East Coast Academic Medical Center

Adult Intensive Care Units

Green ICU Assessment

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Executive Summary

This memorandum presents preliminary findings from a Green ICU sustainability pilot assessment conducted at East Coast AMC Health Care's adult intensive care units. The assessment was performed at no cost to East Coast AMC and is, to our knowledge, the first ICU-focused sustainability evaluation of its kind, and one of the first systematically structured Green ICU assessments in the United States.

East Coast AMC operates four adult ICUs (Medical, Trauma, Neuro, Cardiovascular) totaling 95 beds with three step-down units and consistent census reported at 90% or greater. The assessment applied the Greenhouse Gas (GHG) Protocol's three-scope methodology, structured against the five operational domains identified by the European Society of Intensive Care Medicine (ESICM) Green Paper (2024) and the Society of Critical Care Medicine (SCCM) Sustainability Task Force (2025).

East Coast AMC's Position of Strength

East Coast AMC enters this pilot already committed to The Joint Commission's Sustainable Healthcare Certification (10 members, 6 sub-committees), with active variable-frequency-drive (VFD) deployment, ~60% LED conversion across the system, two new high-efficiency boilers being installed, and supply-chain leadership through the Vizient/Captis program. These commitments provide a credible foundation on which an ICU-specific sustainability program can be built.

Material Findings

- **Why ICUs matter:** Per the Prasad et al. (2022) life-cycle analysis of a US tertiary hospital, ICUs generate approximately 138 kg CO_2e per bed-day versus 45 kg CO_2e for an acute-care bed-day, roughly three times the carbon intensity. ESICM Green Paper estimates put US ICU emissions at up to 178 kg CO_2e per patient-day, with HVAC alone driving ~75% of energy-related emissions. At 95 beds × ~90% occupancy, East Coast AMC's adult ICUs plausibly account for an estimated 4,000–5,500 metric tons of CO_2e annually.
- **Largest single waste-reduction opportunity:** ICU room nursing kits. AVP of ICUs Caristo, RN identified that significant volumes of supplies in admission kits are discarded unused at discharge. There is currently no regular kit review and no tracking of which items are most often discarded. The literature consistently identifies consumable procurement as the single largest contributor to ICU greenhouse gas emissions (32–37% of total ICU GHG per Prasad et al.).
- **Highest-ROI single-item opportunity identified on site:** Disposable blood pressure cuffs (~$12 each) used for the entire length of stay and then discarded. Reusable cuffs at ~$30 produce a payback in approximately 2.5 patient cycles, with substantial waste avoidance. This is a literature-supported quick win (McGain et al., 2009) and is operationally feasible to pilot with infection-control review and a defined cleaning protocol.
- **Long-term energy-strategy opportunity:** Because East Coast AMC generates the majority of its electricity on site through a 100% natural gas–fueled cogeneration plant, most of what would normally appear as Scope 2 (purchased electricity) instead falls under Scope 1 (direct fuel combustion). The cogeneration plant delivers strong reliability and may be efficient relative to grid purchasing once heat recovery is credited. Phase 2 will compare the plant's actual heat rate, natural-gas consumption, thermal recovery, and marginal $/kWh against grid-purchase and PPA alternatives. With two new buildings planned over the next decade, East Coast AMC has a strategic opportunity to evaluate long-term Power Purchase Agreements (PPAs) for incremental clean-energy supply. The US average hospital energy spend is $3–4 per square foot annually.
- **Procurement leverage point:** Captis (GPO sub-agreement under Vizient) does not currently incorporate Vizient's environmental-attributes reporting. Supply Chain has indicated openness to a discussion with Vizient sustainability leadership. Embedding environmental data into Captis contracting would influence purchasing across all 94 Captis member hospitals, well beyond East Coast AMC itself.
- **Governance gap:** There is no dedicated Green Team in the ICU. ICU green teams are the single most consistently cited grassroots intervention in the published Green ICU literature.

Preliminary Financial Opportunity (subject to data validation)

Quick-win interventions identified during the site visit are projected to deliver $250,000–$680,000 in annualized recurring savings within 18 months, with significantly larger long-horizon savings ($1M+) achievable through energy-strategy optimization (cogeneration

efficiency review, PPA evaluation) and full ICU supply standardization. All ranges are preliminary and will be refined once the Outstanding Data Requests in this memo are completed.

Path Forward

This is a Phase 1 deliverable. Phase 2 (May–June 2026) will incorporate the requested utilization, energy, and supply-chain data; complete a quantitative carbon-baseline calculation for the four adult ICUs; and produce a final assessment with prioritized recommendations and validated savings estimates.

Site Visit Overview

The assessment team conducted a structured walkthrough of East Coast AMC's adult ICUs and met with operational, clinical, and supply-chain leadership. The visit combined direct observation of patient rooms, supply kits, and clinical workflow with semi-structured interviews against a standardized assessment instrument adapted from the GHG Protocol and the ESICM Green Paper framework.

Assessment Team

- **Andy Draper, PhD** — CEO, SION60, Inc.; healthcare sustainability lead
- **Mostafa Balbous, MD** — Clinical co-assessor

Scope of the Assessment

- **Included:** the four adult ICUs at East Coast AMC Hospital — Medical ICU, Trauma ICU, Neuro ICU, and Cardiovascular ICU — totaling 95 beds, plus the three associated step-down units.
- **Excluded:** Neonatal Intensive Care Unit (NICU) and pediatric critical care environments; these may warrant a separate companion assessment.

As reported during the site visit, the four adult ICUs operate at consistent census of 90% or greater, reflecting East Coast AMC's role as the only state-designated Level I trauma center and as the regional tertiary-care referral hospital.

Background: Why the ICU Is a Sustainability Priority

The US healthcare sector accounts for an estimated 8.5–9% of national greenhouse gas emissions (Eckelman & Sherman, 2020). For a system the size of East Coast AMC Health Care located in a region with documented environmental-justice burdens, multiple Superfund sites, and a long industrial legacy, the local public-health rationale for emissions reduction is unusually direct.

Within the hospital, the ICU is the single most resource-intensive clinical environment. Three converging lines of evidence make this clear:

ICU Carbon Intensity vs. Acute Care

In a hybrid life-cycle assessment of a US tertiary hospital, Prasad et al. (2022) reported that an ICU bed-day generates approximately 138 kg CO_2e versus 45 kg for an acute-care bed-day — a 3× multiplier. Solid-waste generation was 7.1 kg per ICU bed-day versus 5.5 kg for acute care. The hot-spots in this analysis were procurement of consumable supplies (32–37% of total GHGs), procurement of capital equipment (28–32%), and on-site energy use (25–33%).

The HVAC Hot-Spot

The European Society of Intensive Care Medicine Green Paper (2024) identifies HVAC as the single largest contributor to ICU energy emissions, representing approximately 75% of total energy-driven CO_2e in critical-care environments. ICUs typically maintain higher air-exchange rates, isolation-room negative-pressure capability, and 24/7 conditioning — all justified clinically, but each of which compounds energy demand. The Green Paper's review of 13 international ICU studies estimated daily ICU GHG emissions in the range of 88–178 kg CO_2e per patient-day, with US ICUs at the top of that range.

Single-Use Devices and Consumable Procurement

McGain et al. (2009) and subsequent waste audits (Bardoult et al., 2025) consistently identify single-use disposables - gloves, syringes, IV sets, ventilator circuits, PPE, and disposable monitoring accessories such as blood pressure cuffs - as the dominant ICU waste stream. The Bardoult French ICU eco-audit found that gloves alone accounted for nearly 1.8 kg CO_2e per patient-day. Importantly, these supply items also drive the largest ICU expenditure category outside labor, which is precisely why ICU sustainability and ICU margin optimization tend to align.

The Emerging Green ICU Movement

Three frameworks now anchor the structured Green ICU literature:

- **ESICM Green Paper (2024)** "Environmental Sustainability in Intensive Care: The Path Forward." Published in Intensive Care Medicine, this is currently the most comprehensive practice-oriented framework, organized around energy efficiency, waste reduction, sustainable procurement, education, and research.

- **SCCM Sustainability Task Force (2025)** "Environmental Sustainability in ICUs: A Report from the Society of Critical Care Medicine Sustainability Task Force." Published in Critical Care Medicine, this report explicitly proposes the development of a US Green ICU certification, modeled on but distinct from The Joint Commission's hospital-level Sustainable Healthcare Certification. It anchors the "R's" hierarchy: refuse, reduce, reuse, recycle.
- **Houston Methodist Green ICU Initiative** hosted the inaugural Green ICU Conference in September 2025 and published the first US large-system experience narrative (Masud et al., Critical Care, 2024). Houston Methodist's published findings explicitly identify ICUs as the dominant carbon and waste hot spot within their hospital system, with single-use supply burden as the largest single driver. Their three-step pathway — measure, mobilize a multidisciplinary green team, and implement context-specific reduce/reuse/recycle interventions — closely parallels the approach proposed for East Coast AMC in this assessment.

Methodology

This assessment is grounded in the international Greenhouse Gas Protocol (ghgprotocol.org), which is the most widely accepted carbon-accounting framework globally and the basis for nearly all corporate, healthcare, and governmental emissions reporting. The Protocol partitions an organization's emissions into three scopes:

Scope	Definition	ICU-Relevant Sources & Approximate Hospital Share
Scope 1	Direct emissions from owned or controlled sources	Anesthetic gases (sevoflurane, desflurane, isoflurane, nitrous oxide), natural gas combustion in cogeneration plant and boilers, on-site fuel for emergency generators. Roughly ~10% of hospital total at most US hospitals — but materially higher at East Coast AMC, where on-site cogeneration shifts much of what is normally Scope 2 into Scope 1.
Scope 2	Indirect emissions from purchased energy	Purchased grid electricity and steam. Limited at East Coast AMC given the on-site cogeneration plant, which produces most of the campus's electrical and thermal load directly. The relative Scope 1 vs. Scope 2 split is a Phase 2 quantification.
Scope 3	All other indirect emissions across the value chain	Procurement of consumables, capital equipment, pharmaceuticals; reusable vs. single-use device choices; PPE; food services; investment portfolio; staff commuting. Roughly ~80% of hospital total — of which ~60 percentage points is supplies and capital equipment.

Within this GHG-Protocol scaffolding, the assessment is organized along the five operational domains synthesized from the ESICM Green Paper (2024) and the SCCM Sustainability Task Force report (2025):

- **Domain 1: Energy & Facility Systems** (Scope 2; portion of Scope 1 from natural gas)
- **Domain 2: Waste & Single-Use Devices** (portion of Scope 3; downstream)
- **Domain 3: Anesthesia, Medical Gases & Pharmaceuticals** (Scope 1 anesthetic gases; portion of Scope 3 pharmaceuticals)
- **Domain 4: Procurement & Supply Chain** (largest portion of Scope 3)
- **Domain 5: Governance, Education & Sustainability Program** (cross-cutting enabler)

Each domain is assessed against three lenses: current state observed during the site visit, opportunities identified, and outstanding data required to quantify those opportunities.

Data Sources

- Direct observation of patient rooms, ICU corridors, and supply storage during the April 13 walkthrough
- Semi-structured interviews with clinical, nursing, supply-chain, and facilities leadership
- East Coast AMC-supplied operational descriptors (bed counts, census, GPO arrangement, certification status)

- Outstanding quantitative data — energy consumption, square footage, ICU supply expenditure, waste hauling invoices, EMR utilization data — to be collected during May–June 2026 (see Outstanding Data Requests)
- Comparative literature: Prasad et al. 2022, Bardoult et al. 2025, ESICM Green Paper 2024, SCCM Task Force 2025, McGain et al. 2009, Eckelman & Sherman 2020, Houston Methodist Green ICU Initiative (Masud et al. 2024)

Patient Safety and Infection-Control Guardrails

Every recommendation in this assessment is offered subject to the following non-negotiable guardrails. No sustainability intervention will be implemented at East Coast AMC without explicit clinical, infection-prevention, and regulatory sign-off through East Coast AMC's existing governance structures.

Sustainability Will Not Compromise Care

All recommendations in this assessment must satisfy:

- Infection-prevention review by East Coast AMC leadership before any reusable-substitution, kit-redesign, or waste-reclassification change is rolled out.
- Isolation-room and immunocompromised-patient exclusions where indicated; sustainability protocols must explicitly carve out these populations.
- Clinical readiness and emergency response -supply availability, room turnover, and code-blue capability must remain unaffected.
- Regulatory compliance with The Joint Commission, CMS Conditions of Participation, DOH licensure standards, and East Coast AMC's own ventricular-assist and Comprehensive Stroke Center certifications.
- Defined cleaning, reprocessing, and replacement protocols for every reusable substitution, with documented loss-rate and replacement-cost assumptions built into the savings model.

Domain 1 — Energy & Facility Systems

Scope 2 plus the portion of Scope 1 attributable to on-site natural gas combustion.

Current State

- **Cogeneration plant:** East Coast AMC operates a 100% natural-gas-fueled cogeneration plant that supplies the campus's electricity and thermal energy. This is a long-standing strength for energy reliability and resilience, and combined-heat-and-power can be efficient relative to grid purchasing once thermal recovery is credited. The plant's actual heat rate, fuel consumption, thermal-recovery efficiency, and resulting carbon intensity per kWh require Phase 2 quantification before any conclusion about emissions performance versus grid or PPA alternatives can be drawn.
- **Boilers:** Two new high-efficiency boilers are currently being installed. This is a positive investment that will reduce thermal-side emissions and operating costs.
- **Variable Frequency Drives (VFDs):** Aggressive VFD deployment on motors has been ongoing for several years. Specific count and remaining opportunity to be quantified.
- **Lighting:** System-wide LED conversion is approximately 60% complete. ICU and administrative-area conversion balance to be quantified.
- **Air Handling Units (AHUs):** Approximately 50 AHUs across the campus. Facilities independently identified AHU replacement as the #1 priority if a $5M efficiency budget were available — indicating a large fraction are aging beyond optimal-efficiency window. Specific age distribution to be confirmed.
- **HVAC setbacks:** No temperature setbacks are currently scheduled in the ICUs, attributed to near-100% census. This is a material gap given that HVAC drives ~75% of ICU energy emissions per the ESICM Green Paper.
- **Occupancy sensors:** Not systematically deployed in non-clinical spaces.
- **Building envelope:** Duct-work sealing was identified as an opportunity by facilities staff.
- **Capital horizon:** East Coast AMC's announced ~$2 billion expansion will add at least two new buildings over the next decade, creating a once-in-a-generation opportunity to lock in efficient envelope design and clean-energy supply contracts before construction.

Opportunities Identified

Near-term (≤12 months)

- **Occupancy sensors in non-clinical ICU support spaces** (break rooms, storage, restrooms, conference rooms). Per facilities estimate, ~22 kWh per room per year and $3–4 per room per year; aggregate impact scales with room count.
- **Complete LED conversion in ICU and ICU-support administrative areas-** per facilities estimate, 75–150 kWh per fixture per year and $10–20 per fixture per year, which compounds across the four ICUs.
- **Complete duct-sealing assessment** across ICU air-handling systems.
- **Catalog and prioritize remaining VFD opportunities** (typical motor VFD cost $150–$1,500 depending on horsepower, with payback typically 1–3 years).

Mid-term (12–36 months)

- **Selective HVAC setbacks in trauma- and neuro-ICU step-down zones during off-peak periods.** Although the four ICUs themselves run at near-100% census, the step-down units, procedure rooms, and administrative zones may permit setbacks. **Critically: the Epic EMR system likely contains discharge and bed-status data that could trigger automated building-management-system temperature setpoint changes.** This is an emerging best practice in the Green ICU literature and aligns with the Houston Methodist Green ICU Initiative experience.
- **Replacement schedule for the oldest AHUs (those >20 years), prioritized for ICU-serving units >15 years old.**

Long-horizon (3–10 years, alongside capital expansion)

- **Cogeneration efficiency review followed by Power Purchase Agreement (PPA) evaluation.** The first analytical step is a side-by-side comparison of the cogeneration plant's actual performance — heat rate, fuel cost per useful kWh delivered, thermal recovery, maintenance costs — against the marginal delivered cost of grid electricity and PPA-sourced renewable supply. Depending on what that comparison shows, options range from continuing the cogeneration plant as-is, supplementing it with a PPA for incremental load (especially the new buildings), or evaluating a longer-term transition. Well-structured PPAs lock in flat $/kWh pricing for 10–20 years, hedging against natural-gas price volatility.
- **Local economic development framing.** PPAs structured with -sited renewable assets create regional jobs and tax-base benefits — directly responsive to 's environmental-justice context. This is a story East Coast AMC can credibly its board, the city, and the state.

Domain 2 — Waste & Single-Use Devices

Portion of Scope 3 (downstream waste); largest near-term waste-reduction lever.

Current State

- **Room nursing kits:** Standardized supply kits are placed in each ICU patient room at admission. Nursing leadership identified significant volumes of these supplies are discarded unused at patient discharge — a finding consistent with the published Green ICU literature.
- **Kit review cadence:** There is no regular review process to determine which items are routinely discarded and could be removed from the standard kit.
- **Waste tracking:** There is no systematic tracking of what supplies are most commonly thrown away.
- **Sustainability advocate:** Nursing leadership identified a strong sustainability champion within nursing — a critical asset for any Green ICU program.
- **Differential ICU layouts:** Nursing leadership noted that the Trauma ICU patient rooms do not have cabinets, while the Medical ICU rooms do. The cabinets may be driving over-stocking and over-discard. *This is a testable hypothesis — comparing waste generation per bed-day between the Trauma and Medical ICUs would produce one of the most actionable internal benchmarks in the assessment.*
- **Isolation patients:** Nursing leadership flagged infection-control standards must be respected for isolation patients, but a focused supply-kit review for that population is feasible.
- **Disposable blood pressure cuffs:** Used for the entire ICU length of stay and then discarded. Disposable cuff: ~$12. Reusable cuff: ~$30. At 95 beds and a typical ICU length of stay, payback is on the order of 2.5 patient-cycles, with substantial waste avoidance.
- **Joint Commission Sustainability Certificate:** East Coast AMC is participating, with 10 members and 6 sub-committees. The ICUs are not yet a formal participant — a clear opportunity to position the ICUs as the lead implementation site within the certificate program.
- **Reprocessing:** Supply Chain indicated medical-device reprocessing is on the supply-chain roadmap; the OR is the next planned reprocessing assessment site, with timing to be determined. ICU reprocessing represents a parallel opportunity.

Opportunities Identified

Near-term (≤6 months)

- **Pilot reusable blood pressure cuffs in one ICU.** Lowest-friction quick win identified during the visit. Establishes proof of concept for reusable substitution; produces measurable supply-cost and waste-volume data.

- **Establish an ICU Green Team.** ESICM and SCCM both identify the green team as the single most consistently effective grassroots intervention. The team should include nursing, supply chain, physician, and environmental-services representatives.
- **Conduct a one-week ICU waste audit.** McGain et al. (2009) documented 505–540 kg of solid waste over a one-week period in 10–11-bed Australian ICUs. Replicating this audit at East Coast AMC provides the baseline against which all subsequent interventions are measured. Estimated cost: <$10,000 in staff time and waste-stream segregation supplies.

Mid-term (6–18 months)

- **ICU room-kit redesign.** Working from the waste-audit data and the Top-30 ICU consumables list (a Phase 2 deliverable), redesign the standard nursing kit to remove items routinely discarded. Industry experience suggests 10–20% reduction in kit cost is typical.
- **Trauma vs. Medical ICU comparative analysis.** Quantify whether the absence of patient-room cabinets in Trauma ICU correlates with reduced supply discard. If so, evaluate cabinet-removal or kit-redesign interventions in Medical, Neuro, and CV ICUs.
- **Waste-stream re-classification audit.** Red-bag (regulated medical waste) disposal typically costs 5–10× more per pound than general waste. Most ICUs over-classify; even in critical care, much packaging, disposable gowns, and clean material can be diverted from red-bag streams. Coordinate with environmental-services hauler.
- **Extend medical-device reprocessing scope to the ICUs** alongside the planned OR reprocessing assessment.

Domain 3 — Anesthesia, Medical Gases & Pharmaceuticals

Scope 1 anesthetic gases and natural gas; portion of Scope 3 pharmaceuticals.

Current State

- **Anesthetic gas use in the ICU is limited** compared with ASCs and the OR — sedation in critical care is predominantly intravenous (propofol, dexmedetomidine, midazolam, fentanyl). However, ICU patients undergoing bedside procedures, procedural sedation, or transferred immediately post-OR may receive volatile agents.
- **Nitrous oxide central piping:** Status to be confirmed. Central N_2O piping has been a documented major source of fugitive emissions in many US hospitals (with leak rates of 50–90% reported in the published literature). East Coast AMC-specific status is a Phase 2 data request.
- **Medication waste:** Partially used and then discarded medications are a known ICU waste stream and a known emissions source via pharmaceutical manufacturing footprint. East Coast AMC-specific data not yet available; identification of top medications most often partially used is in the Outstanding Data Request list.

Opportunities Identified

- **Track anesthetic gas purchases and procedural usage in the ICU** for a 12-month baseline. Aligns with the SCCM Task Force recommendation.
- **Audit nitrous oxide central piping for fugitive losses.** If the ICU does not require central N_2O delivery, evaluate decommissioning the line in favor of E-cylinder delivery for the small number of cases that need it. This is a high-impact, low-controversy intervention with strong literature support.
- **Identify the top 5–10 medications most frequently partially used and discarded.** These are candidates for vial-size right-sizing, pre-prepared aliquots, or formulary substitution. The Outstanding Data Request list captures this.
- **Coordinate with anesthesia leadership on low-flow protocols** for any ICU bedside procedures using volatile anesthesia.

Domain 4 — Procurement & Supply Chain

Largest portion of Scope 3 — the literature consistently identifies consumable and capital procurement as the single largest contributor to ICU GHG emissions (~60% per Prasad et al. 2022).

Current State

- **Group Purchasing Organization:** East Coast AMC is a Vizient member, with a sub-agreement called Captis.
- **Vizient sustainability data:** Vizient has developed substantial environmental-attribute reporting capabilities for procurement decision-making, but Captis does not currently incorporate these into its contracting process.
- **Custom packs:** Reviewed every 3 years.
- **Sustainability committee representation:** Supply chain could not confirm whether supply chain has a representative on the East Coast AMC sustainability committee.
- **Top ICU consumables (industry pattern, to be validated):** The literature and SION60's prior hospital-system experience suggest the top ~30 supplies typically represent ~60% of total ICU consumable volume. The high-volume, high-cost categories at most ICUs include:
    - IV sets and connectors (~$12 per set)
    - Syringes ($0.50 each, very high volume)
    - PPE (gloves ~$0.40 each; disposable gowns ~$3 each)
    - Ventilator disposables (~$10+ each)
    - Catheters (~$8 each)

Opportunities Identified

Near-term (≤6 months)

- **Convene a Vizient sustainability call with Supply Chain.** Andy Draper to coordinate. Objective: secure inclusion of Vizient's environmental-attribute data into Captis contracting reviews. If achieved, this single action propagates emissions-aware purchasing across all 94 Captis member systems — by far the largest leverage point identified during the visit.
- **Confirm supply-chain representation on East Coast AMC's TJC Sustainability Certificate committee.**

Mid-term (6–18 months)

- **Validate East Coast AMC's actual top 30 ICU supplies** (by volume and by cost) against the industry-pattern list above. This is a Phase 2 quantitative deliverable.
- **Apply Vizient environmental-attribute filters** to the validated top 30 list to identify substitution candidates with measurable emissions and cost benefits.
- **ICU custom-pack review on a shorter cycle than 3 years** — typically annually — to capture clinical-practice changes and waste-audit findings before they accumulate three years of unnecessary cost.

Domain 5 — Governance, Education & Sustainability Program

Cross-cutting enabler. Without governance, point interventions do not compound.

Current State

- **Joint Commission Sustainable Healthcare Certification:** East Coast AMC is participating, with 10 committee members and 6 sub-committees. This is a major strength relative to the US peer set.
- **ICU-specific governance:** There is no Green Team within the ICU.
- **TJC certificate goals:** The three specific TJC goals East Coast AMC is pursuing are not yet documented in this assessment; this is on the Outstanding Data Request list.
- **Education:** No structured ICU-staff education program on sustainability has been identified.

Opportunities Identified

- **Establish an ICU Green Team.** Charter the team formally with a sub-committee linkage to the East Coast AMC TJC Sustainability Certificate working groups. A nursing lead; one ICU physician champion one supply-chain delegate; one facilities delegate.
- **Map TJC Sustainability Certificate goals onto specific ICU action items.** East Coast AMC's three TJC goals — once confirmed — should each have at least one ICU-led implementation project. This converts the certificate from a hospital-level commitment into operational ICU work.
- **Educational integration:** Embed brief sustainability content into ICU resident orientation, nursing onboarding, and the top 10 highest-volume attending physicians' grand-rounds rotation. Education is identified by both ESICM and SCCM as a foundational pillar.
- **Public reporting:** East Coast AMC should consider sharing baseline ICU emissions and reduction targets publicly through East Coast AMC Medical School.
- **Regional benchmarking:** Conduct a parallel assessment of sustainability programs at regional competitors. This work has been initiated by Andy and Mostafa.

Outstanding Data Requests

To convert this Phase 1 site-visit memorandum into a Phase 2 quantitative assessment with validated savings projections and a baseline carbon footprint, the following data are needed.

Utilization

Data Element	Source	Analysis Enabled
Annual admissions for CUHC overall and for each ICU	CMO	Volume baseline; GHG per admission
Average length of stay per ICU	CMO	GHG and EUI per admission
Estimated revenue and cost for the four ICUs in 2025	CMO	Savings opportunity sizing
Top 10 highest-volume ICU attending physicians	CMO	Targeted physician and resident education

Facility & Energy

Data Element	Source	Analysis Enabled
Energy consumption and unit cost for natural gas and electricity (12-month)	Steve	Energy Use Intensity (EUI) for CUHC and ICUs; PPA cost-comparison baseline
Square footage — overall CUHC, and each adult ICU	Jeff	EUI per square foot, normalized benchmarks
Estimated % of LED fixtures in ICUs and total ICU fixture count	Geddy	LED-conversion savings calculation
Square footage of planned new buildings (next ~10 years)	Alex	Forward GHG modeling; PPA scoping
Of the ~50 AHUs, what % are >20 years old?	Neil	Capital-replacement priority
How many AHUs serve the ICUs, and how many are >15 years old?	Geddy	ICU-specific HVAC priority
Waste contracts and 12-month invoices (red bag, general, recycle)	Alex	Waste-stream cost baseline; reclassification savings

Supply Chain

Data Element	Source	Analysis Enabled
Vizient sustainability call (Andy to coordinate with Supply Chain)	Supply Chain	Inclusion of environmental-attribute data in Captis contracting
Estimated total supply expense for the four ICUs in 2025	Supply Chain	Supply-cost savings sizing
Top 30 supplies and vendors for the ICUs	Supply Chain	Substitution and kit-reduction targeting
Estimated cost per ICU nursing kit and frequency of issuance	Nursing	Kit-redesign savings calculation
Identity of supply-chain representative on the sustainability committee	Supply chain	Governance gap closure

Clinical & Other

Data Element	Source	Analysis Enabled
Specific Joint Commission Sustainability Certificate goals (the three East Coast AMC has selected)	John	ICU-specific implementation mapping
Sustainability program review of regional peer systems	Andy, Mostafa	Regional benchmarking
Top medications partially used and discarded in ICU workflow	Pharmacy	Vial right-sizing; formulary substitution
Trauma vs. Medical ICU comparative supply-discard volumes	EVS	Cabinet-vs-no-cabinet hypothesis test

Preliminary Financial Opportunity Summary

The ranges below are preliminary, drawn from site-visit observations cross-referenced against published per-unit savings figures and SION60's prior hospital-system experience. They will be refined materially once East Coast AMC-specific data are received during Phase 2.

Intervention	Annual Recurring Savings (preliminary)	Notes & Time Horizon
Reusable BP cuff substitution (4 ICUs)	$30,000–$70,000	Quick win pending infection-control review and cleaning protocol. ≤6 months. Validate against East Coast AMC utilization and account for loss/replacement rates.
ICU room-kit redesign (post-audit)	$80,000–$200,000	Drives largest single-line ICU consumable line. 6–12 months.
Waste-stream re-classification (red-bag → general where appropriate)	$40,000–$120,000	Red-bag disposal cost typically 5–10× general. Requires staff training and infection-control sign-off.
LED completion + occupancy sensors (ICU areas)	$25,000–$80,000	Order-of-magnitude only; refines once fixture count and rate confirmed.
Vizient/Captis environmental contracting (East Coast AMC share)	$50,000–$150,000 *(highly preliminary)*	Direct dollar capture depends on which contracted items can be substituted without pricing penalty, clinical-substitution barriers, or compliance issues. Strategic value 94 is the larger story.
Selected HVAC setbacks (step-down, admin, off-peak)	$25,000–$60,000	Conservative estimate; HVAC = ~75% of ICU energy emissions per ESICM.
Quick-win subtotal (≤18 months)	$250,000–$680,000	Margin-positive, modest capital required.
Long-horizon: Energy-strategy review (cogeneration efficiency + PPA evaluation)	$1.0M–$3.0M+	3–10 years. Tied to ~$2B capital expansion. Range is highly dependent on cogeneration heat-rate analysis and PPA terms; could narrow significantly once Phase 2 comparison is completed.
Long-horizon: AHU replacement program (ICU priority)	To be quantified	Capital-intensive; dependent on AHU age distribution data.

These figures are conservative relative to the Bardoult French ICU eco-audit's quantification of 5.1 kgCO_2e per patient-day from medical devices alone, and to East Coast AMC's scale (95 ICU beds × ~90% census × 365 days = ~31,200 ICU bed-days annually). Final Phase 2 quantification will use East Coast AMC's actual utility-cost-per-kWh data, actual ICU supply spend, and actual waste-hauling unit costs.

Preliminary Carbon Impact Estimate

Applying the Prasad et al. (2022) US-based hybrid LCA benchmark of 138 kg CO_2e per ICU bed-day to East Coast AMC's adult ICU footprint:

Order-of-Magnitude East Coast AMC Adult ICU Carbon Baseline

95 ICU beds × 90% census × 365 days = ~31,200 ICU bed-days/year

31,200 bed-days × 138 kg CO_2e (Prasad benchmark) = ~4,300 metric tons CO_2e/year

Using the ESICM Green Paper US-high-end estimate (178 kg/patient-day): ~5,550 metric tons CO_2e/year

EPA equivalent: ~900–1,180 passenger vehicles driven for one year.

Decomposed by Prasad et al.'s contribution shares (consumable procurement 32–37%, capital equipment 28–32%, on-site energy 25–33%):

- **Consumable procurement:** ~1,400–1,600 tCO_2e/year — directly addressable by ICU kit redesign, reusable substitution, and Vizient/Captis environmental-attribute integration.
- **Capital equipment:** ~1,200–1,400 tCO_2e/year — addressable by reprocessing program extension, longer service life, and end-of-life remarketing.
- **On-site energy:** ~1,100–1,400 tCO_2e/year — addressable by HVAC, LED completion, occupancy sensors, AHU replacement, and the long-horizon PPA strategy.

These shares will shift somewhat for East Coast AMC specifically, given the natural-gas-fueled cogeneration plant (which alters the Scope 1 vs. Scope 2 split relative to a grid-purchasing hospital). The Phase 2 quantification will produce a East Coast AMC-specific decomposition.

Phase 2 Quantification Method

The financial and carbon ranges presented in this Phase 1 memorandum are deliberately conservative and use published benchmarks (Prasad et al., ESICM Green Paper, Bardoult et al.) cross-checked against site-visit observation and SION60's prior hospital-system experience. They are appropriate for an internal-readiness conversation but are not yet appropriate for capital-decision sign-off or external attribution.

Phase 2 will recalculate every figure in this memorandum using East Coast AMC-specific data:

- **East Coast AMC utilization data** (ICU admissions, average length of stay, top 10 attending physicians, top DRGs by ICU) - replaces benchmark-population assumptions and enables per-admission carbon and per-admission cost modeling.
- **Actual ICU supply expenditure** for the four adult ICUs in 2025 (Supply Chain) replaces the industry-pattern top-30 list with East Coast AMC's actual top-30, scaled to East Coast AMC's actual spend.
- **Actual waste-hauling invoices** (red-bag, general, recycle; 12-month) replaces the "red-bag is 5–10× general" rule of thumb with East Coast AMC's actual per-pound rates.
- **Actual utility-cost data** - natural-gas $/therm, electricity $/kWh equivalent from cogeneration, plus a side-by-side comparison of cogeneration heat rate, fuel consumption, and thermal recovery against grid-purchase and PPA-sourced alternatives.
- **Actual ICU square footage-** Energy Use Intensity (EUI) calculation per square foot in line with ENERGY STAR Portfolio Manager methodology and ASHE benchmarks.
- **Air Handling Unit age and ICU-serving inventory** replaces the qualitative "large fraction aging" observation with a quantitative replacement-priority schedule.
- **One-week ICU waste audit (June 2026)** replicates McGain et al. (2009) methodology to produce a East Coast AMC-specific waste baseline and validates which kit items are most often discarded unused.
- **Vizient sustainability call output** identifies which contracted line items can actually be substituted without pricing penalty, clinical-substitution barrier, or compliance issue, converting the Vizient estimate from "highly preliminary" to bottom-up.

The Phase 2 deliverable will present each intervention with: validated annual savings (point estimate plus uncertainty range), implementation cost, payback period, validated annual carbon reduction in metric tons CO_2e, and the specific clinical, infection-control, and regulatory sign-offs required.

This discipline matters. Healthcare sustainability claims are scrutinized — by clinicians, by CFOs, by accreditors, and increasingly by the public. East Coast AMC's reputational interest is in numbers that hold up to that scrutiny.

Implementation Roadmap

Timeframe	Actions
May 2026	• Outstanding Data Requests fulfilled (utilization, energy, supply spend, waste invoices) • Sustainability call coordinated by Andy with Supply Chain • Confirm three TJC Sustainability Certificate goals • ICU Green Team chartered
June 2026	• One-week ICU waste audit completed (replicate McGain et al. methodology) • Reusable BP cuff pilot launched in one ICU • Top-30 ICU consumables list validated; Vizient environmental-attribute filters applied • Quantitative carbon baseline calculated using East Coast AMC-specific data
July 2026	• Phase 2 final assessment delivered to East Coast AMC leadership with validated savings • Recommended interventions prioritized; ROI and carbon impact quantified per intervention • Joint publication and East Coast AMC Medical School / HA presentation plan agreed
Aug–Dec 2026	• Quick-win interventions implemented and tracked • Captis/Vizient environmental contracting integration progressed • Trauma vs. Medical ICU comparative analysis completed • Regional peer-system benchmark report
2027 and beyond	• AHU replacement program initiated for ICU-serving units >15 years • Renewable PPA structuring evaluated alongside ~$2B capital expansion • East Coast AMC positioned as a national Green ICU reference site

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