KP-NRC-2512-002

Enclosure 1
Presentation Slides for the December 18, 2025
Hermes External Event Design Criteria Meeting
(Non-Proprietary)

(Note that the enclosed information is preliminary and pre-decisional and is subject to change during detailed planning and project execution. It is provided for planning and familiarization purposes in support of pre-application discussions with the NRC Staff.)
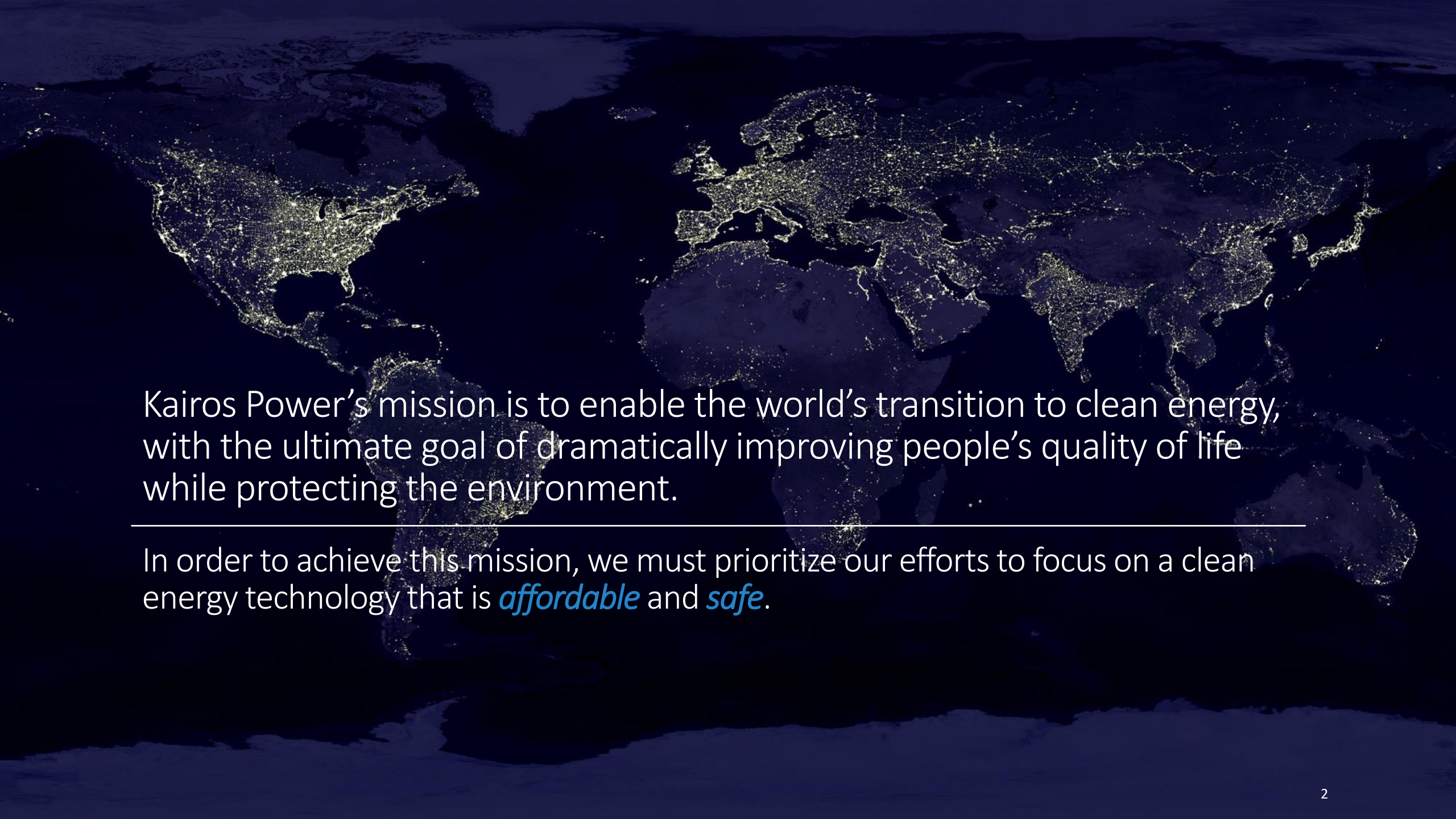
Hermes External Event Design Criteria

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DECEMBER 18, 2025

Kairos Power's mission is to enable the world's transition to clean energy, with the ultimate goal of dramatically improving people's quality of life while protecting the environment.

In order to achieve this mission, we must prioritize our efforts to focus on a clean energy technology that is *affordable* and *safe*.

Agenda

- Hermes Air Traffic Analysis

- Hermes Flood Design Basis

Hermes Site Air Traffic Analysis

- NUREG-1537 Air Traffic Analysis Criteria
  - sites located within 5 mi (8 km) of an existing or projected commercial or military airport
  - sites located between 5 mi (8 km) and 10 mi (16 km) from an existing or projected commercial or military airport with more than approximately 200 d^2 (where d is the distance in kilometers from the airport to the reactor site) commercial or military aircraft movements per year.

- Oak Ridge City Council had proposed a general aviation airport located less than 1 mile to the southeast of the site.

- In January 2025, City Council decided that the airport is no longer proposed to be located at the East Tennessee Technology Park.

- There are no commercial or military airports within 10 miles of the site, therefore the licensing basis will not evaluate accidental aircraft impact.

Hermes Site Air Traffic Analysis

- Two federal airways within 10 miles (16 km)
  - Jet Route 46
  - Victor Route V16

- NUREG-1537 guidance for considering air traffic does not include federal airways

- Evaluation of the two airways concluded they do not pose a credible hazard
  - Conservative evaluation using 2006 DOE Standard 3014 results in hazard probability on the order of 10^{-6}/year.
  - Evaluation using forthcoming DOE Standard with updated data (ANS 2.36) results in hazard probability well below the screening level of 10^{-6} per year.
  - Furthermore, when considering additional shielding of natural features and adjacent structures, the probabilities would be further reduced.
  - Therefore, the flights transiting any nearby airways would pose negligible hazards to the facility and the hazard is below the screening level.

Hermes PSAR Design Basis Flood

- NUREG-1537 Part 1 states that the "effects and consequences of a probable maximum flood […] should be considered." NUREG-1537 Part 2 states that acceptance criteria for hydrology information includes, "The facility be located and designed to withstand credible hydrologic events."

- PSAR Rev. 3 dated May 2023 defined the design basis flood as 759.9 feet msl, which was the projected flood elevation from a 2015 evaluation of the 25,000-year return period flood for Poplar Creek.

- During CPA review, the staff found that the Hermes 25,000-year design basis flood "presents no potential water damage to the site," and that "extreme flood events causing inundation of the site are unlikely during the planned 4-year Hermes operational lifetime."

Figure 2.4-1: Location of Hermes Site
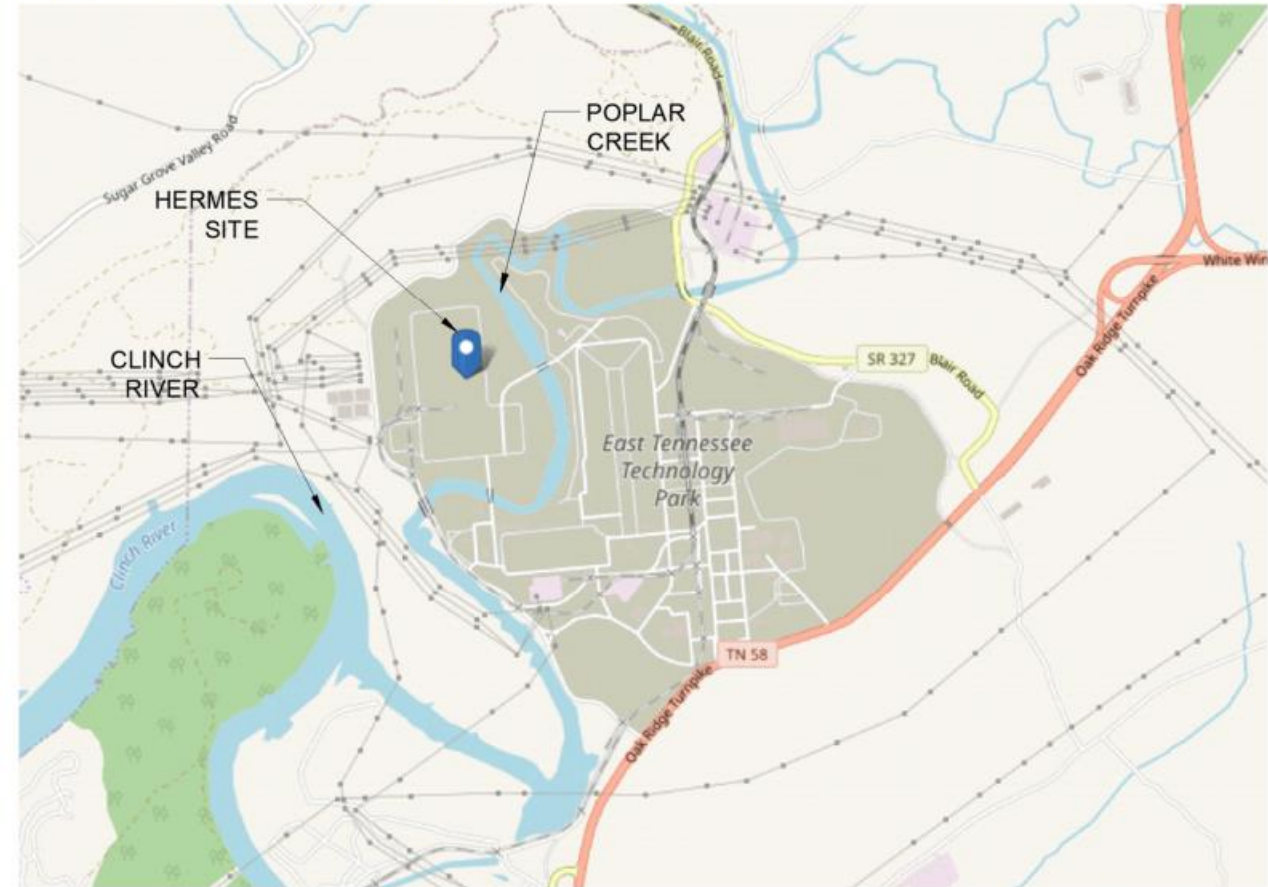
Update to Hermes Flood Design Basis

- An updated Flood Hazard Evaluation has since been performed for a 10,000-year return period flood, consistent with Flood Design Category 3 (FDC-3).
  - Updated to reflect current conditions, including changes to stream cross sections and floodplains and infrastructure along the watercourses.
  - Both Poplar Creek flooding and Clinch River backwater considered.
  - For seismic design, as stated in PSAR, Hermes Safety-Related SSCs are designed to SDC-3 (Seismic Design Category 3), with an annual Target Performance Goal of 1/10,000.

- The updated design basis flood for Hermes is therefore defined as 763.1 feet msl, the projected flood elevation for a 10,000-year flood on Poplar Creek.
  - This is approximately 1.9 feet below existing site grade, and 7.9 feet below the Hermes building slab (raised 6 feet above site grade)

Questions