

National Aeronautics and Space Administration

High-End Computing Capability

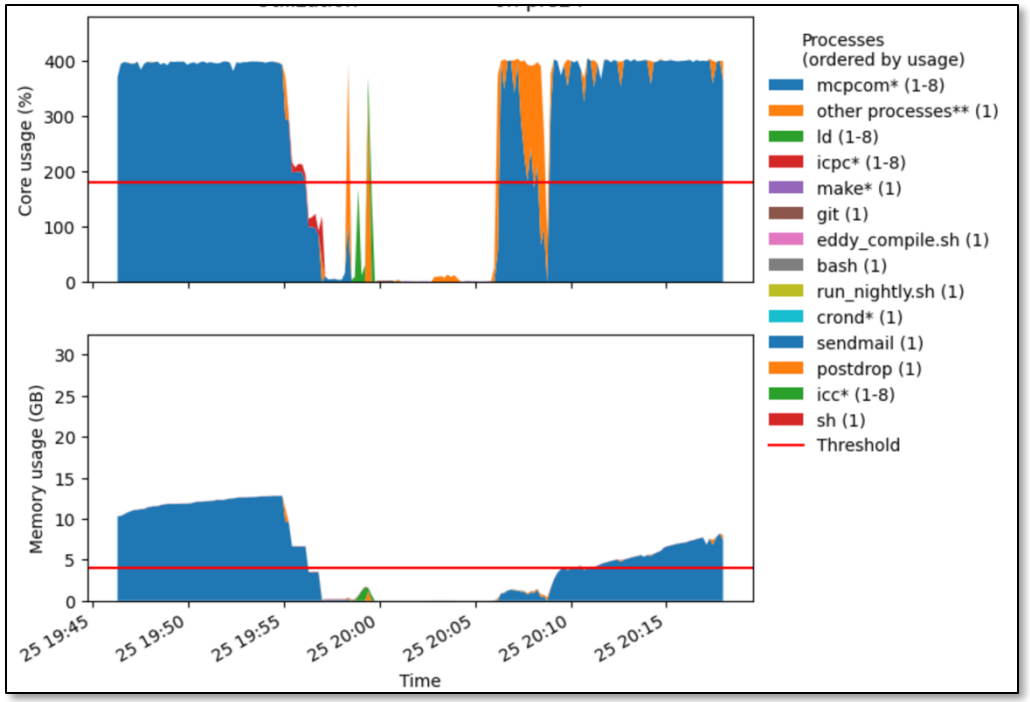
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August 10, 2024

HECC Implements Arbiter Login Node Monitor

- In any HPC environment, login nodes are susceptible to resource abuse due to poor user behavior. HECC has instituted policies to prevent this: To enhance the availability and performance of front-end systems, the Systems and Control Room teams implemented Arbiter, a software solution developed by the University of Utah's Center for High Performance Computing.
- Arbiter is a cgroups-based mechanism—a collection of processes that are bound by the same criteria and associated with a set of parameters or limits—designed to prevent misuse of scarce shared resources on login nodes. Arbiter implements tiered penalty statuses for users who exceed resource usage limits. If a user violates these limits, they are placed in a penalty status, which progressively reduces their CPU and memory allowances.
- Users will receive email notifications detailing their violations and any changes in their penalty status. Providing this information to users helps educate them to make more informed choices to execute their applications on HECC compute resources, thus increasing the performance and stability of login nodes.

IMPACT: Installing the Arbiter software will help increase the stability of HECC login nodes while informing users on how to reduce harmful impacts to those nodes.

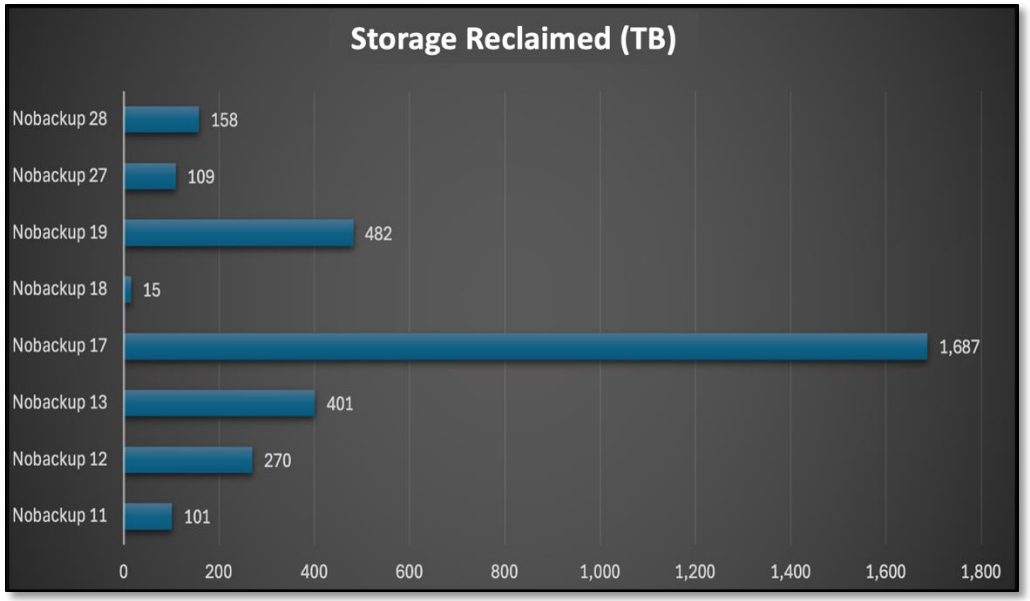


Example analysis report of intensive processes, generated by the Arbiter software and emailed to an individual user. The report shows each individual process and its resource usage over time.

Archiving Retired User Data Frees Storage Space

- In a joint effort by the HECC Control Room and Supercomputing Systems team, data from more than 1,300 retired users were moved from eight Lustre /nobackup "scratch" filesystems to the Lou mass storage system. The effort was completed over the course of two years.
- Project highlights included:
  - Started removing data archive backlog in July 2022.
  - Control Room analysts developed the process, documentation, and scripts for automating the archiving process with guidance from the Systems team.
  - Systems and Control Room staff worked together to revive and give Control Room Analysts ownership of the retired users' archive process.
  - Reclaimed space on the /nobackup systems which improved the health of these filesystems and allows more storage for active users.
- This project resulted in two main benefits:
  - Due to the removal of retired data, the filesystems storage levels fell well below the targeted 75% of capacity. Disruptions caused by filesystem instability when the recommended storage level is exceeded were significantly reduced.
  - No critical outages caused by filesystem problems have occurred in the last six months.
- Retired user data are now archived and removed from Lustre filesystems 90 days after the user's departure.

IMPACT: Removing retired user data in a timely manner opens more storage capacity for active HECC users and increases filesystem stability.

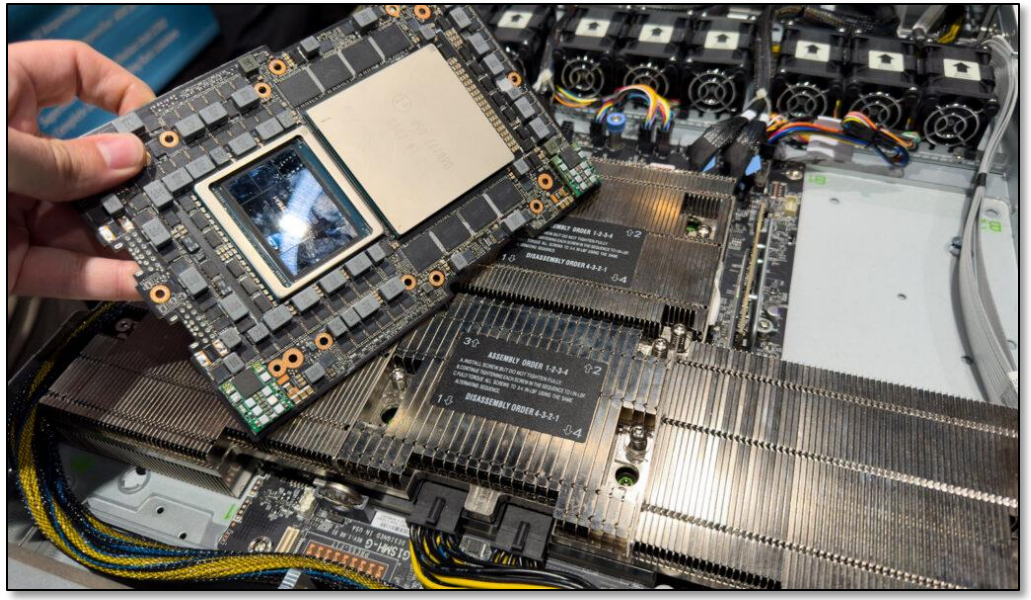


Graph showing storage reclaimed from the Lustre filesystems.

HECC Awards Procurement of New GPU Cluster

- HECC awarded a contract to SuperMicro for the purchase of a new graphics processing unit (GPU) cluster that will use NVIDIA's Grace Hopper superchip architecture.
- The new Grace Hopper cluster will be comprised of 350 GPU nodes. Each GPU node has the following components:
  - One 72-core NVIDIA GH200 Grace CPU, ARM Neoverse V2 cores.
  - One NVIDIA H100 GPU.
  - 480-gigabytes (GB) LPDDR5x soldered system memory, globally addressable by both CPU and GPU.
  - 96-GB HBM3 GPU memory.
  - Single-port NVIDIA NDR200 InfiniBand.
- The cluster hardware is expected to arrive in late September and is scheduled to be in production by the end of 2024.
- The Grace Hopper architecture is well suited for traditional computational fluid dynamics and artificial intelligence/machine learning workloads as well as research in quantum computing.

IMPACT: The new Grace Hopper cluster provides a significant increase in graphics processing unit capacity and computational performance to support research engineers and scientists for NASA mission projects.



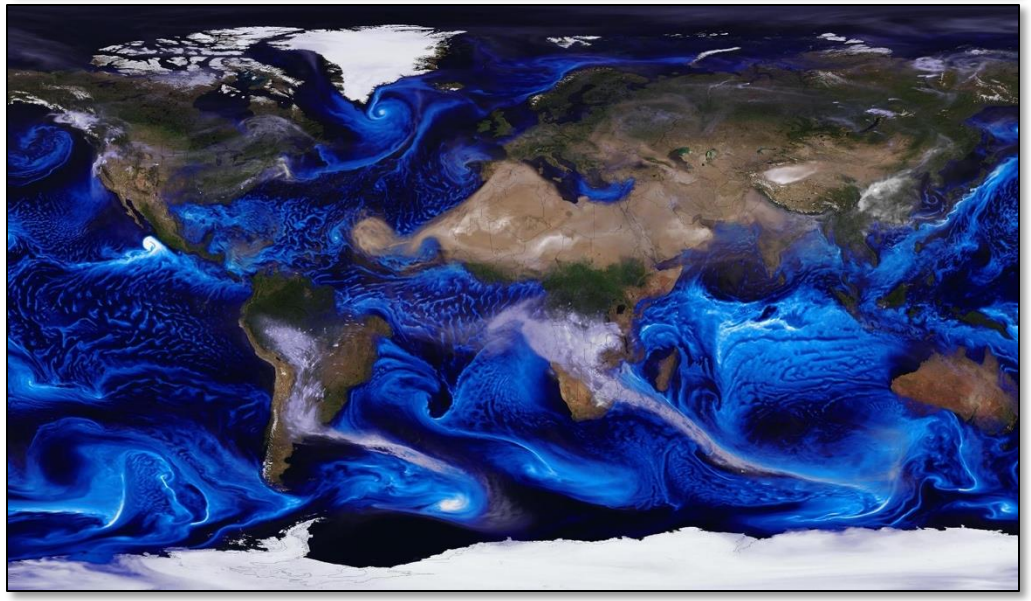
The NVIDIA Grace Hopper architecture combines the performance of the Hopper graphics processing unit with the versatility of the Grace central processing unit. *Don Story, NASA/Ames*

HECC Usage Sets New Normalized Record

- In July, the combined usage of HECC supercomputers set a new normalized record of 18,554,599 Standard Billing Units (SBUs*).
- The usage by 385 of NASA's science and engineering groups exceeded the previous normalized record of 17,514,953 SBUs set in May 2024 by 1,039,646 SBUs.
- The record was achieved in great part by the Science Mission Directorate supporting many high-resolution simulations with the Goddard Earth Observing System (GEOS) for future observing system development. These simulations approach 1.5 kilometers globally, and focus has been placed on extreme events and storm-scale processes in these simulations.
- Usage of Aitken, Pleaides, Electra, Endeavour, and Cabeus contributed to this record. The new record is greatly attributed to the 512 Milan nodes being in production.
- The top 10 projects' usage ranged between 353,877 and 2,376,313 SBUs, and together accounted for over 44% of the total usage.
- The HECC Project continues to evaluate and plan resources to address the future requirements of NASA's users.

1 SBU represents the work that can be done in 1 hour on a Pleaides Broadwell 28-core node.

IMPACT: The increased capacity of HECC systems and expert support to help users optimize their run capacities provide mission directorates with more resources to accomplish their goals and objectives.

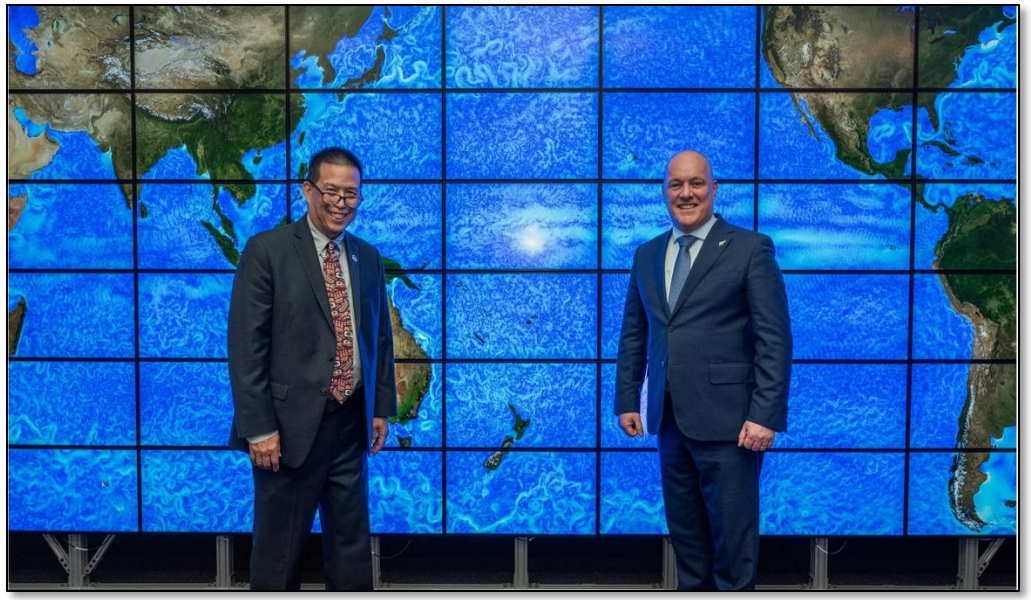


Snapshot of forecasted aerosol optical depth from the GEOS model at 12-kilometer horizontal resolution, with blue plumes representing sea salt; white, carbon; and brown, dust. Features visible are dust plumes streaming from the Sahara into the Atlantic, carbon emissions from fires in Africa, and cyclones traced by sea salt in the Pacific.
William Putman, NASA/Goddard

New Zealand Prime Minister Tours the NAS Facility

- On July 12, NASA Ames Center Director Eugene Tu welcomed the Prime Minister of New Zealand, Christopher Luxon, who was hosted at the NAS facility. Luxon was briefed on Ames' core competences—including advanced computing—and learned more about how Ames supports efforts to return humans to the Moon, as well as NASA's and New Zealand's collaborative efforts to study Earth's interconnected systems.
- The prime minister visited the Pleiades and Cabeus supercomputers and learned about the HECC environment; and how the Modular Supercomputing Facility's environmentally friendly cooling system saves water and electrical power consumption.
- He also received a demonstration of the capabilities of the facility's newly upgraded hyperwall, including:
  - A particle advection visualization showing turbulent flow through the rotors and stators of a turbine from a jet engine. (Simulation: Luis S. Fernandes, NASA/Ames; visualization: Tim Sandstrom, NASA/Ames.)
  - A visualization of the Estimating the Circulation and Climate of the Ocean (ECCO) project's 1/48° global ocean estimate, animating sea-surface speed at one day/second over the course of 14 months. (Simulation: ECCO; visualization: David Ellsworth, NASA/Ames.)

IMPACT: One of eight nations that helped to develop the Artemis Accords, and the 11th to sign, New Zealand is a valuable NASA partner. Learning about HECC capabilities supporting global science and engineering efforts may open opportunities for future collaborations.

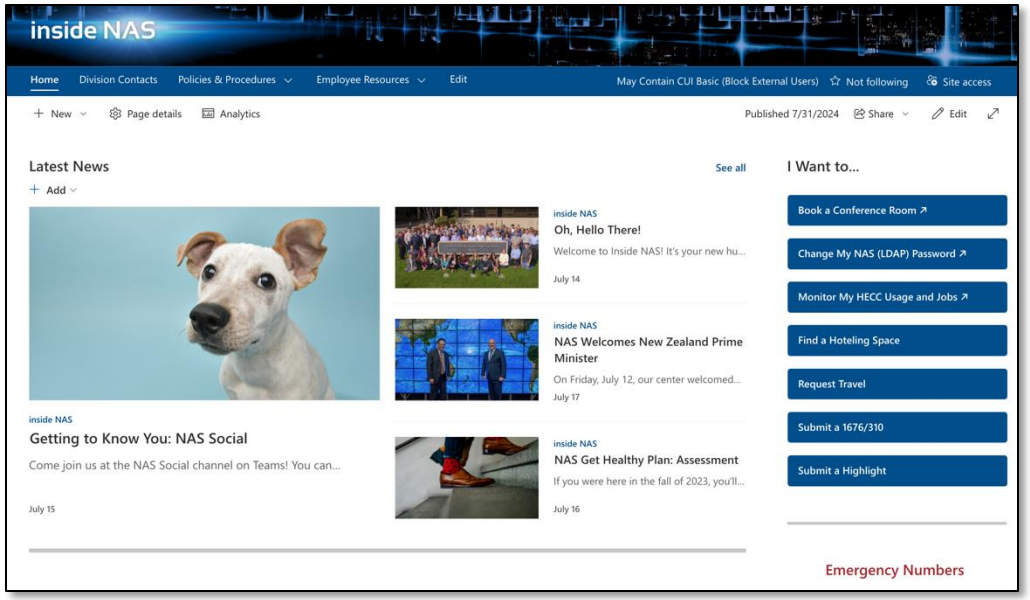


NASA Ames Center Director Eugene Tu (left) and New Zealand Prime Minister Christopher Luxon pose in front of the NASA Advanced Supercomputing facility hyperwall as it displays New Zealand and Earth's ocean currents. *NASA/ Brandon Torres Navarrete*

HECC Teams Develop Intranet Site for NAS Division

- The HECC Tools, Publications, and User Services teams collaborated to develop a new intranet site for use by staff in the NASA Advanced Supercomputing (NAS) Division, including all HECC staff as well as NAS researchers using HECC systems. The site was published on July 18.
- Called Inside NAS, the site is based on a SharePoint template provided by the agency's MS Office support team for internal use by any NASA organization (for example, Inside Ames).
  - The teams designed Inside NAS to be friendly and easy to use, with actionable buttons leading to frequently used tools and procedures for booking conference rooms, changing NAS account passwords, requesting travel, submitting highlights, and monitoring HECC jobs.
  - Inside NAS also provides quick access to the latest division updates, upcoming events, and NAS policies and procedures, as well as resources like emergency and safety information, division contacts, facility maps, and instructions for publishing scientific and technical information.
  - The site is designed for easy maintenance to ensure minimal resources are required to keep the site up to date with the latest policies, procedures, documents, and division news.
- Future iterations of Inside NAS will include orientation materials for new staff and additional support information, such as how to install scientific software on government workstations. The teams are currently soliciting feedback from division staff to inform further development.

IMPACT: Inside NAS supports the NAS Division's Get Healthy Plan, which was initiated to implement operation and policy changes to ensure compliance with IT security, streamline documentation and processes, and improve communication among HECC teams, management, and staff supporting the agency's mission.

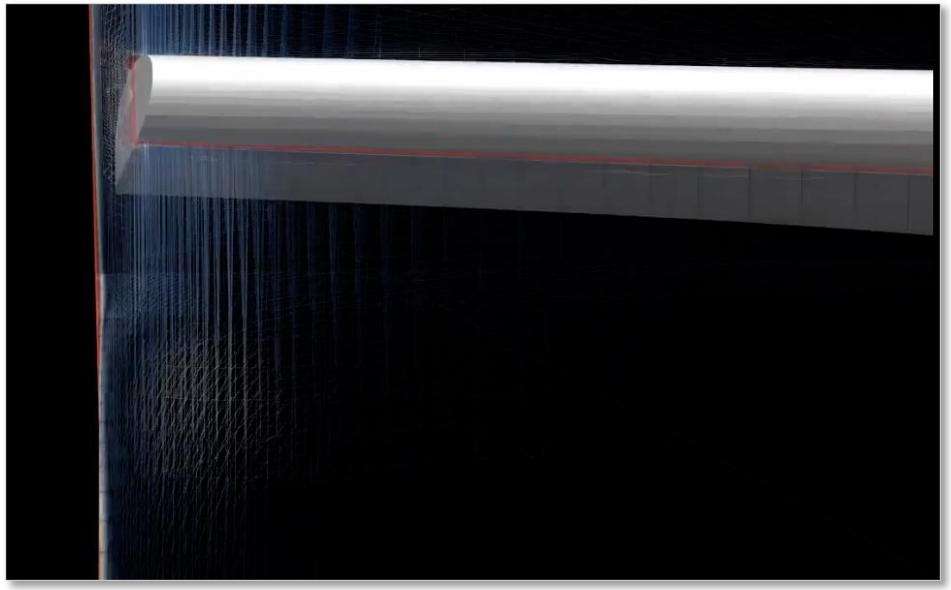


Snapshot of the Inside NAS homepage.

Computational Study of a Small Ducted Propeller*

- As part of the Revolutionary Vertical Lift Technology project to help develop the next generation of vertical lift vehicles, researchers from the NASA Advanced Supercomputing (NAS) Division used agency high-end computing resources to simulate the physics of a ducted propeller design.
- The Computational Aerosciences team simulated a single propeller of the Tiltduct design, with the goal to better understand what methods and grid resolutions are required for computational analysis to be an accurate and cost-effective tool for agency engineers. Using wind tunnel data from a test performed at NASA Glenn, the team's results will be used to establish the best methods for future simulations of a full vehicle where multiple ducted propellers are present.
- The project ran time-accurate simulations of a rotating propeller using NASA's OVERFLOW computational fluid dynamics code, while studying a variety of parameters, including refinement of the computational mesh and testing different numerical schemes to optimize and improve the simulation's accuracy.
- Each simulation from this case required ~300 CPU nodes over a full week on the HECC supercomputing systems at NAS.

IMPACT: The results and best practices developed though this Tiltduct study will be used by engineering groups across NASA to analyze future vehicle concepts that utilize the ducted propeller design.



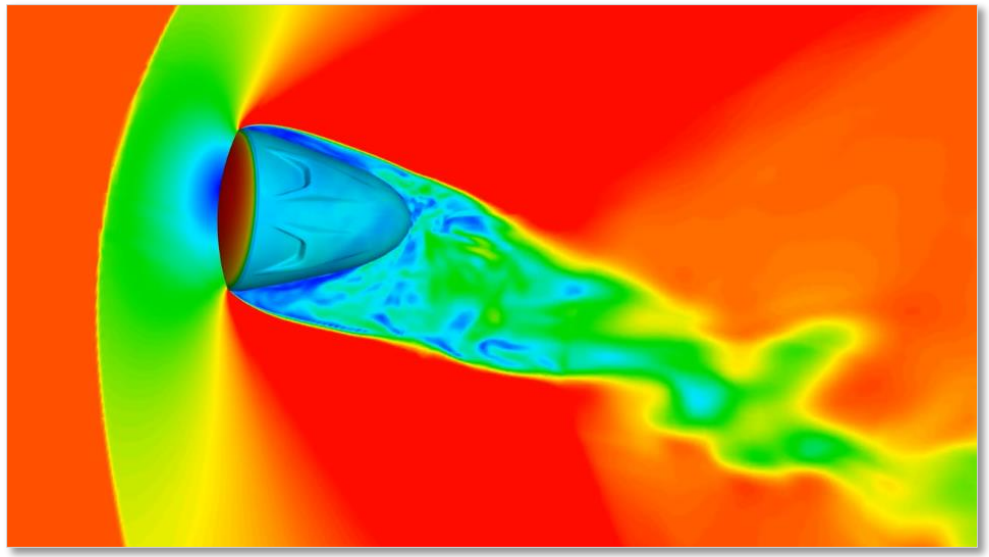
Video showing a slice through the mesh of the six-passenger Tiltduct concept vehicle, colored by vorticity magnitude. As the blades advance through the slice, the tip vortex is created by the blades and then moves down as the next blade advances. The mesh itself demonstrates how OVERFLOW's adaption allows for it to dynamically change along with the movement of the blades. *James Jensen, Timothy Sandstrom, NASA/Ames*

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

Aerodynamic Analysis for Safe Human Space Flight*

- Aerospace engineers at NASA Johnson used HECC resources to perform CFD simulations as part of NASA's efforts to certify three separate human-rated spacecraft currently in use by the agency: the SpaceX Dragon—which flies astronauts to the International Space Station (ISS), the Boeing Starliner—which debuted its astronaut docking with the ISS on June 6, 2024—and the Orion spacecraft and the Space Launch System, in support of the Artemis program.
- The team's CFD simulations were used to create aerodynamic databases or verify existing databases, which were then used by program leaders and engineers to evaluate the flight characteristics of these spacecraft and rolled up into trajectory simulations that verify these vehicles are safe for for astronauts to fly in.
- Certifying these systems requires a huge analysis space from pre-launch until reaching orbit. HECC supercomputing resources allowed the Johnson team to thoroughly analyze the abort system performance over the entire design space, resulting in a higher level of success and reliability than would otherwise be possible.

IMPACT: HECC computing resources allowed aerospace engineers to run thousands of CFD solutions to show that these human-rated space vehicles will meet their mission objectives safely.



Video showing a computational fluid dynamics simulation of the SpaceX Dragon vehicle oscillating back and forth. *Jim Greathouse, NASA/Johnson*

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

Papers

- "**Photospheric Prompt Emission from Long Gamma Ray Burst Simulations – III. X-ray Spectropolarimetry**," T. Parsotan, D. Lazzati, arXiv:2407.01831 [astro-ph.HE], July 1, 2024. *
  https://arxiv.org/abs/2407.01831
- "**Subglacial Discharge Accelerates Dynamic Retreat of Aurora Subglacial Basin Outlet Glaciers, East Antarctica, Over the 21st Century**," T. Pelle, et al., *Journal of Geophysical Research: Earth Surface*, vol. 129, issue 7, July 3, 2024. *
  https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2023JF007513
- "**Computational Insights into Electrolyte-Dependent Li-Ion Charge-Transfer Kinetics at the Li_xCoO_2 Interface**," J. Halldin Stenlid, et al., *ACS Energy Letters*, vol. 9, issue 7, July 3, 2024. *
  https://pubs.acs.org/doi/abs/10.1021/acsenergylett.4c01375#
- "**Surviving in the Hot Neptune Desert: The Discovery of the Ultra-Hot Neptune TOI-3261b**," E. Nabbie, et al., arXiv:2407.04225 [astro-ph.EP], July 5, 2024. *
  https://arxiv.org/abs/2407.04225
- "**TOI 762 A b and TIC 46432937 b: Two Giant Planets Transiting M Dwarf Stars**," J. Hartman, et al., arXiv:2407.07187 [astro-ph.EP], July 9, 2024. *
  https://arxiv.org/abs/2407.07187
- "**Eccentricity and Inclination of Massive Planets Inside Low-Density Cavities: Results of 3D Simulations**," M. Romanova, et al., *Monthly Notices of the Royal Astronomical Society*, vol. 532, issue 3, published online July 9, 2024. *
  https://academic.oup.com/mnras/article/532/3/3509/7710118

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Papers (cont.)

- "**Machine Learning of Unsteady Transonic Aerodynamics of a Pitching Truss-Braced Wing Section**," U. Kaul, *Aerospace Science and Technology*, vol. 152, published online July 9, 2024. *
  https://www.sciencedirect.com/science/article/abs/pii/S1270963824005078
- "**The Stagger Code for Accurate and Efficient, Radiation-Coupled Magnetohydrodynamic Simulations**," R. Stein, et al., *The Astrophysical Journal*, vol. 970, no. 1, July 12, 2024. *
  https://iopscience.iop.org/article/10.3847/1538-4357/ad4706/meta
- "**Hybrid Kinetic Modeling of the Magnetosheath Impulsive Plasma Cloud Penetration Through the Magnetopause and Comparison with MMS and Other Spacecraft Observations**," A. Lipatov, et al., *Journal of Geophysical Research: Space Physics*, vol. 129, issue 7, July 15, 2024. *
  https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2024JA032909
- "**Efficient and Accurate Force Replay in Cosmological-Baryonic Simulations**," A. Arora, et al., arXiv:2407.12932 [astro-ph.GA], July 17, 2024. *
  https://arxiv.org/abs/2407.12932
- "**Modeling the Far-Infrared Polarization Spectrum of a High-Mass Star Forming Cloud**," D. Lee, et al., arXiv:2407.12917 [astro-ph. GA], July 17, 2024. *
  https://arxiv.org/abs/2407.12917
- "**TESS Giants Transiting Giants. VI. Newly Discovered Hot Jupiters Provide Evidence for Efficient Obliquity Damping after the Main Sequence**," N. Saunders, et al., *The Astronomical Journal*, vol. 168, no. 2, July 18, 2024. *
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Papers (cont.)

- "**Understanding the Variability of Helium Abundance in the Solar Corona Using Three-Fluid Modeling and Ultraviolet Observations**," L. Ofman, et al., *The Astrophysical Journal Letters*, vol. 970, no. 1, July 19, 2024. *
- "**Hidden Mechanism of Dynamic Large-Eddy Simulation Models**," X. Hu, et al., *Physical Review Fluids*, vol. 9, issue 7, July 22, 2024. * https://journals.aps.org/prfluids/abstract/10.1103/PhysRevFluids.9.074607
- "**Catalog of Proper Orbits for 1.25 Million Main Belt Asteroids and Discovery of 136 New Collisional Families**," D. Nesvorny, et al., arXiv:2407.18221 [astro-ph.EP], July 25, 2024. * https://arxiv.org/abs/2407.18221
- "**Anomaly Detection for the Roman Space Telescope Wide Field Instrument's Science Data Processing Pipeline**," P. Horton, et al., *Proceedings Volume 13101, Software and Cyberinfrastructure for Astronomy VIII*, published online July 25, 2024. * https://www.spiedigitallibrary.org/conference-proceedings-of-spie/13101/131014B/Anomaly-detection-for-the-Roman-Space-Telescope-wide-field-instruments/10.1117/12.3020576.full
- "**Dynamic and Thermodynamic Environmental Modulation of Tropical Congestus and Cumulonimbus in Maritime Tropical Regions**," S. Freeman, et al., *Journal of the Atmospheric Sciences*, published online July 26, 2024. * https://journals.ametsoc.org/view/journals/atsc/aop/JAS-D-24-0055.1/JAS-D-24-0055.1.xml
- "**Impact of Model Spatial Resolution on Global Geophysical Satellite-Derived Fine Particulate Matter**," D. Zhang, et al., *ACS ES&T Air*, published online July 29, 2024. * https://pubs.acs.org/doi/abs/10.1021/acsestair.4c00084#

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Papers (cont.)

- **AIAA Aviation Forum and Ascend 2024**, Las Vegas, NV, July 29 – August 2, 2024.
  - "**A Comparative Study of Contrail Frequency Indices and Landsat-8 Contrail Data Set**," R. O'Hara, H.K. Ng, S. Saxena. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-4543
  - "**Aerodynamic Analysis of Propeller-Wing-Flap Configurations Using High-Fidelity Computational Fluid Dynamics**," E. Brown, et al. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-4340
  - "**Comparison of Common Research Model Wing Meshes for Drag Minimization Using Fluent Adjoint Optimization**," M. Aleman Chona, L. Serrano. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-3864
  - "**Simulation of a Mach 2 Jet in a Supersonic Retropulsion Configuration**," J. Shafner, P. Martin. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-4371
  - "**Aerodynamic Design Optimization for Natural Laminar Flow Airfoils**," P. Paredes, et al. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-3529
  - "**GlennICE Simulation of 24-, 28-, and 36-Inch Diameter eVTOL Propellers in Forward Flight**," D. Rigby, P. Von Hardenberg. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-4449
  - "**A Study of Parallel Scalability and Dynamic Workload Balancing in GlennICE**," Z. Sabri, C. Porter. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-4165
  - "**Computational Analysis of Two Mars Powered Descent Vehicle Concepts Tested in the Langley Unitary Plan Wind Tunnel**," K. Edquist, et al. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-3971
  - "**USMD3—ME Analyses Performed in Support of a Wind Tunnel Test of a Boundary-Layer Ingestion Configuration**," M. Bozeman. *
    https://arc.aiaa.org/doi/abs/10.2514/6.2024-4022

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Presentations

- **COSPAR 2024: 45th Scientific Assembly**, Busan, South Korea, July 13-21, 2024.
  - "**Forecasting SEP Events During Solar Cycles 23 and 24 Using Machine Learning**," S. Kasapis, et al.
  - "**Characterization of the Van Allen Radiation Belt Proton and Electron Fluxes using SDO Spikes Data**," S. Kasapis, et al.
  - "**Predicting Active Region Emergence Using LSTM Machine Learning Model**," S. Kasapis, et al.
- **International Conference on Computational Fluid Dynamics**, Kobe, Japan, July 14 – 19, 2024.
  - "**Enhanced Simulation Techniques in Predicting X-59 Sonic Boom Loudness Using CFD**," S. Neuhoff, C. Paul, L. Ashby, J. Housman, J. Duensing.
  - "**Implicit Preconditioning for Explicit Multigrid Solvers on Cut-Cell Cartesian Meshes**," J. Chiew, M. Aftosmis.
  - "**Wall-Modeled Large-Eddy Simulation of Supersonic Parachute Inflation**," F. Cadieux, M. Barad.
- "**TIC 271971130.02 is Unlikely to be a Transiting Planet**," J. Jenkins, presented at the TESS Science Conference III held in Cambridge, MA, July 29 – August 2, 2024.
- **AIAA Aviation Forum and Ascend 2024** (cont.)
  - "**Effect of Transition Modeling on the XV-15 Hovering Rotor Flows**," D. Garcia Perez, et al. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4611
  - "**Advances in Automation of Overset Structured Volume Mesh Generation and Domain Connectivity**," W. Chan, A. Chuen, J. Jensen. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4305
  - "**Discretization Error Estimation and Control for Farfield Acoustic Signatures**," S. Rallabhandi, M. Nemec, M. Aftosmis. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4669
  - "**Exploring the Impact of Sideslip Angle on Acoustic Predictions of an Open Rotor System Using Scale-Resolving Simulations**," E. Dumlupinar, et al. https://arc.aiaa.org/doi/abs/10.2514/6.2024-3679
  - "**Wall-Modeled Large Eddy Simulations of Transonic Buffet Over a Supercritical Airfoil**," R. Hass, et al. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4263

Presentations (cont.)

- **AIAA Aviation Forum and Ascend 2024**, Las Vegas, NV, July 29 – August 2, 2024.
  - "**Fluid-Structure Interaction Simulations of Supersonic Parachute Inflation: Model Sensitivities**," F. Cadieux, M. Barad. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4225
  - "**Acoustic Signature Uncertainty Quantification for Quiet Supersonic Aircraft**," M. Nemec, G. Bedonian, M. Aftosmis. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4671
  - "**Towards Aerodynamic Shape Optimization Using an Immersed Boundary Overset Grid Method**," B. Lowe, et al. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4229
  - "**Comparison of OVERFLOW Computational and Experimental Results for a Blunt Mars Entry Vehicle Concept During Supersonic Retropulsion**," L. Halstrom, T. Pulliam, R. Childs, P. Stremel, P. Moran. https://arc.aiaa.org/doi/abs/10.2514/6.2024-3973
  - "**Comparison of OVERFLOW Computational and Experimental Results of the CobraMRV Mars Entry Vehicle Concept During Supersonic Retropulsion**," K. Matsuno, R. Childs, T. Pulliam, P. Stremel, P. Moran, J. Garcia. https://arc.aiaa.org/doi/abs/10.2514/6.2024-3972
  - "**Aeropropulsive Assessment of a BLI Tail-Cone Thruster Propulsion System for the NASA Common Research Model and a Transonic Truss-Braced Wing**," L. Machado, T. Chau, J. Duensing. https://arc.aiaa.org/doi/abs/10.2514/6.2024-3767
  - "**LAVA Voronoi Mesher for Wall-Modeled Large-Eddy Simulations**," V. Sousa, et al. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4306
  - "**Evaluation of a Physics-Based Unsteady RANS Method for Buffett Onset Prediction**," D. Maldonado, et al. https://arc.aiaa.org/doi/abs/10.2514/6.2024-3639
  - "**Comparing Planetary Helicopter Brownout Observations with Numerical Predictions for Ingenuity**," D.-G. Caprace, et al. https://arc.aiaa.org/doi/abs/10.2514/6.2024-4341

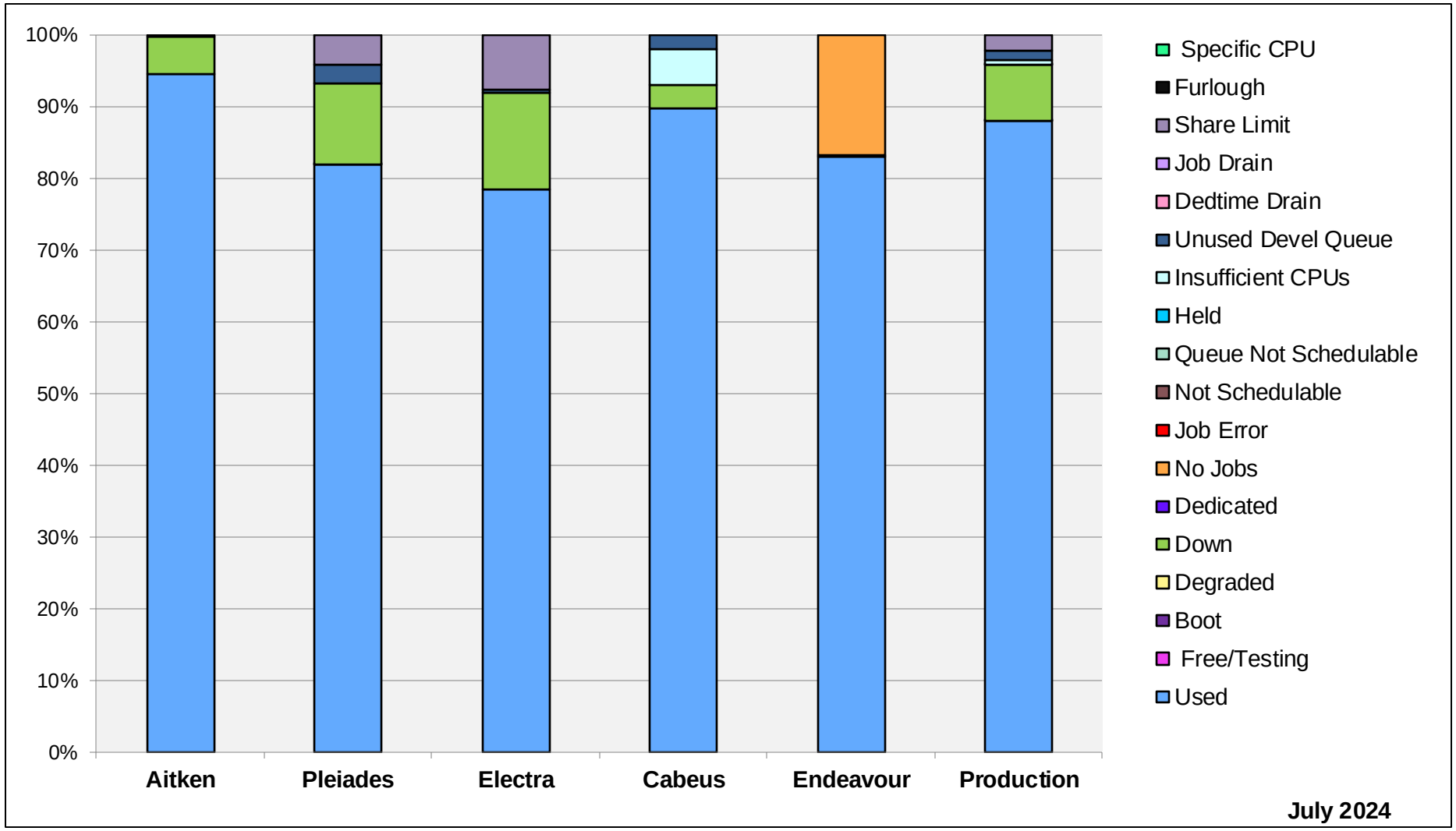
News & Events

- **NASA's Upgraded Hyperwall Offers Improved Data Visualization**, *NASA Ames Research Center*, July 1, 2024—In May, the NASA Advanced Supercomputing (NAS) facility celebrated the newest generation of its hyperwall system, a wall of LCD screens that display supercomputer-scale visualizations of the very large datasets produced by NASA supercomputers and instruments. *https://www.nasa.gov/centers-and-facilities/ames/nasas-upgraded-hyperwall-offers-improved-data-visualization/*
- **NASA Ames Welcomes New Zealand Prime Minister, Celebrates Partnership**, *NASA Ames Research Center*, July 18, 2024—On July 12, NASA Ames welcomed the Prime Minister of New Zealand, Christopher Luxon, who was hosted in the NAS facility where he was briefed on Ames' core competences and NASA's and New Zealand's collaborative efforts to study Earth's interconnected systems. The prime minister visited the Pleiades and Cabeus supercomputers and examined the capabilities of the facility's upgraded hyperwall. *https://www.nasa.gov/centers-and-facilities/ames/nasa-ames-welcomes-new-zealand-prime-minister-celebrates-partnership/*

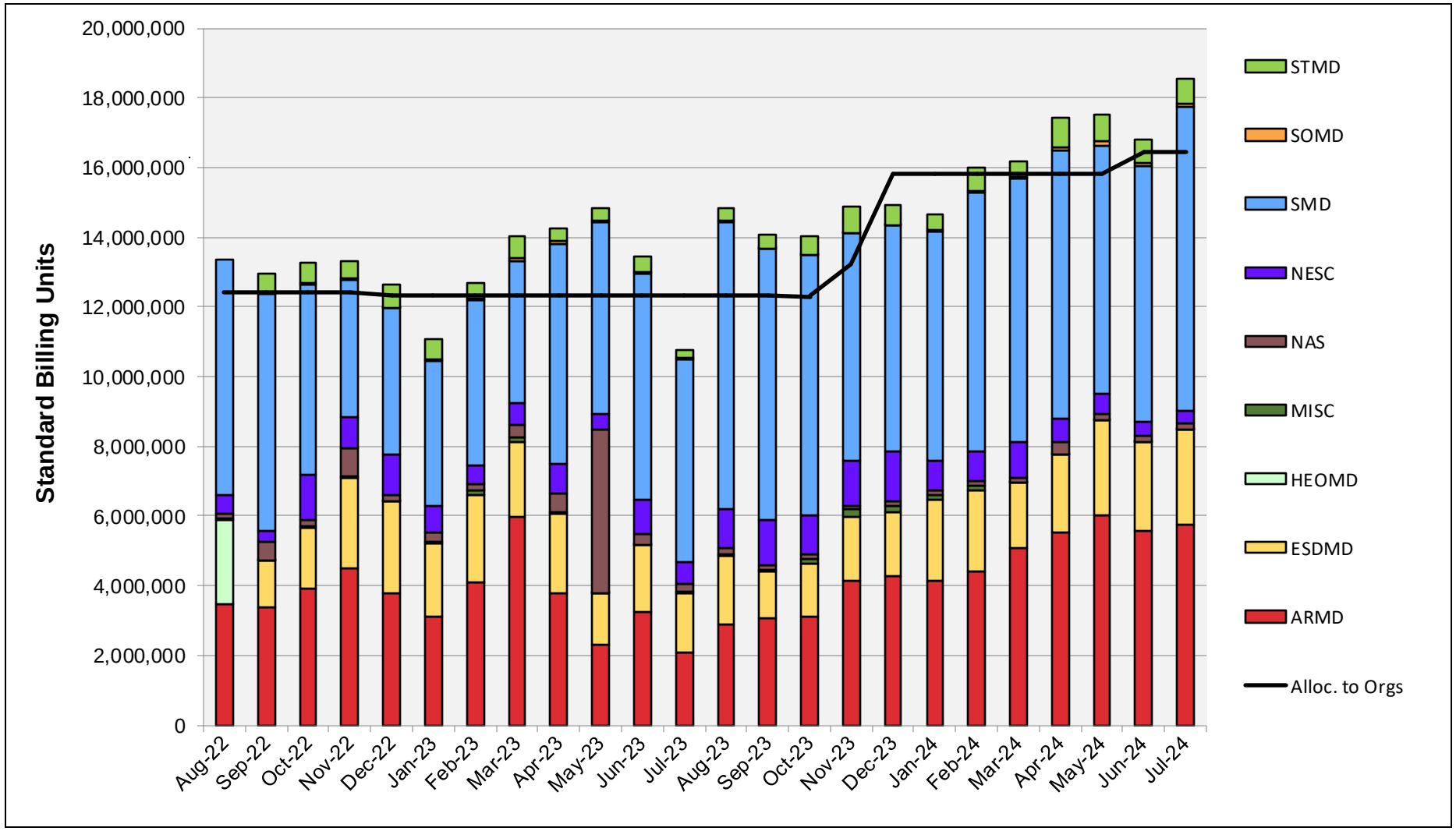
Social Media Coverage

- **Hyperwall Ribbon Cutting Event**
  - NASA Ames: X 32 reposts, 158 likes; Facebook 107 likes, 26 shares.
  - NASA Supercomputing: Facebook 8 likes, 2 shares.
- **ATAP Simulation Work**
  - NASA Advanced Supercomputing Division: X 1 repost, 5 likes.
  - NASA Supercomputing: Facebook 25 likes, 10 shares, 3.7k views.
- **NASA Apollo 11 Anniversary Campaign**
  - NASA Supercomputing: X 3 reposts, 7 likes; Facebook 11 likes, 4 shares.
- **NASA Olympics Campaign**
  - NASA Supercomputing: X 4 reposts, 9 likes; Facebook 9 likes.

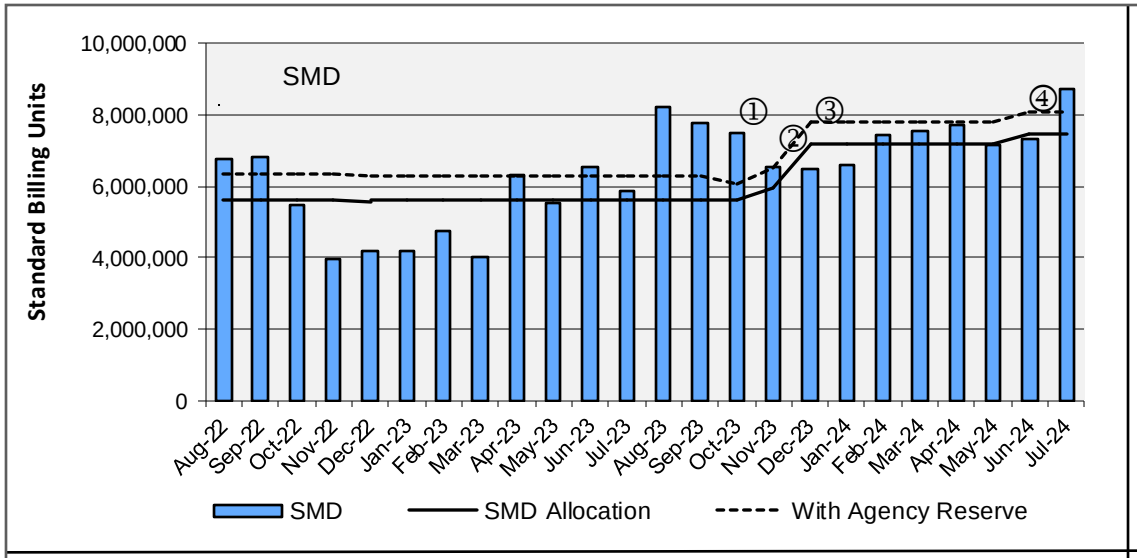
HECC Utilization

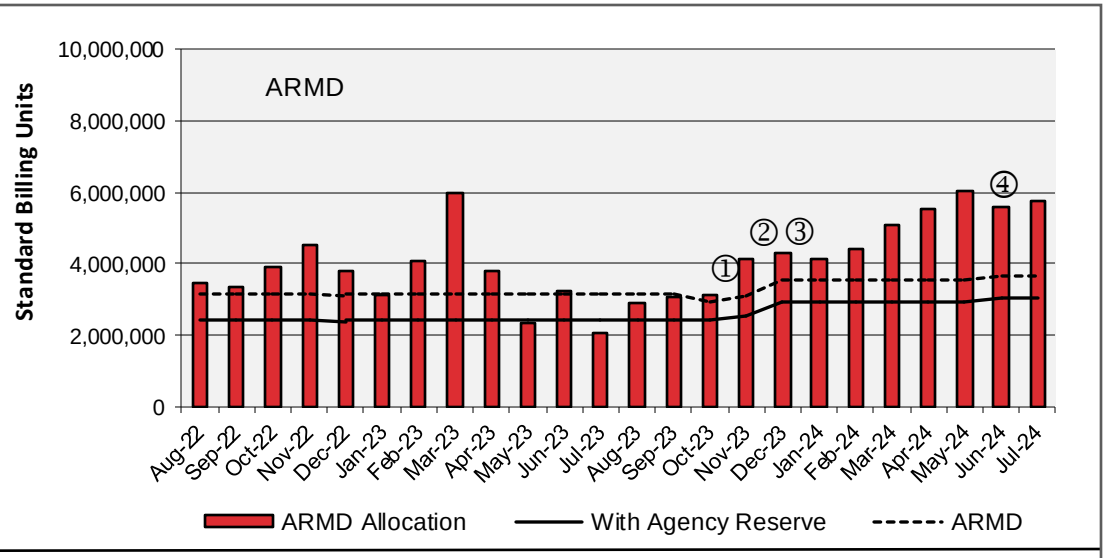


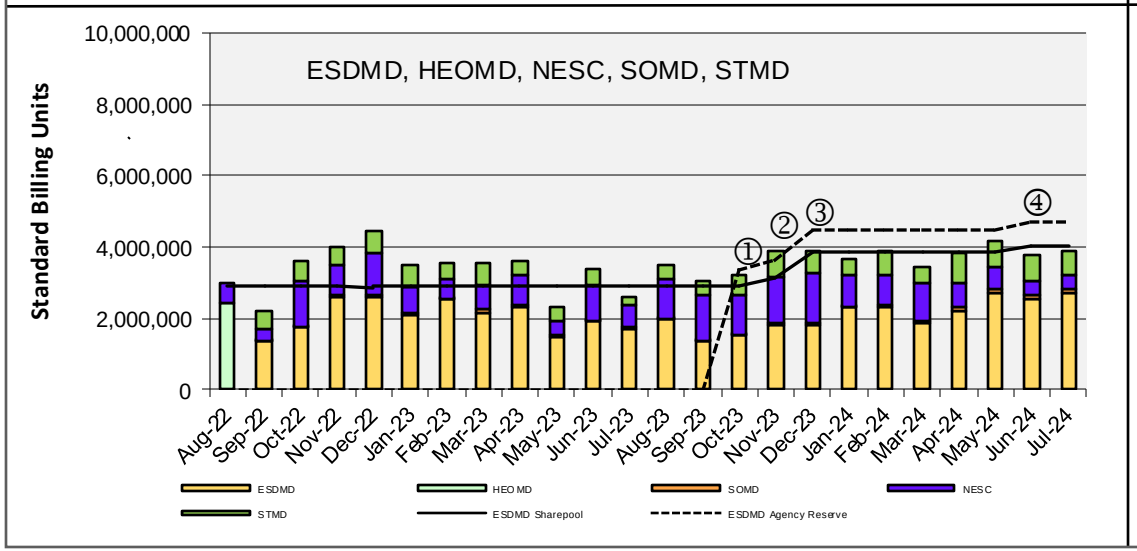
HECC Utilization Normalized to 30-Day Month



HECC Utilization Normalized to 30-Day Month







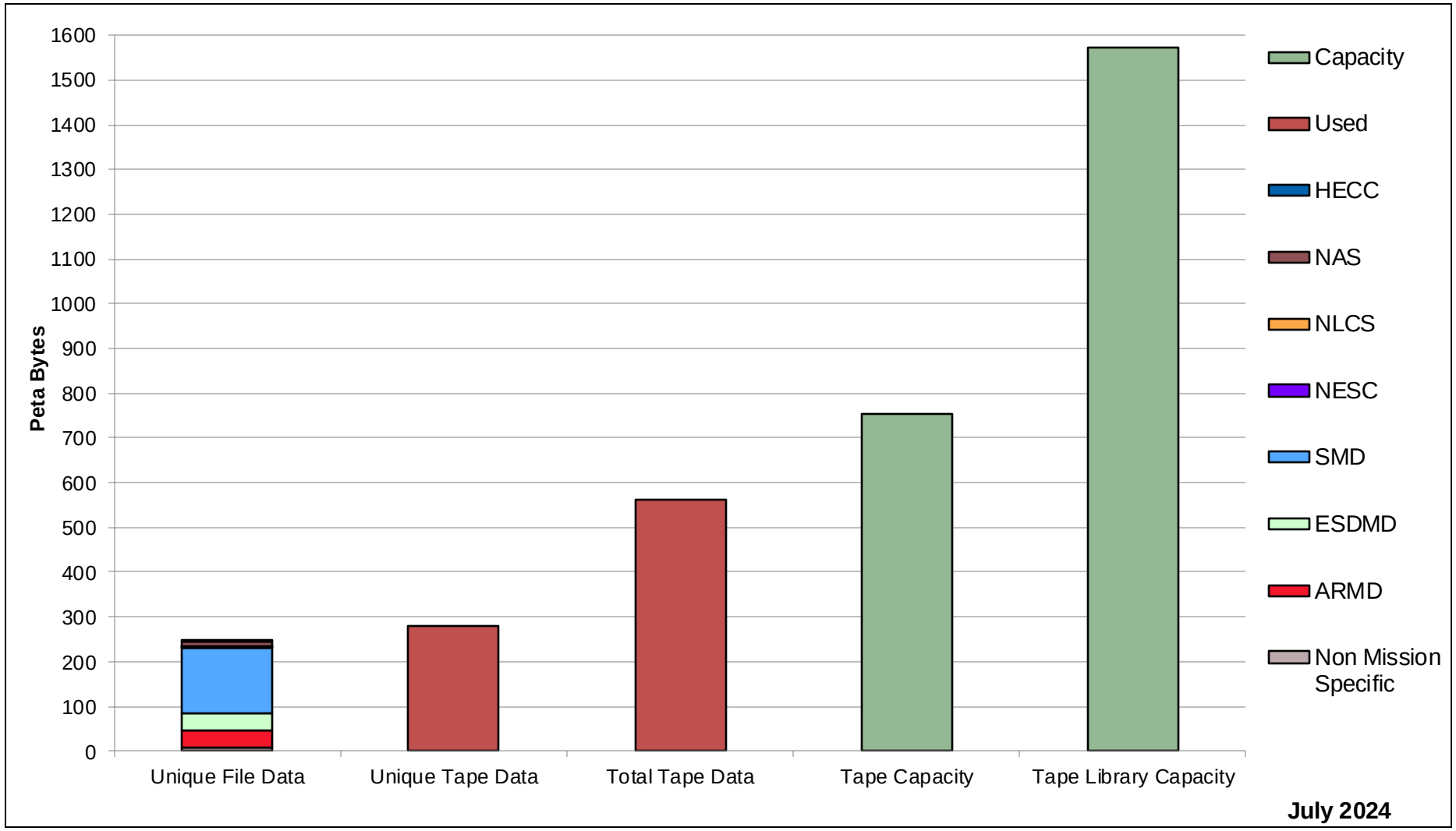
① October 2023 - Agency Reserve Divided evenly between MD sharepools

② November 2023 - Cabeus v100 GPU nodes added

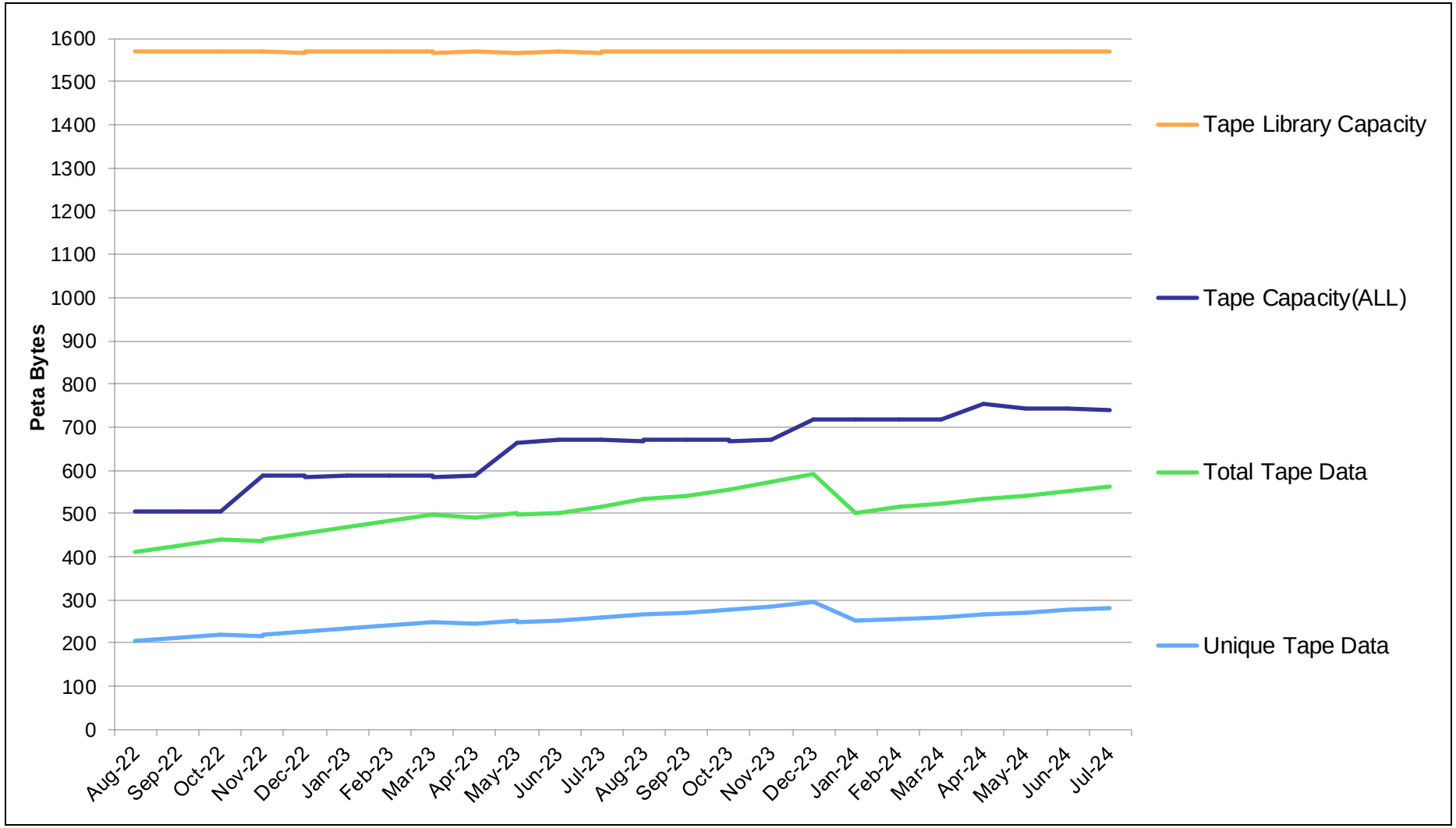
③ December 2023 - Cabeus Milan A100 nodes added

④ June 2024 - Aitken Milan nodes added

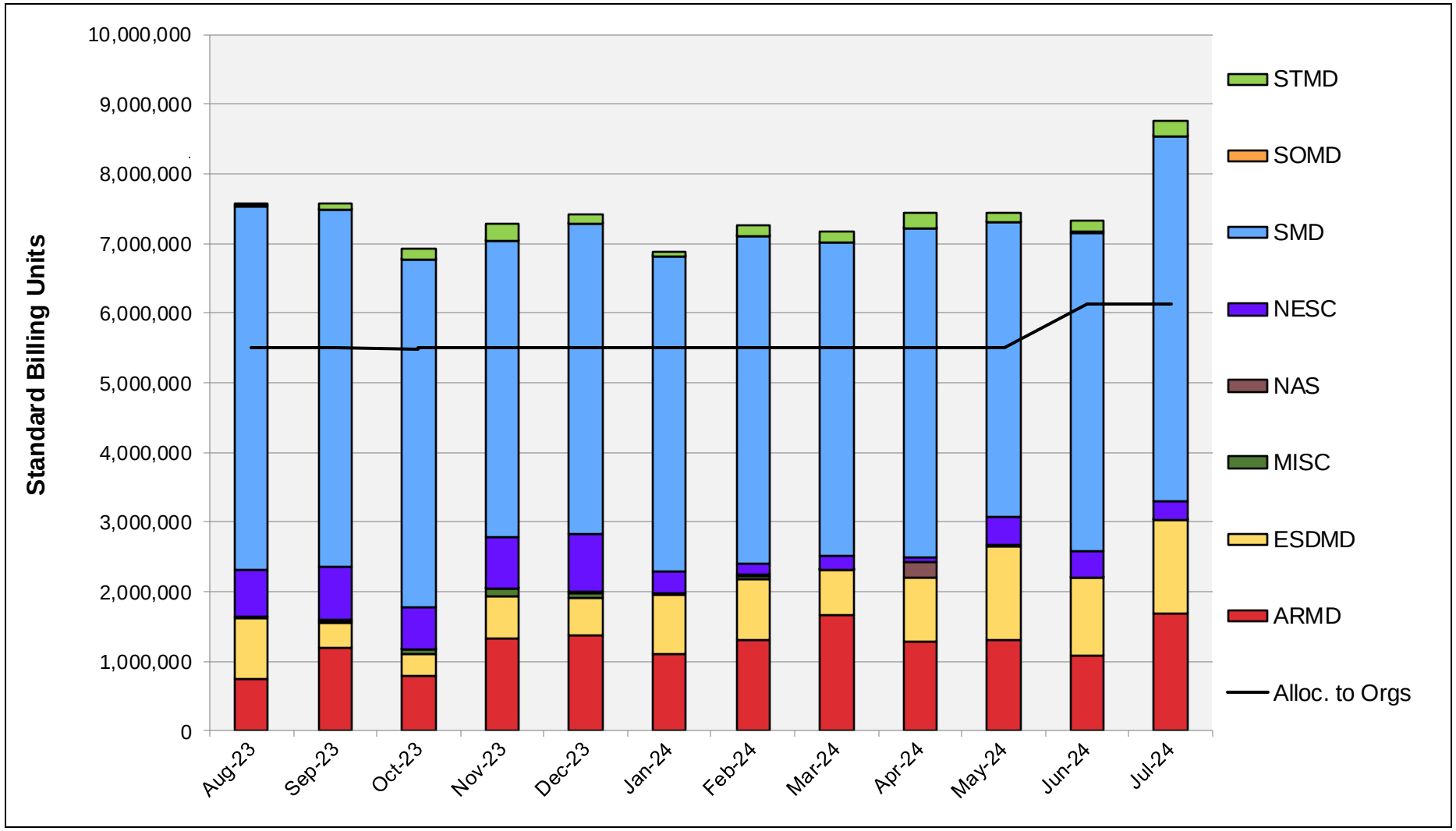
Tape Archive Status



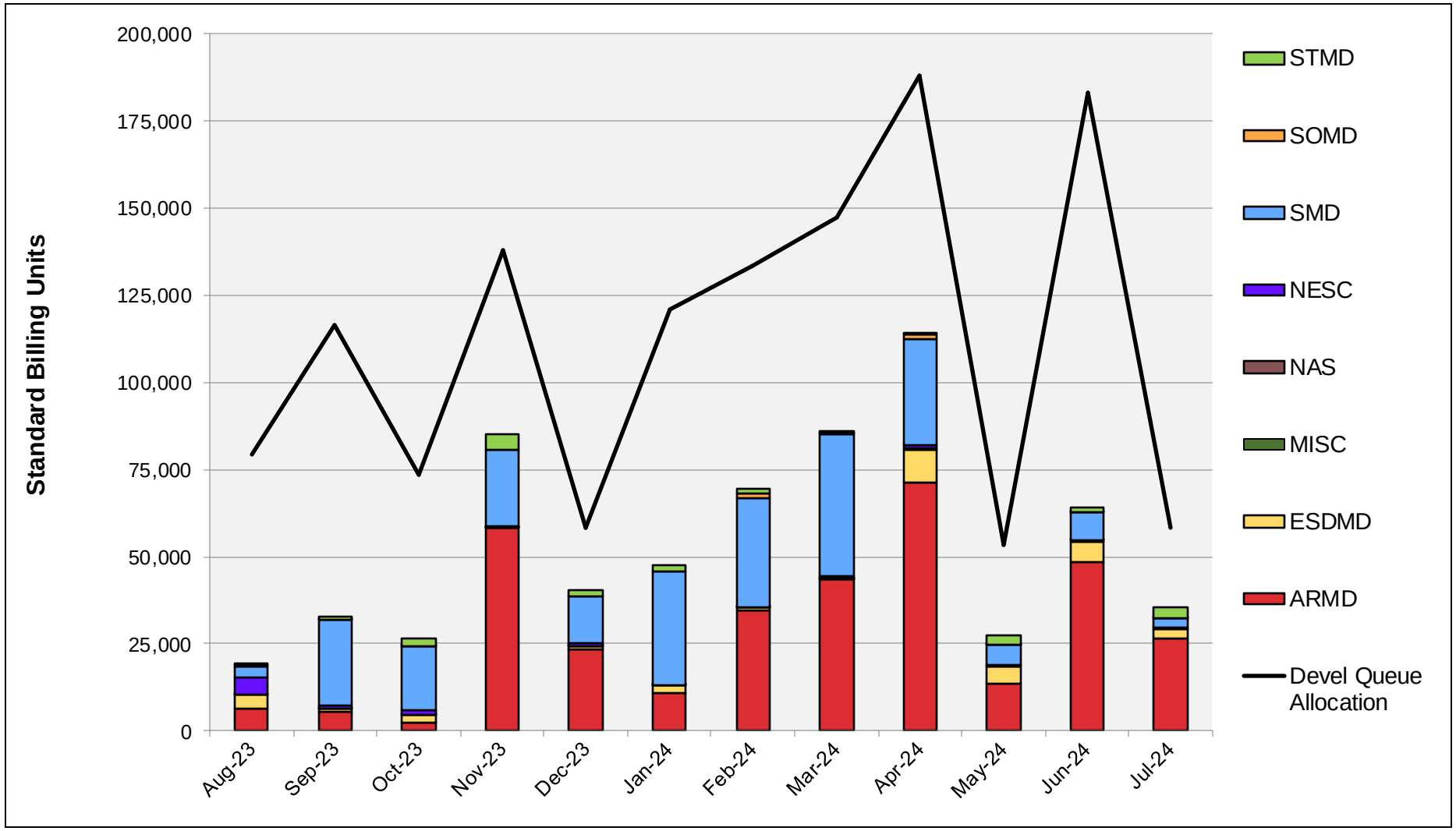
Tape Archive Status



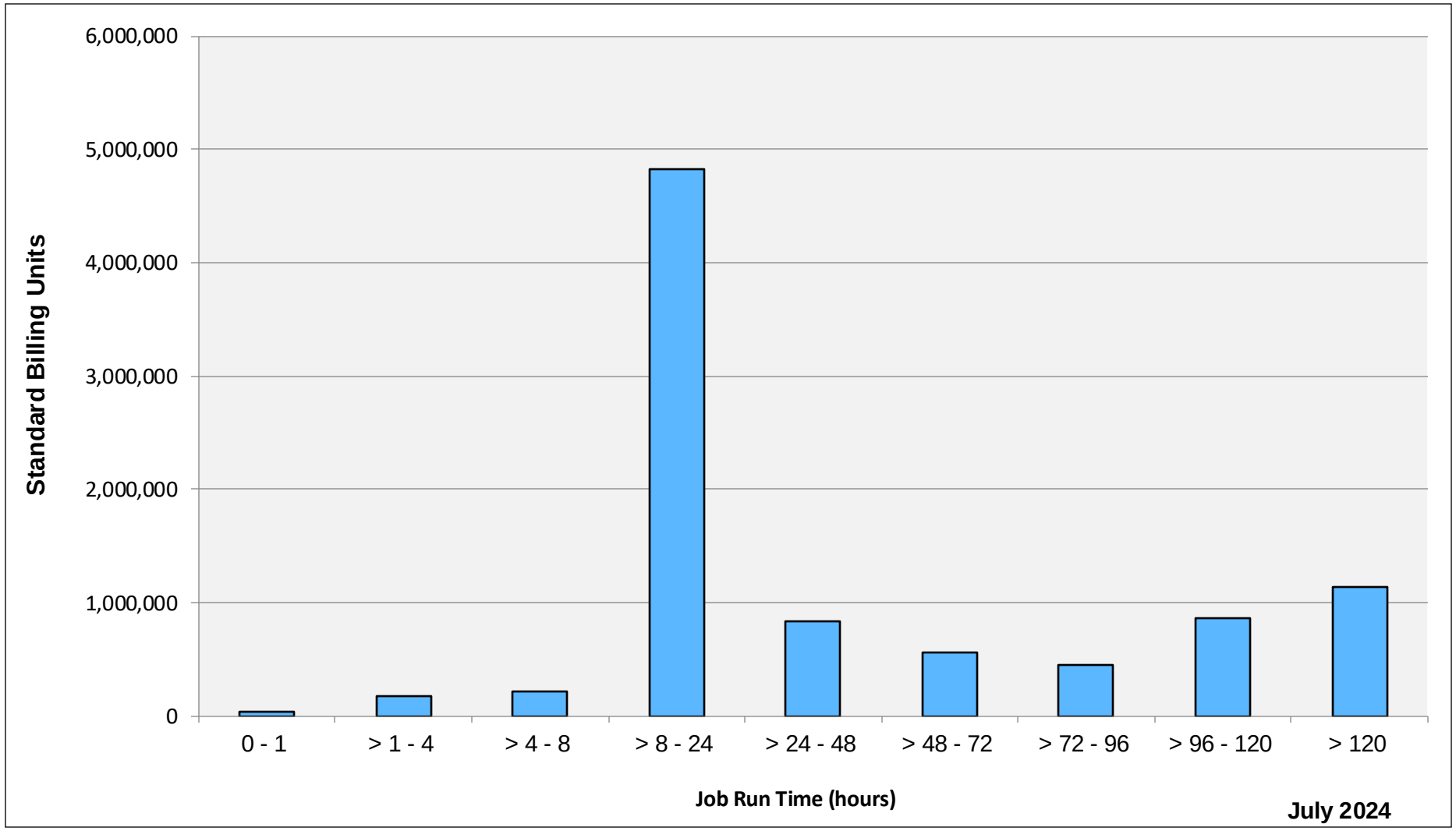
Aitken: SBUs Reported, Normalized to 30-Day Month



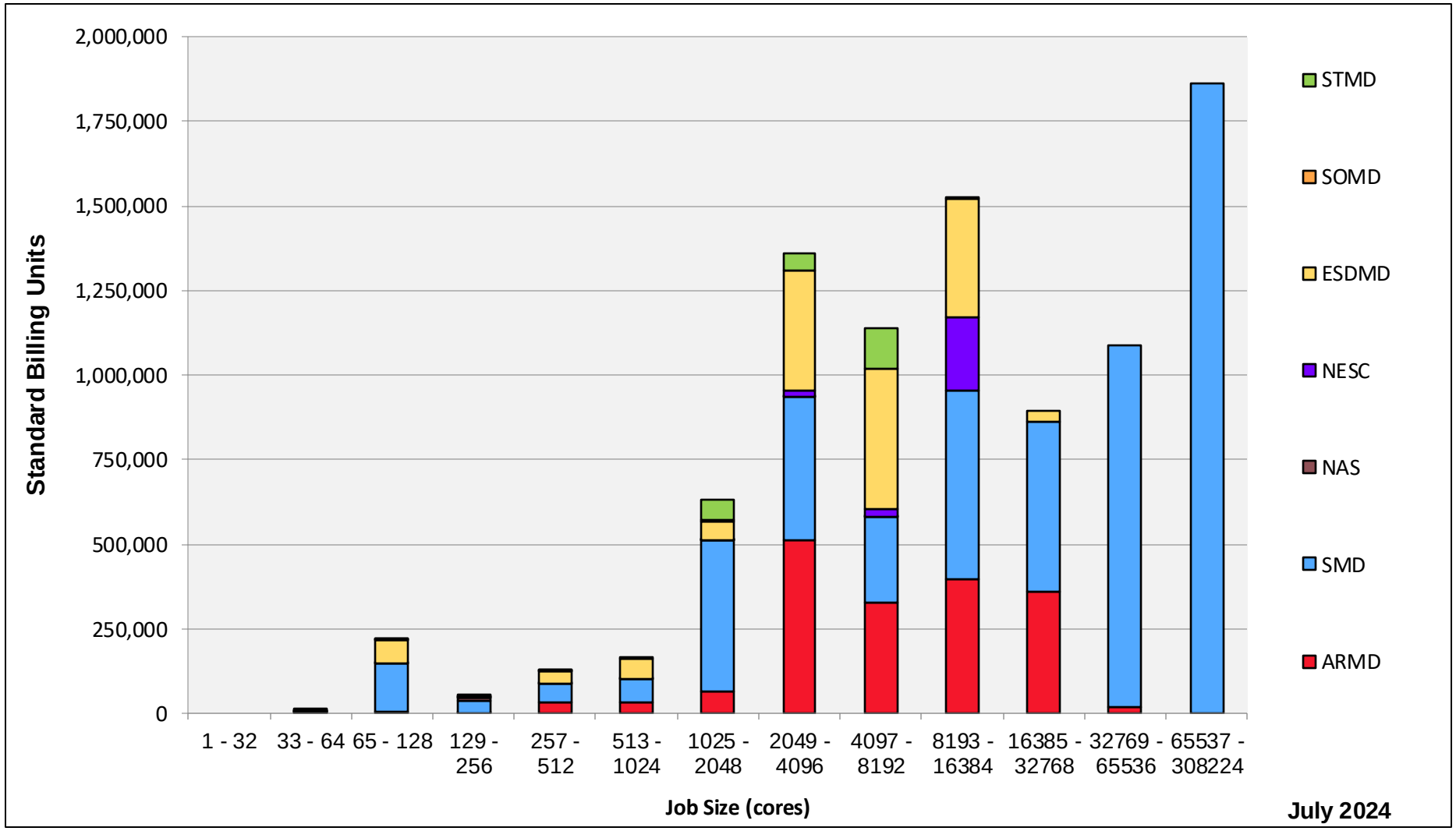
Aitken: Devel Queue Utilization



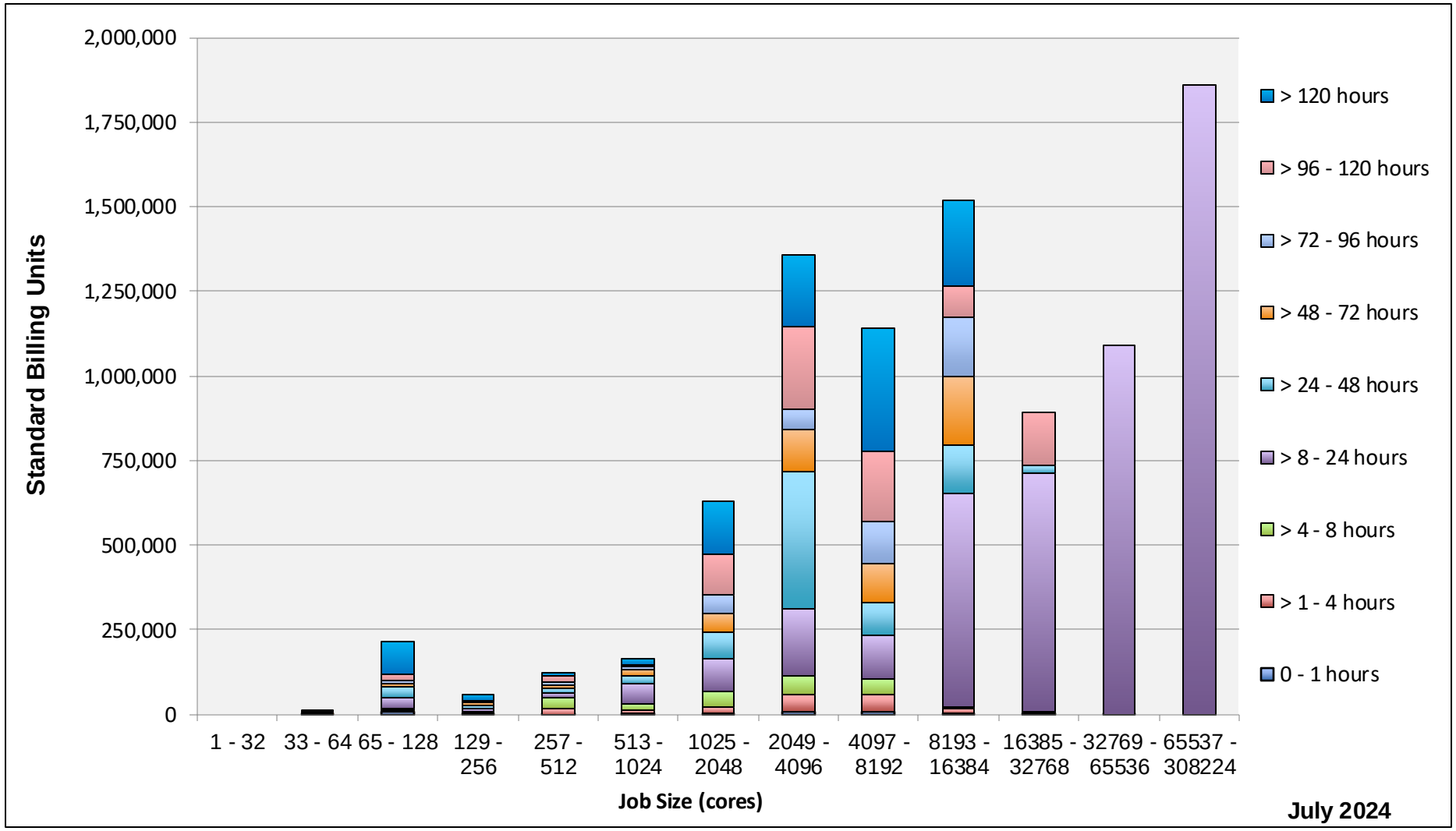
Aitken: Monthly Utilization by Job Length



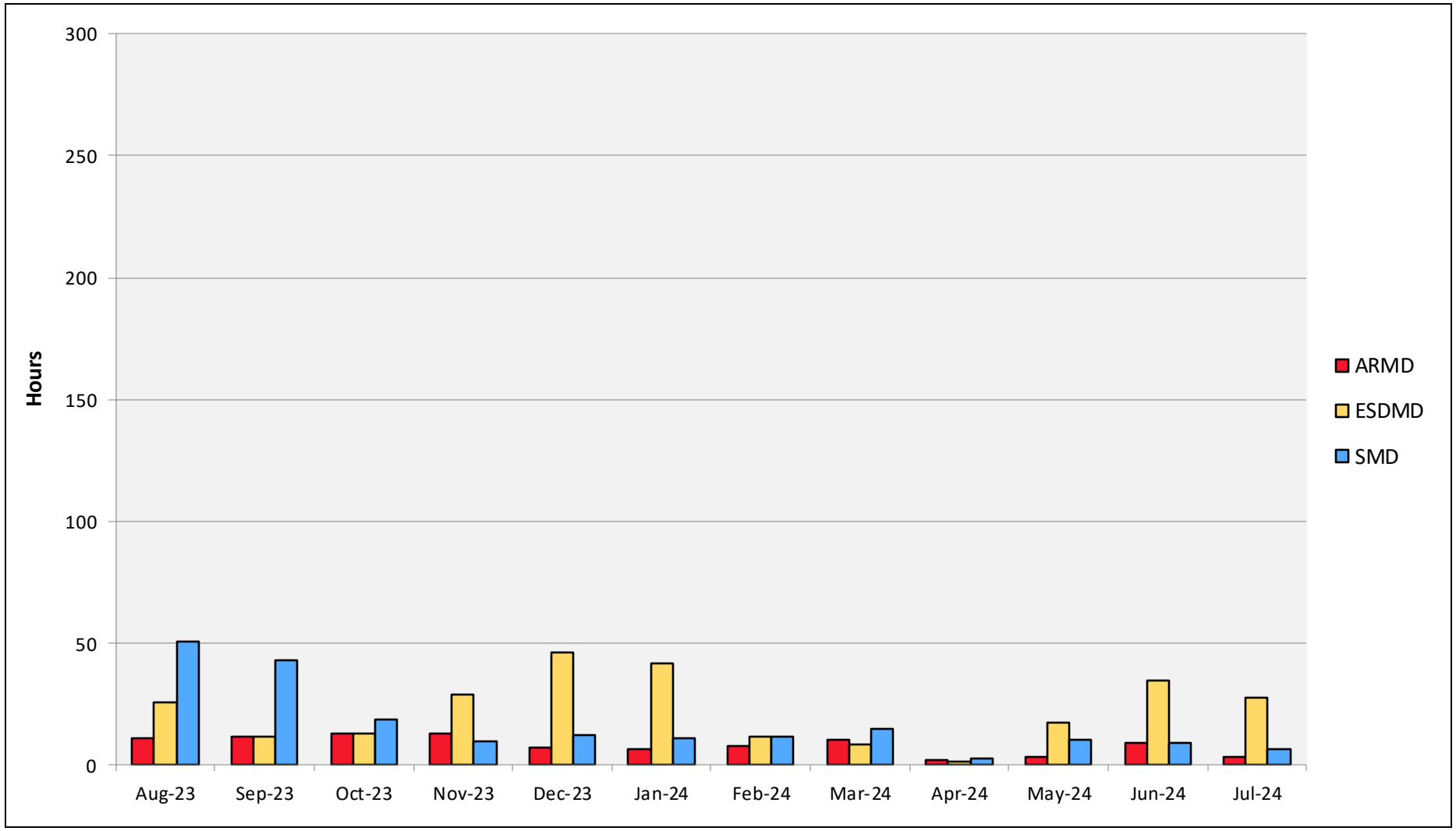
Aitken: Monthly Utilization by Job Size



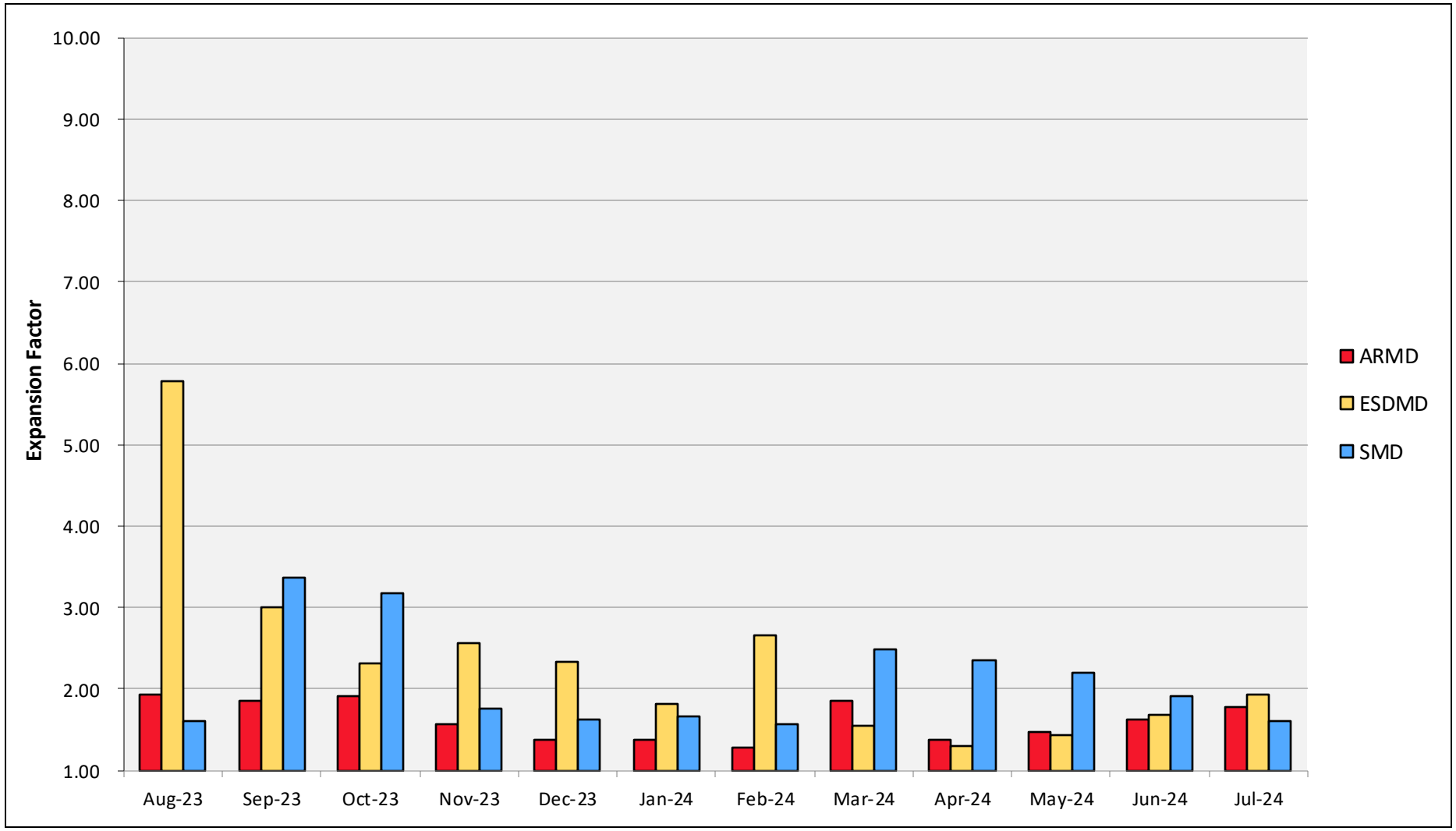
Aitken: Monthly Utilization by Size and Length



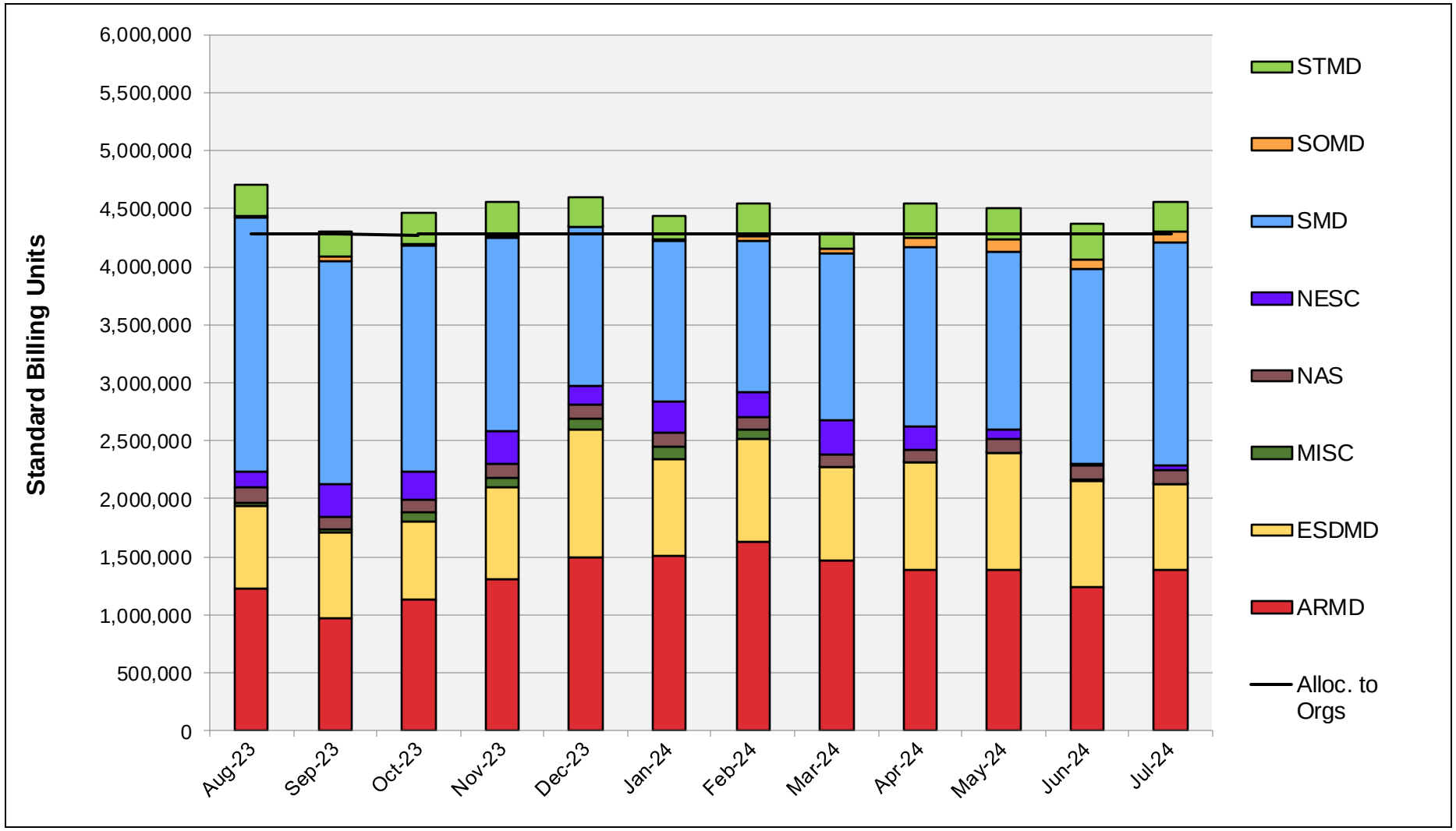
Aitken: Average Time to Clear All Jobs



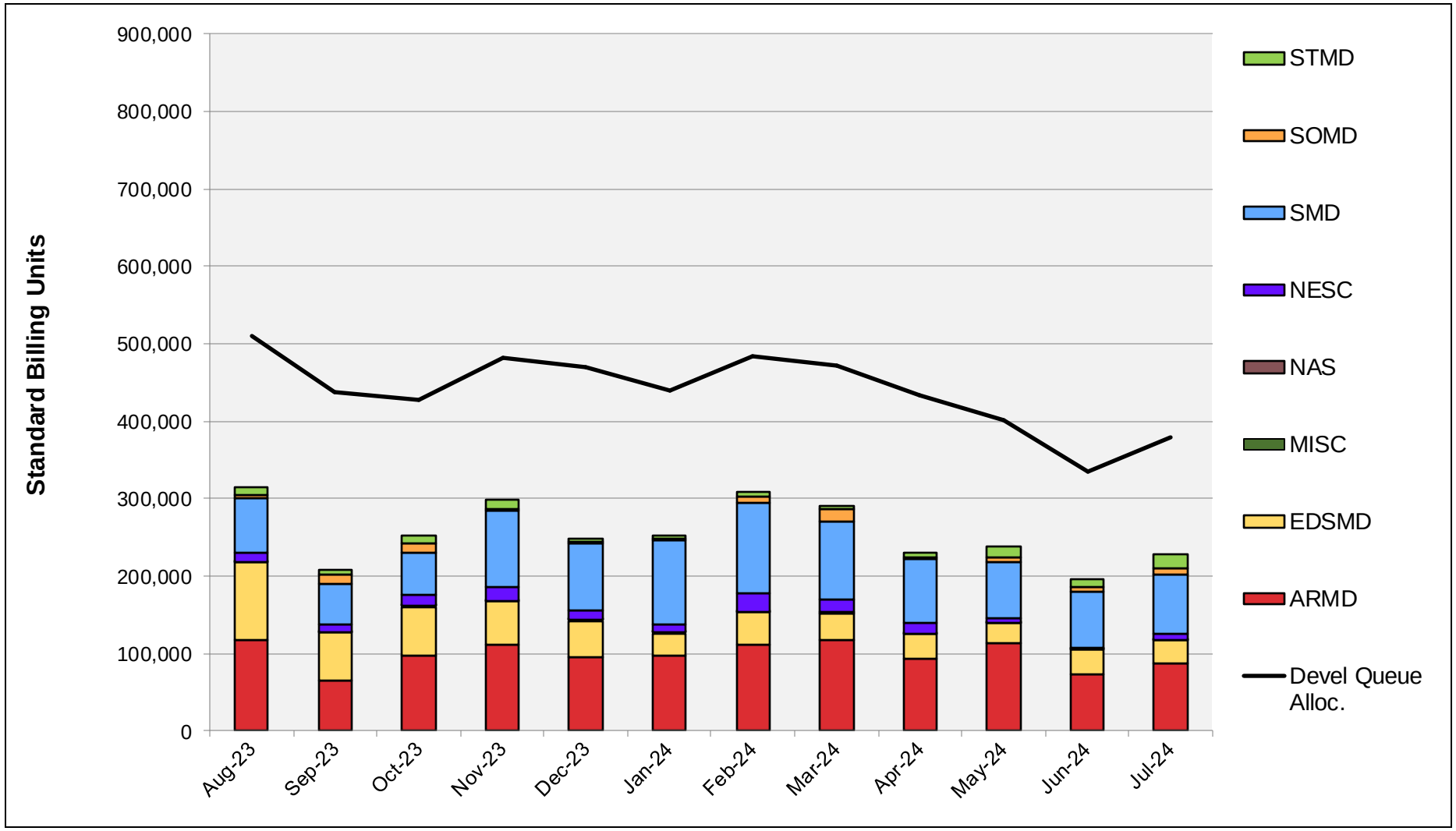
Aitken: Average Expansion Factor



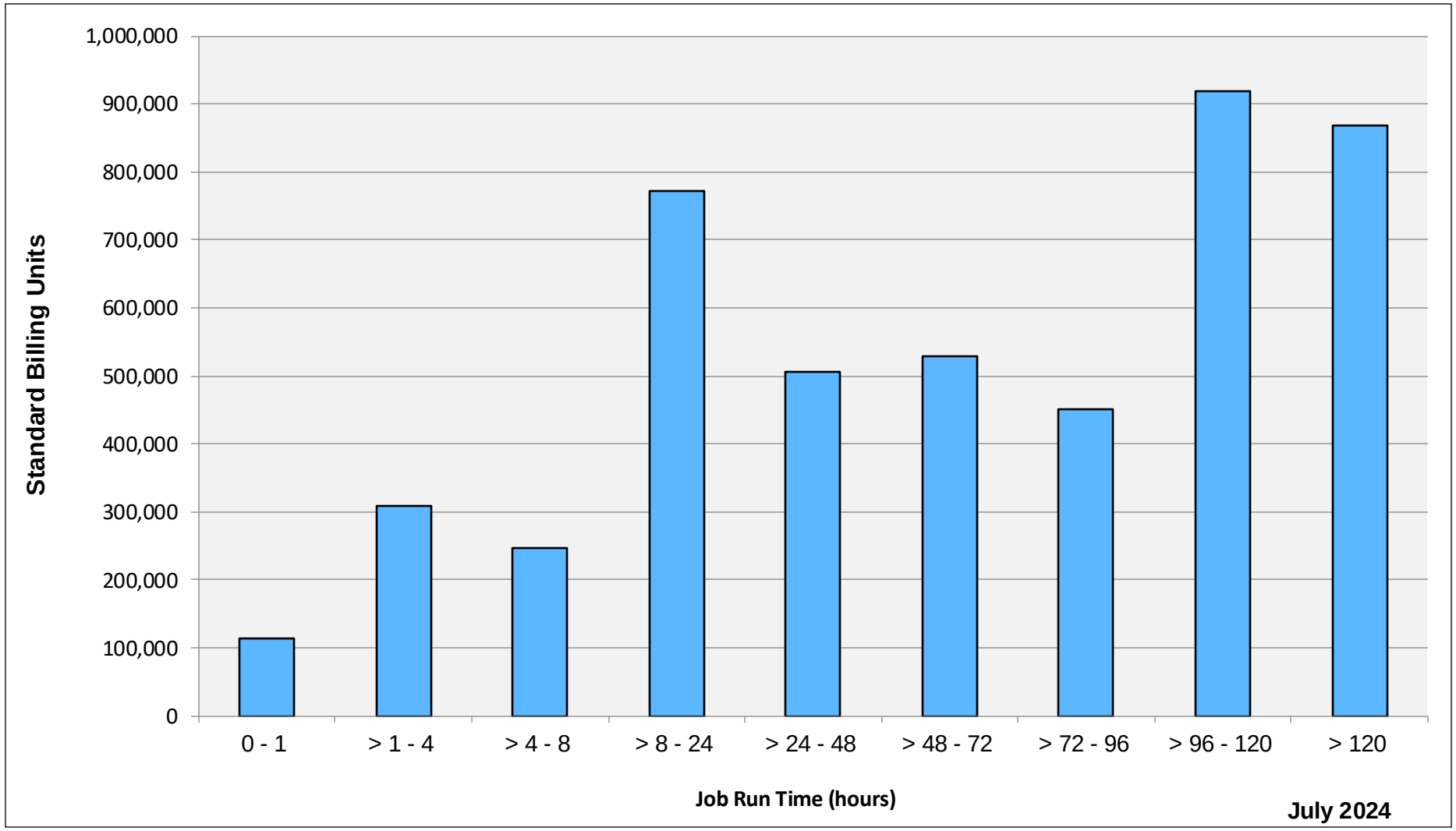
Pleiades: SBUs Reported, Normalized to 30-Day Month



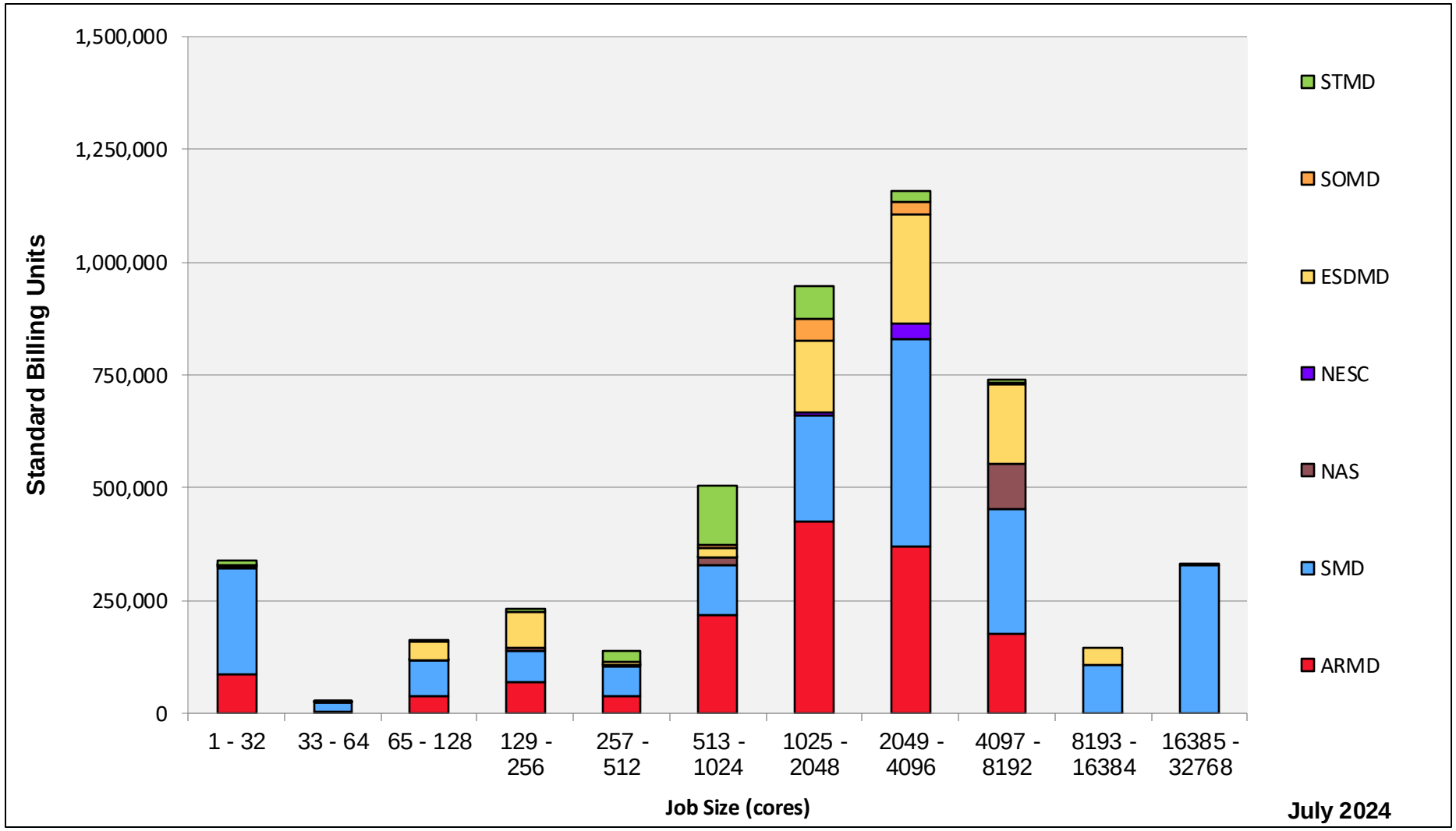
Pleiades: Devel Queue Utilization



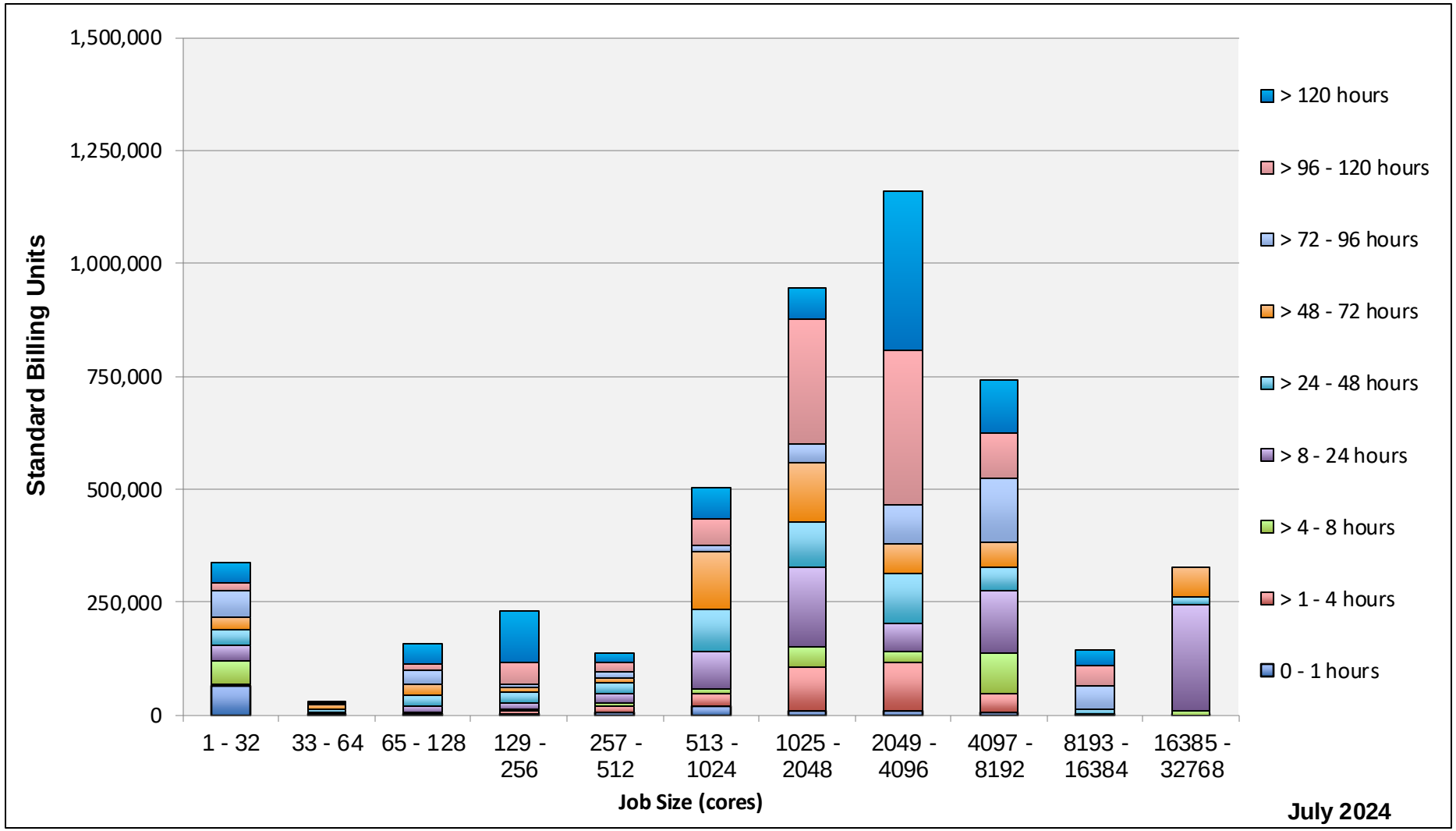
Pleiades: Monthly Utilization by Job Length



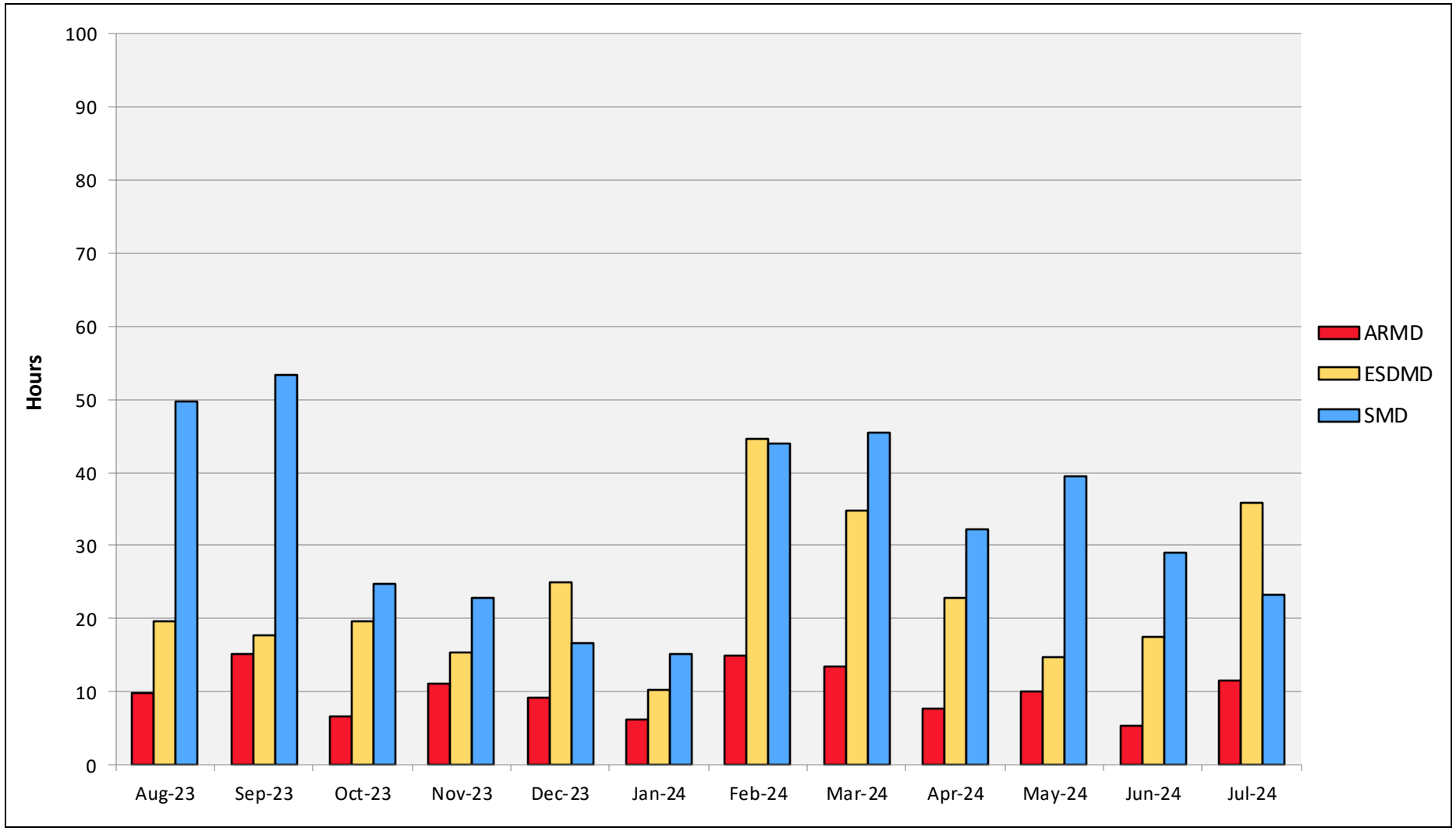
Pleiades: Monthly Utilization by Job Size



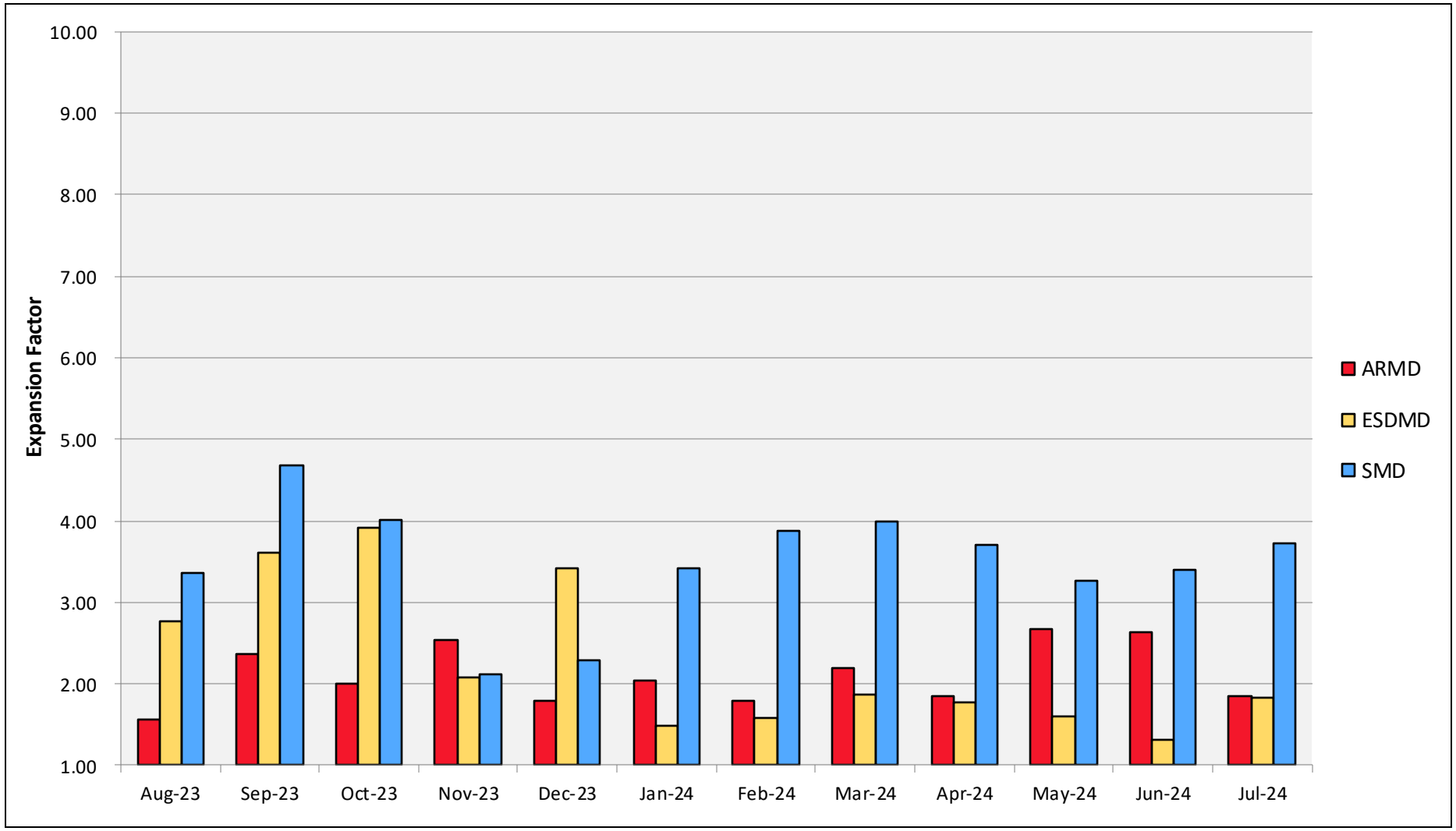
Pleiades: Monthly Utilization by Size and Length



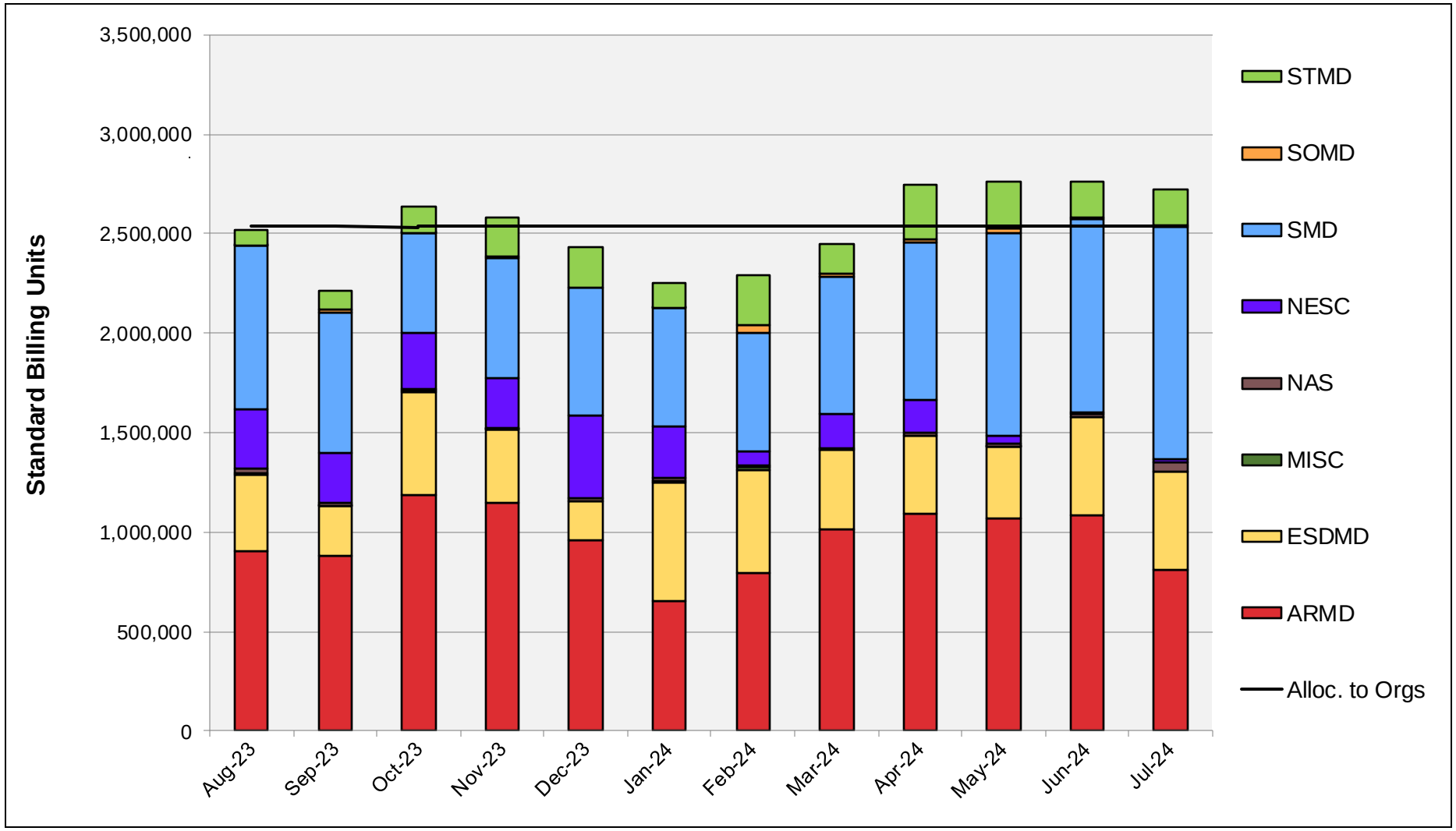
Pleiades: Average Time to Clear All Jobs



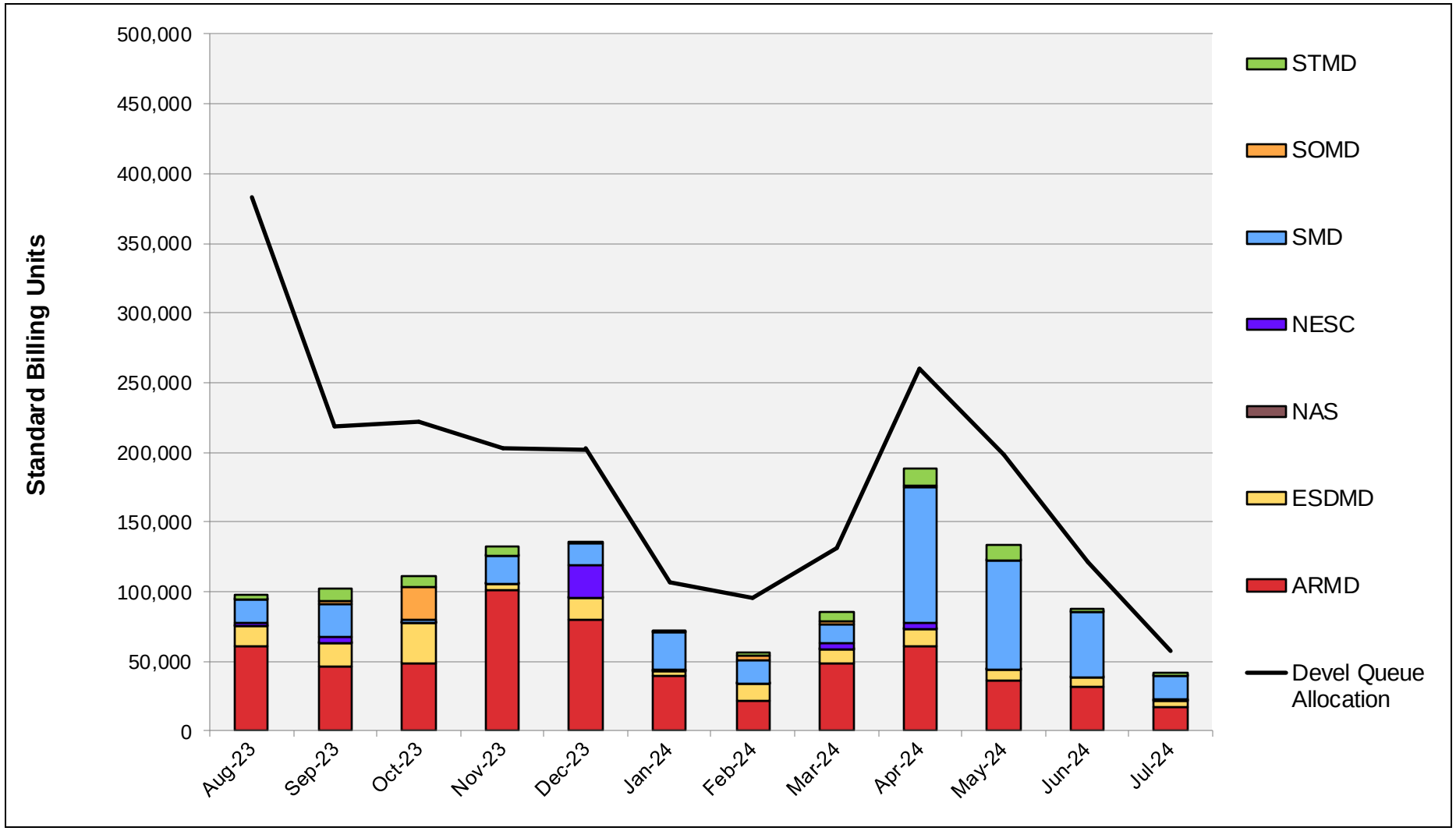
Pleiades: Average Expansion Factor



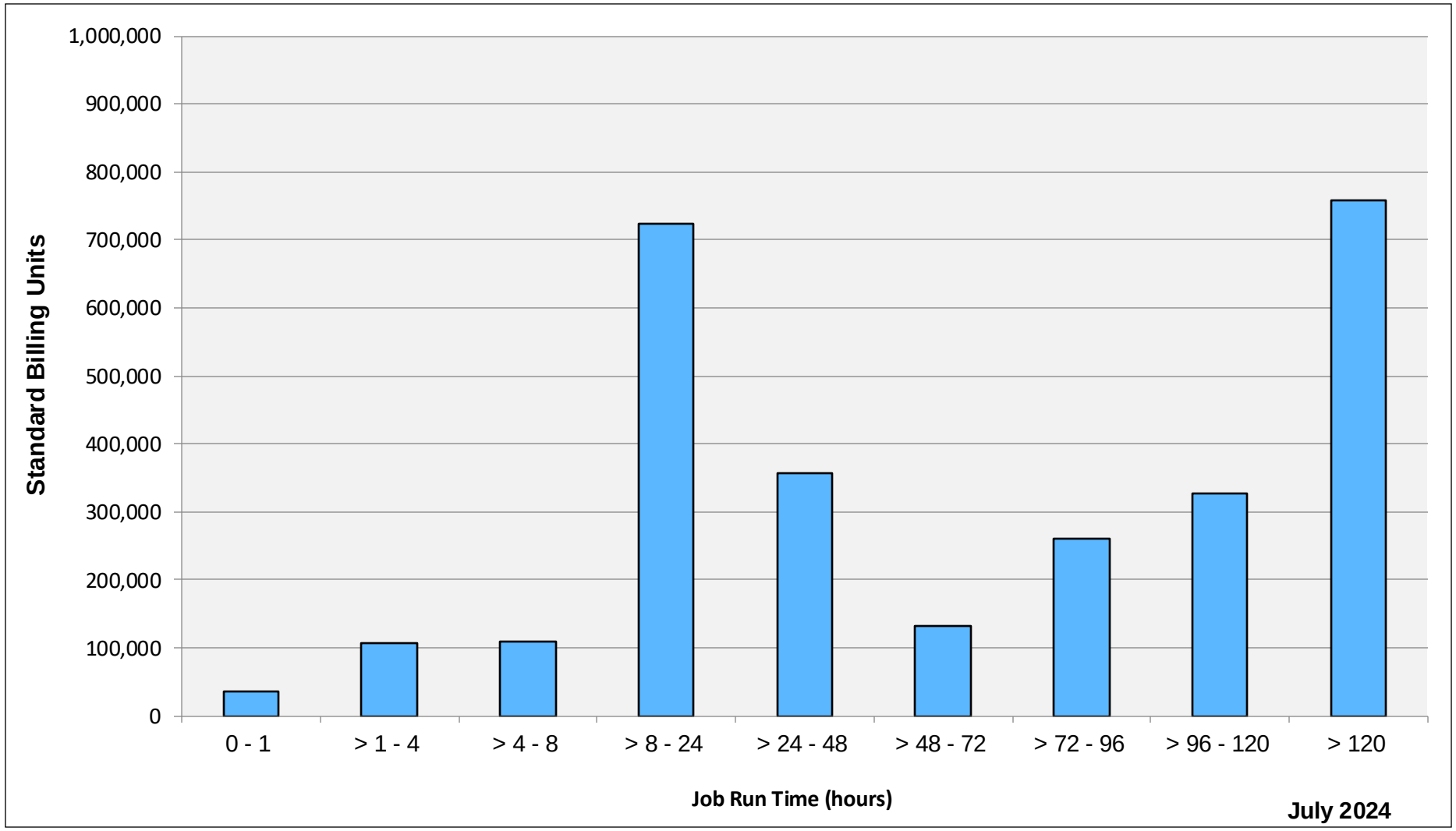
Electra: SBUs Reported, Normalized to 30-Day Month



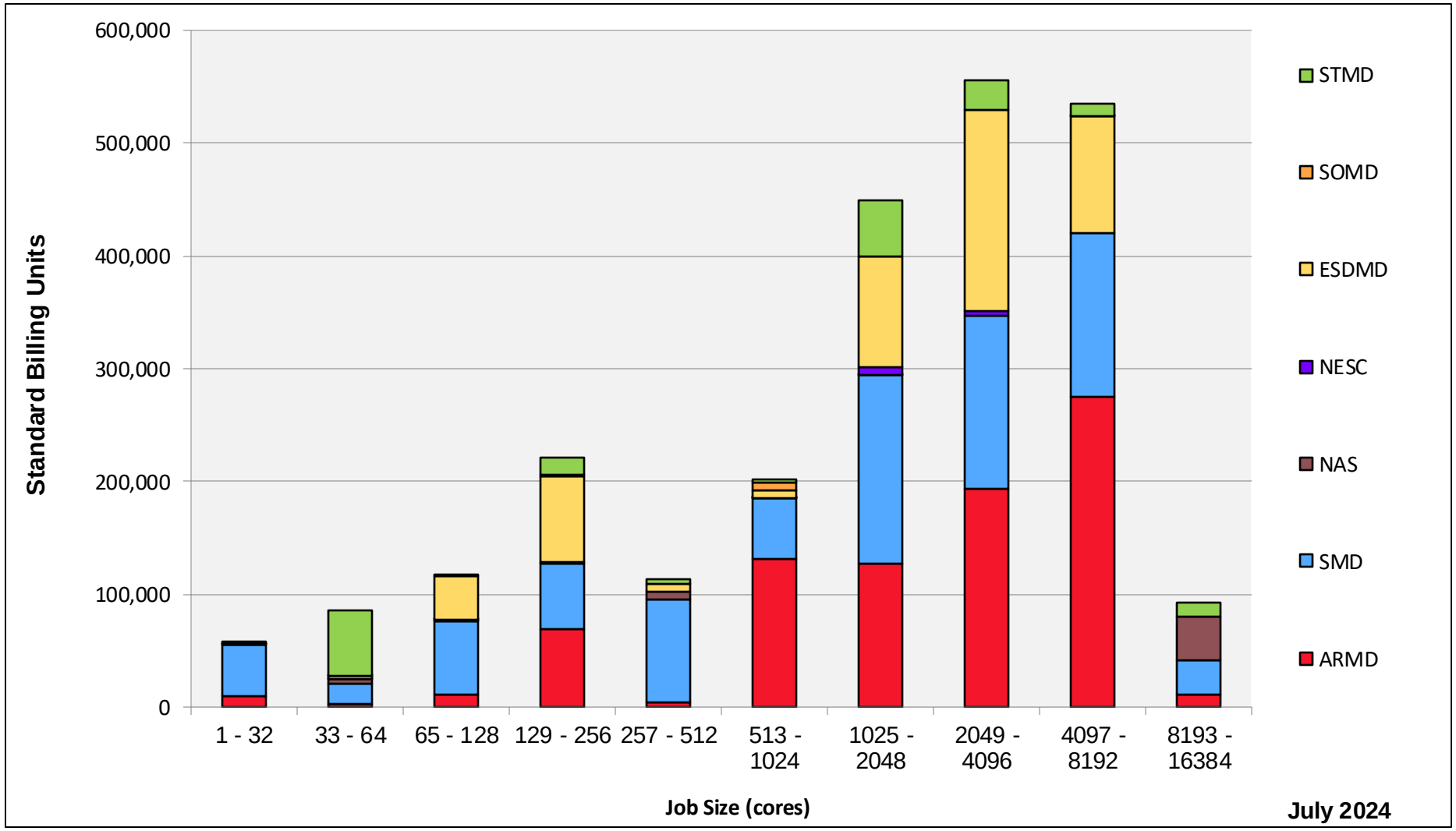
Electra: Devel Queue Utilization



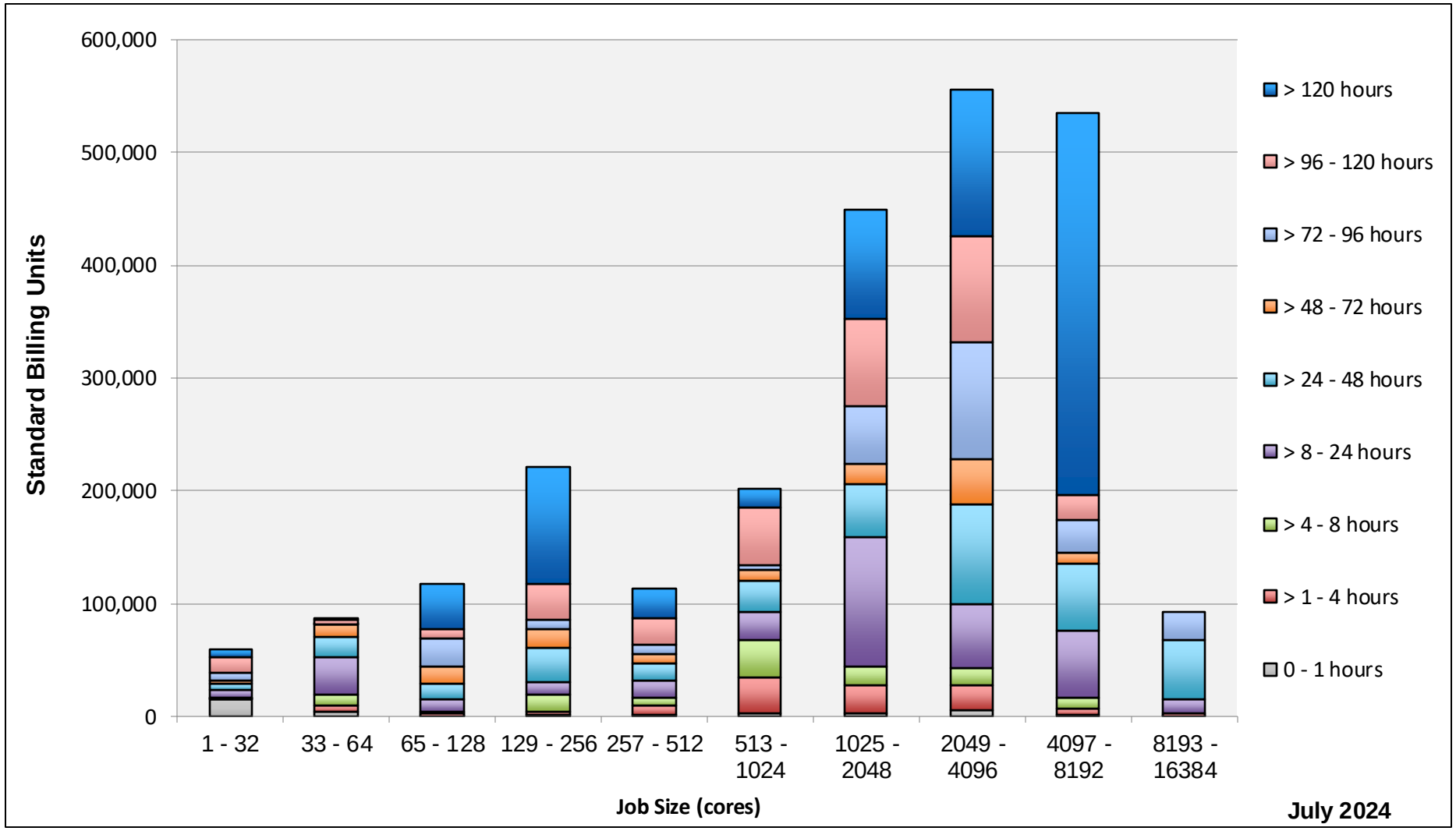
Electra: Monthly Utilization by Job Length



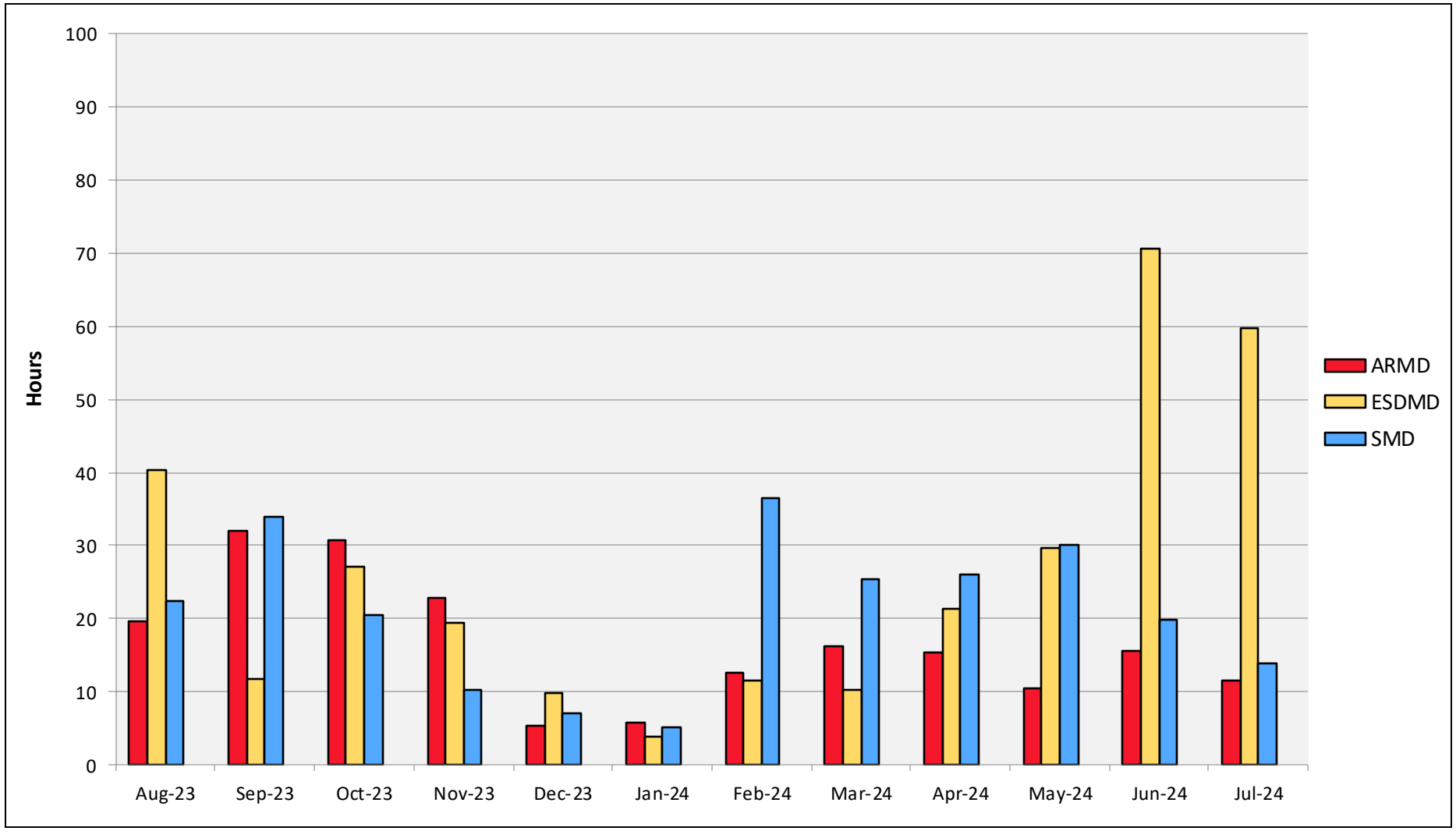
Electra: Monthly Utilization by Job Size



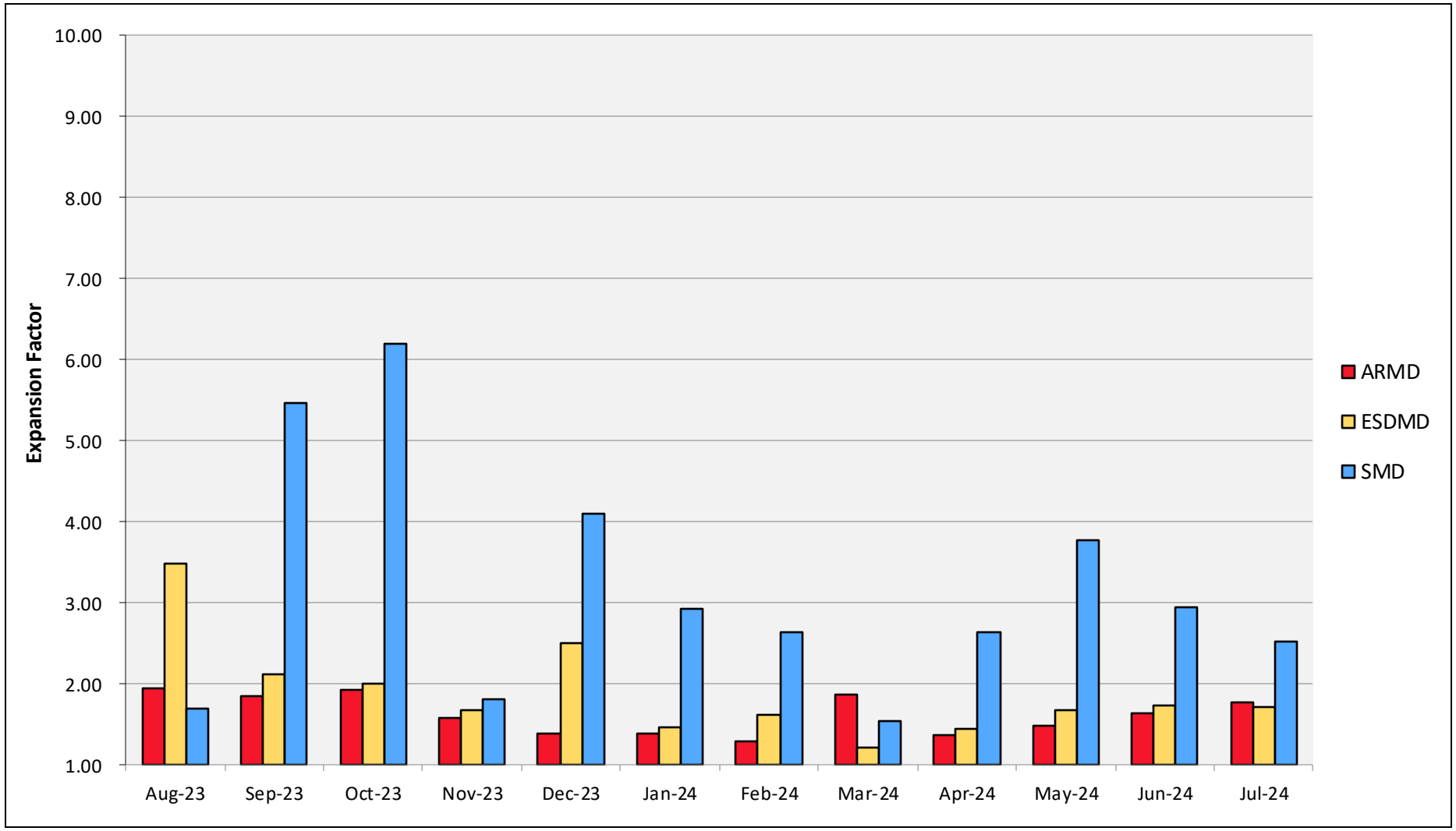
Electra: Monthly Utilization by Size and Length



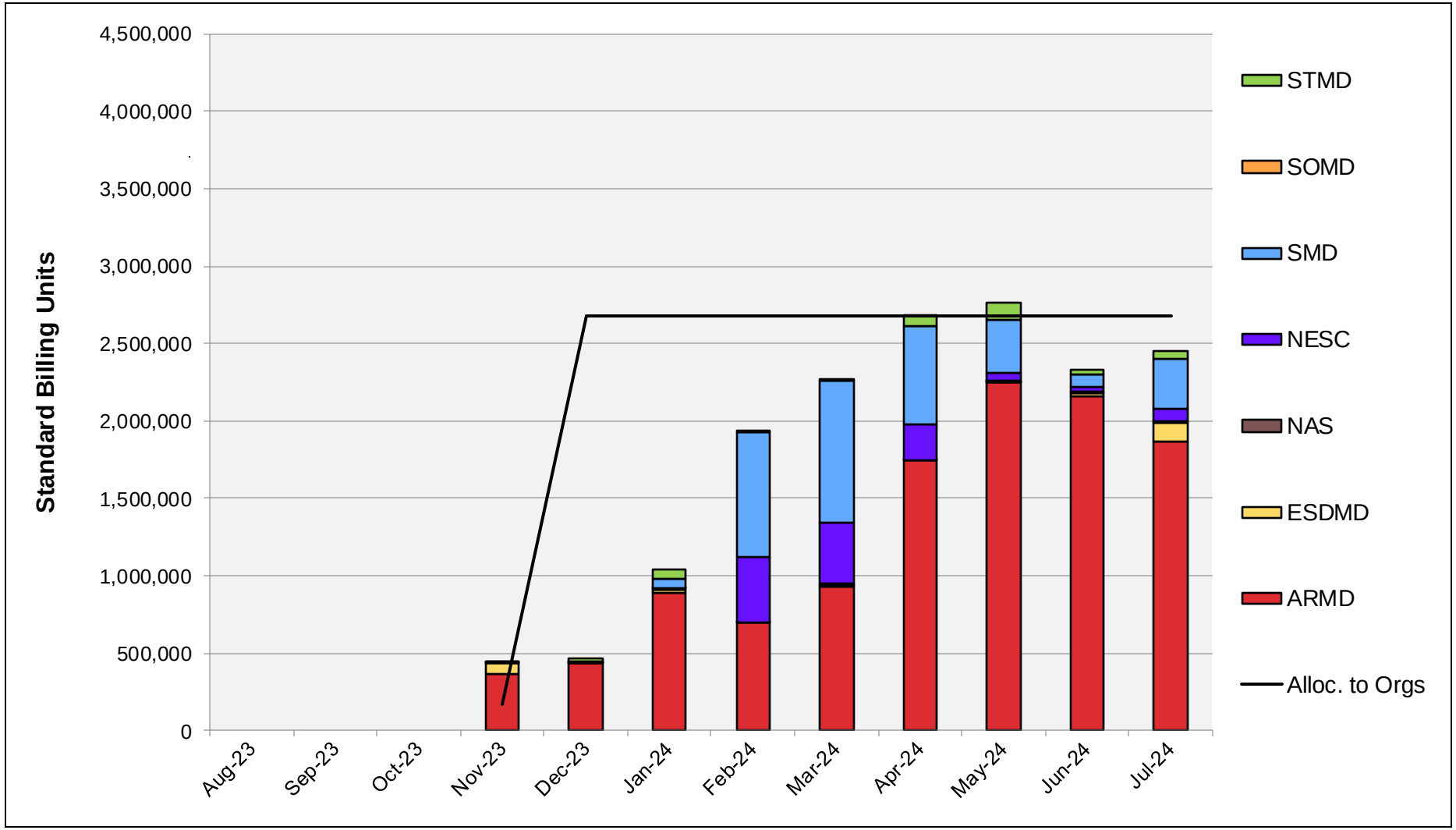
Electra: Average Time to Clear All Jobs



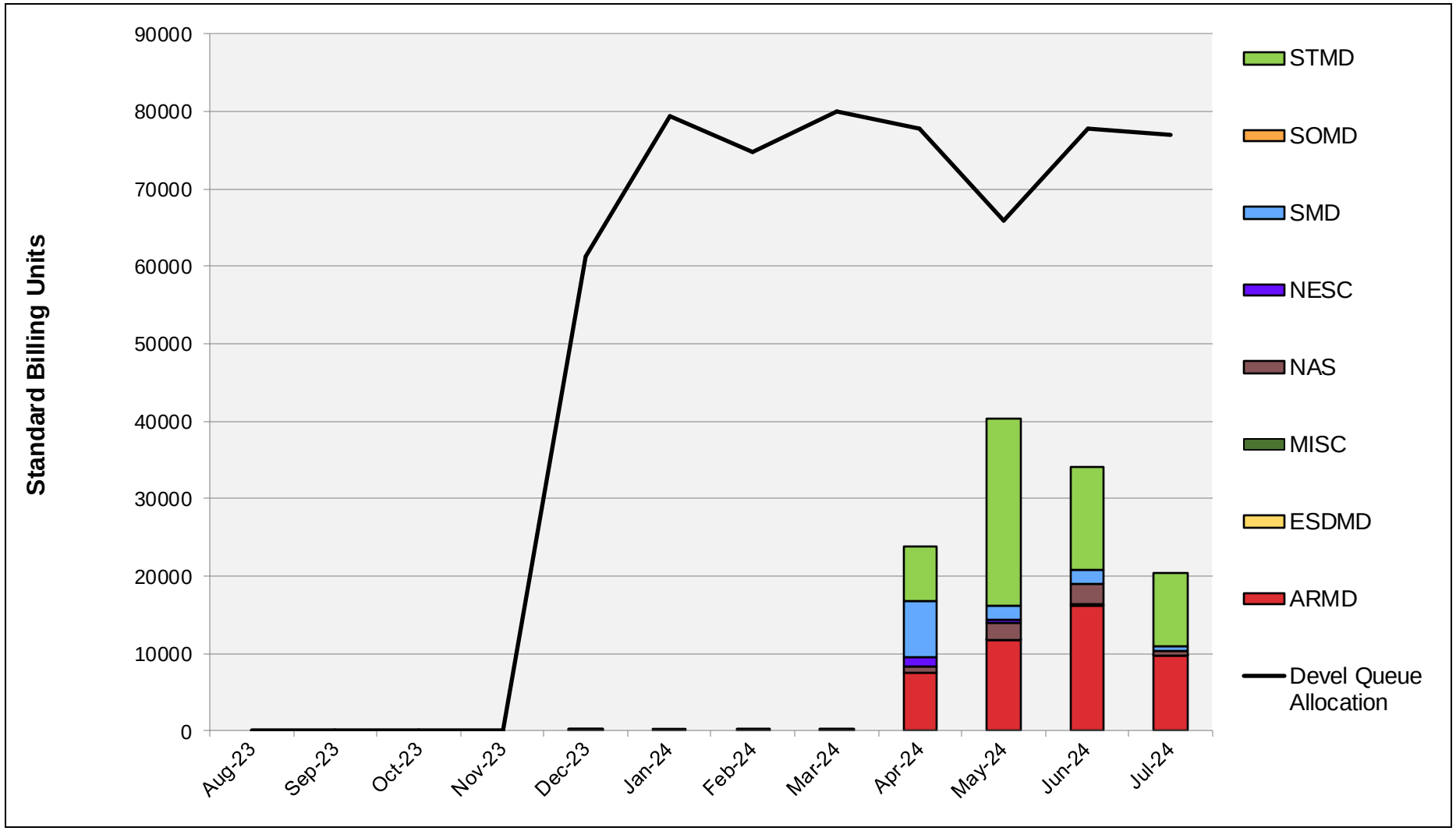
Electra: Average Expansion Factor



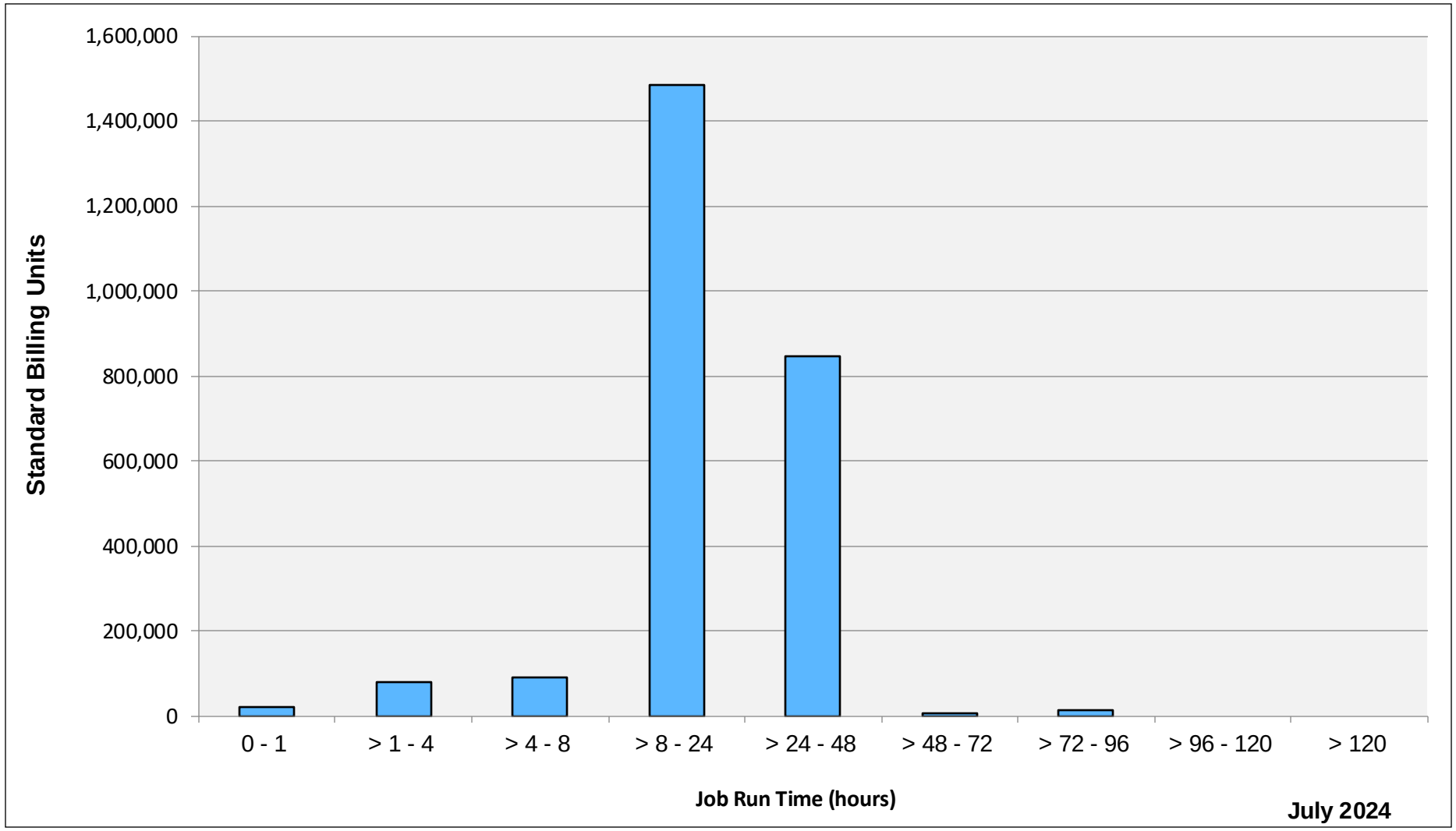
Cabeus: SBUs Reported, Normalized to 30-Day Month



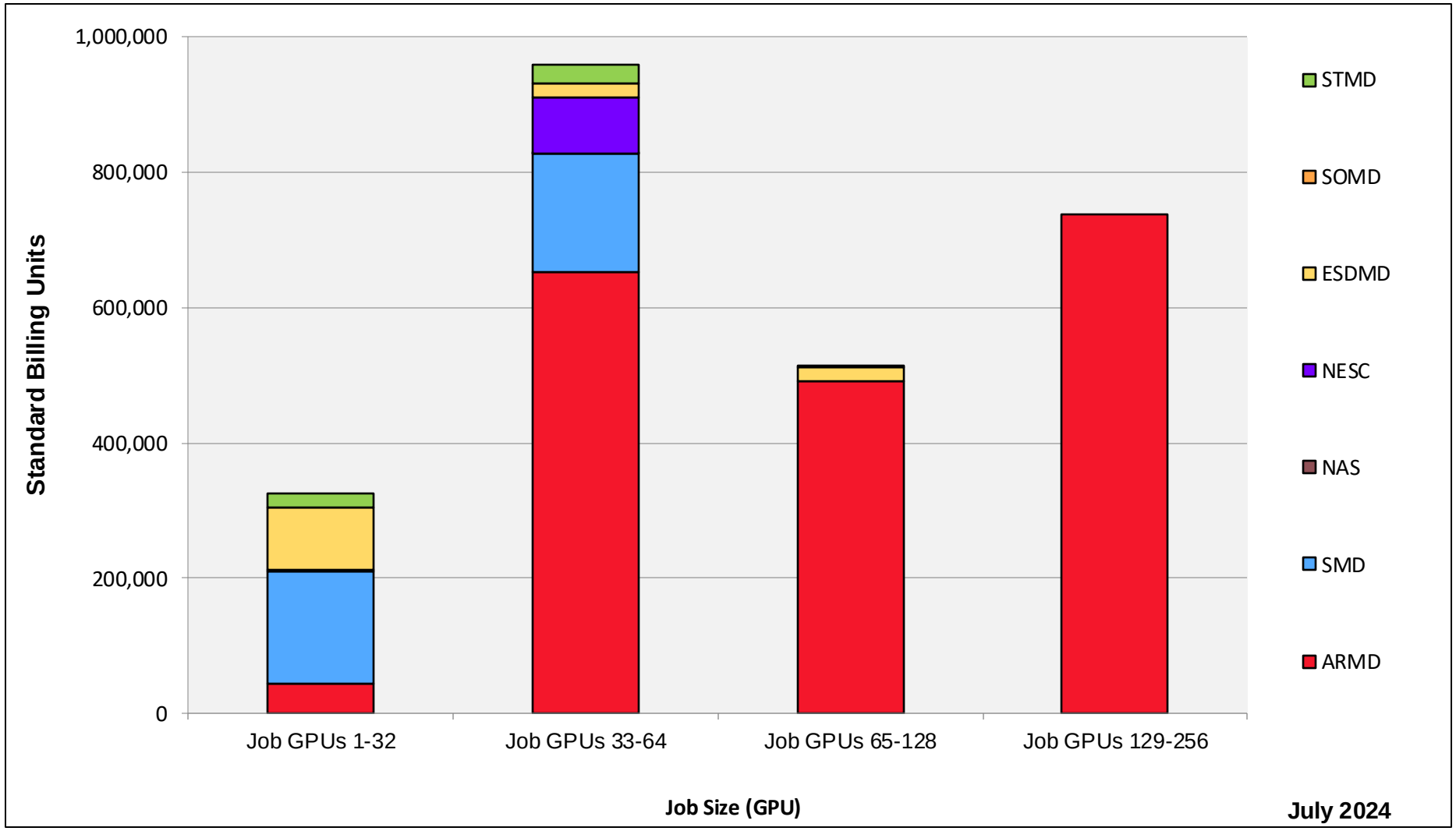
Cabeus: Devel Queue Utilization



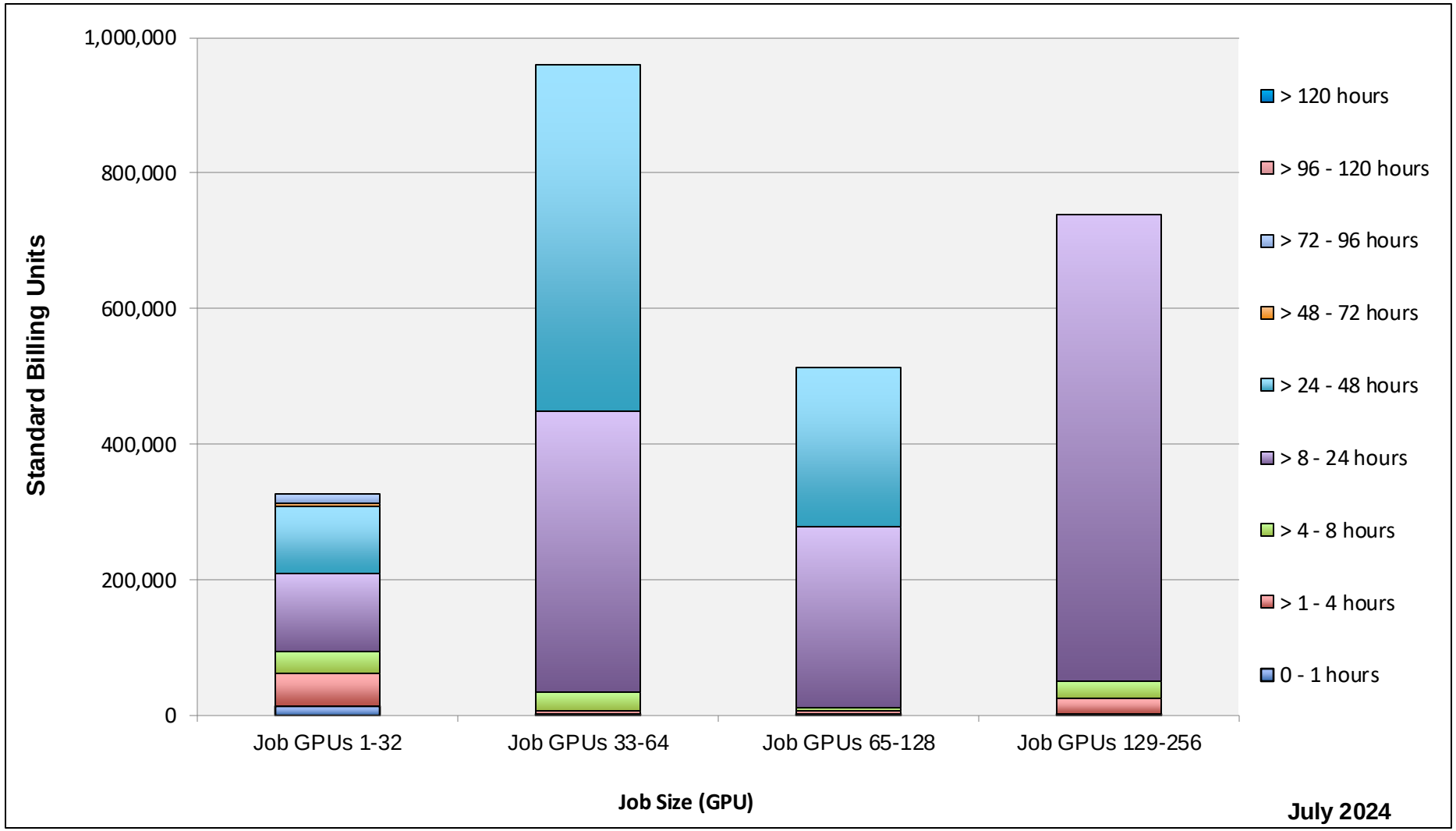
Cabeus: Monthly Utilization by Job Length



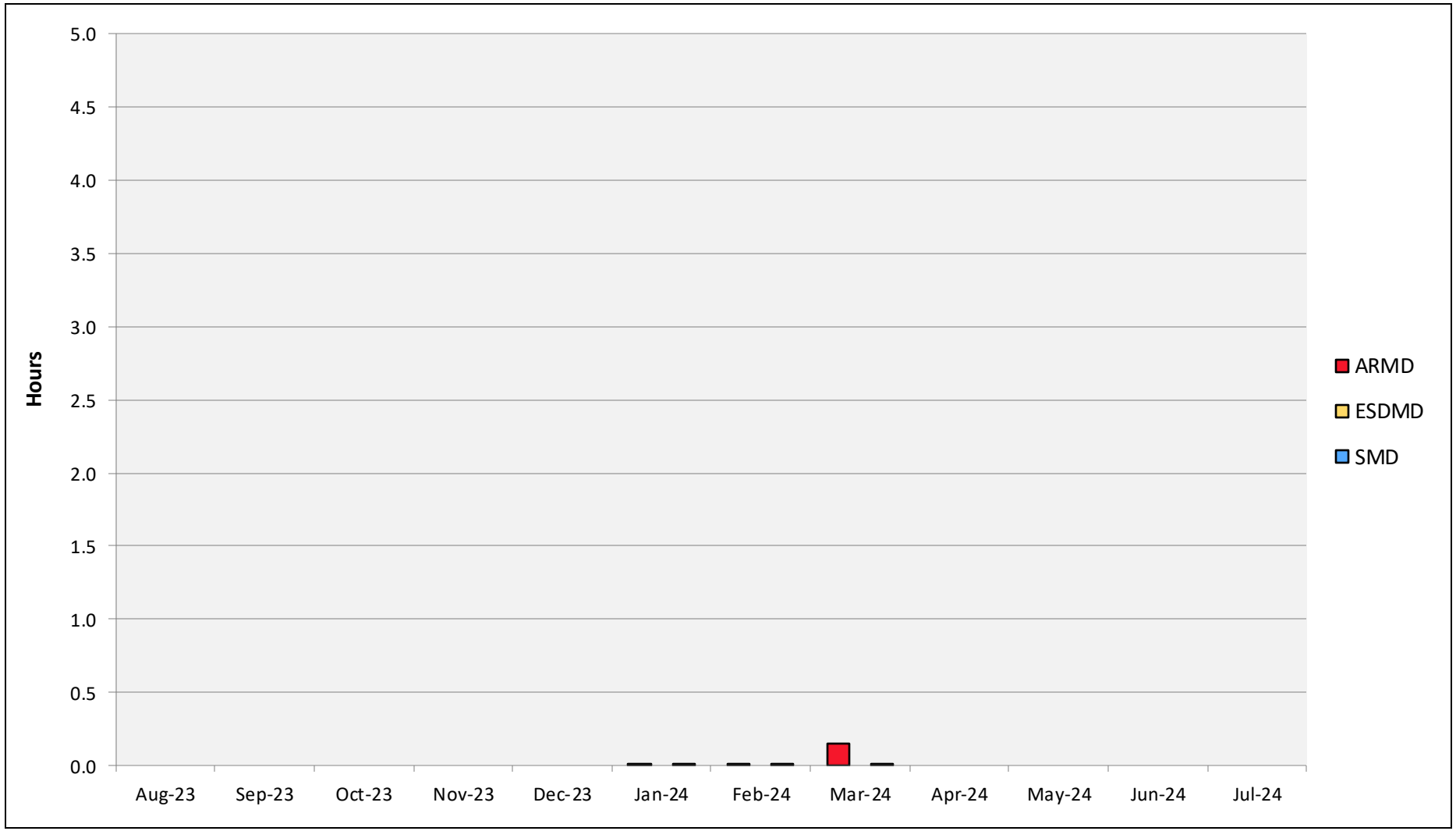
Cabeus: Monthly Utilization by Job Size



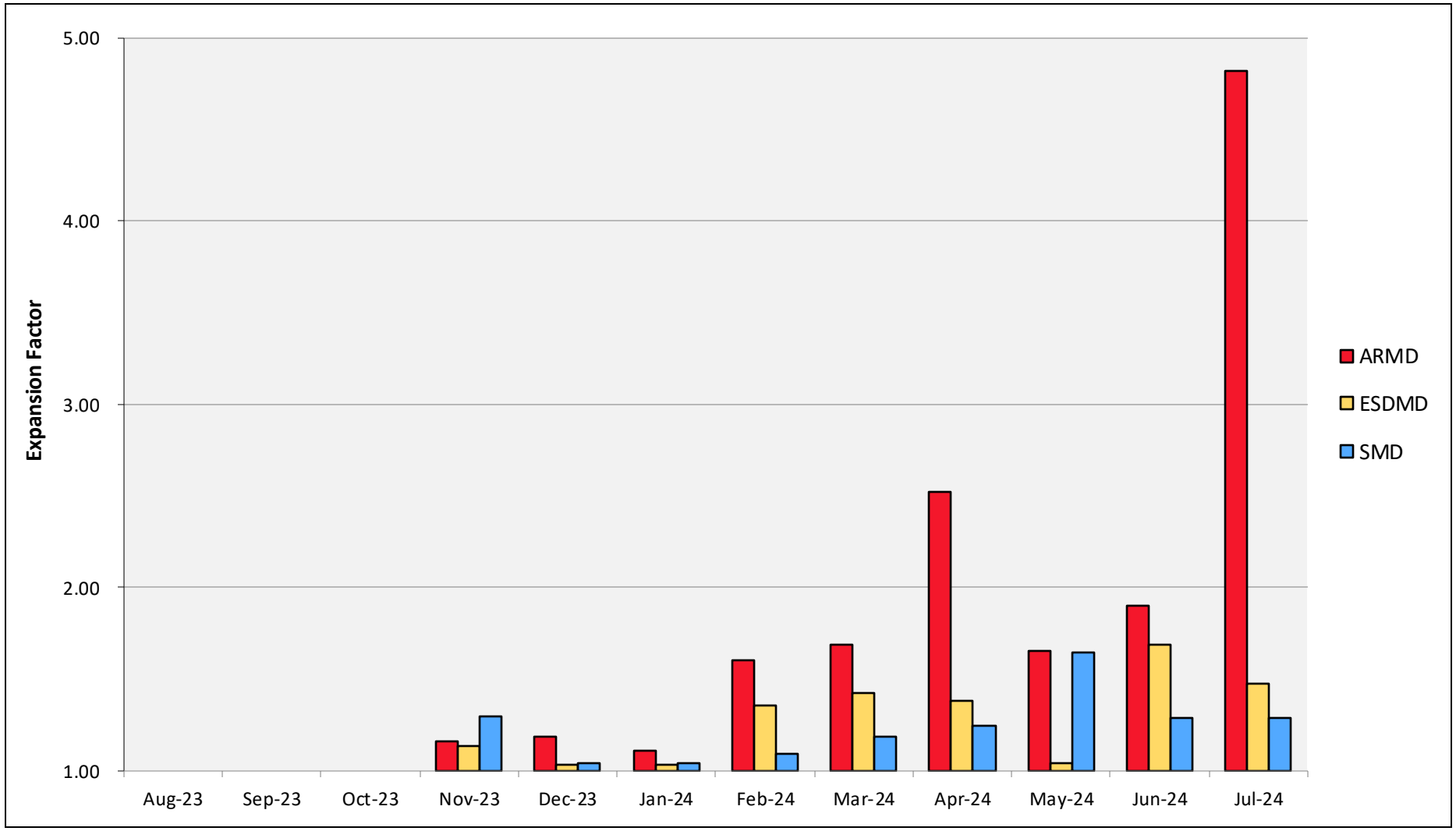
Cabeus: Monthly Utilization by Size and Length



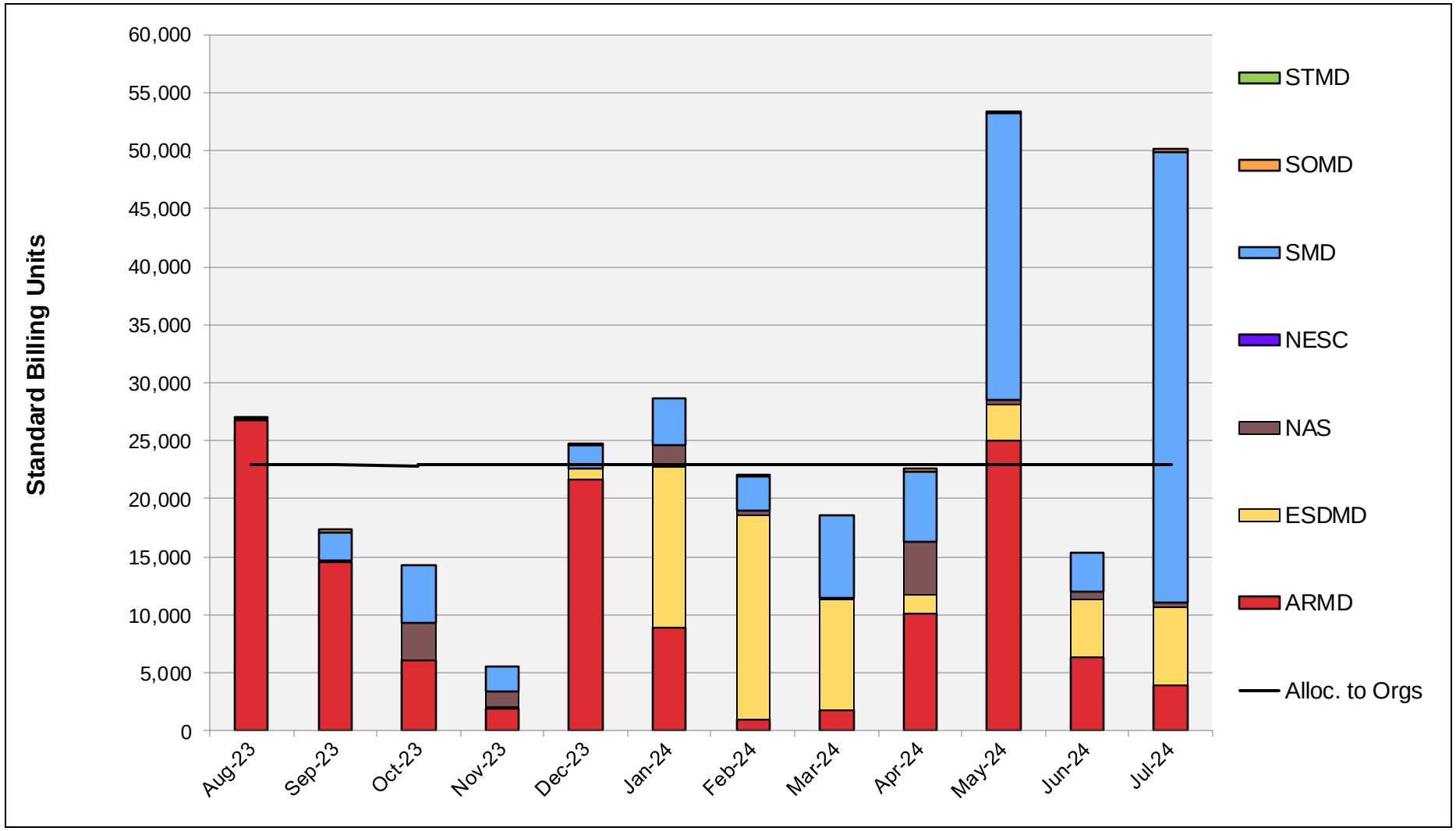
Cabeus: Average Time to Clear All Jobs



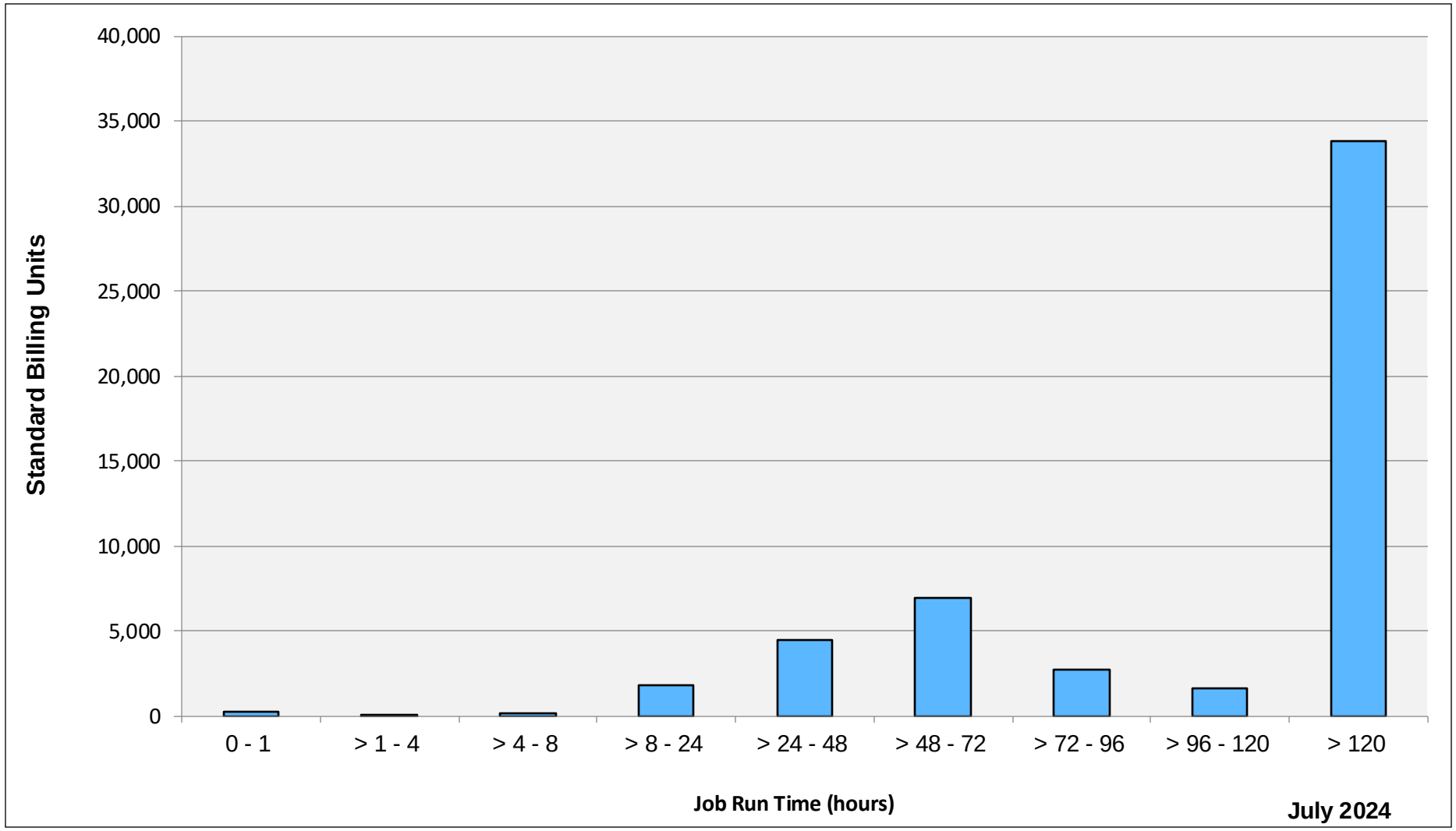
Cabeus: Average Expansion Factor



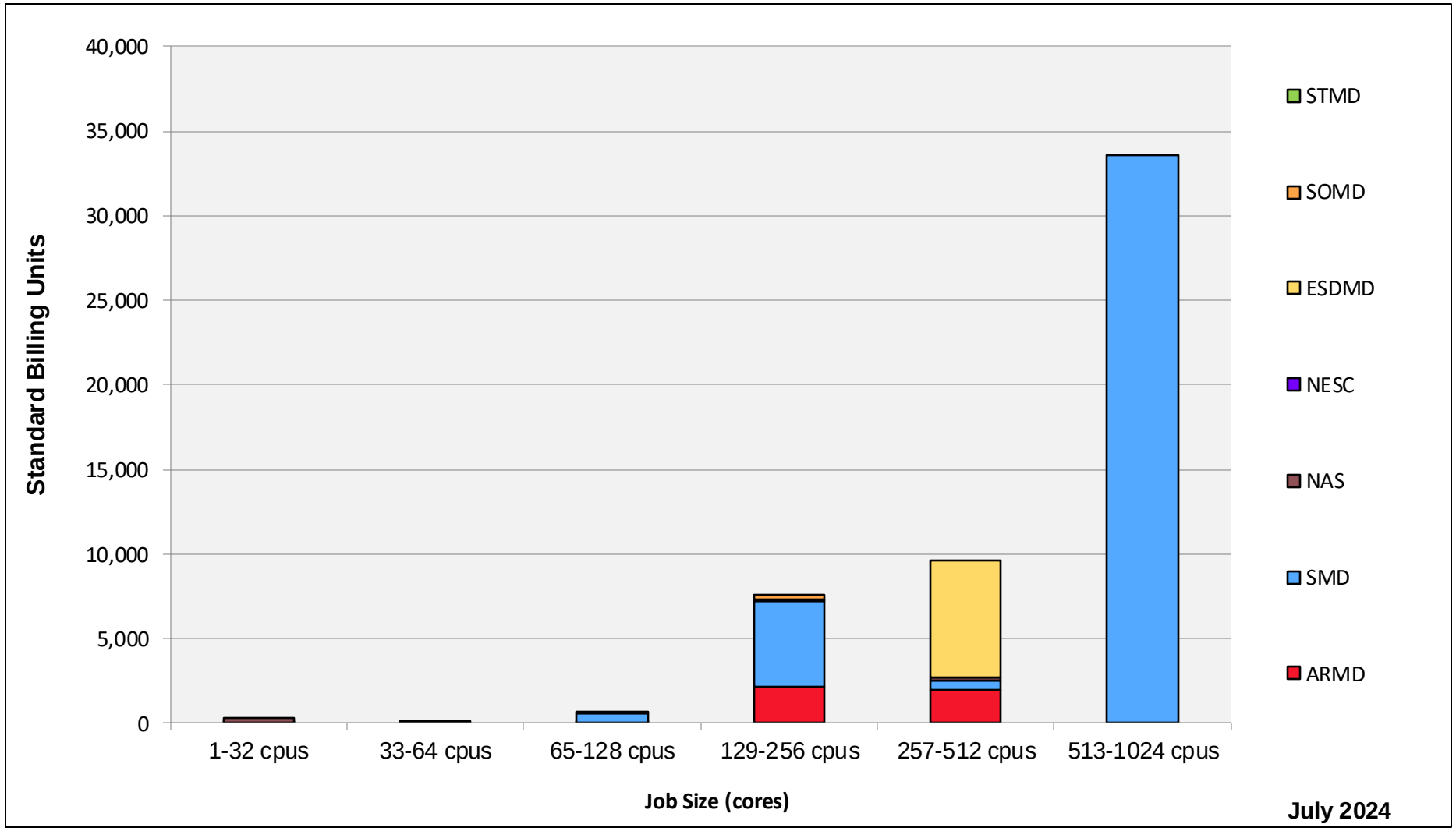
Endeavour: SBUs Reported, Normalized to 30-Day Month



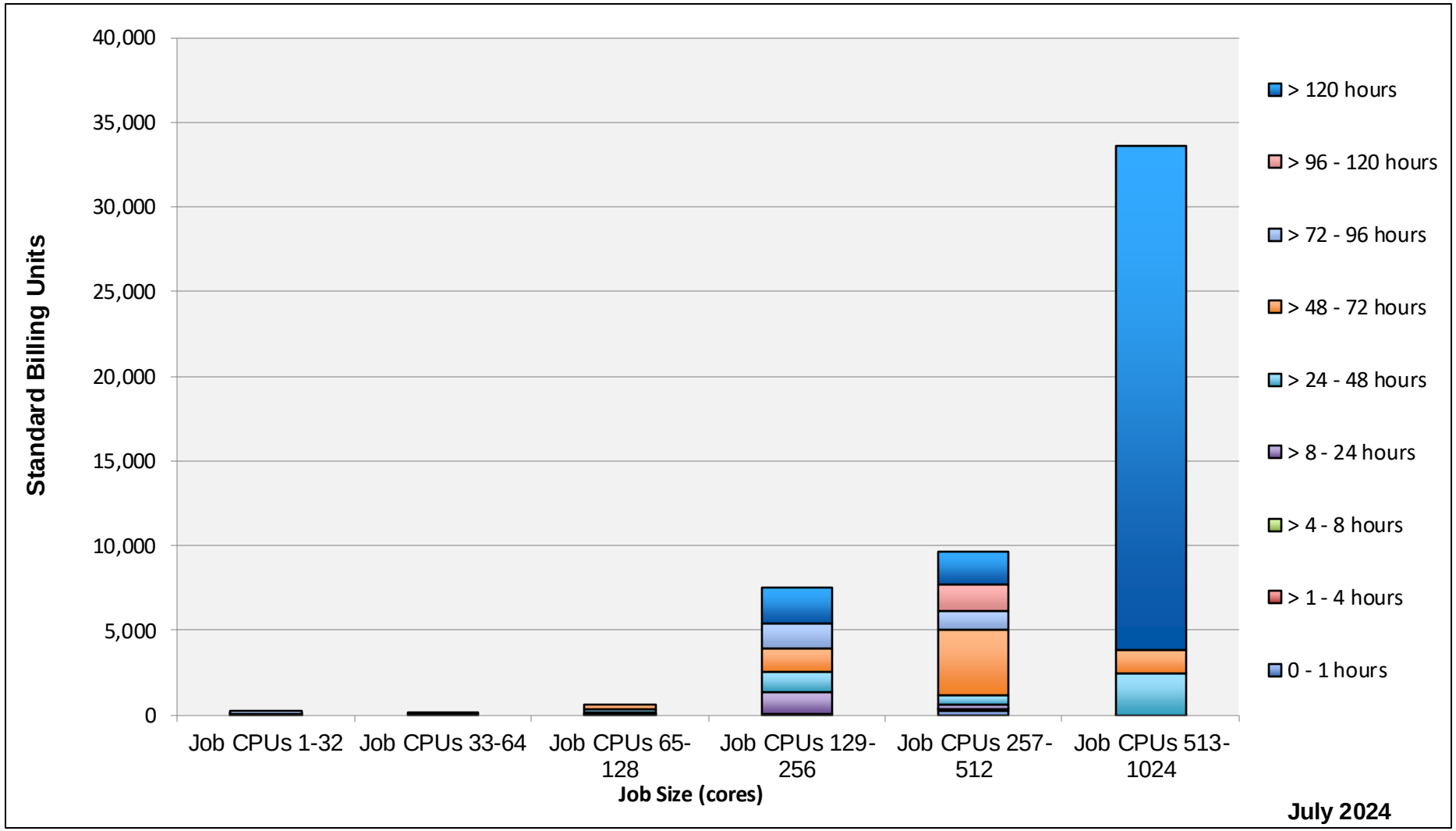
Endeavour: Monthly Utilization by Job Length



Endeavour: Monthly Utilization by Job Size



Endeavour: Monthly Utilization by Size and Length



Endeavour: Average Expansion Factor

