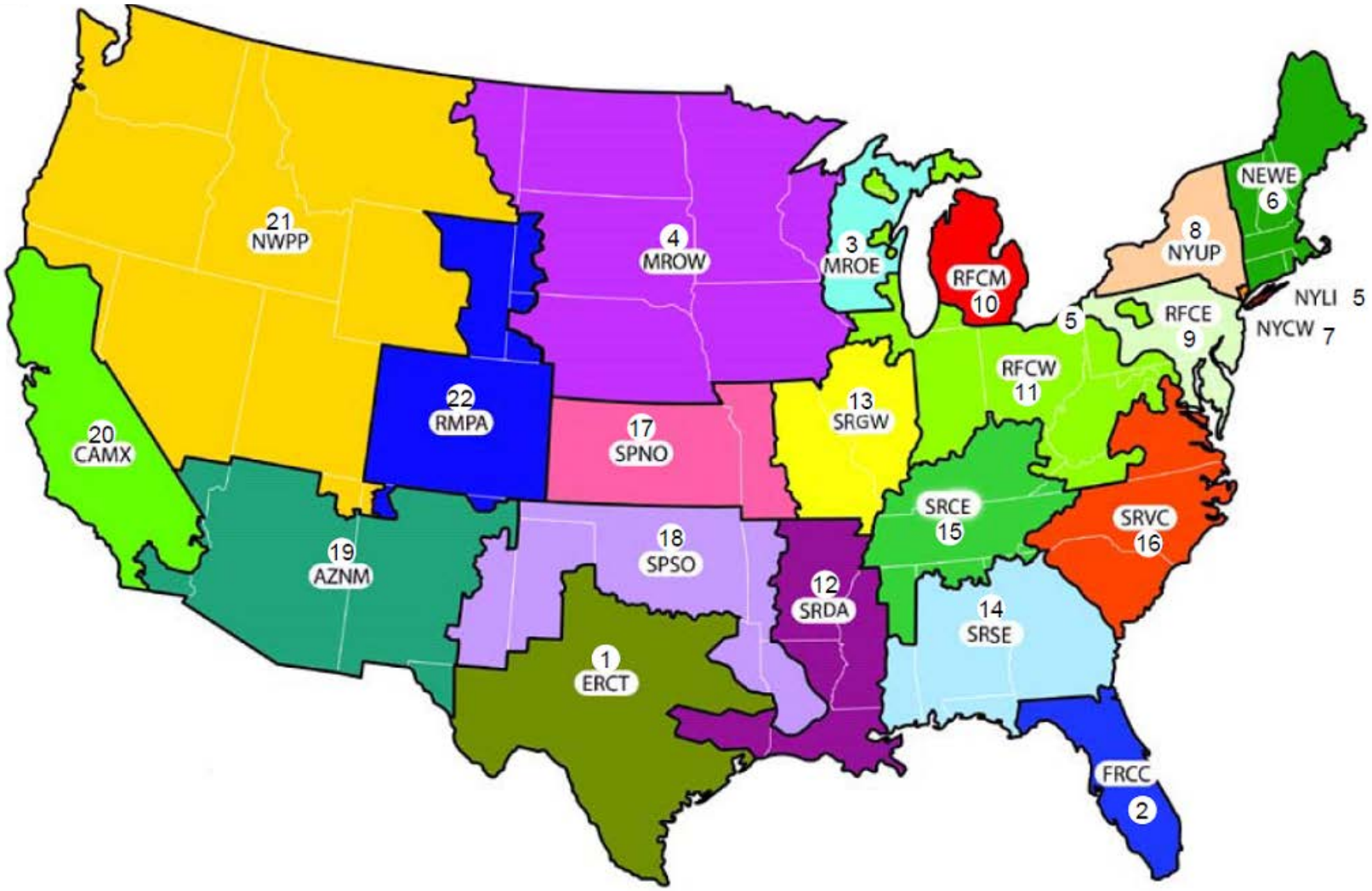
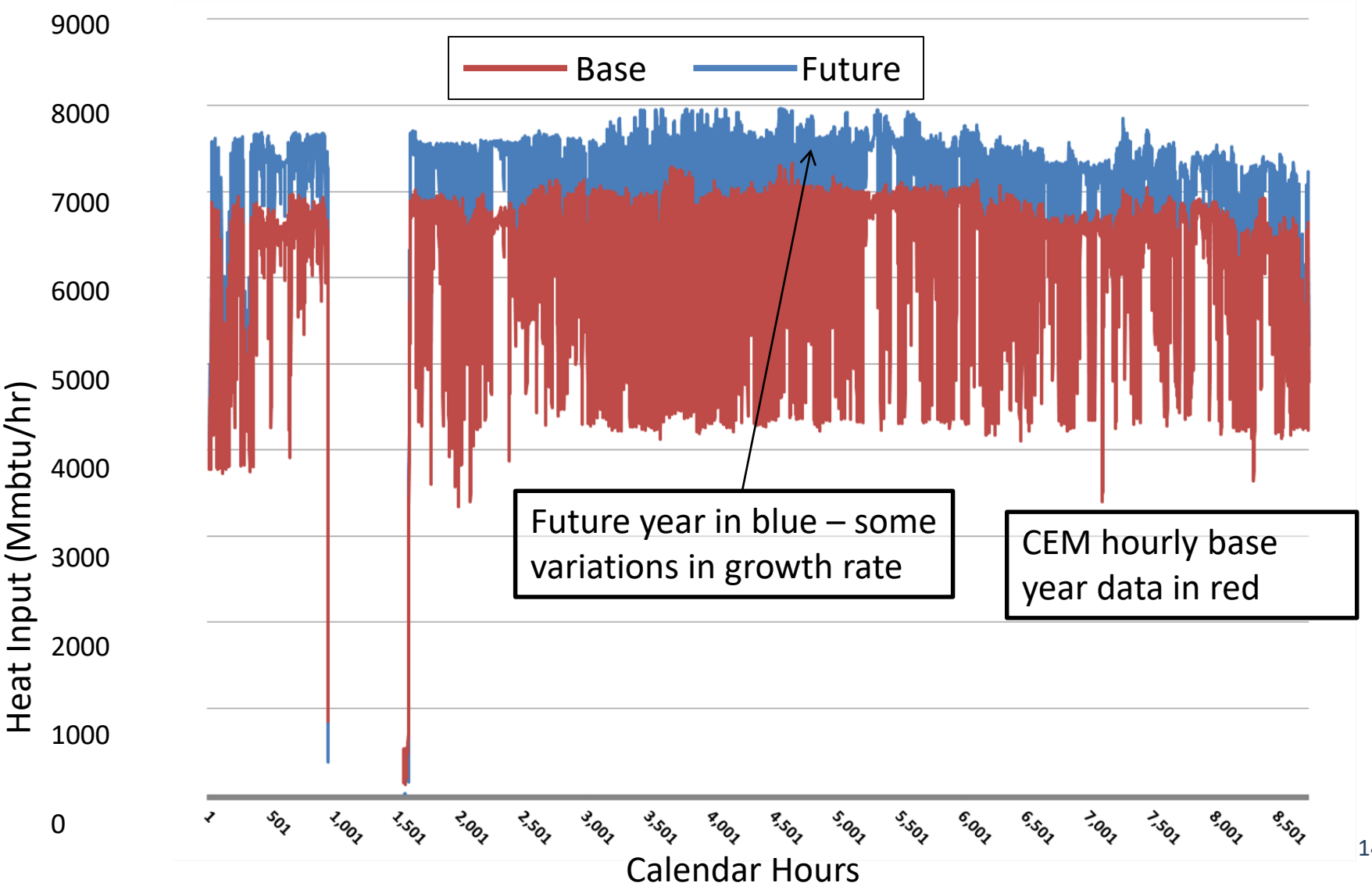
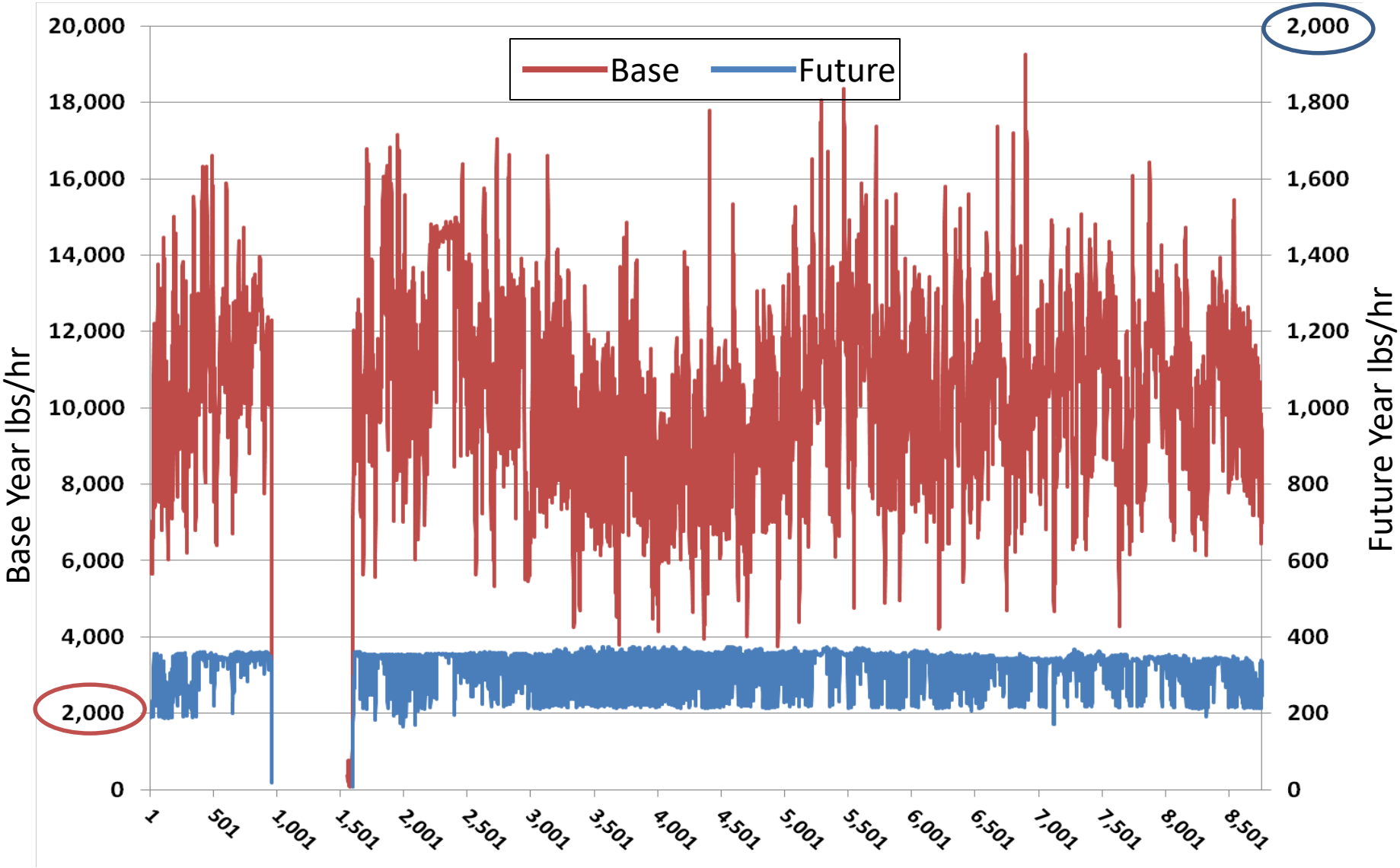
ERTAC Regions Example



Unit Level Hypothetical Example
Coal Fired Existing Unit, 800 MW – Future Growth



Hypothetical Unit Level Example
Coal Fired Existing Unit, 800 MW – Future SO2 Control



Current Work on ERTAC EGU 2.6

- Update to newer energy demand forecast
- Adjust forecast to reflect CSAPR compliance
- Coordinate with EPA CAMD and EPA Regional Offices to build basis for use in SIP modeling
- Western states considering use of ERTAC tool

DEQ
Virginia Department of Environmental Quality

Central States Air Resource Agencies

Connecticut Energy Environment

OZONE TRANSPORT COMMISSION

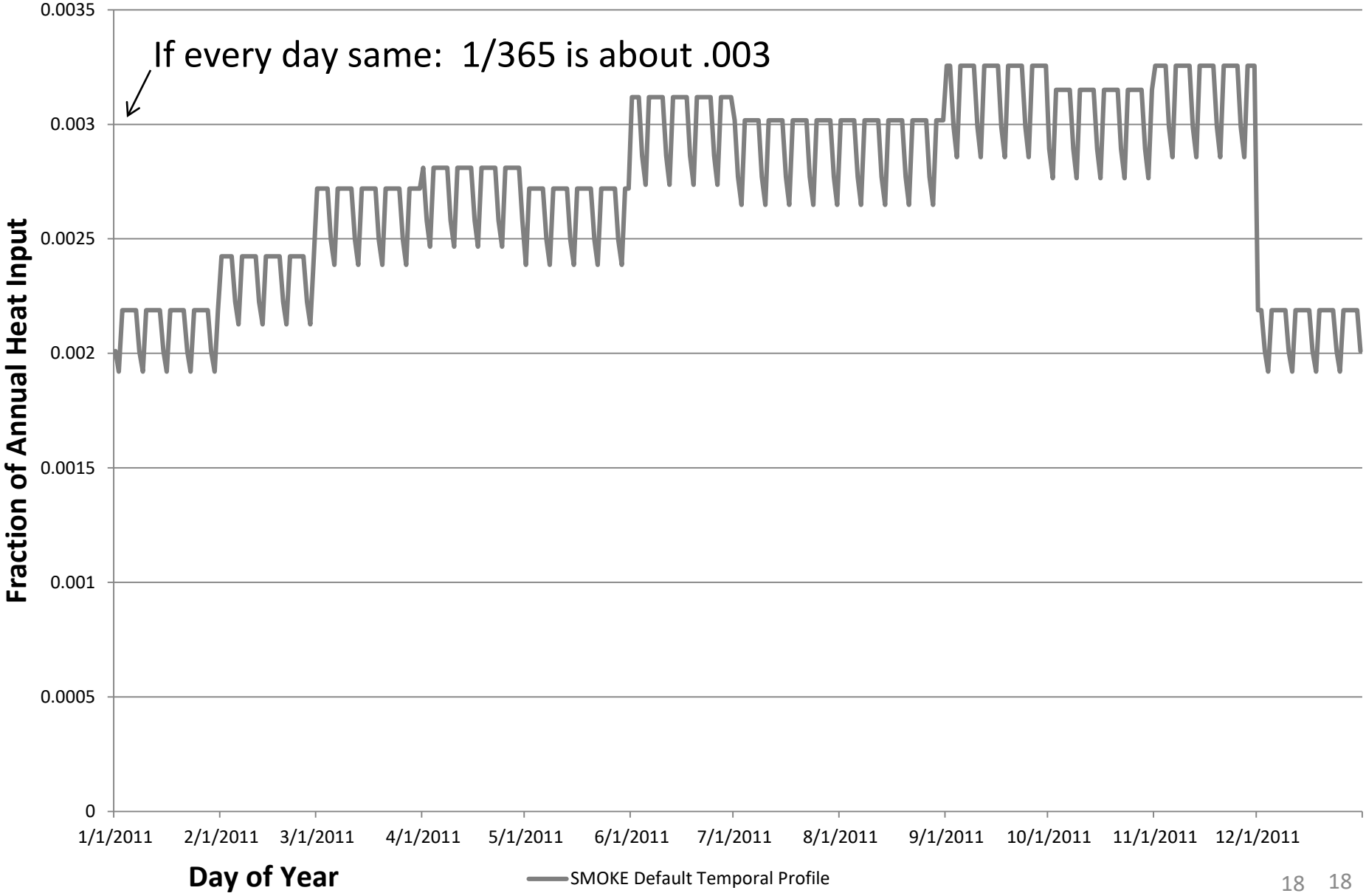
EPA
United States Environmental Protection Agency

Small EGU Temporalization

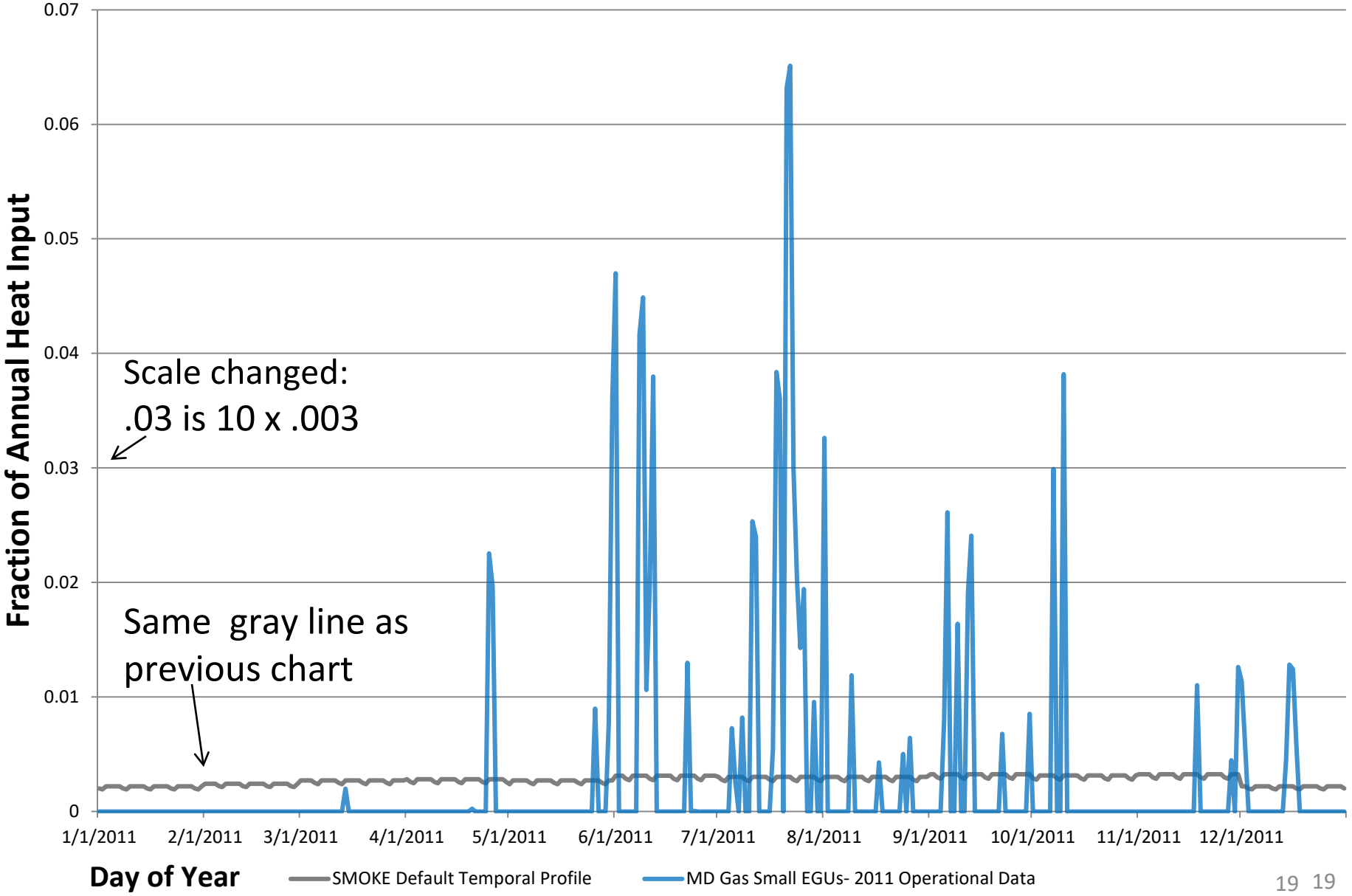
- Goal: address small EGU emissions that occur on High Electricity Demand Days
  - Emissions exist in inventory, but currently spread out evenly over the year
- MD developed peaking profiles for each region.
  - Profiles redistribute existing emission data for small EGUs in a more realistic way
  - See Poster by Ashenafi & Bull

Maryland
Department of the Environment

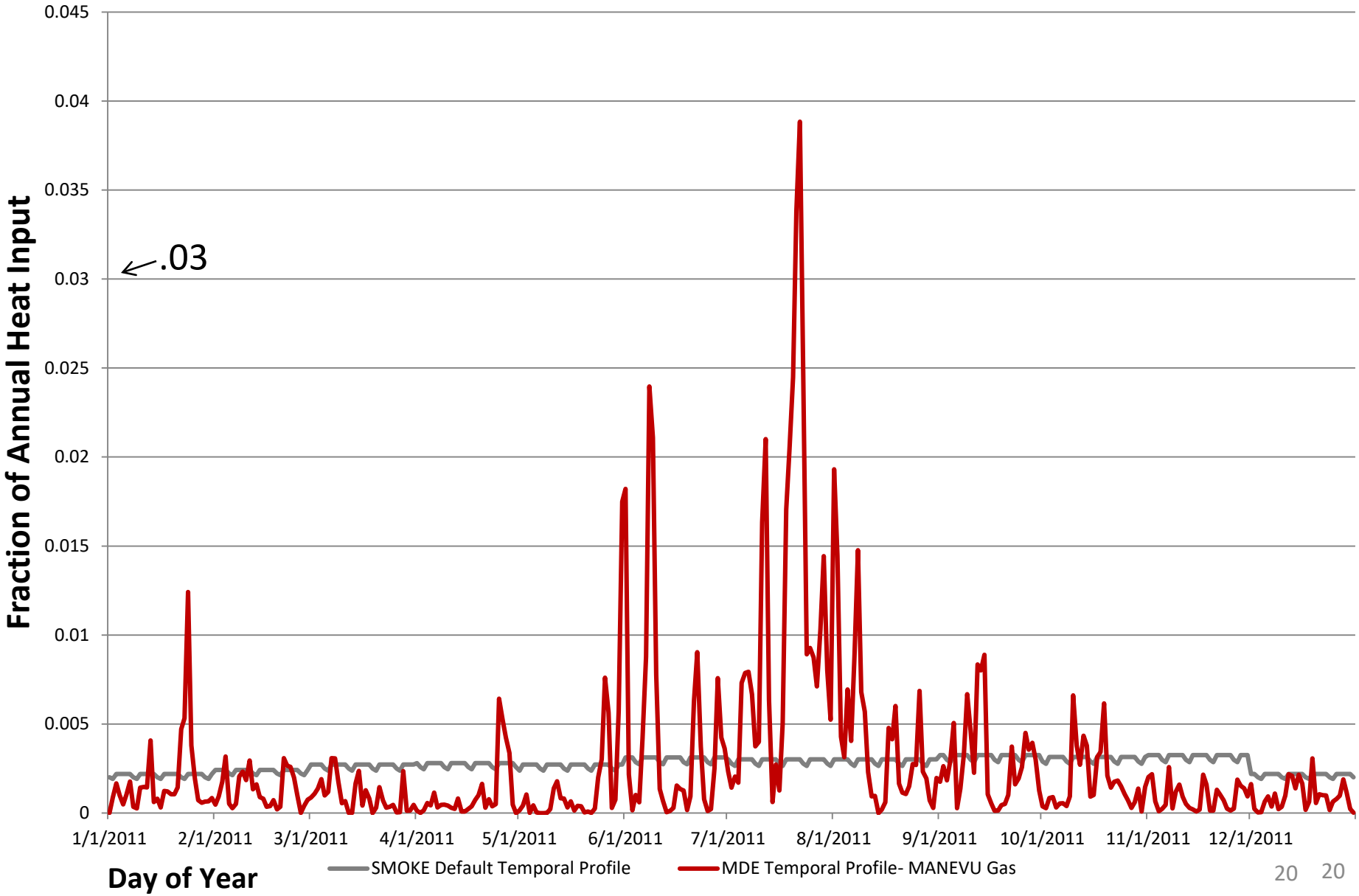
Smoke Default Hourly Temporal Profile for Small EGUs



Same SMOKE Default Compared to Actual Heat Input Fraction for MD Gas-Fired Small EGUs



Temporal Profile used for Small EGU Gas Units in MANE-VU compared to SMOKE Default



Briefly Discuss 3 Key Sectors

✓ EGUs

Oil & Gas

Mobile

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Oil & Gas Inventory Study

- For 2014 NEI v1, EPA used 2011 oil and gas activity data with the Oil and Gas Tool for all counties
  - Many state/local/tribal agencies also submitted nonpoint oil and gas data
- WESTAR/WRAP organized a study by Ramboll ENVIRON with support from CENSARA, LADCO, MARAMA
  - to evaluate representativeness and completeness of national oil and gas emissions estimates
  - to help with 2017 NEI planning

WESTAR
Western States Air Resources Council

WRAP
Western Regional Air Partnership

Central States Air Resource Agencies

O&G Study Task 1 Findings

- Gaps in the 2014 NEI v1 inventory in some states
  - Under-reporting of pipeline emissions,
  - Gathering and boosting and gas processing facilities that fall below emission reporting thresholds, and
  - High emitting O&G sites underestimated
- Basin-specific updates may be needed for well-site equipment activity and emission factor assumptions in the O&G Tool
- Organizing O&G sector emissions by subsectors/segments consistent with the Greenhouse Gas Reporting Program would facilitate integration and comparison

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Western States Air Resources Council

WRAP
Western Regional Air Partnership

O&G Study Task 2: Case Studies

- Wyoming – Greater Green River Basin
- New Mexico-Colorado-Southern Ute Tribe – Greater San Juan Basin
- Oklahoma – portion of the Anadarko Basin
- Pennsylvania – portion of the Marcellus Basin
- Ohio – portion of the Utica Basin

For more information:
https://www.wrapair2.org/NatOilGas.aspx

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Mobile Source Emissions

- Depend on EPA to run SMOKE-MOVES
  - Work with EPA, MJOs, and State/Local Agencies to understand results and improve input data
  - MJO calls with EPA helpful
  - Virginia DEQ conducts detailed analyses
  - New Jersey runs updates for sub-regions if needed
- U of MD and others: top-down analysis of results
- EPA MOVES Model Review Work Group focusing on improvements
  - www.epa.gov/moves/moves-model-review-work-group

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Future Issues & Unknowns

- Improve Onroad and Nonroad inventory
- Reflect results of residential wood survey
- Improve the ammonia inventory
- Estimate emissions of lower volatility organics
- Improve detail on high emission/episode days
- Cope with lack of resources
- Clarify upcoming deadlines

There's always more work to do on inventories!

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Thank you for improving emissions inventories!

For more info. see:
www.marama.org/technical-center/emissions-inventory/projects-overview

www.marama.org/2013-ertac-egu-forecasting-tool-documentation

or *contact: JMcDill@marama.org*

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