

GREEN IT PLAN

City of Avondale, Information Technology Department
Updated September 2014



CITY GREEN IT PROGRAM

The City of Avondale created its first assembly of environmentally-responsible technology goals at the end of 2011. Between 2012 and 2013, Avondale completed initiatives in eight areas focused on minimizing toxic materials and energy usage. The results of the first plan were noteworthy:

- 100,000 kWh fall in electricity usage at the City Data Center;
- Power policies that reduced computer and printer electricity usage at night;
- Decline of 21% and 28% in the number of staff computers and printers/copiers, respectively; and
- Fall of over 1 million paper copies produced annually.

In mid-2013, the City of Avondale created its Municipal Sustainability Program and the Information Technology Department rolled its efforts under the Municipal Sustainability Plan. The City's Green IT Goals are now part of a larger effort to forge an ecologically integrated community.

Along with the efforts defined in this plan, new Green IT Goals will be defined and implemented continuously as software and hardware cycles provide opportunities for progress with smart investments and new practices. Where cost savings and cost avoidances merit, the City will accelerate specific goals.

GREEN IT GOALS

1. ENERGY STAR CERTIFIED EQUIPMENT AND SETTINGS

The United States Environment Protection Agency (EPA) states that if all computers sold in the United States met ENERGY STAR requirements, the energy cost savings would amount to \$2 billion per year. In addition, greenhouse gas emissions would reduce by the equivalent of 2 million cars.

To earn the Government's ENERGY STAR certification, manufacturers of desktop/workstations/portable computers, integrated computer systems, servers, and storage can design and configure their products to certify as energy-efficient. These steps take advantage of decreased power consumption from increasingly efficient components, power settings, and more environmentally friendly production techniques.

Objectives:

- a. When purchasing hardware, the City will only purchase ENERGY STAR certified equipment unless no other option exists.
- b. The City will utilize ENERGY STAR operating modes—standby, active, and sleep—as defaults in its configurations.
- c. IT will define computer maintenance cycle schedules and communicate those with employees. Employees will be encouraged to turn off their computers at night during non-maintenance periods to save energy and wear.

- d. The City will lease and/or purchase only ENERGY STAR-certified multi-function copier/printers. IT will configure sleep and standby modes for those devices to capture power savings.

2. SERVER VIRTUALIZATION AND CONVERGED INFRASTRUCTURE

The trend towards management of computers and servers on shared hardware through virtualization software is decades in and well-validated. Three factors drive increased virtualization: (1) reduced inventory costs and staff administration time, (2) faster hardware provisioning and responsiveness, and (3) lower maintenance costs due to improved redundancy and security. Related to total-cost-of-ownership, data centers consume up to 40 times more energy per square foot than a typical office space. Virtualized server environments reduce power consumption and physical space requirements of the old physical server model.

Objectives:

- a. The City will achieve a >90% virtualized server environment by the start of 2014. **(Done)** The City will not maintain separate physical servers unless required by a vendor for contractual, performance, or security reasons.
- b. Pilot at least 25% of City library computers on virtual computers by the end of 2013. **(Done)** If successful, progress to 100% use of virtual computers at City libraries by the end of FY2015. This will reduce costs and environmental impact of public computer labs while increasing session security for patrons.
- c. Convert publically accessible City computers to virtual computers on thin client hardware by the end of 2014. Ensure security is set to prevent any data loss in the event a hardware unit is stolen or damaged. If successful, convert at least 50% of office-based staff to virtual computers by the end of FY2016.
- d. Integrate virtualization into the City's Disaster Recovery/Business Resumption program by the end of 2014 to eliminate hardware and shipping needs while improving recovery time in the event of a disaster. **(Done)**
- e. Administer City servers on consolidated infrastructure. No dedicated server hardware will be purchased and assigned unless a manufacturer gives the City no option.
- f. Expand infrastructure use from the Avondale Internal Cloud to infrastructure-as-a-service (IaaS) vendors on-cloud as cost and security requirements meet the City's needs. Use a vendor-agnostic strategy to maximize benefits across all IaaS providers in further reducing the hardware and power requirements of the City's technology portfolio.
- g. Maintain an environmentally neutral heavy-gas fire suppression system to guard the safety of the City Data Center.

3. MINIMUM INVENTORIES AND EWASTE

Extraneous computers and copiers/printers often accumulate over time in organizations. As new equipment is deployed, some departments wish to retain old items for convenience. This increases power consumption, licensing costs, and asset management. An approach wherein IT inventories are kept at levels where they meet only defined needs reduces overall inventory counts, carbon footprint from deliveries, manufacture of unneeded additional equipment, and supports secure disposal of equipment.

Related to inventories, large organizations process significant numbers of obsolete technology equipment over time. The EPA estimated that ~45 million computers are disposed of per year without regard for the toxic materials they contained. And this does not include numbers for tablets and smartphones.

Most states have outlawed the disposal of computer waste in landfills, or otherwise addressed how computers must be disposed of. Environmental concerns with computer waste center on toxic materials such as mercury, cadmium (a known carcinogen), lead, and hexavalent chromium used in manufacture of components. Utah's Department of Environmental Quality estimated computer waste contained 1.2 billion pounds of lead, 2 million pounds of cadmium, 1.2 million pounds of hexavalent chromium, and 400,000 pounds of mercury that were deposited in its state landfills.

Objectives:

- a. The City will maintain a 1:1.15 or better computer allocation policy that maintains an inventory of 1.15 computers per City FTE. The additional .15 will be for training, common rooms, presentation, and special field-work computers.
- b. The City will minimize the number of dedicated desk-side telephones in its portfolio to <40% of 2013 inventories by the end of 2017. Staffs will continue to transition to cellular smartphones and computer-based softphones, reducing usage of and need for traditional handsets.
- c. For decommissioned equipment, IT will maintain its donations program to redeploy computers to education and non-profit programs that request the equipment. Disposition will be secure and allow those agencies to obtain more modern hardware through reuse.
- d. The City will purchase replacement computing equipment in the fewest number of orders possible so as to reduce carbon emissions from deliveries and capture volume discounts. As a required part of this, deploy computers and servers within 90 days of receipt to capture energy savings from newer equipment and minimize waste of warranty coverage.
- e. The City will only purchase computing equipment from manufacturers with EPA-certified disposal services unless no other options exist.
- f. The City will use an EPA-certified "eWaste" disposal services for 100% of decommissioned technology equipment that is not donated for reuse.
- g. The City will minimize the number of individual desktop printers to <3% of total inventory to minimize additional hardware and power consumption, decrease use of consumables, and to realize replacement cost savings.

4. VIRTUAL MEETINGS

The City of Avondale expends significant resources coordinating with agencies in other region and states. By permitting City staff to meet and train virtually from local offices, video conferencing services allow the City to save fuel costs, lessen wear and depreciation on vehicles, and reduce reimbursement costs for staff travel. Related to decreasing driving and mileage, video conferencing can provide significant reductions to the City's total carbon emissions.

Objectives:

- a. The City will provide technical tools and network capacity to support desk-side video conferencing for meetings, training, and events involving external agencies or businesses by January 2014. **(Done)**

- b. The City will provide video conferencing capabilities in at least two City conference rooms for meetings, training, and events involving external agencies or businesses, such as Maricopa Association of Government meetings by July 2014. **(Done)**

5. REMOTE SUPPORT

Remote access software allows the City's computer technicians to connect to a user's PC over the network. IT staff can diagnose and repair problems for customers quickly regardless of their location. This is especially useful for City staffs when traveling, in the field, or at remote offices.

Objectives:

- a. IT will continue to develop and use remote support tools as a primary option, allowing technical staffs to interact with computers at field and remote office locations while reducing the number of miles driven by technicians to support City employees.

FUTURE GREEN IT TECHNOLOGIES

GREEN INITIATIVES TO BE ASSESSED

- Mass transition to Solid State Hard Drives
- Cloud-based virtual computers for the enterprise
- Increased application virtualization

WHAT IS E-WASTE?

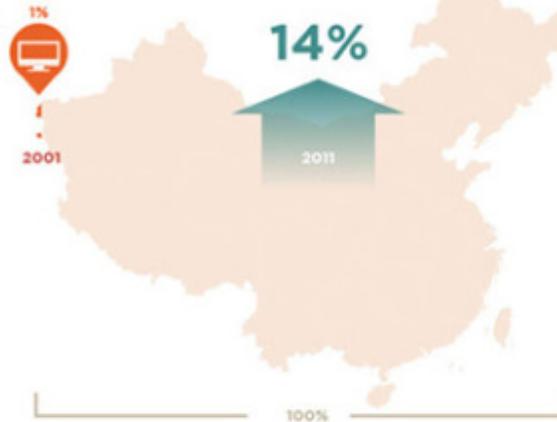
As the consumption of electronic products has increased so has a new type of waste—**e-waste**.



The term **e-waste** is applied to all waste caused by discarding electronic devices, especially consumer electronics.

WHAT CONTRIBUTES TO E-WASTE?

According to Gartner, IT spending by Chinese end users grew by nearly **14%** in 2011. This is astounding when one considers that over ten years ago, under **1%** of China's population owned a computer.



HOW IT SPENDING BY CHINESE END USERS IS EXPECTED TO GROW



It's not just computers that contribute to e-waste



E-WASTE BY THE NUMBERS: HOW MUCH ARE WE GETTING RID OF?



In the U.S. in 2010 more than **130 million** mobile phones are trashed a year, this means every day we trashed or recycled over **17,000 tons** of e-waste.

☑️ =10 Million



In the U.S.A. in 2010, **152,000,000** mobile phones were disposed of.

TRASHED **135 M.**

RECYCLED **17 M.**

11% Giving us a recycling rate of 11%, one of the worst recycling rates for 2010.

WHAT HAVE PEOPLE DONE WITH THEIR OLD MOBILE PHONES?



THE BEST RECYCLING RATES IN THE U.S. IN 2010

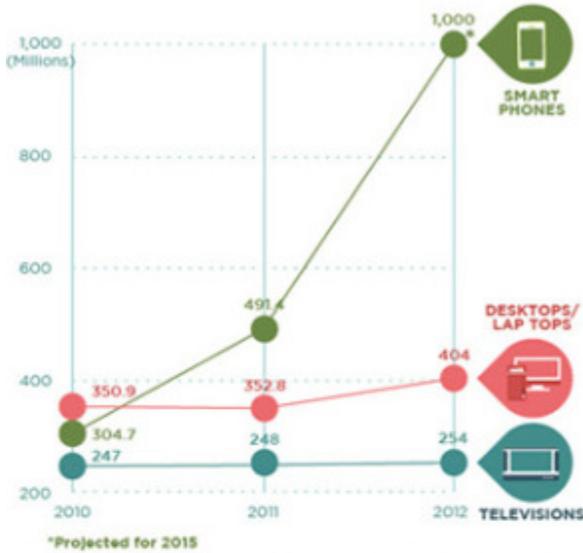


THE REPORTED RECYCLING OF LAST MOBILE PHONE IN DIFFERENT COUNTRIES



WHAT ABOUT THE NUMBER OF ELECTRONICS WE ARE BUYING?

ELECTRONICS BOUGHT WORLDWIDE

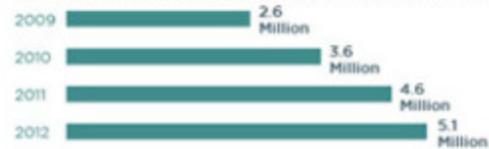


We are buying more electronics year on year, adding more emphasis to the fact that we should be trying to manage our e-waste as best as we can!

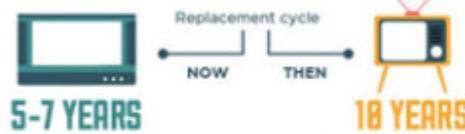
In 2011 the average U.S. household spent



The number of Americans purchasing new TVs for the Superbowl:



The *NY Times* also reports that consumers seem to be more willing to upgrade their televisions than they did in the tube era



The EPA estimates that by the end of 2007 there were **OVER 99 MILLION** TVs stockpiled or stored in the USA.



WHAT CAN WE GAIN FROM OUR E-WASTE BY RECYCLING IT?

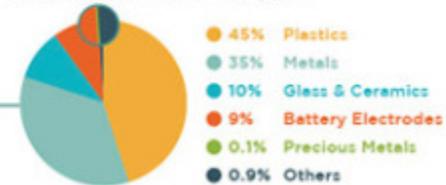
E-waste contains many valuable and precious materials, up to 60 elements from the periodic table can be found in complex electronics. Physical components in mobile phones can be harmful if left to decay, and there are two ways to go about recycling them.

THE 1ST WAY: TO BREAK DOWN THE MOBILES AND SOURCE THE MATERIALS INSIDE THEM.

Recycling 1 million mobile phones can recover



the material content of a mobile phone:



6,000 mobile phone handsets contain



The average mobile phone battery contains another **3.5 grams of copper**.

Combined value: over US \$15,000 at today's prices.

Despite these benefits e-waste is still the fastest-growing sector of the US waste stream

1 metric ton of electronic scrap from PCs contains more gold than that recovered from 17t of gold ore. In 1998 the amount of gold recovered from electronic scrap in the U.S. was equivalent to that recovered from more than 2 million metric tons of gold ore and waste.



THE 2ND WAY: TO TAKE UNWANTED PHONES AND SEND THEM OVERSEAS TO DEVELOPING COUNTRIES

These phones can then provide people with the ability to communicate, as well as creating new jobs and business opportunities.

When 10 more people out of 100 in developing countries use mobile phones the GDP rises by 0.59% per capita.



WHAT ABOUT THE RESOURCES WE USE WHEN MANUFACTURING ELECTRONICS?

According to a UN study, the manufacturing of a computer and its screen takes...

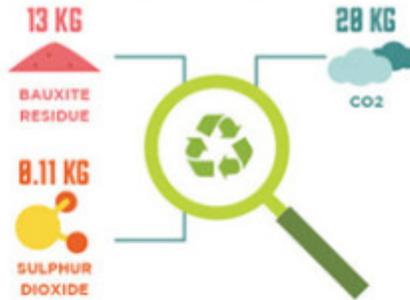


more than the weight of a rhino!

The life cycle energy use of a computer is dominated by production



Recycling metals from e-waste uses a fraction of the energy needed to mine new metals. Recovering 10 kg of aluminium via recycling uses no more than 10% of the energy required for its primary production. Thus preventing:



Compared to disposal, computer reuse creates



We are living in a technology obsessed world and are always buying new gadgets, however due to campaigns run by big tech companies, and the emphasis on being "green" getting bigger and bigger we will see an increase in the number of pieces of tech being recycled.

Despite miners digging up more precious metals, production alone cannot meet global demand. Global silver mine production is up **33%** since 1999.



Could we harness recycling to satisfy demand for consumer electronics?

Resource list:

<http://www.bostonelectronicwaste.com/go-green/what-is-ewaste/>
<http://www.gartner.com/it/page.jsp?id=2124215>
http://www.step-initiative.org/index.php/Initiative_WhatIsEwaste.html
<http://www.wirefly.org/news/cell-phone-facts.php>
http://www.electronicstakeback.com/wp-content/uploads/Facts_and_Figures_on_EWaste_and_Recycling.pdf
http://cdn.intechopen.com/pdfs/37110/InTech-%20Electronics_waste_recycling_of_mobile_phones.pdf
[http://www.ce.org/News/News-Releases/Press-Releases/2011-Press-Releases/20110523-American-Households-Spend-More-Than-\\$1.10.aspx](http://www.ce.org/News/News-Releases/Press-Releases/2011-Press-Releases/20110523-American-Households-Spend-More-Than-$1.10.aspx)
http://www.nytimes.com/2011/01/06/technology/06sets.html?ref=todayspaper&_r=0
<http://isp.unu.edu/news/2011/us-teams-with-global-partners-to-curb-ewaste.html>
<http://dsc.discovery.com/technology/tech-10/cell-phones-help-nations.html>
<http://www.ehs.unu.edu/file/get/4080#>
<http://www.nytimes.com/1993/04/14/business/recycling-answer-sought-for-computer-junk.html>
<http://www.caseyresearch.com/editorial.php?page=articles/are-we-running-out-silver>



<http://www.govtech.com/infographics/E-Waste-and-Us-1700-Tons-Trashed-Each-Year-Infographic.html>