









































































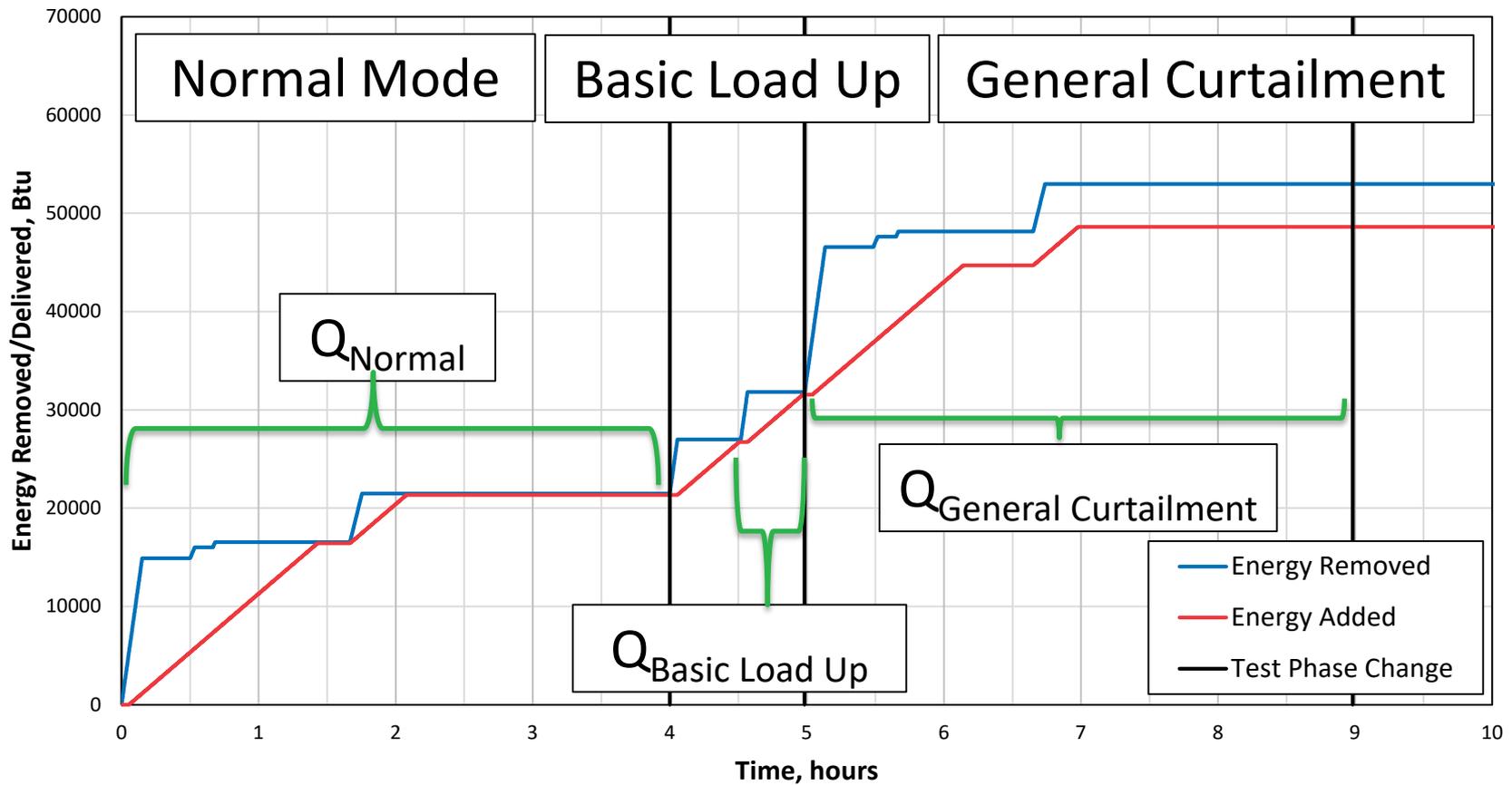








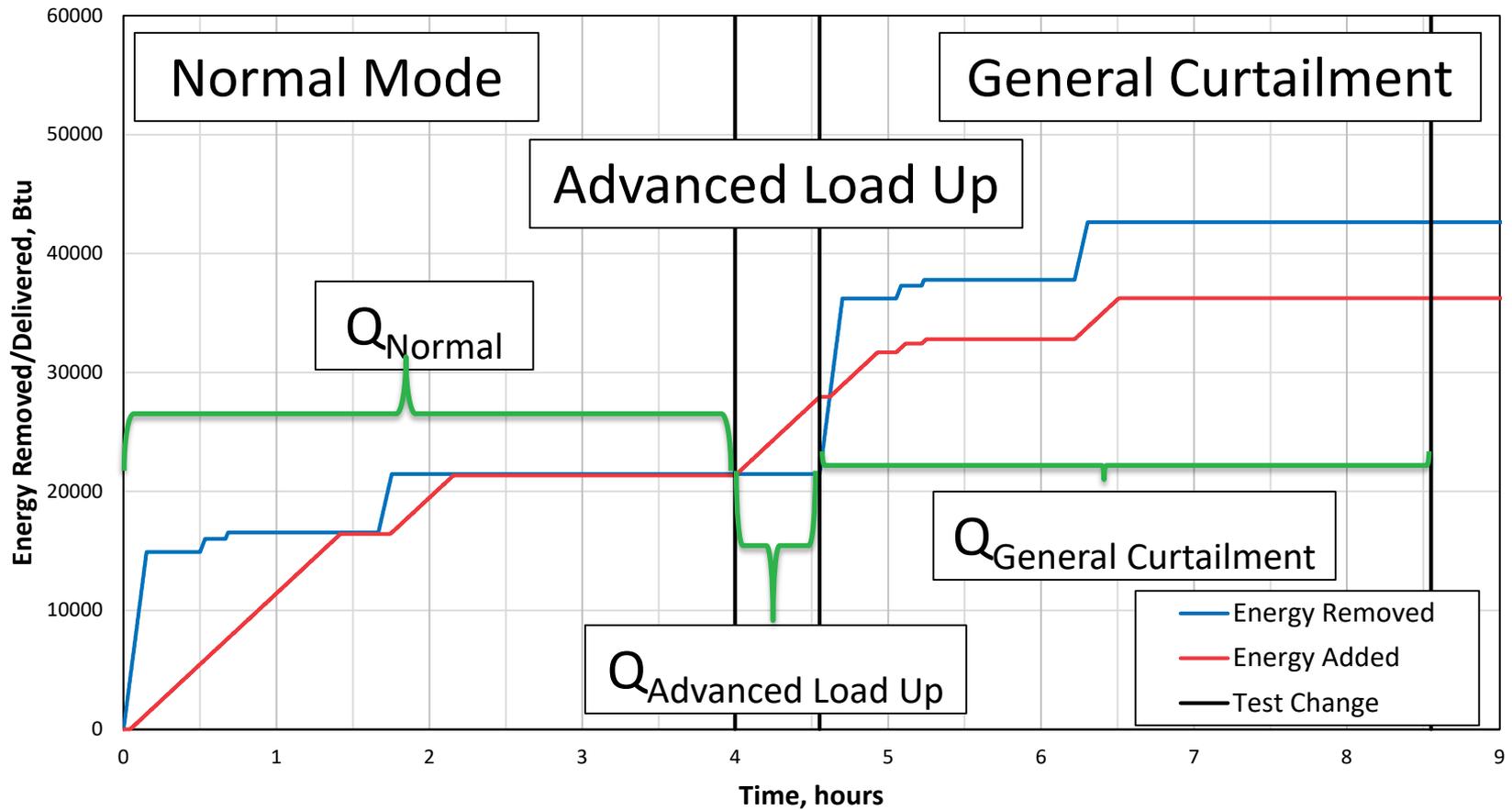
# Load Shift Example – Basic Load Up Verified



$$Q_{Basic Load Up} + (Q_{Normal} - Q_{General Curtailment}) \geq \text{Basic Load Shift} = 0.5 \text{ kW}$$



# Load Shift – Advanced Load Up Verified



$$Q_{Advanced Load Up} + (Q_{Normal} - Q_{General Curtailment}) \geq \text{Advanced Load Shift} = 1.0 \text{ kW}$$



## Emergency Curtailment and Grid Emergency

- Emergency Curtailment
  - For HPWH with ER elements, if elements are used, the unit fails.
  - For ER only units, if any element but the top is used, the unit fails.
- Grid Emergency
  - If any energy is used to heat water, the unit fail.
- Procedure
  1. Start with a CWHP in standby (not recovering)
  2. Send Emergency Curtailment request
  3. Draw off water at prescribed flow rate for the rated draw pattern
  4. When the delivery (outlet) temperature reaches 80°F, send a Grid Emergency request
  5. Stop drawing water when the delivery temperature reaches 60°F



## Accuracy of Current Available Energy Storage Capacity

During the Load Shift test the Current Available Energy Storage Capacity (AE) is requested and recorded several times.

1. Calculate the energy content of the CWHP at each recording ( $\bar{T}_{Step}$  is the mean tank temperature at each recording)

$$E_{Step} = V_{st}\rho C_p \bar{T}_{Step}$$

2. Calculate  $\bar{E}_{Setpoint}$

3. Calculate AE for each  $E_{Step}$  not used to determine  $\bar{E}_{Setpoint}$

$$AE_{C,Step} = \bar{E}_{Setpoint} - E_{Step}$$

4. Calculate the root-mean-square difference (RMSD)

$$RMSD_{AE} = \sqrt{\frac{\sum (AE_{C,Step} - AE_{R,Step})^2}{N}}$$



## Meeting Agenda

1. Introductions
2. Draft 1 and Feedback
3. Connected Criteria
4. Test Method
- 5. UEF as Main Criteria**
6. Next Steps
7. Questions



## UEF as Main Criteria

- As the Federal minimum efficiencies are now in terms of UEF, EPA has moved the water heaters UEF criteria from Appendix A to the main body of the specification.
- Legacy criteria in terms of EF will remain in the specification for reference but have been moved to Appendix A
- Definitions, criteria, and test method have been updated to reflect this.
- Products currently certified against EF criteria will remain certified. However, Partners with products currently listed with only EF criteria will be contacted to provide UEF ratings.

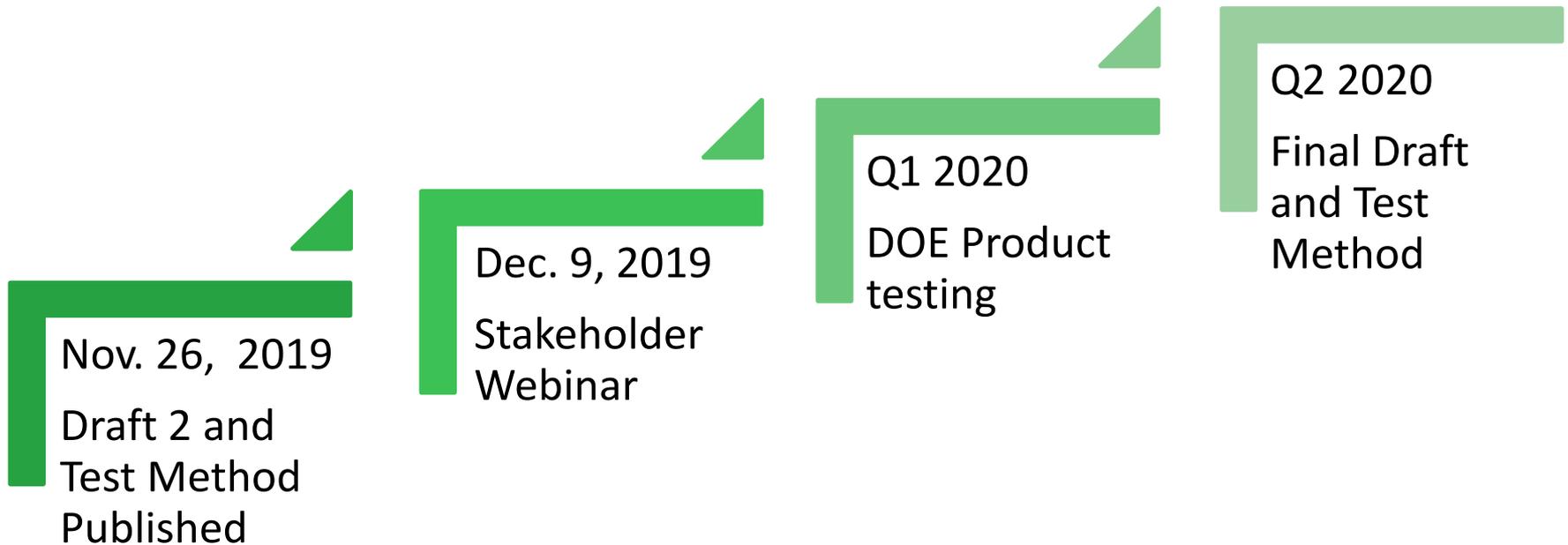


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## Next Steps





## Meeting Agenda

1. Introductions
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- 7. Questions**



## Questions

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Stakeholders are encouraged to provide written comments for consideration to [waterheaters@energystar.com](mailto:waterheaters@energystar.com) by Jan 6, 2020.