Sponsored by ADEQ's Pollution Prevention (P2) Program and the Western Sustainability Pollution Prevention Network

ADEQ
Arizona Department of Environmental Quality

WSPPN

Webinar Instructions

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Brought to you by:

- The Western Sustainability Pollution Prevention Network
- The Arizona Department of Environmental Quality

Western Sustainability Pollution Prevention Network

- Cooperative alliance of P2 programs in Region 9
- P2 information research, consolidation, dissemination
- Pollution Prevention Resource Exchange (P2Rx)
- Preventing or reducing pollution before it is released has a greater positive impact on the environment, economy and health

(ADEQ's)
Pollution Prevention (P2) Program

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Pollution Prevention Week

September 21-27, 2015

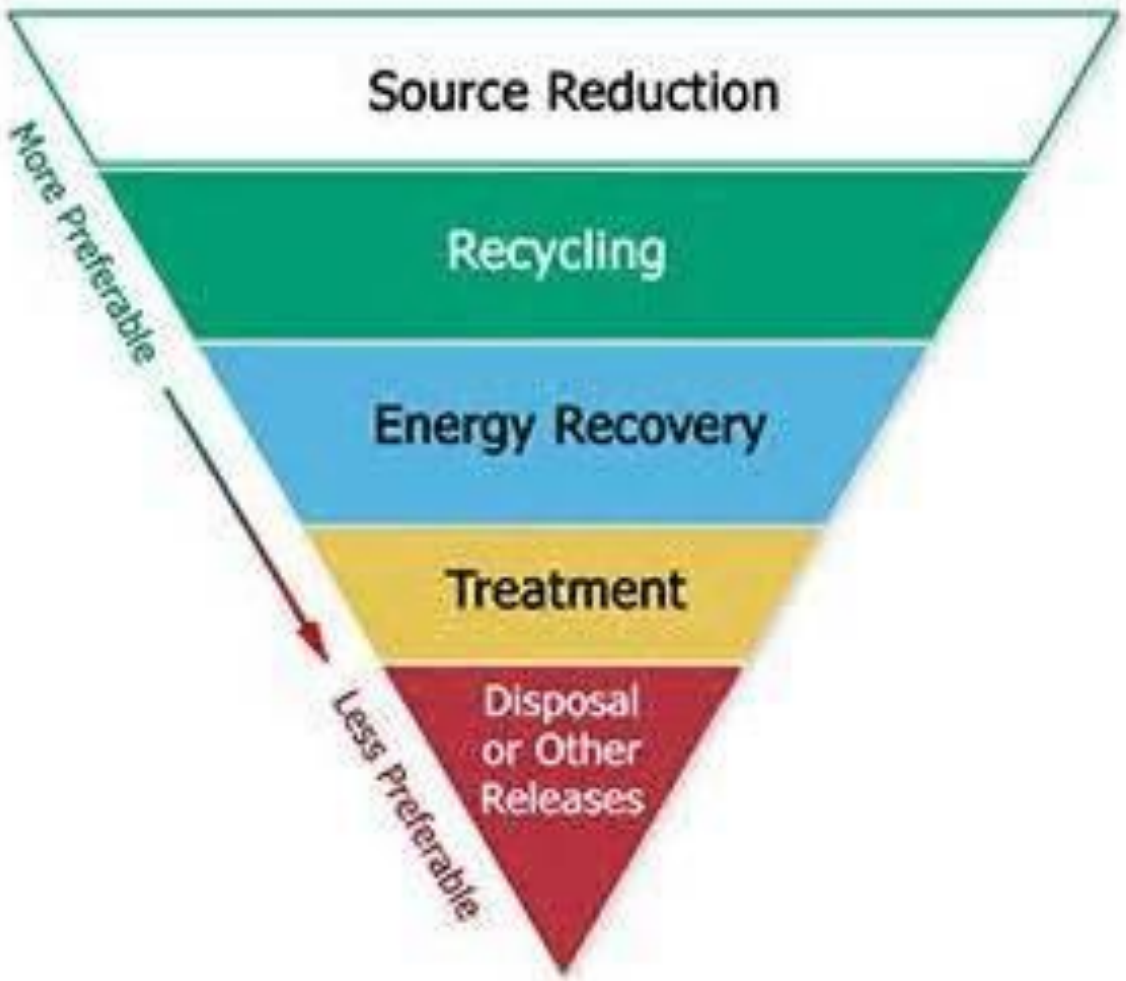
Arizona Department of Environmental Quality

Pollution Prevention Program

September 22, 2015

ADEQ Arizona Department of Environmental Quality

What is P2?


Source Reduction
Recycling
Energy Recovery
Treatment
Disposal or Other Releases
More Preferable
Less Preferable

Arizona State P2

In 1991, Arizona initiated one of the broadest P2 programs in the nation and adopted a P2 policy to include:

Arizona Revised Statutes (A.R.S.) §§ 49-961 to 49-969

- Toxic substance use reduction
- Hazardous waste generation reduction

What is P2 in Arizona?

P2 in Arizona

Operational procedures and processes and improvements in housekeeping or management techniques that reduce potential or actual releases of pollutants to the overall environment including all air, water and land resources affected by those pollutants.

A.R.S. §49-961(7)

Arizona P2 Program Plan Filing Thresholds

1. Filed a Toxic Release Inventory Form (form R or A)

A.R.S. §49-962(A)(1)

If the owner or operator of a facility was required to file an annual Toxic Release Inventory (TRI) form (Form A or Form R) to EPA during the preceding calendar year, the facility must prepare and implement a P2 Plan.

2. Hazardous Waste Generators

A.R.S. §§49-962 (A)(2) and 49-963(C)

A facility that generated or shipped off-site an average of 2,200 pounds (1,000 kg) per month of hazardous waste or an average 2.2 pounds (1 kg) per month of acute hazardous waste during the preceding calendar year, must prepare and implement a P2 Plan.

3. Toxic Substance Users

A.R.S. §49-963(D)

If the facility used in excess of 10,000 pounds of a TRI listed chemical during the previous calendar year, the facility must prepare and implement a P2 Plan.

Voluntary Environmental Stewardship Program

A.R.S. §49-192

- Identify and reward organizations with a good history of compliance
- Various categories
  - Copper, bronze, silver gold and platinum

Reasons to join

- ADEQ recognition of your organization
- Reduced inspection frequency
- Coordination of multiple onsite inspections
- Advanced notification of inspections and enforcement rulings

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Why Celebrate P2 Week?

ADEQ Arizona Department of Environmental Quality

Pollution Prevention Week in Arizona highlights the efforts of facilities in our own State P2 program in reducing the use of toxic substances and hazardous waste generation and the conservation of natural resources!

The following companies will conduct a presentation on successful goals implemented at their facilities:

- Praxair Electronics Kingman
- Luke Air Force Base
- Freescale Semi-Conductor Chandler

freescale

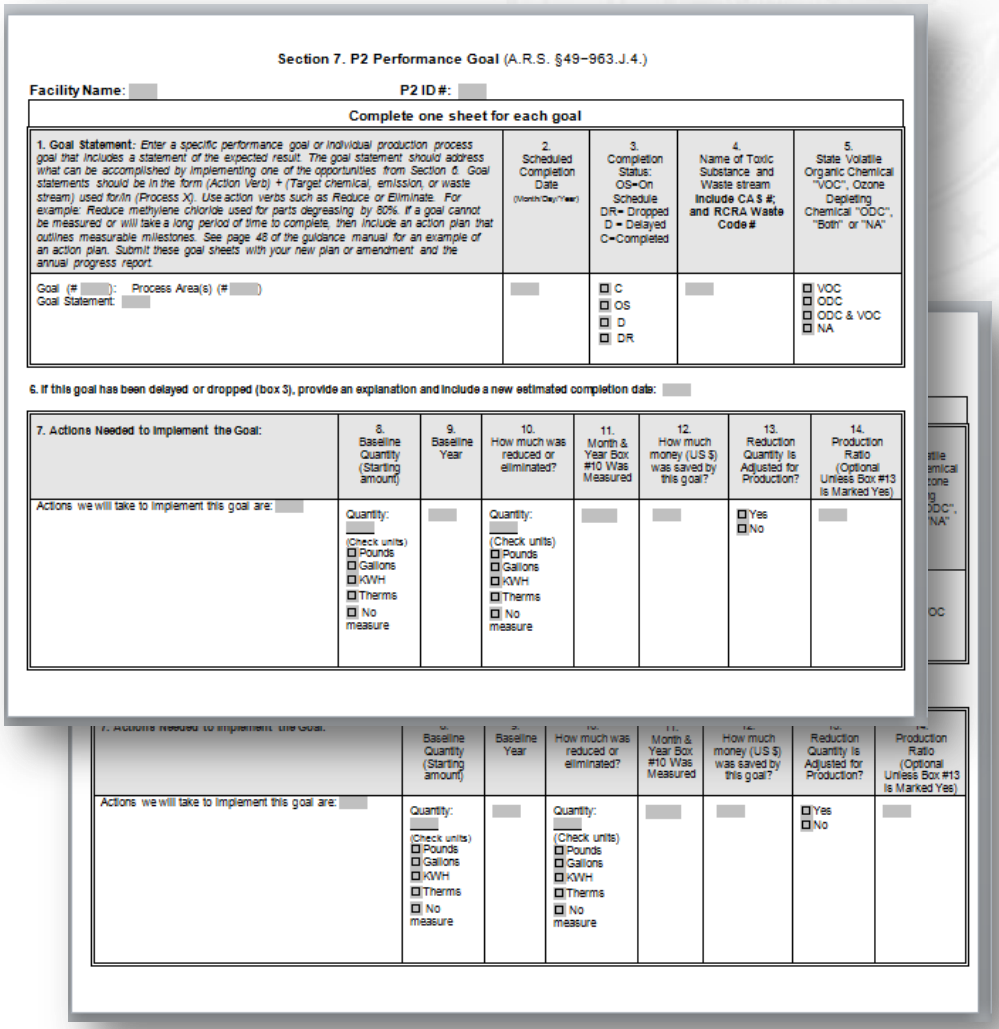
PRAXAIR
Making our planet more productive

What are P2 goals?

ADEQ Arizona Department of Environmental Quality

ADEQ P2 Program Goal Forms:

- An identified opportunity for waste reduction
- Facility provides a statement to reduce pollution
- Facility provides actions needed to implement the goal
- Defines a completion date and identifies a baseline quantity and year
- Reductions are reported annually to ADEQ P2 through the goal form



Section 7. P2 Performance Goal (A.R.S. §49-963.J.4.)

Facility Name: P2 ID#:

Complete one sheet for each goal

1. Goal Statement: *Enter a specific performance goal or individual production process goal that includes a statement of the expected result. The goal statement should address what can be accomplished by implementing one of the opportunities from Section 6. Goal statements should be in the form (Action Verb) + (Target chemical, emission, or waste stream) used for/in (Process X). Use action verbs such as Reduce or Eliminate. For example: Reduce methylene chloride used for parts degreasing by 80%. If a goal cannot be measured or will take a long period of time to complete, then include an action plan that outlines measurable milestones. See page 48 of the guidance manual for an example of an action plan. Submit these goal sheets with your new plan or amendment and the annual progress report.*	2. Scheduled Completion Date (Month/Day/Year)	3. Completion Status: OS=On Schedule DR= Dropped D = Delayed C=Completed	4. Name of Toxic Substance and Waste stream **Include CAS #; and RCRA Waste Code#**	5. State Volatile Organic Chemical "VOC", Ozone Depleting Chemical "ODC", "Both" or "NA"
Goal (#): Process Area(s) (#) Goal Statement:		☐ C ☐ OS ☐ D ☐ DR		☐ VOC ☐ ODC ☐ ODC & VOC ☐ NA

6. If this goal has been delayed or dropped (box 3), provide an explanation and include a new estimated completion date:

7. Actions Needed to Implement the Goal:	8. Baseline Quantity (Starting amount)	9. Baseline Year	10. How much was reduced or eliminated?	11. Month & Year Box #10 Was Measured	12. How much money (US $) was saved by this goal?	13. Reduction Quantity is Adjusted for Production?	14. Production Ratio (Optional Unless Box #13 is Marked Yes)
Actions we will take to implement this goal are:	Quantity: (Check units) ☐ Pounds ☐ Gallons ☐ kWH ☐ Therms ☐ No measure		Quantity: (Check units) ☐ Pounds ☐ Gallons ☐ kWH ☐ Therms ☐ No measure			☐ Yes ☐ No	

Disclaimer: The slides and information presented by the following facilities are for informational purposes only and do not necessarily reflect the opinion or endorsement of ADEQ. For more information on the technologies, topics and calculations discussed on the slides, please contact the respective facility and direct questions to them.

Praxair Electronics Kingman

Stoney Shumway presenting;

Plant Compliance and Environmental Engineer

We are a semiconductor process gas manufacturer; we specialize in extremely high purity gases and high precision blends for the electronics industries; including semiconductor manufacturers and similar technologies like photovoltaics and LEDs.

Due to the nature of our industry and the products we provide; and our commitments to safety and environmental protections, we maintain state of the art abatement systems, chillers, freezers, vacuum pumps, and air handling systems; as well as a full analytical laboratory and 24/7 air monitoring and measurement equipment.

All of this contributes to a very high electrical energy demand. This was our first big target when investigating ways to improve our environmental footprint.

Initial investigation found that the plant is idle for a considerable number of hours per week.

Initial goal: By turning off or slowing down equipment, we can reduce the energy consumption by 20-45%

The Biggest User

- The VES Exhaust Fan is the biggest energy user at the plant.
- We can safely reduce the speed of the fan from 76% to 20% during non-production hours
- We can also safely reduce the speed of the liquid pump from 100% to 40% during non-production hours

VES Lighting Auxiliary Equipment

3 Switches were installed

The Lighting Switch turns off 18 selected lighting circuits throughout the facility.

The Auxiliary Equipment Switch turns off water heaters, pumps, heaters, and select ventilation fans. It also alters the set points for select chilled water and HVAC systems.

The VES Switch

- This was the major improvement. This switch initiates an automated shutdown sequence:
  - Slows the VES Fan Speed from 76% to 20%
  - Slows the VES Pump Speed from 100% to 40%
  - Turns on Red Warning Beacons in the facility
  - Turns on Snapshot Screen Warning to all monitoring stations

During Sleep Mode

Certain Areas of the Plant are Off-Limits

- Although plant-wide monitoring remains active, there is reduced air flow in production areas, for safety reasons, necessitates that these areas not be entered.
  - In addition, there is built in automation control. If any of the plant monitoring equipment; the atmospheric monitors, oxygen sensors, etc., is triggered for any reason, the automation will immediately ‘wake up’ the facility and return all processes to normal operation.
- Beacons, Warning Lights, and Alarm system alerts are all present to warn individuals when the plant is in Sleep Mode.
- In addition, facility maps are located near each entrance to illustrate those areas of the facility that may not be entered during Sleep Mode.

Who Flips the Switches?

- The last Lead Person (or designate) on property puts the plant in “Sleep” Mode
- The first Lead Person (or designate) on property “Wakes” the plant up
- It takes approximately two minutes for the plant to come out of “Sleep” Mode

Total Energy savings has been quite good, and getting better each year, even with new systems going online, as we optimize our process and get better at managing the control.

Year	total Usage (kWh)
2011 (baseline)	6319916
2012	4745985 (25% improvement!)
2013	4402800
2014	4294720
We are up to a 32% improvement from baseline!	

Some of the things to consider before implementing a similar process:

- **Safety systems have to remain intact – we went to great lengths to ensure that at no time was any of our safety or environmental obligations neglected. Awareness and training were a key aspect of the program.**

- **Our facility also has 24/7 security, so we had personnel on site to communicate issues or raise alarms if needed.**

- **Some systems may not do well with the daily power fluctuations, or perhaps were needed to maintain other systems.**

- **Other processes were designed to operate over long periods: several processes had to be left out of the sleep mode loop, because they had process cycles of 36 hours or more, and couldn't shut down.**

Praxair Kingman has had great success with throttling our power usage to reduce our consumption during off hours. Hopefully others can as well!

Questions?

LUKE ENVIRONMENTAL EXCELLENCE PROGRAM

Environmental • Safety • Occupational Health

360° SUSTAINABILITY

ACTIVE BIOREMEDIATION OF WASTEWATER: OIL WATER SEPARATORS (OWS) & GREASE TRAPS

PRESENTED BY:

JEFFERY SCHONE; LEED AP, C.E.M.; PMP

360º Sustainability

BACKGROUND:

- **Needed an alternative to the traditional "pump & treat" for waste POL liquids and grease from commercial and industrial processes.**
- **Infrastructure is old, worn, and a lot of man-hours were used for maintenance (e.g. snake lines, manual sludge cleanout)**
- **Costs continue to rise for treatment of wastewaters; reduction in force; and only partially sustainable.**

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360º Sustainability

BACKGROUND:

360º Sustainability

BACKGROUND:

360º Sustainability

BACKGROUND:

- **Initiated our own treatment study using bacteria injection that specifically targets POL degradation and cleaning**
- **Pumping Costs continue to rise**
- **Cradle to Grave 'process' as Luke AFB owns and operates its own WWTP.**

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360º Sustainability

OBJECTIVE:

Studied 360º Treatment Case for October 2013 to October 2014

- Documented the Process of Bacterial Injection through ASU School of Sustainability
- Bacteria and the effects (newer technology) – NOT ENZYMES!
- Defined all Advantages & Identify any Disadvantages

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OBJECTIVE:

- Document Results; Both Direct and Intrinsic (e.g. reduction of nitrate levels at WWTP)
  - Costs/Cost Avoidance
  - 360 - zero waste?
- Identify Stakeholders to Benefit (Other Applications?)
- Publishable/Sharable; ASU Sustainable Cities Network, STORM, Restaurant Association, Vehicle Maintenance, etc.

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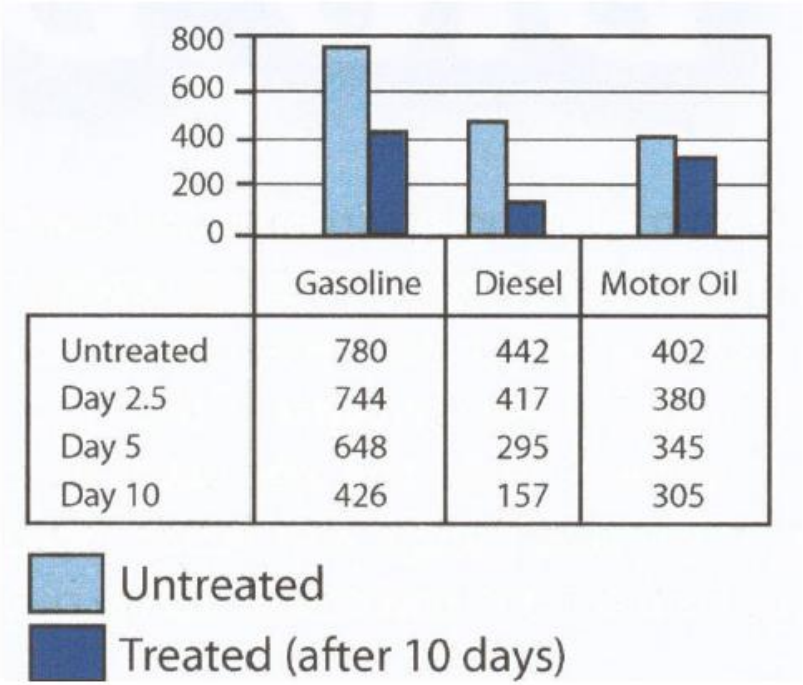
THE RESULTS:

- 3-Months:
  - Gasoline – 46 ppm
  - Diesel – 10 ppm
  - Motor Oil – 66 ppm
- 6-Months:
  - Gasoline – 6 ppm
  - Diesel – 0 ppm
  - Motor Oil – 2 ppm
- NO SLUDGE – only Silt

Petroleum Degradation by
Bacto-Treat OWS



	Gasoline	Diesel	Motor Oil
Untreated	780	442	402
Day 2.5	744	417	380
Day 5	648	295	345
Day 10	426	157	305

360º Sustainability

THE RESULTS:

- Bacteria targets with no residual negative affects at
  - The Point of Treatment, or
  - The Luke WWTP
- Documented Results; Both Direct and Intrinsic (e.g. reduction of nitrate levels at WWTP)
  - Significant Cost Reduction and Cost Avoidance
  - 360 - zero waste with recharge

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THE RESULTS:

- Published and Shared:
  - Case Brief published through ASU School of Sustainability
  - Case Brief published in the Wastewater Digest
  - Shared; AZ Sustainable Cities Network, STORM, and Restaurant Association (Grease Trap Maintenance)

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THE RESULTS:

PUMPING AND COST HIGHLIGHTS			
Year	Gallons Pumped	Man-hours Used*	Total Cost
2013	175,926	98	$124,075
2014	7,440**	2.5	$24,023***
Savings (%)	88 %	97 %	80 %

* Average rate of $39/hr; **Requires annual pumping due to being a holding tank; ***Includes Bacteria, labor, and pumping

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THE RESULTS:

- Complementary reductions of Wastewater
- Nitrates at WWTP less than 1 mg/l
- October 2014 to Present
  - Cost Savings increased to 98%
  - No Mechanical failures
- October 2015 – September 2016; Best Year Yet?

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QUESTIONS?

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Freescale Chandler Site

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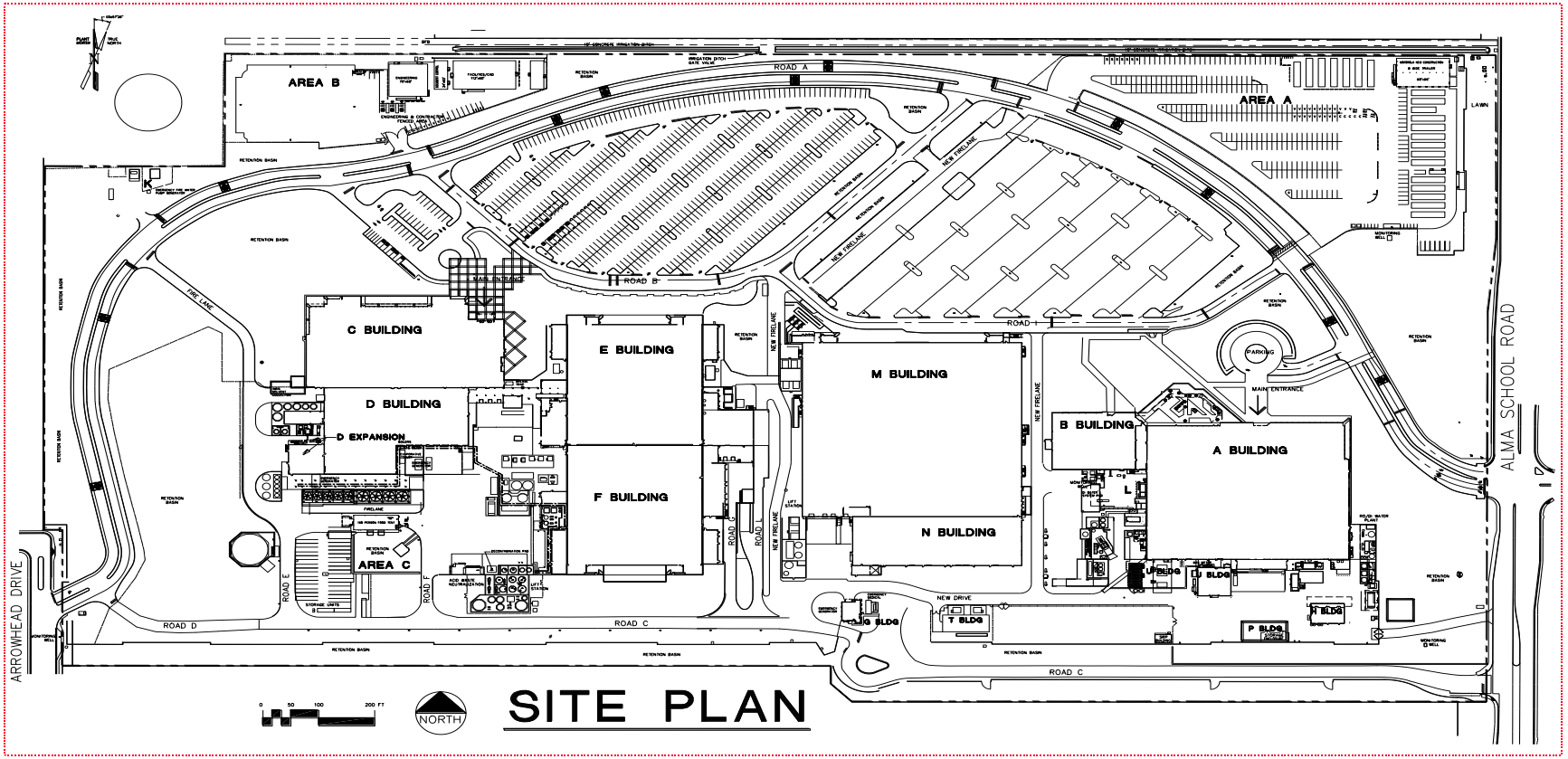
Chandler Campus - Pollution Prevention Reuse, Recycle



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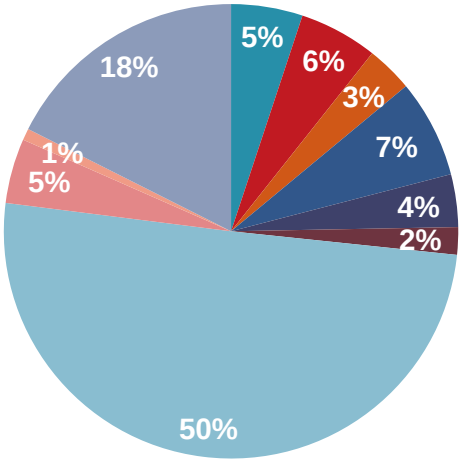
Chandler Q1 and Q2 2015 Waste Break Down

Chandler Non-Hazardous Waste

1,138,396 lbs generated
(82.4% recycled)

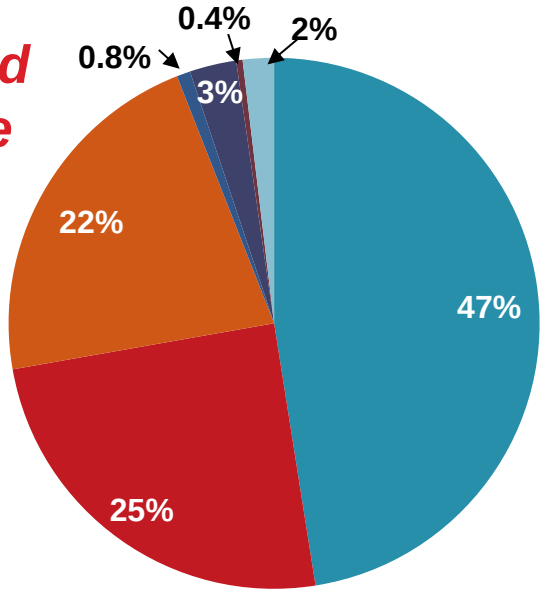


- Paper / Corrugated
- Plastics
- Metals
- Landscaping
- Wood
- Electronic Waste
- Calcium Fluoride
- Equipment Salvage
- Other - Miscellaneous
- Landfilled Waste

86.9% combined recycling rate

Chandler Hazardous Waste

641,735 lbs generated
(94.9% recycled)



- Mixed Solvent
- Photoresist
- Sulfuric Acid
- Copper Plating Waste
- Solvent Wipes
- Arsenic Debris
- Other

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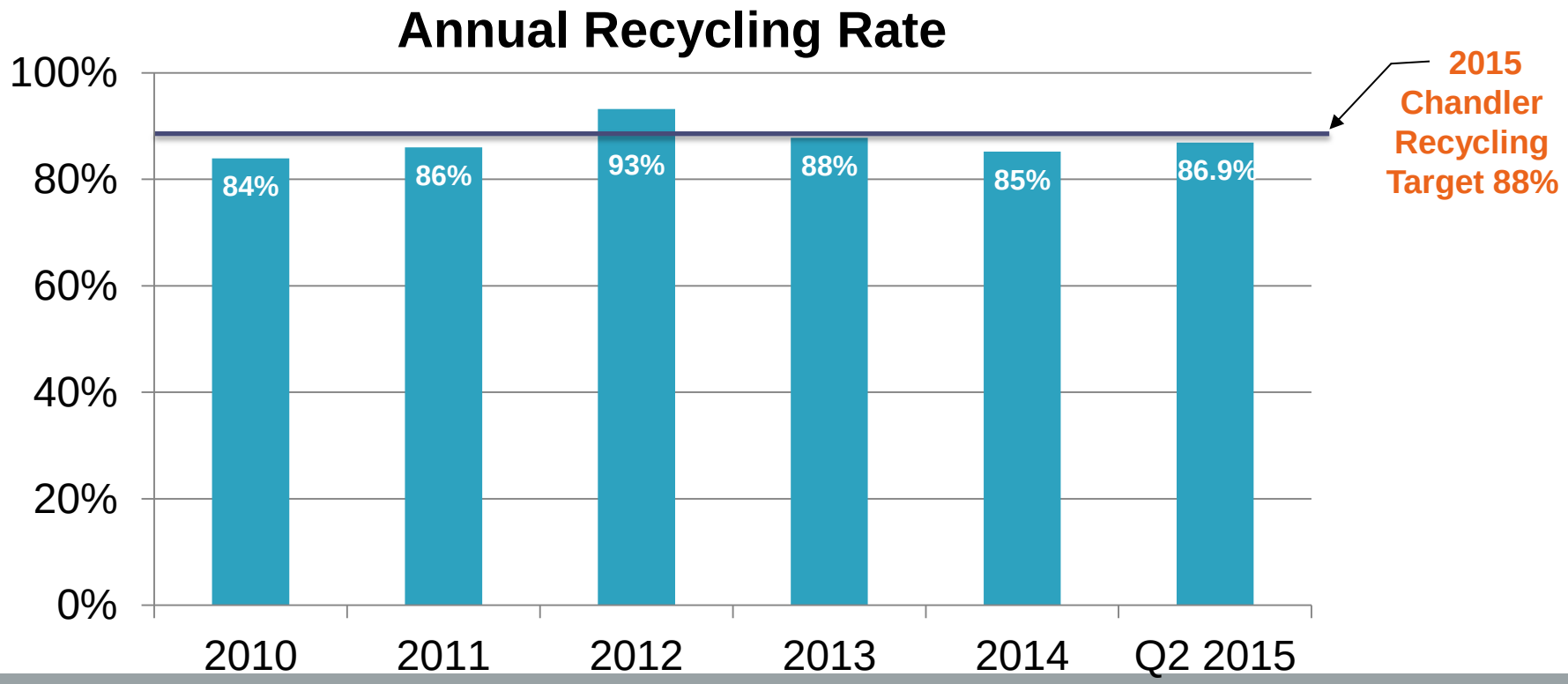
Recycling Goal

Chandler Site Goal: Improve the recycling rate to 88% or better



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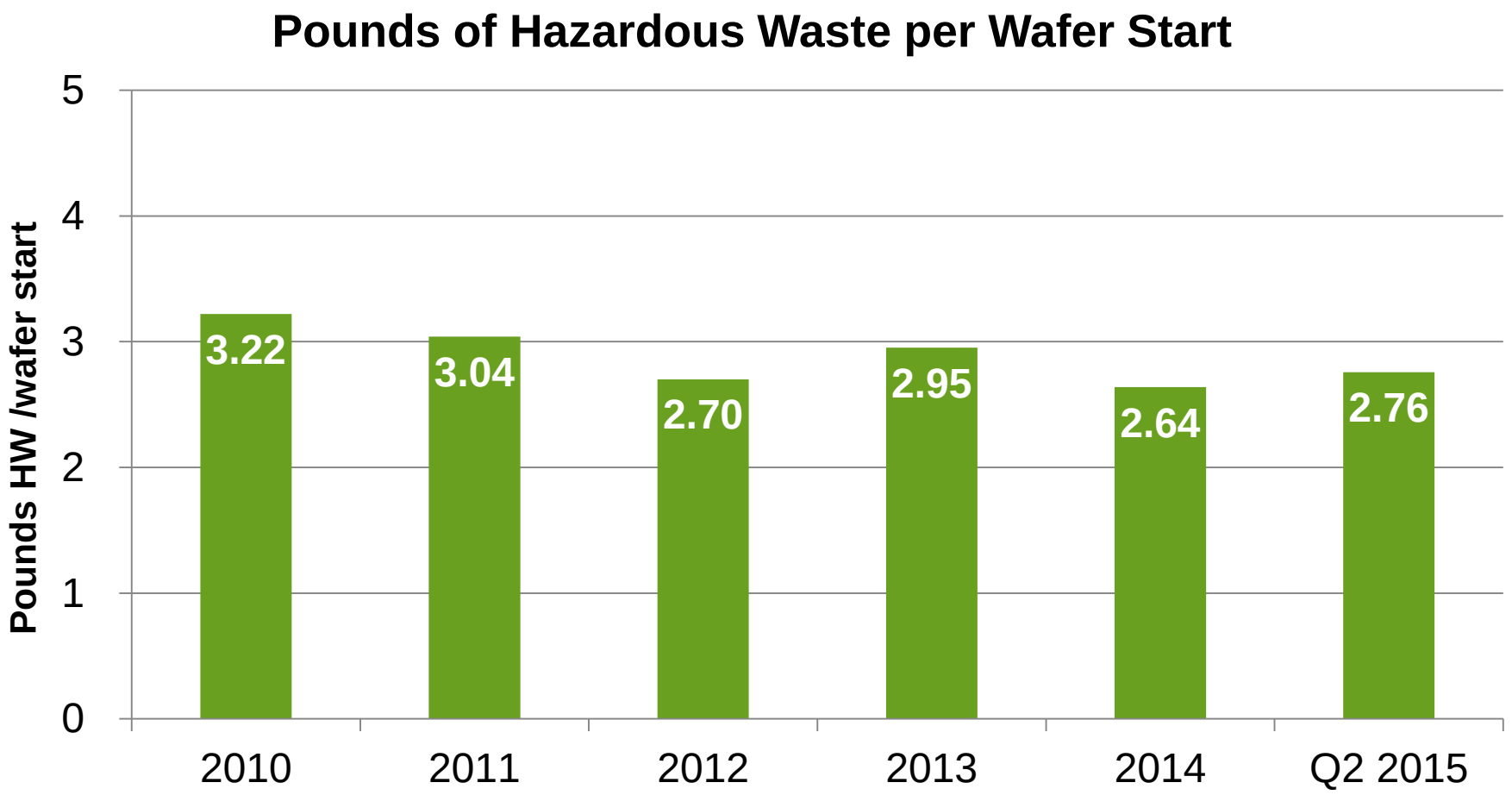
Chandler Pounds of Hazardous Waste per Wafer



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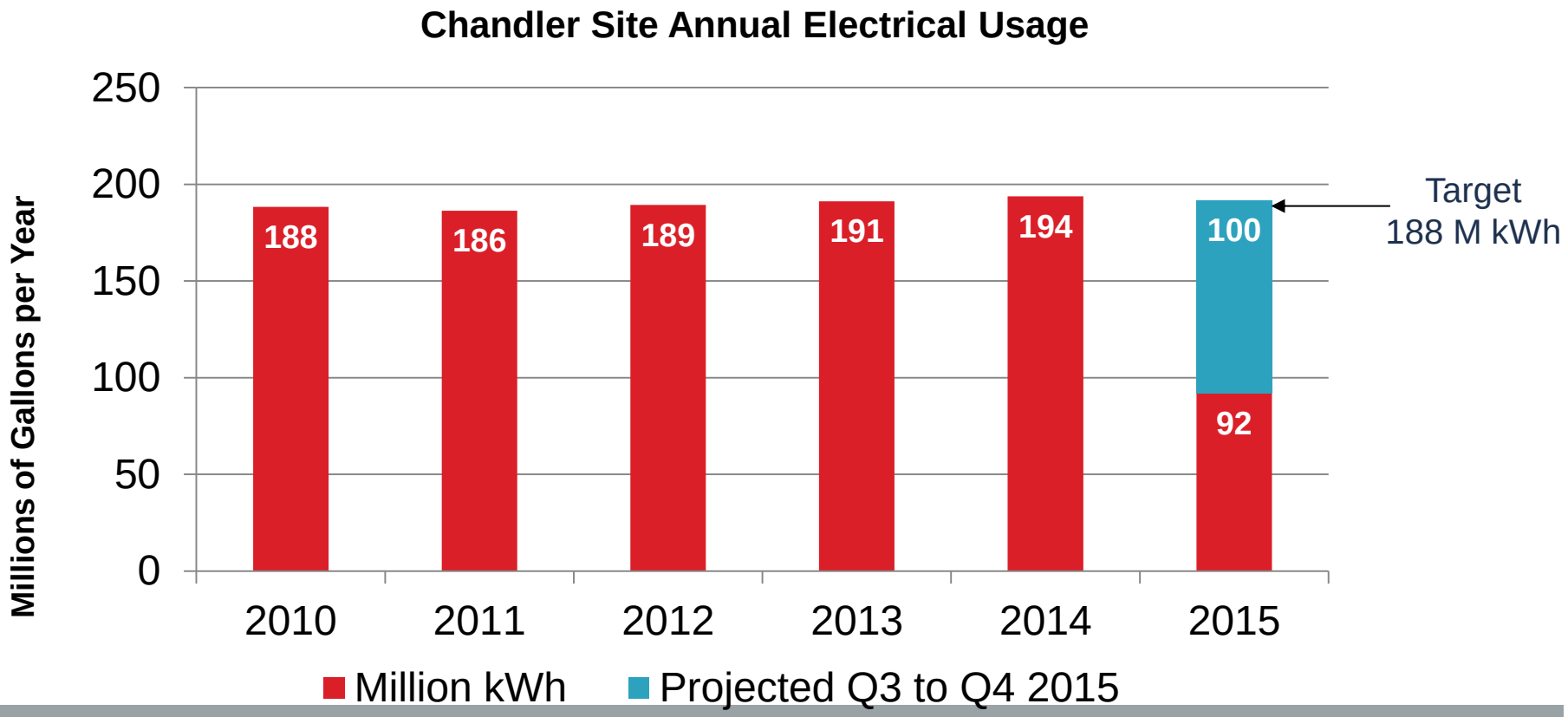
Electricity Consumption Goal

Reduce Electricity Usage by 6 million kWh over prior year

- Conservation projects completed during 2014 have a total electricity annual savings of 2.15 Million kWh per year



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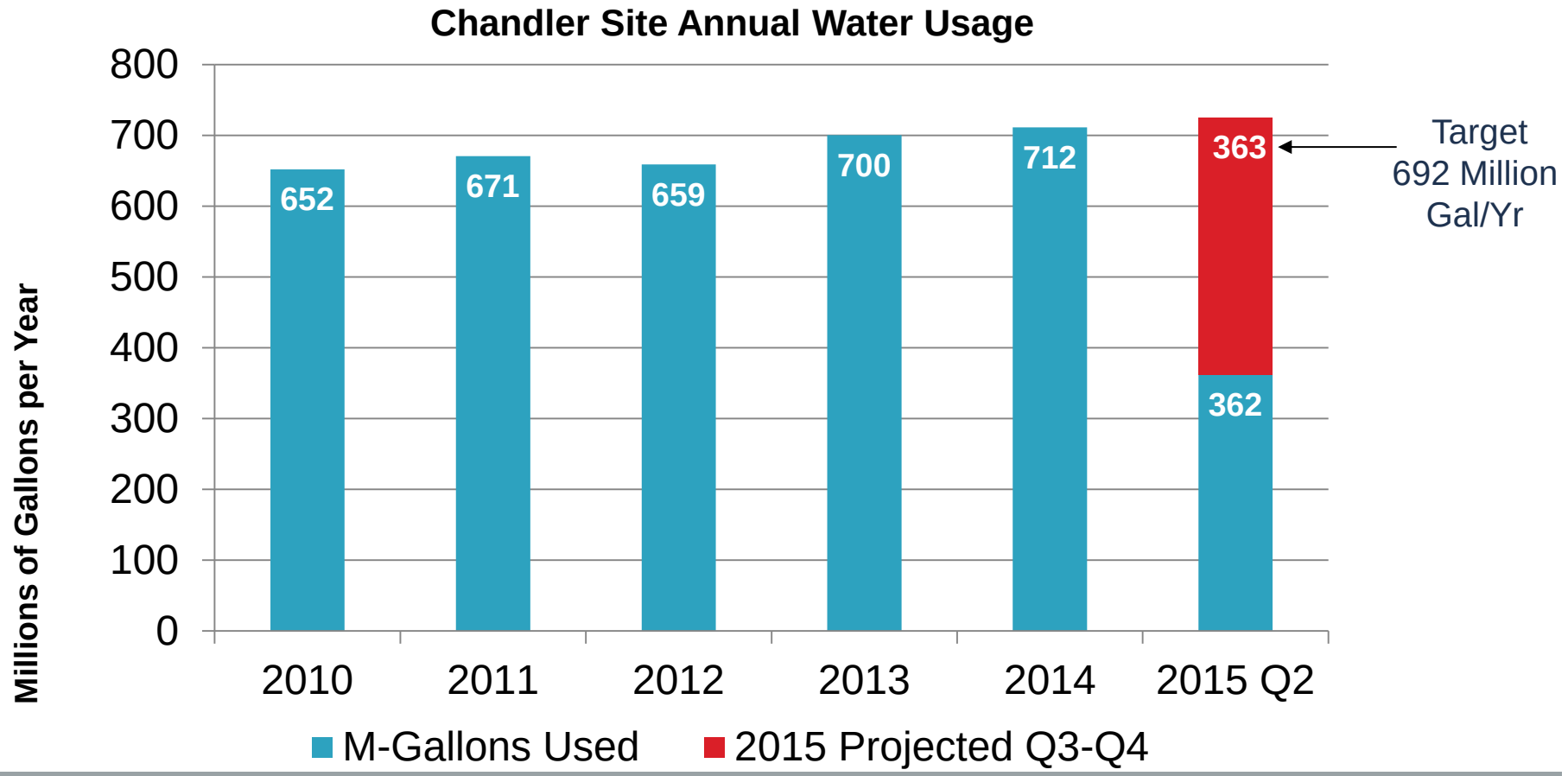
Water Consumption Goal

Reduce Water Usage by 20 Million Gallons over prior year



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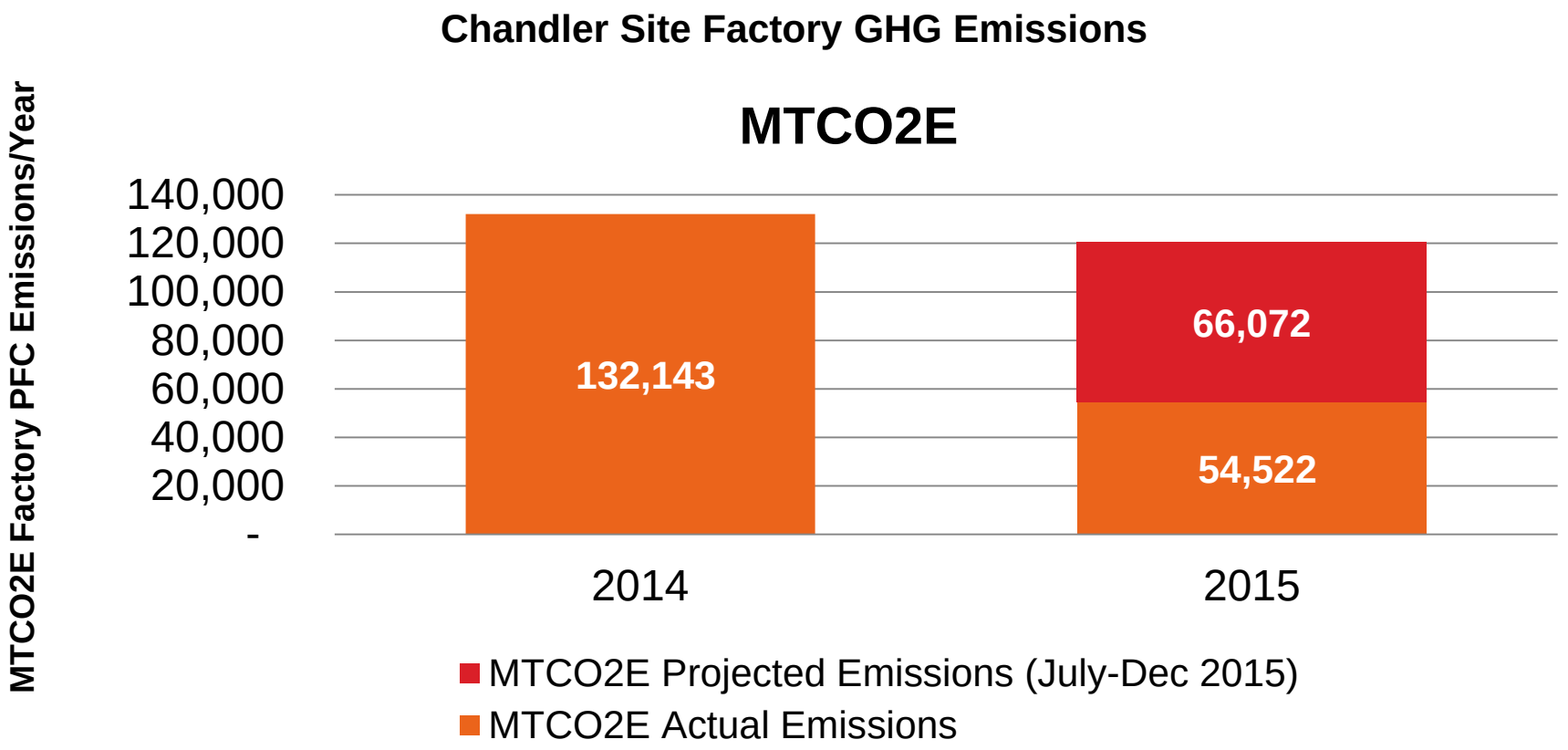
Carbon Footprint Goal

Reduce or keep constant absolute Factory GHG emissions over prior year

- GHG abatement is required for new tool installations – any new emissions must be off-set with reductions



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Employee, Contractor & Vendor Involvement

- Recycling locations inside buildings

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Recycling Gondolas

- Gondolas located close to buildings & easy to relocate

Roll-off Boxes

- Large bins for off-site recycling

Volume Reduction

- Cardboard Compactor

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Volume Reduction

- Trash Compactor

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Sulfuric Acid

- Off-site sulfuric acid product/reuse

Copper Sulfate

- Copper Sulfate for off-site metal reclaim

Photoresist Tanks

- Off-site solvent recovery

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Mixed Solvent Tanks

- Off-site fuels blending

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Fluoride Cake

- Off-site calcium fluoride feedstock

Q & A

- Go Green
- Live Healthy
- Be Safe

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Questions?

Contact us! We are here to help!

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