



**RECOMMENDED AREAS FOR FURTHER ANALYSIS
REGARDING ENERGY STAR SCORE UPDATES**

1. Apply prior models and equations to the most current 2012 CBECS data

EPA's slides demonstrate key differences in the prior office model (applied against 2003 CBECS data) compared to the new model (applied against 2012 CBECS data).¹ Changes between the prior and new office models include:

- **Size:** EPA uses a square footage adjustment in an effort to score offices of all sizes equitably. The prior model "capped" offices at 200K ft² – and adjusted upward from there to predict energy usage in buildings above that threshold. In contrast, the new model dropped down to a size cap of 100K ft² and adjusted up from that point.
- **Weather/Climate:** The previous model incorporated adjustments for both cooling degree days (CDD) and heating degree days (HDD). In the new model, however, climatic adjustments were made by *only* accounting for CDD. HDD was dropped.
- **Percent of Conditioned Space:** The prior office model considered the percent of the building that is both heated and cooled. The new office model *only* considered the percent of the building that is cooled.
- **Regression Equation Coefficients:** From the previous to the new scoring models, EPA changed the coefficients used to multiply variables and normalize for factors such as worker density, computer density, and heating/cooling.

The real estate industry, in partnership with ENERGY STAR, has made significant strides in improving building efficiency since 2003 – the vintage year of CBECS data against which the prior model was applied. We recognize that stale 2003 energy efficiency data should no longer be the basis for EPA's building ratings. Accordingly, The Roundtable suggests that progress toward transitioning to new scores can be furthered by analyzing the same models and equations EPA has used for years – and apply them against the latest CBECS 2012 data.

We still anticipate that a number of scores will decline once EPA refreshes them with 2012 data. It will thus be critical for the agency to provide potential paths as to how buildings might earn back ENERGY STAR recognition. In this regard, The Roundtable stresses that EPA must test the capability of its "Target Finder"² function. To maintain ENERGY STAR's resonance (particularly for assets that have lost the label), Target Finder must continue as a tool to assist owners' capital investment decisions by reliably predicting how various arrays of efficiency control measures might impact ENERGY STAR scores.

Request for further analysis: The Roundtable requests that EPA apply the same variables, "caps" and coefficients that it employed in the prior model – and do so against the more current 2012 CBECS

¹ E.g., slide 10; slides 38-41 ("old" and "new" regression equations for hotel, office, retail and warehouse).

² <https://www.energystar.gov/buildings/service-providers/design/step-step-process/evaluate-target/epa%E2%80%99s-target-finder-calculator>

data set. So that SPAC members may assess how their buildings score under such an analysis, we also request that our members receive the tools they need so they can run the prior model against the 2012 data themselves. Furthermore:

- Upon application of the prior model to 2012 CBECS data, EPA should evaluate its “Target Finder” function to ensure that it remains an accurate tool upon which building owners and managers can predict resulting ENERGY STAR scores among various project designs.
- Indeed, Target Finder’s predictive ability must be confirmed for *any* new scoring model that EPA evaluates.

2. An “even” distribution of ENERGY STAR scores should not drive EPA’s model

While EPA provided key details regarding *how* the agency changed its models and equations, we remain unsure as to *why* the agency selected the approach that yielded the scores released last August. EPA explains it ran “hundreds of models to determine the best results”³ when it derived the new scores. But the agency’s reasons for rejecting certain models and its motivation in arriving at its preferred methodology remain opaque.

We surmise that a statistically “even distribution” of scores is a key reason why EPA selected the latest model as it did.⁴ The Roundtable shares EPA’s objective that the ENERGY STAR label must be awarded in a fair but rigorous manner. However, we do not believe that achieving an “even” score distribution among Portfolio Manager buildings should drive the model EPA ultimately picks.

As the agency recognizes, the Portfolio Manager database is over-populated with buildings that actively benchmark energy consumption and/or voluntarily provide building energy data. And, Portfolio Manager has a successful track record in spurring the selective tranche of benchmarking buildings in its database to save energy. ***Notably: EPA reports that buildings using the tool saved 7% of energy consumption over a four-year study period – and experienced a concomitant six point increase in ENERGY STAR scores over that span.***⁵

Simply put, buildings in Portfolio Manager represent a more energy efficient, better performing subset of U.S. real estate assets. It is thus reasonable to expect that a greater percentage of Portfolio Manager buildings would score “75” or higher on ENERGY STAR’s 1-100 scale, compared to the national population of all commercial buildings. Accordingly, The Roundtable cautions against a result whereby new ENERGY STAR scoring models and equations are selected because they hit a preordained mark or bias that only about 25% of Portfolio Manager buildings should score “75” or higher.

Request for further analysis: We request that EPA assess ENERGY STAR scores by running the prior model against 2012 CBECS data (as described in point #1)– and thereafter share its model runs and the distribution curve that plots where overall building scores land under such an analysis (similar to the curve portrayed in Slide 11). We do not consider this a cure, but merely wish to see the impact of how scores are distributed following our requested analysis.

³ Slide 8.

⁴ As Slide 11 explains, under the “old” model, 50% of offices in the Portfolio Manager database scored \geq “75.” The slide further indicates a preference that the “new model’s distribution is more balanced” – with about 28% of Portfolio Manager offices scoring \geq “75” and about 10% of properties falling within each 10-point score range on a 1-100 scale (*i.e.*, 10% of properties falling with “71” to “80” scores, another 10% falling within the “81” to “90” range, etc.)

⁵ *E.g.*, ENERGY STAR Portfolio Manager, Data Trends, “Benchmarking and Energy Savings,” available at: https://www.energystar.gov/sites/default/files/buildings/tools/DataTrends_Savings_20121002.pdf. (35,000 buildings in Portfolio Manager studied between 2008 – 2011; “These buildings realized savings every year ... Their average annual savings is 2.4%, with a total savings of 7.0% and an increase of 6 points over the period of analysis”).

3. **Building size as a key variable in ENERGY STAR scoring**

The Roundtable has long expressed concerns that “very large” buildings – *i.e.*, larger than 500K ft² – are under-represented in the CBECS survey. As a result, EPA’s scores are not based on *actual* energy consumption information supplied by “very large” buildings. Rather, scores derive from EPA’s *models and estimates* that predict energy consumption for such sizable assets. Accordingly, one of The Roundtable’s key concerns is to ensure that ENERGY STAR’s scoring methodology fairly reflects genuine performance of “very large” buildings.

Scrutiny of CBECS’s data sample amplifies the importance for ENERGY STAR models to reliably and accurately capture “very large” building performance:

- 2012 CBECS reports it surveyed about 6,700 commercial buildings of *all types*.⁶
- In contrast, the number of actual *office* buildings alone in Portfolio Manager, that have provided verifiable energy consumption information to EPA, is far greater than the number of buildings in CBECS’s sample.
 - EPA reports over 45,000 actual office buildings in its Portfolio Manager database (from 2012 or later)⁷—more than seven times the number of all buildings surveyed by CBECS.
 - EPA also reports that 22,962 office buildings earned ENERGY STAR recognition prior to the recent updates.⁸ That is, even the small subset of EPA labeled office buildings is more than three times larger than the total number of CBECS-surveyed buildings.
 - In fact, only 41 “filtered” CBECS 2012 buildings – of sizes larger than 500K ft² – were used by EPA in developing new ENERGY STAR scores.⁹
 - ✓ There were only 12 “filtered” CBECS buildings between 750K ft² and 1.499M ft².
 - ✓ There were *zero* “filtered” buildings 1.5M ft² or larger.
 - ✓ By contrast, EPA reported 2,215 actual buildings in Portfolio Manager – of a size greater than 500K ft² – providing actual energy consumption data.¹⁰

Despite the dearth of actual “very large” buildings surveyed in 2012, CBECS reports a significant trend in U.S. commercial real estate where growth in building *size* is outpacing increases in absolute *numbers* of buildings:

Although there are relatively few very large buildings (over 100,000 square feet of floorspace), they account for more than one-third of total commercial building floorspace.¹¹

⁶ See: <https://www.eia.gov/consumption/commercial/2012-cbecs-building-sampling.php> (“For the 2012 CBECS, the final sample size was just over 6,700 completed building interviews (over a 28 percent increase from the number of buildings in the 2003 CBECS)”).

⁷ Slide 44

⁸ Slide 16

⁹ As slide 44 explains, to protect anonymity of “very large” buildings, CBECS masks their exact size and location and does not give information on these “unfiltered” buildings to EPA. Instead, CBECS gives energy consumption information to EPA on a smaller number of “filtered” buildings for ENERGY STAR scoring purposes, where they group and round off similarly-sized buildings by the square foot. EPA then applies its scoring model against the “filtered” building information it receives from CBECS.

¹⁰ *Id.*

¹¹ <https://www.eia.gov/consumption/commercial/reports/2012/buildstock/> (“Building size has outpaced the growth in the number of buildings over the past decade, according to [CBECS]. CBECS estimates that there were 5.6 million commercial buildings in the United States in 2012, comprising 87 billion square feet of floorspace. This level represents a 14% increase in the number of buildings and a 21% increase in floorspace since 2003, the last year for which CBECS results are available.”)

As CBECS plainly states, “the changing needs and wants of consumers has led to larger buildings.”¹² Yet, the number of “very large” buildings surveyed in fact by CBECS is virtually non-existent.

Request for further analysis regarding building size: Considering the near total absence of actual energy consumption data from “very large” office buildings in 2012 CBECS, EPA must scale the high bar to equitably provide ENERGY STAR scores for this critical segment of commercial real estate. To instill greater confidence in EPA’s models and estimates as applied to buildings 500K ft² or larger, The Roundtable requests the following:

- As explained in point #1, we encourage an analysis where the prior 200K ft² cap is included as one of the variables in applying the previous model to the 2012 data.
- We also encourage EPA to consider analyses where size caps larger than 200K ft² are used for modeling purposes – and request EPA to explain why these higher caps are (or are not) appropriate for its ENERGY STAR scoring methods.
- The plotted curve on slide 11 portrays how scores of *buildings* are distributed. We request a similar analysis that plots distribution of ENERGY STAR scores with reference to the *square footage* covered by EPA’s label.

4. Heating Degree Days (HDD) should be re-incorporated into EPA’s scoring model

EPA excluded HDD from its latest ENERGY STAR scoring methodology. The reason for this exclusion is a “counterintuitive negative correlation” between energy use and HDD. That is, EPA noted a general, slight national *decline* (in both the Portfolio Manager and CBECS datasets) that office buildings somehow used less energy per square foot when factoring HDD into its scoring equation.¹³ In contrast, Cooling Degree Days (CDD) evinced a slight *positive* correlation with energy use, with building EUI *increasing* relative to the greater number of days where the property required cooling.¹⁴ EPA accordingly continued to incorporate CDD in its ENERGY STAR scoring model.

The Roundtable questions the negative trend EPA perceived in building heating and energy use – and the resulting exclusion of HDD from the regression equation. In dismissing heating as a factor that increases building energy use per square foot, EPA relied on weather information gathered for 2012 (as tied to the year of the CBECS data collection). However, NOAA data reveals that 2012 was the warmest winter on record in 25 northern and northeastern states; and top ENERGY STAR cities (including Boston, Chicago, and Washington, DC) experienced a record-warm January-March in 2012.¹⁵ SPAC analysis supports this by noting in NYC, there were only 3,975 HDD in 2012 – while the average HDD over the period from 2000-2017 was 4,455. ***That is, almost 500 more heating days on average are reported in NYC over the 17-year span since the turn of the century, relative to the isolated single year (2012) that EPA used in its latest scoring analysis.*** Furthermore, based on data gathered from NYC’s benchmarking law (and itself derived from Portfolio Manager’s use), heating is by far the largest category of energy usage for NYC buildings: 36% for heating versus 9% for cooling.¹⁶

¹² *Id.*

¹³ Slides 26-27.

¹⁴ Slide 28.

¹⁵ According to historical NOAA weather data (<https://www.ncdc.noaa.gov/sotc/national/201203>):

- The first three months of 2012 were record warm for the contiguous United States with an average temperature of 42.0 degrees, which is 6.0 degrees above the long-term average.
- For the January-March period, 25 states east of the Rockies had three-month average temperatures which were the warmest on record, and an additional 16 states had temperatures for the first-quarter of 2012 ranking among their ten warmest. Numerous cities had a record warm January-March, including Chicago, Boston, and Washington, D.C. No state in the Lower-48 had 3-month temperatures below average.

¹⁶ See pp. 5-6 at <http://www.nyc.gov/html/gbee/downloads/pdf/UGC-Benchmarking-Report-101617-FINAL.pdf>.

Considering this broader historical weather trend, The Roundtable is concerned that selecting only the year 2012 to consider the impact of heating on building energy usage skewed the results in a manner that unfairly prompted EPA to drop HDD altogether from its latest model.

Request for further analysis regarding HDD: As explained in point #1, we encourage EPA to re-include HDD as one of the variables to apply the prior model against the 2012 CBECS data. Further:

- Upon re-including HDD in the scoring model, EPA should carefully consider what coefficient is appropriate as the multiplier for this variable. In its slide presentation, EPA stated “regressions show a negative coefficient for HDD;” it thus concluded that buildings in colder climates would not score better if HDD was included.¹⁷ We caution EPA against relying solely on 2012 as an outlier warm year as the basis for its treatment of HDD in its regression equation. We request the agency to carefully assess broader historical weather data – not solely with reference to conditions in 2012 – to arrive at a fair and defensible coefficient for this component of a revised scoring model.
- Upon re-including HDD in its scoring model with a proper coefficient, we request that EPA report on whether it still discerns a “negative correlation” between building heating and energy use – both nationwide (similar to the report provided in slide 27) and in “colder” ENERGY STAR markets on its “top cities” list.¹⁸

5. The impact of new ENERGY STAR scores on buildings that use district steam warrants closer examination

Many Roundtable members own and manage buildings that rely on district steam (both for heating and cooling) as a fuel source. EPA explained that about 1,000 office buildings in its Portfolio Manager database (about 3%) use steam, and they are more likely to be “large” in size (greater than 100K ft²) and located in high HDD climates.¹⁹ EPA further stated: “It is difficult to see the isolated impact of [district steam] because of limited data and interconnected effects of climate and size.”²⁰

With respect, we recommend that EPA’s analysis going forward should assess how any modifications of its scoring model (especially with regard to proper inclusion of HDD) impact district steam buildings. Certainly, The Roundtable and EPA share the perspective that any new scoring methodologies should not arbitrarily penalize buildings with greater score declines just because district steam is part of their fuel mix.

Request for further analysis regarding district steam use: Once HDD is re-included in the office scoring model (as per points #1 and #4 above), The Roundtable requests information on how the subset of buildings in Portfolio Manager that use district steam fare in terms of their revised ENERGY STAR scores. Further:

- EPA does “not adjust for specific technologies”²¹ in developing building scores. Accordingly, ENERGY STAR would not provide a score based on the type of HVAC system a building uses – yet slides 35 and 36 appear to only consider district steam as a heating source. Some buildings, however, that use district steam for heat also use steam absorption chillers for cooling. Was district steam at least weather normalized for CDD?
- As we discussed at our October 29 meeting and as many stakeholders have noted, under EPA’s new models, California building scores seem to have declined the least compared to assets in most other

¹⁷ Slide 32.

¹⁸ See <https://www.energystar.gov/buildings/topcities> (listing Washington, DC, New York City, San Francisco, Chicago, Boston, Philadelphia, Minneapolis and Indianapolis as among 2018 “top cities” with the most ENERGY STAR building certifications).

¹⁹ Slide 35.

²⁰ *Id.*

²¹ Slide 5.

states. However, a number of buildings in San Francisco use district steam. Based on the scores released in August, did San Francisco buildings sustain more severe ENERGY STAR declines compared to buildings in Los Angeles and other southern California markets? Once HDD is included in the model for office, how do San Francisco buildings fare in terms of revised scores?

6. EPA should reconsider the appropriateness of a single, national source EUI factor – and its impact on ENERGY STAR scores – in favor of more regional variations in grid power delivery.

EPA states, “national median source EUI is a recommended benchmark metric for all buildings.”²² It thus relies on source EUI as the basis for ENERGY STAR scores.²³ At the October 2017 commercial partners meeting, EPA explained it updated the national electric source factor from “3.1” to “2.8” to reflect a more efficient grid – and that this change in source factor “will impact ENERGY STAR scores”²⁴

We question reliance on a single, uniform *national* factor that does not take into account *regional* variations for energy sources and grid efficiency. As the U.S. Energy Information Administration explains:

The generation mix is not uniform across the country and varies significantly by region depending on available resources and regional market prices A particular region's capacity, the delivered costs of fuels, and system constraints all affect the overall fuel mix in a given month.²⁵

Whether for economic, regulatory, or other policy reasons, certain utilities spend billions of dollars of ratepayer money to achieve less carbon intensive, more efficient, and higher resiliency power grids. Others do not. Considering that EPA has ready access to regional emissions factors from the Emissions & Generation Resource Integrated Database (“eGRID”),²⁶ The Roundtable strongly encourages EPA to reevaluate the correctness of using a single national electric source factor to affect building ratings. Jurisdictions that do not prioritize renewable energy and/or more efficient power delivery should not benefit from a lower source EUI factor – and better ENERGY STAR scores – at the expense of buildings in other regions where commercial owners, tenants and other ratepayers more heavily invest in grid sustainability.

Request for further analysis regarding source EUI: EPA should provide stakeholders with greater information so we may better understand how the updated source factor affected ENERGY STAR scores. In addition:

- Why did EPA conclude that a new source EUI factor of “2.8” was appropriate? How did it arrive at that figure, and reject others?
- The grid does not perform with the same level of efficiency in service areas across the United States. Likewise, the resource mix and carbon footprint of power delivery vary widely. Just as EPA normalizes for weather and temperature variations across the country when deriving ENERGY STAR scores, it should likewise normalize for source EUI – because grid efficiency and fuel mix of supplied power also vary widely. In short: Why is a single, national electric source factor an appropriate component of EPA’s scoring model for buildings?

²² See <https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf>.

²³ See <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics/what-energy>.

²⁴ See slides 18-19 at https://www.energystar.gov/sites/default/files/asset/document/Preparing-for-Metric_Updates_25Oct2017.pdf.

²⁵ See <http://www.eia.gov/todayinenergy/detail.cfm?id=13731>.

²⁶ See <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>. “The preeminent source of air emissions data for the electric power sector, eGRID is based on “available plant-specific data for all U.S. electricity generating plants that provide power to the electric grid and report to the U.S. government.” See <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid-questions-and-answers#egrid1>.

7. Further analyses should not be rushed

The Real Estate Roundtable greatly appreciates our good faith dialogue with the EPA team. We share common purposes to maintain the strength of the ENERGY STAR brand and its relevance as an important signal of well-managed, high performance buildings for a variety of audiences. Moreover, we are mindful of the program's long-term integrity. EPA and its private sector partners will benefit from the precedent we are setting now so that future scoring updates have less of a shock, pose fewer questions, and present more seamless integration into real estate markets across the U.S. (and other rating programs used throughout the world).

A long-lasting and resilient outcome to ENERGY STAR updates based on 2012 data will take more time. The Roundtable also understands that EPA is resource constrained. We thus encourage that EPA continue on the path it started this fall – and take the time it needs to conduct a thorough analysis of its scoring methods and report back to stakeholders along the lines of additional inquiry we request above. The current study period should endure as long as needed (as opposed to rushing to market a new set of scores that could disaffect many of ENERGY STAR's users).

For more information regarding these comments, please contact Duane Desiderio, Senior Vice President and Counsel with The Real Estate Roundtable (ddesiderio@rer.org).