

Zero Waste Process

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Presented by:

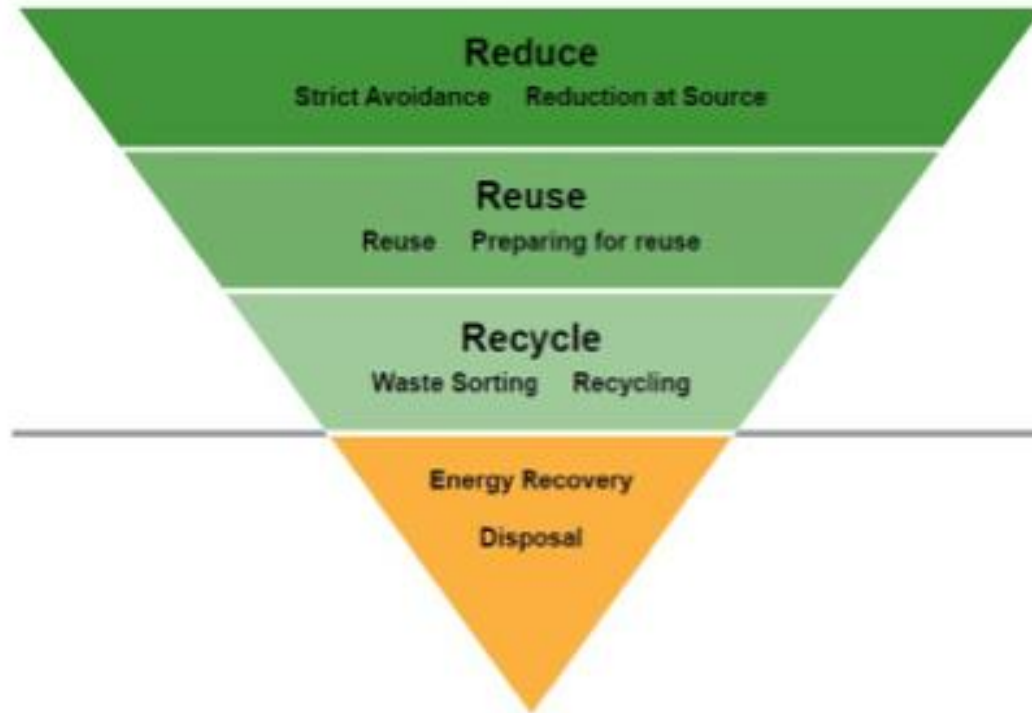
Name **Rod Valdes**

Position **Director**

Department **Economic Development**



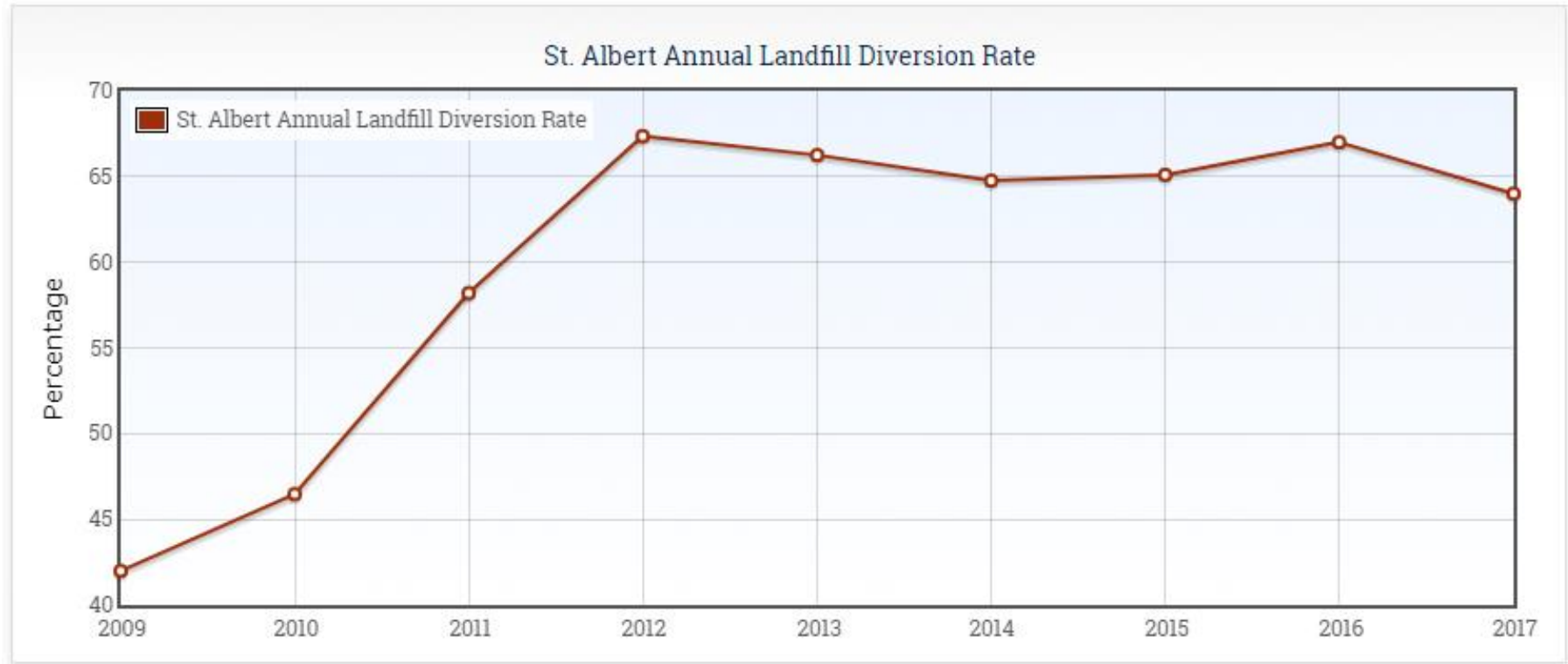
Current Approach



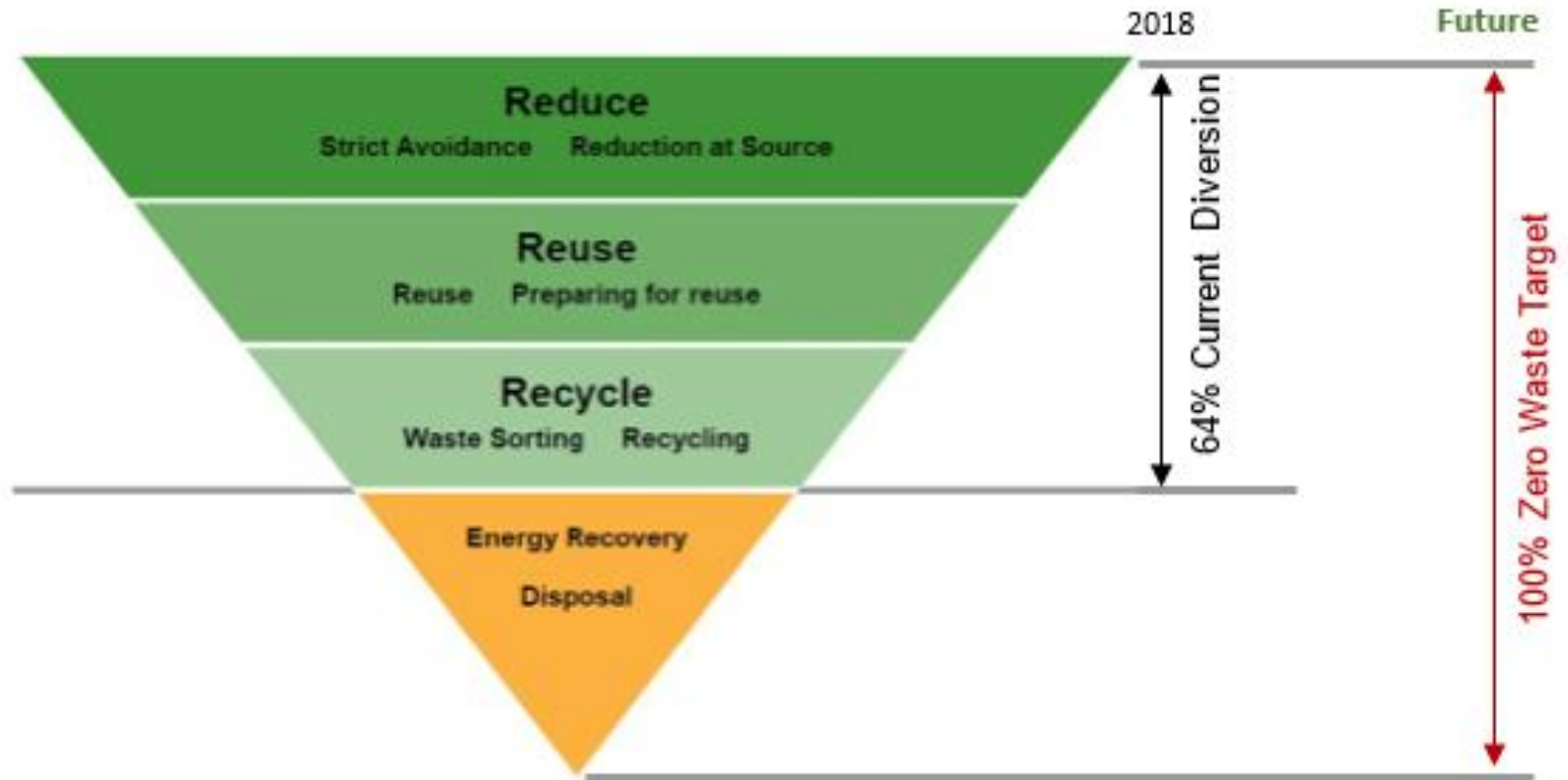
COSA Waste Diversion

- City generates 22,000 tonnes of municipal solid waste per year and 64% is diverted:
 - 9,800 organics (green bins) – diverted
 - 4,200 recyclables (blue bags) - diverted
 - 8,000 garbage (brown bins) – 36% not diverted
- Cost vs Revenue
 - Cost - COSA pays fees for removal of diverted organics and recyclable
 - Missed Revenues – vendor sells removed recyclables to market and does not share revenues
- Diversion rate has plateaued for last 5 years
 - What can be done to achieve 100%

We're stuck in a rut....



Getting out of the rut.....



What does 100% Zero Waste mean?

- **Long term sustainability**
 - Economic - reduce operating expenses and generate revenue
 - Environmental – minimal landfill, water and atmospheric demands
 - Social - knowledge-based economic opportunities
- **Non-traditional revenue opportunities**
 - Local production of electricity and heat
 - Additional feedstock from waste water reuse
 - Additional carbon credits

Conventional Zero Waste in the World

- **Existing Zero Waste (Waste to Energy) systems in the world**

- Have large centralized facilities that require significant initial capital costs.
 - Cost for COSA facility is estimated at \$25-35M
- A central facility has a maximum volume capacity limit
 - Additional volume would require another facility or alternatively a larger facility to accommodate future growth. There is no flexibility on waste volume changes.

- **Conventional Waste to Energy Plants today**

- * France – 126 / Germany – 121 / UK, Sweden, Switzerland, Italy – 140
- Canada - 3
 - Vancouver – operational
 - Ottawa – built and then closed due to economic reasons
 - Edmonton – built but not fully operational

* <http://www.cewep.eu/2017/09/07/waste-to-energy-plants-in-europe-in-2015/>

Addis Ababa, Ethiopia – Zero Waste



<https://www.unenvironment.org/news-and-stories/story/ethiopias-waste-energy-plant-first-africa>

Emergent Technology

- **Modular / Scalable**

- Waste volume inputs are scalable to needs
- Capital costs scalable to start-up and growth needs

- **Operational costs reduced**

- Little to no pre-sort required
- Lower logistics requirements, potentially only one truck instead of three

- **Recycling increased**

- Ease of use for customers, residents would not have to sort waste.
- Recycling can be accomplished by pre-sort or post process

- **Revenue**

- Local production of electricity and heat, from residential waste and waste water feedstock
- Use of recyclables

Zero Waste System - Eight Modules



Zero Waste Process

Sigma Professional Engineering

Renewable Energy
Sustainable Environment

Integrated Ecosystem

- Integration with Utility Services for revenue from electricity, heat and carbon credits
 - Electricity – power generated from the zero waste system can be used in micro grids, commercial and residential
 - Heat - hot water can be sent to Eco Industrial Park and residential developments through district heating pipelines
 - Carbon Credits - can be sold or used by City to achieve environmental goals
- Water reuse
 - Water biosolids can be used as feedstock in the zero waste system for additional energy outputs
 - Waste water and storm water on site can be repurposed for commercial applications

Waste Water Reuse

EPCOR Goldbar Plant / Suncor Refinery Edmonton

Suncor has a 5.5km 18 inch pipe that runs reclaimed wastewater from the Goldbar Waste water plant to process applications at Suncor's 135,000 bbl/day Edmonton refinery

- Used for cooling water and hydrogen
- Capacity of 15 ML/D, About 50% of total water used by the refinery



Ec Dev Opportunities

- Potential reduction in land servicing costs providing competitive pricing to land developers
- Local manufacturers can use post process metal, plastic and ash for manufacturing
- Collaboration with aligned educational institutions
- Attraction of large companies with corporate sustainability goals to an Eco-Industrial park

An Emerging Trend

- City of Surrey Biofuel Plant
- 2018 CAMA Award (Environment Category, 100,000+ population)



<https://www.youtube.com/watch?v=ucj7oP9sHgY&feature=youtu.be>