Emerging Technologies

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Pacific Northwest
NATIONAL LABORATORY

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- Building-High Performance Windows
- HVAC & Water Heating
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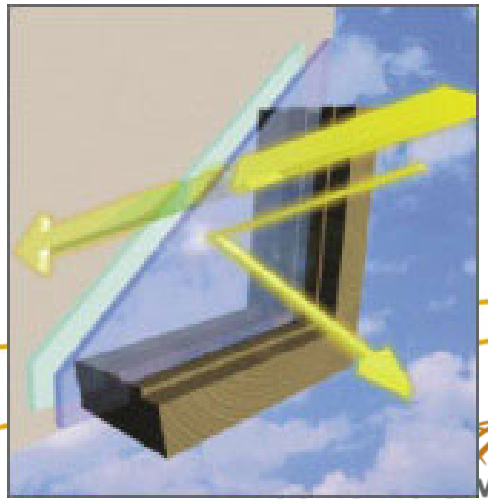
High Performance Windows (R-5) DOE Volume Purchase

- Windows in the U.S. account for 30% of building heating and cooling energy, representing an annual 4.1 quadrillion Btu (quads) of primary energy consumption
- In cold and mixed climates, R-5 windows save considerably more energy than conventional windows and can be cost effective when produced in volume.
- The principal barrier to widespread market commercialization of R-5 windows is cost.
- A few R-5 or better windows are in the marketplace at a premium cost (www.seriouswindows.com)

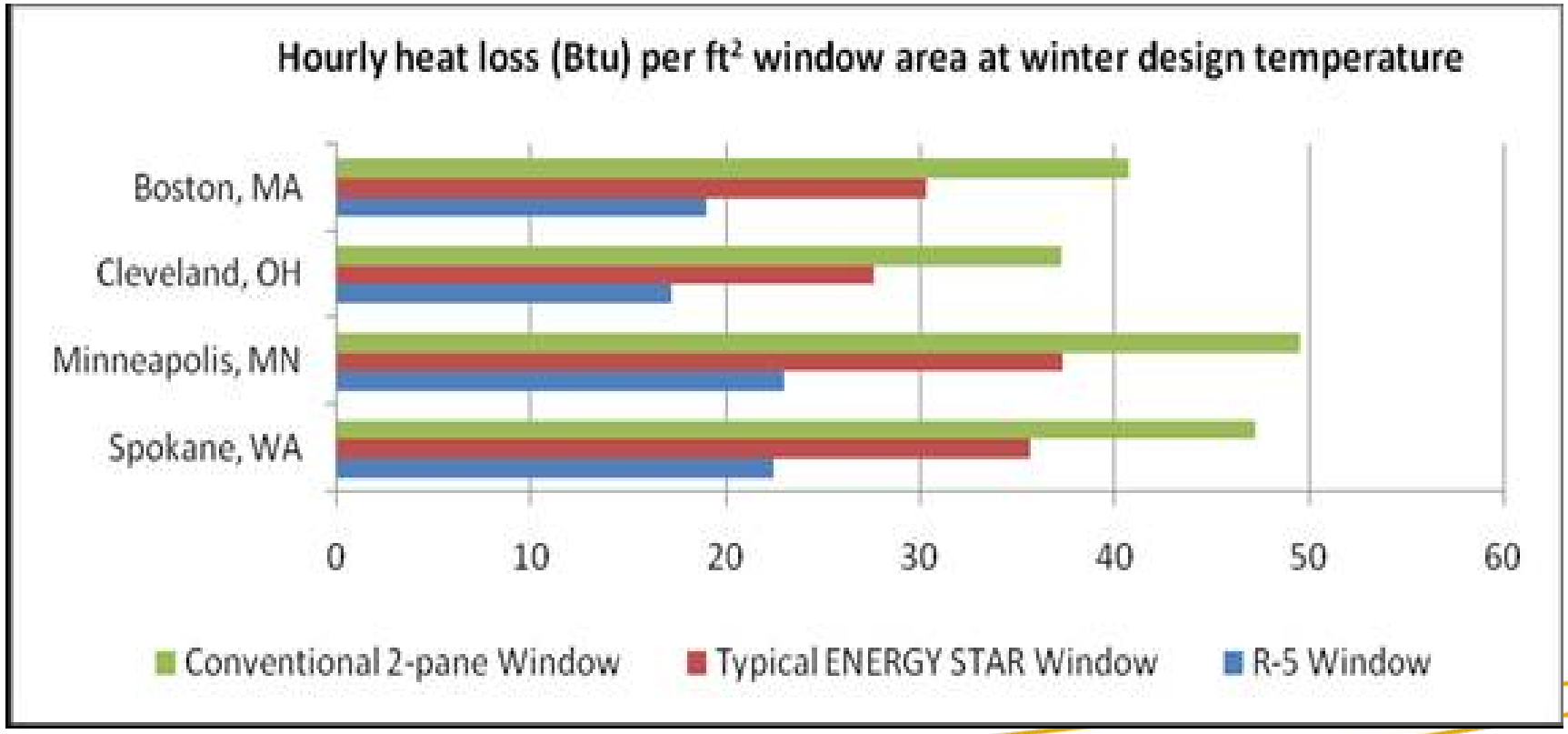
To overcome this barrier, the Department of Energy (DOE) is working with industry and potential buyers to achieve a price premium of $4/sq ft or less compared to today's typical ENERGY STAR windows

Low-e Storm Windows
DOE Volume Purchase

- Storm windows can reduce heat loss through the windows by **25% to 50%** compared to single pane windows with a U-value of 1.1. Low-e storm windows save even more energy.
- HUD's PATH program (with DOE and industry partners) field evaluation concluded that low-e storm windows reduced heating load by 20% and achieved less than a **5 year simple payback**.
  - Chicago weatherization agency identified 6 older homes with single pane windows (U-value of 1.1) for evaluation.
- Retrofitting of low-e storm windows can be a very cost effective solution in select residential and commercial buildings.
- Currently, low-e storm windows are a vendor specialty order.



High Performance Windows (R-5)
DOE Volume Purchase



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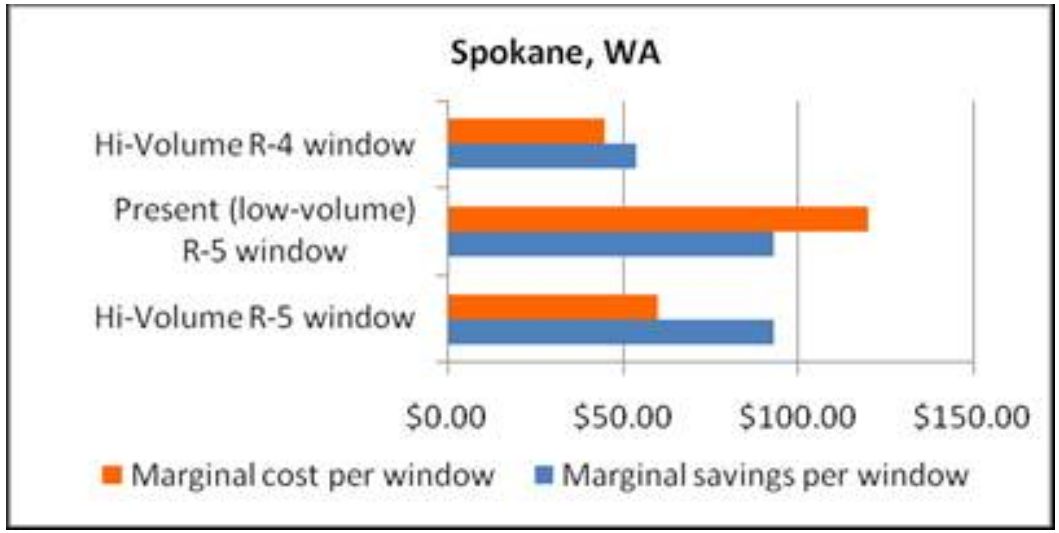
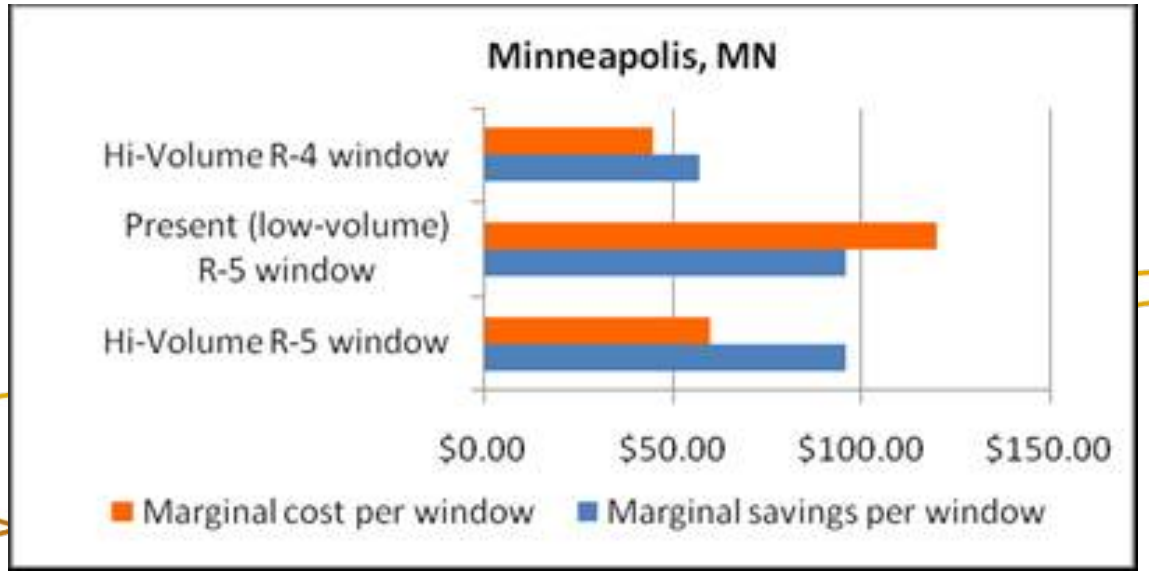
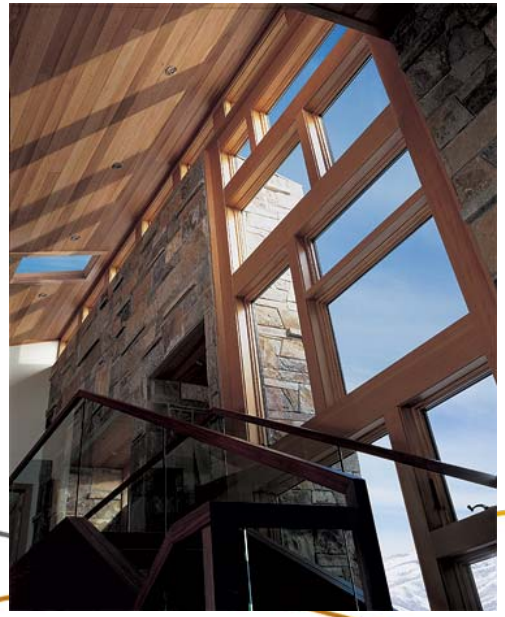




High Performance Windows (R-5)
DOE Volume Purchase

- Solicitation to be released: October/November 2009
- Awards to manufacturers: May 2010.
- Products available: Late CY2010.

www.R-5WindowsVolumePurchase.com



Source: Anderson Windows

HVAC & Water Heating

PNNL Photo: Marine Corps Base Hawaii Family Housing/HECO Load Control

Lennox SunSource™ Solar-Assisted Heat Pump Comfort System

Source: http://hardwareaisle.thisoldhouse.com

- 170W roof, fence or ground-mounted solar panel to run fan for outdoor coil—particularly during peak cooling periods.
- SEER 20.0/EER 13.7 with solar panel
- SEER 18/EER 12.7 w/o solar assist
- Lennox indicates 8% overall less energy consumption than stand-alone heat pump.
- ~$10,000+installation (3-ton model)
- ENERGY STAR and thus qualifies for 2009 tax incentives.

Lighting Technologies

PNNL Staff Photo

PNNL Staff Photo

Be Careful of SSL Claims!

Maintenance Free. Reduce Energy Costs. Sustainable.

Energy use is one of the most costly operating expenses in commercial buildings. The xxxxx system is a dimmable, recessed LED down-light that reduces energy consumption, lowers utility costs and is maintenance free.

***XXX* Recessed LED Downlights: Energy efficient, maintenance free and dimmable**

Residential, retail, commercial: it's the right light. No matter what the environment -- the Xxx LED Downlight is the new, improved approach to recessed lighting. Extremely low energy consumption, remarkably long life, minimal heat generation, and uniform illumination make it the right answer for so many applications.

***Xxxx*™ LED Tube Lights**

LED tube lights are energy-saving **direct replacements for fluorescent T8s.** Available in lengths of 2-6 feet with a frosted or clear lens, these lights require no ballast, contain no mercury, feature an aluminum heat sink, **and last 50,000+ hours.**

***XXXX* Lighting Technology**

This innovative, environmentally responsible company has developed new, breakthrough technology for their energy-efficient Compact Fluorescent Lighting (CFL) and Linear Ballast products, featuring instant-on, truly dimmable and superior performance.

Lighting for Tomorrow 2008 Awards

www.lightingfortomorrow.com/

2008

Fluorescent Category

Recessed Can Fixture Families

LIGHTING for tomorrow

2008

HALO, COOPER LIGHTING

Winner

LIGHTING for tomorrow

2008

LYTECASTER XCEED, LIGHTOLIER

Winner

LIGHTING for tomorrow

2008

Fluorescent Category

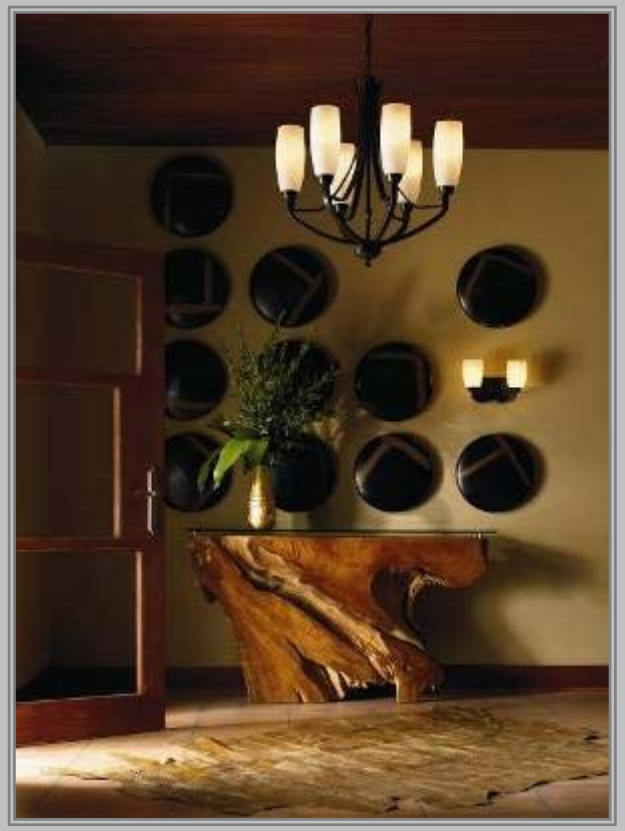
Indoor Fixture Families

LIGHTING for tomorrow

2008

WESTIN, PROGRESS LIGHTING

Winner



LIGHTING for tomorrow

2008

BRIGANTINE, MAXLITE

Grand Prize Winner

LIGHTING for tomorrow

2008

Solid State Lighting (SSL) Category

Other Applications

LIGHTING for tomorrow

2008

LOTUS, JOURNEE LIGHTING

Honorable Mention for Design

LIGHTING for tomorrow

2008

LR24, CREE

Honorable Mention for Efficacy

CALiPER currently scheduling evaluation

LIGHTING for tomorrow

2008

Solid State Lighting (SSL) Category

Near-term Applications

LIGHTING for tomorrow

2008

CYLANDRIUM, LUXICOM

Winner, Portable Desk/Task

LIGHTING for tomorrow

2008

LR4 DOWNLIGHT, CREE

Winner, Recessed Downlight

LIGHTING for tomorrow

2008

DESIGN PRO SERIES, KICHLER LIGHTING

Winner, Kitchen Undercabinet

LIGHTING for tomorrow

2008

For Sale…….LED 40 Watt Incandescent Replacement

Pharox LED 40 Watt LED light bulb replacement

★★★☆☆ (5 customer reviews)

List Price: $59.95

Our Price: $34.95

SKU: G25-E27-4W1

In Stock

Usually ships in 1-2 business days

Source: Lemis Lighting

Manufacturer: Lemnis Lighting
www.lemislighting.com
230 lm
57 lm/W (calculated)
>85 CRI

CALiPER testing:
198 lm
40 lm/W
CRI 86

Water Technologies

AQUS® Greywater System

- System reclaims greywater from bathroom lavatory drains and reuses it in toilets.
- System funnels water that flows down lavatory sinks and routes it through a sanitizing device that cleans and filters the water.
- The water then goes to a storage reservoir under the sink.
- When a toilet that is connected to the system flushes, it pumps water from the reservoir to the flush tank.
- System is ideal for hotels, school commercial buildings, governmer structures and single- and multi-f residences that have restrooms v regular, tank-type toilets.
- 2-person household can save up 5,000 gal/year.
- ~$300+installation (w/o toilet)

Source: Sloan® Valve Company

Source: http://www.inhabitat.com

WaterSaver Technologies www.watersavertech.com

The Early Version of the AQUS®?

Is Your Teenager Taking Too Long in the Shower?

“I am a big daydreamer in the shower - so I need the Aqualim to kick me out” Father Dave - excessive water user

Source: www.inhabitat.com

Then install the Aqualim Auto-Off Showerhead!

Source: www.inhabitat.com

- A showerhead from Australia that rations out a certain quantity of water per shower.
- After the quantity is used, the shower reduces its flow as a warning, and soon afterwards **shuts off!**
- And, if you still have shampoo in your hair you can easily reset the Aqualim to finish your shower!!!!
- **Consider this device like an 'alarm clock' for the shower. Maybe everyone will need 2!**

www.aqualim.com.au

‘Small Scale’ Generation Technologies

“Revolving Door” Energy Generation

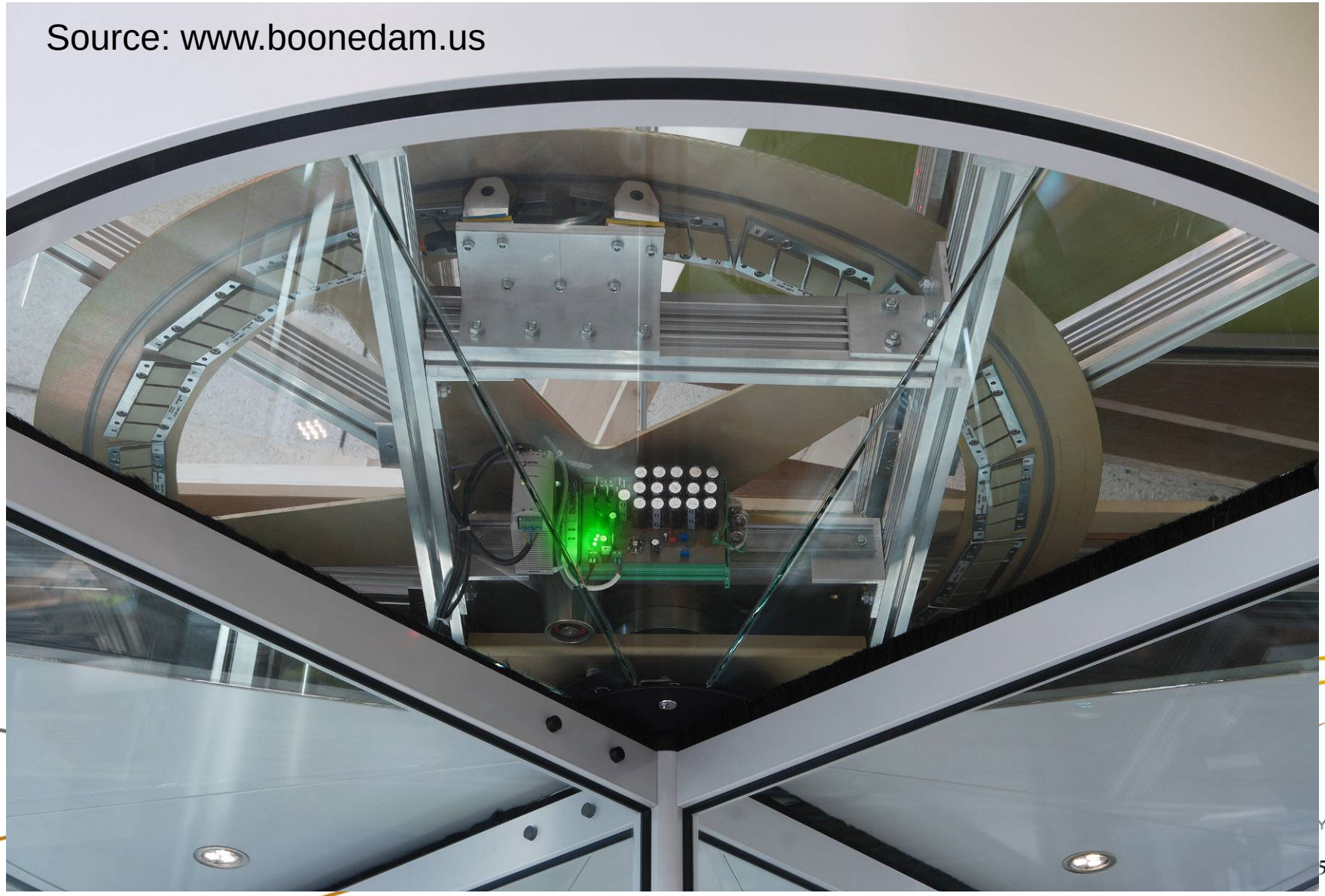
- Boon Edam (Germany) has gone one step further to become the first manufacturer in the world to develop an energy generating manual revolving door, which will not only save energy but also generate energy with every person passing through the door.
- The revolving door is equipped with a special generator that is driven by the human energy applied to the door whilst the generator controls the rotating speed of the door and makes it safer.
- A set of super capacitors stores the generated energy as a buffer and provides a consistent supply for the low energy LED lights in the ceiling. In case the LED lights have used-up all the stored energy, the highly efficient control unit will switch to the alternative mains supply of the building. This ensures that the door is illuminated at all times, even when the passenger flow is minimal.
- A calculation was made for this particular situation that indicated an energy saving of around 4600 kWh per year, a considerable saving compared to a conventional sliding entrance.

www.boonedam.us

“Revolving Door” Energy Generation

Source: www.boonedam.us

“Revolving Door” Energy Generation



Dutch Windmill

- Home-sized wind generator (but that is difficult to visualize by photo).
- *Claim* to operate with as little as 2.3 MPH wind.
- *Claim* to have storage capability
- Almost no useful information on web site: www.methexusa.com

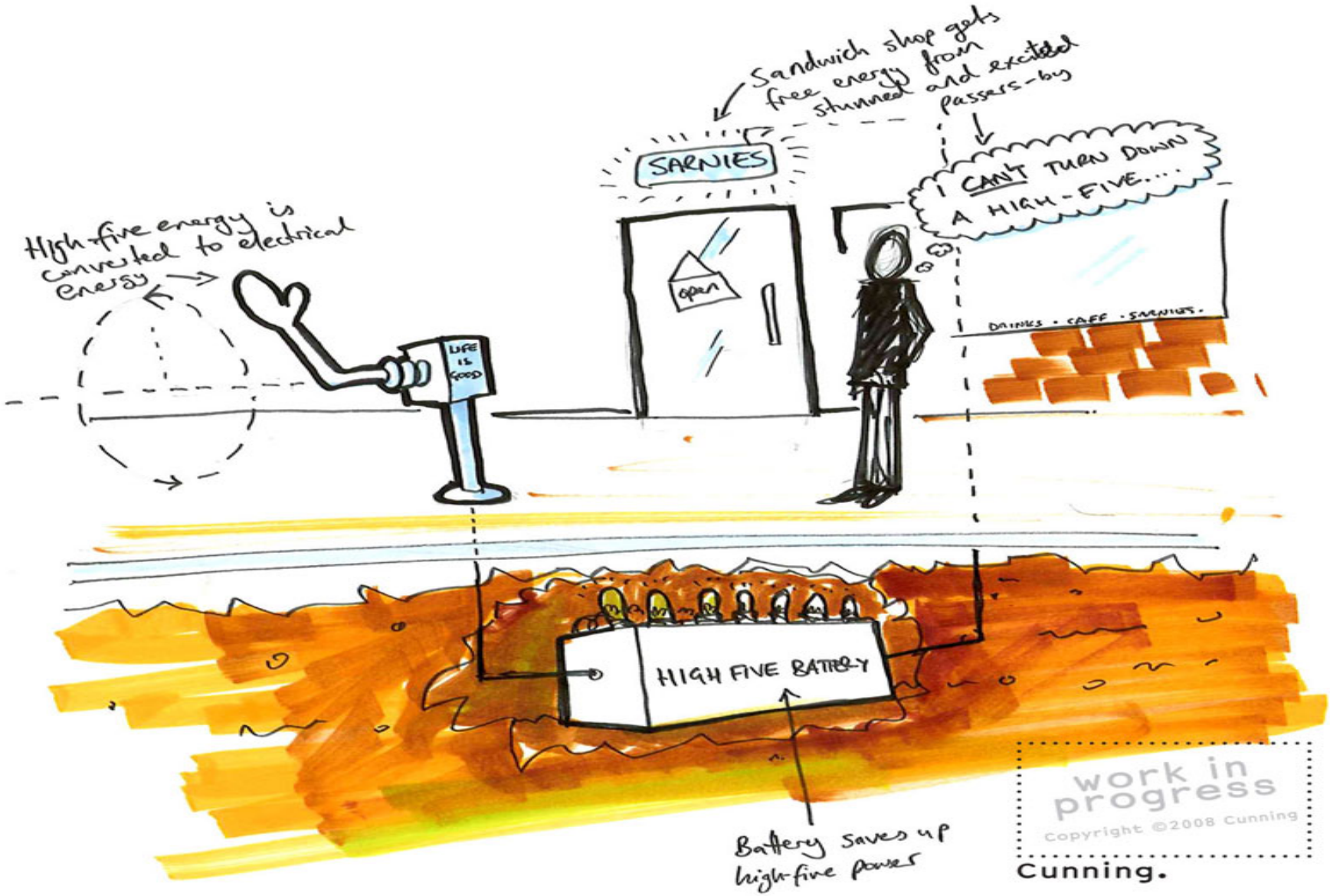
Source: www.methexusa.com

Sintex Backyard Digester

Source: Sintex

- A 1 cubic meter "digester" that takes something we have too much of (waste) and turns it into something we don't have enough of (energy).
- Biogas reactor has a little tube that moves the methane into a storage container for use with any natural gas application.
- A "primed" digester can digest all the waste of a four-person household and produce enough energy for that household to cook all of its meals!
- U.S. $425 with estimated 2 yr payback (in India).

The “High-Five” Generator



Wind Generating Capacity (MW)*