Report on Management of Discarded Fluorescent Lights

NC DENR
Division of Pollution Prevention and Environmental Assistance
Division of Waste Management
Division of Air Quality

Fluorescent Lights – Lamps Containing Mercury (LCMs)

- All fluorescent lights contain some amount of mercury to make them work – hence the term: ***Lights Containing Mercury*** or ***LCMs***.
- LCMs widely used in many applications and come in many different forms.
- Two main forms are linear or tube lamps and compact fluorescents, or CFLs.
- Fluorescent lights are energy efficient – CFLs 3-4 times more efficient than incandescent bulbs.
- Fluorescent lights are also durable – CFLs should last five years or more, 6 to 10 times longer than incandescents.

Two Main Kinds of Fluorescent Lights

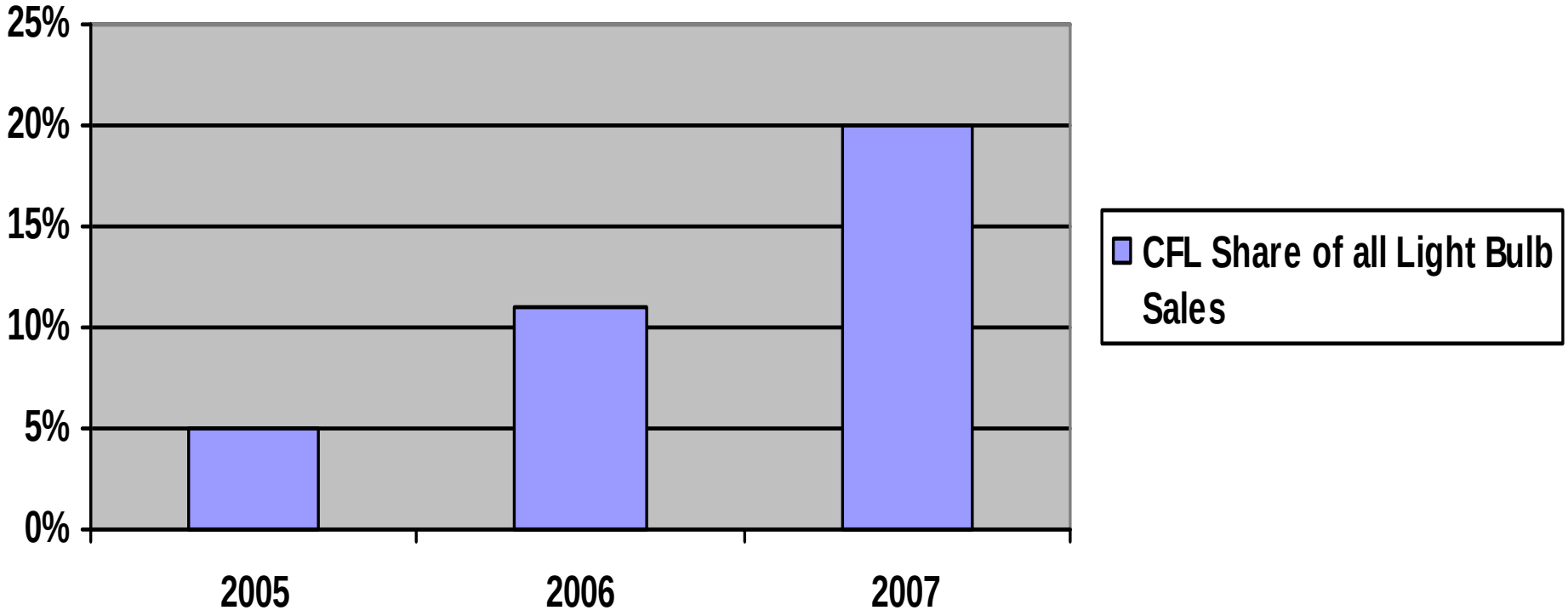
Tube or “Linear” Fluorescent Lights

Compact Fluorescent Lights, or CFLs

Use of CFLs Growing

- Homeowners, businesses and institutions are buying increasing quantities of CFLs.
- Large retailers and utilities helping push CFL use:
  - Wal-Mart sold 100 million in 2007.
  - Progress Energy and Home Depot program sold 200,000 in 2007.
- U.S. Energy bill sets lighting efficiency standards that may phase out incandescents by 2014.
- Other nations phasing out incandescents: China, Ireland, Australia.

Rise in CFL Market Share



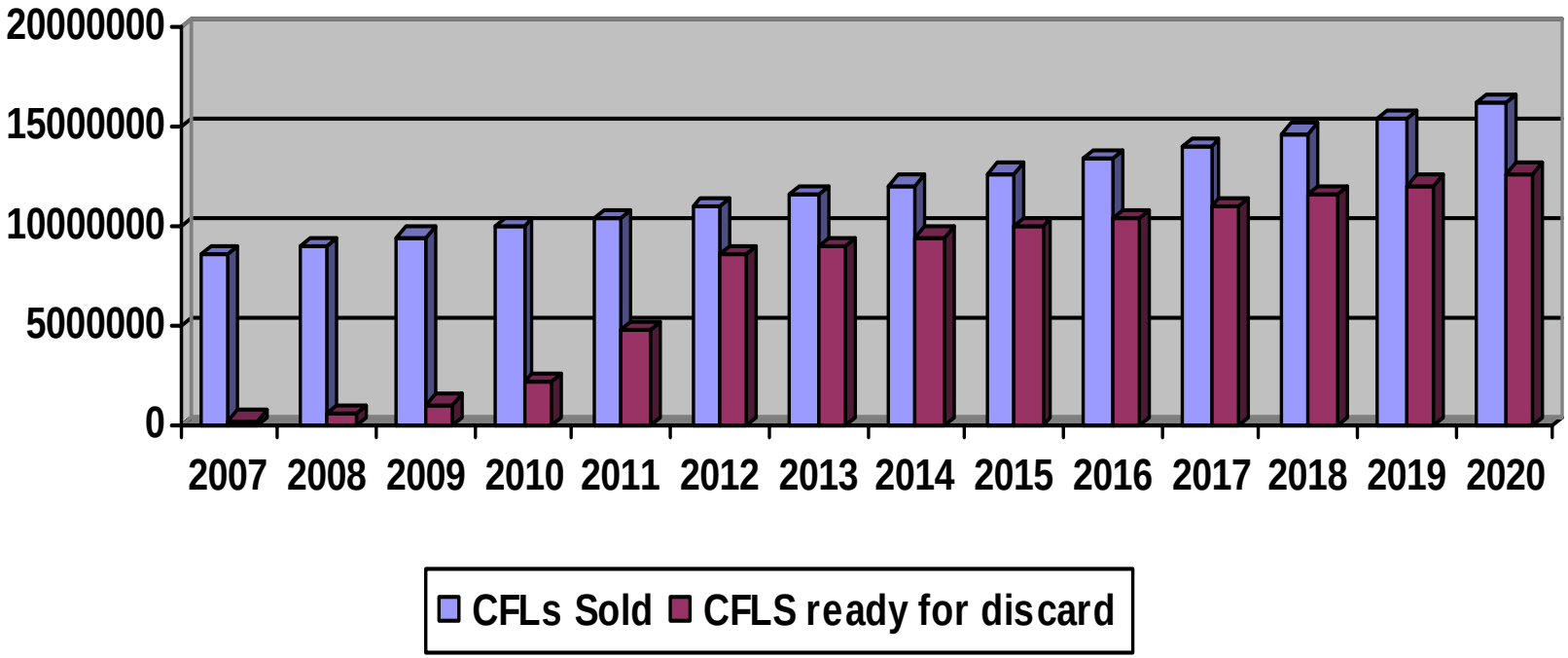
- 290 million CFLs sold in 2007 – 20 percent of market.
- However, CFL sales are less than half of all LCM sales
- Tube lamps are still vast majority of LCMs in use.

Estimated Sale and Use of LCMs

	National	North Carolina
Total LCMs sold	670 million	**20 million**
Total CFLs sold, 2007	290 million	**8.6 million**
Total Incandescent Bulbs sold	1.45 billion*	**43.5 million**
Projected total of CFLs sold at 50 percent of all bulb sales	725 million*	**21.5 million**
Number of LCMs in use	4 billion	**120 million**
Number of LCMS ready for discard annually	514 million	**15 million**
Residential	142 million	**4 million**
Commercial	372 million	**11 million**

* Calculated extrapolating from EPA estimate of 2007 CFL sales reaching 20 percent of all bulb sales.

Generation of Discarded CFLs



- Assumes 5% growth in market share over time.
- 12.7 Million CFLs ready to be discarded annually by 2020

Recycling Rates for LCMs

Source of LCM	Estimated Recycling Rate	Percentage Disposed
Residential	2%	98%
Commercial	29%	71%
All Generators	24%	76%

- Recovery rates are for the nation as a whole.
  - North Carolina rates probably lower.

How Much Mercury is in LCMs

- Manufacturers have set a voluntary limit of 5 milligrams per 25 watt CFL.
- Most CFLs at 3 - 4 milligrams and manufacturers are seeking further reductions.
- Tube lamps contain about twice as much mercury as CFLs: about 8.3 milligrams.
- By comparison, other mercury-containing products have much higher levels:
  - Mercury thermostats have 500 times more mercury
  - Mercury thermometers, 100 times more

Amount of Mercury in an average CFL

Mercury Content in LCMs in NC

	Number of LCMs in NC	Amount of Mercury in Milligrams	Amount of Mercury in Lbs.
Estimated Current Annual LCMs Ready for Discard	15 million	105,000,000	231.5
Residential Portion	4 million	28,000,000	61.7
Non-Residential (Commercial) Portion	11 million	77,000,000	169.8
Estimated Current LCMs in Use	120 million	840,000,000	1,851.9
CFLs Sold, 2007	8.6 million	34,400,000*	75.8
Projected total of CFLs sold at 50 percent of all bulb sales	21.5 million	64,500,000**	142.2

* Includes CFLs and tubes lamps together. For purpose of analysis, with tube lamps containing 8.3 mg and CFLs about 4 mg per bulb but tube lamps more prevalent, an average of 7 mg per LCM is used for mercury estimates.
** Assumes 4 mg mercury per bulb.
*** Assumes 3 mg per bulb as manufacturers reduce mercury content over time.

What Happens to Mercury Disposed from LCMs

- Mercury can be released in collection, hauling, and disposal of LCMs.
- Landfill liners help control LCM mercury effects on groundwater.
- LCM mercury in organic or methlyated form can be released from the working face and gas vents of landfills.
- LCM just one source of potential mercury air releases from landfills.

Do LCMs result in overall increased mercury emissions?

- Average CFL will reduce over 5 milligrams of coal-source mercury emissions.
- Most CFLs only contain 3 – 4 milligrams of mercury, and level is dropping.
- Even if all CFL mercury was released, there is still a net mercury benefit.
- Increased recycling of CFLs will enhance the mercury reduction benefits of the product.
- Tube lamps have twice as much mercury - imperative to recover as many as possible.

What Is The Regulatory Status of Fluorescent Lights?

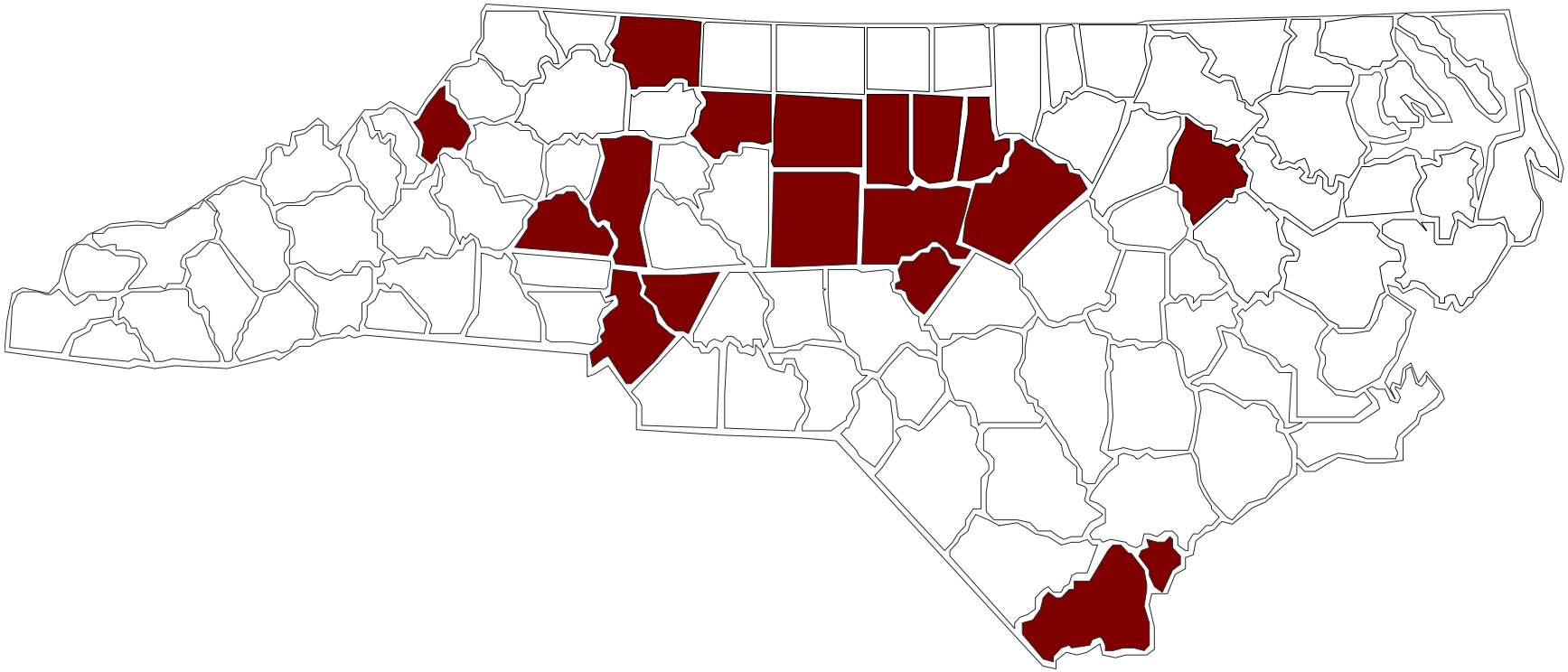
- Households may dispose of LCMs as solid waste.
- Non-households – more complicated:
  - Cannot dispose of hazardous waste in solid waste landfills.
  - Can dispose of fluorescent lights if they show the lights are not hazardous.
  - Expensive to test lights to prove they are non-hazardous.
  - Recycling is the only practical option.

Recycling Options – Households

Two main options:

- Local household hazardous waste (HHW) programs.
  - Cover only a minority of communities in NC
  - Not all collect LCMs
  - Buncombe County collection at fire stations
- Mail-back through a manufacturer, recycler or U.S. Postal Service program: RecyclePak
  - Self-mailing kit costs $15 or about $1.25/bulb

Counties with HHW programs accepting LCMs



Recycling Options for Non-Households

- Many available commercial recycling services
  - 35 listed in NC Recycling Markets Directory.
  - Range from general hazardous waste handlers to specific bulb recyclers.
  - Many offer on-site pick-up, appropriate for large generators.
  - Most also offer self-mailing kits, appropriate for small generators.
- LCM recycling ***highly feasible for all non-household generators***.

Examples of LCM Mail-in Kits

Costs for Recycling LCMs

- Mail-in Kits:
  - $1 to $1.50 per CFL
  - Between $.55 and $3.27 for 4 foot tubes – average about $1.60.
- Pick-up services cheaper but require greater volume:
  - As low as $.06 per foot of lamp
  - Tube lamps average cost $.40 to $.70/lamp
  - CFLs average cost around $.40/bulb
- Statewide program or contract can lower costs

Projected Cost of CFL Recovery

	# of CFLs	Total Cost at 100% Recovery	Total Cost at 50% Recovery	Total Cost at 25% Recovery
CFLs sold – 2007	8.6 million	$3.44 million	$1.72 million	$.86 million
CFLs at 50% of market share	21.5 million	$8.6 million	$4.3 million	$2.15 million

What Are Other Parties Doing?

- Utilities want to see more CFLs used but have no plans at this time to be involved in recycling.
  - Support household use of HHW programs.
  - See need for state or federal leadership on this issue.
- Retailers not yet accepting LCMs in any program in North Carolina.
  - Only IKEA has made a corporate take-back commitment but no IKEA stores in NC
- Examples of successful partnership programs between utilities, utility commissions, retailers, and local governments in Maine, Vermont, and Minnesota.
- Product Stewardship Institute starting a national dialogue on LCM management in April.

Recommendations

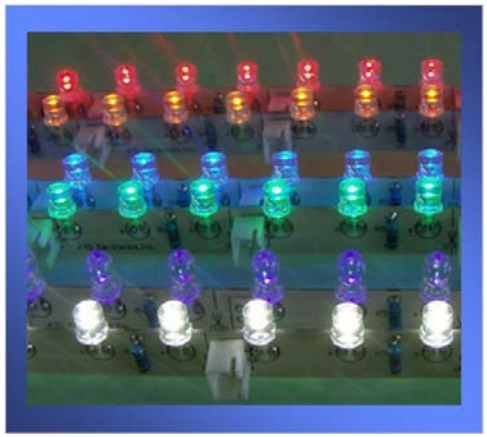
1. Increase efforts and resources to educate and enforce on non-household disposal of LCMs.
2. Encourage expansion of household hazardous waste programs.
3. Encourage development of additional recycling outlets for CFLs – e.g., retail stores.
4. Convene a workgroup to identify long-term funding and solutions for LCM recycling.
5. Require all state agencies to recycle all LCMs and to report on their efforts by March 1, 2009.

Recommendations, cont.

6. Support efforts of Product Stewardship Institute to conduct dialogue on national recovery system.
7. To address larger sources of mercury, ban the sale of mercury thermostats and mercury thermometers.
8. Ban disposal of all mercury-containing products from unlined landfills (e.g., C&D landfills).
9. Require removal of fluorescent lights and mercury thermostats in all demolition projects in NC.

Long-term Alternative To Both Incandescent and Fluorescent Lights: LEDs

- LEDs more durable and more efficient.
- Growing applications and use of LEDs.
- Very little household market use.
- Cost and availability issues.



Recommendation

- Encourage greater manufacture and use of LEDs - potential policy examples:
  - Require use of LEDs in state-owned facilities where applications are feasible.
  - Eliminate or temporarily suspend sales taxes on LEDs.
  - Provide tax credits for businesses and industries that switch to LEDs.
  - Provide economic incentives to manufacturers of LEDs to develop LED products for the mass home market.

- Encourage use of day-lighting in new and retro-fitted buildings.