HIGH-END COMPUTING CAPABILITY PORTFOLIO

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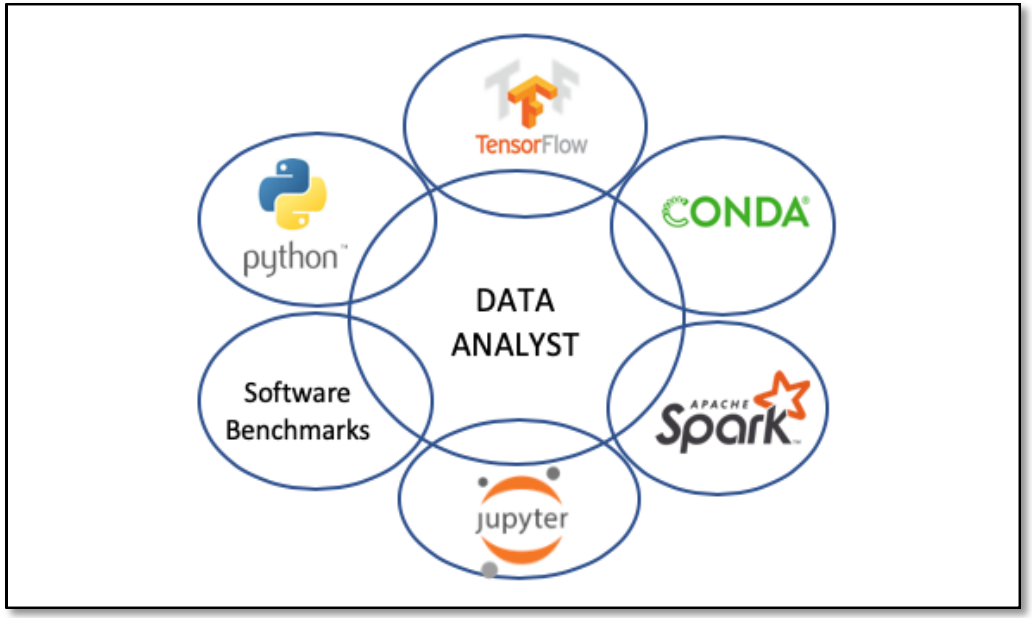
HECC Offers Jupyter Notebook Machine Learning Environments for Data Science

- The Data Science team set up machine learning (ML) environments and tools to enable researchers across NASA to effectively use HECC data science and ML resources.
- The environment is based on Miniconda3 and Python v3.6. The setup also allows users to extend this framework to build their own set of tools for their ML projects. The Jupyter Notebook:
  - Is the leading open-source application for exploring science data, installed on Pleiades.
  - Displays computational results with code using built-in tools like matplotlib.
  - Promotes interactive research and collaboration.
  - Meets NASA security requirements.
- The Data Science team installed and tested TensorFlow 2.0, which provides a distributed computing capability. This open-source platform works on both CPU and GPU nodes.
  - Apache Spark was installed to help users with their data pipelines.
- The HECC Knowledge Base was expanded with usage guidelines for the ML environments, including performance tuning tips to enhance user productivity.

IMPACT: HECC data science experts provide NASA research communities with an integrated Machine Learning environment to solve problems that would be too time- or resource-intensive using traditional approaches of physics-based or statistical modeling.

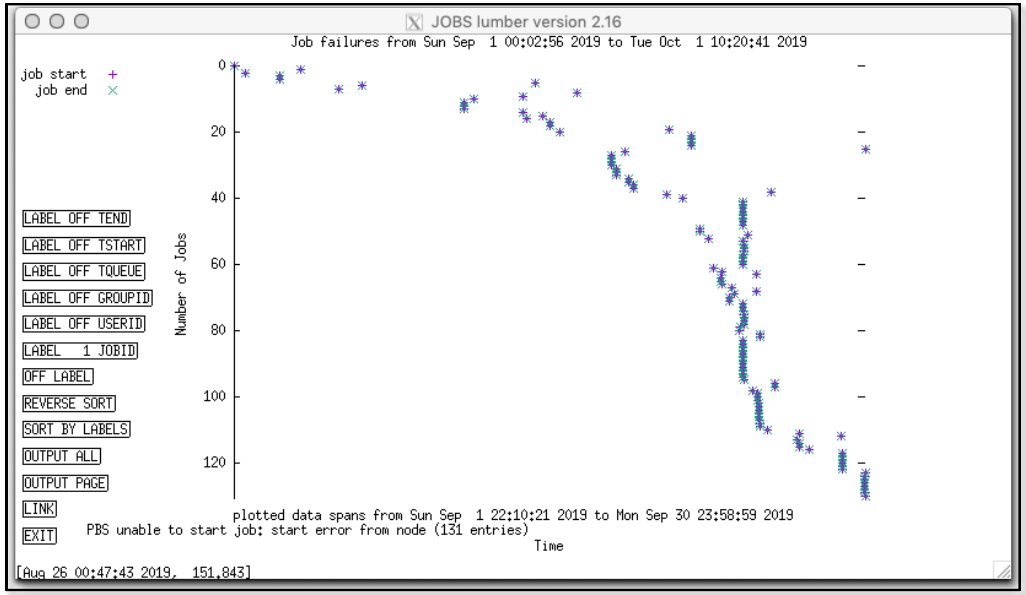


Software platforms and packages available for data analysis using HECC machine learning environments.

Visualization of Pleiades Job Failures Improves Diagnosis

- The HECC Application Performance and Productivity (APP) team developed a new graphical user interface (GUI), which was added to the existing “lumber” tool.
  - Lumber is a proven tool that analyzes system logs, creating lists and data about known and unexpected job failures, among many other functions.
  - APP’s simple but powerful graphical tool, “glumber,” is based on the tried and tested “gnuplot” graphical tool.
- The graphical system allows system analysts to “deep dive” into Pleiades data.
  - Analysts can visualize job failure data for any time span. A selection window allows them to focus on the failure type of choice. From there, windows focusing on jobs, or the Pleiades nodes assigned to the jobs, can be explored.
  - Powerful sorting mechanisms allow the visualization to be further directed to specific avenues of interest. Resulting patterns that appear in the temporal distribution of the data allow analysts to correlate the failures with other system events.
  - The new tool is very simply implemented with gnuplot, and is readily adaptable as experience is gained with usage.

IMPACT: HECC’s new tool to visualize and sort job failures by various factors greatly enhances the ability to find root causes of issues on NASA’s most powerful supercomputers, resulting in improved system performance.



Screenshot from the “glumber” GUI shows a job failure type linked with the inability to start a node, revealing a strong temporal correlation, indicated by vertical “bars” of data. This new visualization capability allows analysts to examine events that might have occurred at the same time to find a root cause. Buttons at left show the rich sorting features.

HECC Completes Annual N258 Building Maintenance

- HECC facilities engineers, along with counterparts in Code J (Jacobs Engineering), planned, coordinated, and conducted the annual N258 building maintenance, which included numerous repairs and maintenance of key facility components.
- The N258 maintenance requires a complete building power shutdown. Pleiades and storage systems were powered off, while Electra, Aitken, and Merope were placed in dedicated time.
- Activities completed during the shutdown:
  - Cleaned the cooling tower, replaced the drift eliminators, and re-greased the fan gearboxes.
  - Cleaned the cooling system's chillers.
  - Cleaned and tested all power switchgear and circuit breakers.
  - Cleaned the computer room sub-floor.
  - Tested all fire suppression systems.
  - Replaced belts and filters on the air handlers and the rotary uninterruptible power supply (RUPS) air conditioner.
  - Cleaned the reactor module in RUPS #1.
  - Tightened electrical connections on power distribution unit branch circuit breakers operating warm during a pre-shutdown infrared scan.

IMPACT: Preventative maintenance to the NASA Advanced Supercomputing facility's cooling system and electrical distribution eliminates downtime caused by an aging infrastructure—yielding more computer uptime for HECC's scientific and engineering users.

At the NASA Advanced Supercomputing facility, electrical equipment such as the rotary uninterruptible power supply reactor module shown above, is powered down once a year for preventative maintenance work.

HECC Staff Coordinate 31st NASA Exhibit at Annual Supercomputing Conference

- HECC staff planned and produced NASA's presence at SC19, the International Conference for High Performance Computing, Networking, Storage, and Analysis, held November 18–22 in Denver, CO.
- Presenters from four NASA locations, plus university and corporate collaborators, presented 38 science and engineering projects enabled by Pleiades, Electra, Endeavour, and Discover and supported by HECC and NCCS visualization, optimization, and network experts.
- Featured demos highlighted for attendees included:
  - Unprecedented simulations of a full-scale, large airliner that provide insight into the sources of airframe noise during landing.
  - First-of-a-kind predictions of the acoustic vibrations generated by Orion's Launch Abort System motor to help engineers reduce risk.
  - Machine learning to identify trees across Sub-Saharan Africa and calculate all the carbon stored in the region's woody biomass for the first time.
  - Simulations created with unprecedented resolution that help scientists understand how galaxies co-evolve with the extensive reservoirs of gas around them.
- A wide array of stunning images and videos of science and engineering simulations, many created by HECC visualization experts, were shown on the 10x6-foot hyperwall; dozens of high-resolution images were made available for download on the NASA@SC19 website (see slide 6).

Visit the NASA@SC19 website at: https://www.nas.nasa.gov/SC19/

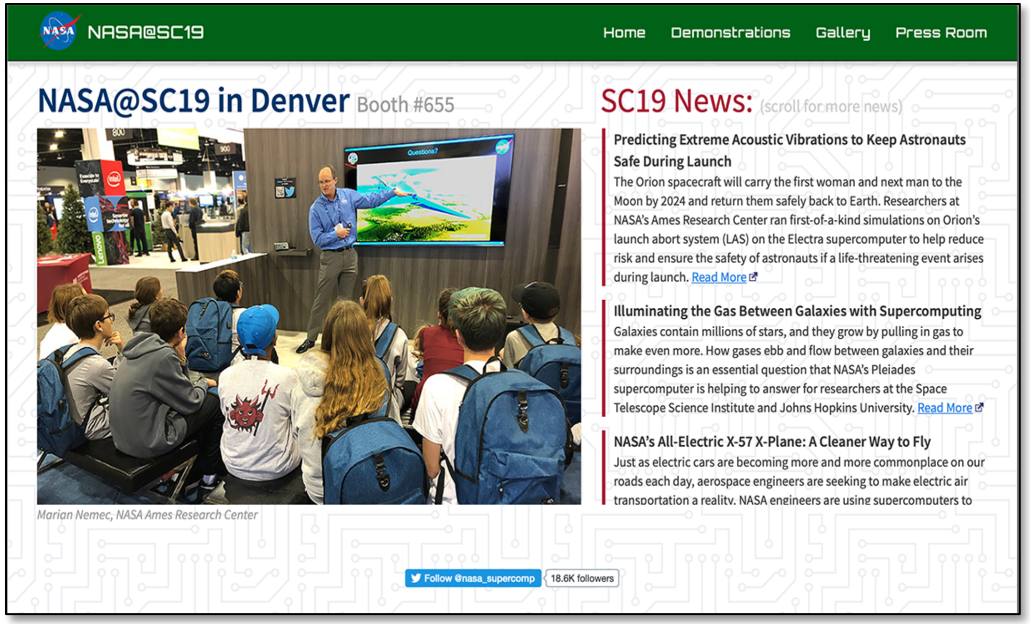
IMPACT: The annual supercomputing conference provides a highly visible public platform to showcase NASA science and engineering missions supported by the agency's high-performance (HPC) computing resources, as well as NASA's latest research and advances in advanced computing technologies.

The SC19 exhibit support team and presenters representing all mission directorates provided thousands of conference attendees with a memorable NASA experience.

Tools Team Highlights NASA Science, Engineering at SC19

- The HECC Tools team, with the Pubs Media team, collected and presented content from users who gave demonstrations at the SC19 conference in Denver.
- The Tools team created and continues to maintain internal and public-facing websites that support NASA's presence each year at the supercomputing conference, including:
  - A content upload site, where researchers transmit their demonstration text, images, and videos to the Pubs Media team.
  - The main NASA@SC19 website, which draws thousands of visitors from the HPC community, the media, and the public. Supercomputing-related news and information were updated by the Tools team throughout the conference.
  - Websites that drive the two animated schedule screens in the NASA booth. Scripts pull data from a Google calendar with information on over 120 booth events.
  - The calendar also supplied data to schedule pages on the main NASA@SC19 website and an iPad at the booth information desk. This approach enables scheduling changes during the conference to be reflected across all platforms within moments.
  - Animated screens featuring an Artemis Program theme were shown for the opening night gala and during unscheduled times in presentation areas.

IMPACT: NASA@SC websites call attention to the agency's supercomputing, science, and engineering outreach activities before, during, and after the annual supercomputing conference.



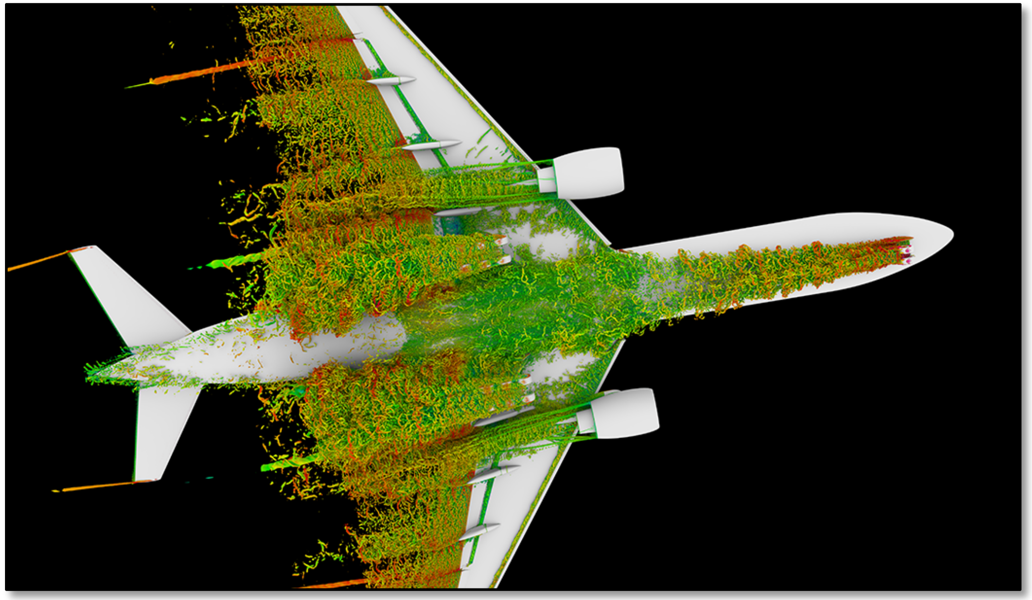
The NASA@SC19 website features more than 120 images and 19 videos taken from 38 demonstrations presented in the NASA booth, including research work shown to local STEM students. Each demonstration has its own page to explain the details, results and impact of the research. *Visit: https://www.nas.nasa.gov/SC19/*

Simulating a Full-Scale, Large Airliner Landing*

- Scientists at NASA Langley ran simulations on Pleiades to accurately compute the far-field noise signature of a full-scale, large civil transport airliner in landing configuration—airframe noise contributes significantly to the total noise generated by aircraft during approach and landing.
  - Simulations were run on low-resolution meshes to establish best practices for attaining the numerical, spatial, and temporal resolution required to capture the key noise-producing flow features.
  - The scientists, in partnership with Boeing, used Dassault Systeme's Lattice Boltzmann code PowerFLOW to investigate the complex, unsteady flow field around the airliner to gain greater understanding of the prominent noise-generation mechanisms and locate the major noise sources.
  - They also sought to validate the predicted results against measured acoustic data obtained from flight tests of the same aircraft.
- Results from ongoing, preliminary comparisons of predicted levels and frequency content of the noise spectrum on the ground with flight test data indicate that good agreement will be achieved. This bodes well for the suitability of their current simulation approach to solving this airframe noise grand challenge for the aerospace community.
- Scientists will next perform the simulations on a finer spatial grid to capture the high-frequency segment of the far-field noise spectrum.

** HECC provided supercomputing resources and services in support of this work.*

IMPACT: Simulation-based prediction of airframe noise, enabled by HECC resources and visualization experts, is essential for the design of effective noise-reduction strategies that can substantially improve the quality of life in communities near major airports.



Visualization of the simulated flow field around a large airliner. Of note: complex, vortical, unsteady flow features generated by the wing high-lift devices and aircraft landing gear. *Benedikt Koenig, Dassault Systemes; Patrick Moran, NASA/Ames*

HECC Facility Tours in November 2019

- HECC hosted 5 tour groups in November; guests learned about the agency-wide missions being supported by HECC assets, and also viewed the D-Wave 2000Q quantum system. Visitors this month included:
  - His Majesty King Jigme Khesar Namgyel Wangchuck, Kingdom of Bhutan, and his delegation group from Bhutan and the U.S. State Department; this group was at Ames as part of the Breakthrough Initiatives Team, led by former Ames Center Director Pete Worden.
  - Verron “Ron” Brade, Deputy Associate Administrator, Mission Support Directorate at NASA Headquarters in the Facility Real Estate Division group, visited the Modular Supercomputing Facility with Bill Thigpen.
  - Robin Riedel, a partner for aviation industry at McKinsey & Company in San Francisco, visited the NAS facility with Seokkwan Yoon.
  - Brigadier General Jeremy Sloan, U.S. Air Force, Commandant, Air War College, Maxwell Air Force Base in Alabama, and a group of National Science Foundation Alumni, visited the NAS facility during an Ames Center tour.
  - Jacob Cohen, Ames Chief Scientist, brought a group from the German Aerospace Center, including March Jochemich and Ali Guelhan, to tour the NAS facility.

Chris Henze, NASA Advanced Supercomputing Division Visualization Team Lead, presents ocean modeling results to His Majesty King Jigme Khesar Namgyel Wangchuck, Kingdom of Bhutan (front row, second from the left).
Gina Morello, NASA/Ames

Papers

- "**The Effects of Disk Self-Gravity and Radiative Cooling on the Formation of Gaps and Spirals by Young Planets**," S. Zhang, Z. Zhu, arXiv:1911.01530 [astro-ph.EP], November 4, 2019. *
https://arxiv.org/abs/1911.01530
- "**TOI-132 b: A Short-Period Planet in the Neptune Desert Transiting a *V* = 11.3 G-Type Star**," M. Diaz, et al., arxiv:1911.02012 [astro-ph.EP], November 5, 2019. *
https://arxiv.org/abs/1911.02012
- "**Lean Fully Premixed Injection for Commercial Jet Engines: An Initial Design Study**," P. Palies, R. Acharya, A. Hoffie, M. Thomas, *Turbo Expo: Power for Land, Sea, and Air* (The American Society of Mechanical Engineers), published online November 5, 2019. *
https://asmedigitalcollection.asme.org/GT/proceedings-abstract/GT2019/58622/V04BT04A039/1066787
- "**Aeromechanic Response of a Coupled Inlet-Fan Boundary Layer Ingesting Distortion-Tolerant Fan**," G. Heinlein, M. Bahkle, J. Chen, *Turbo Expo: Power for Land, Sea, and Air* (The American Society of Mechanical Engineers), published online November 5, 2019. *
https://asmedigitalcollection.asme.org/GT/proceedings-abstract/GT2019/58561/V02BT42A007/1066477
- "**Hybrid Simulation of Solar-Wind-Like Turbulence**," D. A. Roberts, L. Ofman, *Solar Physics*, 294:153, November 7, 2019. *
https://link.springer.com/article/10.1007/s11207-019-1548-x

** HECC provided supercomputing resources and services in support of this work*

Papers (cont.)

- "**A Road Map for Improving the Treatment of Uncertainties in High-Resolution Regional Carbon Flux Inverse Estimates**," S. Feng, et al., *Geophysical Research Letters*, published online November 11, 2019. *
  https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019GL082987
- "**The Origin of Massive Stars: The Inertial-Inflow Model**," P. Padoan, et al., arXiv:1911.04465 [astro-ph.GA], November 11, 2019. *
  https://arxiv.org/abs/1911.04465
- "**TESS Reveals HD 118203 b to be a Transiting Planet**," J. Pepper, et al., arXiv:1911.05150 [astro-ph.EP], November 12, 2019. *
  https://arxiv.org/abs/1911.05150
- "**TOI-677 b: A Warm Jupiter (P = 11.2d) on an Eccentric Orbit Transiting a Late F-Type Star**," A. Jordan, et al., arXiv:1911.05574 [astro-ph.EP], November 13, 2019. *
  https://arxiv.org/abs/1911.05574
- "**Simulating Storm Surge and Compound Flooding Events with a Creek-to-Ocean Model: Importance of Baroclinic Effects**," F. Ye, et al., *Ocean Modeling,* vol. 145, November 13, 2019. *
  https://www.sciencedirect.com/science/article/pii/S1463500319302173

** HECC provided supercomputing resources and services in support of this work*

Papers (cont.)

- **SC19 in Denver, CO, November 17–22, 2019.**
  - "**Airframe Noise Prediction Grand Challenge: Simulating a Large Airliner Landing**," M. Khorrami. * https://www.nas.nasa.gov/SC19/demos/demo12.html
  - "**HPC Framework for Predicting High-Altitude Relight in Aircraft Engines**," Y. Tang, V. Raman. * https://www.nas.nasa.gov/SC19/demos/demo2.html
  - "**Realistic Simulations of the Coupled Atmosphere-Ocean-Ice System**," C. Hill, D. Menemenlis. * https://www.nas.nasa.gov/SC19/demos/demo22.html
  - "**Revolutionizing Assessment of Unsteady Flows Using Pressure-Sensitive Paint**," N. Roozeboom, J. Lie, D. Murakami. * https://www.nas.nasa.gov/SC19/demos/demo3.html
  - "**Simulating Dream Chaser: Spacecraft Aerodynamics Subsonic through Hypersonic**," M. Opgenorth, M. Jeffries. * https://www.nas.nasa.gov/SC19/demos/demo1.html
  - "**Achieving Quantum Supremacy with Noisy Intermediate-Scale Quantum Devices**," S. Mandra, B. Villalonga. * https://www.nas.nasa.gov/SC19/demos/demo26.html
  - "**Teaching Your Legacy Code New (GPU) Tricks**," R. Caplan, J. Linker. * https://www.nas.nasa.gov/SC19/demos/demo10.html
  - "**Discovering Distinctive Cycles in the Global Solar Dynamo**," L. Matilsky, J. Toomre. * https://www.nas.nasa.gov/SC19/demos/demo24.html
  - "**Exploring the Origins of Extreme Magnetism in Red Dwarf Stars**," C. Bice, J. Toomre. * https://www.nas.nasa.gov/SC19/demos/demo25.html
  - "**How Does Space Weather Affect Mercury, Earth, and Uranus?**" C. Dong, L. Wang. * https://www.nas.nasa.gov/SC19/demos/demo7.html

** HECC provided supercomputing resources and services in support of this work*

Papers (cont.)

- **SC19 in Denver, CO (cont.)**
  - "**Numerically Modeling the Weather and Climate of Mars**," M. Richardson. * https://www.nas.nasa.gov/SC19/demos/demo9.html
  - "**Simulating the Diffuse Gas Surrounding Galaxies**," M. Peeples. * https://www.nas.nasa.gov/SC19/demos/demo4.html
  - "**Simulating the Water Cycle and Cloud Formation on Mars**," M. Kahre. * https://www.nas.nasa.gov/SC19/demos/demo16.html
  - "**The Milky Way and Its Neighbors: Simulating Ultra-Faint Dwarf Galaxies**," J. Van Nest, F. Munshi. * https://www.nas.nasa.gov/SC19/demos/demo5.html
- "**Pathways of Ocean Heat Towards Pine Island and Thwaites Grounding Lines**," Y. Nakayama, et al., *Nature: Scientific Reports*, vol. 9, November 22, 2019. * https://www.nature.com/articles/s41598-019-53190-6
- "**Validation of MHD Model Predictions of the Corona with LASCO-C2 Polarized Brightness Images**," P. Lamy, et al., *Solar Physics*, 294:162, November 22, 2019. * https://link.springer.com/article/10.1007/s11207-019-1549-9

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Presentations

- **SC19 in Denver, CO, November 17-22, 2019.**
  - “**Minimizing Sonic Boom through Simulation-Based Design: The X-59 Airplane**,” M. Nemec, M. Aftosmis. * https://www.nas.nasa.gov/SC19/demos/demo20.html
  - “**Predicting Jet Noise for Full-Scale Low-Boom Aircraft**,” G.-D. Stich, C. Kiris. * https://www.nas.nasa.gov/SC19/demos/demo14.html
  - “**Predicting Quadcopter Drone Noise Using the Lattice Boltzmann Method**,” M. Barad, C. Kiris. * https://www.nas.nasa.gov/SC19/demos/demo18.html
  - “**Towards Urban Air Mobility: NASA’s Quadcopter Air Taxi Concept**,” P. Ventura Diaz, S. Yoon. * https://www.nas.nasa.gov/SC19/demos/demo15.html
  - “**Using CFD to Develop NASA’s X-57 Maxwell Flight Simulator**,” J. Duensing, C. Kiris. * https://www.nas.nasa.gov/SC19/demos/demo13.html
  - “**Building Booster Separation Aerodynamic Databases for Artemis II**,” J. Meeroff, D. Dalle. * https://www.nas.nasa.gov/SC19/demos/demo27.html
  - “**Predicting Orion Pad Abort Vibrations to Keep Artemis Astronauts Safe**,” F. Cadieux, C. Kiris. * https://www.nas.nasa.gov/SC19/demos/demo19.html
  - “**Towards Multiphysics Prediction Capability for the KSC Launch Environment**,” J. Angel, C. Kiris. * https://www.nas.nasa.gov/SC19/demos/demo28.html
  - “**Jumping the Queue: From NASA to the Commercial Cloud**,” R. Hood, S. Heistand. https://www.nas.nasa.gov/SC19/demos/demo21.html

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Presentations (cont.)

- **SC19 in Denver, CO (cont.)**
  - “**The Evolution of NASA’s High-End Computing Capabilities**,” W. Thigpen. https://www.nas.nasa.gov/SC19/demos/demo11.html
  - “**Modeling the Solar Corona to Study Sources of Space Weather Disturbances**,” I. Kitiashvili, A. Wray. * https://www.nas.nasa.gov/SC19/demos/demo8.html
  - “**Microscale Analysis of Spacecraft Heat Shields**,” J. Thornton, N. Mansour. * https://www.nas.nasa.gov/SC19/demos/demo17.html
  - “**Energy Efficiency Considerations for HPC Procurements**,” W. Thigpen.

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News and Events

- **From Wind to Data, in No Time Flat: Accelerating Spacecraft and Aircraft Design**, *NASA Ames*, November 6, 2019—Collaborating with supercomputing and visualization experts at the NASA Advanced Supercomputing facility, aerospace engineers linked wind-tunnel test data with the Pleiades supercomputer for near-real-time processing and display of pressure-sensitive paint data, to help speed spacecraft and aircraft design. https://www.nasa.gov/feature/ames/from-wind-to-data-in-no-time-flat-accelerating-spacecraft-and-aircraft-design/
  - **NASA's SLS Rocket Visualization May Help Accelerate Spacecraft Design**, *Geek.com*, November 7, 2019. https://www.geek.com/news/nasas-sls-rocket-visualization-may-help-accelerate-spacecraft-design-1809759/
- **Scientists Run Coupled Atmosphere-Ocean Simulations at Groundbreaking Resolutions on NASA Supercomputers**, *NASA Center for Climate Simulation*, November 8, 2019—Using NASA Advanced Supercomputing (NAS) Facility and NASA Center for Climate Simulation (NCCS) HPC resources, NASA and university scientists are running simulations with a new coupled atmosphere-ocean model to study swirls of ocean water called eddies. https://www.nccs.nasa.gov/news-events/nccs-highlights/ocean-simulations
- **NASA to Showcase Science and Engineering Achievements at Annual Supercomputing Conference**, *NASA Goddard*, November 12, 2019—Researchers from across NASA and university and industry partners will highlight their latest findings, made possible by the agency's supercomputers, at SC19, Nov. 18 to 22 in Denver, Colorado. https://www.nasa.gov/press-release/goddard/2019/nasa-to-showcase-science-and-engineering-achievements-at-annual-supercomputing

News and Events (cont.)

- **A Cloudy Martian Night, Through the Eyes of a Supercomputer**, *NASA Ames*, November 18, 2019—As NASA's Curiosity rover makes its way over the surface of Mars, it's sometimes accompanied by clouds drifting by in the sky above. The NASA Advanced Supercomputing facility at Ames Research Center provides Mars researchers with the necessary computing power to produce high-resolution data visualizations to study how the planet's atmosphere works, in fine detail. https://www.nasa.gov/image-feature/ames/a-cloudy-martian-night-through-the-eyes-of-a-supercomputer
  - **What is the NASA's Mars Climate Modeling Center?** *NASA Ames*, November 18, 2019. https://www.nasa.gov/feature/ames/mcmc
  - **Watch Clouds on Mars Drift by in Supercomputer Simulations**, *Space.com*, November 22, 2019. https://www.space.com/mars-clouds-supercomputer-model.html
- **NASA's All-Electric X-57 X-Plane: A Cleaner Way to Fly**, *NASA Ames*, November 19, 2019— Just as electric cars are becoming more and more commonplace on our roads each day, aerospace engineers are seeking to make electric air transportation a reality. NASA engineers are using supercomputers to accurately predict flight conditions for the agency's X-57 Maxwell electric experimental aircraft's flight simulator. https://www.nasa.gov/image-feature/ames/nasa-s-all-electric-x-57-x-plane-a-cleaner-way-to-fly/

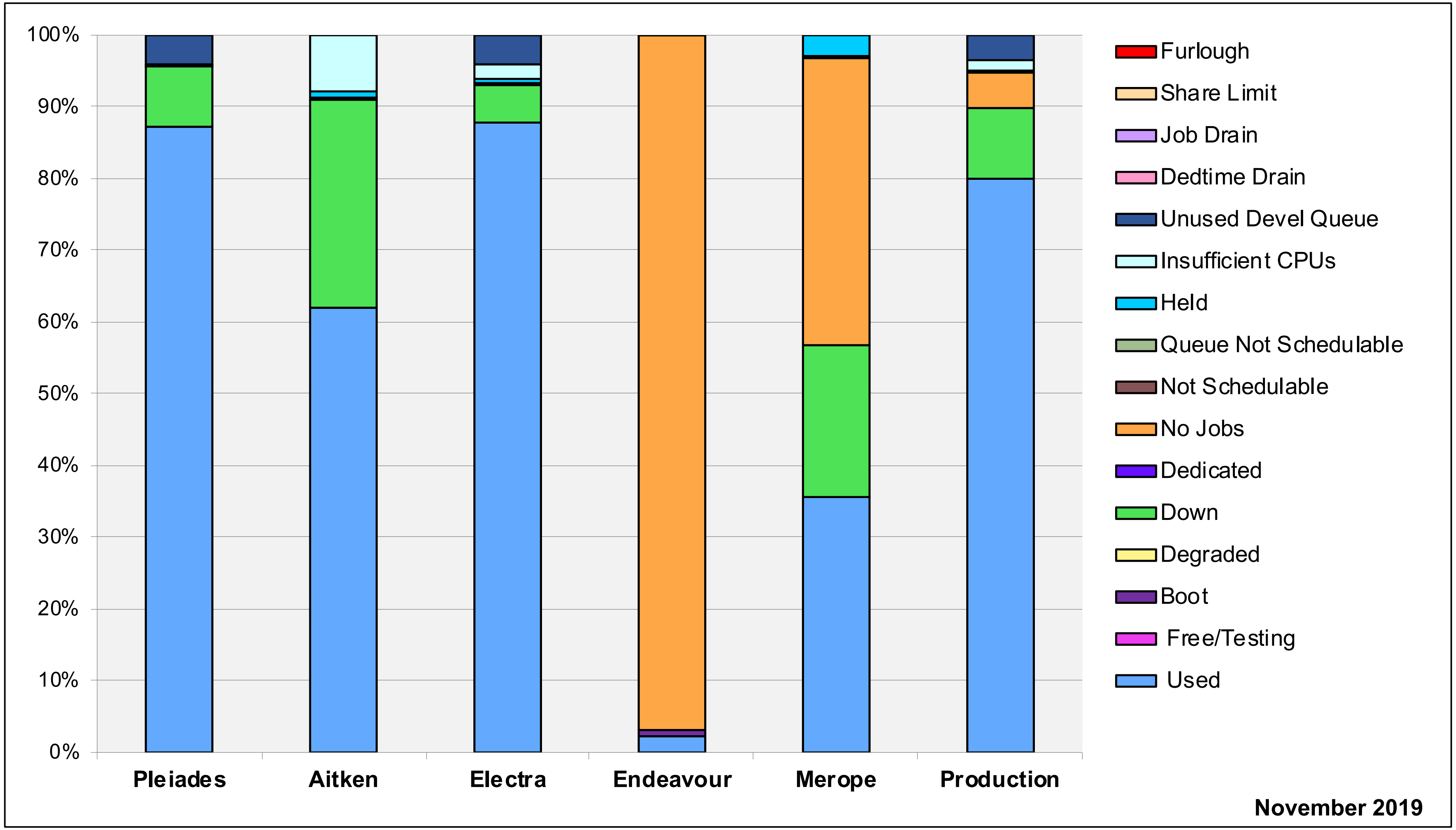
News and Events (cont.)

- **Illuminating the Gas Between Galaxies with Supercomputing**, *NASA Ames*, November 20, 2019—Galaxies contain millions of stars, and they grow by pulling in gas to make even more. How gases ebb and flow between galaxies and their surroundings is an essential question that NASA's Pleiades supercomputer is helping to answer for researchers at the Space Telescope Science Institute and Johns Hopkins University. https://www.nasa.gov/image-feature/ames/illuminating-gas-between-galaxies
  - **Watch This Ultra-Hypnotic Supercomputer Simulation of Galaxies Feasting**, *Motherboard*, November 21, 2019. https://www.vice.com/en_us/article/9kepy8/watch-this-ultra-hypnotic-supercomputer-simulation-of-galaxies-feasting
  - **Supercomputer Simulation Reveals How Galaxies Eat Gas and Evolve**, *Sky News*, November 22, 2019. https://news.sky.com/story/supercomputer-simulation-reveals-how-galaxies-eat-gas-and-evolve-11866990
- **Predicting Extreme Acoustic Vibrations to Keep Astronauts Safe During Launch,** *NASA Ames*, November 22, 2019--The Orion spacecraft will carry the first woman and next man to the Moon by 2024 and return them safely back to Earth. Researchers in the NAS Division ran first-of-a-kind simulations on Orion's launch abort system (LAS) on the Electra supercomputer to help reduce risk and ensure the safety of astronauts if a life-threatening event arises during launch. https://www.nasa.gov/image-feature/ames/predicting-extreme-acoustic-vibrations-to-keep-astronauts-safe-during-launch

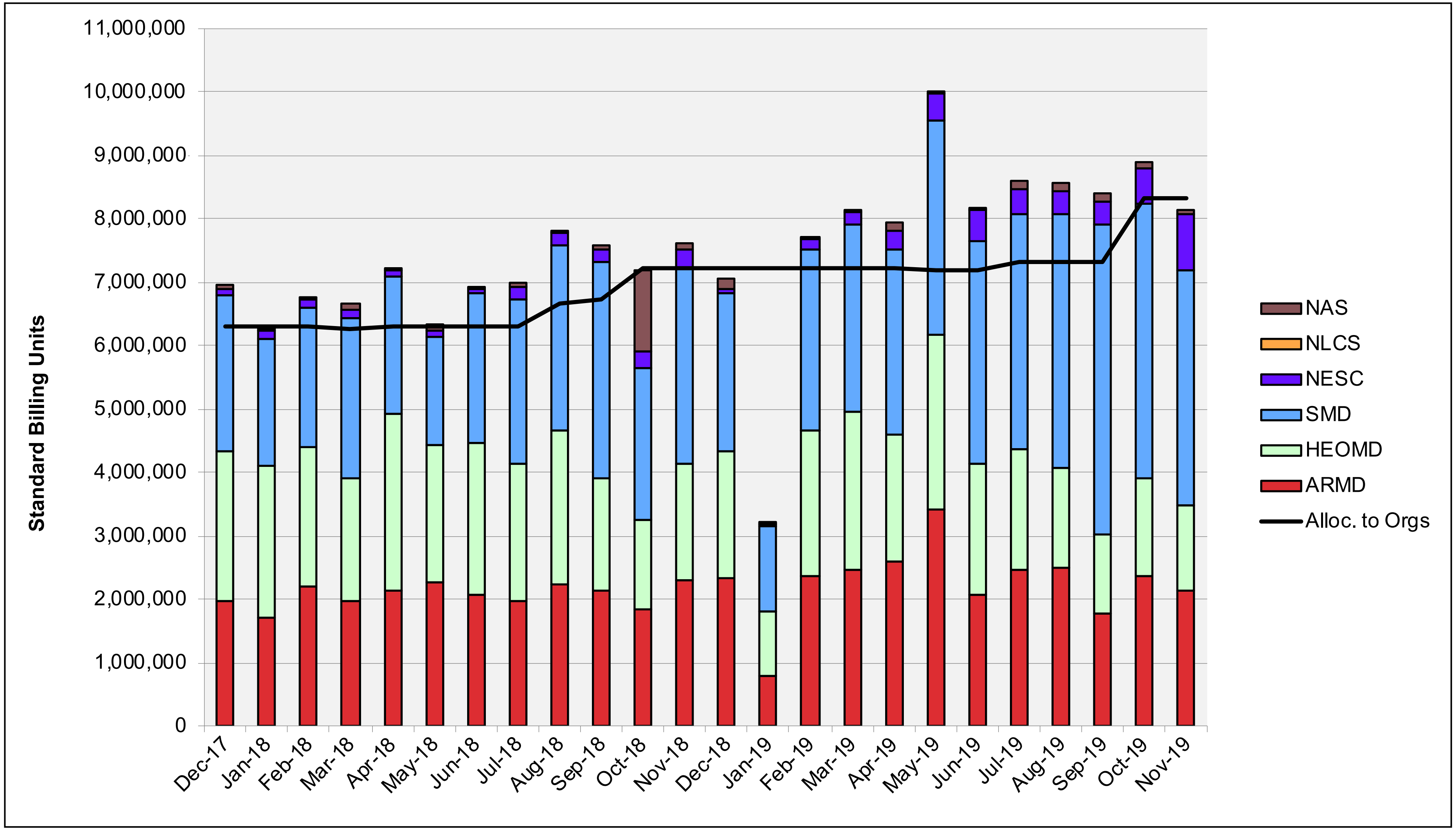
News and Events: Social Media

- **Coverage of NAS Stories**
  - Pressure Paint Ames Wind Tunnel Pipeline
    - NASA: Facebook, Twitter; NASA Ames: Facebook, Twitter; NASA Marshall: Twitter; NASA Supercomputing: Facebook, Twitter; Admin. Jim Bridenstine: Twitter
  - Mars Weather Simulations (SC19 tie-in)
    - NASA: Facebook, Twitter; NASA Ames: Facebook, Twitter; NASA Supercomputing: Facebook, Twitter
  - X-57 Concept Simulations (SC19 tie-in)
    - NASA Ames: Facebook, Twitter; NASA Supercomputing: Facebook
  - Galaxy Gas Formation Simulations (SC19 tie-in)
    - NASA Ames: Facebook, Twitter; NASA Supercomputing: Facebook, Twitter
  - Orion Launch Abort Simulations (SC19 tie-in)
    - NASA Ames: Facebook, Twitter; NASA Supercomputing: Twitter
- **Coverage of SC19**
  - In-booth NASA Supercomputing Coverage:
    - Facebook: Nov. 11 – Pre-conference, with link to the NASA@SC19 website - 324 users reached, 19 engagements
    - Facebook: Nov. 22 – Post-conference, with photo from NASA booth – 1,193 users reached, 349 engagements
    - Twitter Collection (30 Tweets from @NASA_Supercomp)

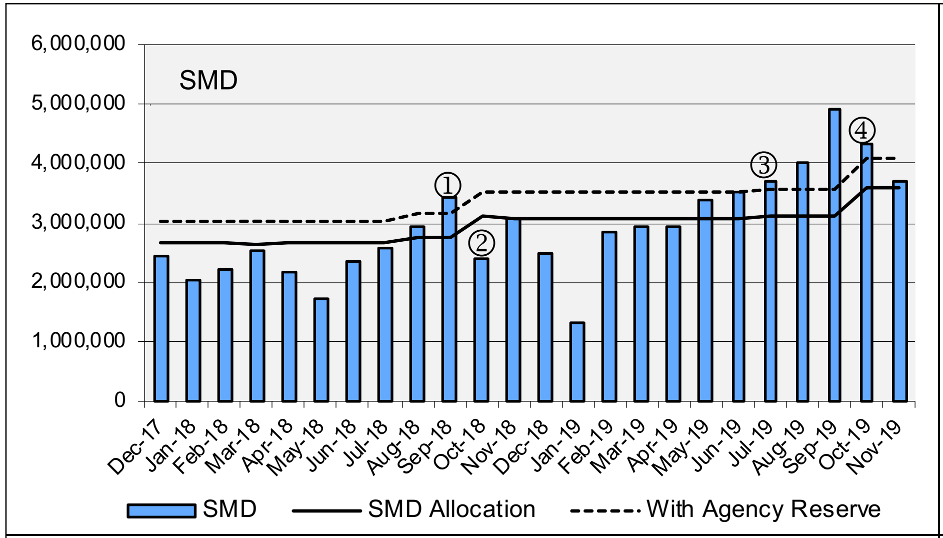
HECC Utilization

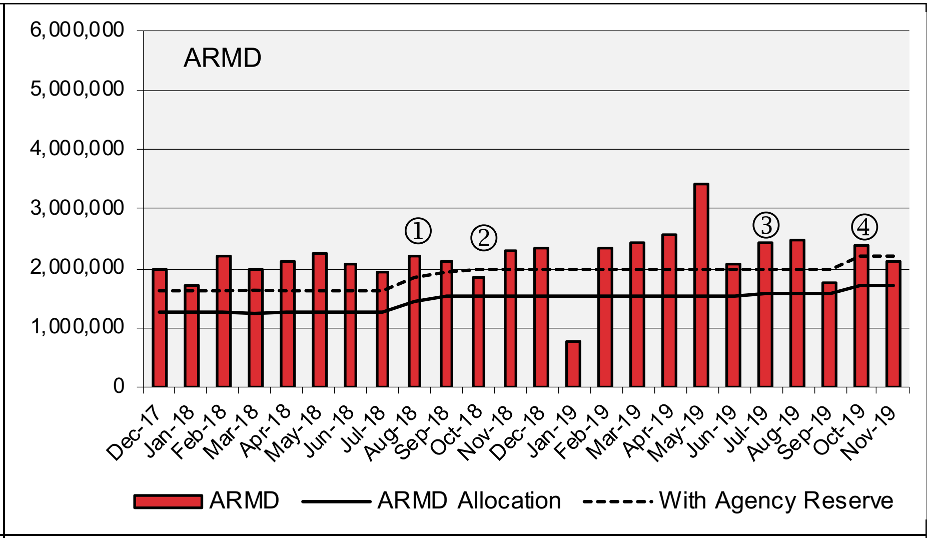


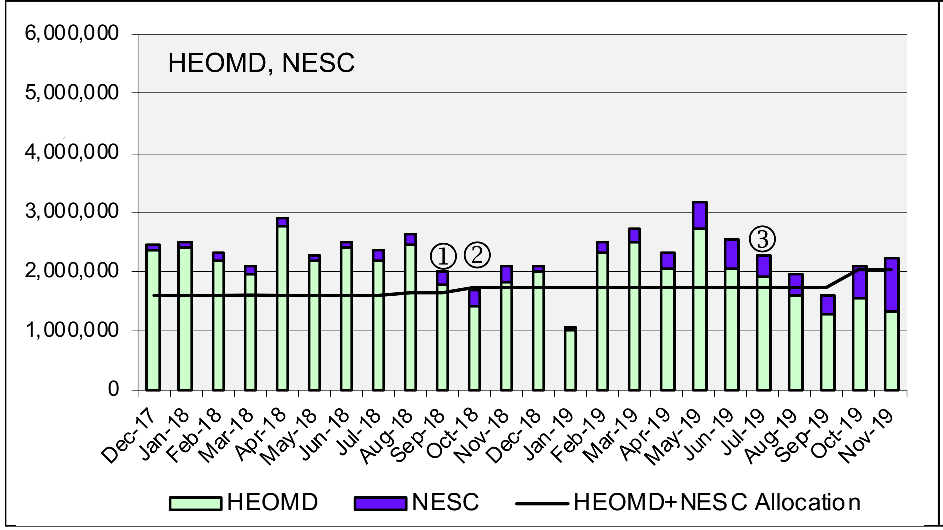
HECC Utilization Normalized to 30-Day Month



HECC Utilization Normalized to 30-Day Month







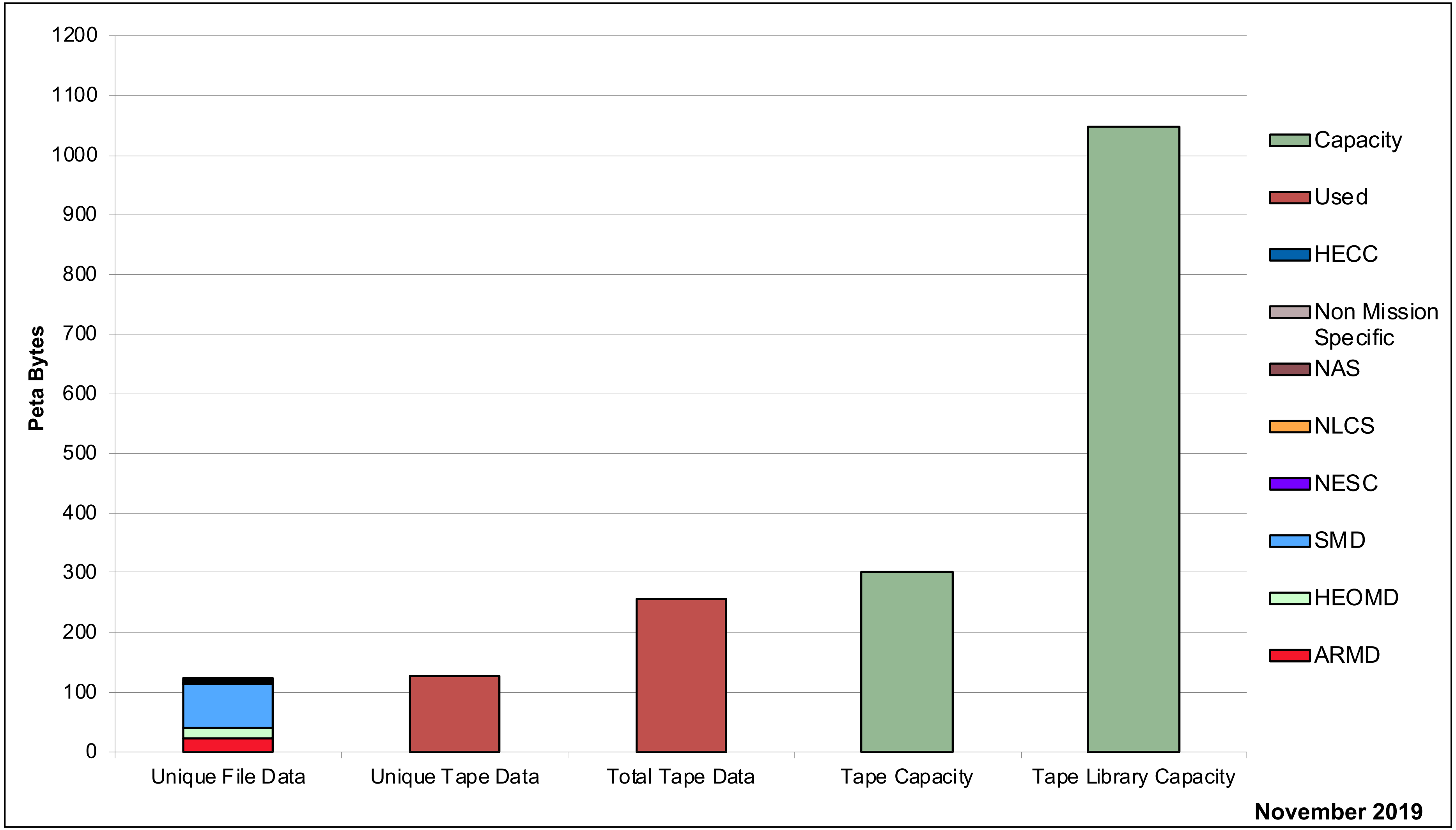
① 4 Skylake E cells (16 D Rack Equivalence) added to Electra

② 2 Skylake E cells (8 D Rack Equivalence) added to Electra; 1 rack is dedicated to ARMD

③ 2 Skylake E cells (8 D Rack Equivalence) added to Electra; 1 rack is dedicated to SMD

④ Skylake Tesla GPU V100 Nodes installed

Tape Archive Status



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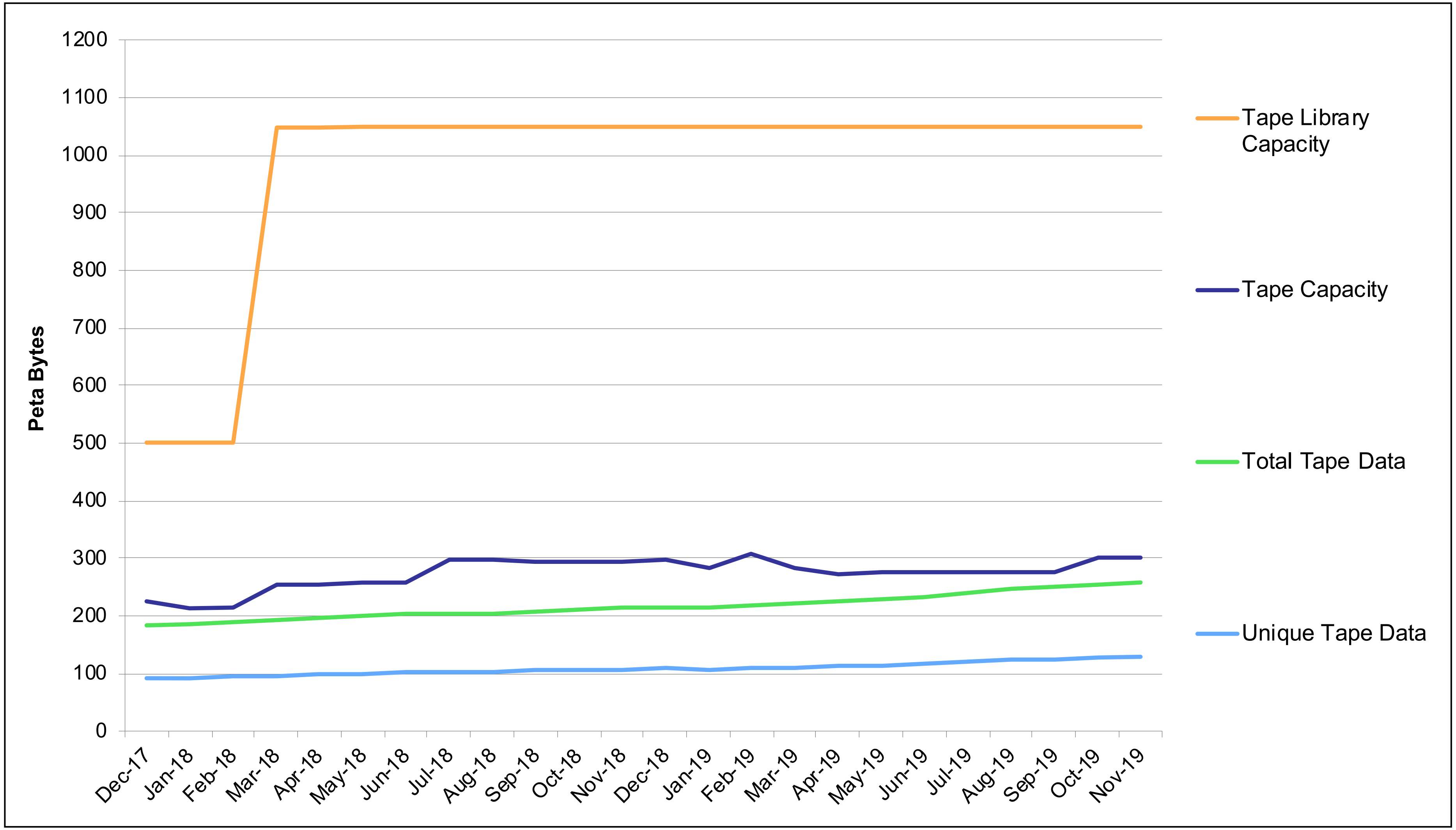
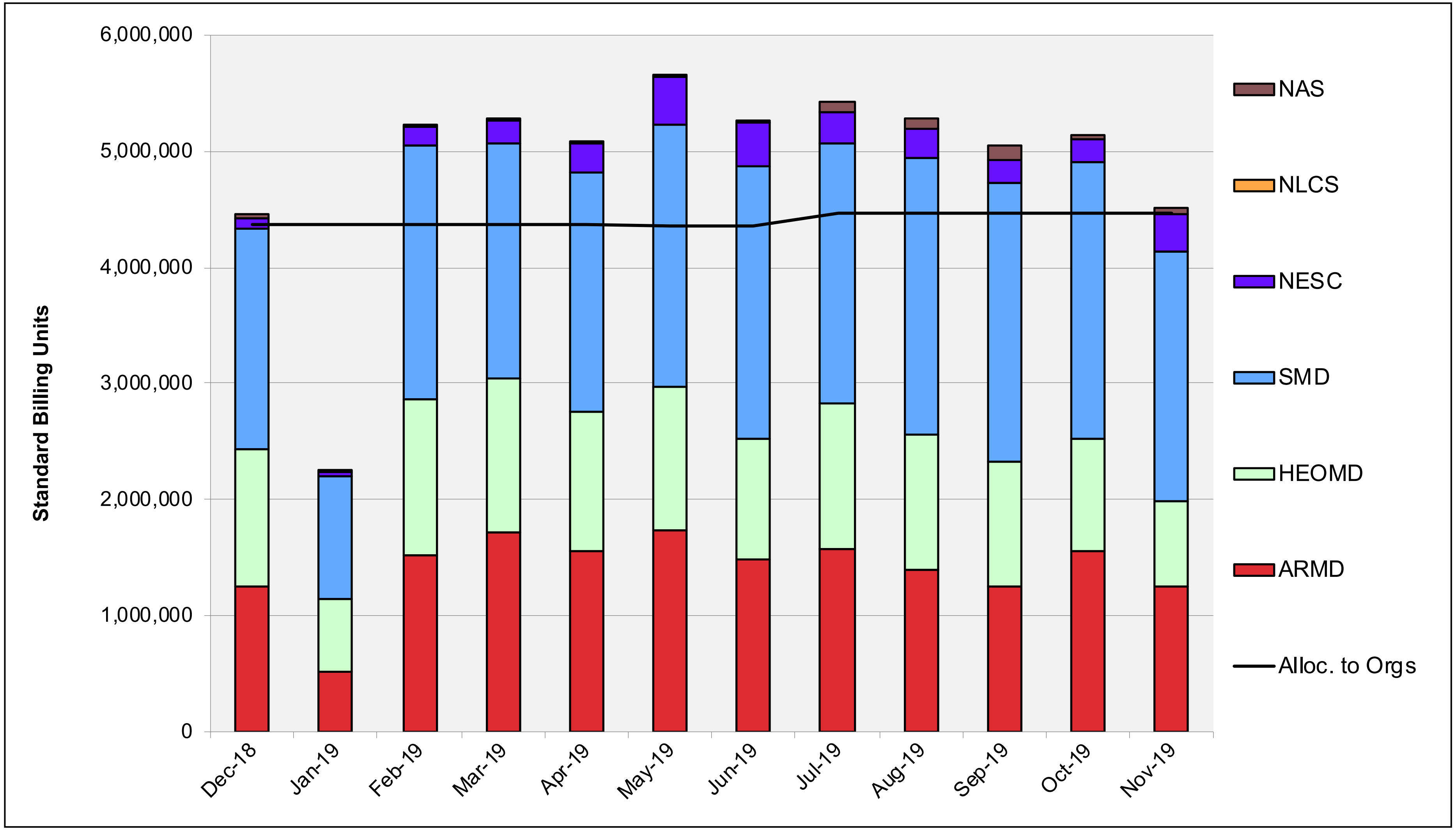
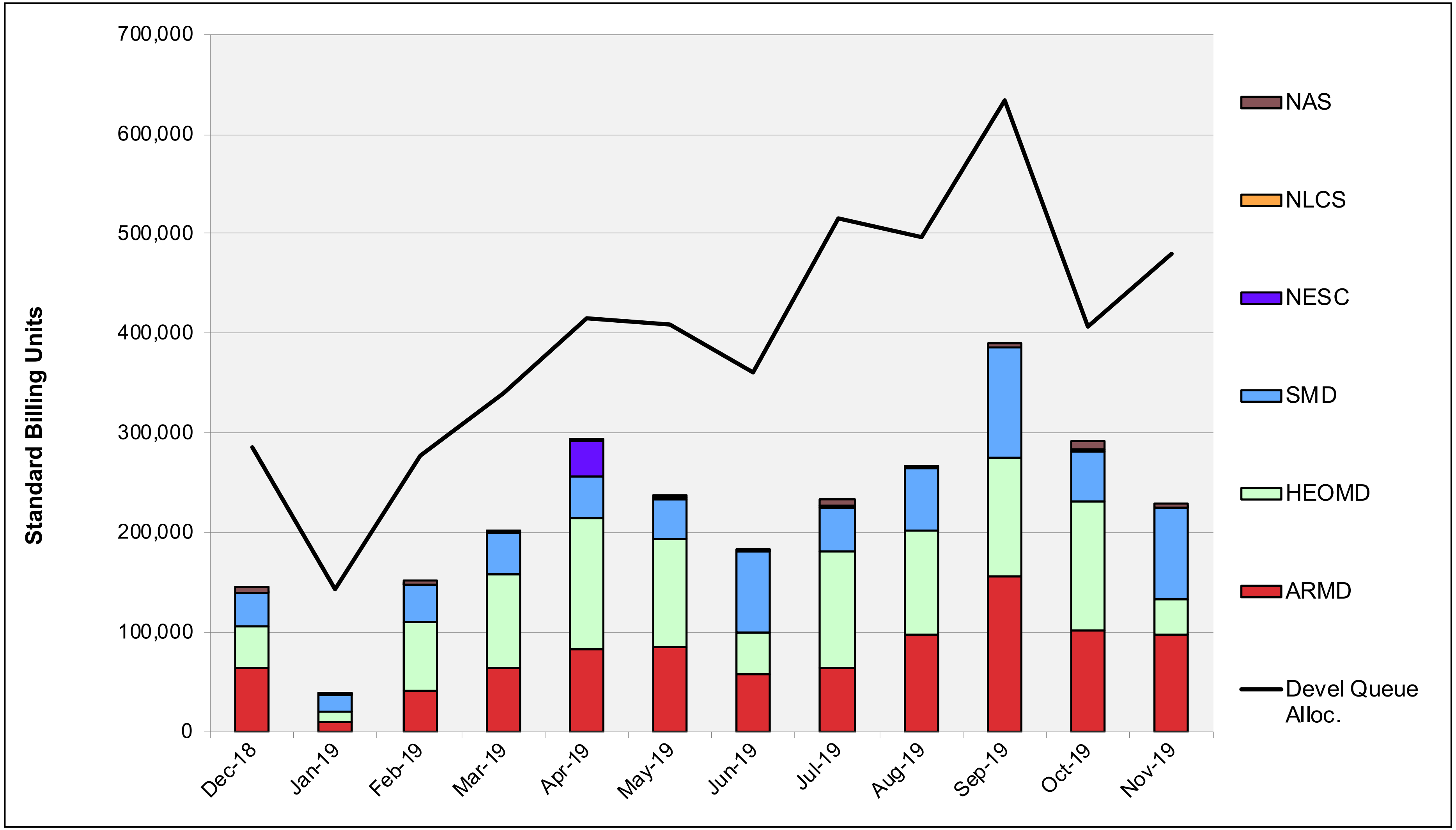


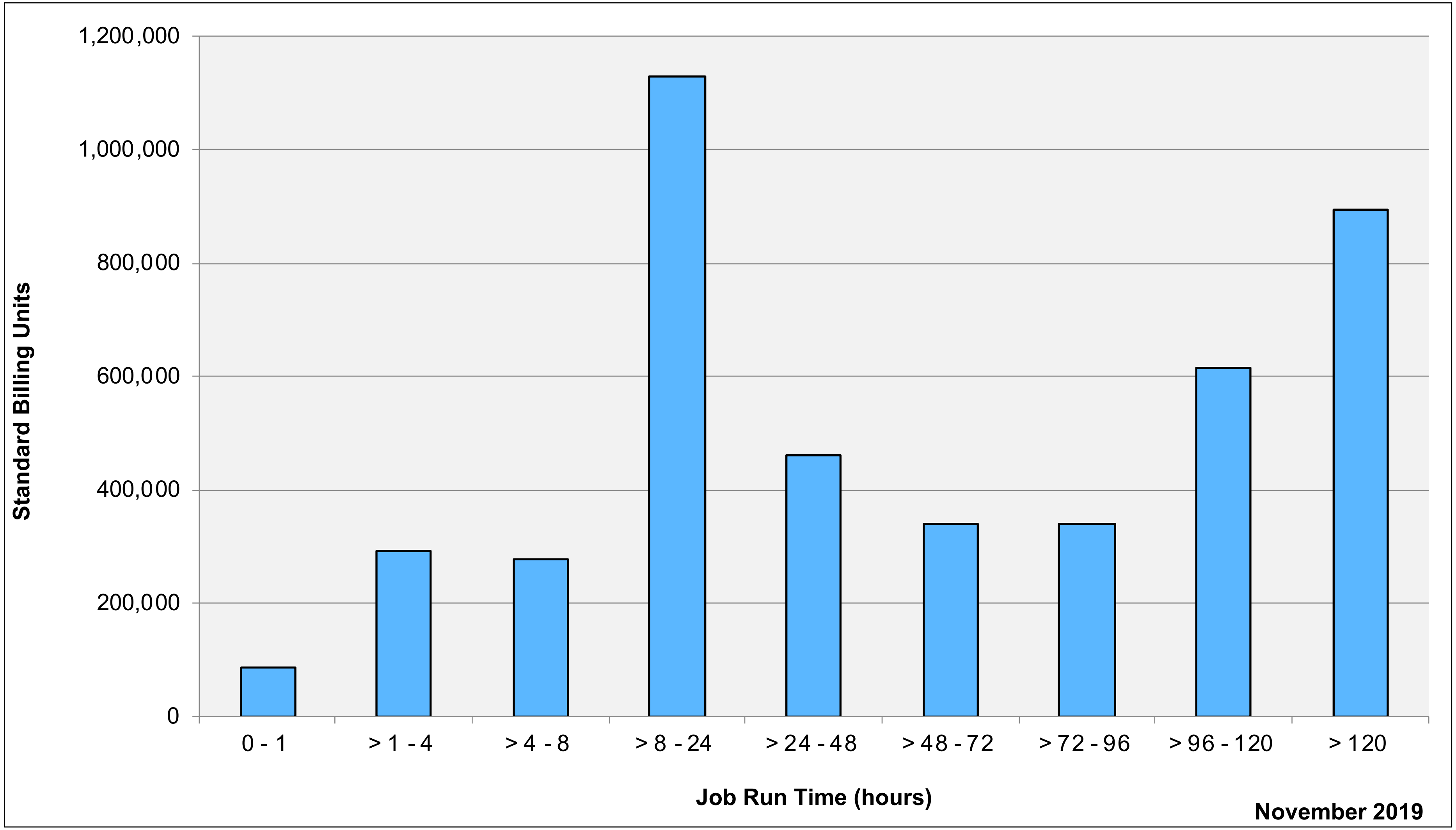
Pleiades: SBUs Reported, Normalized to 30-Day Month



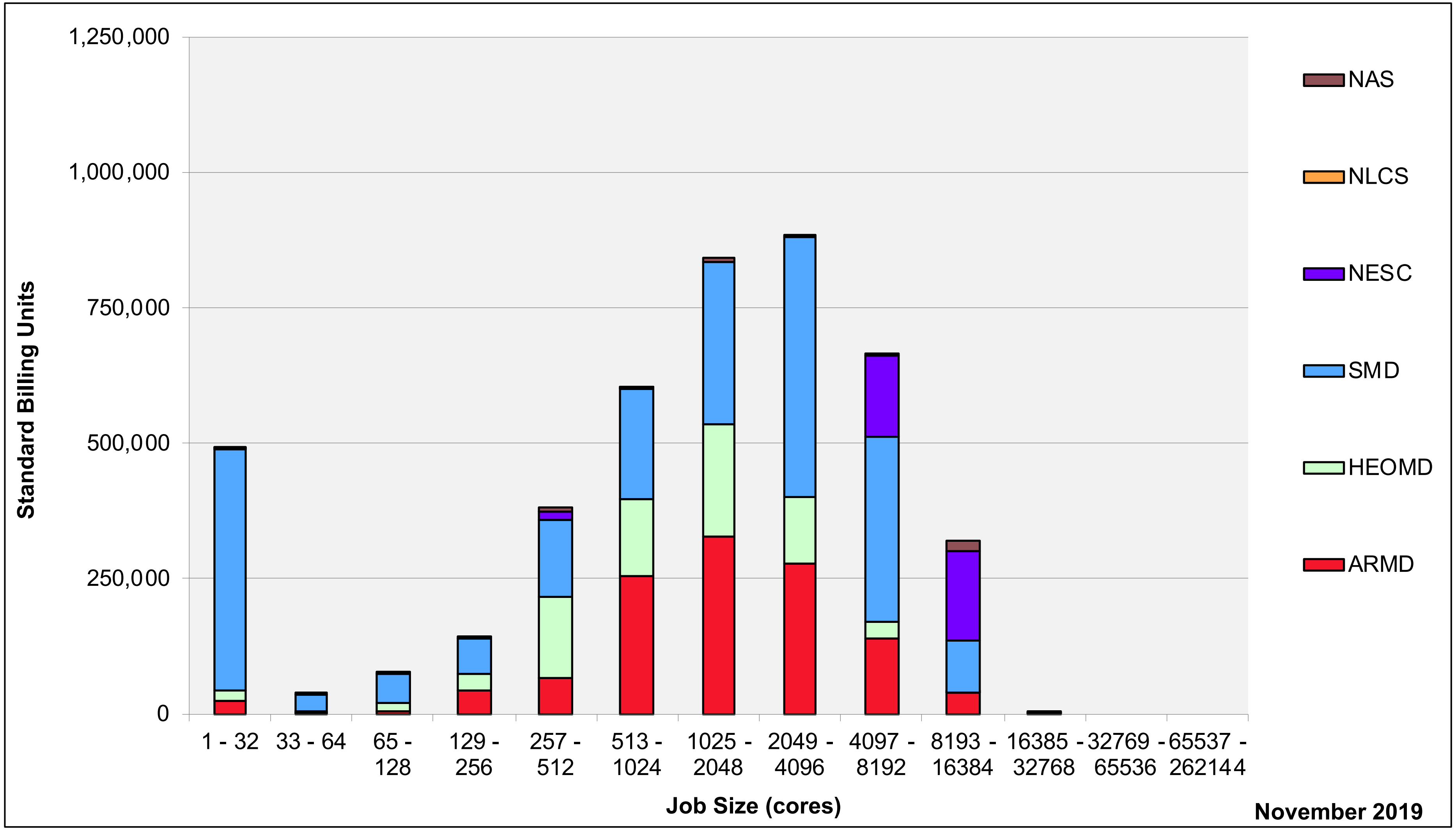
Pleiades: Devel Queue Utilization



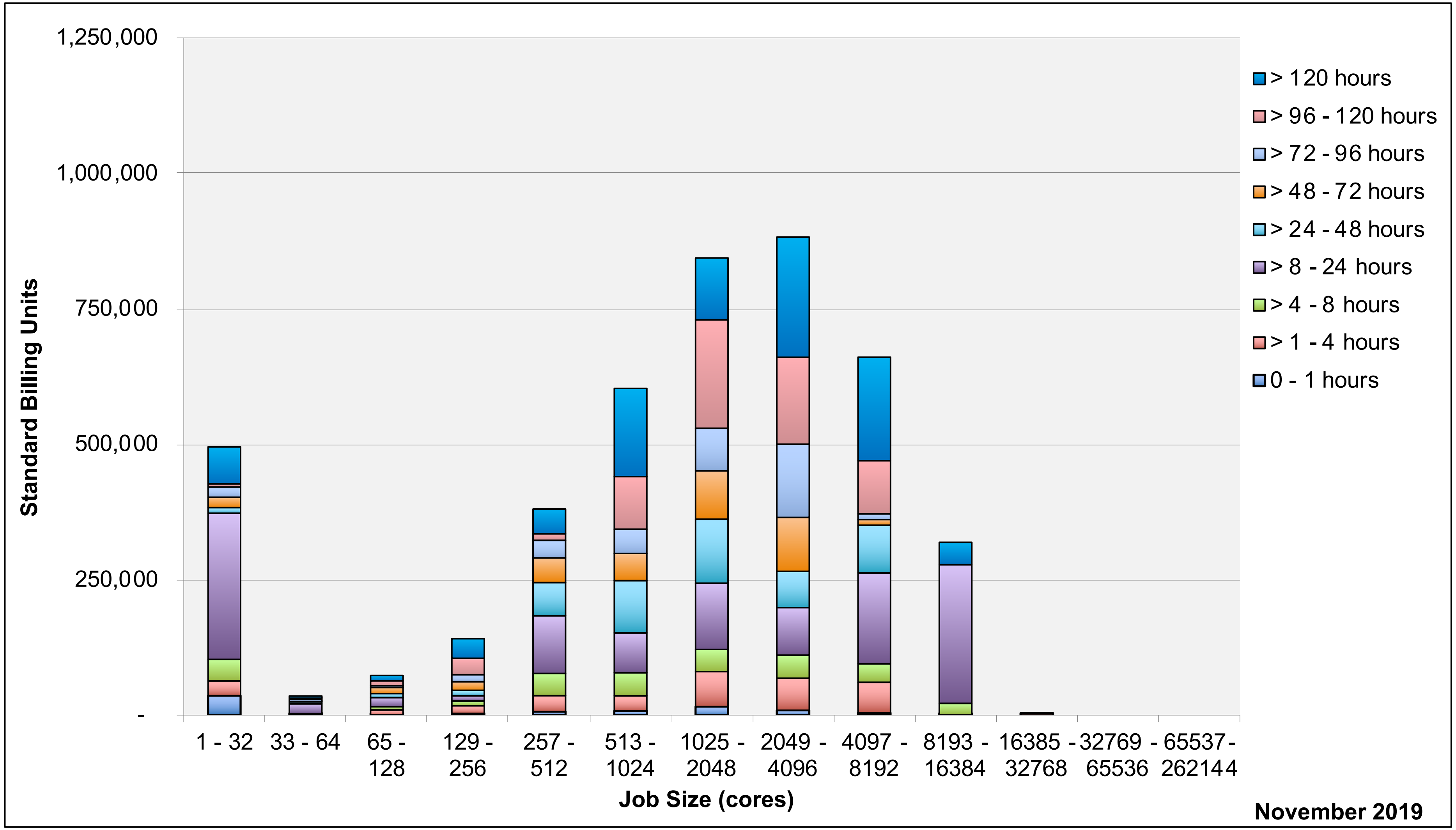
Pleiades: Monthly Utilization by Job Length



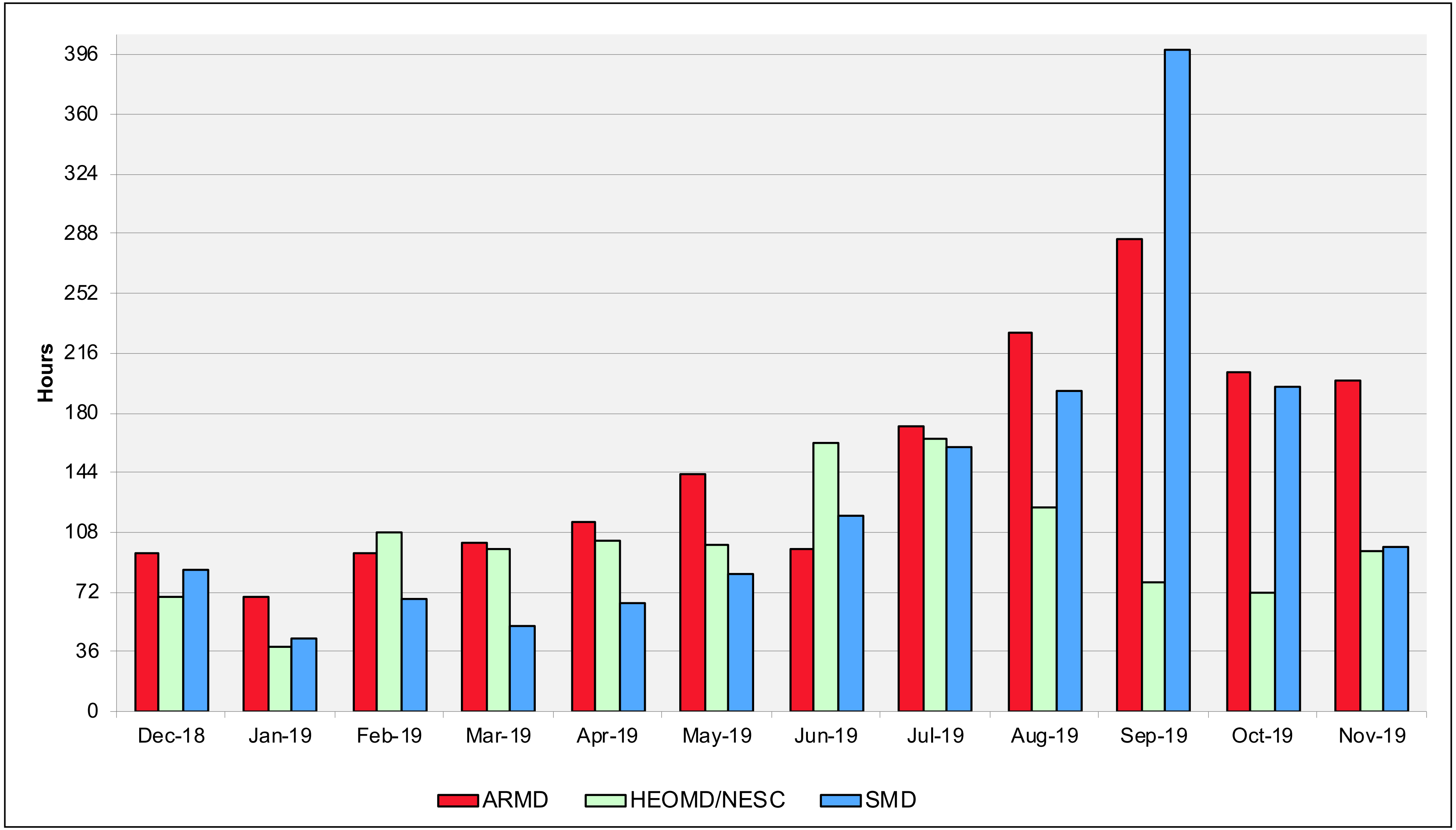
Pleiades: Monthly Utilization by Job Length



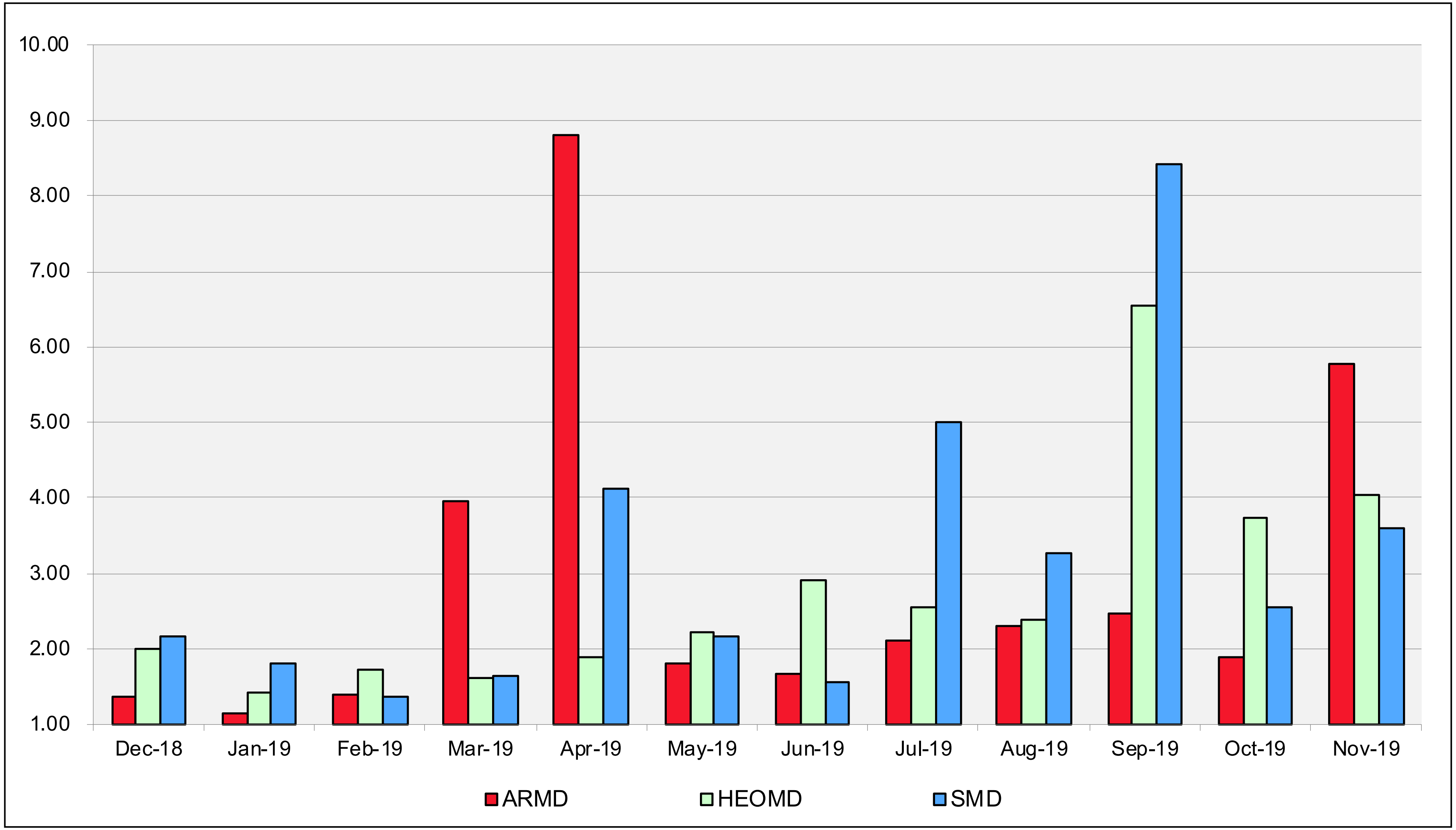
Pleiades: Monthly Utilization by Size and Length



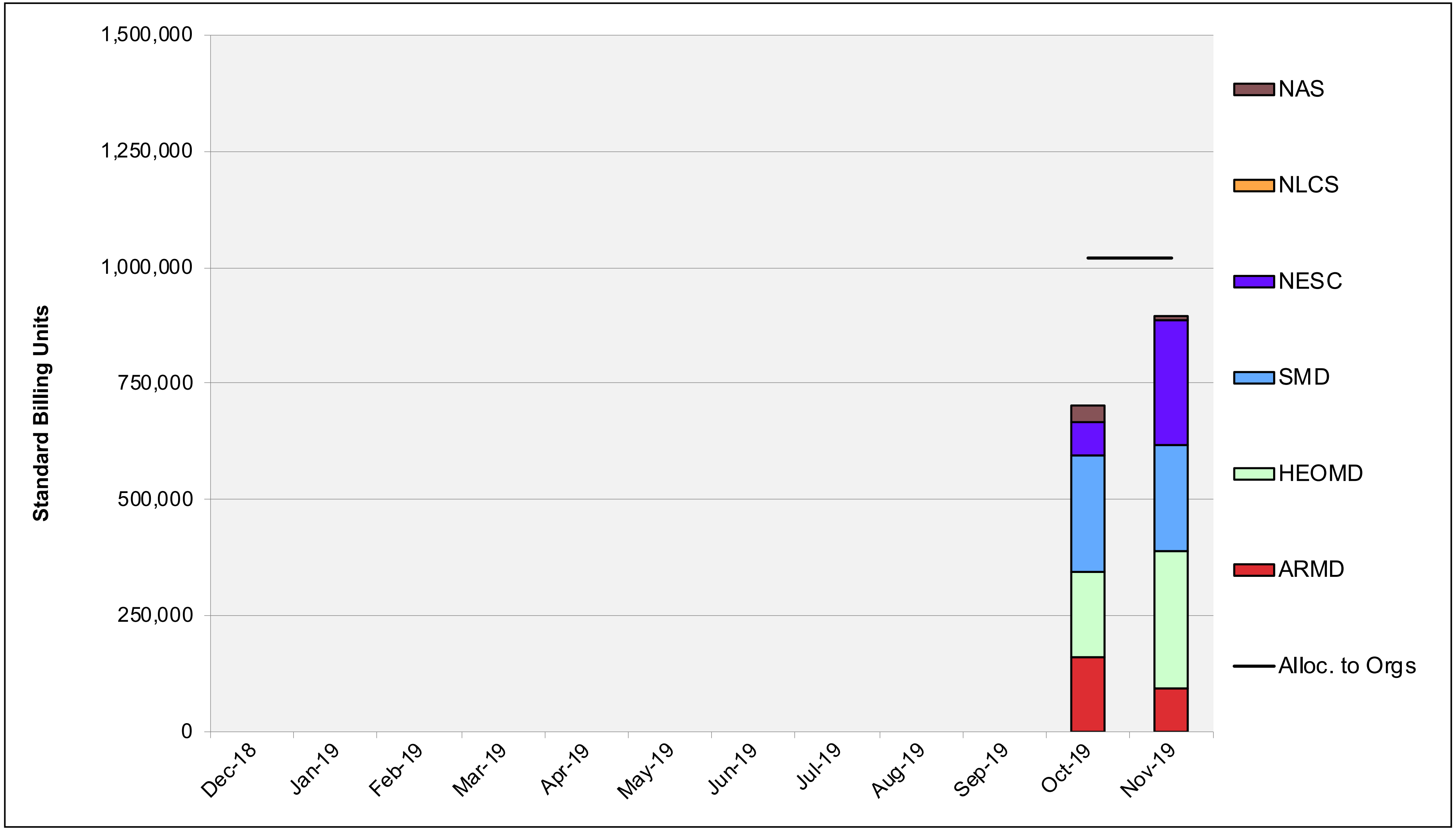
Pleiades: Average Time to Clear All Jobs



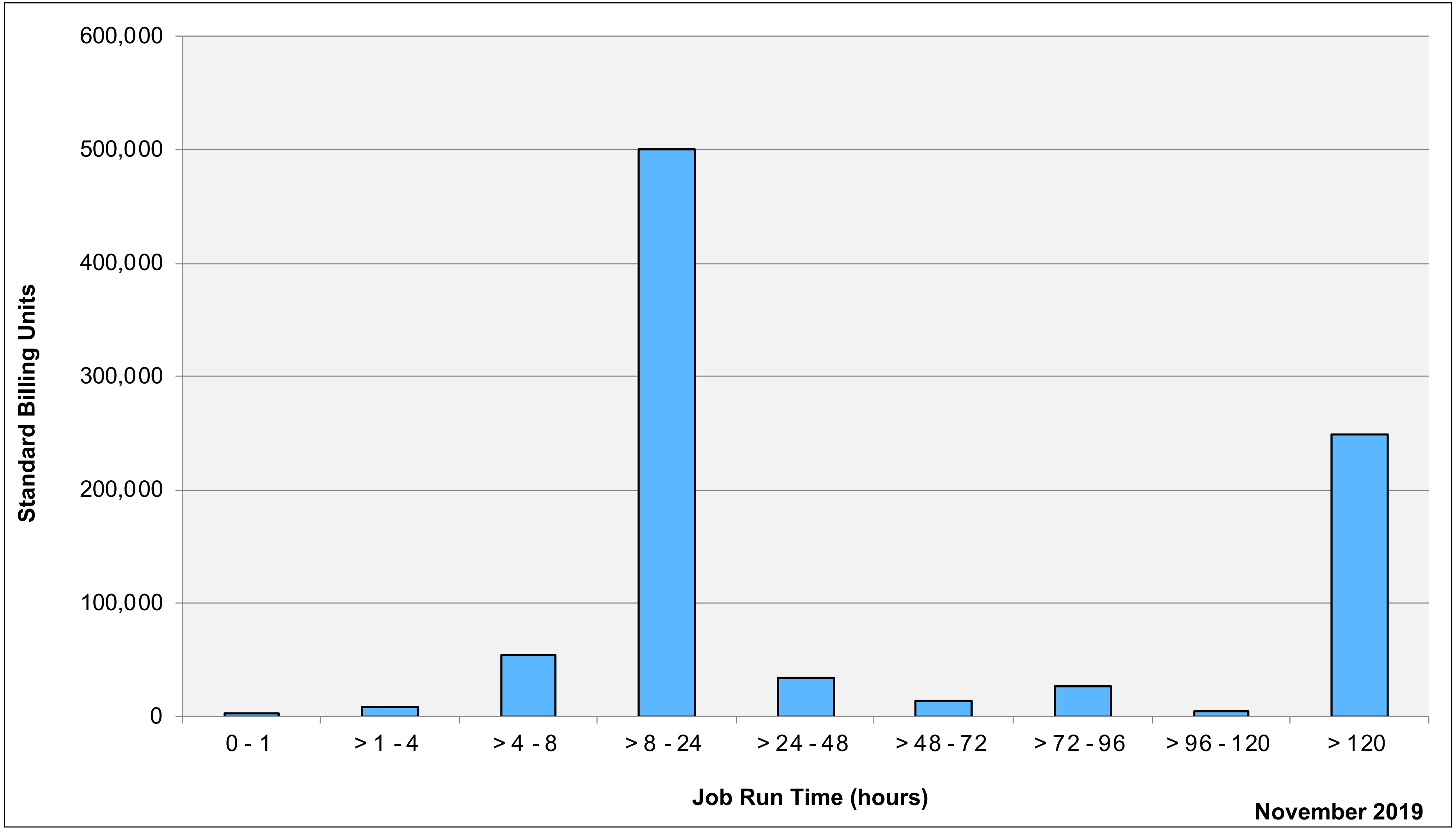
Pleiades: Average Expansion Factor



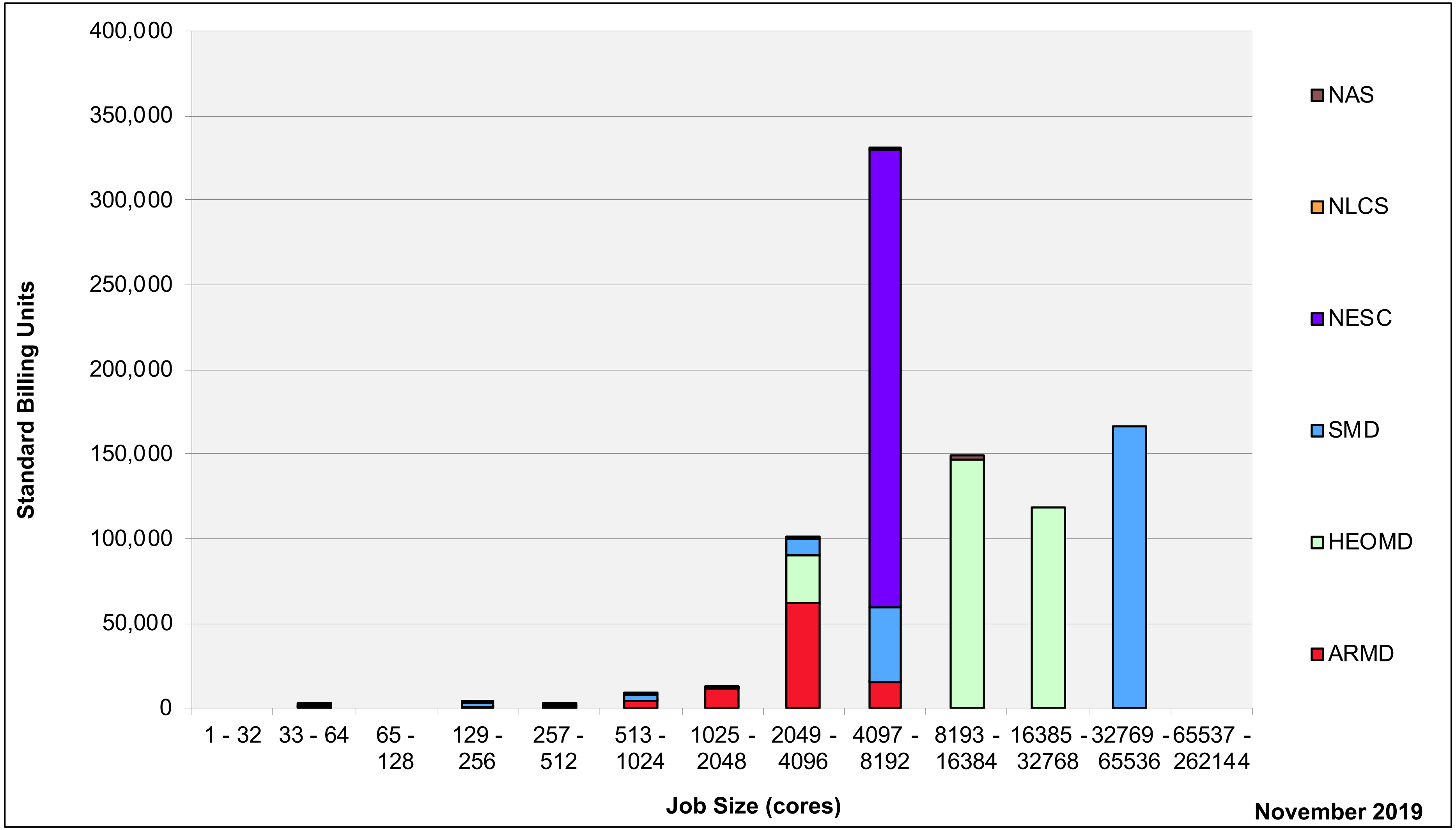
Aitken: SBUs Reported, Normalized to 30-Day Month



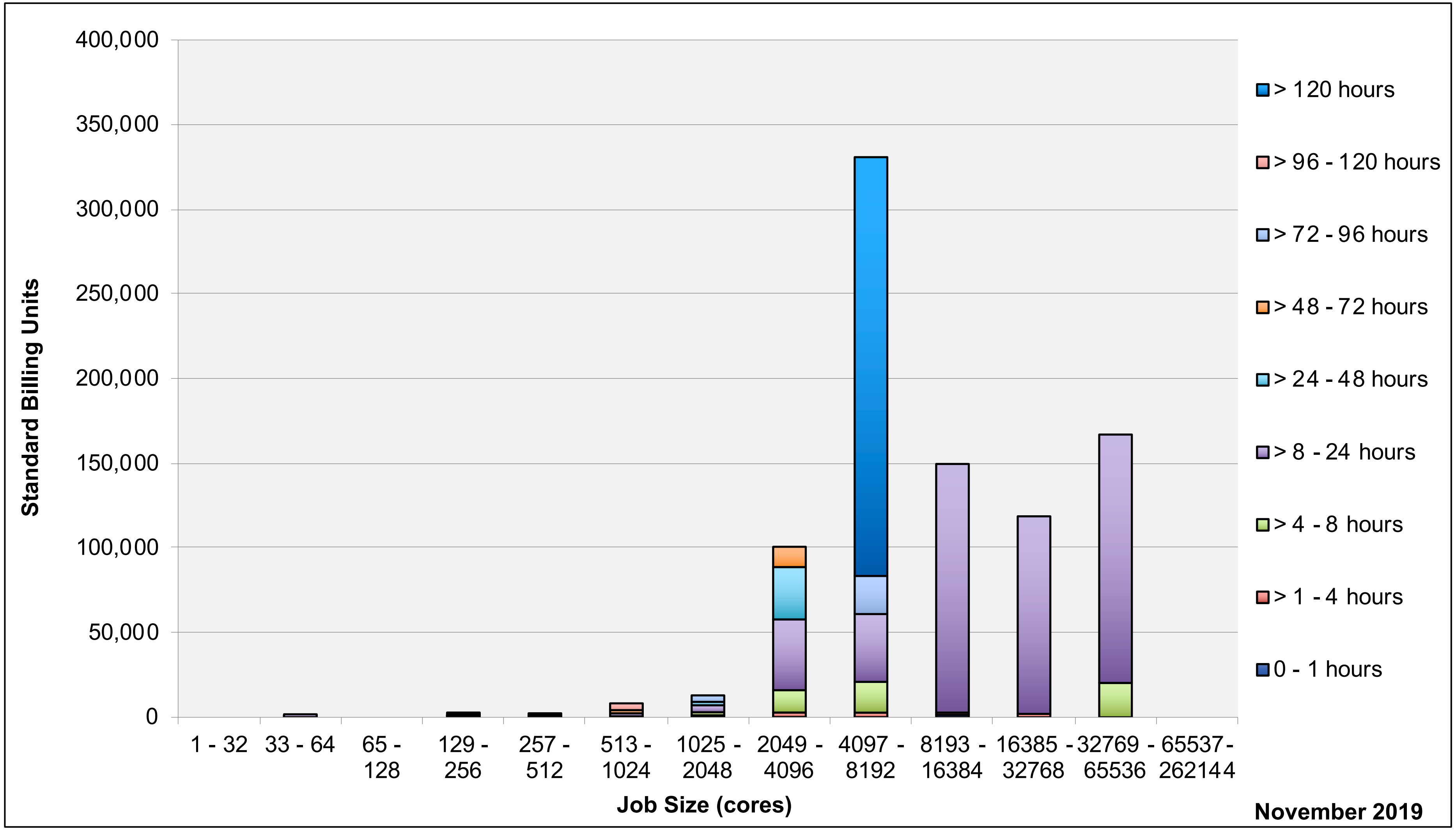
Aitken: Monthly Utilization by Job Length



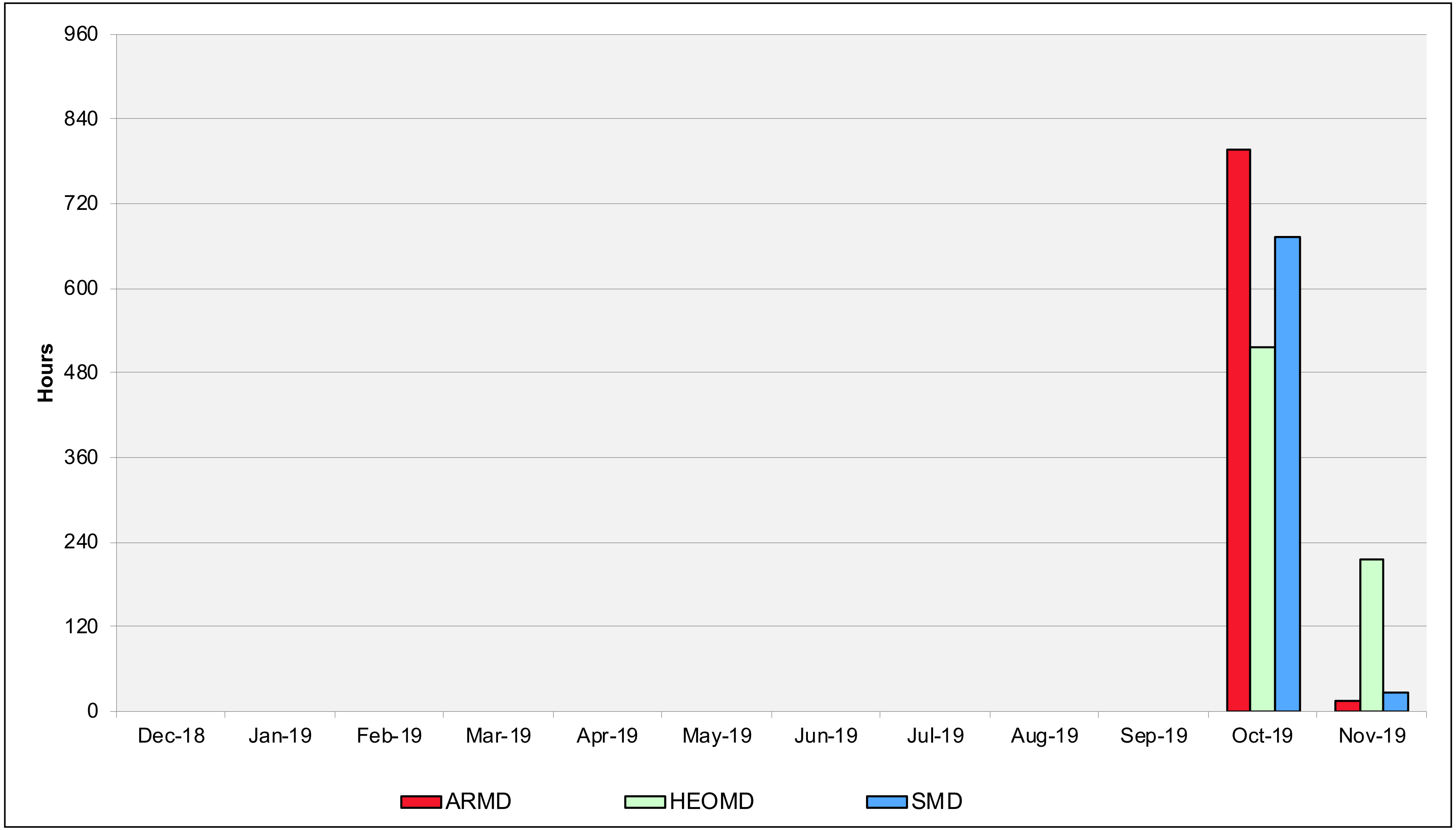
Aitken: Monthly Utilization by Job Length



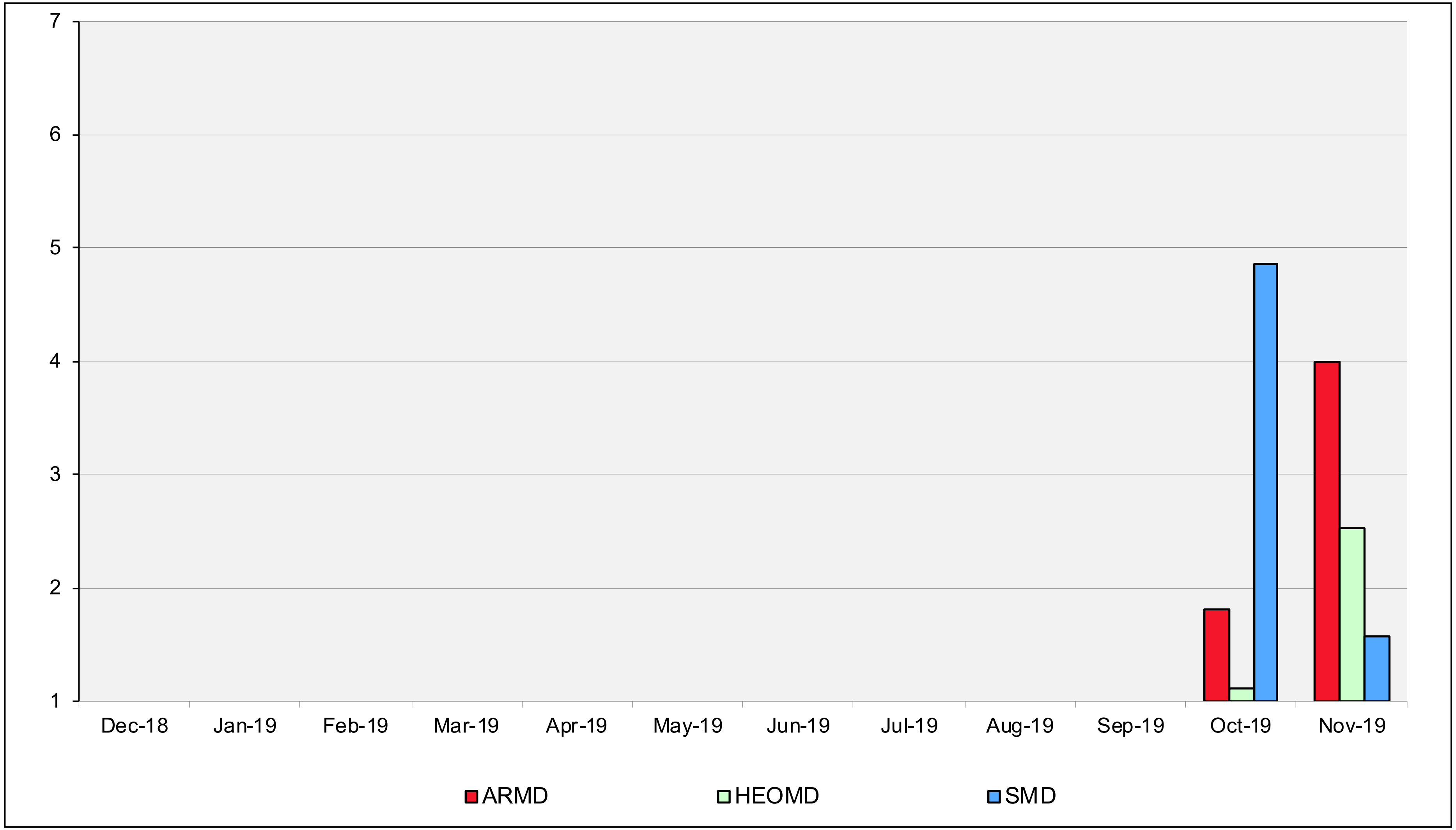
Aitken: Monthly Utilization by Size and Length



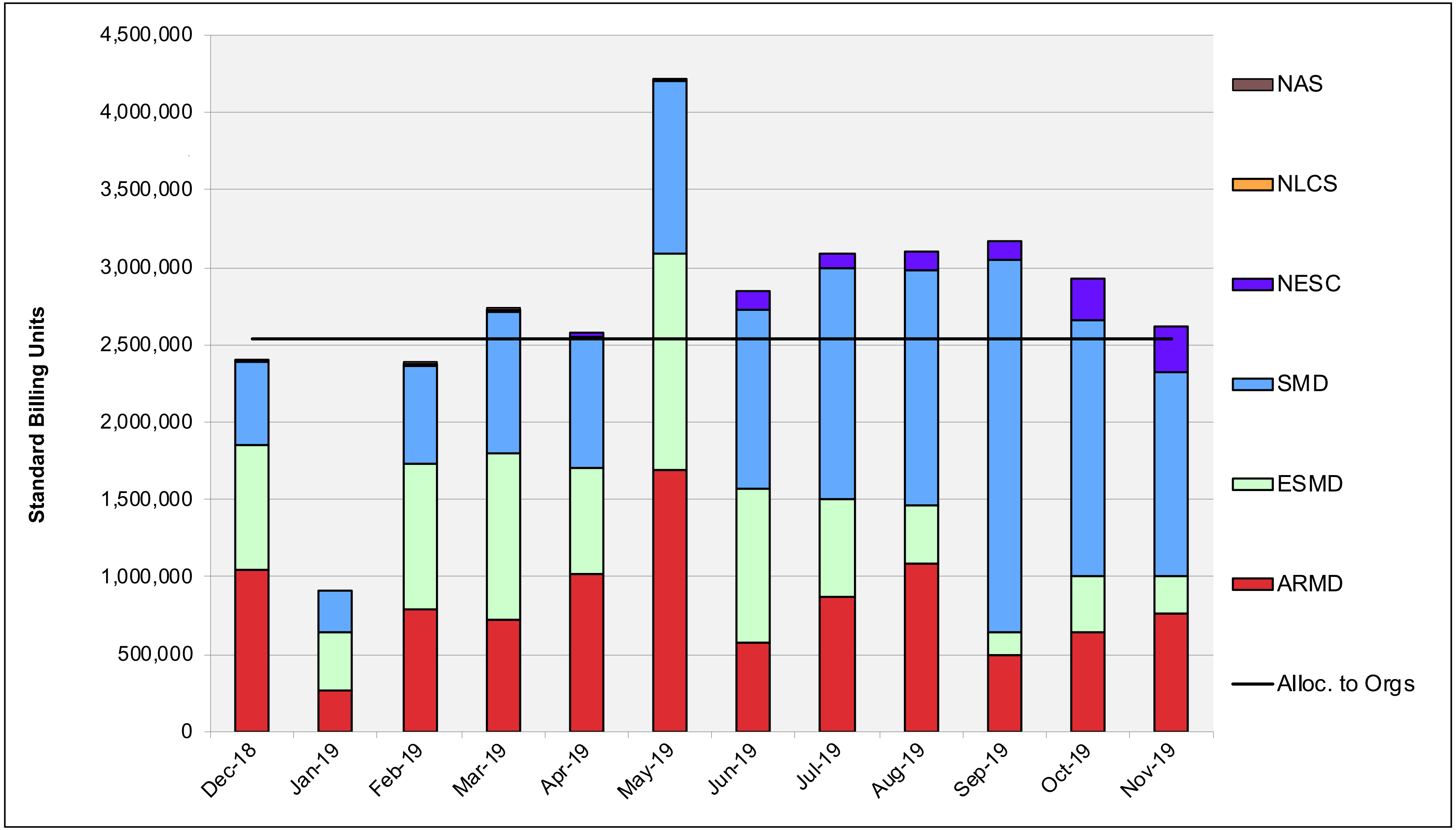
Aitken: Average Time to Clear All Jobs



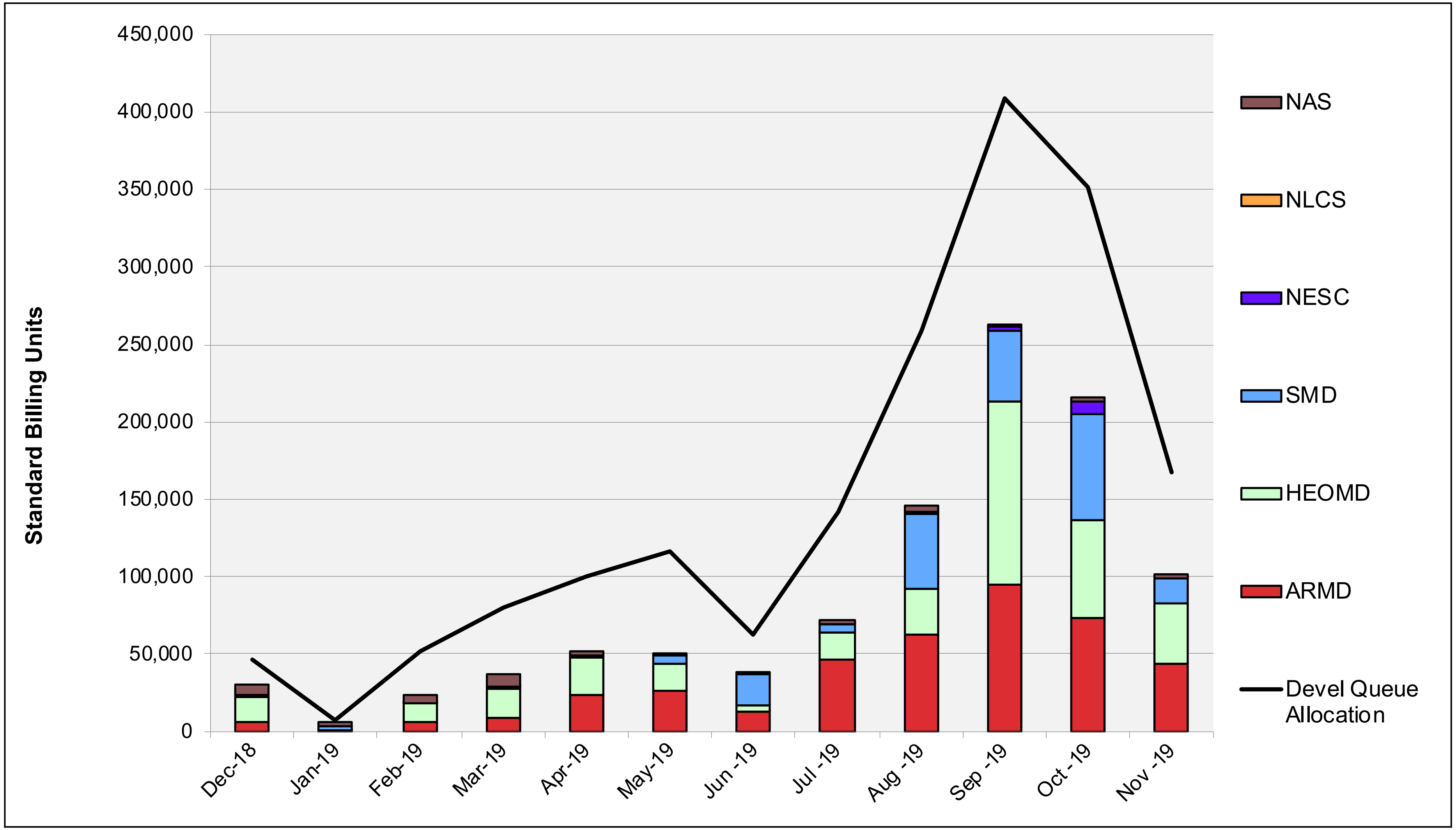
Aitken: Average Expansion Factor



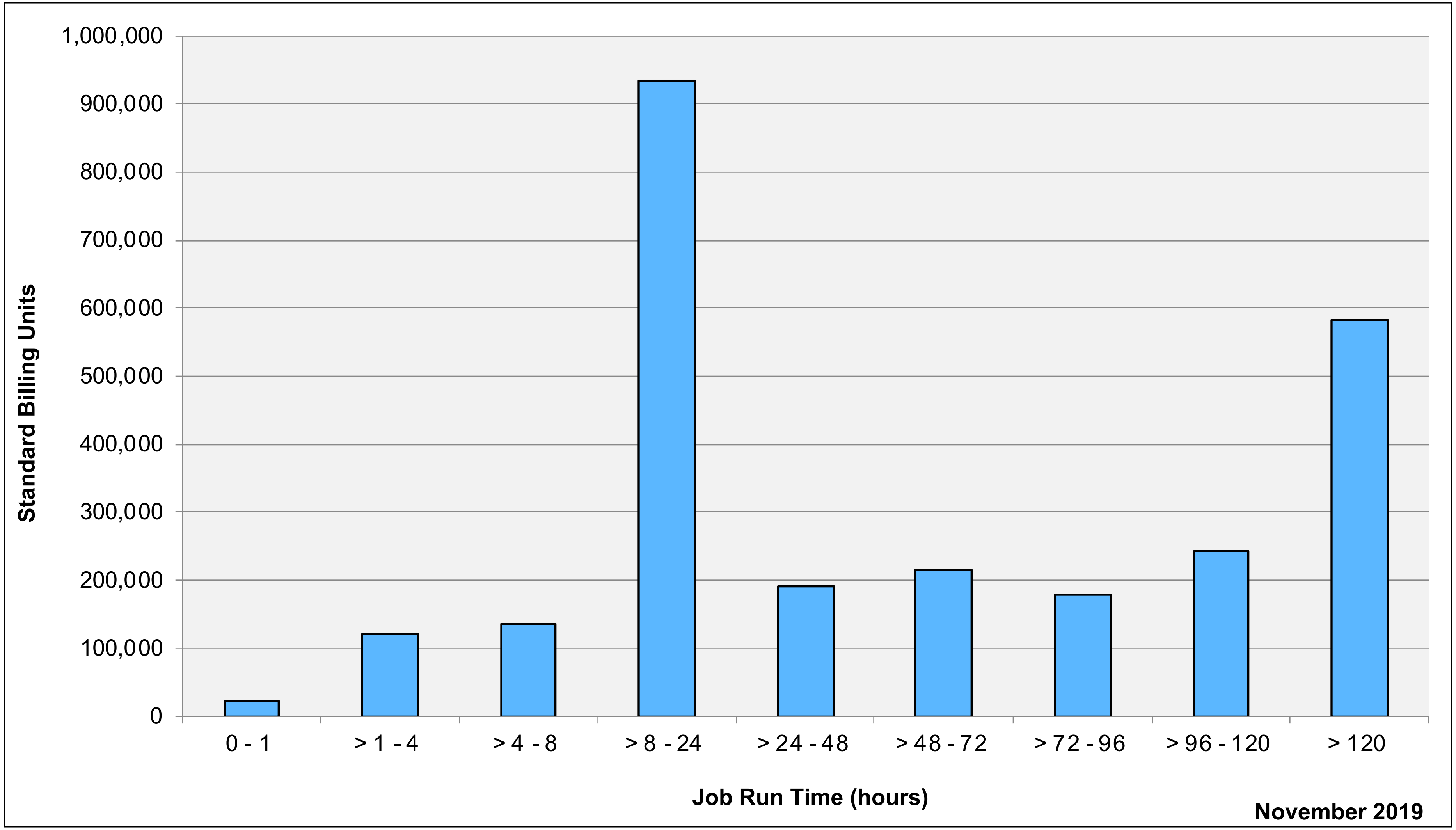
Electra: SBUs Reported, Normalized to 30-Day Month



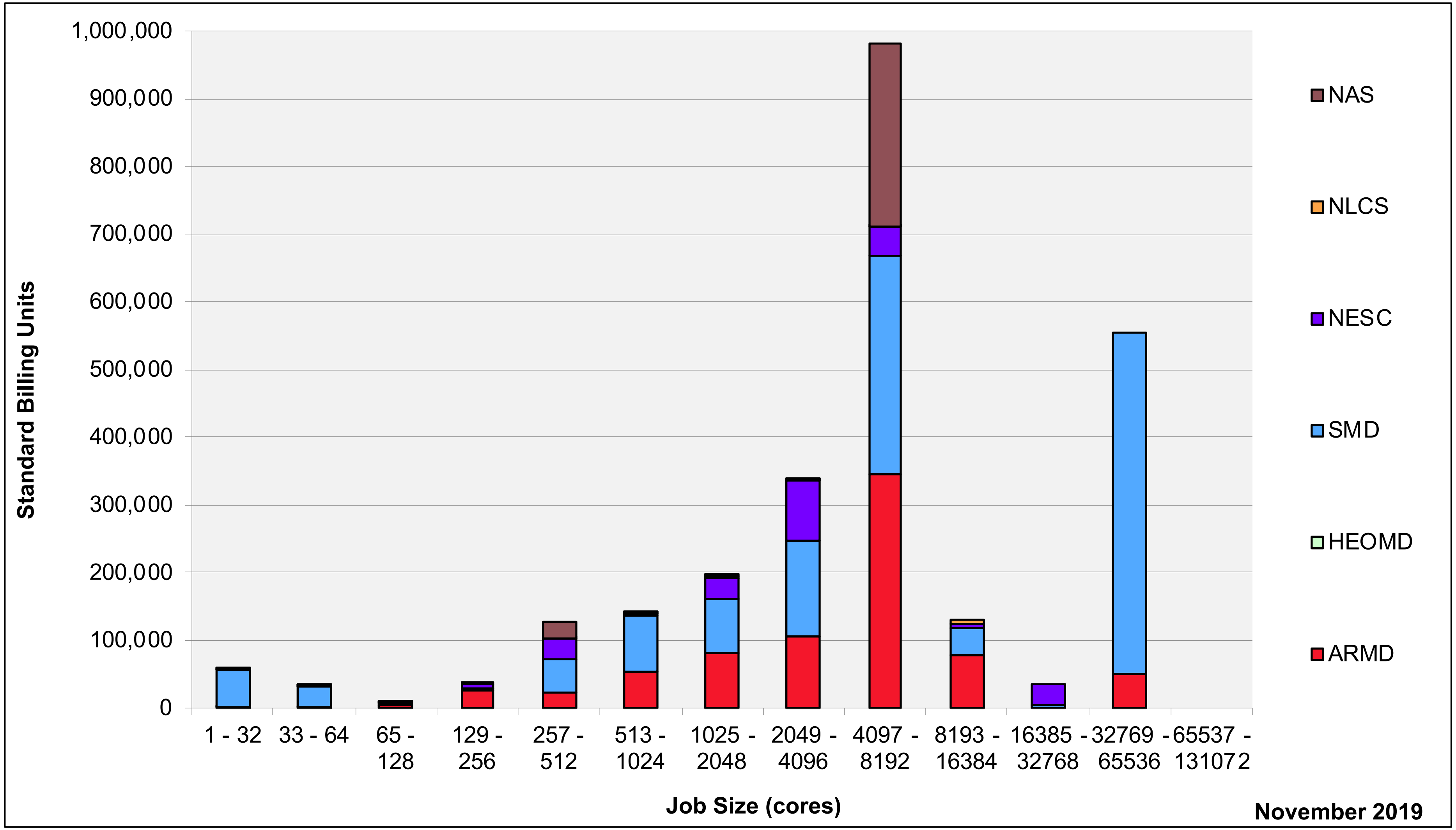
Electra: Devel Queue Utilization



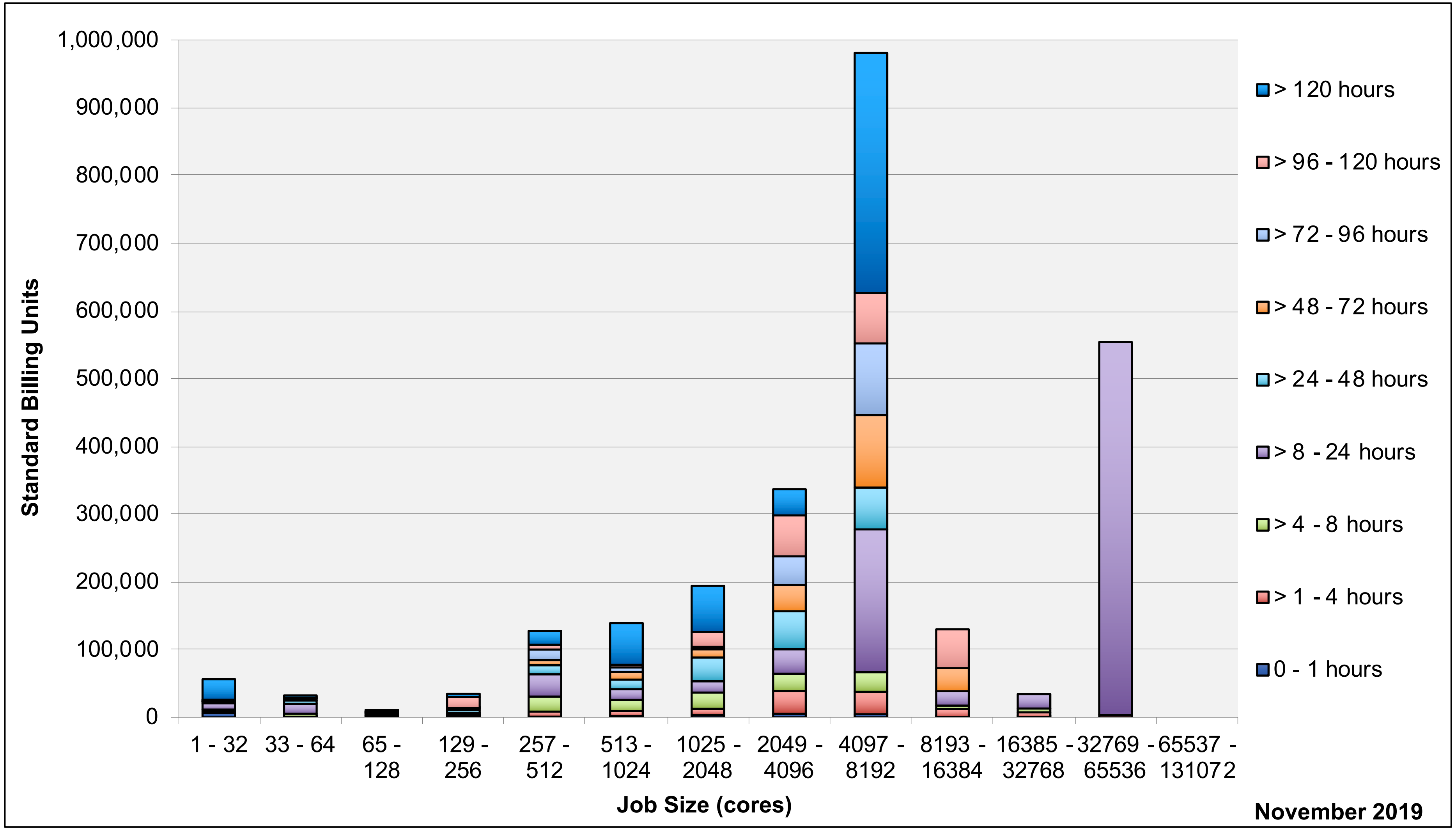
Electra: Monthly Utilization by Job Length



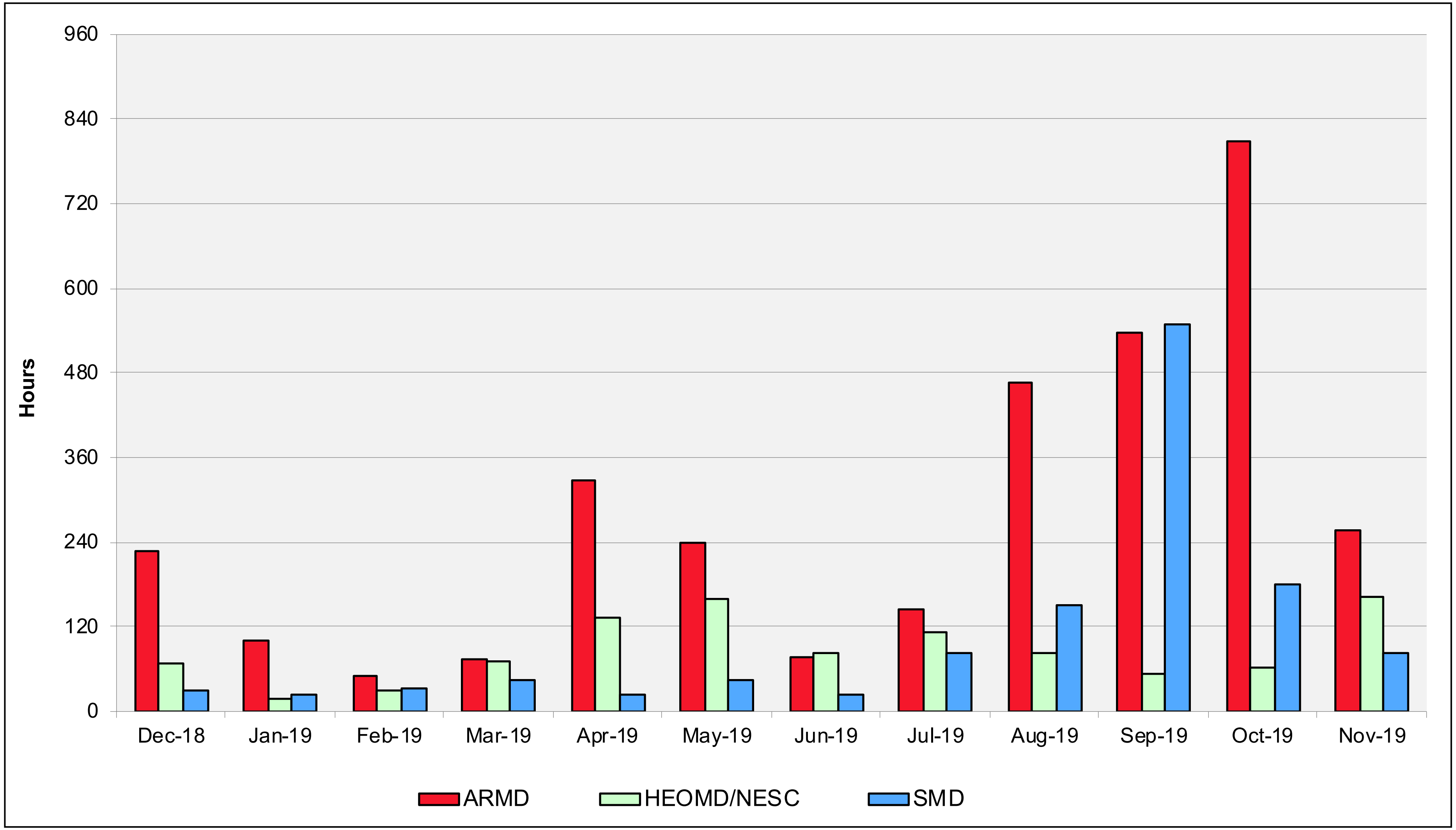
Electra: Monthly Utilization by Job Length



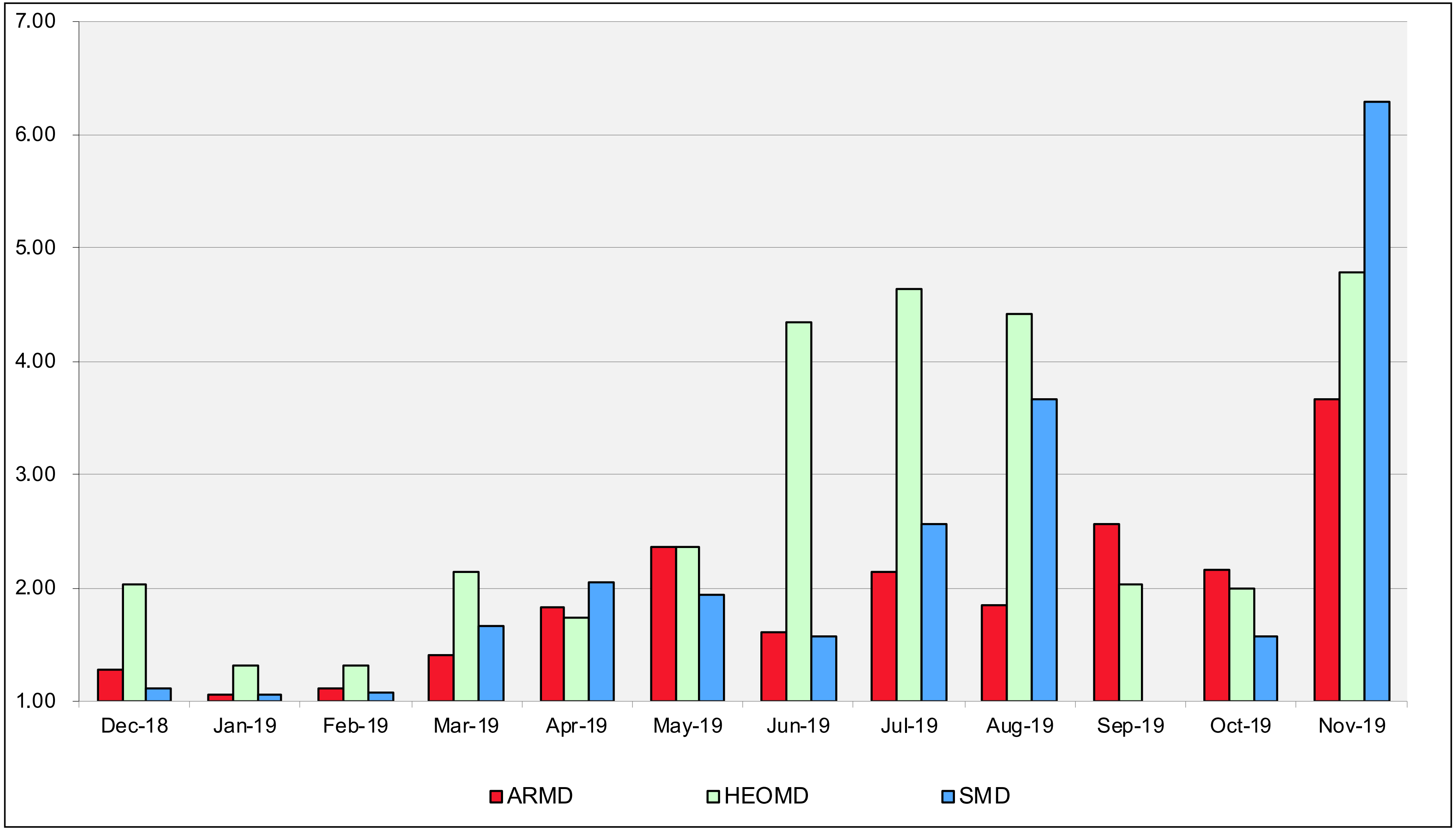
Electra: Monthly Utilization by Size and Length



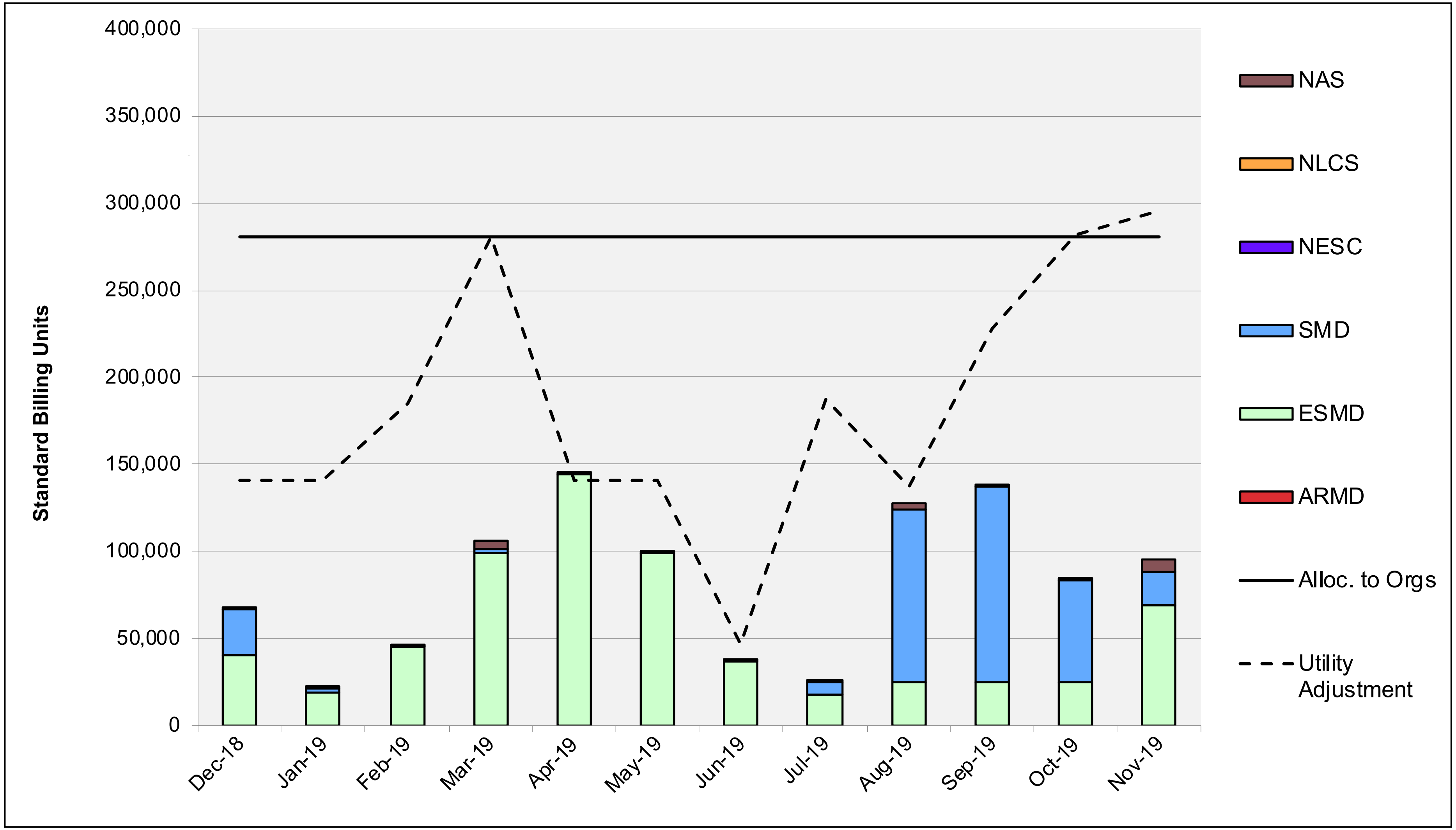
Electra: Average Time to Clear All Jobs



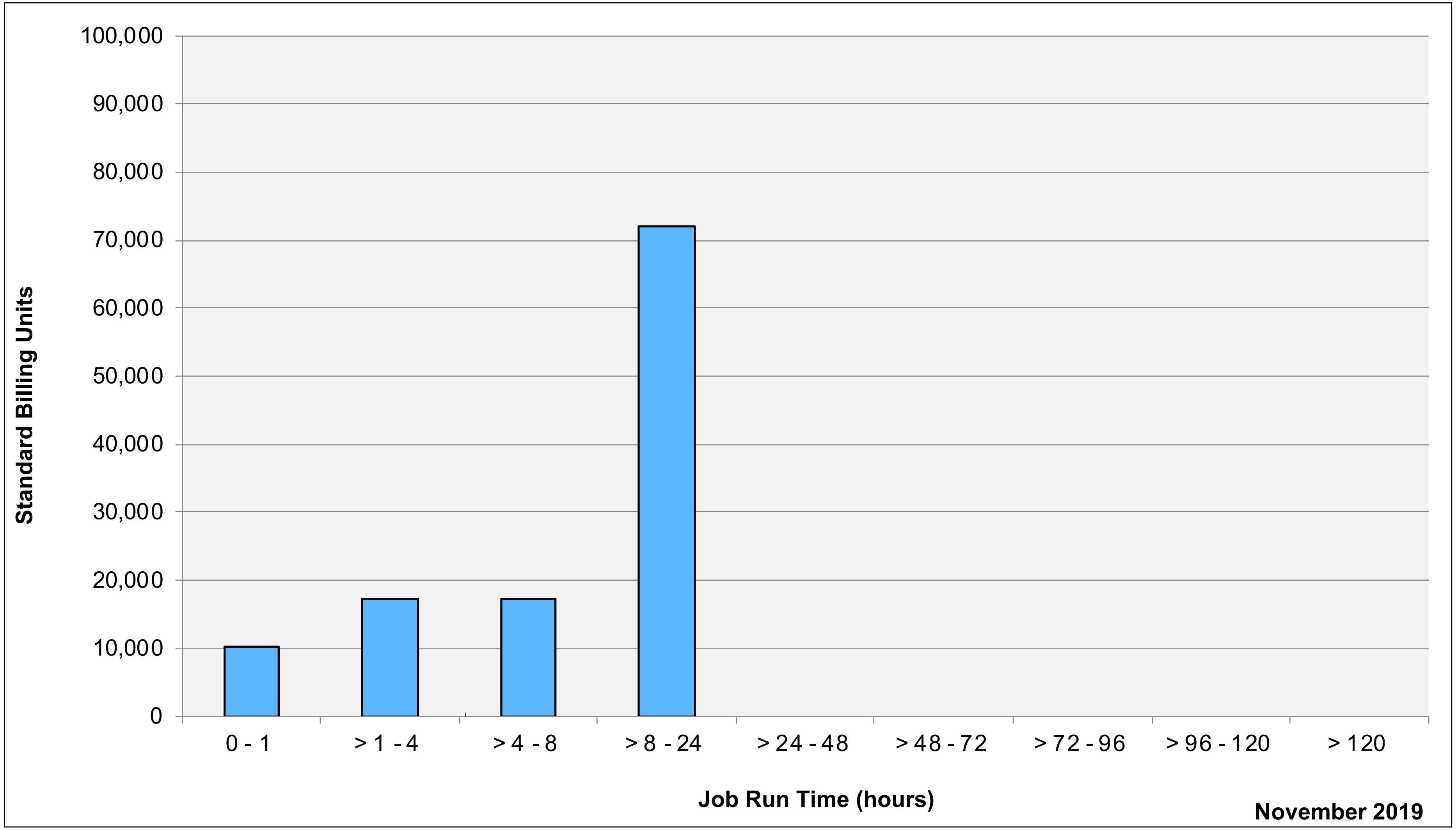
Electra: Average Expansion Factor



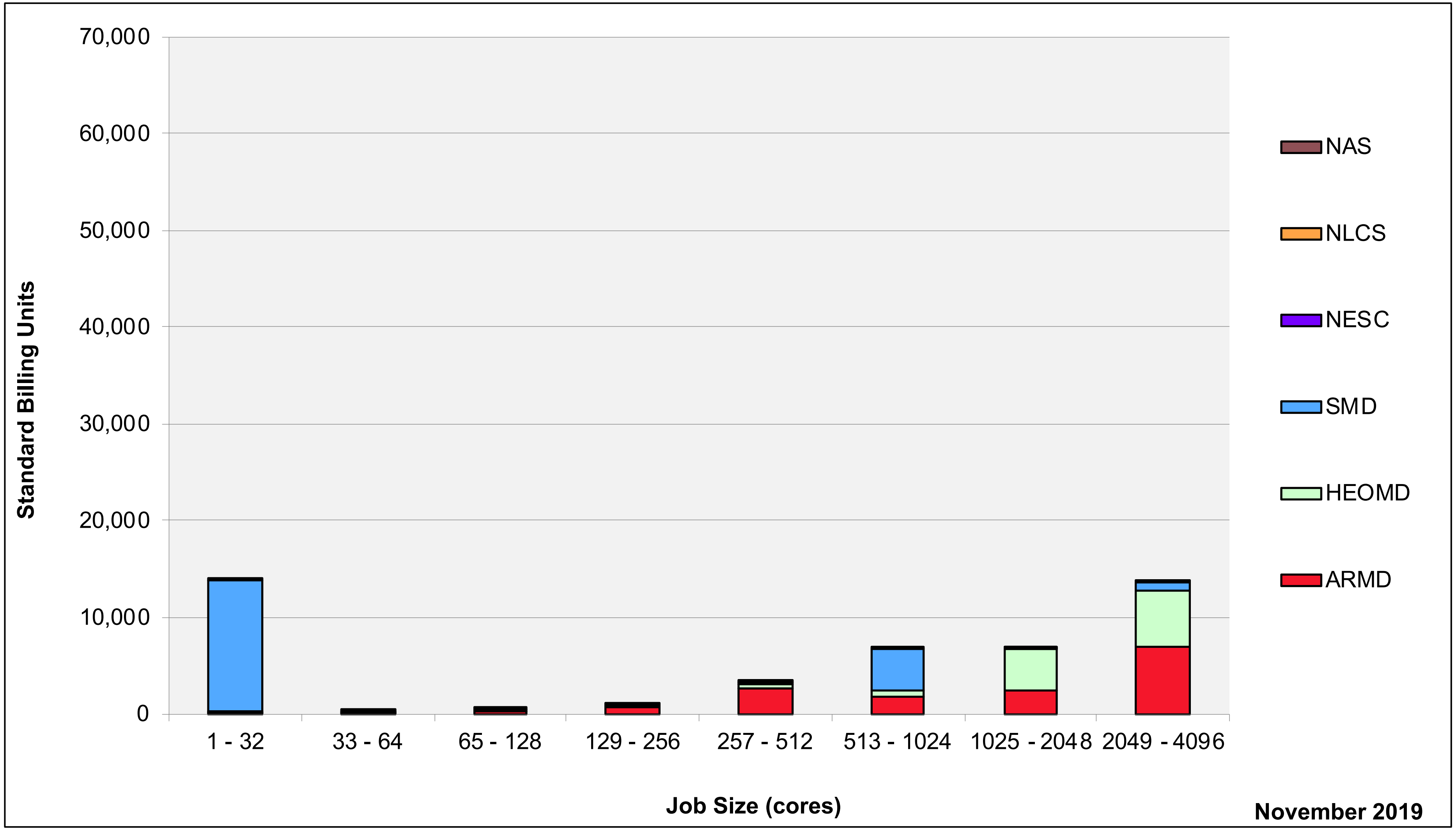
Merope: SBUs Reported, Normalized to 30-Day Month



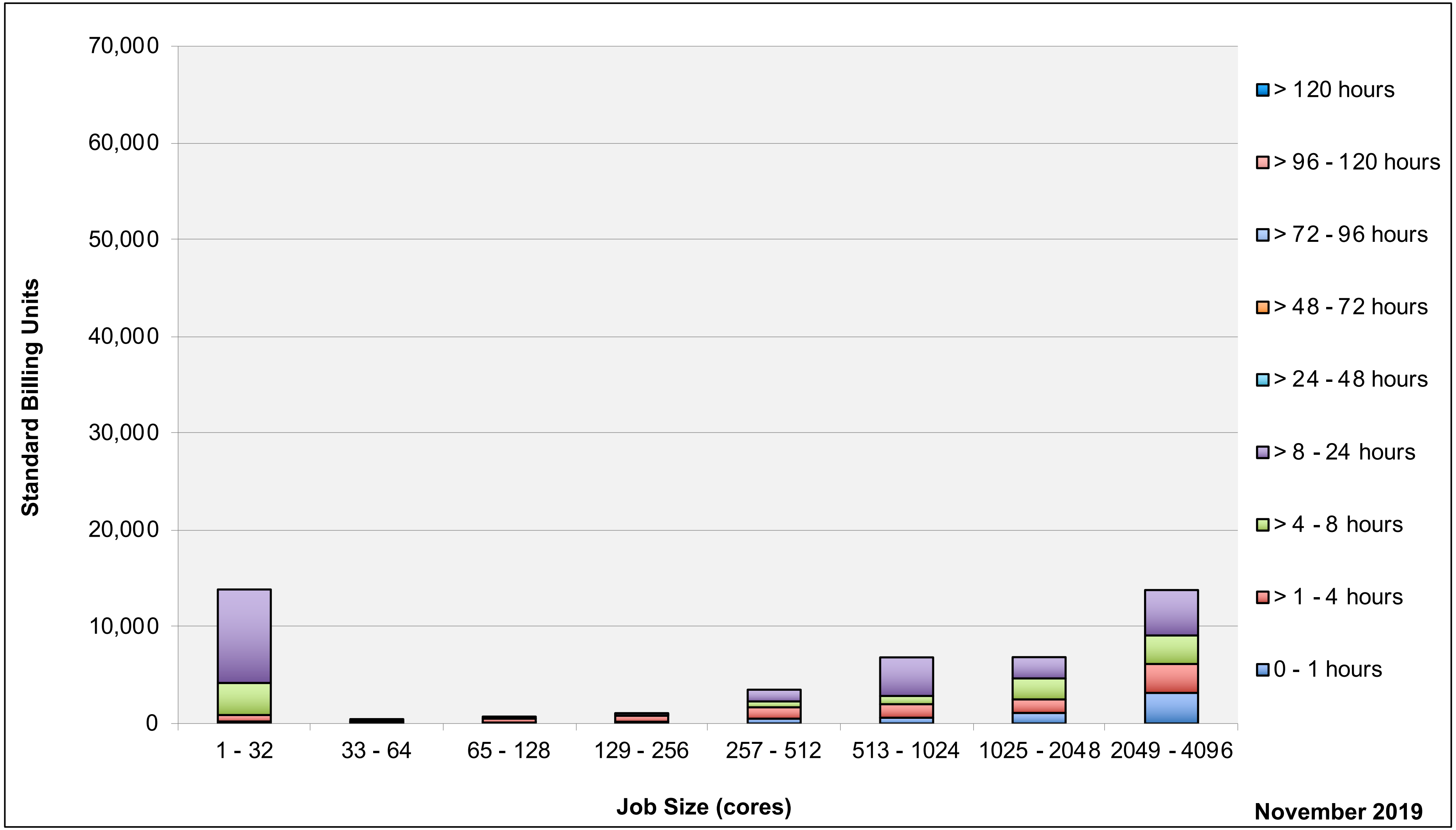
Merope: Monthly Utilization by Job Length



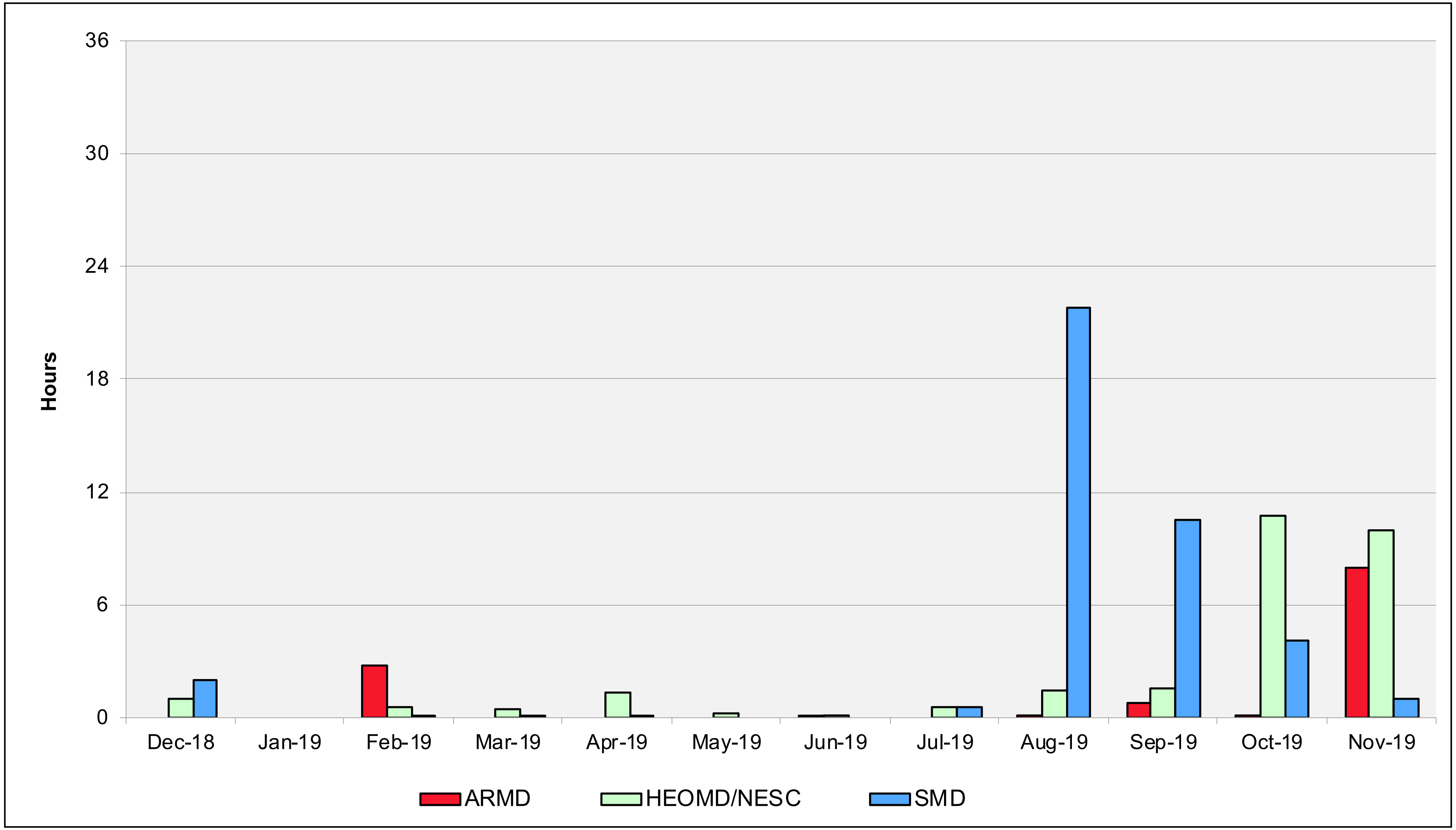
Merope: Monthly Utilization by Job Length



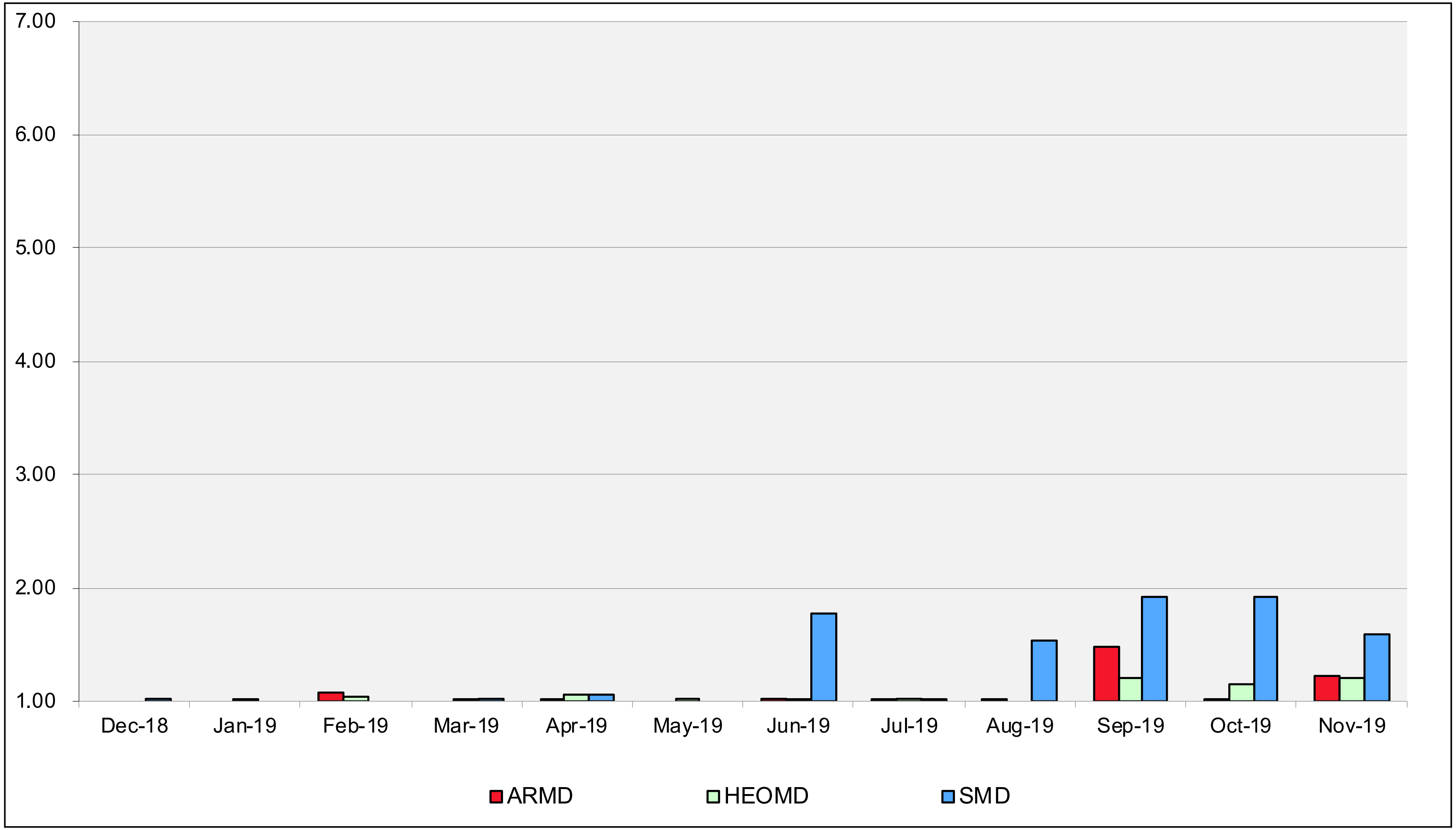
Merope: Monthly Utilization by Size and Length



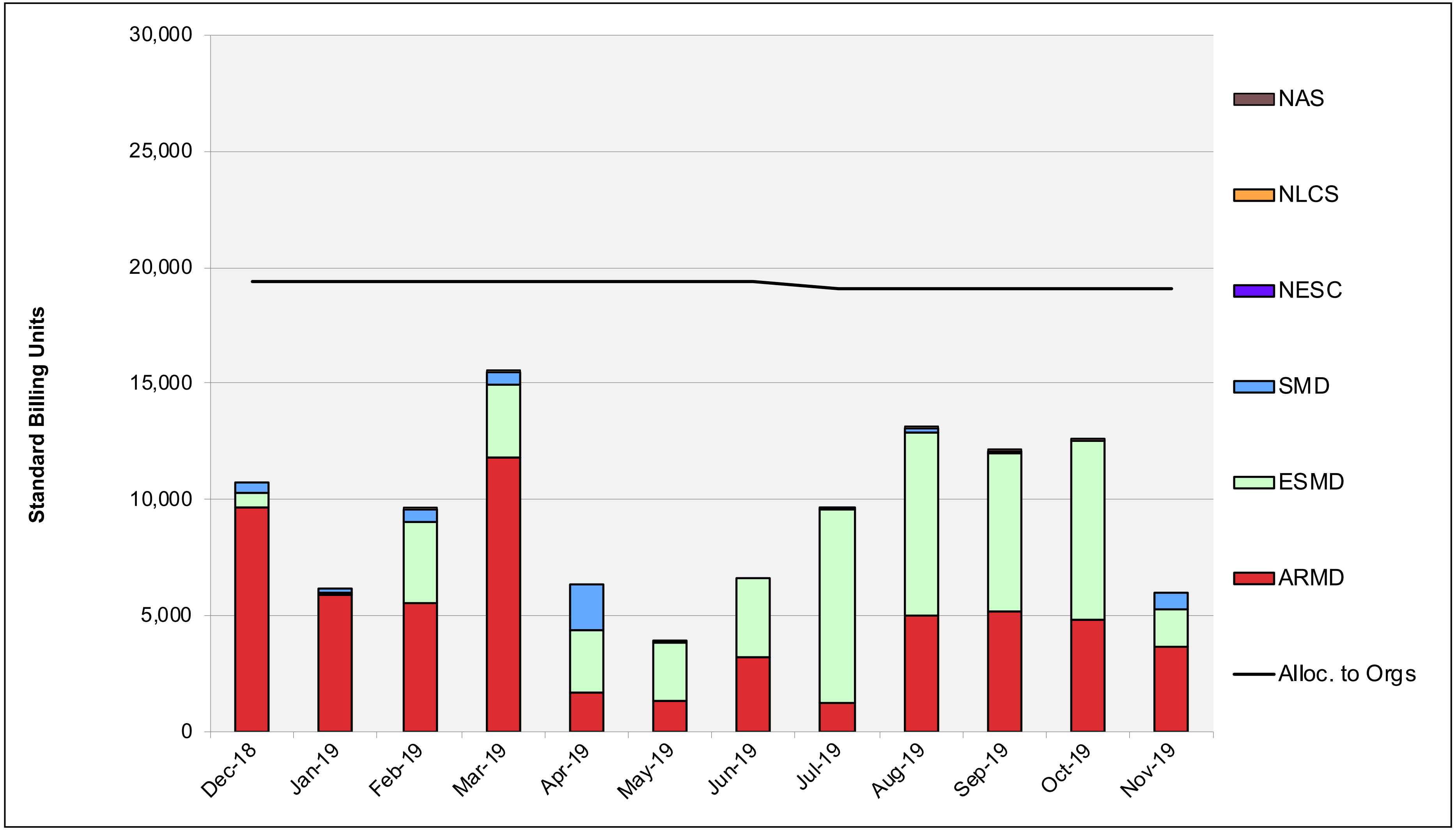
Merope: Average Time to Clear All Jobs



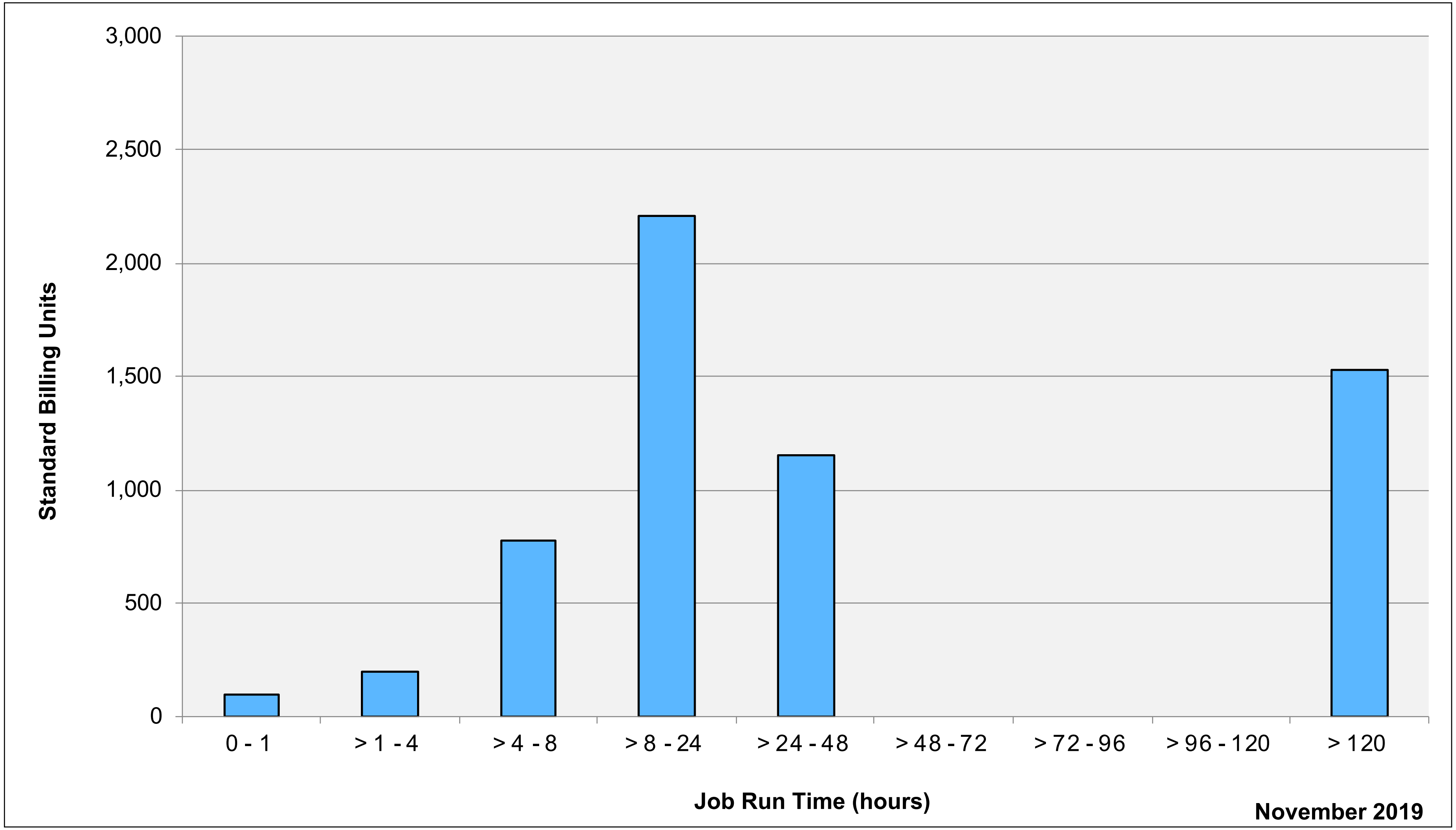
Merope: Average Expansion Factor



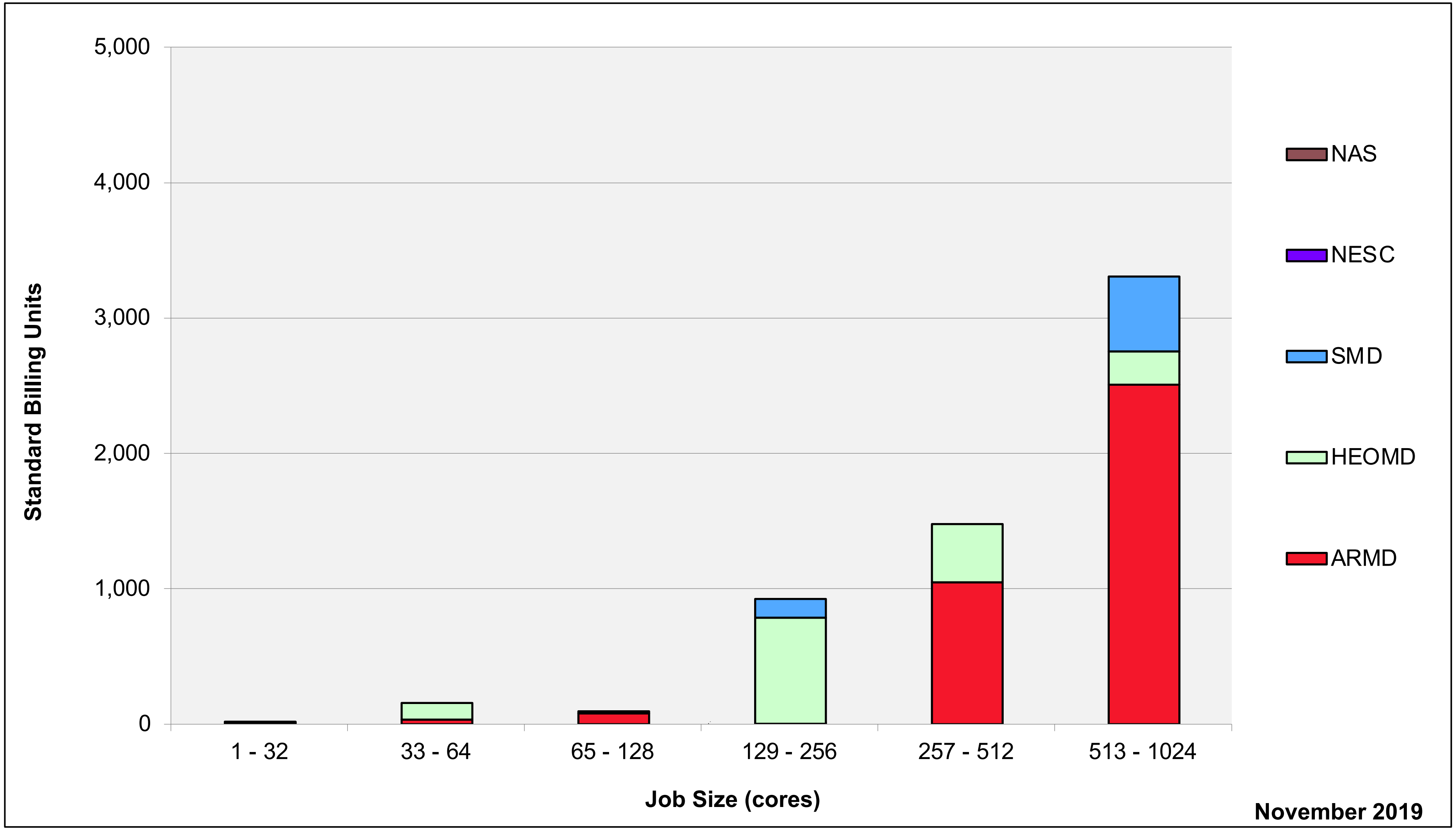
Endeavour: SBUs Reported, Normalized to 30-Day Month



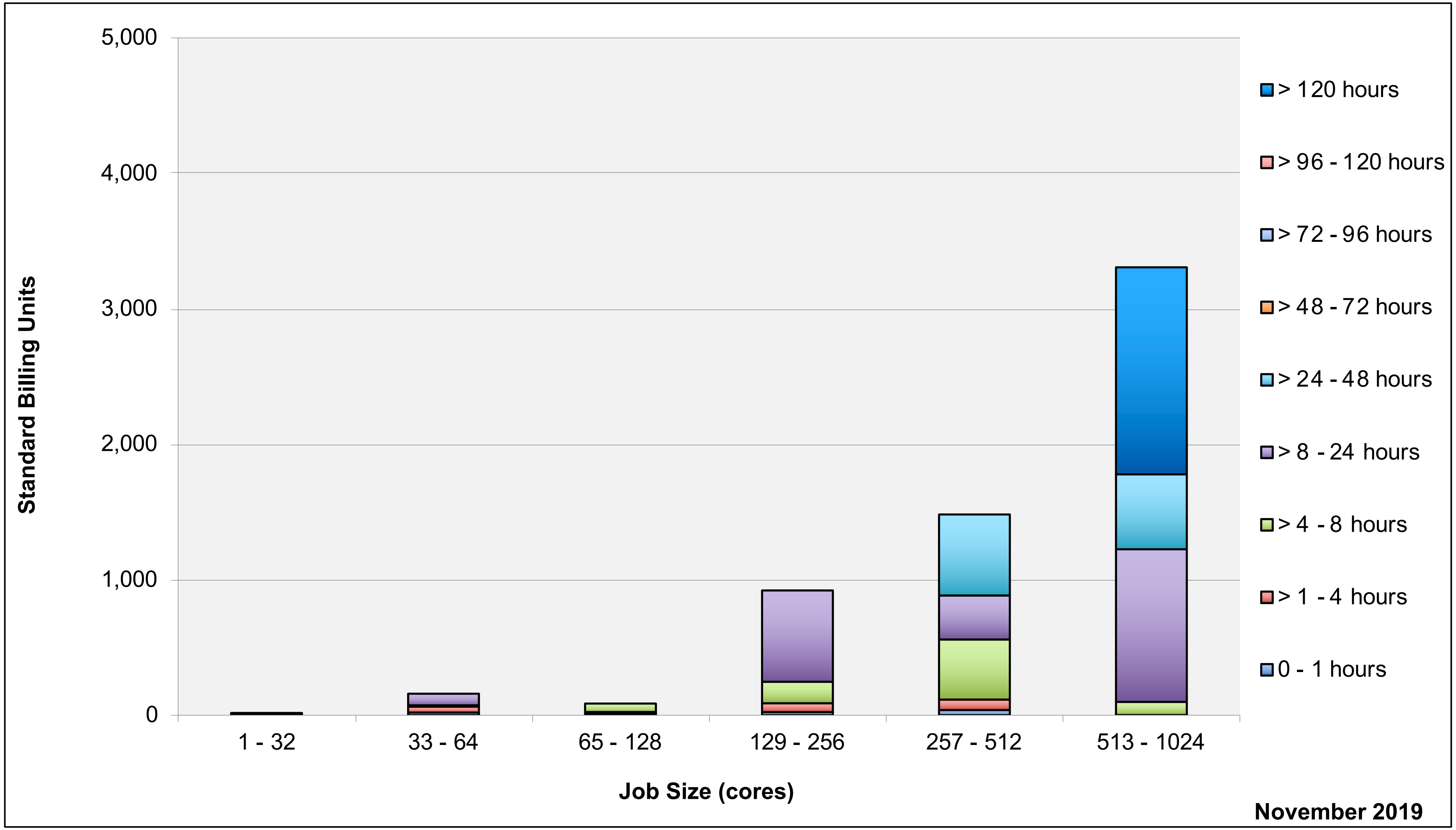
Endeavour: Monthly Utilization by Job Length



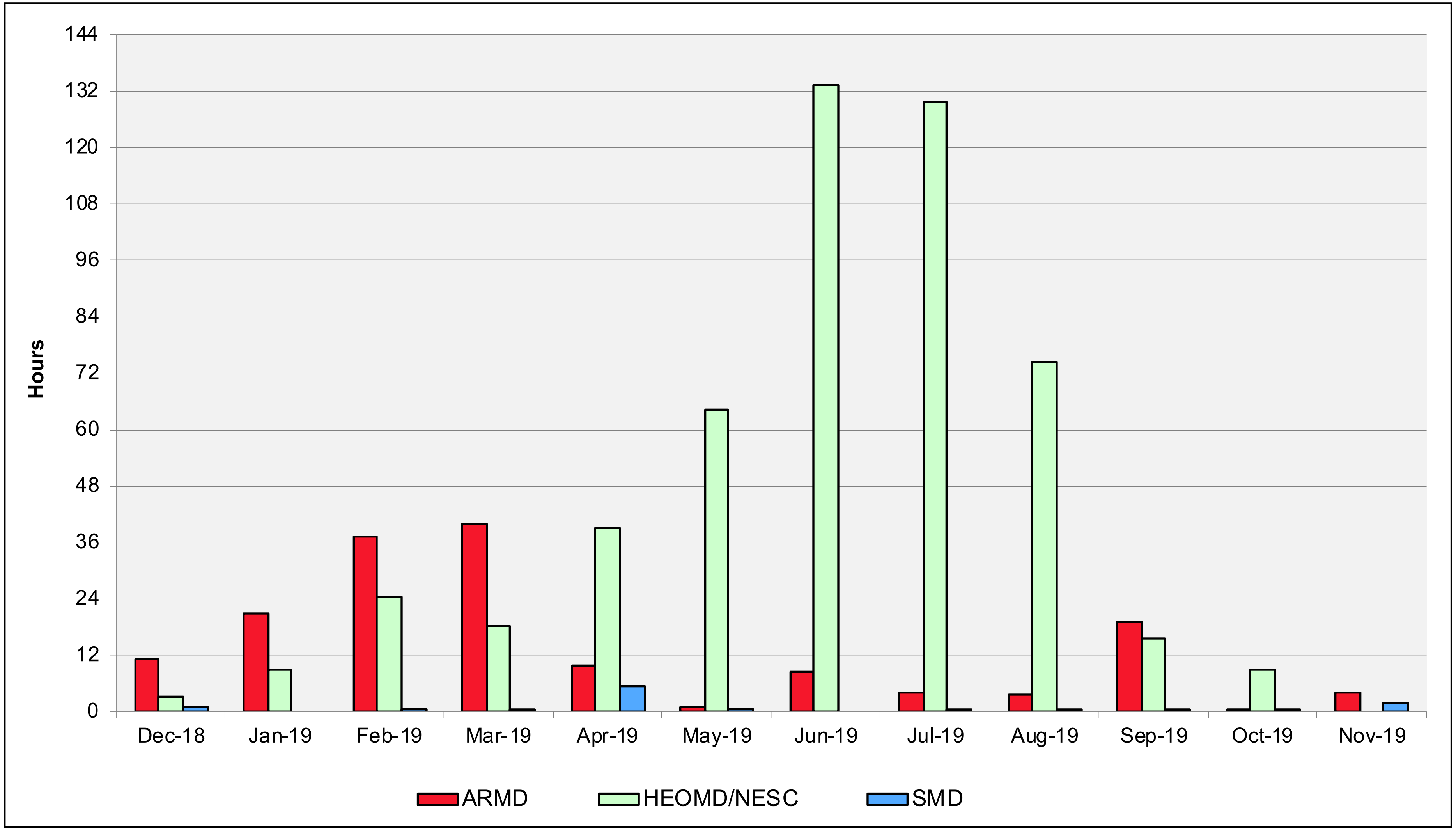
Endeavour: Monthly Utilization by Job Length



Endeavour: Monthly Utilization by Size and Length



Endeavour: Average Time to Clear All Jobs



Endeavour: Average Expansion Factor