

**From:** [Zhang, Yanda](#)  
**To:** [Jon McHugh](#); [Eilert, Patrick L](#)  
**Cc:** [Anderson, Mary](#); [Hunt, Marshall](#)  
**Subject:** RE: Docs for your study  
**Date:** Tuesday, November 17, 2015 10:25:30 PM  
**Attachments:** [Natural Gas Strategic Planningv2 YY.pdf](#)

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Jon,

I added one slide (#4) to summarize the two furnace standard proposals and the loss of savings for not requiring small furnaces to be condensing models.

I also revise the values in slide #5 to according to the last analysis.

**Yanda Zhang**  
Direct: 916.844.1103

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**From:** Jon McHugh [mailto:[jon@mchughenergy.com](mailto:jon@mchughenergy.com)]  
**Sent:** Tuesday, November 17, 2015 9:47 PM  
**To:** Eilert, Patrick L <[PLE2@pge.com](mailto:PLE2@pge.com)>  
**Cc:** Anderson, Mary <[M3AK@pge.com](mailto:M3AK@pge.com)>; Hunt, Marshall <[MBH9@pge.com](mailto:MBH9@pge.com)>; Zhang, Yanda <[YDZhang@trcsolutions.com](mailto:YDZhang@trcsolutions.com)>  
**Subject:** RE: Docs for your study

Hi gang,

Statewide the new tankless water heater standard in T-24 saves around 5.6 MM Therms per year, reducing growth from new construction from 19.2 to 13.6 Million therms for added new homes. If this were applied to all replaced water heaters this would be another 45 Million therms/yr statewide. There are about 10x of replacement water heaters sold as there are new water heaters. However Title 24 does not require that new water heaters are tankless. These estimates should be reduced by the fraction of residential water heaters that are served by PG&E as compared to all other providers.

Yanda has calculated that PG&E's residential customers use 2,157 Million therms per year of gas. If half of the statewide savings for water heating in T-24 occurs in PG&E's territory, this water heater standard for new construction has about a 1/10th of 1 percent impact on residential sales which are about 1/3 of total gas sales. If this were to be applied to existing water heaters the impact would be 10x as high which would be growing by about 1% of residential sales per year (and leveling out after 13 years due to full stock replacement) or growing by around 1/3% of total sales per year.

I have provided a background discussion of the T-24 impacts statewide and some strategic planning concerning higher gas efficiency standards to be competitive relative to electrotechnologies.

In Title 24 there were no changes to the furnace efficiency requirements (which are preempted). I have conducted a little analysis which indicates why someone might want to increase gas furnace efficiency to be more competitive with heat pump space heating.

Statewide for single family homes the improved water heating efficiency standard saves approximately on average 53 therms/yr per house. Assuming \$1.14/therm based on PG&E residential G-1 baseline rate, the savings per home is \$60/yr.

For new construction, shifting from a 80% AFUE gas furnace to a 96% efficient gas furnace saves around 25 therms statewide (but 95 therms in CZ 16) for around \$29/yr savings (and \$105/yr in CZ 16).

For existing homes the savings are larger as the loads are larger and the base case efficiency is lower.

Yanda is going to have a better estimate of the existing homes savings as he is going to use the RASS data for this and he is going to evaluate the changes proposed or the federal standards which are different than the changes to Title 24.

Please contact me if you have any questions about the Title 24 single family analysis.

I will be at the CEC meeting on LEDs in the morning and traveling to DC on Thursday and at the DOE ASRAC meeting all day Friday (I can be called Friday afternoon due to the 3 hour difference).

**Jon McHugh, PE**  
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**McHugh Energy Consultants Inc.**  
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-----Original Message-----

From: Eilert, Patrick L [mailto:[PLE2@pge.com](mailto:PLE2@pge.com)]  
Sent: Tuesday, November 17, 2015 9:24 AM  
To: Jon McHugh <[jon@mchughenergy.com](mailto:jon@mchughenergy.com)>  
Cc: Anderson, Mary <[M3AK@pge.com](mailto:M3AK@pge.com)>; Hunt, Marshall <[MBH9@pge.com](mailto:MBH9@pge.com)>  
Subject: FW: Docs for your study

Jon:  
How close are you on the deck?  
Thanks.  
Pat

-----Original Message-----

From: Hunt, Marshall  
Sent: Tuesday, November 17, 2015 8:37 AM  
To: Eilert, Patrick L  
Cc: 'Zhang, Yanda'; Jon McHugh  
Subject: RE: Docs for your study

Pat  
At some point this will be a good observation to share with our leadership. Also, Kristen at the CEC would be very interested.

Marshall B. Hunt  
Professional Mechanical Engineer  
Codes & Standards  
Pacific Gas & Electric Company  
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-----Original Message-----

From: Zhang, Yanda [mailto:[YDZhang@trcsolutions.com](mailto:YDZhang@trcsolutions.com)]  
Sent: Monday, November 16, 2015 11:31 PM  
To: Eilert, Patrick L; Jon McHugh  
Cc: Hunt, Marshall

Subject: RE: Docs for your study

Jon,

I performed the billing impact analysis per Pat's request. Please include the following into your summary slides.

If DOE adopts a gas furnace standard that only requires furnace with heat input larger than 70 kbtu/hour to be condensing models, the loss of first-year energy savings from annual gas furnace installation in PG&E territory is estimated to be 3.1 MMT/year. The loss of cumulative savings from 2020, when the standard is expected to take effect, to 2030 is estimated to be 51 MMT. This means that PG&E customer would pay \$58 million more for heating their homes (assuming \$1.14/therm based on PG&E residential G-1 baseline rate).

The estimation is based on energy savings data obtained from the DOE's life cycle analysis model and market share data for different sizes of furnace provided in the DOE rulemaking document.

Yanda Zhang  
Direct: 916.844.1103

-----Original Message-----

From: Eilert, Patrick L [mailto:PLE2@pge.com]  
Sent: Thursday, November 12, 2015 7:59 PM  
To: Jon McHugh <jon@mchughenergy.com>; Zhang, Yanda <YDZhang@trcsolutions.com>  
Cc: Hunt, Marshall <MBH9@pge.com>  
Subject: RE: Docs for your study

Can we estimate the total dollars that pge customers will have to pay if we the cutoff for condensing is 70 kbtu until 2030?

Sent from my Verizon Wireless 4G LTE smartphone

----- Original message -----

From: Jon McHugh <jon@mchughenergy.com>  
Date: 11/12/2015 7:52 PM (GMT-08:00)  
To: "Zhang, Yanda" <YDZhang@trcsolutions.com>  
Cc: "Hunt, Marshall" <MBH9@pge.com>, "Eilert, Patrick L" <PLE2@pge.com>  
Subject: Re: Docs for your study

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Yanda,

Is this the first year's worth of savings? If yes do I just multiply by 10 for the tenth year's savings?  
Does this include replacements and retrofits or new construction only?  
What was base and proposed efficiencies for these analyses?

Thanks,

Jon McHugh, PE  
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PO Box 2878  
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Tel 916.966.8600

[https://urldefense.proofpoint.com/v2/url?u=http-3A\\_www.mchughenergy.com&d=BQIFAg&c=hLS\\_V\\_MyRCwXDjNCFvC1XhVzdhW2dOtrP9xQj43rEYI&r=NFEIWhf9TgrsB2jylwkJeQ&m=UmSicylhJDONPRAkzWjihDzclFUgTgE85BHACyuvf7g&s=hkNft-55EmDjM5Kq\\_fkYaUXy08356QuiczOf\\_W0I8&e=-<https://urldefense.proofpoint.com/v2/url?u=http-3A\\_www.mchughenergy.com&d=BQMFAG&c=hLS\\_V\\_MyRCwXDjNCFvC1XhVzdhW2dOtrP9xQj43rEYI&r=NFEIWhf9TgrsB2jylwkJeQ&m=sOd3rRt7Dc9\\_HUXDpQEbgZlCYRGRReUd0H\\_09yOyLos&s=qG6DAOww8stbQG-5JlqatbmnG-q\\_tlxvmlc315E15GI&e=>](https://urldefense.proofpoint.com/v2/url?u=http-3A_www.mchughenergy.com&d=BQIFAg&c=hLS_V_MyRCwXDjNCFvC1XhVzdhW2dOtrP9xQj43rEYI&r=NFEIWhf9TgrsB2jylwkJeQ&m=UmSicylhJDONPRAkzWjihDzclFUgTgE85BHACyuvf7g&s=hkNft-55EmDjM5Kq_fkYaUXy08356QuiczOf_W0I8&e=-<https://urldefense.proofpoint.com/v2/url?u=http-3A_www.mchughenergy.com&d=BQMFAG&c=hLS_V_MyRCwXDjNCFvC1XhVzdhW2dOtrP9xQj43rEYI&r=NFEIWhf9TgrsB2jylwkJeQ&m=sOd3rRt7Dc9_HUXDpQEbgZlCYRGRReUd0H_09yOyLos&s=qG6DAOww8stbQG-5JlqatbmnG-q_tlxvmlc315E15GI&e=>)

On Nov 12, 2015, at 6:54 PM, Zhang, Yanda <YDZhang@trcsolutions.com<mailto:YDZhang@trcsolutions.com>> wrote:

Jon and Marshall,

Here is estimate of furnace/water heater standards savings as compared to PG&E annual gas demand.

PG&E gas demand (2011)  
(base on CEC California 2012 Gas report)

MMT/year

MMCF/day

Residential

2157

577

Commercial

912

244

Industrial

1858

497

Electric generation

2706

724

Wholesale

37

10

NGV - Natural Gas Vehicles

19

5

Total

7688

2057

Savings from federal appliance standards (MMT/yr)

% of PG&E Total annual demand

% of PG&E Total residential annual demand

Residential Gas Furnace

1.85

0.02%

0.09%

Residential Gas Water Heater

0.93

0.01%

0.04%

Total

2.77

0.04%

0.13%

Yanda Zhang  
Direct: 916.844.1103

From: Hunt, Marshall [mailto:MBH9@pge.com]

Sent: Friday, November 06, 2015 5:08 PM

To: Jon McHugh <jon@mchughenergy.com<mailto:jon@mchughenergy.com>>; Zhang, Yanda <YDZhang@trcsolutions.com<mailto:YDZhang@trcsolutions.com>>

Cc: Eilert, Patrick L <PLE2@pge.com<mailto:PLE2@pge.com>>

Subject: Docs for your study

John and Yanda

Here are two docs to get you started. Look at my comment letter footnotes for important references.

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