

Milwaukee Energy Efficiency (Me2)

Joel Rogers

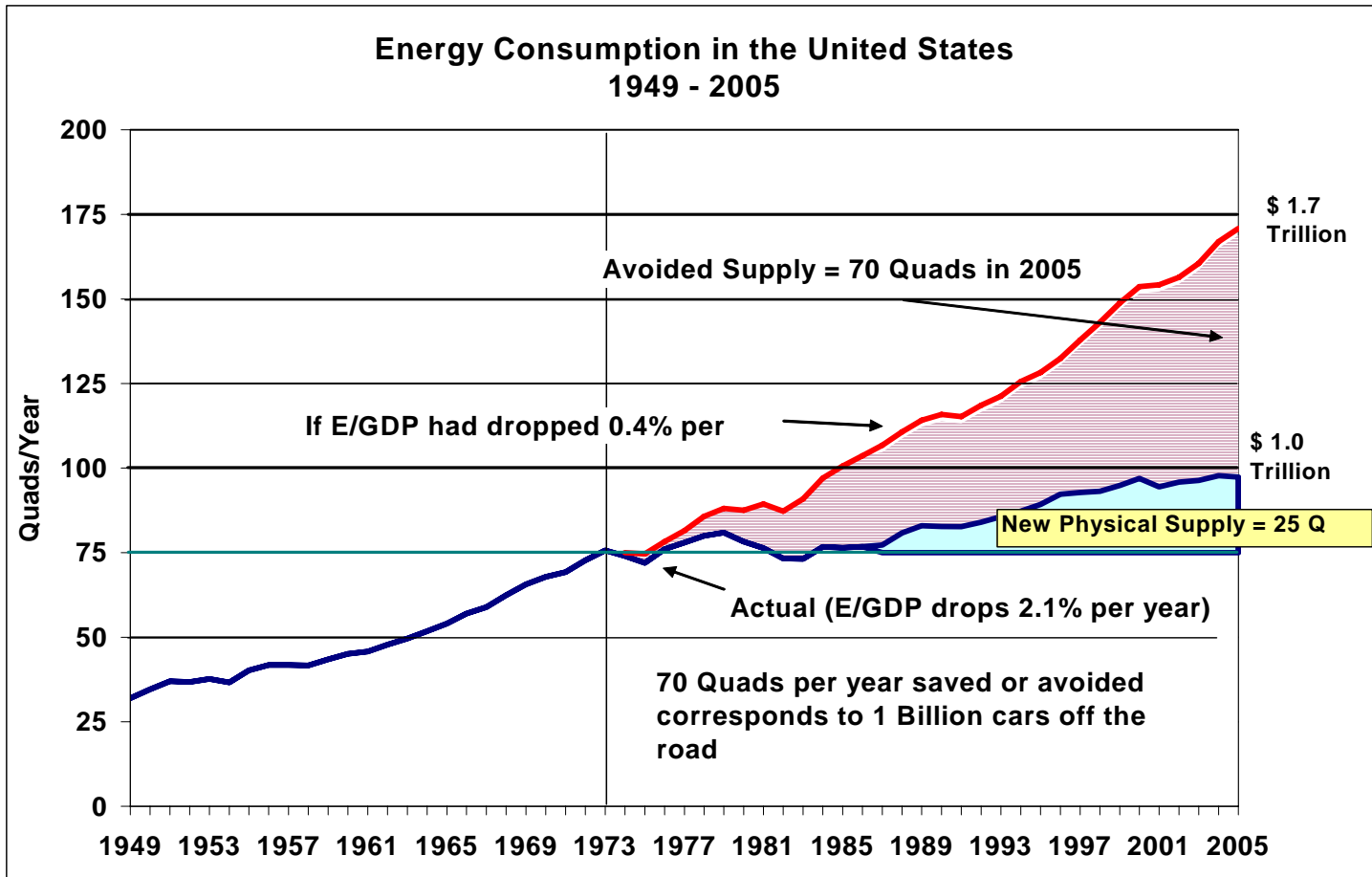
UW-Madison, COWS, CSI, MIP, MSC, Apollo, G4A

What I'll talk about

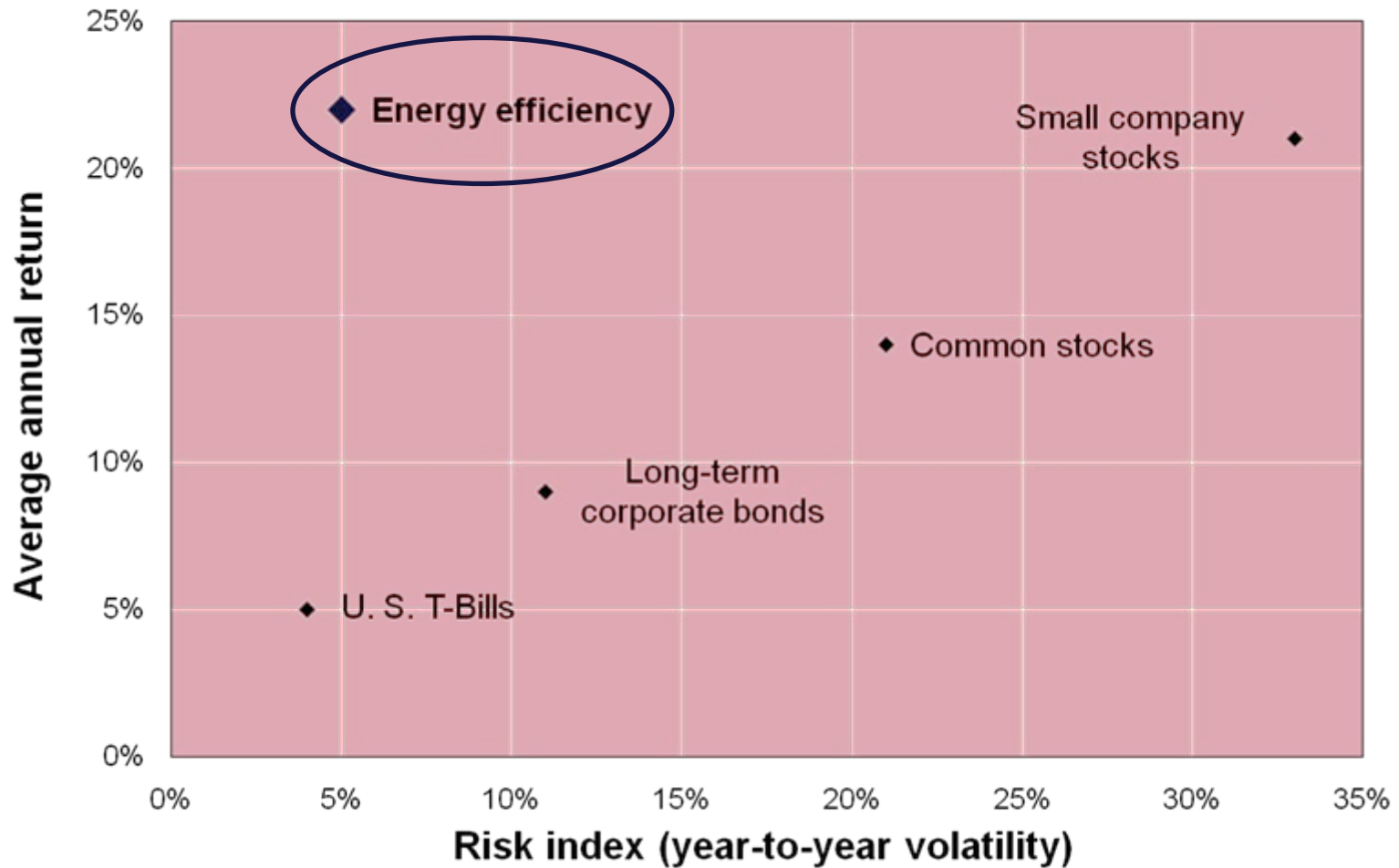
- Why building efficiency?
- Why it's typically not done, and some reasons for hope
- Me2
- Cost and benefits of replication

Why building
efficiency?

Efficiency as the first fuel

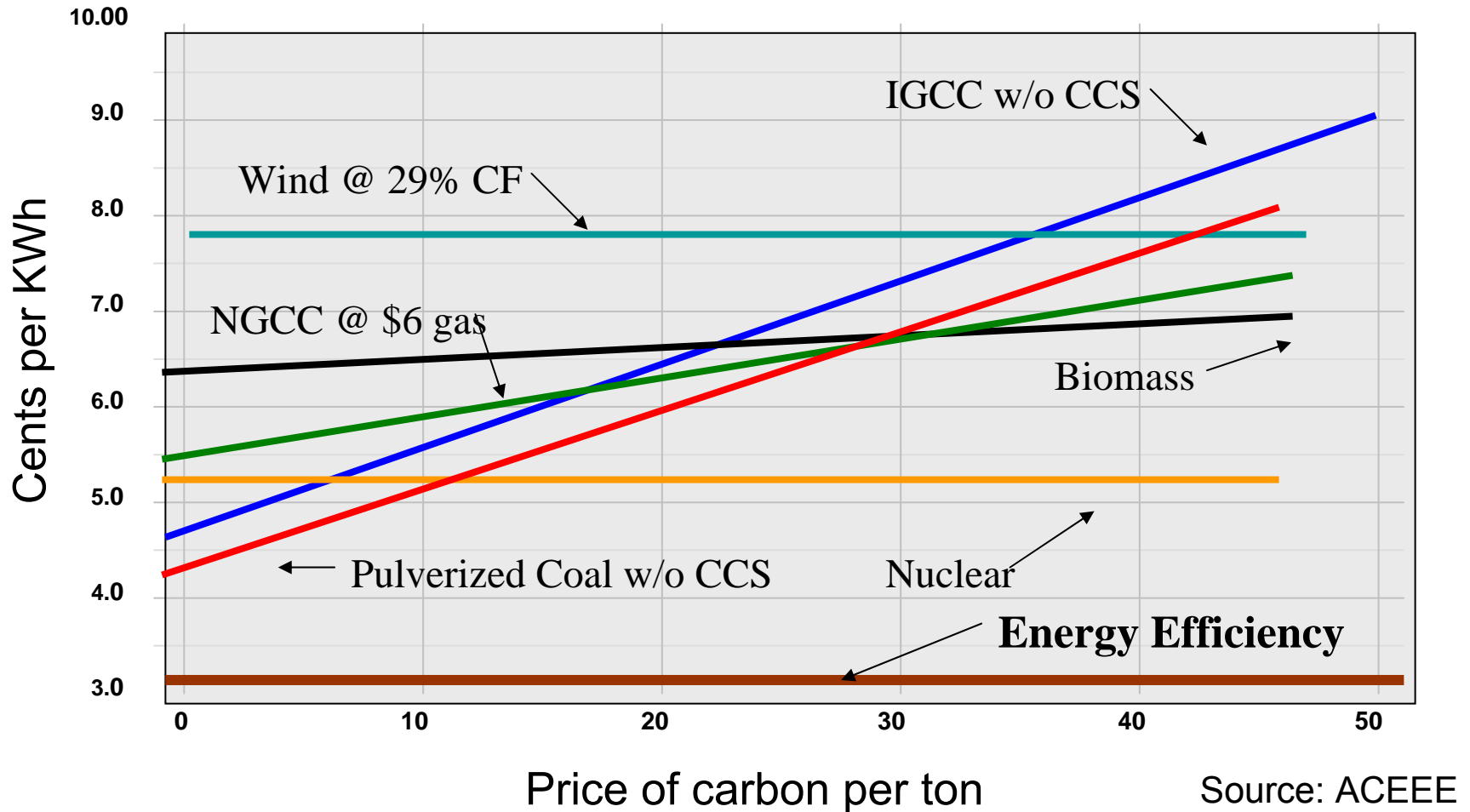


A good investment

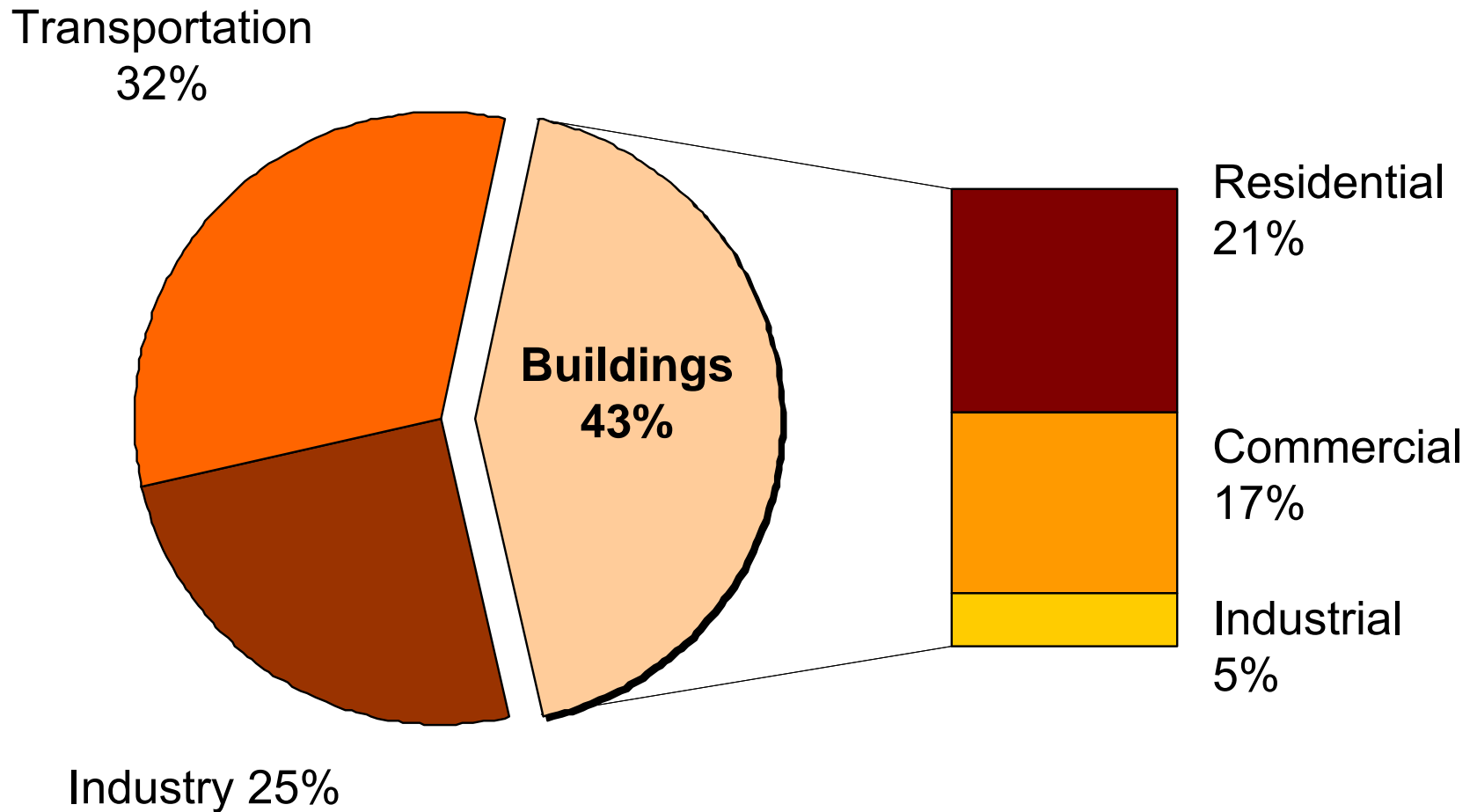


Source: ACEEE

Cheap and getting cheaper



Building contribution to CO₂ emissions



Source: Pew Center on GCC

Typical residential retrofit measures

- **Shell**
 - Insulation (wall, ceiling, floor, rimjoist)
 - Infiltration reduction
- **Heating**
 - Furnace replacement
 - Boiler replacement
 - Boiler controls
 - Boiler pipe insulation
 - Fuel switch
- **Appliances**
 - Refrigerator replacement
 - Washer replacement
- **Hot water**
 - Temperature reduction
 - Heater replacement
 - Heater wrap
 - Fuel switch
 - Showerhead
 - Pipe insulation
- **Lighting**
 - LED exit lights
 - Fixture/bulb replacements
 - Lighting controls

Benefits of building retrofits

- Climate and public health
- Income to tenants and owners
- Higher property values
- Extended building life
- Tenant/occupant health and productivity
- Jobs (\$1M \approx 10 person years of employment for direct installation, another 2-3 for materials, more with multipliers)

So why not
realized?

The unclaimed value



RRIDDLLS

- Regulatory surround is bad
- Risk aversion among tenants and owners, especially given uncertain duration of tenancy/ownership
- Information problems on everything (benefits, cost, reliable service)
- Disaggregated savings
- Disruption
- Lack of capital
- Lack of interest
- Split incentives (tenants vs. owners)

What's changed?

Greater interest: Greater public, industry, policy concern; greater awareness of climate risk

Better technology: Better materials, more efficient appliances, broader wireless application, smart grid, micro CHP, etc.

New markets: New opportunities to sell efficiency in demand response, forward capacity, and emissions permit markets

What generally hasn't ... strategy

- Technical assistance (information on available savings, energy audits, certified contractors, etc.)
- Subsidized customer purchase (rebates or tax credits)
- Financed customer purchase (ordinary loans, e-mortgages, on-bill financing, shared savings and performance contracts)

Problems with SBCs (System Benefit Charges)

- ✓ Designed-in free riding
- ✓ *De facto* limits on funds
- ✓ Political vulnerability
- ✓ High administrative & transaction costs
- ✓ Still usually require up-front payments or participant debt

Result is low take-up and missed application of cost-effective measures

Me2

Goal of Me2

Comprehensive application of cost-effective energy efficiency measures to Milwaukee's building stock with maximum community capture of their benefit.

One opportunity ...residential

Residential	# of Units	Avg unit cost	Total cost	Avg unit annual savings	Total annual savings
Rental	126,793	\$1,278	\$162.0M	\$482	\$61.1M
Pre-1960 owner-occupied	83,052	\$911	\$95.8M	\$251	\$22.2M
Total	209,845	\$1,158	\$243.1M	\$397	\$83.3M

Source: ECW/COWS

Another ...commercial

(excluding industrial processes)

Commercial	Total cost	Total annual savings
Electric	\$176.4M	\$39.2M
Natural gas	\$8.3M	\$1.8M
Total	\$184.6M	\$38.0M*

*Total is less than sum of electric and gas savings due to interaction effects.

Source: ECW/COWS

Combined

Type	Total cost of measures	Total annual savings
Residential	\$243.1M	\$83.3M
Commercial	\$184.6M	\$38.0M
Total	\$427.7M	\$121.3M

Value proposition

- For an investment of ~ \$428M, Milwaukee can realize ~\$121M annually, a 28% return that it can borrow on and pay out of savings, at no cost to its operating budget
- That's a lot of jobs. \$1M invested \approx 12.5 job years (most in installation, some in production of materials installed), so about $428 \times 12.5 = 5350 \approx 5.5\text{K}$ job years. With low local multipliers at least twice that, or 11K job years.
- After full installation and payment of loaned capital, that will mean \$1.2B per decade in money that would otherwise have left Milwaukee, with ongoing gains to public health and wealth, quality of life, productivity.
- Expected improvements in technology and higher energy prices only make this look better.

Solving RRIDDLLS

- ✓ Efficiency-enabling (-demanding) regulation
- ✓ Minimize risk associated with transience
- ✓ Minimize information problems on everything (benefits, cost, reliable service)
- ✓ Aggregate savings
- ✓ Minimize disruption
- ✓ Provide capital
- ✓ Market heavily as community project
- ✓ Align incentives (tenants vs. owners)

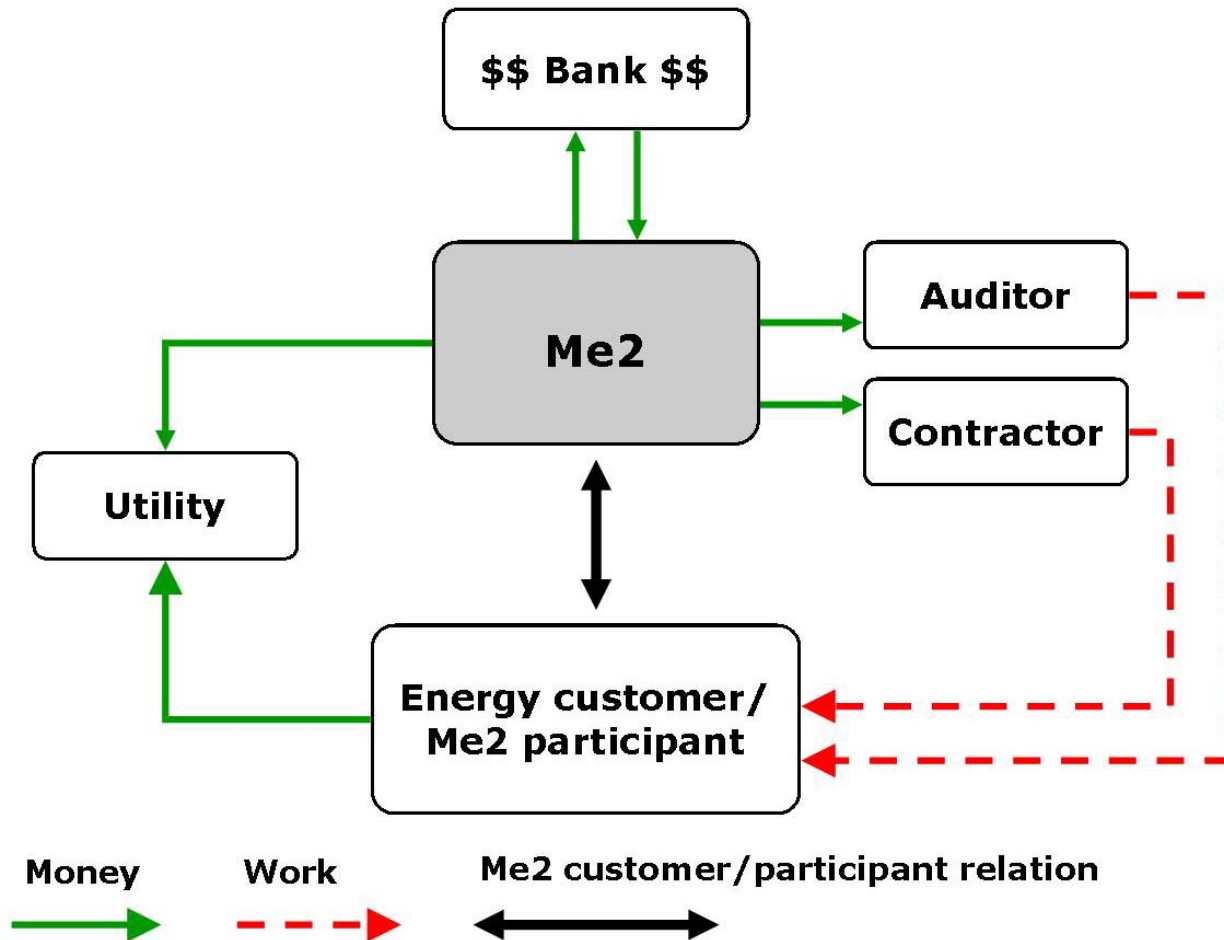
Elements of design

- Measures installed at no cost to customer and limited to those (a) with full payback ≤ 75 percent of useful life and (b) with annual costs (less rebates) ≤ 75 percent of annual savings. This ensures immediate benefit.
- Customer pays tariffed charge on utility bill (or the same on property services bill), with standard penalties for non-payment. This lowers the cost of capital.
- Payment obligation for permanent measures assigned to property, not person (“runs with the meter”). This eliminates the transience problem.
- Lots of social marketing. This, we hope, builds community interest.
- Run like a business (with soul), to reassure both creditors and the community that their money’s safe and well invested.

Key actors

1. Me2 ... coordinating entity, private or public, for profit or not
2. Bank ... ordinary bank, pension funds, foundations, bond
3. Utility ... electric or gas utility, or water utility, or provider of municipal services
4. Customers/participants .. Residential and commercial owners and tenants
5. Auditor ... to assess needed work and verify
6. Contractor ... to do the work

Me2 work and money flows



Key contracts

1. Between Me2 and bank (ideally a revolving loan fund or line of credit)
2. Between Me2, customer, and utility, with customer agreeing to pay for the costs of installed working measures during period of tenancy/ownership on his/her utility bill
3. Between Me2 and auditor to recommend measures and verify installation and performance afterward
4. Between Me2 and contractor, to do approved work

An offer they can't refuse?

“The Me2 energy efficiency service will buy and install cost-effective energy-efficiency measures in your home or business with no up-front payment from you and no new debt obligation. The cost of this service included, your net energy bill should drop immediately and always be lower than it would have been without use of the service. Your payment obligation ends when you quit this property and is suspended during any period of measure malfunction, which we will repair at no cost to you.”

High leverage

Energy costs for 2,252,800 Wisconsin households		20% savings
Total cost of residential energy (gas, electricity, fuel oil, propane) consumption	\$4,572,463,104	\$914,492,621
Average <i>monthly</i> cost per household	\$169.14	\$33.83
Available capital under Me2-styled program		
Average available capital per household if amortized over 10 yrs at 6% interest and \$33.83/month		\$3,047
Total available capital (2,252,800 X \$3,047)		\$6,864,281,600
Current direct WI public spending on residential energy efficiency		~ \$70M
Ratio of available capital under Me2-styled program to current WI public spending		~ 100/1

Distributed generation?

- Sure, at least for that portion of costs paid back on above terms
- Payback depends on energy purchase price and grid connectivity


Efficiency attributes?

Sure

- Demand response
- Forward capacity
- Carbon trading

Future utility bill ☺

ACCOUNT NUMBER	DATE DUE	AMOUNT DUE
945-345-491	11/04/2006	\$201.40

WE Energies  **JOHN Q PUBLIC**
JANE Y PUBLIC
 123 MAIN ST
 #123456 WI 53210

Billing Summary
 Previous Balance 02/08/06 \$128.24
 Payment Received As Of 02/10/06 \$133.24 CR
 Balance As Of 02/08/06 \$ 0.00
 Current Energy Charges 02/08/06 \$172.40
Total Amount Due \$172.40


Electric Service for 02/07/06 to 03/06/06
Electricity Used
 Meter Run fee \$089.094
 Meter and Reading as of 02/08/06 \$047
 Actual Reading as of 02/07/06 \$2542
Total Electricity Used 1765 kWh
 Next Scheduled Meter Reading Date 04/05/06

Gas Service for 02/06/06 to 02/07/06
Gas Used
 Meter Run fee \$52.00315
 Actual Reading as of 02/07/06 938
 Actual Reading as of 02/06/06 898
 Difference 40
 Heat Factor Adjustment [24 x 1.022] 24.528
Total Gas Used 14 Items
 Next Scheduled Meter Reading Date 04/05/06

Messages
 No Stamp? No Check? No Problem! Consider Online energy bill. Your best option for convenience and safety is 1-800-242-9133.

Contact Us Anytime Customer Service
 Electric Energy
 Please attach address portion and return with your payment.

ACCOUNT NUMBER: 945-345-491

WE Energies  **JOHN Q PUBLIC**
JANE Y PUBLIC
 123 MAIN ST
 #123456 WI 53210

00081 3 2 945-345-491

Your pre-Me2 average energy bill

\$170

This month's gross energy consumption

\$135

- Energy sold back to grid (\$ 30)
- Demand response savings credit (\$ 30)
- Negawatts credit for forward capacity (\$ 30)
- Climate exchange credit (\$ 30)

Your net energy bill this month

\$ 15

Me2 service charge

\$ 25

You owe

\$ 40

What's needed to make this work

- Political leadership
- Utility or other regulatory cooperation
- Community buy-in
- Capital
- Market-ready operations plan

Where we're at

- PSC approval of FOCUS pilot
- Neighborhood targeting
- Additional financing for pilot
- Neighborhood targeting
- Marketing strategy
- Training, career ladders, equity
- Governance structure, other legal
- Assignment of attribute benefits

Payoff to replication

What would spending \$10M in TA to establish 20 comparable city plans do? Based on the Me2 example:

- \$500K for planning would yield ~ \$500M in private investment (a 1,000/1 leverage on initial investment)
- \$500M would yield ~ 5.5K person years of employment (with multipliers, easily ~ 11K), or \$45-\$90/job

For more information

www.cows.org/me2

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