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**Comments of the Natural Resources Defense Council (NRDC) on the
*Existing Buildings Energy Efficiency Draft Action Plan Update***

Docket Number 16-EBP-01

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I. Introduction and Summary

The Natural Resources Defense Council (NRDC) appreciates the opportunity to offer these comments on the “Existing Buildings Energy Efficiency Action Plan Draft 2016 Plan Update,” October 2016 (draft Action Plan Update). NRDC is a non-profit membership organization with more than 70,000 California members who have an interest in receiving affordable energy services while reducing the environmental impact of California’s energy consumption. NRDC appreciates the hard work to develop the updated Action Plan that will help achieve substantial efficiency upgrades in existing buildings and urges swift action to ensure substantial progress is made in line with Senate Bill 350 to reach a cumulative doubling of energy efficiency by 2030.

II. Discussion

1. Strategy 1.1 – State and School Buildings

NRDC supports the recommendation to leverage customer-funded programs under the purview of the California Public Utilities Commission (CPUC) to support implementation of energy upgrades in state buildings (Strategy 1.1.1). However, the CEC should work with the CPUC to clarify current policy rules to ensure that savings achieved by the Program Administrators (PAs) would not be automatically discounted due to the fact that these buildings fall under the requirements of Executive Order B-18-12. The current policy could undermine this objective if not clearly addressed.

2. Strategy 1.4 – Uniform Energy Asset Ratings to Compare Building Properties

NRDC generally supports Section 1.4, particularly the recommendations that the HERS II proceeding work to more closely harmonize with the national RESNET standard, and that CEC work with RESNET on a simpler method for existing homes. Having a rating scale that allows comparability is critical to making real estate markets work in energy efficiency, and to allow more efficient terms to qualify for financing and refinancing based on the higher level of

loan security for homes with lower HERS scores.¹ NRDC offers the following recommendations for the final update:

- The CEC should ensure the initial rating to identify the project scope in existing homes avoids overly complex diagnostics (e.g., duct testing) that make it too costly to carry out, in line with the DOE Home Energy Score. However, post-retrofit evaluation should continue to require a complete HERS rating to enable comparability and make sure the installations are completed with high quality.
- The CEC should expand the scope of HERS II to include all residential, not only buildings that are fewer than 4 units. The CEC could leverage the RESNET Standards Development Committee that is creating a HERS standard with a scope to address all residential units regardless of building height.
- The CEC should work toward a national commercial rating standard to ensure comparability outside of California for regional and national efforts as well as to save time and resources harmonizing at a later date. The CEC could leverage existing work, such as the COMNET manual, a quality assurance guideline that is currently the basis of most of the current Title 24 ACM manual for nonresidential buildings and also underlies most of the DOE Asset Rating program.

3. Strategy 1.5 – Building Efficiency Standards Development and Compliance

NRDC supports exploring a modified approach to assessing the cost-effectiveness for codes and standards that apply to alterations and offer two recommendations:

- Explore potential implications of this strategy given the updates occurring through the CPUC's Integrated Demand Energy Resources proceeding.
- Ensure the discount rate reflects the value of longer term energy savings and the benefit to society (i.e., a lower discount rate).

4. Strategy 1.6 – Plug-Load Efficiency

Plug Load

NRDC greatly appreciates the progress made by the CEC to reduce energy consumption from plug-in equipment, including the development of related standards, investment in research and development, enforcement, federal standards advocacy and technical support, market transformation programs, and state procurement initiatives. To continue with this trend and maximize the opportunity to capture low-cost energy savings, NRDC urges the Commission to:

- Define and include a roadmap and quantified goal for plug loads and appliances efficiency savings to 2030 in the final Action Plan Update.
- Investigate innovative complementary approaches to Title 20 standards.

¹ <http://www.imt.org/resources/detail/home-energy-efficiency-and-mortgage-risks>

NRDC's analysis (Attachment 1) suggests that plug load and appliances efficiency standards alone could yield more than 40 percent of SB 350's doubling energy efficiency savings goal, if such standards are developed sooner than later.² A quantified goal and roadmap would enable target-driven planning around plug-load and appliances efficiency activities and allow the Commission to allocate the financial and human resources necessary to achieve the goal.

In addition, an increased share of the plug load energy savings opportunity comes from the myriad of smaller uses, many of them ever-changing electronic devices. As noted in NRDC's 2015 Home Idle Load study,³ there were an average of 65 electrical devices in Northern California homes, using 23 percent of residential electricity when not actively used (i.e., not including *active* energy use). The vast majority of these 65 electrical products are not covered by efficiency standards, yet setting individual standards for these electronic and other small energy uses would be very resource-intensive and challenging due to the rapid evolution of this market.

Instead, NRDC encourages the Commission to investigate alternative approaches, such as:

- Set 10-year efficiency roadmaps for certain products that could potentially provide higher savings over the long-term, while speeding up the process and reducing the engineering and compliance burden for industry.
- Consider other successful appliance efficiency regulatory or semi-regulatory approaches internationally, such as the European Union's Ecodesign⁴ process that commonly sets 3-tier standards, and Japan's Top Runner⁵ approach.

If the results of the investigation are encouraging, CEC could then launch a pilot project to try out the approach and then extend it to more products if successful.

Energy-Smart Product Marketplace

NRDC strongly supports easy access to product information to make the decision process for consumers easier to navigate. However, the Action Plan Update does not address potential confusion between competing websites or how to mitigate for such confusion. We recommend the CEC explore how the current utility program marketplace platforms align with the Energy

² Given the cumulative nature of SB 350, standards established by 2020 will yield substantially more savings than standards adopted in 2029.

³ <https://www.nrdc.org/resources/home-idle-load-devices-wasting-huge-amounts-electricity-when-not-active-use>

⁴ http://ec.europa.eu/growth/industry/sustainability/ecodesign_en

⁵ <http://www.iea.org/policiesandmeasures/pams/japan/name-21573-en.php>

Upgrade California website, which also has a website to help consumers find equipment.⁶ In addition, the CEC plan should also ensure cross-promotion with the CEC consumer website.⁷

5. Strategy 1.9 – State Policy Leadership

NRDC strongly supports establishing a California collaborative (Strategy 1.9.6) to ensure statewide consistency, engage stakeholders in cooperatively resolving challenges, and leverage the expertise of those on the ground to ensure programs capture substantial savings and serve customer needs. In developing such a forum, it is important that the state learn from and specifically address the shortcomings of previous California and other similar forums. Any structure should rely on identified best practices that are employed by well-functioning forums.⁸

NRDC proposed a similar structure in our report “California’s Golden Energy Efficiency Opportunity: Ramping Up Success to Save Billions and Meet Climate Goals,” in August 2015. We proposed a structure that would build on the existing Energy Principles forum to prioritize and resolve key issues that inhibit widespread scale up of energy efficiency efforts (Figure 1 below).⁹

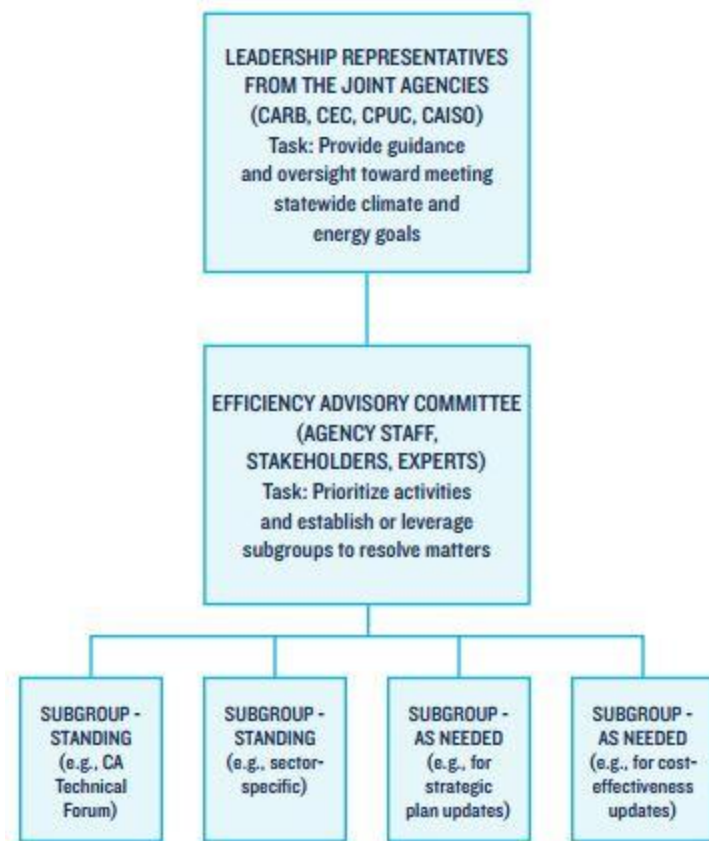
⁶ <https://myenergy.energyupgradeca.org/products/list> [note, access to this page may require a log-in]

⁷ <http://www.consumerenergycenter.org/>

⁸ California Technical Forum, Memorandum re: Energy Efficiency Stakeholder Research, May 1, 2014. <https://static1.squarespace.com/static/53c96e16e4b003bdba4f4fee/t/54a32e0fe4b034981b42d8c9/1419980303421/Stakeholder+Group+Research+Memorandum.pdf>

⁹ NRDC. “California’s Golden Energy Efficiency Opportunity: Ramping Up Success to Save Billions and Meet Climate Goals,” August 2015, p.31. <https://www.nrdc.org/sites/default/files/ca-energy-efficiency-opportunity-report.pdf>

Figure 1: Concept for a Statewide Efficiency Collaborative Forum



6. Strategy 4.1 – Real Estate Value

NRDC recommends that the CEC link back Section 4.1 on real estate to the section on asset ratings to ensure a strong connection. The SAVE Act¹⁰ is one approach that attempts to ensure efficiency improvements translate into higher appraisals and greater borrowing power for building owners. In addition, the CEC should leverage RESNET’s existing relationship with the Appraisal Institute to encourage expanded use of HERS ratings in appraisals.

Last, RESNET is in the process of developing a rating standard for water use. The standard for interior use of water is nearing completion. The CEC should work with RESNET as they develop this rating standard for water use to assure the closest appropriate harmonization of water ratings and use such a rating once completed.

¹⁰ <http://www.imt.org/finance-and-real-estate/save-act>

III. Conclusion

NRDC appreciates the opportunity to comment on the draft Action Plan Update. We look forward to working with the CEC and other agencies as well as stakeholders to successfully implement the Action Plan and establish the statewide Existing Building Efficiency Collaborative.

Summary: Plug-in equipment energy efficiency offers some of the largest and cheapest opportunities to achieve SB 350's goal to double energy savings, while putting money back in Californian's wallets and improving public health from fossil power plants that do not need to be built. NRDC's analysis suggests that a goal of saving an additional 150 billion kilowatt-hours cumulatively between 2015 and 2030 from cost-effective plug-in equipment efficiency standards is achievable. It would save Californians **\$24 billion** in utility bills through 2030, enough electricity to power all the households in the cities of **Los Angeles and Sacramento** for the next 15 years. This is equivalent to the electricity produced by **solar panels on 1 million houses** over 15 years, accelerating California's transition to renewable energy and avoiding millions of tons of carbon pollution.

Setting a Goal for the Contribution of Plug-In Equipment Efficiency to SB 350's Doubling Energy Efficiency Goal

What is plug-in equipment? – Plug-in equipment consists of energy consuming products that get plugged into outlets in buildings. They include appliances, electronics and miscellaneous electric loads. Plug-in equipment are typically brought into the building by occupants, as opposed to central HVAC and water heating, which is typically installed by the builder or contractor, or is present when the occupant moves in. Plug-in equipment efficiency falls under CEC's Title 20 appliance standards program. The name plug-in equipment (synonymous to "plug-loads") is used to clarify that it includes not only household appliances but also electronics and miscellaneous devices.

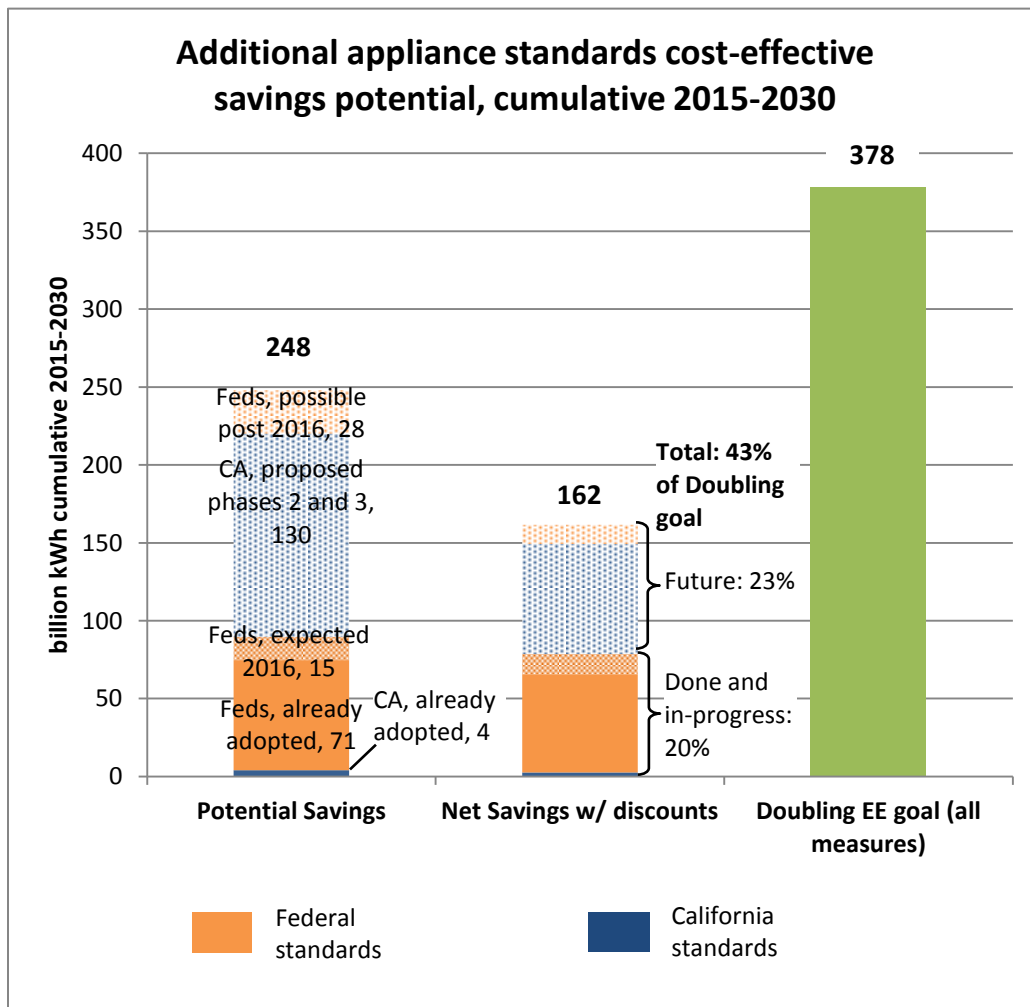
Why plug-in equipment matters – According to the CEC's energy demand forecast, plug-in equipment is responsible for **two-thirds** of residential electricity use in California, and **three-quarters** of the demand growth expected over the next decade. In other terms, plug-in equipment uses roughly **twice as much electricity as heating, cooling and lighting combined** in California's residential sector (much of California's space and water heating uses natural gas).

Plug-in equipment efficiency also offers some of the **cheapest energy savings available**. CPUC's 2010-2012 evaluation study found that appliance standards delivered **25 percent** of efficiency program savings at just **1 percent** of total program cost (efficiency programs play an important role too in jump-starting the market and increasing potential savings, and they are still cost-effective).

Scaling appliance efficiency is a critical strategy to achieve SB 350's efficiency goal in the most affordable manner. While most large household appliances are now preempted by federal appliance efficiency standards thereby preventing California from setting its own standards for these products, very few electronic and miscellaneous products are, leaving a large remaining opportunity for CEC efficiency standards.

Why set a goal? - A numerical goal for the contribution of plug-in equipment efficiency to the doubling of energy efficiency savings in buildings will help CEC make appliance efficiency programs a high priority, plan for a specific target, and allocate the resources required to scale up and sustain standards work through to 2030.

NRDC’s proposed goal is based on an in-depth analysis of the cost-effective savings potential from future state and federal appliance efficiency standards, and applying the same adjustments as those applied by CEC in the Demand Forecast. The following chart shows potential cost-effective savings from state and federal appliance efficiency standards, before and after discounts, relative to SB 350’s efficiency goal:



The proposed goal is non-prescriptive, and is open to all forms of CEC programs including **compliance and enforcement enhancements, non-regulatory programs such as state government procurement, group procurement for multi-family, and innovative regulatory or semi-regulatory approaches such as roadmap standards.**

Ambitious but achievable – The proposed goal corresponds to a doubling of the pace of new and revised standards adoption since the 2012 OIR, including those in-progress and likely to be adopted in 2016 (10 standards adopted in 5 years). It is slower than the pace of adoption over the last two years (5 standards per year in 2015 and 2016).

The proposed goal covers all plug-in equipment sold in California. It is focused on state and federal appliance efficiency standards and other programs under CEC’s purview. Federal appliance standards are included because they benefit Californians and because CEC plays an important role in influencing their development to achieve the highest cost-effective savings possible. The goal does not include savings from investor-owned utilities efficiency programs. Those are important too but are under CPUC’s oversight and require separate policies.

IV. The Numbers Behind the Goal

This section describes the data sources and logic for calculating the numbers that inform the goal.

I. Approach

SB 350’s Doubling EE goal requires achieving **incremental energy savings equivalent to those already accounted for in California Energy Demand Forecast 2014 mid-AAEE scenario, on a cumulative basis** (the earlier the savings start occurring, the more energy savings they account for). We therefore sought to determine the savings potential from future Title 20 and federal appliance standards that are not already included in either the baseline or mid-AAEE in CED 2014.

NRDC’s potential savings estimate did not include utility efficiency programs, or other programs that CEC may be able to do including: state government procurement, group procurement for multi-family buildings, and roadmap (non-regulatory) standards, but those are intended to count toward achieving the goal.

II. California Appliance Standards (Title 20)

Per communications with CEC’s Energy Assessment Division, Demand Analysis Office, the following standards were included in CED 2014 baseline and mid-AAEE scenario:

CED 2014 Baseline	CED 2014 Mid-AAEE
All Title 20 up to and including 2011 Television and 2011 Battery Charger standards ¹¹	All Phase 1 products in 2012 Order Instituting Rulemaking: Phase 1 – Adopted (as of 1/1/2016) Faucets Urinals Toilets Dimming Ballasts Air Filter Labeling Phase 1 - In-progress (as of 1/1/2016)

¹¹ 2014-2024 Demand Forecast, Table 24, Page 85

	<p>LED Quality Small Diameter Directional Lamps Computers – Notebooks Computers - Desktops, Small-Scale Servers, Workstations Displays Pool pump motors & Spas</p> <p>Phase 1 - Not started (as of 1/1/2016) Set Top Boxes Network Equipment Game Consoles</p> <p>Phase 2 - but already accounted for in mid-AAEE Outdoor Lighting</p>
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Savings potential from products in phase 1, whether already adopted, in-progress or not started, as well as Outdoor Lighting, were excluded from Doubling EE potential, since they were already accounted for in mid-AAEE, but they were included in projected CEC Title 20 activity by 2030, in order to project CEC activity and estimate how much of the Doubling savings potential can be achieved by 2030.

Savings potential for future Title 20 standards, beyond those already accounted for in CED 2014 mid-AAEE, was based on a CA IOU analysis of future standards opportunities for revised phases 2 and 3 of the OIR:

Proposed revised phases 2 and 3 of the OIR
<p>Irrigation Emission Devices (Res, Non-Res) Irrigation Controllers (Res, Non-Res) Commercial Dishwashers EISA 2007 exempt Lamps LED Tube Lamps Standby power (aka Idle load, previously called Low-Power Modes) Indoor Plug-in Signs Power Factor Spa Covers T12 Replacement (previously GSFLs) Televisions Solar Inverters (generation savings and production reduction) Servers Imaging Equipment (Res & Commercial) Cordless Phones Home Audio + a continued pipeline of not-yet-identified standards opportunities of at least 250 GWh annual savings after stock turnover (this is conservative: the</p>

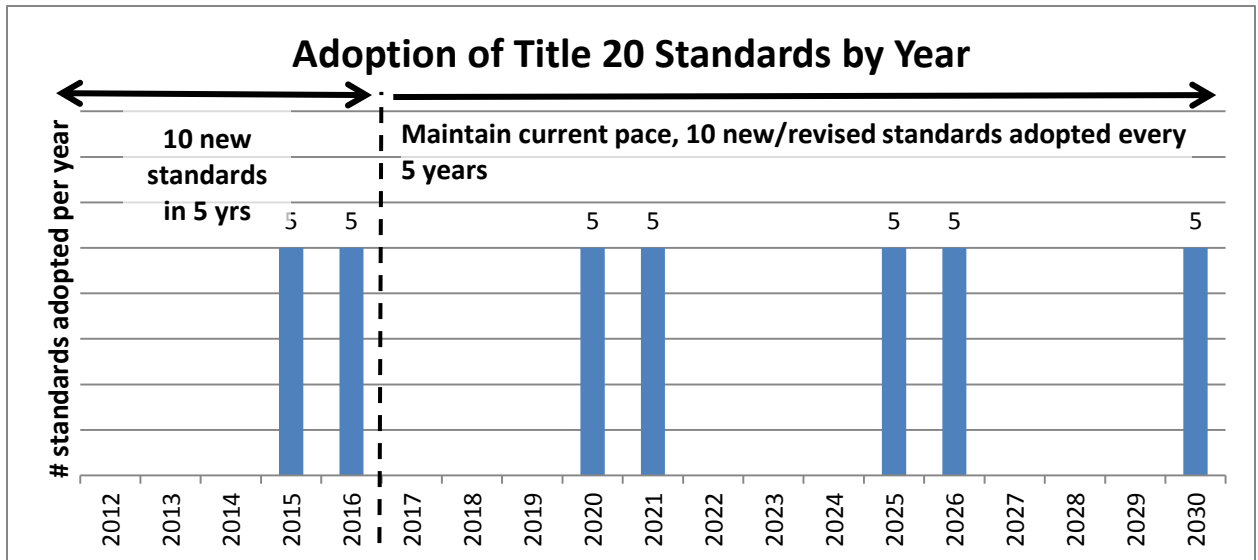
average of known future topics is 1,000 GWh/y savings).

These are the potential future standards identified to date. It is likely that other standards will be identified over time, as technology evolves and new products emerge.

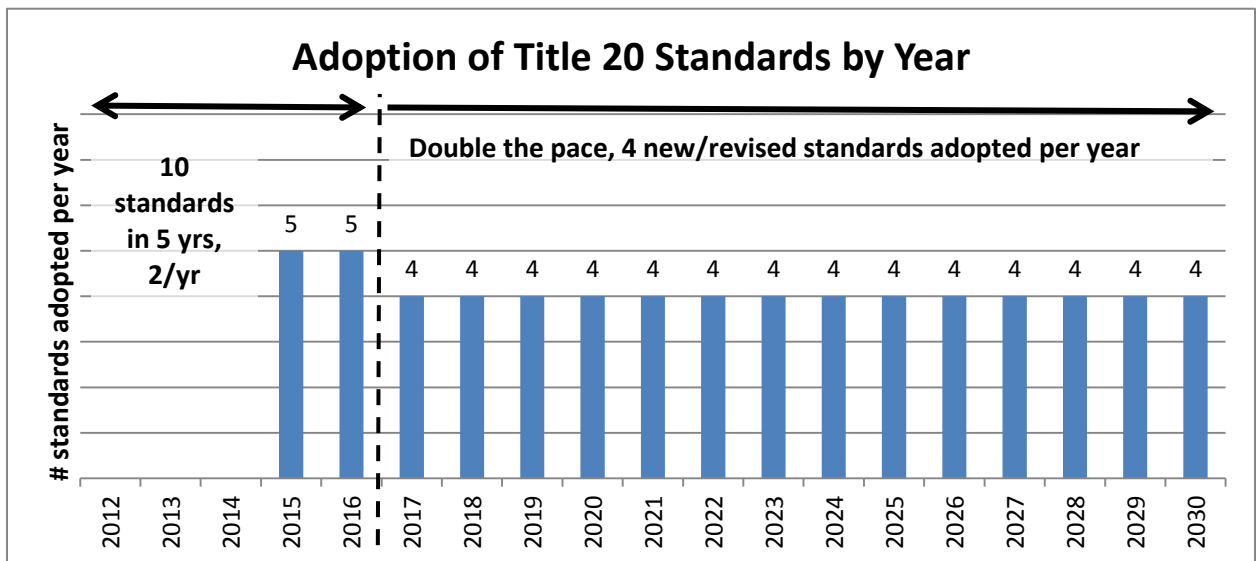
How much of this Doubling savings potential can be achieved by 2030?

We assessed two scenarios:

1. **Maintain current pace:** same pace of new or revised standards adoption as over the 2012-2016 time period (10 in 5 years).



2. **Double current pace:**



Each scenario gives the following results (based on calculations described in the rest of this document):

	Current pace	Double pace
Percent of total goal achieved	33%	43%

The difference between the two scenarios is only 10 percent of the total goal. This reflects the fact that many of the measures modeled toward the end of the 2015-2030 period have been modeled conservatively with relatively low savings, based on today’s assessment, but it is very likely that larger savings opportunities will be identified in the future as technology evolves and new products emerge, which provides significant upside potential in the Double Pace scenario.

III. Federal Appliance Standards

CED 2015 mid-AAEE scenario included federal standards adopted until end of 2013.¹² Potential savings from federal standards not included in CED 2015 mid-AAEE therefore fall into three categories:

- Standards completed 2014- Jan. 2016 (excluding GSFLs):** include standards already adopted but not included in CEC’s mid-AAEE 2015 forecast;
- Standards scheduled to be completed by the end of 2016:** federal standards expected to be adopted by the end of the Obama administration;
- Post-2016 standards:** ASAP’s estimate of the savings potential for new and updated federal standards from future federal standards DOE could adopt over the next decade. ASAP’s detailed estimates will be published in an upcoming report, and were shared early for the purpose of this developing this goal.

The table below shows the standards included in each category, and 2030 annual, and 2015-2030 cumulative savings for each group:

	2030 Annual (TWh/y)	2015-2030 Cumulative (TWh)
Standards already completed but not included in 2015 mid AAEE (adopted 2014- Jan. 2016): Metal halide lamp fixtures, external power supplies, commercial refrigeration equipment, electric motors, walk-in coolers and freezers, furnace Fans, commercial clothes washers, automatic commercial ice makers, single-packaged vertical unit AC, commercial AC, ceiling fan light kits, beverage vending machines, pre-rinse spray valves, commercial and industrial pumps.	10.0	71
Standards scheduled to be completed by the end of 2016: Battery chargers, ceiling fans, commercial AC and heat pumps, dehumidifiers, dishwashers, furnaces, hearth	2.9	15

¹² 2013 Potential and Goals study, Appendix D, Table D-11, except for General Service Fluorescent Lamps, which were included in the baseline, per communication with CEC’s Demand Analysis Office.

products, portable AC, ranges and ovens, wine chillers, fans.		
Post-2016 standards Boilers, ceiling Fans, clothes Dryers, clothes washers, dehumidifiers, furnace fans, microwaves, ranges and ovens, refrigerators, room AC, water heaters, wine chillers, automatic commercial ice makers, battery chargers, beverage vending machines, commercial clothes washers, commercial AC, commercial refrigeration equipment, commercial 3-phase AC and heat pumps, distribution transformers, motors, fans, packaged terminal AC, single-packaged vertical unit AC, C&I pumps, water-source heat pumps.	8.0	28
Total	20.9 TWh	114 TWh

Some of these upcoming standards cover electric dryers and water heaters. The savings potential for these appliances has been adjusted to account for the market share of these appliances in California. Specifically, for dryers, water heaters, faucets, and showerheads, estimates reflect national savings adjusted for stock distribution of electric dryers and water heaters in California, as well as for population.

These numbers only includes standards for which ASAP had a basis to develop an estimate. For example it only accounts for 11 out of the 17 standards that the administration expects to adopt in 2016. This means that this estimate is more a reasonable realistic potential than a maximum potential.

Federal standards overlapping with topics included in California standards, such as computers and TVs, were also excluded from federal savings potential to avoid double-counting.

IV. Adjustments

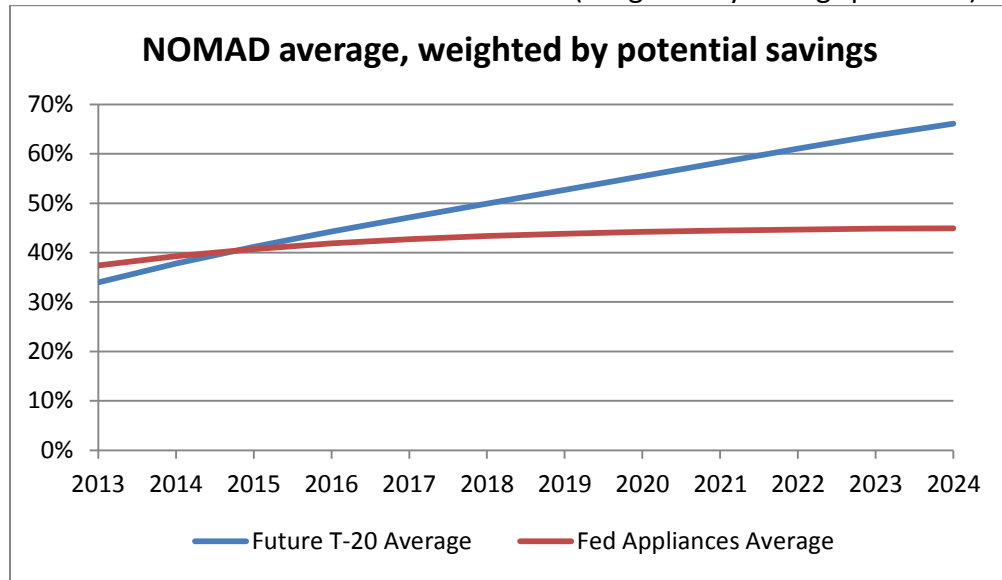
The CED 2015 Demand Forecast is based on savings estimates from the CPUC/Navigant 2013 Potential and Goals study (P&G). The P&G study applies adjustments to the gross savings potential of standards which are reflected in CED 2015 baseline and mid-AAEE scenario. We apply the same adjustments to savings potential from future standards, for consistency with mid-AAEE.:

1. Compliance:

	Compliance
T20	84.75%
Fed stds	95.00%

2. Naturally Occurring Market Adoption (NOMAD):

P&G models NOMAD as S-curves which are specific to each product. The S-curves of future standards are not known. We therefore applied the average NOMAD factor for all mid-AAEE standards to future standards (weighted by savings potential).



Also, CEC and DOE savings estimates already account for the market share of compliant products at the time of the staff analysis. This accounts for the market at the time of the analysis, not for the market evolution post-analysis. Therefore only the difference between the average NOMAD factor and the compliant share at analysis time, should be applied as a reduction factor for NOMAD. Following this approach, the reduction factors are as follows:

	2013	2015-2024 average	Net NOMAD
T20	34%	54%	20%
Fed Stds	37%	44%	6%

3. Realization rates:

Realization rates adjustments do not come from the P&G study, they are our estimate of the probability that these savings can be realized by 2030. Savings from already adopted standards are virtually certain, those from in-progress standards are almost certain, and those from future potential are less so. Realization rate adjustments provide some margin to account for uncertainty in gross savings potential estimates, as well as unplanned political, financial and resource constraints. We applied the following realization rate adjustments:

		Realization rate
T20	Already adopted, not in mid-AAEE	100%
	In-progress (OIR phase 1)	95%
	Proposed revised OIR phases 2 and 3	80%
Federal	Already adopted as of end 2015, not in mid-AAEE	100%
	Expected 2016	95%

Possible post 2016	50%
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The 50% adjustment for federal standards post 2016 reflects the greater uncertainty and lower level of influence that CEC has over the realization rate of future federal standards.

V. How does the plug-in equipment savings potential compare with SB 350's Doubling Energy Efficiency Savings Goal?

Last, we need to compare the efficiency goal with the overall Doubling EE goal for all measures in order to understand the contribution that appliance efficiency can have on SB 350's Doubling goal.

	Annual				Cumulative	
	IOUs ¹³	POUs ¹⁴	Total	Double Total	Total	Double Total
2015	1,936	673	2,610	5,220	2,610	5,220
2016	2,276	813	3,089	6,178	5,699	11,397
2017	2,176	892	3,068	6,137	8,767	17,534
2018	1,838	916	2,754	5,508	11,521	23,042
2019	1,954	898	2,851	5,703	14,373	28,745
2020	1,745	858	2,603	5,206	16,976	33,952
2021	1,874	635	2,508	5,016	19,484	38,968
2022	1,942	563	2,505	5,010	21,989	43,978
2023	2,098	523	2,621	5,241	24,610	49,219
2024	2,114	723	2,838	5,676	27,448	54,895
2025	2,353	752	3,105	6,210	30,553	61,106
2026	2,028	752	2,780	5,560	33,333	66,666
2027	2,028	752	2,780	5,560	36,113	72,226
2028	2,028	752	2,780	5,560	38,893	77,787
2029	2,028	752	2,780	5,560	41,673	83,347
2030	2,028	752	2,780	5,560	44,454	88,907
Total	32,446	12,007	44,454	88,907	378,494	756,989

This calculation shows that SB 350's Doubling EE goal corresponds to **44.5 TWh** in incremental (beyond CED 2015 mid-AAEE) **annual energy savings in 2030**, and **378.5 TWh in cumulative incremental energy savings** over the 2015-2030 period.

SB 350's Doubling EE goal is defined in cumulative terms, we are therefore making all comparisons in cumulative terms.

¹³ IOU Mid AAEE 2014-2024 forecast

¹⁴ 2015 CMUA report p.208