



WHERE OBJECTIVITY FLOURISHES



A SYSTEMS APPROACH TO BY-PRODUCT AND SUSTAINABLE MATERIALS MANAGEMENT



OUR SUSTAINABILITY MISSION

Play a key role in powering a circular, sustainable economy, in which by-products and materials are reclaimed and cycled to eliminate waste while reducing environmental impacts and conserving resources.

OUR VISION

A place where customer focused teams collaborate objectively and responsibly to deploy game changing solutions and technologies that enhance the sustainability of our Stakeholders.



CHEMISTRY: The Science Behind Sustainability

Chemistry is fundamental to understanding the world's most pressing sustainability challenges, and essential to overcoming them.

Chemicals must be produced and used in ways that protect the health of people and the environment. Members of the American Chemistry Council (ACC) are committed to meeting this core expectation and are helping other manufacturers and businesses along the value chain to do the same.

And our commitment to sustainability goes beyond safe chemistry. We must put the power of chemistry and our industry's best scientific minds to work with experts in other business sectors, at universities and in government to develop new and innovative ways that chemistry can contribute to a sustainable future.



Safe
Chemistry



Sustainable
Practices



Health &
Nutrition



Quality
of Life



Clean
Water



Modern
Energy



Healthy
Climate



Vibrant
Oceans



Reimagining
Resources

As an industry, we are committed to improve our own sustainability performance and help others to do the same. We will:

- Develop new ways to measure and promote the [safe and sustainable](#) use of chemicals.
- Commit to [industry sustainability practices](#), hold ourselves accountable and exceed government regulations.
- Elevate the [quality of life](#) for people around the world through technologies that improve [health and wellness](#), enable [food security](#), increase access to [clean water](#) and provide [comfortable shelter](#).
- Improve the availability, performance and cost-effectiveness of [renewable energy and energy efficient technologies](#) enabled by chemistry.
- Reduce [greenhouse gas emissions](#) in the manufacture and use of our products.
- Protect our environment by supporting efforts to reduce and manage waste so [oceans and water sources](#) are not polluted with mishandled plastic or other materials.
- Promote innovations in product design, product re-use, repurposing and recycling to [extend the useful life and value](#) of all products.



www.ScienceBehindSustainability.org

TRADITIONAL SERVICE BUSINESS → SUSTAINABLE SOLUTIONS



▪ WTS Staff 2005 → 2020

- Total Staff Increase 42%, Focused Approach
- Engineers On-Staff have Tripled
- Chemists On-Staff have Doubled
- On-Site Environmental Managers Doubled

- In 1991, over 550 million tons of hazardous waste were generated in the United States
- In 2001, over 240 million tons of hazardous waste were generated in the United States
- In 2011, less than 35 million tons of hazardous waste were generated in the United States

CUSTOMER SURVEY : Sustainability Projects



RCMS Objective: “Does your company have goals or projects around (check all that reply):

Responses by Type:

Landfill Avoidance: 68 (52% of total)

Waste Minimization: 107 (82% of total)

VOC Controls: 40 (30% of total)

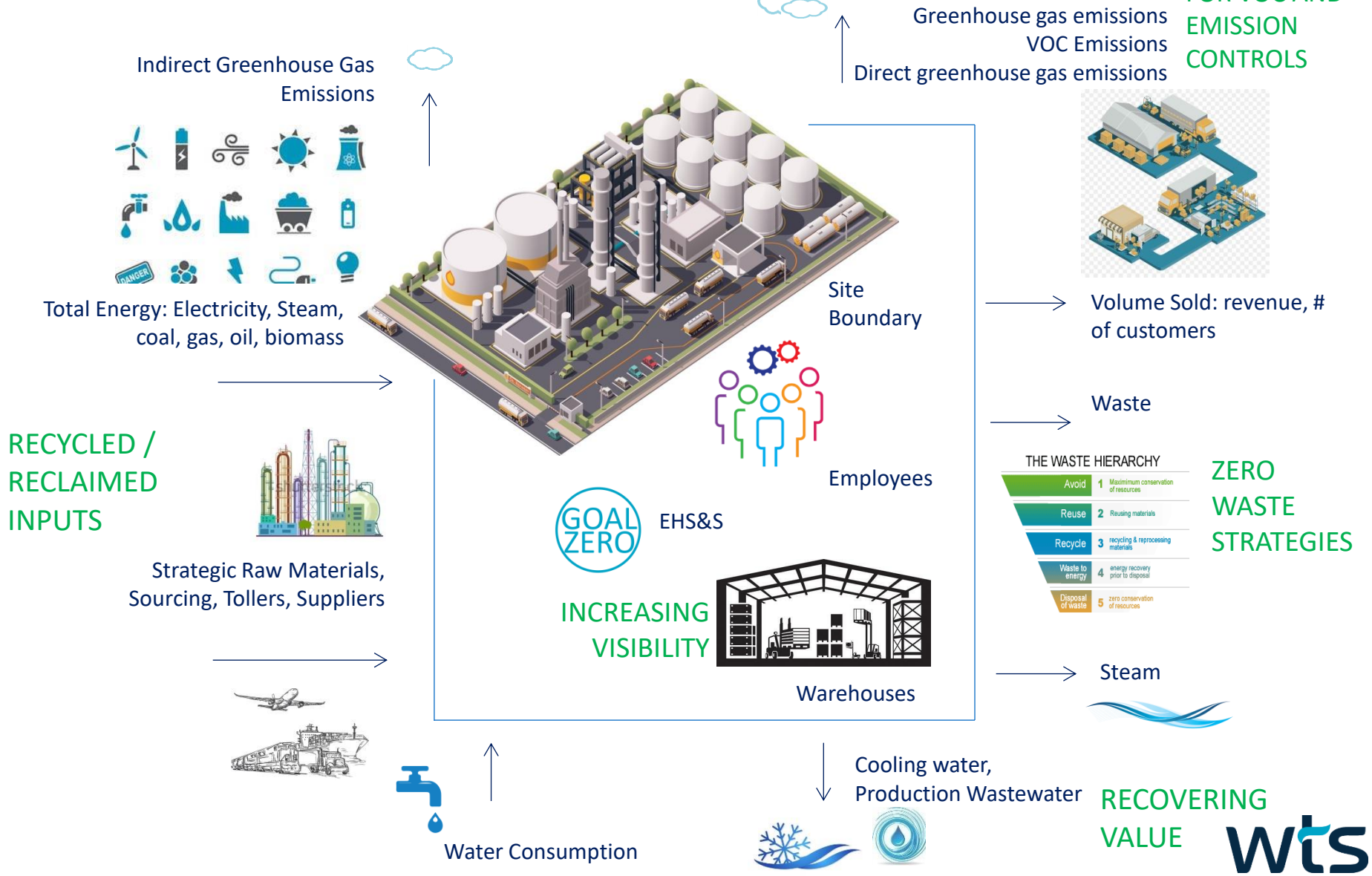
Circular Economy: 13 (10% of total)

End Product Recycling: 42 (32% of total)

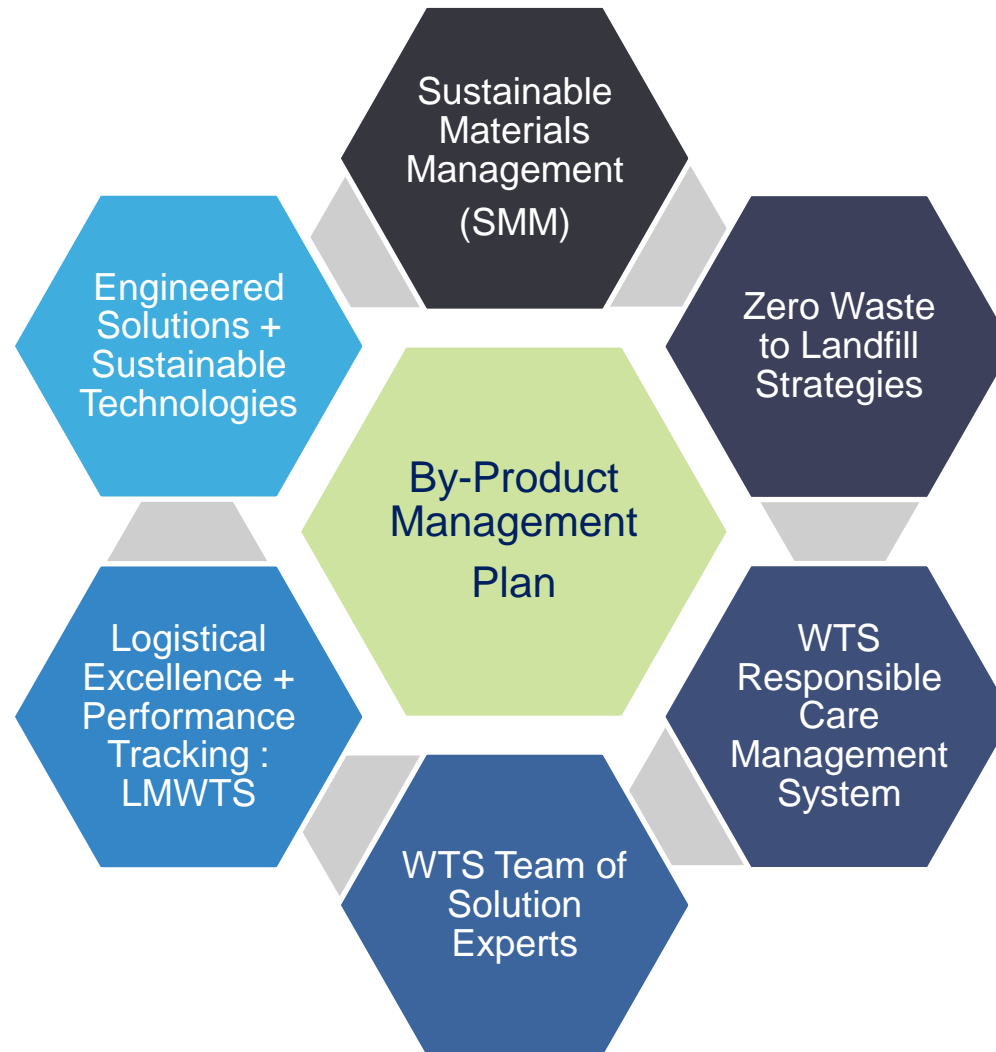
Sustainable Materials Management: 37 (28% of total)

Energy Efficiency: 72 (56% of total)

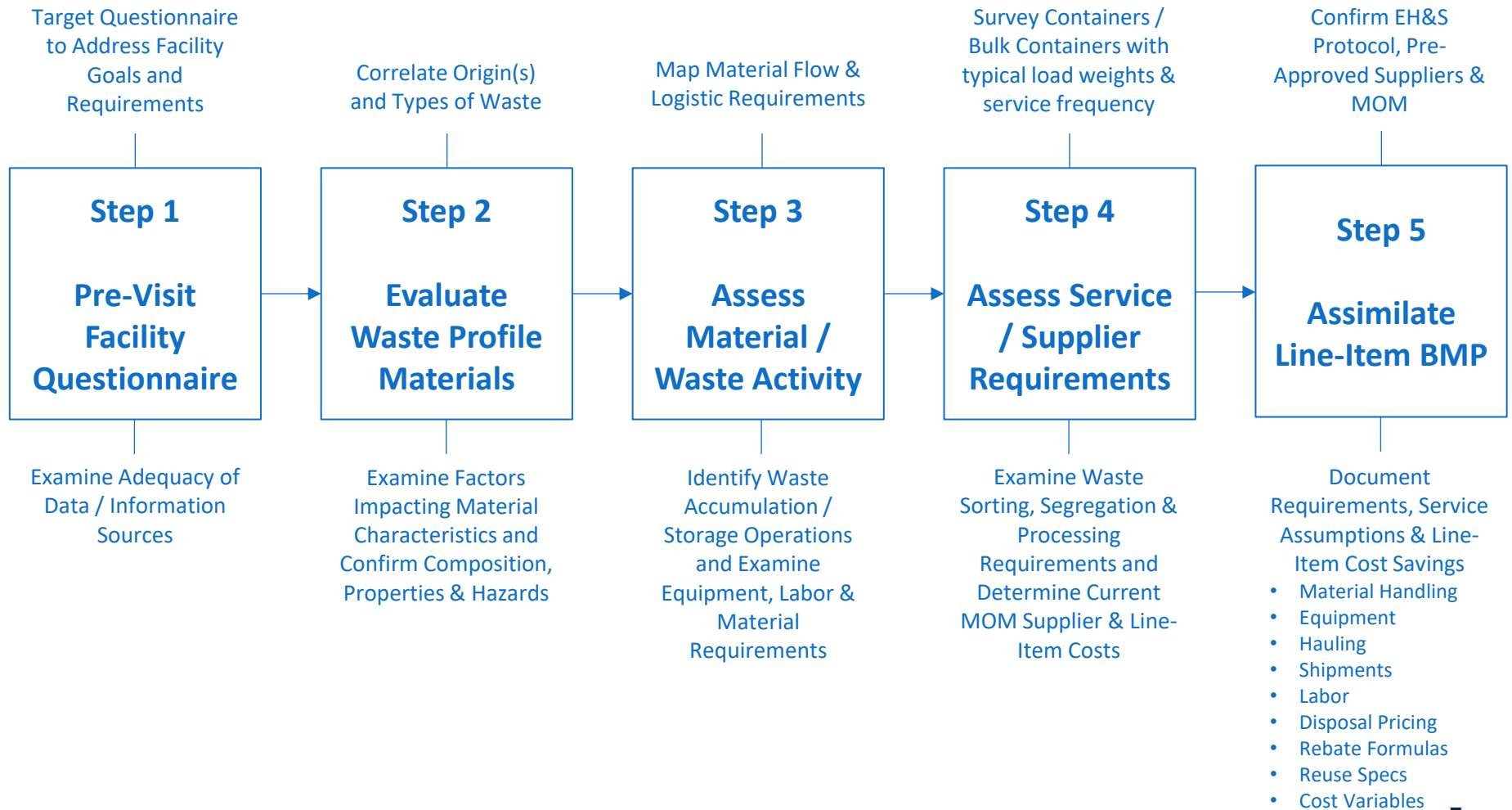
OUR HOLISTIC APPROACH INPUT / OUTPUT PERSPECTIVE



SYSTEMS APPROACH TO BY-PRODUCT MANAGEMENT



BY-PRODUCT MANAGEMENT OPPORTUNITY ASSESSMENT – BASELINE METHODOLOGY



STEP 1: PRE-VISIT QUESTIONNAIRE

Review Cost and Schedule of Current Service

- Review 6 months of Invoices and Manifests
- Ensures accuracy in the data we collect (costs, volumes, and frequency of service)
- Assess hidden costs (surcharges, labor, equipment rental, etc.)
- Understand the complete economic picture

Understand Site Goals

- Cost Savings
- Landfill Avoidance
- TSDF Consolidation
- Superior Method Management Codes
- Reduction in Hazardous Waste
- Value Recovery
- Sustainable Material Management
- Air or Water Issues
- Uncover Corporate Goals (if different than site goals)

STEP 2: EVALUATE WASTE PROFILES & MATERIALS

- **Collect Copies of All Existing Profiles**

- Review Waste Stream Composition
 - Identify Hazards
 - Confirm Properties and Constituents
 - Is this in fact “waste” or a saleable product?
 - Where is the value?
 - Brainstorm suitable TSDFs and technologies
- Review Compliance
 - RCRA
 - DOT
 - State & Local
- Build Complete Picture
 - Line item analysis including all costs down to the unit



STEP 3: ASSESS MATERIAL / WASTE ACTIVITY



- “Walk the Pipes” – On Site Assessment to Examine
 - Manufacturing Processes Generating Waste By-Products
 - Flow of Materials
 - Waste By-Product Accumulation



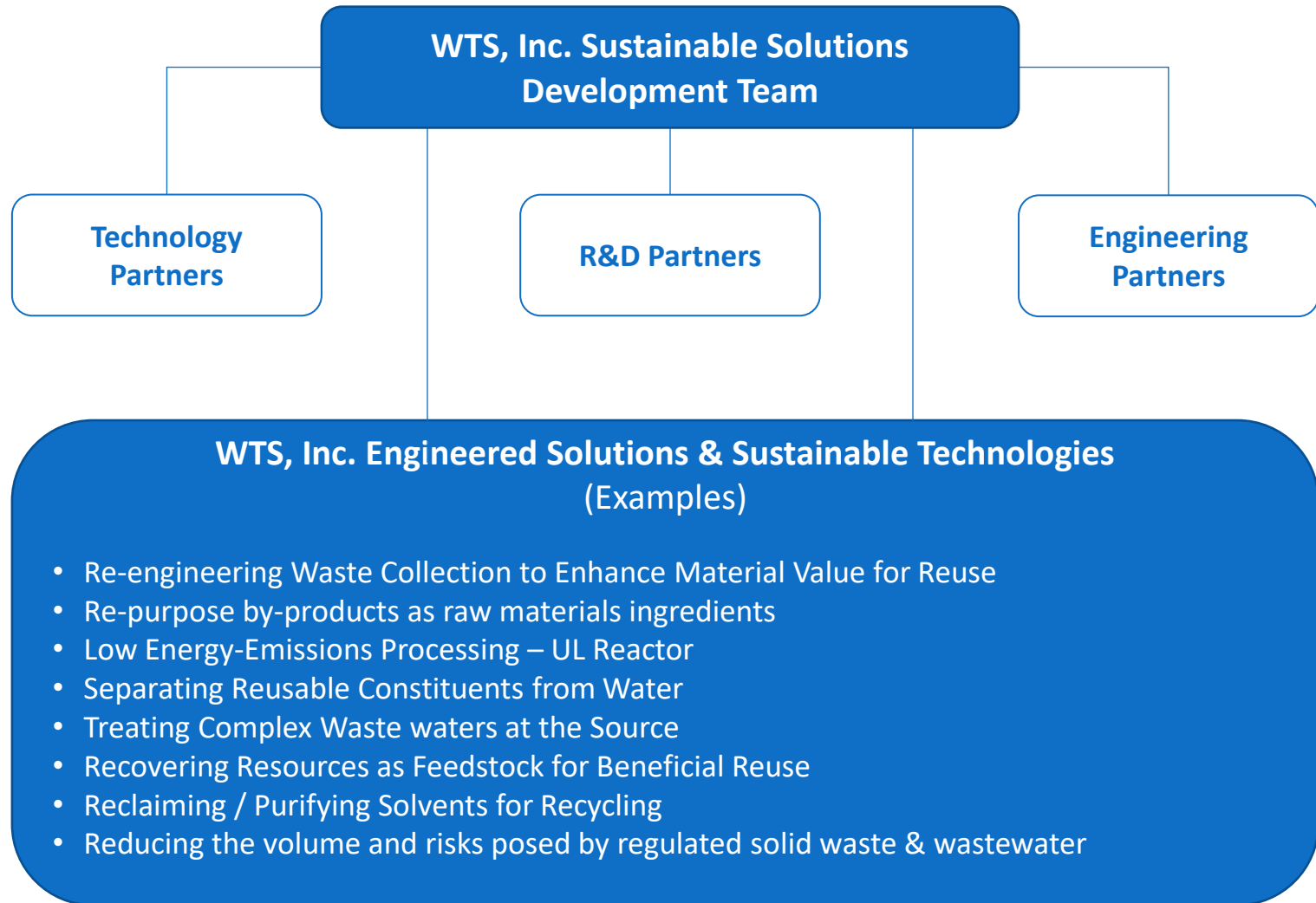
- Storage and Shipping Capabilities
 - Storage Capacity
 - Loading Dock



- Engineered Solutions – Is There a Business Case?
 - High Volume
 - High Cost
 - Hard to Treat
 - Value Recovery
 - Sustainability Enhancement

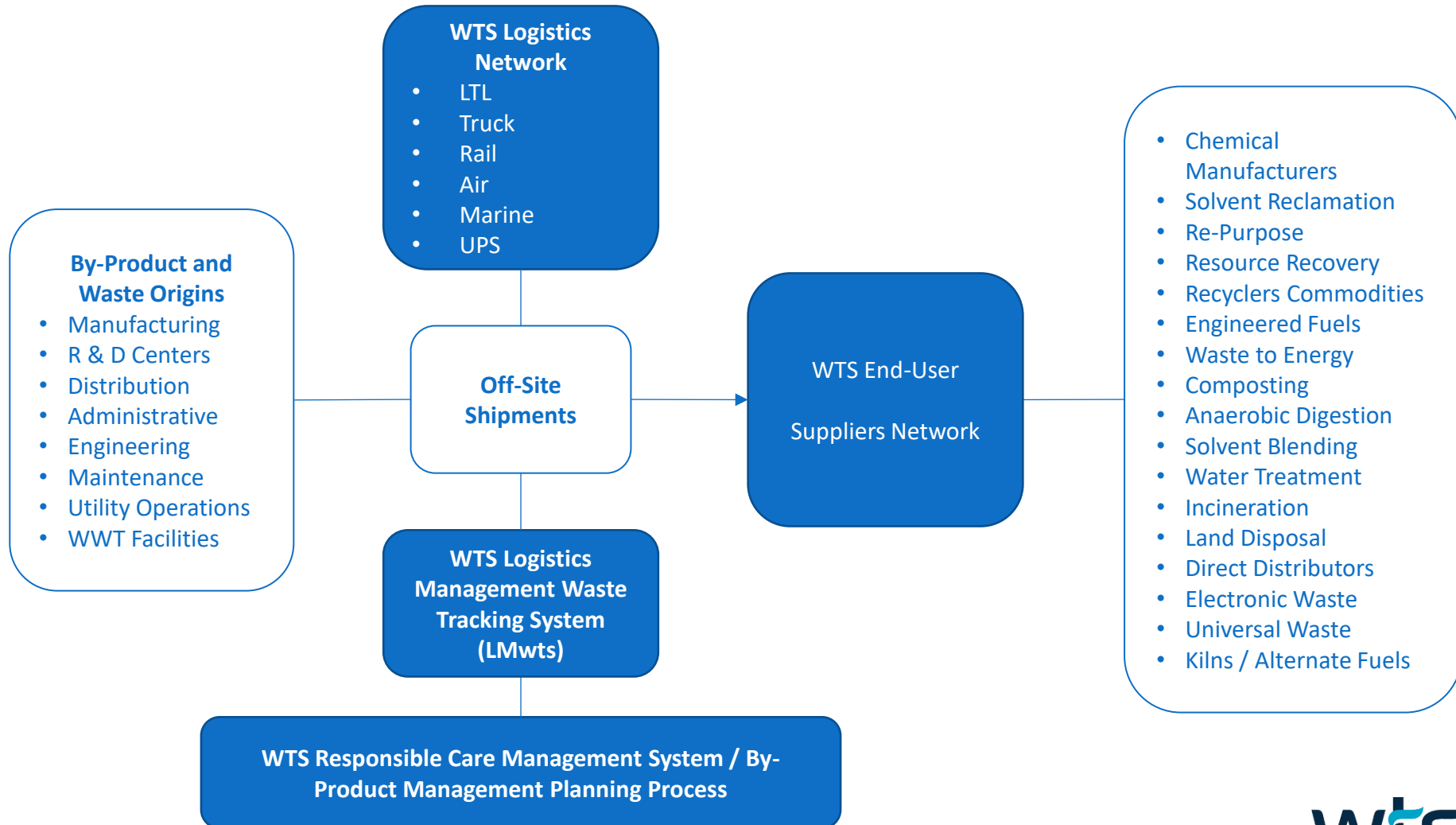
STEP 3: ASSESS MATERIAL / WASTE ACTIVITY

DEPLOYING ENGINEERED SOLUTIONS AND SUSTAINABLE TECHNOLOGIES



STEP 4: ASSESS SERVICE / SUPPLIER REQUIREMENTS

LOGISTICS / END-USER SUPPLIER NETWORKS



STEP 5: ASSIMILATE LINE ITEM BMP

| Drum and Containerized Waste | | | | | | | | | | | | | | | |
|---|------------------------|---------------------|--------------|--|--|---------------------------------|---------------------|----------------|-----------------------|----------------------|----------------------------|---|------------------|--------------------------|----------------|
| By-Product Stream | Annual Baseline Volume | Annual Baseline UOM | Current TSDF | Current Cost / Unit (Trans & Disposal) | Current Cost / Unit (12% Fuel Surcharge) | Current Cost / Unit (Container) | Current Total/ Unit | Preferred TSDF | WTS Container Pricing | WTS Disposal Pricing | WTS Transportation Pricing | WTS price per Unit (T&D; Supplies, EIS) | Savings per Unit | Projected Annual Savings | Previous Spend |
| Acetic Acid | | | | | | | | | | | | | | | |

IMPLEMENTATION RESULTS – CASE STUDY

| Year | Sustainable Solutions Managed by WTS for Generator in lbs | Sustainable Solutions as a % of Total Material Managed by WTS |
|-------|---|---|
| 2014 | 24,681,749 | 52% |
| 2015 | 60,199,314 | 70% |
| 2016 | 55,827,618 | 71% |
| 2017 | 48,715,094 | 75% |
| 2018 | 55,784,711 | 74% |
| Total | 245,208,486 | 70% |

WTS systems approach with one of our clients has ***delivered greater than \$1.4 million in savings***, while deploying ***sustainable solutions for 245 Million lbs. or 122,500 tons*** of by-products since 2014. During this same period, over 351 million lbs. or 175,500 tons of materials have been safely managed by WTS through our Responsible Care® Management System ***without incident, violation or claim***.

CASE STUDY : DIRECTLY REUSING SODIUM HYDROXIDE SOLUTION



40 – 50% Sodium Hydroxide Solution produced

Able to process material, remove small amount of contamination

Load into totes for shipment to end user



Material safely transferred to storage facility

Storage until requested by end user due to small size of site and lack of storage area



End User receives materials as needed for Waste Hydrolysis Process

Savings >20% after:

- Purchase from producer
- Processing costs
- Container costs
- Transportation
- Storage

ACC PARTNERSHIP



WTS Works with All Types of Manufacturers to Find Sustainable Materials Management Opportunities

Sustainability Challenge:

Manufacturing processes generate by-product materials that need to be managed responsibly and sustainably.

Chemistry Solution:

WTS, a by-product management services provider, works with all types of manufacturers to minimize or eliminate waste, recover value from by-products and divert waste from the landfill.

Sustainability Benefit:

Since 2010, WTS has helped chemical manufacturers divert over 1 billion pounds of materials from landfills through sustainable recovery options.

REPORTING PERFORMANCE 2010 - 2018



Beneficial Reuse

890.15 million lbs

Innovative reuse of by-products and/or co-products that is economically and environmentally beneficial.



Natural Resource Preservation

289.99 million lbs

The act of preserving resources by substituting alternative technologies to expressly continue sustainable use.



Recycling

116.16 million lbs

The act of processing by-products and/or co-products into new products to prevent waste of potentially useful materials.



Energy From Waste

81.44 million lbs

Is the process of creating energy in the form of electricity or heat from the thermal application of organic by-products.



Resource Reclamation

20.78 million lbs

The act of reclaiming resources from by-products and/or co-products that can be processed into a product of value.



WHERE OBJECTIVITY FLOURISHES

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