# The FPD era

*Numbers, challenges and success strategies*

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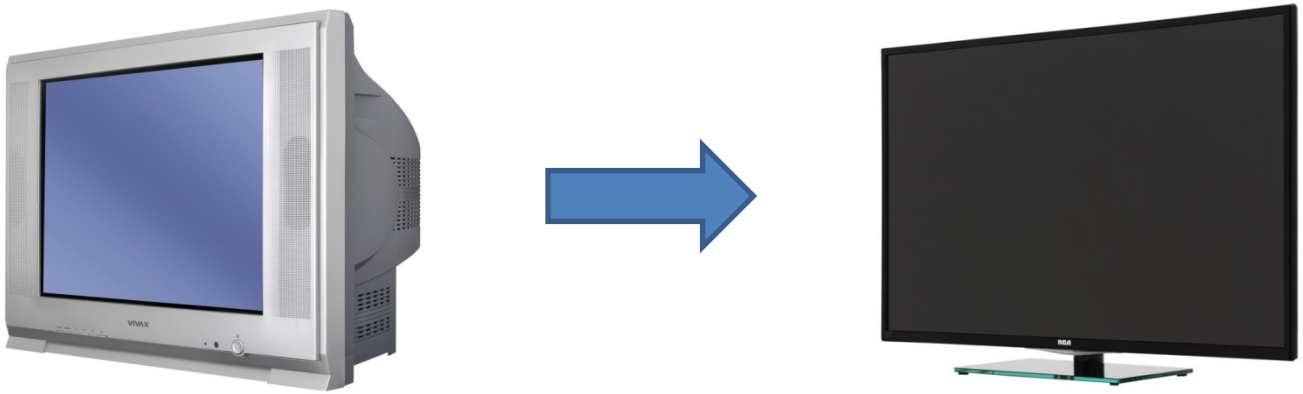
E-Scrap News

# The FPD era

Why I’m talking about FPDs, not CRTs

# The ABCs of FPDs

- Short for flat panel display TVs and monitors
- Became popular by the mid 2000s
- Thinner build, better picture quality than CRTs



# FPDs as the light at the end of the tunnel

- After what we've gone through with CRTs, FPDs viewed by some as a welcome change
- State programs closely monitoring CRT stream, hoping it begins to plateau
- Processors also keen on the shift away from CRTs

# Narrowing down our focus for today's presentation

- Many types of FPDs, including:
  CCFL
  Plasma
  LED
  OLED

- Our focus today is on CCFL FPDs

# Explaining CCFL FPDs

- CCFL FPDs represent first wave (2001-2014)
- With LEDs now controlling market share, CCFLs will be first to hit the e-scrap stream
- CCFL refers to cold cathode fluorescent lamps within devices

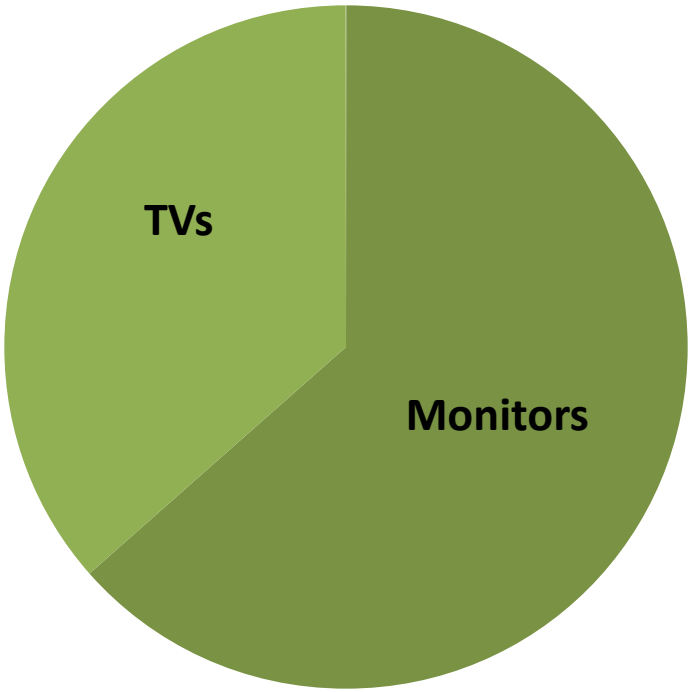
# The first wave:
# Sales of FPD TVs and monitors in U.S.

**TV Sales: 2004-2014**

- 174 million units (CEA)
- Note: All CCFLs

**Monitor Sales: 2001-2014**

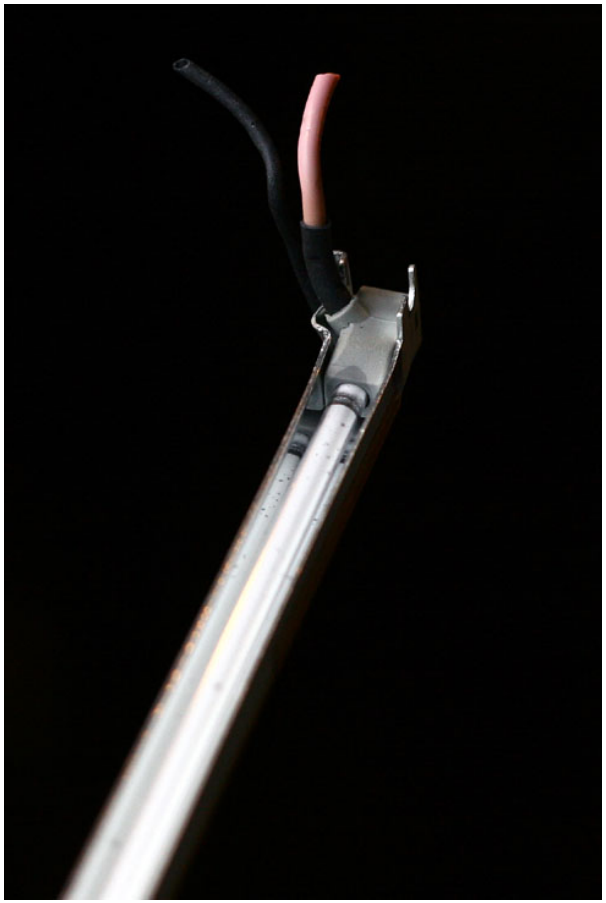
- 302.5 million units (EPA, IDC)
- Note: Almost all CCFLs




**Rough estimate:**
**470 million units**

# Mercury in first-generation FPDs

- While lighter and not made with lead, CCFL FPDs contain mercury
- Each lamp contains anywhere from 1 to 10 mgs of mercury
- Number of lamps varies per device – smaller monitors have a couple, large TVs can have more than 20



# Crunching the numbers

- How many: about 470 million units to enter stream
- Average life span: 3-10 years (possibly longer)
- Average weight: 15-30 pounds per device (roughly half as heavy as CRTs)
- Estimated total weight: About 10 billion pounds over next 10-15 years

# Are we there yet?

# The end of an era and the beginning of another

*"The lighter flat-panel displays are now displacing CRT devices in the solid waste/recycling stream"*

*-Consumer Electronics Association, June 2015*

Bottom line: Lighter overall stream equals more FPDs

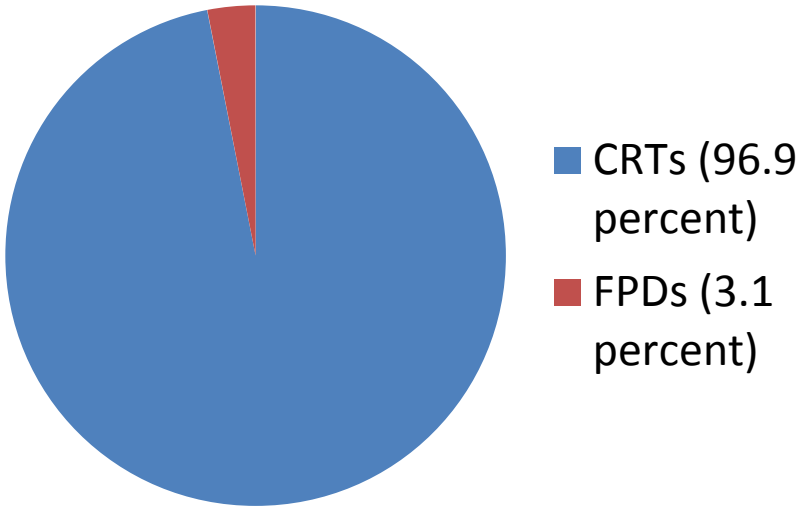
# Today's stream

- Talk of the end of the CRT era may be premature
- Anecdotal evidence points to more FPDs coming in…
- But data so far suggests FPDs remain a small portion of stream

# What the numbers say

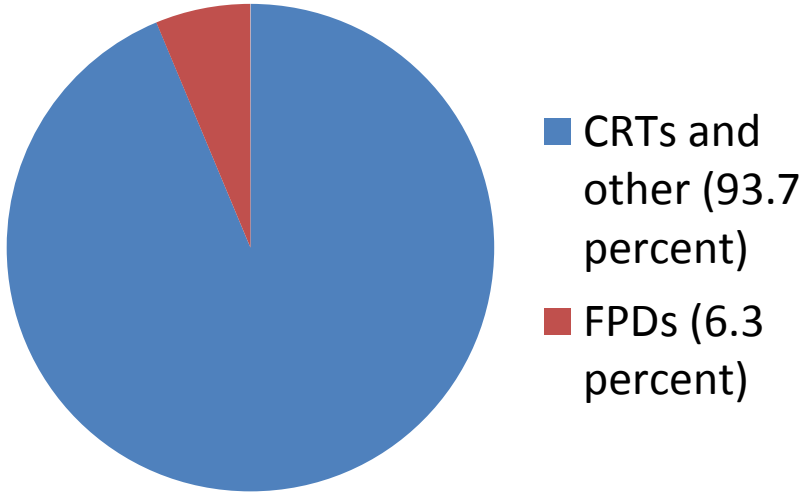
**California**

**Display stream, 2014**




**Washington**

**E-scrap stream, 2014**



# What the industry is saying

- “Just breaking in,” “percentages ticking up”
- “[Volume] not exploding like I thought it would”
- Business stream more FPD-heavy than residential
- “The problem is poised to be even greater [than CRTs]”

# How will it compare to CRTs?

**CRT sales and generation**

- Between 1980 and 2010, 979 million CRTs sold in U.S.
- At 50 pounds per device, that's **nearly 50 billion pounds** of CRTs to recycle

**FPD sales and generation**

- Between 2001 and 2014, about 470 million CCFL FPDs
- At 15-30 pounds per device, that's **about 10 billion pounds** of FPDs to recycle

# When will we see them?

- Volumes to ramp up in the near future – California at 4.5 percent midway through 2015
- At height, CCFL FPDs still might not surpass CRT volumes
- LED, OLED and plasma streams will also grow

# Handling CCFL FPDs

# General concerns and challenges

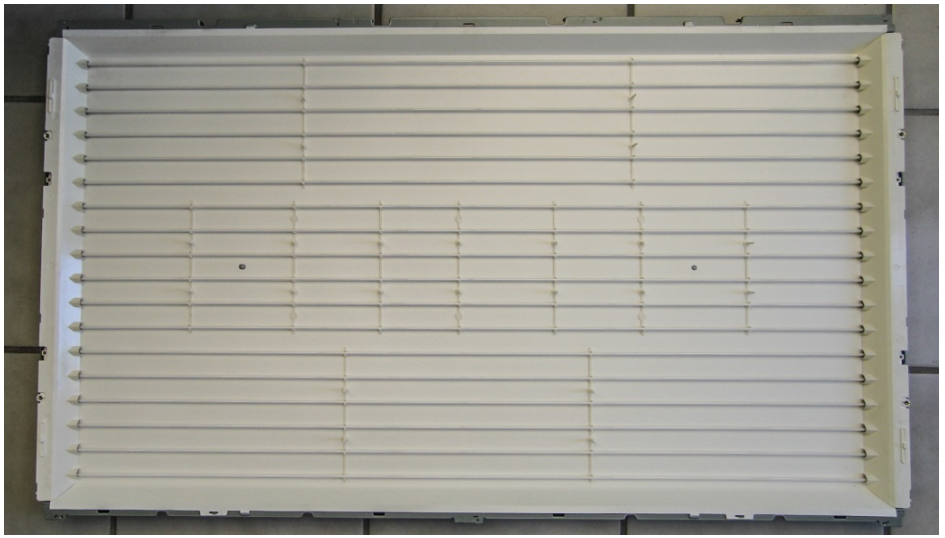
- Mercury as the big issue
- Cannot shred freely
- Little research in U.S. on safe handling
- Hard to make money off of them
- Commodity pricing does not help things

# Manual process

- Used by most U.S. recyclers due to shredding concerns
- Takes 10-20 minutes per device (more time-consuming than CRTs)
- FPDs contain steel, plastic, aluminum, glass, boards and, of course, mercury lamps

# Handling mercury lamps

- Importance of locating and keeping fragile lamps intact
- WRAP (U.K.) study found 17 percent of lamps broke – and that was during highly careful process
- Lamps  can be sent to mercury lamp recyclers for about $1 per pound of tubes (5-10)



# Automated processes

- Limited systems available
- Blubox and Electrical Waste Recycling Group
- Very fast but challenge is the mercury
- No U.S. processors currently use automated system
- Perhaps a couple on the way…

# Specific processing concerns

- Both manual and automated process can release mercury, endangering workers and environment
- Mercury is hazardous, can cause various health issues
- WRAP very concerned, particularly with automated system ("We haven't seen a way yet that can get the mercury out")
- As volumes rise, however, we'll need automated options

# The good news

- FPDs are less costly to handle than CRTs
- Finite amount in e-scrap stream, with LEDs and now OLEDs taking over sales
- Amount of mercury nowhere near amount of lead in CRTs
- Mercury recyclers widely available to take extracted lamps

# The bad news

- While less costly, they are still cost-negative
- We've already seen one company fall
- Recyclers are charging for them, generally about 5-8 cents per pound, sometimes less/more
- Thin build could create stockpiling susceptibility

# Avoiding another crisis

# How to prepare

- Biggest lesson from CRT crisis has been "we were not prepared" for challenges

- Volumes will come – remember about 470 million units have sold in the U.S. – but they will be only a fraction of the weight we saw with heavier, more abundant CRTs

# What you can do

- Expect them to start streaming in
- Don’t expect them to match CRT volumes
- Charge for them
- Do not shred unless system is designed and approved to do so

# What our industry can do

- Share your experience – FPDs need to be on everyone's radar
- Push for more data so we can gain a better understanding of what to expect
- Remember there's an opportunity here as well

# Thank you!

Consumer Electronics Association
National Center for Electronics Recycling
International Data Corporation
Best Buy
Cascade Asset Management
Universal Recycling Technologies
3S International
Blubox Trading
Cleanlites Recycling
CalRecycle
Washington State Department of Ecology
Orange County, North Carolina
Association of Lighting and Mercury Recyclers
Product Stewardship Institute
WRAP (U.K.)
Electrical Waste Recycling Group (U.K.)

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