



# AVoided Emissions and geneRation Tool (AVERT) v3.1 and 2020 Data Release

October 13, 2021 | 1 PM Eastern

Three audio options:

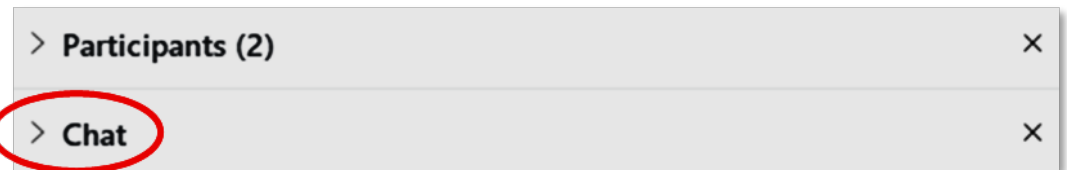
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# Webinar Panels

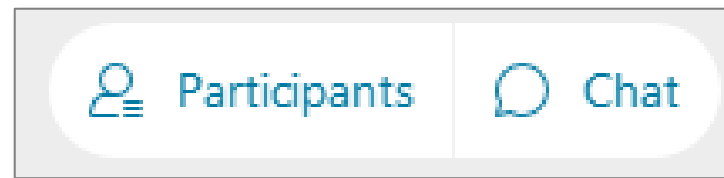
We'll use two panels

- Participants and Chat
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Adding Panels

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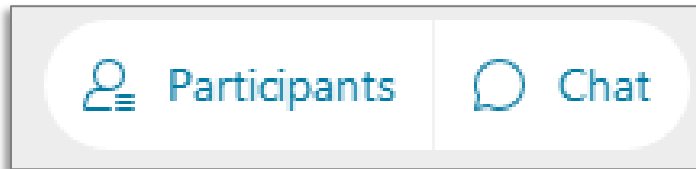
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- Participants are muted
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[www.epa.gov/statelocalenergy/state-local-and-tribal-webinar-series](http://www.epa.gov/statelocalenergy/state-local-and-tribal-webinar-series)



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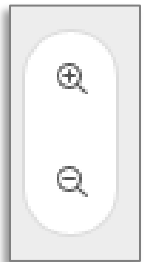


Panels open



Panels closed

- You can also zoom in on the webinar content
  - Move your mouse to the left side of screen and select zoom in or zoom out





# Today's Agenda

- **Colby Tucker**, U.S. Environmental Protection Agency
- **Patrick Knight**, Synapse Energy Economics
- Question and Answer Session

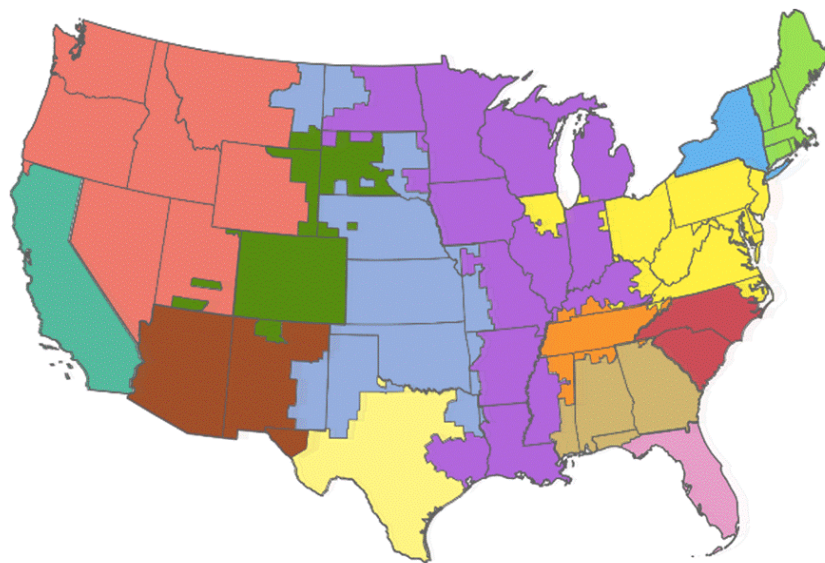


# AVERT v3.1 Release

October 13, 2021

# AVERT v3.1 Release: Agenda

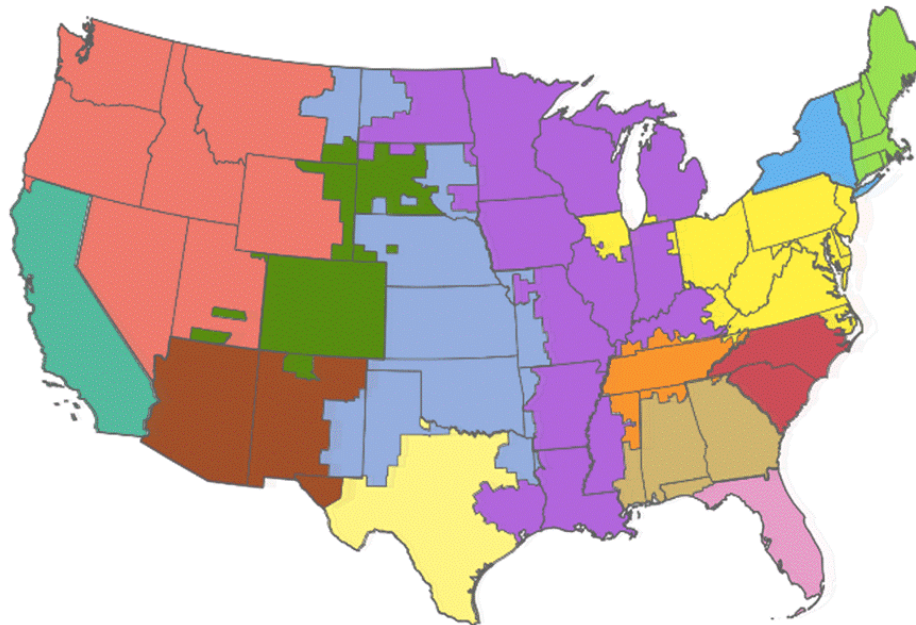
- Brief introduction to AVERT
- What's new in AVERT v3.1?
- Coming soon





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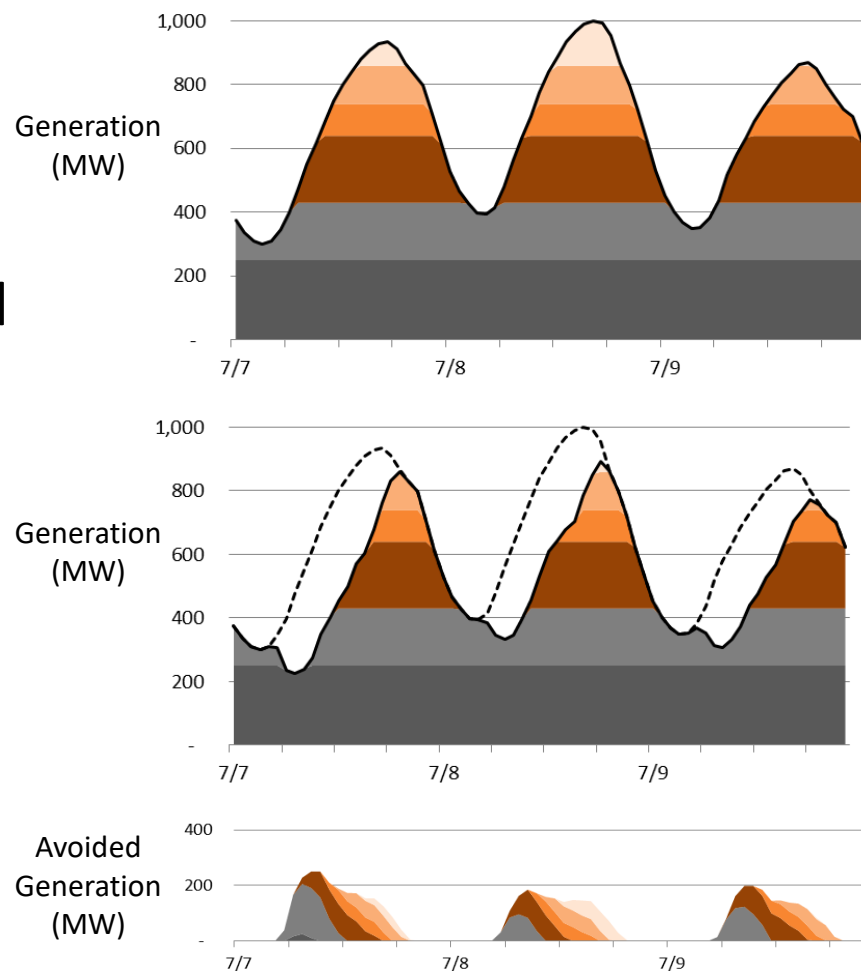
# What is AVERT?





# What is AVERT?

- AVERT is a publicly available tool published by U.S. EPA. It can be used to assess the generation and emissions impacts of implementing energy efficiency and renewable energy programs.
- AVERT relies on historical hourly emissions and generation data from 4,500 power plants across the continental United States.



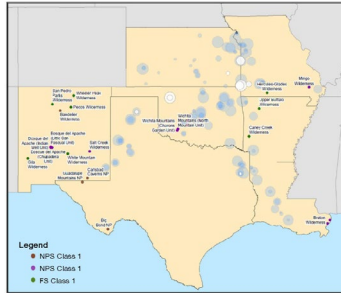
# What is AVERT? (continued)

- AVERT can analyze hourly data in one of 14 regions for 2017, 2018, 2019, and 2020
- AVERT can examine impacts of:
  - Energy efficiency and demand response programs
  - Onshore and offshore wind resources
  - Utility and distributed solar resources
- AVERT estimates emission impacts of carbon dioxide and five air pollutants:
  - Criteria pollutants: sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), particulate matter (PM<sub>2.5</sub>)
  - Other air pollutants: ammonia (NH<sub>3</sub>), volatile organic compounds (VOCs)

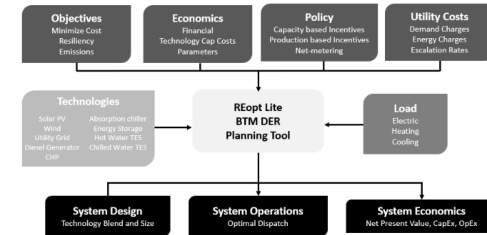
# What is AVERT? (continued)

- AVERT is available in three primary forms:
  - 1) AVERT Excel Edition: [www.epa.gov/avert/download-avert](http://www.epa.gov/avert/download-avert)
  - 2) AVERT Web Edition: [www.epa.gov/avert/avert-web-edition](http://www.epa.gov/avert/avert-web-edition)
  - 3) AVERT Emission Rates:  
[www.epa.gov/avert/avoided-emission-factors-generated-avert](http://www.epa.gov/avert/avoided-emission-factors-generated-avert)
- Other more advanced versions of AVERT are available
- An AVERT tutorial is available at  
[www.epa.gov/avert/avert-tutorial-homepage](http://www.epa.gov/avert/avert-tutorial-homepage)

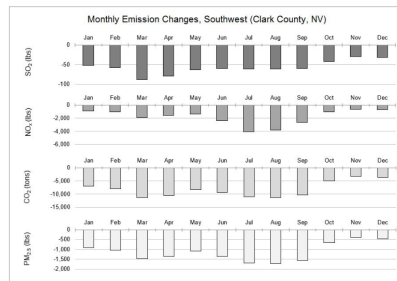
# How has AVERT been used?



**Arkansas Department of Environmental Quality.**  
*Accounting for Energy Efficiency Measures in Regional Haze Planning. (2019)*



**National Renewable Energy Laboratory.**  
*Computational Framework for Behind-The-Meter Techno-Economic Modeling and Optimization-- REopt Lite. (2020)*



**Clark County Department of Air Quality.**  
*Clark County Department of Air Quality Ozone Advance Program Progress Report Update. (2019)*



**Bureau of Ocean Energy Management, Office of Renewable Energy Programs.**  
*South Fork Wind Farm and South Fork Export Cable Project Draft Environmental Impact Statement. (2021) \**

- Studies marked with a “\*” used AVERT data to conduct health impact analyses
- For more publications that have used AVERT, see [www.epa.gov/avert/publications-cite-avert](https://www.epa.gov/avert/publications-cite-avert)



# What's new in AVERT v3.1?

# Update A: Data for 2020

- Hourly regional data files (RDFs) are now available for 2020.
- Prior to AVERT v3.1, data was only available for 2017, 2018, and 2019.
- The latest dataset is a statistical representation of power plants' generation and emissions during the 2020 calendar year.

# Update B: Onshore wind capacity factors

- AVERT v3.1 updates the default capacity factors for onshore wind.
- New capacity factors are based on hourly modeled data from EPA's *Power Sector Modeling Platform v6 – January 2020 Reference Case* dataset.
- Annual capacity factors have been calibrated to reflect recent annual capacity factors for onshore wind, per regional data from the Energy Information Administration (EIA).
- These new capacity factors are now the default for any AVERT analysis year.

# Update C: Changes to outputs

- The “Output: Annual Regional Results” page in AVERT v3.1 has been expanded.
- This page now includes annual reported emissions for volatile organic compounds (VOCs) and ammonia (NH<sub>3</sub>).
- This page also now displays information for heat input (MMBtu) and ozone season (May through September) nitrogen oxide (NO<sub>x</sub>) emissions.
- Finally, this page now displays “average fossil” and “marginal fossil” emission rates.

	Original	Post Change	Change
Generation (MWh)	510,511,950	504,920,480	-5,591,470
Heat Input (MMBtu)	4,917,277,270	4,863,528,160	-53,749,110
Total Emissions from Fossil Generation Fleet			
SO <sub>2</sub> (lb)	710,791,670	702,002,510	-8,789,150
NO <sub>x</sub> (lb)	528,845,720	522,330,220	-6,515,520
Ozone season NO <sub>x</sub> (lb)	224,707,220	222,554,080	-2,153,150
CO <sub>2</sub> (tons)	440,539,320	435,704,060	-4,835,250
PM <sub>2.5</sub> (lb)	47,484,740	46,971,280	-513,460
VOCs (lb)	15,329,350	15,152,020	-177,330
NH <sub>3</sub> (lb)	10,163,730	10,058,210	-105,520
AVERT-derived Emission Rates:			
	Average Fossil	Marginal Fossil	
SO <sub>2</sub> (lb/MWh)	1.392	1.572	
NO <sub>x</sub> (lb/MWh)	1.036	1.165	
Ozone season NO <sub>x</sub> (lb/MWh)	0.976	1.081	
CO <sub>2</sub> (tons/MWh)	0.863	0.865	
PM <sub>2.5</sub> (lb/MWh)	0.093	0.092	
VOCs (lb/MWh)	0.030	0.032	
NH <sub>3</sub> (lb/MWh)	0.020	0.019	

Lb: pound  
MWh: Megawatt hours  
CO<sub>2</sub>: Carbon dioxide



# Update D: Updates to PM<sub>2.5</sub> calculation

- AVERT v3.1 updates the database used for calculating PM<sub>2.5</sub> emissions.
- Unlike other pollutants (CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>) which are calculated based on hourly data reported in EPA's Air Market Programs (AMP) dataset, PM<sub>2.5</sub> is calculated in AVERT based on observed changes in heat input (measured in million British Thermal Unit (MMBtu) and reported in the AMP dataset) and plant-specific lb/MMBtu PM<sub>2.5</sub> emission rates reported in EPA's National Emissions Inventory (NEI).
- Prior to AVERT v3.1, data for PM<sub>2.5</sub> emission rates were obtained from the 2014 edition of the NEI.
- In AVERT v3.1, we include PM<sub>2.5</sub> emission rates from the 2017, 2018, and 2019 editions of the NEI. Each set of AVERT RDFs utilize the appropriate NEI dataset.

# Update E: New pollutants

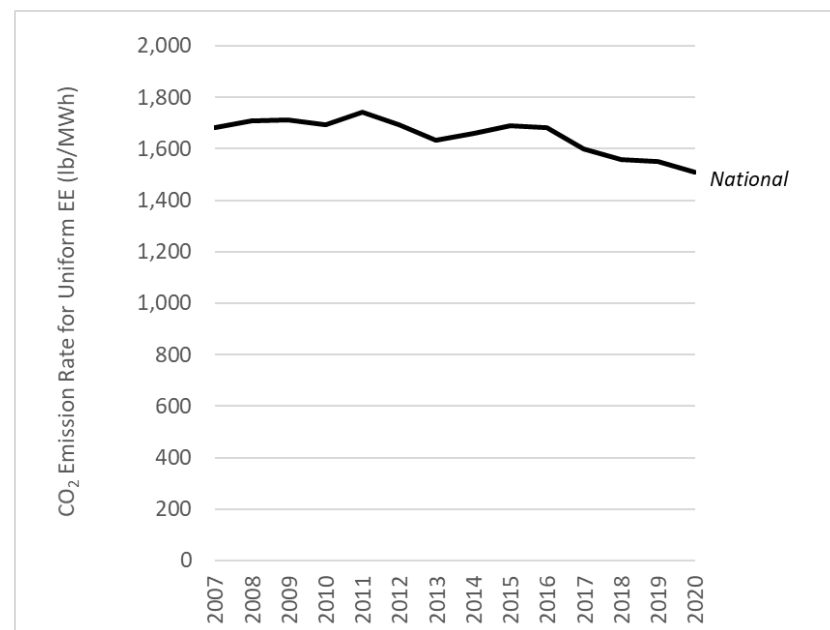
- AVERT v3.1 now estimates avoided emissions for two new pollutants: VOCs and  $\text{NH}_3$ .
- These are the remaining pollutants that can be analyzed using EPA's CO-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool. Like  $\text{SO}_2$  and  $\text{NO}_x$ , both pollutants are precursors to  $\text{PM}_{2.5}$ . These pollutants were added to enable a more comprehensive assessment of health impacts using a paired AVERT-COBRA analysis.
- Emission rates for VOCs and  $\text{NH}_3$  are estimated using the 2017, 2018, and 2019 NEIs. The methodology is the same as the methodology for estimating  $\text{PM}_{2.5}$  emissions.
- Emission rates for 2020 analysis in AVERT currently rely on data from the 2019 NEI.

# What new materials are available?

- New data for analyzing 2020 is now available for the Excel edition:  
[www.epa.gov/avert/download-avert](http://www.epa.gov/avert/download-avert)
  - The default version of the Excel edition continues to use 2019 data as temporary declines in electricity demand in 2020 means that year may not be appropriate for some analyses.
- 2017-2019 regional data files have been re-released to reflect the updated PM<sub>2.5</sub> emission rates and to enable modeling of NH<sub>3</sub> and VOCs.
- AVERT Web Edition has been updated to reflect the changes discussed on the previous slides: [www.epa.gov/avert/avert-web-edition](http://www.epa.gov/avert/avert-web-edition)
  - The AVERT Web Edition continues to use 2019 data.
- The AVERT Emission Rates dataset has been updated to reflect the changes on the previous slides:  
[www.epa.gov/avert/avoided-emission-factors-generated-avert](http://www.epa.gov/avert/avoided-emission-factors-generated-avert)

# Emission Rates Dataset

- U.S. EPA publishes a set of emission rates that are intended for quick estimates of avoided emissions from energy efficiency/renewable energy policies, programs, and projects.
- National and 14 regional emission rates are available for CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>2.5</sub>, VOCs, and NH<sub>3</sub>.
- For impacts from custom runs or for more detailed data (e.g., hourly emission impacts or plant-by-plant information), users should rely on the Excel or Web edition.
- Available at: [www.epa.gov/avert/avoided-emission-factors-generated-avert](https://www.epa.gov/avert/avoided-emission-factors-generated-avert)





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**Coming soon**

# Coming soon

- The AVERT Web Edition and COBRA Web Edition are being modified to allow users to export relevant results from AVERT Web Edition to the COBRA Web Edition with the simple click of a button. *(Expected release: October 2021)*
- In a future AVERT release, we will update the 2020 dataset to reflect PM<sub>2.5</sub>, NH<sub>3</sub>, and VOC data from the forthcoming 2020 NEI. Other AVERT datasets (2017-2019) will not be affected. *(Expected release: Summer 2022)*
- AVERT Office Hours: October 26<sup>th</sup> at 1 PM ET. See AVERT website for more details.
- What features would you like to see in AVERT? Let us know!





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# Question and Answer Session



# Connect with the State and Local Climate and Energy Program

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