



Maximizing EnergyCAP: Precision Allocation for Complex Federal Portfolios using Pre-Processing Automation

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Agenda



1. Context and the Mission
2. The Engineering Challenges
3. The Solution
4. Synergizing with EnergyCap
5. Conclusions and Questions

Welcome to Kennedy Space Center

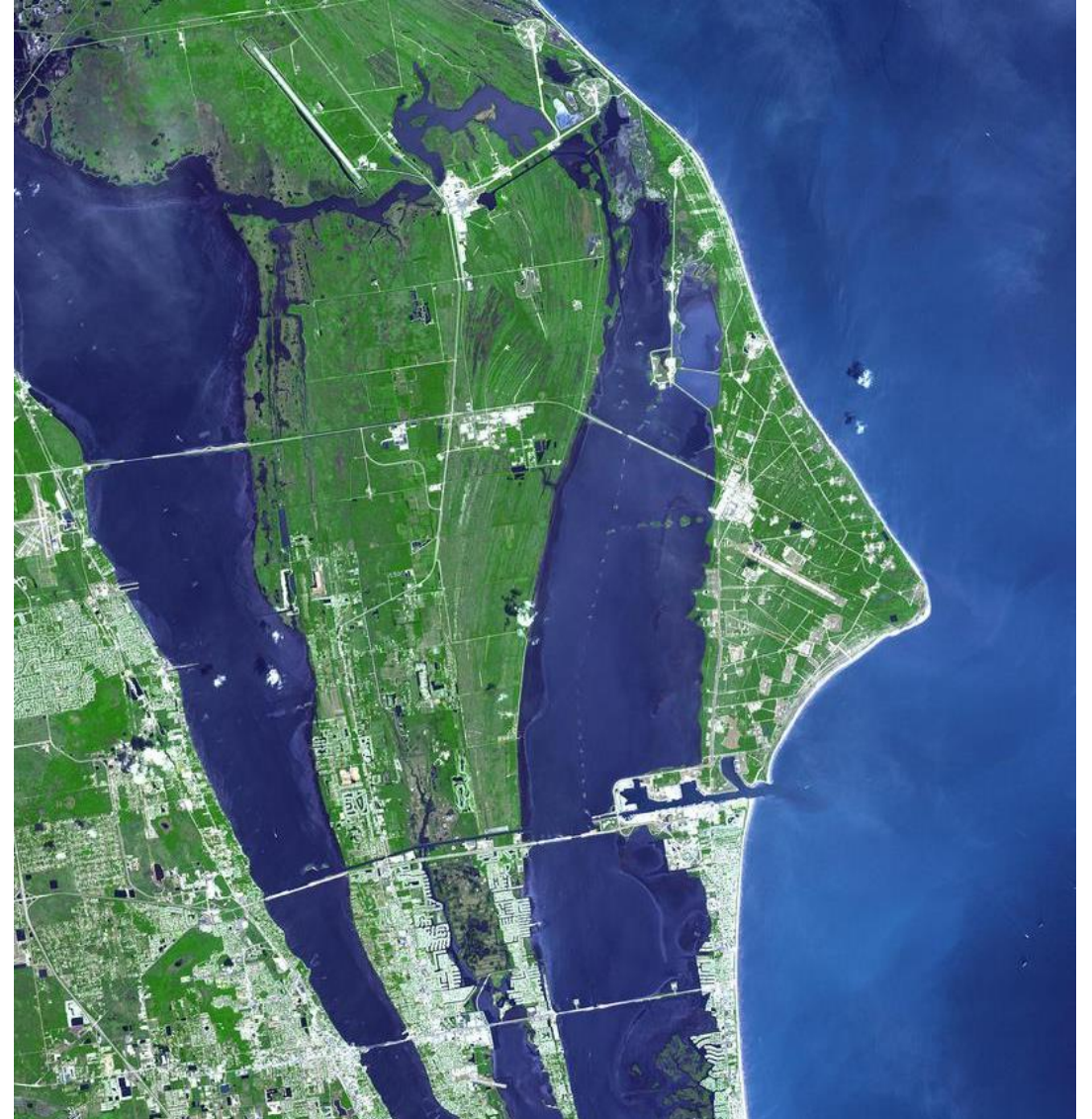
The Land: 140,000 Acres (Co-managed as the Merritt Island National Wildlife Refuge)

The Infrastructure: 7.5 Million Square Feet of built environment

The Assets: 1,000+ pieces of real property

The Grid: Powered by 2 major electrical substations

The Operators: NASA Programs + Federal Partners + Commercial Aerospace



The Ultimate Goal – Defensible Chargebacks

The Input: Parent meters covering highly shared infrastructure.

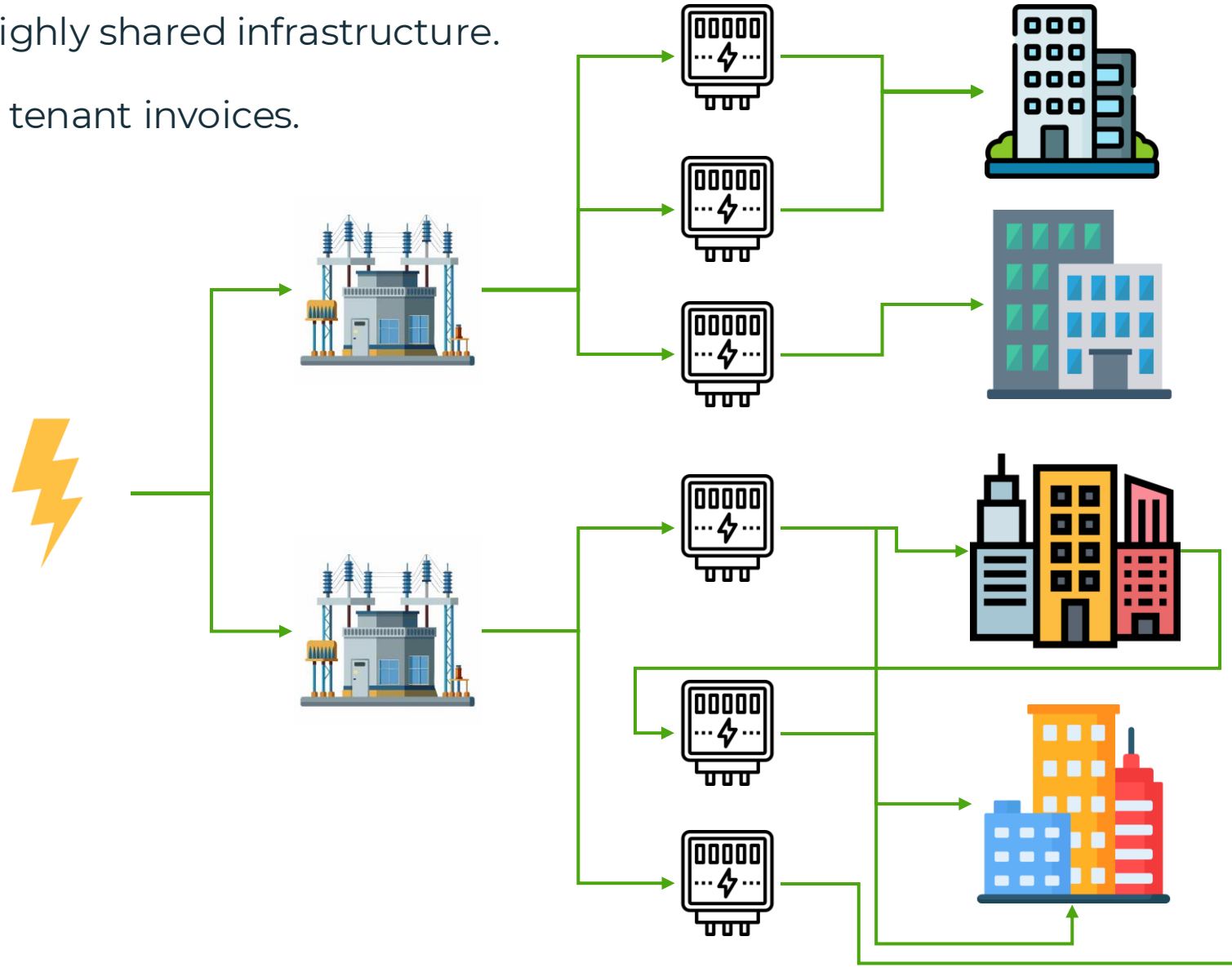
The Output: Granular, individualized tenant invoices.

The Requirements:

100% Defensible Cost Recovery

Audit-Ready Transparency

Seamless EnergyCAP Integration



The "Edge Case" Reality



The Standard Assumption:

1 Building = 1 Space Type = 1 Tenant

The KSC Reality:

Hyper-Variable Space Types: Offices sharing walls with industrial shops and heavy labs.

Complex Occupancy: Multiple tenants (Federal + Commercial) layered within single facilities.

Non-Standard Assets: Massive power draws that do not fit on a traditional floor plan

Area Level Meters: Many facilities do not have independent meters



Challenge 1 – The Mixed-Use Reality

The Metering Topology: 1 Master Meter feeding multiple facilities.

The Mixed-Use Problem: Facilities are rarely a single "Type."

Building A: 100% Administrative

Building B: 30% Office | 40% Lab | 30% Shop

The Solution: Micro-level space composition math to calculate a true

BldgNum	Office	Conf	Lab	Tech	Shop	Trans	Whse	Misc
L6-0146	48729	3198	0	1635	0	2651	194	3617
L6-0147	0	0	0	0	0	0	0	0
L6-0247	64714	7365	3991	50506	19750	0	11605	4240
L6-0248	0	0	0	0	3244	0	1855	385



Challenge 2 – The Multi-Tenant Web

Legacy System: 1 Tenant / 1 Area.

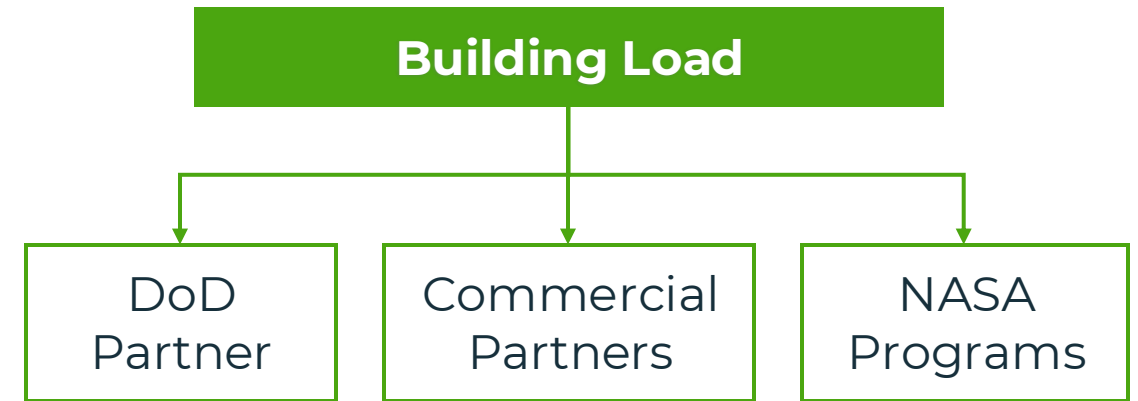
EnergyCAP Setup: Multiple Tenants / Building

Dynamic Chargebacks:

Federal vs. Commercial leases.

Sub-metered tenants vs. area-allocated tenants.

The Administrative Bottleneck: Leases and tenant footprints change faster than the physical infrastructure.



Challenge 3 – The "Zero-Footprint" Anomaly

The Problem: Standard allocation logic relies entirely on Area * Weight.

The Anomaly: Standalone infrastructure (sirens, pumps, lighting, towers) draws significant, continuous power but occupies 0 square feet.

The System Failure: Multiplying by zero yields a zero load. The power draw vanishes from the billing model.





The "Spoofing" Trap

The "Easy" Fix: Spoofing the database with a "1 SqFt" anchor just to force the software to calculate the load.

The Consequence: Energy Use Intensity (EUI) = Total Energy / Total Area.

The Reality: A 1 SqFt "building" drawing 100,000 kWh creates an astronomical EUI spike, skewing the entire agency's efficiency metrics.

Bill Split Versions

 [KSC.EL.BPA.CMFESEM01 \[USS 110\]](#)

▼ Original

Split bills using workflow step [Kennedy Workflow: Area Meters-Electric to Building Split](#)

Recipients (Dynamic percentage based on area)

Share = 100% 

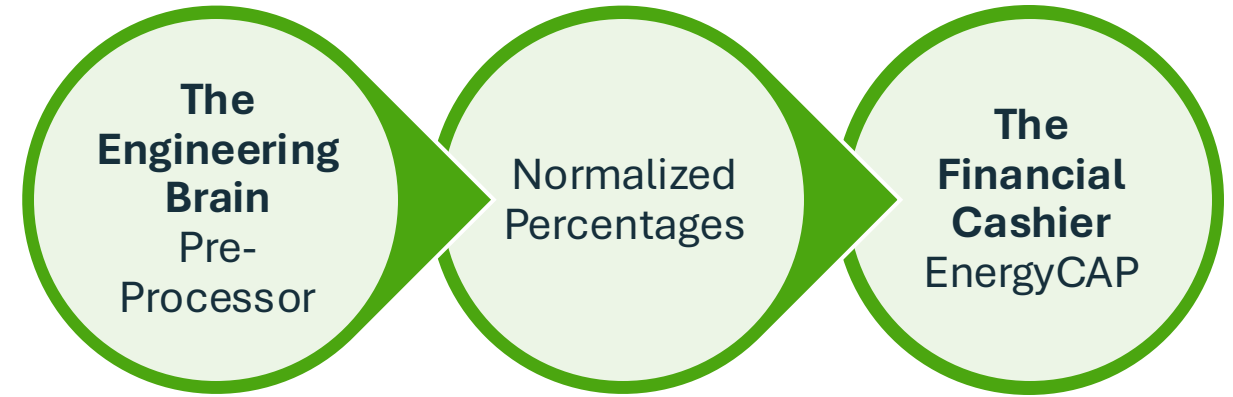
 M6-0791 COMM MAINTENANCE & STORAGE - ELE01	32,522 ft ² × 17.1761	98.74%
 TR1-759 TEMPORARY BUILDING - ELE01	500 ft ² × 9.9728	0.88%
 M6-0790 COMM CROSS CONNECT TERMINAL #5 - ELE01	115 ft ² × 18.5	0.38%
 M6-0791D RADIO TOWER - ELE01	0 ft ² × 1	0.00%

The Pre-Processing Epiphany

The Paradigm Shift: Decoupling facility engineering math from commercial billing logic.

Upstream Processing: Handling the complex edge cases (mixed-use spaces, zero-footprint assets) in a localized environment.

The Perfect Input: Delivering 100% normalized, percentage-based splits directly into the billing platform.



Ingesting the Reality

Step 1: The Master Inventory: Tracking the physical truth (Total Area and Master Meter mapping).

Step 2: The Composition Breakdown: Capturing the exact mixed-use ratios of every facility.

The Advantage: We no longer force a building into a single "Type." We map its actual operational DNA.

BldgNum	Office	Conf	Lab	Tech	Shop	Trans	Whse	Misc
L6-0146	48729	3198	0	1635	0	2651	194	3617
L6-0147	0	0	0	0	0	0	0	0
L6-0247	64714	7365	3991	50506	19750	0	11605	4240
L6-0248	0	0	0	0	3244	0	1855	385

Area	BuildingNumber	BuildingName	SquareFootage	Asset Class	Year Built
Unmetered C5	K6-1345	VAB Gas Station		515	1972
KSC.EL.ZV.K6-1397	K6-1395	LES Restroom	864	540	2005
KSC.EL.ZV.J6-2313	J6-2361	ELECTRICAL SUBSTATION	189		2005
KSC.EL.ZV.E3-1133	E3-1138	E3-1138 - 30 FT. C-BAND RADAR EQUIPMENT PAD			1991
KSC.EL.ZV.60680		60686 ANTENNA		515	2002
KSC.EL.ZV.60680		60677 ANTENNA STRUCTURE	49	515	2007
KSC.EL.ZV.60680		60678 ANTENNA STRUCTURE	49	515	2007
KSC.EL.ZV.60680		60679 ANTENNA STRUCTURE	49	515	2007
KSC.EL.ZV.M6-0409	M6-0460	KENNEDY ENTRY EXPERIENCE			
KSC.EL.ZV.K6-0545	K6-0544	MLP RESTROOM	576	540	2006
		KSC NORTH RADIO TOWER EQUIPMENT BUILDING	131	540	1986
73058-08920.FPL [Shiloh]	C2-1060A				
73058-08920.FPL [Shiloh]	C2-1060B	KSC NORTH RADIO TOWER	N/A	515	2014
73058-08920.FPL [Shiloh]	C2-1155	C2-1155 - MERLIN SYSTEM #6	N/A	515	2014
73058-08920.FPL [Shiloh]	C2-1410	LIGHTNING MAPPING ARRAY SITE 4	N/A		2014
KSC.EL.ZV.80520		80800 Oxidizer Trailer Parking			
KSC.EL.ZV.P6-1435	P6-1435	INDOOR RANGE & CLUB HOUSE	1200	540	1966
KSC.EL.ZV.P6-1435	P6-1638	RECREATION BUILDING	2180	540	1963
KSC.EL.ZV.P6-1435	P6-1638A	RECREATION BUILDING	2180	540	1963
KSC.EL.ZV.P6-1435	P6-1638B	RECREATION BUILDING	2180	540	1963
KSC.EL.ZV.P6-1435	P6-1639	FINGER PIERS	0	515	2021
KSC.EL.ZV.P6-1435	P6-1686A	NORTH PAVILION PICNIC SHELTER A	1584	515	2021
KSC.EL.ZV.P6-1435	P6-1686B	NORTH PAVILION PICNIC SHELTER B	704	515	2021
KSC.EL.ZV.P6-1435	P6-1689A	SOUTH PAVILION PICNIC SHELTER A	704	515	2021
KSC.EL.ZV.P6-1435	P6-1689B	SOUTH PAVILION PICNIC SHELTER B	704	515	2021
KSC.EL.ZV.P6-1435	P6-1689C	SOUTH PAVILION PICNIC SHELTER C	704	515	2021
KSC.EL.ZV.P6-1435	P6-1689D	SOUTH PAVILION PICNIC SHELTER D	1584	515	2021
KSC.EL.ZV.P6-1435	P6-1689E	SOUTH PAVILION PICNIC SHELTER E	256	515	2021
KSC.EL.ZV.P6-1435	P6-1689F	SOUTH PAVILION PICNIC SHELTER F	144	515	2021

Applying Weighted Load Factors

The Translation: Converting physical area into energy intensity.

The Formula: (Composition % * Total Area) * Weight Factor = Raw Score

The Result: A true, weighted energy profile for every mixed-use facility, ready for master grid allocation

- **Undefined Area Calculation:**

$$\text{Undefined SqFt} = \text{Building Total SqFt} - \sum (\text{Known Room SqFt})$$

*Note: If Undefined SqFt is negative, it is highlighted in **red**. If the building data was missing and backfilled entirely as undefined, it is highlighted in **blue**.*

- **Weighted Electricity Consumption (Section D):**

$$\text{Load} = \text{Room SqFt} \times \text{Weight Factor}$$

The total load for a building is the sum of all weighted room loads.

- **Weight Factor (Section E):**

$$\text{Wt. Factor} = \frac{\text{Total Building Load}}{\text{Building SqFt}}$$

- **Percent Allocation (Section E):**

$$\text{Percent} = \left(\frac{\text{Total Building Load}}{\sum \text{Total Area Load}} \right) \times 100$$

Space Type	Factor	Space Type	Factor
Office	18.1	Shop-Industrial	17.6
Executive	18.1	Operational	18.5
Conference	63.2	Transient	18.5
Training	63.2	Warehouse	5.3
Laboratory	57	Admin Storage	5.3
Technical	57	Miscellaneous	18.5
		Undefined	18.5

BldgNum	Office	Conf	Lab	Tech	Shop	Trans	Whse	Misc
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Solving the Zero-Footprint Problem

The Equalizer: Translating equipment loads into the exact same metric as building loads.

The FixedLoad Override:

Engine detects zero-square-foot equipment.

Bypasses the compositional math entirely.

Directly injects the known engineering load as a Raw Score.

The Result: Standalone infrastructure is seamlessly integrated into the parent meter distribution.

Code snippet

```
% =====
% LOAD CALCULATION ENGINE
% =====

% Check if the asset has a Fixed Load override (Zero-Footprint)
\ifstrempy{\FixedLoad}{

    % STANDARD PATH: Physical Buildings
    % Calculate load based on Area and Space Composition math
    \FPeval{\RawScore}{(\Area * \CompositionWeight)}

}

% OVERRIDE PATH: Zero-Footprint Equipment (Sirens, Pumps)
% Bypass area calculations and inject the known load
\edef\RawScore{\FixedLoad}

}
```

```
% =====
% LOAD CALCULATION ENGINE
% =====
```

Normalization

The Final Calculation: $\text{Asset Score} / \text{Total Master Meter Score} = \text{Exact Percentage}$.

The Great Equalizer: Consolidating offices, heavy labs, and standalone equipment into a single, unified 100% distribution.

The Result: Flawless, normalized data ready for commercial billing

Building	Area	Weight	Load Factor	Percent
Building A	20000	34	680000	70.5%
Building B	15000	18	270000	28.0%
Structure A	0		14400	1.5%

The Pivot to Percentages

The EnergyCAP Handoff: Shifting the software from an "Engineering" role to a "Financial" role.

The Configuration:

Disable Area-based splits.

Enable Percentage-based allocations.

The Result: EnergyCAP accepts the exact, defensible splits calculated by the upstream engine without attempting to recalculate them.

Split method

Dynamic percentage based on area

Recipients		Share	
 K6-1896 CONTRACTOR SUPPORT BLDG. NO. 8 - ELE01	 K6-1896 CONTRACTOR SUPPORT BLDG. NO. 8	8,292 ft ² ×	16.9577 ×
 K6-1896A COVERED WORK AREA - ELE01	 K6-1896A COVERED WORK AREA	2,000 ft ² ×	17.6441 ×
 K6-1896B WASTE STAGING SHELTER - ELE01	 K6-1896B WASTE STAGING SHELTER	931 ft ² ×	6.7745 ×
 K6-1896C STORAGE BUILDING - ELE01	 K6-1896C STORAGE BUILDING	705 ft ² ×	6.3485 ×
 K6-1896E STORAGE BUILDING - ELE01	 K6-1896E STORAGE BUILDING	559 ft ² ×	18.5 ×

The Clean Handoff

Dynamic Lease Management: Update a tenant footprint in one master file; the engine recalculates the entire grid.

The EnergyCAP Import: Generating pre-formatted CSVs for seamless, bulk percentage updates.

The Audit Trail: Automatically generating a human-readable, alphabetically sorted Global Tenant Directory for financial transparency.

E. Dynamic EnergyCAP Weights

Bldg #	Meter Name	Area (SqFt)	Wt. Factor	Percent
M7-0355	M7-0355 O&C - ELE01	604912	37.3519	99.97%
M7-0404	M7-0404 HIGH PRESSURE GAS STORAGE - ELE01	0	0	0%
M7-0355D	M7-0355D ELECTRICAL MOTOR CONTROL BUILDING - ELE01	360	18.5	0.03%
M7-0355E	M7-0355E GUARD HOUSE - ELE01	33	18.5	0%

F. Tenant Distribution

Bldg #	Bldg Meter	Tenant	Share	Tenant Meter
M7-0355	M7-0355 O&C - ELE01	MSD	36%	KSC.EL.BV.M7-0355.MSD
M7-0355	M7-0355 O&C - ELE01	ESDMD	27%	KSC.EL.BV.M7-0355.ESDMD
M7-0355	M7-0355 O&C - ELE01	SOMD	37%	KSC.EL.BV.M7-0355.SOMD
M7-0355E	M7-0355E GUARD HOUSE - ELE01	MSD	100%	KSC.EL.BV.M7-0355E
M7-0355D	M7-0355D ELECTRICAL MOTOR CONTROL BUILDING - ELE01	MSD	100%	KSC.EL.BV.M7-0355D
M7-0404	M7-0404 HIGH PRESSURE GAS STORAGE - ELE01	MSD	100%	KSC.EL.BV.M7-0404

EUI Preserved!

The Reporting Victory: Accurate utility bills achieved without corrupting the core database.

How it Works:

Percentages handle the financial billing.

EnergyCAP calculates EUI *only* on valid, physical buildings.

The Federal Mandate: Portfolio efficiency metrics remain 100% mathematically pure and audit-ready.

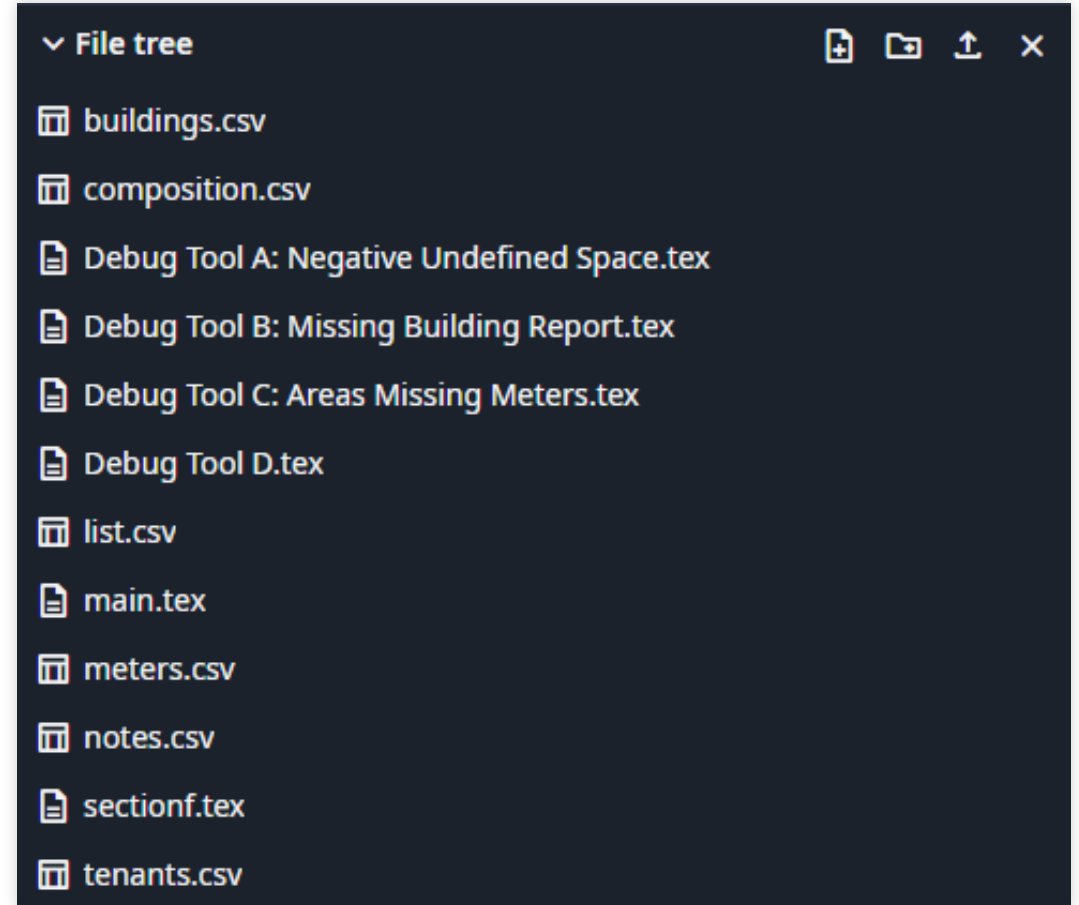
Automated Auditing & Debugging

The Human Element: Dynamic leases mean constant data entry, which leads to mathematical errors.

Automated Debugging: The engine verifies every parent meter sums to exactly 100.00% before generating the import file.

The Gatekeeper:

- Flags missing tenants.
- Catches over-allocated sub-meters (the 105% problem).
- Prevents bad data from ever reaching the billing platform.



The Results

Faster Monthly Closeouts: Eliminating manual data entry and calculation errors.

Total Financial Transparency: Defensible, mathematically proven chargebacks for commercial and federal partners.

100% EUI Integrity: Zero-footprint infrastructure accurately billed without corrupting portfolio efficiency metrics.

Perfect Synergy: Facility engineering reality perfectly mapped to commercial billing logic.

Get best-in-class portfolio level utility bill data management and reporting. Free up valuable time, uncover massive energy savings, and effortlessly streamline operations for everyone in your organization.

- Accurate utility bill data, always
- Watts AI™-powered energy management
- Easy facility benchmarking
- Integrate with ENERGY STAR®
- Measurement and verification

Key Takeaways for Your Campus

1. Decouple the Math from the Bill:

Don't force billing software to act as a facility engineering calculator. Pre-process your complex edge cases upstream.

2. Never Spoof Square Footage:

Protect your Energy Use Intensity (EUI). Find alternative allocation paths for zero-footprint equipment.

3. Leverage the "Cashier": Use EnergyCAP's percentage-allocation features to bypass standard real-estate limitations and execute flawless financial splits



Questions?