Carbon Reduction versus the TRC

...cost-effectiveness needs redefinition

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Association (CBPCA)

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A Look at Our Carbon Footprint

This half: mostly due to stationary energy uses
The Carbon Challenge

California’s AB32: A model for the nation

MMTCO2e

1992  2008  2020  2050

85  422  30%  80%
The Carbon Challenge

Renewables cover about 15% of the 2020 goal

1992 | 2008 | 2020 | 2050
---|---|---|---

PV, geo, wind, etc.
The Carbon Challenge

Renewables cover about 15% of the 2020 goal

Energy Efficiency is about the same, but separate
Energy Efficiency’s Part

These look small…but are very large numbers

- **Electricity 2012-2020**
  - 21.9 MMTCO2e
  - 32,000 GWh

- **Gas 2012-2020**
  - 4.4 MMTCO2e
  - 800MM Therms
## Future vs. Present Savings Goals

**2011 Targets: only 1/3 of 2012-20 average annual needs**

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>2012-2020 Use (GWh/yr)</th>
<th>2011 Use (GWh/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>~3200</td>
<td>1086</td>
</tr>
<tr>
<td>Gas</td>
<td>80 MM Therm/yr</td>
<td>22</td>
</tr>
</tbody>
</table>

...and the goals DOUBLE for 2021-2050
Can existing programs do it?

You just can’t get there on this road.

...Conventional measures can’t save enough per site (40-80%)
Can existing programs do it?

You just can’t get there on this road.

...Conventional measures can’t save enough per site (40-80%)

- In homes, 20% savings is rare with single measures
- Virtually everything possible is needed at each site
- Separate additive programs would be slow + wasteful

Must have comprehensive upgrading programs
What **Will It Take?**

- Even current goals are hard with existing EE programs
- Conventional “widget” programs can’t do enough
- Strategic Plan seeks innovative/comprehensive programs
- New emphasis on “market transformation” approaches for much deeper energy savings and market reach
What Will It Take?

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**EXAMPLE:**

New homes: All zero net energy by 2020
Existing homes: All 14 million to reduce use by 40% (and 80% by 2050)
The Cost-Effectiveness Barrier

- Even current goals are hard to reach
- Conventional “widget” programs inadequate
- Strategic Plan seeks innovative/comprehensive programs
- New emphasis on “market transformation” approaches for much deeper energy savings and market reach

BUT...

Utility program portfolios must be “cost-effective”
...and new approaches tend to fail the test
Usual Cost-Effectiveness Definition

TRC = 

BENEFITS:
Utility Avoided Power Cost
(and small emissions adder)

COSTS:
All program + participant costs
(total project costs)
What’s Wrong with the TRC?

Nothing was wrong with the original idea… but it changed:

ALL costs are counted… but only ONE benefit ($\Delta$kWh)

Not quite realistic…
What’s Wrong with the TRC?

Nothing was wrong with the original idea… but it changed:

ALL costs are counted…but only ONE benefit (ΔkWh)

- Personal investments have more complex motivations
- Societal investments can yield varied societal benefits
- Social/psychological sciences recognize these complexities

**A more realistic interpretation is needed**
A Comprehensive Program Example: 

*Home Performance with Energy Star*

A comprehensive home energy efficiency approach

- huge underserved market
- deepest energy savings
- valued non-energy benefits
- builds increased savings indefinitely

*but is often systematically undervalued in public-goods cost-benefit tests*
Home Performance and the TRC

Example: $15,000 home retrofit saving 2500kWh + 150 therms (~30-40%)

- Assume $2,000 program share + $15,000 participant

- RESULT: TRC < 0.5 due to high participant cost

- BUT if Non-Energy Benefits are accounted for …

- TRC could be 1.5 - 2.0 or higher

  AND both the participant and society gain much more than energy cost savings
Why is the TRC so low?

Because the underlying logic is flawed

- Counts ALL the costs but only a PART of the benefits
- Some measures “pay off” mostly in non-energy benefits
- All measures contribute to energy and demand savings
- The savings pie is smaller for each added measure

*But the total energy savings are the deepest possible*  
*...and there are other personal/societal benefits too*
It’s not just bill savings: The customer buys a whole BUNDLE! …but all the non-energy benefits are ignored in evaluations.
Big Benefits for Broader Society Too

- Secondary Jobs
- Construction Jobs
- CARBON REDUCTION
- Public Safety
- Unemployment Savings
- Productivity
- Housing Stock Value
- Emissions Reductions
- Local Tax Revenues
- Income Tax Revenue

But these benefits are not considered either.
A Strategic Dilemma

_Catch-22: Big Needs, Outmoded Tools_

- Ever more radical efficiency goal increases needed
- Conventional “widget” programs don’t go deep
- Need realized for more comprehensive approaches
- Current C-E tests disqualify such approaches

_SOLUTION: Broaden the C-E Tests_
Profound Implications for Policy

*Climate change...changes the game*

*Deep energy savings will be essential*

*...and comprehensive programs necessary*

Non-Energy Benefits are real and must be counted...
Profound Implications for Policy

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Non-Energy Benefits are real and must be counted...

**Societal Benefits:**

Identify & Monetize

...Much research done

...Solid evidence

...Used elsewhere

...Likely to be more valuable than energy cost savings
Deep energy savings will be essential
...and comprehensive programs necessary

Non-Energy Benefits are real and must be counted...

Societal Benefits: Identify & Monetize
...Much research done
...Solid evidence
...Used elsewhere

Participant Costs: Reflect motivations
...Remove costs for non-energy benefits
...Remainder often a small part of total

Profound Implications for Policy
Climate change...changes the game
A Total Resource Cost Test Fix

TRC = COSTS:
Program+ ~20% participant costs (total ATTRIBUTED project costs)

BENEFITS:
Utility Avoided Power Cost (PLUS Societal NEBs)

Use only participant cost share for energy savings and expand benefits to include all societal NEBs
Conclusions: Time for a Change

- AB32 and Strategic Plan have very high goals
- Far beyond capability of present programs
- Present cost-effectiveness definitions outdated
- Actual benefits are far higher, appropriate costs lower
- Need state/national redefinitions of cost-effectiveness

*This change can empower energy efficiency*

*...and do we have a choice?*