



# NAS Patuxent River Energy Incentive Contest



# **Definitions for Contest**



### > MBTU = Mega British Thermal Unit

- What: A standard unit to measure energy
- > Why: We need an apples-to-apples comparison of different units of energy.
  - I.E. How do we compare a barrel of oil to a kilowatt of electricity?
- How: Convert each unit to MBTU by using a standard formula
  I.E. a MWH (Mega Watt Hour) of electricity is converted to a MBTU by multiplying each MWH by 3.414

### "EUI" = Energy Use Intensity

- > What: A standard unit to measure energy concentration between facilities of similar use
- Why: We need an apples-to-apples comparison of energy consumption for different sized facilities.
  I.E. How do we compare a big building with medium energy use to a small building with high energy use?
- How: Take the consumption in standard MBTU's and divide by the facility square footage: Consumption (MBTU) / Thousands of Square Feet (KSF)

### "Benchmark Score"

- > What: a standard way to measure energy concentration between all facilities (similar or not)
- Why: we need an apples-to-apples comparison of energy consumption for facilities that have different uses (e.g. how do we compare an industrial machine shop to an office building?)
- How: lookup "Category Benchmark" determined by DoN independent study of consumption result is "expected" energy in (MBTU / KSF); plug into the following formula: Benchmark Score = 1 – (EUI / Category Benchmark)
- NOTE: if a benchmark score is above zero, the facility is performing better than "expected"; a benchmark score below zero means the facility is performing worse than "expected"

#### Although not without issues, "Benchmark Score" is the fairest way to measure a contest.



### **25 Benchmarked Building Categories** (from CNIC Goals 4.0)



- **Clubs & Dining Facilities** 1.
- **Communications Facilities** 2.
- 3. **Community Facilities**
- Data center 4.
- **Family Housing** 5.
- Fuel & Liquid Dispensing & Storage Facilities 18. Stand-alone Retail 6.
- Gate / Guardpost / Watch Tower 7.
- 8. Land, Waterfront and Coastal Operations **Facilities**
- Maintenance Facilities 9
- 10. Medical Facilities
- 11. Office
- 12. Parking & Open Structures

- 13. Power / Heat Generation
- 14. Primary & Secondary Schools
- **15. Production Facilities**
- 16. Public Safety & Base Services
- 17. RDT&E Facilities
- 19. Supermarket
- 20. Training Facilities
- 21. Transient & Visitor Housing
- 22. Unaccompanied Personnel Housing
- 23. Utility Infrastructure
- 24. Warehouse
- 25. Water, Sewage and Waste Facilities



# **CNIC Benchmarking Scores**



- Commander Navy Installations Command (CNIC) has created EUI benchmarks for each of the 25 categories in each of the 16 climate zones
  - Aligns all Navy Category Codes to 25 Benchmark Building Categories
    - Allows comparison of like use facilities
  - Climate zones normalizes for regional temperature and humidity based on commercial standards
    - Supported by American Society of Heating, Refrigeration, and Air-Conditioning Engineers. (ASHRAE) (based on ASHRAE standard 90.1)
    - Supported by International Energy Conservation Code (IECC)
- > By comparing a raw EUI to CNIC benchmark, we can compute a "benchmark score"
  - A "benchmark score" shows individual facility progress towards its benchmark and any "benchmark score" can be compared to any other "benchmark score"
    - Yellow: 0 = "expected"
    - Red: below 0 (negative) = below "expected"
    - Green: above 0 (positive) = above "expected"



# **BLDG Benchmark Score Calculation Methodology**



- $\blacktriangleright Building Benchmark Score = 1 \frac{Actual EUI}{Benchmark EUI}$
- $\succ \lim_{Actual EUI \to 0} Building Benchmark Score = 1$
- $\blacktriangleright \lim_{Actual \ EUI \to \infty} Building \ Benchmark \ Score \ = \neg \infty$
- Zero is meeting benchmark EUI
- > Positive number  $\rightarrow$  favorable energy consumption: closer to 1, the better
- One is net zero
- Above one is energy generation!



## Summary of Energy Incentive Contest



- Establishes the role of Building Energy Monitor (BEM) for each facility
  - Increase energy awareness by distributing facility-level energy consumption reports monthly
    - Electric and natural gas consumption
    - Reports based on authoritative tools -- NSGEM and CIRCUITS
      - → NSGEM = Navy Shore Geospatial Energy Module
      - → CIRCUITS = Centralized and Integrated Reporting for the Comprehensive Utilities Information Tracking System
  - A checklist, information, and assistance will be provided to each BEM by Installation Energy Manager to help facilitate corrective actions or development of projects
- > Establishes award program for all Naval District Washington facilities, which are O&MN funded
  - Contest does not apply to NAWCAD facilities
  - Funds provided by Installation Commander and matched by NAVFAC
  - Evaluate energy consumption results after one year to determine the facilities that have shown the greatest energy reduction from their respective benchmark
    - First place \$50K
    - Second place \$30K
    - Third place \$20K