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Better Math On Weatherization

We see in an [article in the Oregonian Newspaper, on 8/3/2014](#) that [Energy Trust Of Oregon](#) , my local handler of public funds for weatherization, has found that weatherization doesn't pay, even when computed for a 45 year life of a measure. I prove that wrong, always. There are very good returns even in a home where Energy Trust saw nothing to be done, with firm no-bid by a competitor. It's a post at this blog generally challenging Energy Trust's policies:

[Math Of Under-R12 Attic Floor Insulation Rule, For Incentives](#)

The good returns are far more than a matter of adding floor insulation and have no resort to a silly blower door. They include attic floor sealing, thorough R30 insulation in attic walls and installing LED lights, all rejected as profitable measures, by Energy Trust. A five-year payback is computed for hard-covered R30 attic wall insulation in a further blog post for this home:

[A Skylight Insulated >R30, With Plywood Hard-Covering](#)

There is similar under five year payback for upgrade to LED lighting in most cases, and even faster payback for air sealing.

As local enabler and enforcer of US Dept. Of Energy's Home Performance With Energy Star, HPwES, Energy Trust teaches that a blower door is the engine of weatherization, finding energy-saving opportunities and verifying their completion. "Weatherization" is first about tightening our houses in ways that measurably decrease "infiltration." The tighter, the better. Little-trained fools are building scientists, who infer what must be done from the blower door numbers. Without the numbers, solutions can not be found. The captains of weatherization under leadership of Building Performance Institute, shall be [BPI certified](#) believers in the testing in and testing out every home, with a blower door. Air sealing shall be trusted and supported with public funds, only where done, very poorly, by the BPI liars. This is baloney. It must not continue.

Work under HPwES is done poorly, in part, because a blower door generally reverses flow in leakage paths, inviting repair only in living spaces, along a carpet, say. Repairs must instead be done in the attic, never with, or needing, clues from a blower door. Specific needed repairs, perhaps difficult, will never be included in a HPwES estimators' authorized work list. Where a diligent worker might volunteer, unhappily in darkness and danger, and it is not expected, why should he bother?.

Despite the notions about infiltration, Energy Trust [does not require](#) that such "prep" must be done before rebate-offered addition of insulation. This is madness, with "weatherization" very often doing more harm than good. Money to be saved in the prep, then barred for decades, is commonly double that to be saved by added insulation.

Fresh Air Math

One problem in tightening up houses against exchange of fresh air, beyond the obvious in quality construction, is

that it does not save much money in fuel costs. That is what Energy Trust is now awkwardly and confusedly admitting. Little energy is needed to raise or lower the temperature of air. All gases have low [specific heat](#) . One might excessively tighten a house, but there is no money in it, that would offset excessive cost in extreme tightening. Further, significant tightening in existing homes, promised with HPwES, has almost never been delivered.

A healthy home should be refreshed with 0.35 air changes per hour, 0.35 ACHnat. In a 1000 sq ft home with eight-foot ceilings, this is $0.35 \times 1000 \times 8 / 60 = 47$ cubic feet of fresh air per minute. In a Portland, Oregon year with 4400 heating degree days, heating with an old gas furnace, and with \$1 per therm consumer cost, this air is heated at cost of \$35 per year. Say the real cost of natural gas counting irreversible depletion and environmental ruin, and military adventure, is \$4 per therm. The cost of the fresh air is still only \$140 per year. Of this fresh air cost, little is controllable.

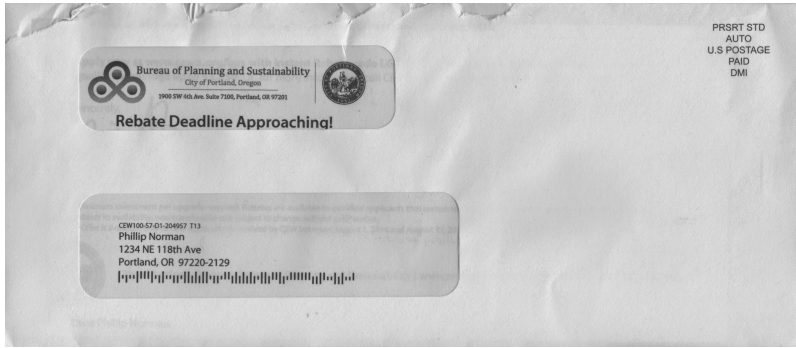
In corresponding bigger numbers, times twenty, now consider blower door test numbers. A blower door measures infiltration with the home strangely exhausted at the rate thought to occur if a twenty mph wind were blowing on all sides, driving air inward. The odd air flow measurement is labeled CFM50, cubic feet per minute at fan pressure differential of fifty pascals, 0.0073 psi. CFM50 and ACH50 are roughly twenty times larger than reverse-flow rates at natural conditions. I think that all payback math for weatherization should be computed with natural gas cost of at least \$2 per therm, and use that number in my math. The [math](#) of fresh air cost is: *Annual Heating Cost = 0.074 * CFM50*, \$70 per year for that 1000 sf home with 47 CFMnat. I hope you are still with me, and see the consistency and bases, in the math.

Now talk of the range of control of infiltration. It is rarely more than 1.0 ACH50, 0.05 ACHnat, 7 CFMnat and 140 CFM50, for that 1000 sf home. Annual value in this range of control is \$10 per year, at \$2 per therm for natural gas. I have known this for years, and have alerted the fact to Energy Trust in hope they would cease promotion of blower door scams.

In a reasonably tight home where obvious drafts have been controlled, we feel winter cold of air not from infiltration, but from convection of air against cold walls, floors and ceilings. Cold surfaces, felt especially at floors, exist because of poor insulation and because of bathing of back sides with outside air. Stopping that bathing of backsides, and thorough placement of insulation, are what weatherization is about, not some pretense with a blower door.

Where Energy Trust now [salutes disappointing returns in weatherization](#) they fail to understand their error and to be ashamed. They will happily go on with little residential work to do, and more money to misspend on utility and business payouts. Creepy blow and go contractors they love and award their top Three Star rating, who have refused to do air sealing, are hereafter and forever more, defended against criticism. In all of this there is yet no admission of blower door stupidity. In Portland this Summer we saw distasteful door to door pushing by HPwES/ [CEWO](#) blow and goers claiming to offer free Energy Trust money. I accuse that these kids in new Company shirts with Energy Trust logo, were paid with "cooperative marketing" dirty money, with nothing free for a home owner. It seems HPwES, Clean Energy Works Oregon, EPS, all the programs promoting blower door scams, are alive and well. How can they persist against declared uselessness of actions purportedly guided by a blower door?

The City Of Portland is shamed through endorsement of CEWO, which was hatched in a pilot program of its Bureau of Planning and Sustainability. BPS stationery has been applied in annual CEWO bulk mailings, a letter, and a follow-up postcard. It appears that Portland taxpayers have paid the cost of this mailing campaign.



I have gotten a letter [like this](#) every year, for three years, mailing costs totaling a half-million dollars I reckon. I find the letter scandalous on many counts, starting with offensive foot-in-door threat about deadlines, wanting reckless action. This one arrived 8/13/2014. If a million have been sent, and there are 3500 takers, it proves the offer is correctly judged a very bad deal. We hear instead that 3500 unusually willing and able to take on an inflated \$20,000 pile of fifteen-year debt, proves that it is not a bad deal. If you need \$3000 of very important work and need up-front financing, you are out of luck. If you are a renter, too paying into our Public Purpose Fund, you can just pay the higher bills, perhaps demeaned with public support. Your landlord knows that helping out, doing the right thing against bleeding of energy and personal suffering, is not expected or rewarded in our City.

So, what shall we do with blower doors? They shall not be used in many of our homes. In our homes, in the matter of [sealing wall headers](#), we have expended the testing budget. There might yet be some academic testing as we defend the real reasons all wall headers must be sealed. I would like to [buy mine back](#), at dimes on the dollar, to be part of the academic effort. My own home is a test lab, testing in at 10.1 ACH50, and probably now down to less than 7.0. I would share my findings on what works. From all of the BPI blower door madness, we have learned nothing about what, in controlling air circulation, contributes to a healthy home. It was only about rewarding and enforcing the reckless HPwES believers, all results confidential for protection of scammers.

We shall go on tightening our houses against [attic floor pits](#) and air-barrier encapsulation of *all* insulation, knowing it is not a game of blower door numbers. We must act with knowledge added insulation does pay, after measures of sealing, upgrade to LED plate lighting and safety modernization of wiring and plumbing are done first. [Insulation cost is repaid in much less than twenty years](#) even at modest \$2 per therm energy cost. Regulators such as Oregon's Public Utility Commission may be commanded to employ fifty-year cost of energy in the administration of public funds for weatherization. Cheap and evil fracked natural gas will expire [in less than ten years](#), evident to any responsible person, and government *must* act responsibly. We are not done with weatherization. For the poor especially, and especially for meanly-neglected renters, we have hardly begun.

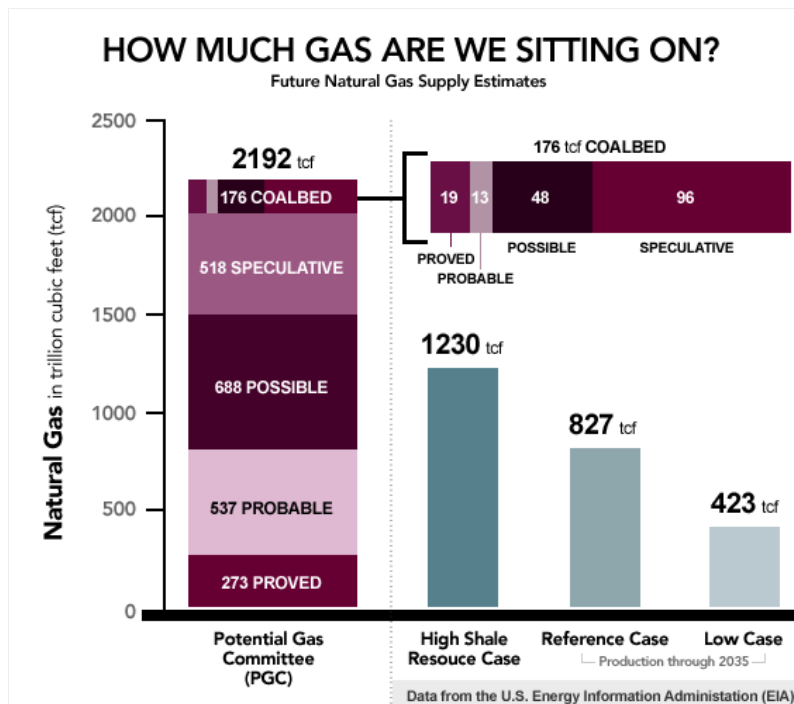
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How Long Will The So-Cheap Natural Gas Last?

We all need to know natural gas made cheap by evil fracking is of very short duration. [Here](#) is one reference for that, published in respected Slate Magazine.



An optimistic "proved" total of 273 tcf would last eleven years at current pace, and the price would rise strongly, much sooner. Six years from now seems consistent with the chart.

Get to know [Chris Nelder](#), who spoke the six-year fracked-gas number, in a [radio interview](#) that inspires this post. I listened to the interview again now for post diligence, and didn't hear the six number. It is there. Chris Nelder's analysis stands on its own, in this presentation:

<http://www.smartplanet.com/blog/the-take/peak-oil-isnt-dead-it-just-smells-that-way/>

There, read this prediction of grave happenings in only a couple of years.

"I expect world oil production to rise, weakly, for another two years or so, as America falls into a deeper slumber believing that fracking has cured everything. The media will reinforce that belief. And when it comes, the wake-up call is going to be harsh. In the meantime we're just going to be waiting for the punchline.

So to those who can grasp the data, here's my final thought: How will you prepare yourself for The Great Contraction? You've got perhaps two good years left of business as usual, and maybe another three or four after that before things really get difficult. I encourage you to use them well, and do what you can to make yourself resilient and self-sufficient. What will you do 10 years from now if the price of gasoline is \$10 a gallon?"

[Here](#) is another reference in this, author Richard Heinberg. [His book](#) is a really easy read, in Kindle. No one can contradict the truth that fuel prices misleading planners, will turn in the next several years. Planners of weatherization must act now, to accelerate action by more than an order of magnitude. In Portland, Oregon, those who brag of [weatherizing 3,200 homes](#) under fat-laden \$20,000 HPwES scams, in five years, will face humiliation. The need in this period was of progress by times-fifty, in work done [honestly](#), perhaps in sacrifice for our common cause.