On Wednesday December 17, 2025, at 12:00 pm (EST) the Department of Fire Protection Engineering at the University of Maryland will host its 12th annual competition to predict the burning behavior (heat release rate, HRR) of Christmas trees. This friendly competition is designed to bring together members of the fire safety science community and provide an opportunity to explore and develop collaborations in the future. The event also serves to share a positive fire safety message, mainly: "If you have a natural Christmas Tree this season, please keep it well-watered."

We invite you to join us by submitting predictions to this year's competition. Predictions can be made online by visiting https://pages.nist.gov/christmas_tree_fire_safety/ and using a custom-made app that allows you to easily 'build' and submit your own fire by adjusting four parameters. Rules, scoring guidelines, and additional competition information can be found online at: https://fpe.umd.edu/burn-competition.

Teams of at least 3 individuals from the same University or Research Institution are needed for a chance to win best team prediction. The first and second place teams of this competition earn our coveted golden and silver pinecones.

The 2024 Golden and Silver pinecones were earned by the Technical University of Munich and the University of Queensland (Fig. 1). In total, nearly 200 predictions from 29 different countries were submitted to the 2024 competition. A brief history of the competition is available online: https://burningmatters.beehiiv.com/p/christmas-tree-fire-experiments-at-the-university-of-maryland.

Come take a break with us for a moment when we can come together as a community just for fun (and to share an important fire safety message). Good luck!

Please let me know if you have any questions,
Isaac
Isaac.Leventon@NIST.gov

The 2025 event will be livestreamed here: https://umd.zoom.us/j/7239055335

Technical University of Munich:
First place (golden pinecone)

The University of Queensland
*The 2024 Silver Pinecone did not clear Australian customs; we're working on its replacement.

Figure 1. Winners of the 2024 Christmas Tree Fire HRR Prediction Competition

Submitting Predictions

This year's competition will take place on Wednesday, December 17, 2025, at 12:00 pm (EST). All HRR predictions received prior to this date will be scored for the competition.

Visit https://pages.nist.gov/christmas_tree_fire_safety/ to use a custom-made app that allows you to 'build' (and submit) your own fire by adjusting four parameters:

- Peak Heat Release Rate (Peak HRR, kW)
- Total Heat Released (MJ)
- Ignition delay time (s)
- Initial Fire Growth Profile // Relative Time to Peak HRR

In this app, after you click 'Submit by Email', an email will be generated that contains the three parameters defining your HRR curve. In this email, please remember to add your name, email and lab affiliation if you wish to receive credit (and final competition results) and CLICK SEND so that we receive your submission.

If you are having trouble automatically generating an email using the 'Submit by Email' button, please:

(1) Click the 'Copy Entry' button to copy your submission entry text,
(2) Paste that into the main text field of a new email,
(3) Provide your contact information [do NOT edit parameter values],
(4) Make the email subject "HRR Competition", and
(5) Send that email to treehrr@nist.gov.

A video guide to using this app to create HRR curves and submit predictions is available online: https://youtu.be/NPPijDHtP3k

Competition information

This year's competition is unique in that it offers a new connection to wildland fire scenarios. Specifically, tree ignition will be accomplished by the spread of a ground fire across an angled bed of excelsior. The incorporation of this new ignition source emphasis prediction of tree ignition time as an important scoring category.

This year's scoring categories include:

- Peak HRR (kW)
- Total energy release (MJ)
- Time to tree Ignition (s)
- Time to Peak HRR (s)
- Duration (s) for which calculated HRR exceeds 20% of measured Peak HRR

Species: The three competition trees (Canaan Firs) are pictured in Figure 1.

	Tree 1	Tree 2	Tree 3
Height	1.83 m	1.85 m	2.04 m
Width	1.20 m	1.30 m	1.18 m
Initial Weight	5380 g ± 50 g	7260 g ± 70 g	6580 g ± 70 g

Uncertainty in listed heights and widths is estimated as ± 2 cm.

Storage: Trees will be kept unwatered for 16 days in lab storage at approximately 20 C.

Ignition: This year's ignition source is unique (Fig. 3): a 1 m long, 30 cm wide tray with a 6 cm to 10 cm deep layer of excelsior will be placed next to the base of the tree. The tray will be angled 30 degrees from horizontal and ignited at the far end away from the tree. This does not represent a typical Christmas tree fire ignition scenario but it is relevant to flame spread and burning behavior of trees in wildland fires.

Time, t = 0 s is defined as the time when *the excelsior* is first ignited. Tree ignition time will be defined as the earliest time at which calculated HRR exceeds 50 kW.

Data: Christmas tree mass loss rate (MLR) will be measured continuously at 1 Hz using a mass balance with a 0.1 g precision. If possible, cone calorimeter measurements will be performed to determine a representative heat of combustion, ΔHc, for each tree. If not, a constant value will be assumed – ΔHc = 17.7 kJ/g [Mell et al. 2009] – and heat release rate will be calculated as: $HRR = MLR \times \Delta H_c$.

Figure 2. Competition Trees

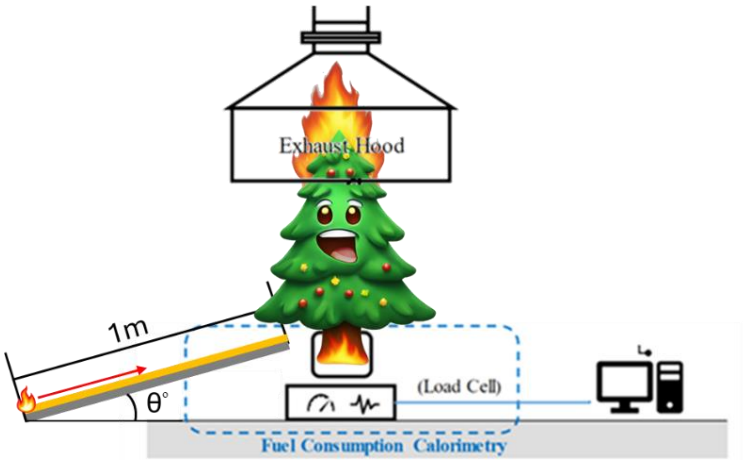

Figure 3. Schematic of the test setup.

Previous NIST studies on the burning behavior of large tree fires (2.5 m to 6 m tall trees) are available online (and may offer useful reference for this year's competition):

1. https://nvlpubs.nist.gov/nistpubs/TechnicalNotes/NIST.TN.2131.pdf
2. https://www.sciencedirect.com/science/article/pii/S0010218009001655
3. https://nvlpubs.nist.gov/nistpubs/TechnicalNotes/NIST.TN.2327r1.pdf

Additional information

Rules, scoring guidelines, and some reference materials can be found online at: https://fpe.umd.edu/burn-competition

As seen in Fig. 4, on average, larger teams (i.e., more participants per team) did as well or better than smaller teams. If there's ever a member of your team who's hesitant to submit a prediction, share this plot and tell them not to worry.

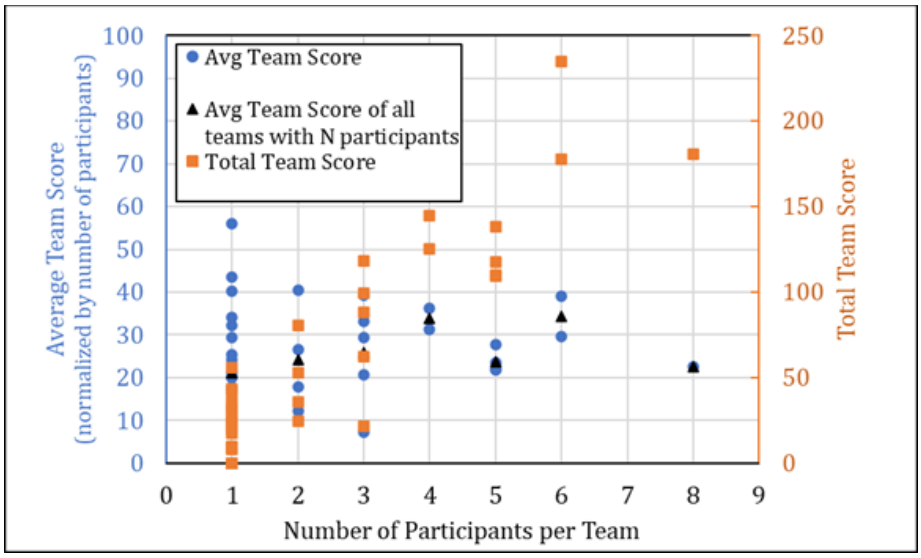

Figure 4. Team score vs. number of participants per team (2021 results)