Research Summary
of
Northwest Energy Efficiency Alliance
Residential New Construction Lighting Program

Developed By:

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March 25-26, 2002
ACEEE/CEE National Symposium on Market Transformation

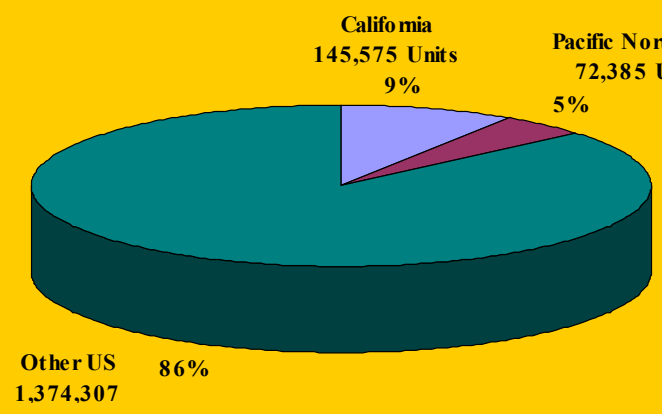
Residential New Construction Lighting Program Objective

To create a program that promotes increased use of energy efficient lighting fixtures in new home construction.

- There are ~1.5 million new housing starts per year.
- LBNL estimated each household consumes 1,400 kwh annually for lighting (1998 est.)

If 10% of new homes installed efficient fixtures in 50% of the applications, the annual savings would approach 68-78 million kwh.

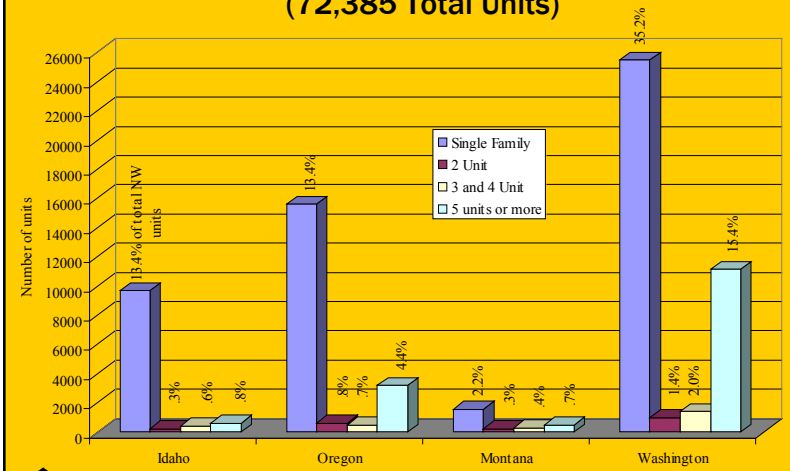
2000 National Breakdown of Residential New Construction



Source: Rising Sun, Census Data

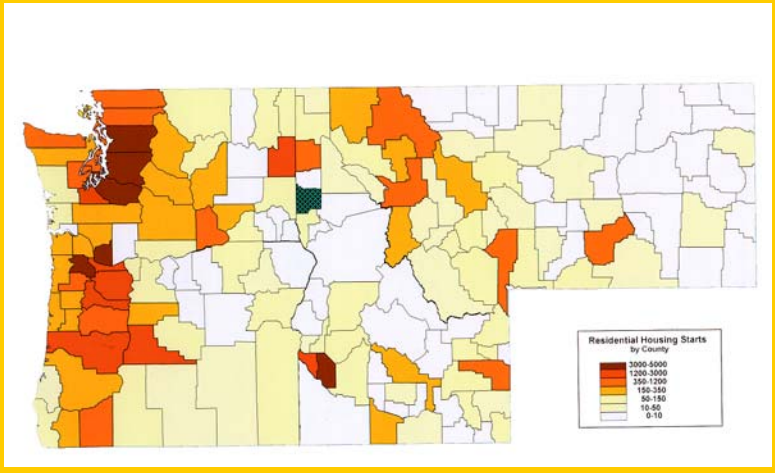
Pacific Northwest Permitted Housing Units Year 2000

(72,385 Total Units)



Source: Rising Sun, Census

1998 Residential Housing Starts for the Pacific Northwest



Source: Ecotope Base Line Study - Single Family Homes

Estimates of Annual Household Energy Use for Lighting

Annual Household Energy Use for Lighting	Study Period	Notes
940 kWh	1993	Average for all US. households in 1992. Based on RECS national survey of 7000 households.
1313 kWh, for *incandescent* lamps only	1990	Average for all US. households in 1990. Based on metered wattage and lighting energy use data for the service territory of Pacific Gas & Electric.
1704 kWh (All) 2076 kWh (Single Family)	1997	Average for all households in California. Based on survey of homeowners regarding hours of use for 16,000 fixtures in 697 homes in Southern CA.
1818 kWh	1993 - 1995	Average for selected homes in Pacific Northwest. Based on metering of 161 single-family homes.
2418 kWh	1992	Average for selected homes in Yakima, WA. Based on surveys and metering of 53 homes.
2517 kWh	1991 - 1992	Average for selected homes in Grays Harbor County, Washington. Based on surveys of 20 homes.

Dominant Residential Light Fixtures and Share of Total Household Lighting Energy Use, by Region

	California Households		Pacific Northwest Households	
Rank	Fixture Location, Type	Fraction of Lighting Energy	Fixture Location, Type	Fraction of Lighting Energy
1	Outdoor, wall-mounted	10.6%	Kitchen, closed ceiling	8.0%
2	Kitchen / dining room, suspended	8.3%	Living room, table lamp	7.6%
3	Living room, table lamp	8.1%	Bath, wall	7.5%
4	Kitchen / dining room, recessed	7.6%	Outdoor, wall	6.9%
5	Bath, wall	7.3%	Living room, floor lamp	5.3%
6	Kitchen / dining, surface	6.3%	Kitchen, recessed	4.8%
7			Dining room, chandeliers	3.2%
8			Garage, bare bulb	3.4%
9			Family room, table lamp	1.9%
10			Outdoor, bare bulb	1.3%
	TOTAL	48.2%		49.9%

Source: NRDC, LBL

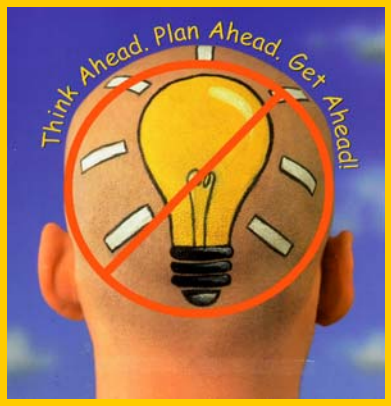
Percent of Household Lamps and Lighting Energy Use in Terms of Daily Hours of Use (TPU Study)

Hours of Use per Day	Percent of Household Lamps		Percent of Household Lighting Energy Use	
<1	53.2%	72%	9.9%	24%
1 - <2	18.6%		13.9%	
2 - <3	9.5%	28%	12.2%	76%
3 - <4	4.8%		8.2%	
4 - <5	3.8%		8.9%	
5 - <6	2.5%		7.0%	
6 - <7	1.6%		4.7%	
7 - <8	1.0%		4.2%	
8 - <9	0.9%		3.7%	
9 - <10	0.9%		4.0%	
>= 10	3.4%		23.3%	
TOTAL	100.0%		100.0%	

28% of the lamps use 76% of the energy

Source: LBL Lighting Market Sourcebook

Residential Lighting Market Transformation



"Current activities by utilities and regional organizations are largely clustered under the umbrella of ***market transformation*** – a term that means different things to different people.

For the purposes of this discussion, residential lighting market transformation is defined as the process of systematically changing

- consumer purchase preferences
- architect and builder practices
- retailer stocking preferences and
- manufacturer product offerings

to consciously favor energy efficient lighting choices over inefficient choices."

Source: NRDC, Lighting The Way to Energy Savings

Focus On New Construction

- Each new home contains ***25 – 35*** permanent lighting fixtures.
- This creates a large opportunity for energy-saving lighting fixtures to be installed.
- Not installing energy-saving lighting creates lost opportunities; consumers who are satisfied are unlikely to make any changes, and therefore potential energy savings are "lost."
- The new construction market building and decorating trends influences the practices found in updating older housing.

30 Fixtures per Home X 1,500,000 New Homes Built per Year =
45,000,000 New Fixtures Installed Each Year

Source: ODC Residential Lighting Fixture Market Assessment

"Doing It Right the First Time"

Homeowners who have not participated in selection of lighting fixtures for their new homes are likely to replace them soon after moving in.

	Indoor Fixtures	Outdoor Fixtures
n (Sample Size)	142	32
Within One month of moving in	33%	24%
One to three months	41%	35%
Four to six months	14%	23%
Seven to twelve months	6%	15%
One year or more after moving in	1%	3%

Source: ODC Residential Lighting Fixture Market Assessment

Who Specifies or Influences Hardwire Lighting for New Homes?

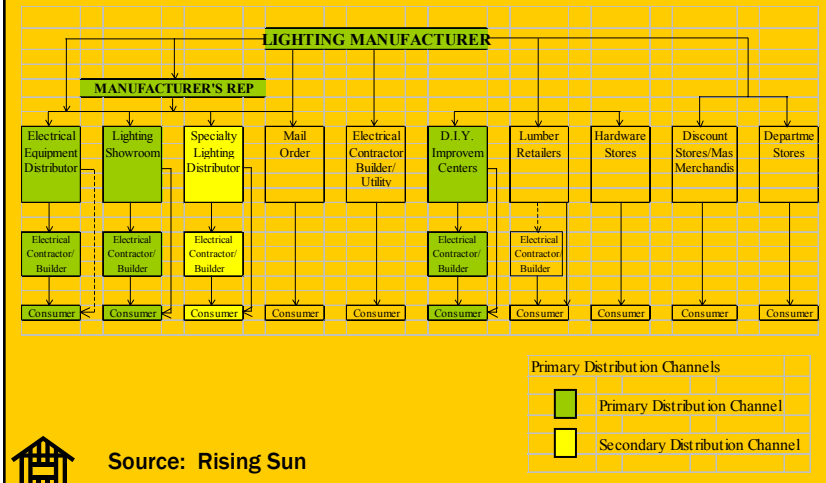
We must understand and influence the people who are involved in lighting design and specification in order to impact the marketplace.

Specifier	Tract Home	Semi - Custom Tract Home	Custom Home	Multi-Family Housing
Commercial Architect	UNLIKELY	UNLIKELY	UNLIKELY	LIKELY
Residential Architect	POSSIBLY	POSSIBLY	POSSIBLY	POSSIBLY
Electrical Engineer	UNLIKELY	UNLIKELY	POSSIBLY	LIKELY
Developer	LIKELY	LIKELY	POSSIBLY	POSSIBLY
General Contractor	UNLIKELY	UNLIKELY	UNLIKELY	UNLIKELY
Electrical Contractor	LIKELY	LIKELY	POSSIBLY	POSSIBLY
Electrical Distributor	POSSIBLY	POSSIBLY	UNLIKELY	POSSIBLY
Lighting Showroom	LIKELY	LIKELY	LIKELY	POSSIBLY
Homeowner	UNLIKELY	POSSIBLY	LIKELY	UNLIKELY
Interior Decorator	UNLIKELY	POSSIBLY	LIKELY	POSSIBLY
Lighting Designer	UNLIKELY	POSSIBLY	LIKELY	POSSIBLY

Source: Rising Sun

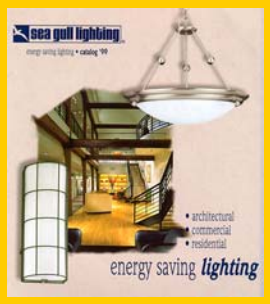
Residential Lighting Distribution Channels

We must understand and influence the people who manufacture, supply and procure residential lighting in order to to impact the market place.



Source: Rising Sun

The Good, The Bad and The Ugly



There are a lot of "Good" and "Bad" energy efficient lighting products to choose from, so we must specify products carefully to insure consumer satisfaction.

- 57 Energy Star manufacturer allies
- 2,689 Listed Products as of October 2001
- <1% Market Share out of 165 million fixtures sold annually
- Many more "Good" and "Bad" non-listed products are available

Program Success is Dependent on Responding to the Marketplace

Homeowner

Style or aesthetics is the most important factor for consumers buying indoor lighting. For outdoor lighting, safety security, and durability are most important.

- Style
- Appearance
- Ambiance
- Light Output
- Functionality
- Safety
- Price
- Control
- Durability
- Frequency
- Energy Efficiency

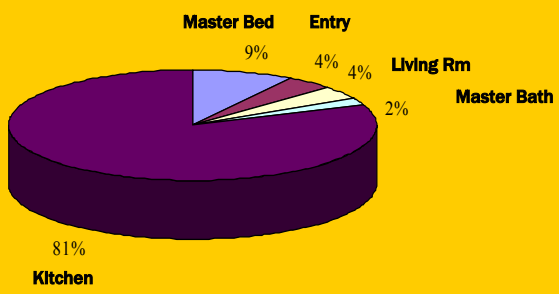
Builder / Contractor

Builders and contractors are overwhelmingly influenced by first cost. They perceive that consumers value other factors such as square footage, floor plan, kitchen appliances, etc. above energy efficiency.

- Price
- Availability
- Function
- Style
- Reliability

Going for the Gold!

Be Sensitive To What Makes The Biggest Impressions In a Home



Make Sure Your Energy Efficient Lighting Doesn't Compromise It

Source: Professional Builder New Home Survey

New Construction Program Focus

Energy Star one for one upgrade

Easy Savings…
Snap Back?

versus

Integrated energy efficient lighting design

Maximize Benefits!
Long Term satisfaction

Technical Components

Regional and National Coordination for Mutual Benefit

- Ballast development
  - Promote resolution of cost and FCC compliance
- Fixture development
  - Promote PNNL downlight and other new/evolved products
- Control development
  - Promote development of residential controls
- Codes and standards
  - Promote code changes to help accelerate use

Barriers

Technical barriers

- Electronic ballasts are usually not suitable for residential use due to FCC restrictions with respect to EMI emissions
- Dimming of fluorescent lamps on regular household dimmers

Cost Barriers

- Fluorescent systems still cost more than incandescent

Policy Recommendations

Consider the following ideas

1. Adopt the California language at least one code cycle behind California to allow for adjustment and acceptance in the marketplace.
2. Work with the California Energy Commission to develop a regional task force to effect change within the FCC rules, and to generally co-promote moving advanced lighting technologies into the residence.
3. Take full advantage of the PNNL downlighting program to help timing of industry and code implementation.

Questions and Answers