

The *fastest* way to reducing residential energy demand

By V. Rory Jones and Stephen Malloy | June, 2010

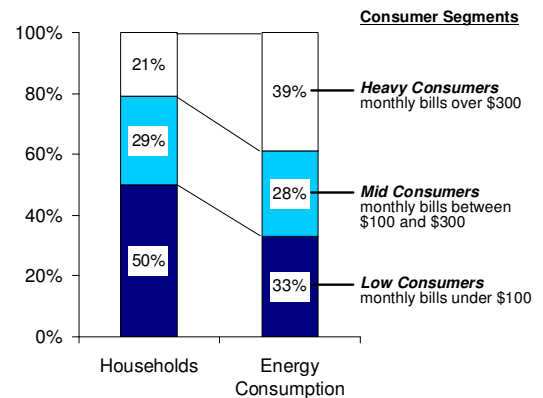
How do you get a consumer to take action? Of course, you make it in their *overwhelming* interest to act, and you enable them with guidance and a few tools. Clearly, if you have an outcome in mind, it is critical to understand what is actually in the consumer's best interest, and to arrange motivators to deliver the desired action.

Such thinking – seeing things from the consumer's viewpoint – needs to be applied to the way policy-makers are approaching the California residential energy market, where much effort is going into initiatives that curtail energy demand from utilities like PG&E and SoCalEd. While good progress has been made in the quest to unlock wide-scale residential energy demand reductions, California is still a few of steps short of its goals. The game-plan for these last steps can be borrowed from the private sector, where they have been tested in countless markets.

Get to know what will drive action in each customer group

Of course, electricity and gas price increases over the last 6 years have received the attention of many consumers, particularly the heaviest energy consuming ones, with bills doubling in many cases since 2004. However, others have seen little change, and to get the most of our consumption reduction investments and efforts we need to distinguish between consumers.

First, it is key to recognize that the top 20% of residential energy consumers (in Sonoma county, these folks have monthly bills exceeding \$300) consume about 40% of all energy and, conversely, the lowest 50% of energy consumers (with monthly bills under \$100 in Sonoma) consume barely 30% of energy; see the chart to the right. This presents an amazing opportunity; pursuing relatively few consumers is likely to deliver disproportionate results. A prioritized return-on-effort approach is warranted. The good news is that *it's actually easier to get heavy energy consumers to undertake demand reduction measures*:



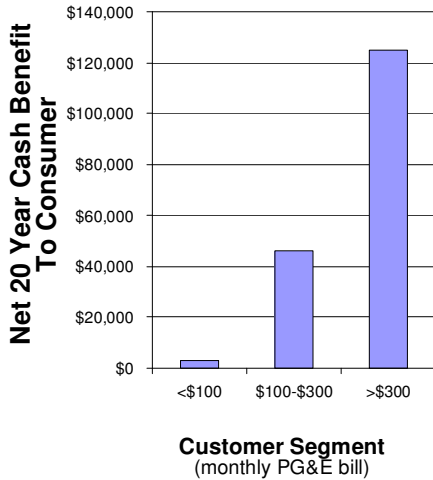
i. Efficiency matters more to heavy energy consumers - as they use a lot of fuel. If one spends \$1,000 on home heating fuel annually, a 30% efficiency improvement is worth \$300 per year. A \$3,000 replacement high-efficiency heater will be paid-off over its 20 year life. But, if you spend only \$100 in heating annually, \$30 in savings will not support any efficiency investment.

ii. Heavy energy consumers pay much higher energy prices (especially for electricity, where the marginal price is four times that for low energy consumers; \$0.40/kWh versus \$0.11/kWh). The result is even mid-energy consumers are thrust into the high bill amounts of (i.) above.

iii. Heavy energy consumers have a clear economic motivation to undertake efficiency investments, as they are usually homeowners. Low energy consumers tend to be renters, and rely on landlords to upgrade energy system efficiencies (alas, landlords rarely pay utility bills).

Money is what really motivates action

Nothing motivates consumers as much as their pocketbooks. Most citizens want to operate environmentally responsibly, but if action requires a net cash outflow there is always hesitation – almost always resulting in inaction (especially true when investment needs are in thousands of dollars; the case for most non-trivial demand reduction measures).



The chart to the left summarizes a study of nearly 200 households in Sonoma County. It shows the average 20-year benefit of undertaking only economically positive measures for the three segments of households; low consumers with monthly bills under \$100, mid consumers paying between \$100 and \$300, and heavy consumers paying over \$300. An economically positive demand reduction measure is any retrofit, behavior change or energy generation that will pay for itself after all costs (equipment, installation and 7% financing, and assuming fuel prices increase at historic rates). This detailed study has a clear message; low energy consumers have little to gain investing to reduce demand, while **heavy energy consumers have much to gain; more than enough to drive action** – enough to pay for a college education!

So, what magnitude of reductions in energy demand is associated with such enormous economic benefits? The potential is staggering. With the proper guidance, using combinations of efficiency retrofits, minor behavioral changes and solar generation, heavy consumers would *profitably* reduce electricity consumption over 60%, and gas nearly 30% (see discussion below).

On the other hand, the opportunity to profitably reduce demand among the low energy consumers is very limited, owing to the lower prices enjoyed today by this customer segment, and their lower fuel throughput.

Positive-Return Demand Reduction Potential, By Customer Segment

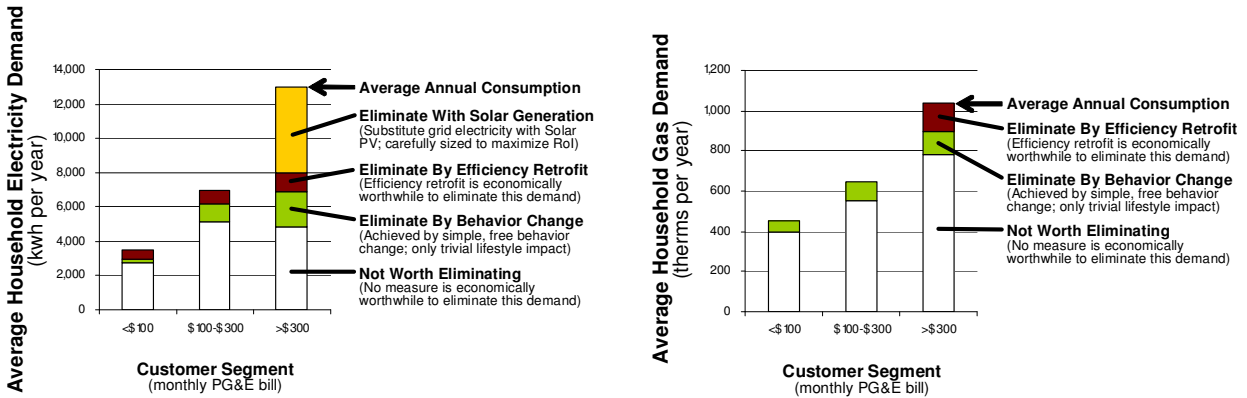
Consumer Segment	PG&E Bill (per month)	Potential Demand Reduction /Home /Yr				Potential California Demand Reduction /Yr	
		Electricity (kWh)		Gas (therms)		Electricity (billion kWh)	Gas (million therms)
Low	<\$100	800	(22%)	50	(11%)	5.1	340
Mid	\$100-\$300	1,800	(26%)	100	(15%)	7.2	390
Heavy	>\$300	8,100	(62%)	255	(28%)	23.0	720
						35.3	1,450

So what does California have to gain by embarking on a program to get consumers to act in their own economic interest? Again, the opportunity is staggering. Projecting this study’s Sonoma County figures to the rest of the state (notably, Sonoma’s potential is likely lower than other counties in California, owing to its mild coastal climate), the back-of-the-envelope calculations in the table above shows 35 billion kWhs are at stake, along with 1.5 billion therms, every year!

Want success? Attack each customer type differently - use what works!

The nature of the demand reduction opportunity is very different between consumer segments, as illustrated in the charts below for typical electricity and gas customers in each segment.

Positive-Return Demand Elimination Potential, By Customer Segment



The huge differences in the nature of these opportunities demand a different approach, tailored to the needs of each customer segment:

Most Effective Public-Policy Approach, By Customer Segment

Consumer Segment	Approach	Message	Cost (/ kWh eliminated)
Low	<ul style="list-style-type: none"> Media campaign 	<ul style="list-style-type: none"> Primarily changing light bulbs to high-efficiency bulbs Limited weatherization 	Unknown, likely negligible
Mid	<ul style="list-style-type: none"> Media campaign Self help and web tools 	<ul style="list-style-type: none"> Low cost actions; bulbs, fridges, duct sealing, etc. Behavioral changes deliver more as more fuel is used 	Unknown, likely negligible
Heavy	<ul style="list-style-type: none"> Custom, in-home solution planning 	<ul style="list-style-type: none"> Wide range of measures viable: Changing bulbs, appliances, equipment, behavior and generation 	<ul style="list-style-type: none"> \$0.02 / kWh \$0.80 / therm

Low / mid energy consumers: The economic viability of demand reduction investments by low / mid energy customers is limited. Professionally installed solar electricity generation is never worthwhile, and much the same is true for most other measures. The majority of the opportunity in electricity demand is, by far, only achievable by light bulb replacement and a few behavior changes. With this in mind, the most efficient approach for the state to drive demand reduction in this segment is, unquestionably, a broad-based educational media campaign focused on 3 or 4 simple messages; the positive economics of light bulb replacement and behavioral tips.

Heavy energy consumers: These 2.8 million California households offer an opportunity to reduce the state’s utility-supplied energy by 23 billion kWh and 720 million therms annually – and each will receive a huge economic gain in the process. The state just needs to tip the cart slightly and allow self-interest to take over.

The Sonoma county study found that homeowners rarely take action because they have no idea what investments will pay-off, and are most afraid of losing money in erroneous investments. They need help figuring out what to do, but cannot find anyone able give them an action plan that is assured to reduce their energy-related spending. The only potential source of help is the

energy audit industry, but they are currently going down a path focused on calculating HERS scores for homes – not in delivering optimized plans for homeowner action. Moreover, even if they started to come up with such plans, homeowners would still not take action as they are so risk-averse they refuse to spend anything on energy audits in the first place.

There is an ultra-low cost solution...

The solution is quite simple, and was successfully used in the Sonoma county study. There are two parts to it: First, software is needed to automate the highly complex energy-economics optimization calculations needed for each unique home; only with such automation can several person-months of analysis be whittled down to a millisecond. Second, California's energy-audit system, currently oriented around giving structures a "HERS" energy score (a number seemingly dreamed up by engineers), needs to be re-focused on the consumer's viewpoint of home energy-economics¹, and simplified to actions that drive down spending.

Both the software and structure energy-economics diagnostic were developed and used in the Sonoma county study (see yoUtilBill.com), such that after 1 person-hour of effort, each home in the study received a custom action-plan that delivered up gains for the homeowners concerned up to \$650,000 in 20-year savings (again, net of all costs, including capital/financing costs)!

If all the heavy energy consuming households in California undertook such a diagnostic, paid for by the state to ensure widespread coverage, the cost to the state would be \$250 million. Now, if only 50% of those households undertook the prescribed action plans, the savings would be 11.5 billion kWh and 360 million therms each year. **That's 2 cents per kWh saved and 80 cents per therm saved annually – a cost far lower than any initiative the State of California is currently paying for, and one that is likely to deliver wide-scale results very quickly, since consumers act in their own interest.**

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Rory has operated as an advisor to leaders in large- and mid-cap businesses for over 20 years, and has helped create billions in cash flow and business value. Rory was Partner at PricewaterhouseCoopers Strategy Consulting, where he led the US Shareholder Value advisory practice. Rory co-founded Business Value Associates; consultants specializing in value growth, and has served leaders in today's most successful businesses; Diageo, Encyclopedia Britannica, HP, Liberty, IBM and others. Rory earned his MBA from the University of Chicago, and his BSc from London's City University. He is widely published and speaks regularly, and is quoted regularly in the media. Rory also sits on several boards, including the Association for Strategic Planning. His book, *Boosting Cash Flow & Shareholder Value* is published by John Wiley & Sons.

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Steve's 20 year career spans strategy consulting and leadership at technology companies. Immediately prior to yoUtilBill Steve was a serial entrepreneur, founding and leading several technology-driven ventures (including Cachet Solutions, a Financial Services software play, and several renewable energy investments). Steve was a Principal in PricewaterhouseCoopers Strategy Consulting, where he advised leaders at Ameritech, Motorola, Samsung and elsewhere. Steve earned his MBA from the University of Chicago, and his BA from Carleton College. Steve serves on several boards, and speaks and writes on renewable energy market issues.

¹ For a more detailed discussion of home energy economics see the paper "*Don't Go Broke Going Green*" by yoUtilBill (<http://www.youtilbill.com/images/youtilbill-Paper-Economics-1001122d.pdf>)