On Tuesday, December 19, at 12:00 pm (EST) the Department of Fire Protection Engineering at the University of Maryland will host its tenth annual competition to predict the burning behavior (heat release rate, HRR) of Christmas trees. This is a friendly competition designed to bring together members of the fire safety science community that hopefully provides 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."

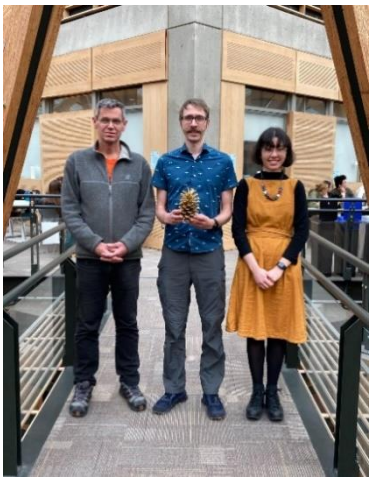
We would like to invite you to join us this year by submitting predictions to this year's competition. Last year, we received 160 predictions from 50 unique institutions across 22 countries - this was *by far* our largest group of participants. I am very happy to see this event continue to grow. This year, I look forward to receiving messages and predictions from old friends and colleagues and to seeing new groups join us from around the world.

Video of the 2022 Christmas Tree Burn can be viewed here: https://youtu.be/UUYUYzsi6yQ. The 2023 event will be livestreamed: https://umd.zoom.us/j/7239055335; details regarding how to watch the event will be provided to all participants who submit a prediction.

The 2022 competition had a new winner: The University of British Columbia. In second place was DBI (returning to the podium for the first time in several years). 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 (see Fig. 1 below).

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



University of British Columbia
First place (golden pinecone)

Danish Institute of Fire & Security Technology, DBI
Second place (silver pinecone)

Figure 1. Winners of the 2022 Christmas Tree Fire HRR Prediction Competition

Submitting Predictions

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:

Fire Growth Rate
Peak Heat Release Rate (Peak HRR)
Duration of Steady Burning
Fire Decay

In this app, after you click submit, an email will be generated that contains the parameters defining your HRR curve. Please remember to add your name, email, and lab affiliation if you wish to receive credit (and to hear future updates/receive the event livestream link) and to CLICK SEND so that the submission actually comes our way.

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 will be organized and scored to contextualize model predictions vs. experimental uncertainty. In short, this means that tests will be repeated in triplicate and your predictions will be scored with respect to the average and standard deviations (with explicit considerations for measurement uncertainty) of experimentally measured burning behavior.

This year's scoring categories include:

- Peak HRR
- Time to Peak HRR
- Total energy release
- Duration for which calculated HRR exceeds 70% of measured Peak HRR
- Duration for which calculated HRR exceeds 200 kW

This year's competition trees are Balsam Firs (see Fig. 2). Tree heights and initial masses are provided in Table 1. The trees will be held in laboratory storage without water for 24 days prior to burning (storage conditions: relative humidity = 50 %; temperature = 12°C to 18°C).

Table 1. Competition Tree Information

	Tree 1	Tree 2	Tree 3
Height	10.96 kg	10.76 kg	10.70 kg
Weight	2.05 m	2.18 m	1.77 m

Figure 2. The 2023 competition trees (Balsam Firs)

For ignition, a 6 cm diameter pan filled with 35 mL of heptane will be placed below the lowest branches of the tree, approximately 15 cm inward from the outermost edge of the tree. Ignition (time, t = 0 s) will be defined as the earliest time at which measured HRR exceeds 50 kW.

Note: this procedure moves the ignition source farther away from the center of the tree as compared to previous competitions (i.e., 2020 and earlier). Also note the variability in 2023 tree dimensions, despite similar initial weights. Experimental results and the best predicted HRR curves from the 2022 Competition are shown in Fig. 3.

Christmas tree mass loss rate will be measured continuously at 1 Hz using a Mettler Toledo mass balance with a 0.1 g precision. If possible, cone calorimeter measurements will be performed to determine a representative heat of combustion, ΔH_c, for each tree. If not, a constant value will be assumed – $\Delta H_c = 17.7$ kJ/g [Mell et al. 2009] – to convert this to HRR.

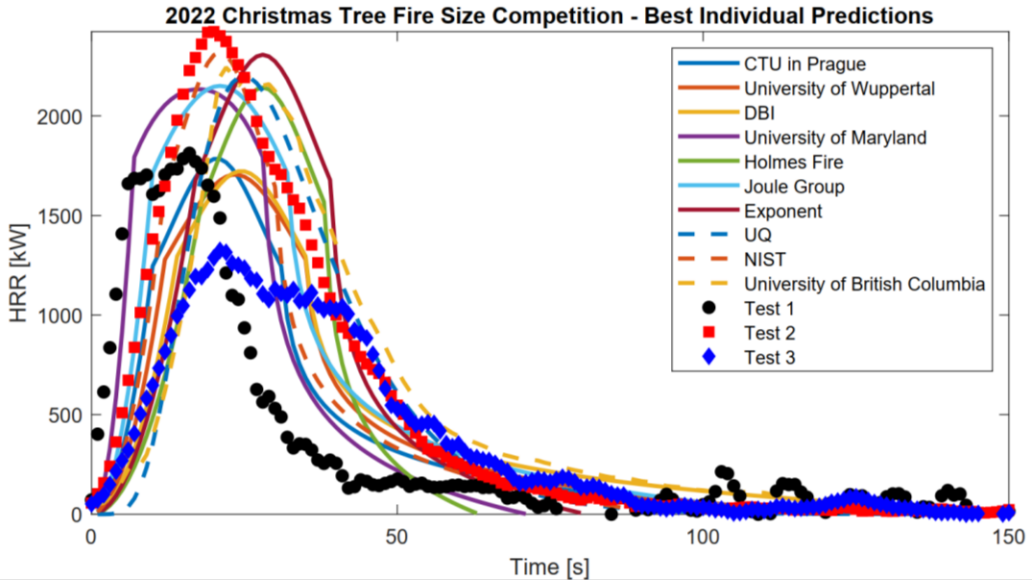


Figure 3. Results from the 2022 Christmas Tree HRR Prediction Competition

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.

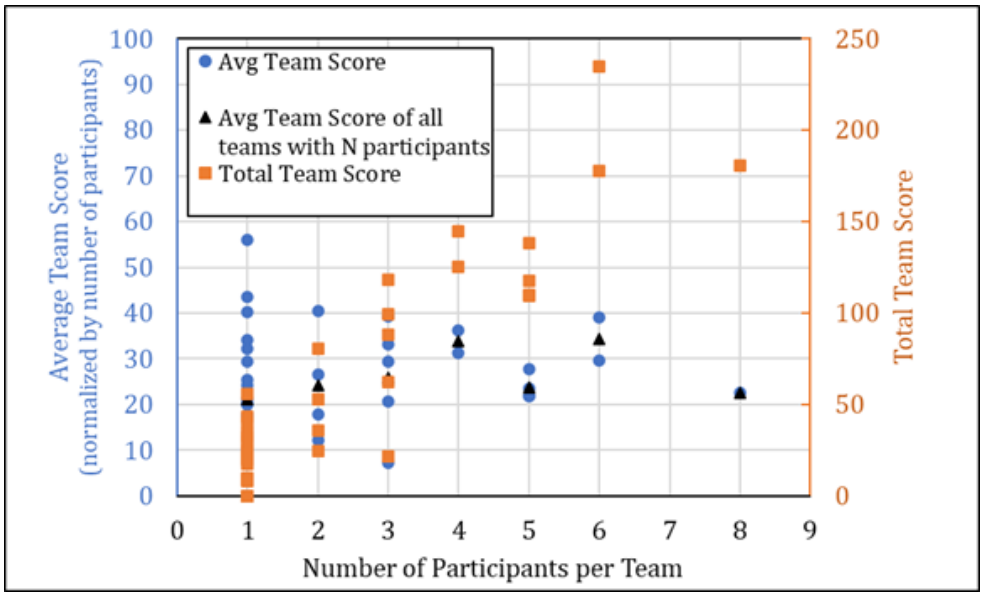


Figure 4. Team score vs. number of participants per team (2021 results)