# Construction Services

***DRAFT for Public Review***

ELECTRIC UTILITY INDUSTRY
SUSTAINABLE SUPPLY CHAIN ALLIANCE

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## Contents

Electric Utility Industry Sustainable Supply Chain Alliance Recommendations for Utility Organizations the Area of Construction Services.

Most heavy industries utilize sustainable practices in construction services during day to day business operations. How well each company manages these practices can make a big difference in the efficiency and profitability of their business.

# Idea in Brief

This document was developed by the Alliance to support utilities and non-utilities with identifying sustainable practices in the area of construction services. Users are encouraged to apply the insights of this standard where they are practical and support schedule and financial goals. This guide contains an overview of the following:

- Definition of Construction Services
- Key Drivers
- Key Opportunities
- Implementation Guidance
- Case Studies
- Voluntary Standard Practices

# Definition of Construction Services

Construction services can include construction of any type of asset in various challenging environments. These services must adhere to many regulatory requirements while also meeting both time and scheduling constraints. One of the most impacted areas from construction can be the environment, beginning with the products and practices used to erect fixed assets and ending with the handling of unused and usable materials to the proper disposal of waste. This voluntary standard addresses the following three topics included in the scope of construction services.

- Jobsite Repackaging
- Recycling and Waste
- Materials Handling

Future revisions of this document will seek to expand on these three topics and include other areas of construction services. Due to the broad scope of construction services, it is necessary to divide this effort into multiple iterations.

# Key Drivers

The main key drivers for implementing sustainable practices applied to construction services are:

- Reduction of negative environmental impact from construction projects
- Potential cost savings
- Promotion of environmental stewardship as part of the evaluation process for construction projects
- Space Optimization: real estate prices remain high and additional land may be scarce or not locally available. One very viable solution is to optimize storage capacity and use the available space more efficiently, minimizing ground disturbance.
- Enhanced Environmental compliance and ability to quickly respond to regulatory changes
- Efficiencies gained by leveraging existing relationships in areas that are common to both operations and construction (e.g., environmental, regulatory)
- Improved safety due to updated practices[1]

# Key Opportunities

Initial areas of construction services to look for opportunities are:

- Inventory reduction and optimization: reducing the number of touchpoints in the supply chain can lead businesses to achieve inventory optimization goals.
- Optimize material handling through direct shipment, third party suppliers, efficient sourcing, etc. to reduce time and resource requirements.
- Cost avoidance: An increasing or changing business opportunity does not always equate to building more warehouse spaces. Increasing square footage totals could result in the need to spend more capital on equipment, resources, and could result in wasteful spending.
- Improvement in indoor environmental quality through the effective use of ventilation and minimizing the use of high VOC materials (adhesives, paints, composite wood, etc.)
- Consistency in project management with scalable solutions
- Include sustainability in bid process

### Including Sustainability in the Bid Process

In addition to the typically economic and operational evaluation during bid opportunities for Construction Services, the Sourcing Team would also develop a process or a template to measure the sustainable aspects.

For more information, including sample questions for the bidding process, see Appendix A.

[1] Although not the focus of this voluntary standard, safety standards specific to construction services do exist (e.g., the Gold Shovel Standard http://www.goldshovelstandard.com/excavators/). See the Con Edison case study in Appendix B for more information.

# Implementation Guidance

Consider the following six steps for implementing new construction services initiatives:

# Jobsite Repackaging

Jobsite repackaging is a precursor to recycling and waste management. Sustainable packaging and repackaging methods reduce waste and lessen the opportunity for material returns or disposal as recycling or solid waste. These voluntary standard practices, once implemented, individually or collectively, can minimize excess packaging materials and maximize the diversion of solid waste from landfills to recycling facilities.

## Product Return[2]

Proactively work with the company crews/contractors to return product. Materials can be acquired from contractor yards, service centers, and jobsites. Material needs to be inspected before being credited in good condition. Materials inspected that do not meet requirements can be recycled or sent to waste.

## Covered Bins[3]

Work with crews to provide/maintain staging areas for material either going out/or coming back from the field. Typically, this is in the form of either a covered bin or Conex box which keeps the materials protected from the elements. This is an attempt to keep material in good condition, so it can be reused or returned.



[2] Product Return content from Baltimore Gas & Electric
[3] Covered Bins content from Exelon

# Recycling and Waste

Due to the scale of construction service projects in the utility industry, large amounts of materials are used and need to be disposed of or recycled. Recycling is beneficial for the economy (job creation) and benefits our environment (preservation of landfill space, water pollution reduction, wildlife protection etc.). Because not all materials can be recycled, we also must make efforts to minimize waste generated during construction.

It was noted that during major outage projects, metal recycling and landfill waste increased while other forms of recycling (wood, cardboard, plastics, etc.) did not noticeably increase. This leads to the conclusion that we are not making recycling a focus of major outage work.

## Arizona Public Service Case Study: Field Service Recycling Containment

**Objective**: Eliminate or greatly reduce the disposal of thousands of plastic water bottles per year by APS Service Crews with a convenient, portable recycling solution for use on service vehicles.

**Proposed/Implemented Solution(s)**: After a field visit to a substation construction site, Supply Chain Management (SCM) identified the need for a recycling solution for APS/Contract crews on jobsites. The solution must be scalable to most service vehicle types, portable, safe, and have small footprint on already-constrained truck bed. SCM proposed to replicate canvas bolt bag that already exist on fleet in bright blue color with "Recycle" logo to be used to capture empty water bottles that are typically trashed. Additionally, SCM proposed recycling solution at all crew docks to process recycled materials by crewmen upon return to their service centers at the end of the day.

**Project Status:** In Progress. Recycling container (bag) design format completed with approved supplier proof of concept. Pilot planned in Q2'17.

**Critical Success Indicators**: 1) #/% of APS fleet vehicles outfitted with recycling container, 2) # of lbs. of recycled waste averted from landfill, 3) overall adoption and satisfaction of targeted stakeholders as captured by surveying crews & crew leadership.

## Arizona Public Service Case Study: Zero Waste 500kVA Transmission Construction Project

**Objective**: Achieve "Zero Waste" on APS's latest 500kVA Sun Valley to Morgan (SV2M) Transmission Construction Project through containment, processing, and reclaim of 100% of all crating/packing materials from incoming equipment deliveries to the right-of-way (jobsite).

**Proposed/Implemented Solution(s):** Upon the greenfield construction of a 40-mile extra-high voltage transmission project, SCM identified an opportunity to recycle incoming equipment delivery dunnage, crating, and related packing materials that would normally be de-trashed for disposal. SCM determined that this program would 1) have no negative impact or delay to schedule, 2) add no costs to the project budget, 3) not be significantly cumbersome or add work for any APS contractors (construction or materials management).

SCM partnered with Construction and Project Management contractors to establish Recycling Centers at both marshalling yards along the right-of-way. Procurement Operations and Investment Recovery teams partnered to contract with service providers specializing in recycling packing material, untreated wood, clean Styrofoam and shrink wrap.

**Project Status**: In progress. Recycling Centers have been implemented at the primary SV2M yard for incoming equipment deliveries when they begin in earnest in April/May 2017.

**Critical Success Indicators**: 1) # lbs. of recycled materials averted from landfill, 2) # lbs. of reclaimed metals, 3) $$ applied to SV2M project budget from reclaimed metals.

## Arizona Public Service Case Study: Styrofoam Cup Elimination

**Objective**: Eliminate use of Styrofoam cups and reduce single-use cup consumption at all APS sites.

**Proposed/Implemented Solution(s):** Remove Styrofoam cups APN (APS Part Number) from MILS MRP system and replace with a recyclable cup option/APN. Some reusable cups will be provided to promote reuse in lieu of single use disposable cups. Require business unit customers to budget/pay for all disposable cups versus having all costs charged to a generic Corp Facilities budget to provide greater sensitivity to costs of paper cups and impact on the environment.

**Project Status:** In Progress. Multi-use recyclable cup has been approved by T&D Engineering Standards and are available from DVS Central Stores Warehouse for issue to all BU customers. Further partnership and alignment required with APS Sustainability/Facilities leadership planned in Q2'17.

**Critical Success Indicators**: 1) Qty. 0 (zero) Styrofoam cups procured/warehoused by SCM, 2) # of recyclable cups issued in lieu of Styrofoam cups.

## Reporting Solid and Recycled Waste

If the Utility and/or Supply Chain is tracking solid waste and recycled waste for measuring of landfill avoidance and recycling improvement as a sustainability goal, the waste generated and recycled during activities involving third party construction services should likewise be included in the overall corporate measure. Report all weight and revenue of waste and recycling to the Corporate Sustainability team or Environmental Team as part of tracking purposes for corporate reporting:

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|---|---|
| Best Practice: | Report all weight and revenue to Corporate Sustainability Team, Environmental Team as part of tracking purposes for corporate reporting |
| Change Mechanism: | Corporate drive to measure the waste stream and support reductions in material that is landfilled and improvements in the materials that are recycled. |
| Time to Implement: | < 1 year |
| Cost to Implement (or Savings): | Incremental labor expenses to manage measurement and reporting process; incremental savings from landfill diversion improvements and other offsets. |
| Details of activity: | Actively measure waste reduction and recycling improvement and consider including the two in your main Corporate Sustainability Goals.<br>**Start by understanding your total waste:**<br>Total Landfill (weight) + Total Recycling (weight) = Total Waste Stream (weight)<br>**Then calculate your diversion rate:**<br>Total Recycling / Total Waste Stream = Total Recycling % (or diversion rate) |

## Additional Waste Management Practices [4]

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|---|
| All waste materials are identified, characterized, labeled and stored in containers compatible with waste type |
| Appropriate permits, registrations and licenses are kept on file for onsite waste/material storage, treatment or disposal |
| Suppliers permitted to transport and dispose of the waste types have been identified and pick-up times scheduled compatible with waste volumes and storage time restrictions |
| The site has records demonstrating that waste/material is not stored for longer than permitted |
| Appropriate permits, registrations and licenses are kept on file for suppliers that transport, store, dispose of, or treat waste on behalf of the project/site/facility |
| Documentation is kept on file that verifies the destination of all waste disposed off-site |
| Solid/general waste is kept free of hazardous waste contamination |
| Hazardous, universal and general wastes are stored in separate receptacles |
| If transferred over bare ground between source, storage and pick-up, all material (hazardous or regulated materials) is secured in closed containers |
| The hazardous and regulated waste storage area(s):<br>• Are secured<br>• Are protected and covered<br>• Segregate incompatible wastes (i.e., toxic, ignitable, corrosive, reactive)<br>• Have impermeable, chemically resistant flooring<br>• Are inspected at least daily |
| Employees managing hazardous or regulated waste or materials:<br>• Are trained to understand the hazards associated with the hazardous waste<br>• Are trained to work in a manner that protects themselves, others and the environment from the associated hazards |
| Periodic inspections are carried out to confirm the above are routinely implemented |
| Develop an inventory of all waste types (see list below for examples), anticipated volumes and generation timing |
| Identify suppliers or markets that will reuse or recycle the identified waste streams |
| Develop and implement a plan to recover, store and sell/dispose of demolition and construction waste materials |
| Create physical infrastructure that makes waste capture and storage easy |
| Design and locate material storage to reduce damage |
| Clearly defined processes for anyone who interfaces with waste streams and could facilitate its avoidance |
| Responsible person appointed to area or areas (if large) to oversee training, period or spot checking (e.g. to ensure no hazardous or general waste, and no mixing or chucking in wrong bins) |
| Measure waste diversion rates by weight, plus estimate cost reductions and revenue rates, credits/tax deductions for salvaged stuff publish results |
| Recognition schemes to reward performance can also motivate |
| Disincentive scheme for those who continually don't follow waste management (fee to contractor signed onto by contractor in contract?) |

[4] Practices taken from The Sustainability Project. For more content, see Appendix B of this document and visit the Sustainability Project website: https://tspproject.org/

# Materials Handling

Materials handling in construction services is complex. The following voluntary standard practices and case studies highlight actions to make the material flow process more efficient, more innovative and more environmentally sustainable for both utilities and non-utilities.

Key drivers for materials handling:

- Progressive material handling equipment – What works in the past may not work now or in the future. Newer material handling technology can enhance the operational efficiency and gain productivity advantages.
- Business automation process (manual tasks take time while process automation delivers consistent and repeatable high quality results and reduces number of human errors)

## Reusable Plastic Macrobins

Reusable plastic macrobins can be used for transfer of materials to and from jobsites, returned and re-inventoried when empty

## Reusable Pallets

Like reusable plastic macrobins, reusable pallets can be used in repeat cycles for transfer of materials.

## Reusable Wire and Cable Reels

Provided by the wire and cable manufacturers for shipment of product from manufacturing site to utility warehouses, or direct to job site. Returned to manufacturer for re-use when empty.

## Biodegradable Packaging / Replacing Styrofoam 'peanuts'

If packaging is not fully recovered and recycled, the impact to the environment is minimized with the biodegradable product.

## Fleet Telematics[5]

Fleet Telematics is a way of monitoring location, movements, status and behavior of a vehicle (or a fleet of vehicles). The following practices are included in this scope:

- Monitoring Vehicle Movement
    - Poor vehicle operation increases the miles per gallon and increases maintenance needs.
    - Replace older engines with newer, cleaner models.
    - Practice good engine maintenance to meet original standards, and properly train operators to run equipment efficiently
- Vehicle Diagnostic Monitoring
    - Reduce Maintenance Cost due to proactive vehicle diagnostic monitoring. Early Identification and alerts can avoid non-routing maintenance costs and vehicle downtime; impacting productivity.
- Vehicle Idling[6]

[5] Fleet telematics practices shared by PECO/Exelon Utilities. Implementation of telematics decreased PECO Recordable Vehicle Accident's by 28%

[6] Source: https://www.waterboards.ca.gov

    - On average, vehicles idle approximately 2-3 hours per day during non-winter months and 4-5 hours per day during the winter, resulting in excess fuel usage. Diesel trucks consume approximately 1 gallon of diesel fuel per hour.[7]
    - Reduce unnecessary idling through the use of auxiliary power units, electric equipment, and strict enforcement of idling limits.
- Use of Cleaner fuels[8]
    - Use verified diesel emission control technology ("VDEC"), including verified diesel particulate filters ("DPFs") or diesel oxidation catalysts ("DOCs").
    - Use cleaner fuels, such as ultra-low sulfur diesel (ULDS), biodiesel, liquid petroleum gas, or compressed natural gas.

## Duke Energy Case Study: Alternative Material Channel Strategies

Due to external forces that have or will create large additional demands or constraints on the Supply Chain, Duke Energy is evaluating various alternative supply chain channel strategies to effectively supplement existing internal material channels. While these strategies were primarily evaluated to manage increased material spending in excess of existing warehouse and infrastructure capacity, the potential to manage material in a more sustainable manner is also a possible benefit, through a reduction of stranded excess and obsolete materials and improved materials handling and logistics.

Potential alternative material channel strategies include:

Contractor Managed Materials Channel: Materials are procured by Duke Energy, held in inventory at a location managed by a Duke Energy contractor, and are the property and inventory of Duke Energy until issued to a project. This strategy is best suited where internal warehouse space and labor are constrained, work is performed exclusively by contractors, and handling materials through another channel would result in re-work or additional handling.

Contractor Supply Materials Channel: Materials are procured by the service contractors, held in inventory location managed by the service contractors, and are the property and inventory of the service contractor until put in service and invoiced by the service contractor. This strategy is best suited to situations where warehouse space and labor are constrained, the work is performed by financially stable contractors.

Engineering, Procurement and Construction (EPC) Firm: Materials are procured and managed exclusively by the EPC firm. This strategy is best utilized where warehouse space and labor are constrained, where a strong EPC provider exists, and the program is large. The program is not suited to small programs that are highly variable, and that have open-ended deliverables.

Vendor Managed Inventory: Materials are procured by Duke Energy, held in inventory at a location managed by the manufacturer, are allocated for the exclusive use of Duke Energy, and are the property and inventory of the Manufacturer until issued to a specific project. This strategy is best utilized where warehouse space or labor is constrained.

[7] PECO/Exelon Utilities saved approximated $870,000 during 2013 pilot to reduce vehicle idling on 300 vehicles
[8] Source: https://www.waterboards.ca.gov

**Potential Sustainable Benefits to Alternative Strategies:** Depending on the strategy utilized, the following sustainable benefits may be achieved:

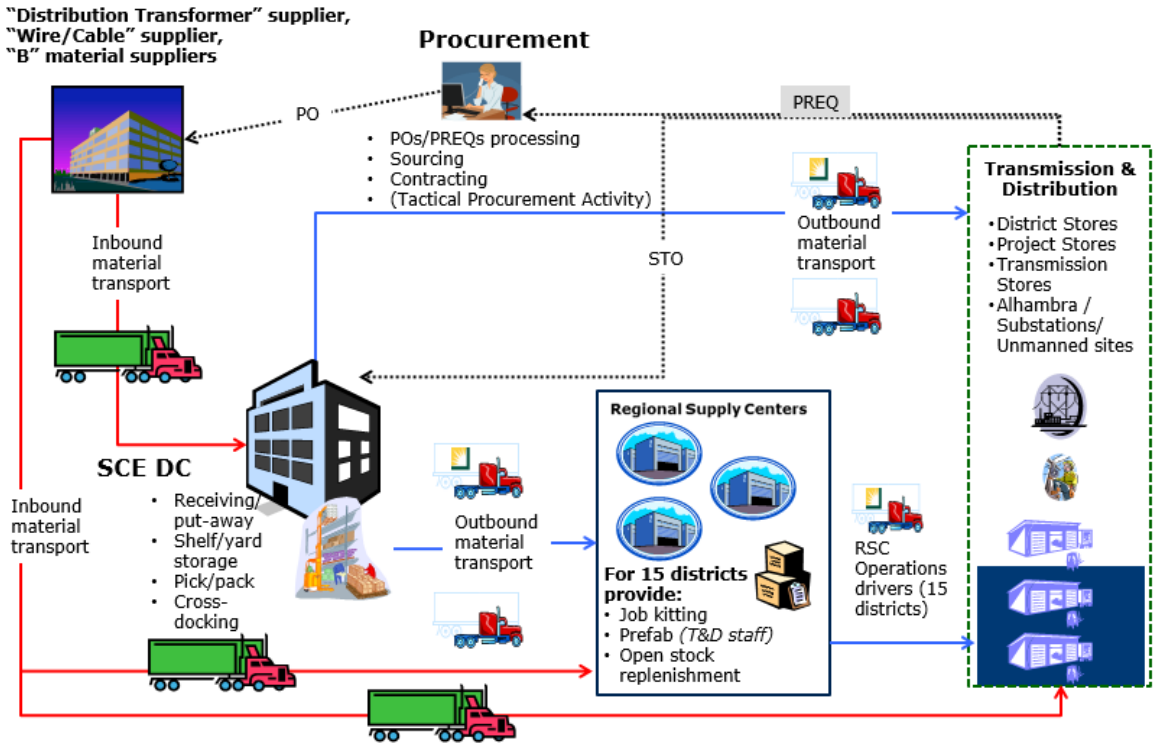
- Avoided holding of inventory, resulting in a reduction of eventual excess or obsolete materials
- Reduced variable warehousing expenses, including energy, water and land utilization
- Reduced material handling, movement and logistics

## Southern California Edison Case Study: Direct Delivery Initiative for Efficient Materials Handling

Southern California Edison (SCE) in collaboration with strategic partners implemented a best-in-class integrated material handling process. Integral to this process is the direct delivery model, which supports the efficient transport of materials from multiple supplier partner's warehouses shipped directly to the Transmission and Distribution (T&D) locations.

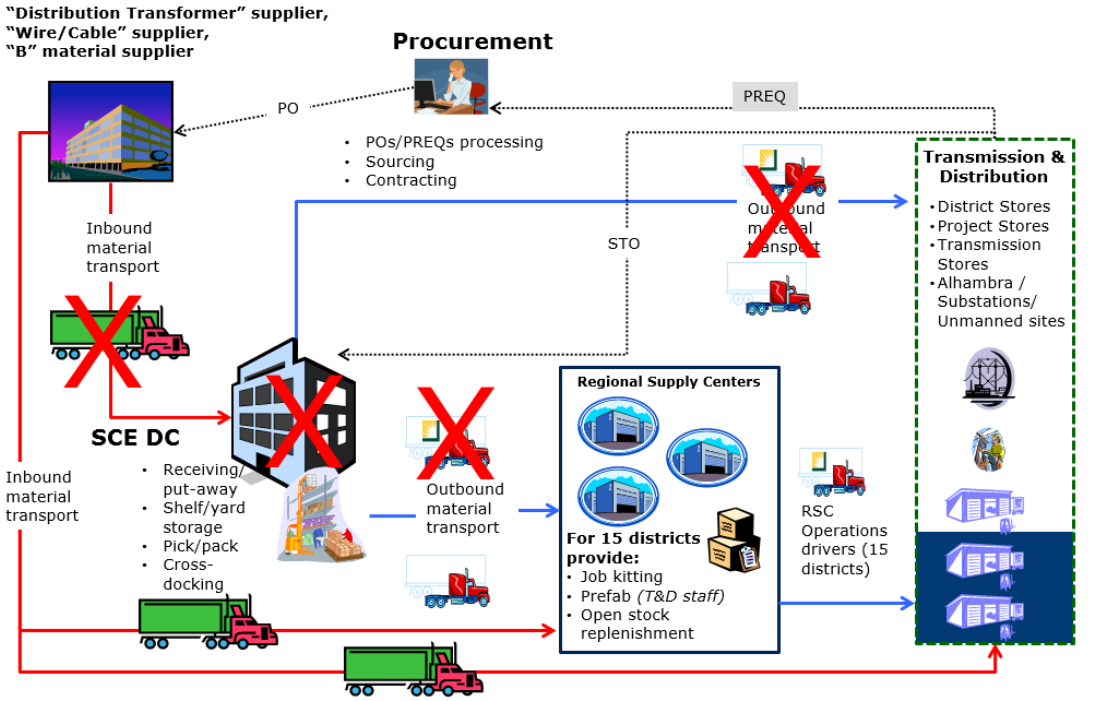
**Initial State of SCE's Materials Handling Process**:

- Multiple inbound deliveries, touchpoints, and material ordering models



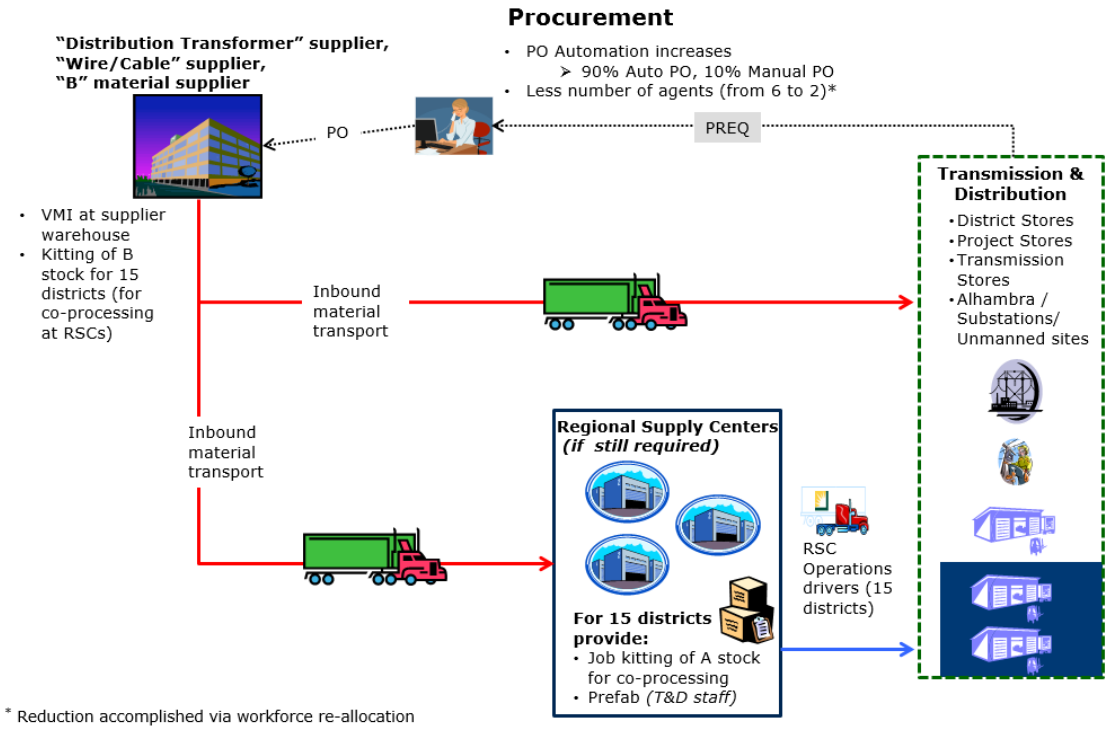
Changes to SCE's Materials Handling Process:

- Eliminated an inbound delivery to SCE DC
- Eliminated warehouse functions for Transformer, Wire/Cable, and "B" material deliveries




Current State of SCE's Materials Handling Process:

- One streamlined material ordering model
- Transformer, Wire/Cable, and "B" materials being consolidated into one shipment and directly delivered by one strategic partner to T&D locations
- Reduced the number of daily inbound shipments to many T&D locations that has resulted in the reduction of greenhouse gas emissions
- Increased safety. Less handling equals to less risk for employees getting injured
- Minimized the use of wooden pallets by transitioning to plastic totes that brings benefits to the environment and company
- Utilization of intermodal transportation, instead of motor carriers, by our supplier partners that leads to significant reduction of greenhouse gas emissions
- Simplified the material ordering processes by utilizing a single ordering model
- Reduced on-hand inventory that SCE needed to maintain to support day-to-day operations
- Avoided need for additional SCE warehouse locations
- Reduced wire and cable scrap rate




## Lessons Learned by SCE through Direct Delivery Initiative

- Synergized different technology tools from SCE and supplier partners
- Educated and trained SCE and supplier partners' employees to utilize the integrated system technology
- Measured supplier's performance before and after the process implemented

## Additional Materials Handling Practices[9]

| Additional Fuel Use Reduction Practices |
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| Over time, replace company-owned or leased vehicles with more fuel efficient, or alternative fuel options |
| Store spoils on site and recycle to own or nearby project |
| Provide portable EV chargers at jobsite parking |
| Develop a jobsite carpool program |

| Additional Energy Efficiency Practices |
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| Select energy-efficient cranes and man lifts |
| Use electrical (vs. fuel) equipment and tools where available |
| Turn off equipment when not in use |
| Use solar powered temporary generators when solar conditions make it feasible |
| Use LED temporary lighting with timers and sensors (daylighting and occupancy) |
| Schedule work during daylight hours |
| If renting, rent electric or alternative fuel vehicles |
| Use green trailer (off the grid, solar powered) |
| Use energy efficient HVAC equipment if used during construction |
| Minimize lighting |
| Shut off temporary lighting systems when not in use |
| Maximize use of PV panels for lighting or get electricity from green power companies |

| Energy: GHG emissions reductions |
|---|
| Use bio-diesel or ultra-low sulfur fuel heavy equipment to reduce GHG emissions |
| Use CFC-free HVAC systems |



[9] Practices taken from The Sustainability Project. For more content, see Appendix B of this document and visit the Sustainability Project website: https://tspproject.org/

# Appendix A: Include Sustainability in Bid Process

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|---|---|
| Best Practice: | Sustainability Components included in the competitive bidding process |
| Change Mechanism: | Request for quote for construction services. |
| Time to Implement: | < 1 Year to implement. Dependent on maturity level of individual Supply Chain team. |
| Cost to Implement (or Savings): | No additional incremental expenses to be incurred by the utility. |
| Details of activity: | In addition to the typically economic and operational evaluation during bid opportunities for Construction Services, the Sourcing Team would also develop a process or a template to measure the sustainable aspects.<br><u>Construction Services Sustainability Questions for Bidding Process:</u><br>Sustainability review during the Construction Services Bidding Process should be designed to accomplish several objectives:<br>1. Review track record of compliance with environmental laws (e.g., Notice of Violations, Reportable Spills)<br>2. Demonstrate a commitment to continuous improvement efforts identified in the environmental impact areas<br>3. Integration of environmental considerations and best practices into standard business practices<br>4. The ability to offer innovative products and services to improve environmental performance<br>5. Leadership and sharing of learning and best practices<br><br><u>General Sustainability questions might encompass some or all of the following broad topics:</u><br>• Environmental Compliance<br>• Policy and Environmental Management<br>• Greenhouse Gas Emissions<br>• Energy Consumption<br>• Water Consumption<br>• Waste and Materials Management<br>• Use of Recycled Materials<br>• Environmental Innovation<br>• Environmental Leadership<br>• Recycling and Waste Stream Management<br>• Supplier sustainability programs<br>• Environmental educational programs |
| Sustainability Benefits: | Incorporating sustainability improvements throughout IR process / commodity management |

# Appendix B: Con Edison Gold Shovel Case Study

Excavation services means any operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means of tools, equipment, or explosives in any of the following ways: grading, trenching, digging, ditching, drilling, auguring, tunneling, scraping, cable or pipe plowing and driving, etc.

Con Edison began utilizing the Gold Shovel Standard as an information management system for excavation safety performance. As a result, Con Edison is requiring contractors and subcontractors performing excavation services to become subscribers to the Gold Shovel Standard.

The Gold Shovel Standard fills a gap in knowledge about the excavation-safety-worthiness of a contracting company. Gold Shovel Standard raises the bar for acceptable excavation safety performance, and provides new tools for evaluating, hiring and managing relationships with suppliers.

Gold Shovel Standard is a two-part program. Certification is the process of auditing a company's policies and procedures related to excavation safety. Performance monitoring is the ongoing review of a company's excavation safety performance. For more information, see: http://www.goldshovelstandard.com/

# Appendix C: The Sustainability Project

The sustainability project is a tool that lets you identify best practices and technology specific to your industry, assess where you have left business value on the table, measure performance against industry peers, get overall performance scores, plan improvements, and share results with clients at your discretion. In addition to the content taken from this tool that is used throughout the topic-specific sections of this document, the following practices are included in the Construction section of this tool. For more information, visit https://tspproject.org/

| HAZARDOUS MATERIALS HANDLING & STORAGE |
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| Storm drains, manholes and other access holes in the work areas are fitted with protective devices before transfer of hazmat |
| Equipment that may leak oil or other hazardous substances is stored on impervious surfaces or furnished with drip pans |
| Equipment is checked regularly for leaks and leaks fixed immediately when found |
| Material storage is placed away from sensitive receptors and receptor pathways |
| Prior to being transported containers with hazmat are secured to prevent spillage or damage, and inspected and their integrity confirmed |
| Monitoring (manual or technical) is in place to ensure no containers are overfilled during material offloading |
| Fuel stations are installed with impervious surfaces |
| The responsible person is able to explain applicable legal requirements for hazardous substances handling, storage and management |
| The work/construction/facility site has:<br>• A current chemical inventory list<br>• A written chemical hazard communication |
| MSDS are:<br>• Readily available for all affected employees<br>• Kept up to date |
| Employees who work with chemicals:<br>• Are trained to understand the hazards associated with those chemicals<br>• Are trained to work in a manner that protects themselves, others and the environment from those chemical hazards, including use, transfer and transportation of chemicals |
| Bulk chemical storage:<br>• Is stored on impervious surfaces<br>• Has proper secondary containment (110% of volume of the largest container therein)<br>• Is stored in compatible containers that are in good condition and covered<br>• Has proper labels and signage<br>• Areas show no evidence of leaks or spills<br>• Areas are managed by employees that are knowledgeable concerning the chemical properties and the risks of mixing incompatible materials<br>• Ensure that incompatible chemicals are segregated<br>• Has grounding used where necessary |
| Compressed gas cylinders are:<br>• Labeled, stored upright and are secured<br>• Transported and used in a safe manner |
| Regarding Above Ground Storage Tanks:<br>• All ASTs are labeled with their contents and associated hazards |

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| • There is secondary containment that will hold 110% of the volume of the largest tank held therein<br>• There are protective barriers to protect ASTs against accidental damage<br>• The ASTs are in good condition (with no signs of leaking, excessive damage, etc.)<br>• Fill points have secondary containment<br>• There are documented weekly inspections on all ASTs on site |
| Regarding Underground Ground Storage Tanks:<br>• There is an inventory of USTs that shows type, age (years in use), location, size, current contents and amount stored<br>• All USTs have leak detection in place<br>• All USTs have documented integrity testing<br>• Each UST has overfill protection devices<br>• USTs are in good condition (not leaking) |

| SPILL PREPAREDNESS & RESPONSE |
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| There is a written emergency action plan that:<br>• Identifies all reasonably foreseeable spill areas and scenarios e.g. spill, loss containment from storage area or during handling on site<br>• Includes appropriate thorough stop-contain-notify instructions and response procedures<br>• Details response requirements (e.g. safe equipment shutdown, containment, clean-up), roles and responsibilities<br>• Has been approved by appropriate regulatory agency where required |
| Appropriate emergency response equipment is in place (e.g. PPE, response material and equipment appropriate to the potential spill material, etc.) |
| Inspection processes include period checks of spill response material to ensure it is available, accessible and in good condition. |
| Employees are trained in the spill response plans |
| Employees participate in a test spill response drill |

| SOIL & WATER QUALITY |
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| Vehicle storage areas are located away from sensitive areas/receptors |
| Vehicle and equipment operators are made aware of sensitive areas/receptors and the requirement to avoid them |
| Site vehicle storage areas are designed to capture and contain any leakage from vehicles |
| Vehicles and equipment operating in sensitive environments carry spill response equipment |
| Vehicle and equipment operators are trained on how to watch for and respond to potential spills during operations |
| Drip trays or equivalent are used to catch any leaks from parked vehicles/equipment to unpaved areas |

| WATER USE |
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| If work flow requires large volumes of water, required permissions have been secured from appropriate regulators |
| For work where large volumes of water are used, the best available technology and conservation measures are identified and implemented to reduce water use |

| WATER QUALITY |
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| A storm water pollution prevention plan is developed during the work plan or site construction plan development |
| The plan addresses the following in accordance with guidance from the applicable regulator:<br>• Erosion prevention<br>• Isolation of potential sources of pollution from rain events |

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| • Trapping of pollutants before they can be discharged from site |
| Site work does not commence prior to approval of the storm water plan by the relevant regulator (if relevant to project) |
| Storm water pollution prevent measures are regularly inspected to ensure they are working as planned |
| All work with the potential to impact water quality (silting, spills, etc.) is identified before work commencement, and measures taken to prevent/avoid water pollution |
| All potential sources of waste water arising from site activities are inventoried, together with volume and polluting characteristics |
| Legal requirements relevant to all waste water streams are identified and implemented |
| All sources of water discharge from work sites receive a discharge consent or permit from the appropriate regulator ahead of project commencement |
| Monitoring processes are in place to ensure that water discharged from the site meets regulatory/permit requirements |
| Water from concrete truck wash-down areas is captured and treated to legally acceptable pH and suspended solid content prior to disposal |
| Compressor blow down and other water that contains oil is sent to an oil-water separator before discharging water to the municipal sewer |

| AIR QUALITY |
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| Gaseous, dusty and/or fume-laden processes are carried out in an enclosed environment |
| Piles of soil are covered with geofabric |
| Dust is controlled with vacuum technology or reuse water captured from the site |
| Onsite cutting is minimized |
| Limit vehicle idling times |
| Maintain vehicles to limit emissions and fuel consumption |
| Add catalytic converters to engines |

| SENSITIVE ENVIRONMENTS |
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| Sensitive environments or habitats (e.g. wetlands, streams) are identified during work or construction planning and plans put in place to:<br>• Eliminate or minimize impacts<br>• Use the minimum land footprint<br>• Prevent erosion and sedimentation |

| Waste Reduction: Demolition |
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| Remove all salvageable and recyclable items prior to demolition or deconstruction |

| Waste Reduction: Temporary structures |
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| Use connections that allow for the ease of disassembly of temporary structures so that materials can be reused |
| Use reusable perimeter fencing and materials that can be easily transported from site to site |

| Waste Reduction: Site work |
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| Treat contaminated soils for reuse rather than importing new soil, where legally permissible |
| Use soil and rocks from site excavation for landscaping or fill operations |

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| Sell marketable trees designated for removal |
| Grind, chip, shred other vegetation for mulching or composting |
| Use masonry rubble as backfill along foundation walls where permitted |
| Utilize excess concrete as parking stops, jersey barriers, etc. |
| Collect and stack bricks and other masonry materials scattered around jobsite to keep from getting soiled or lost |
| Use excess asphalt paving to fix surrounding roads, drives, parking lots, etc. |
| Minimize the use of wood for temporary structures (e.g. pedestrian walkways); use prefabricated AND REUSEABLE components where possible |
| Re-use wood of high quality, including wood formerly used structurally, or in sub flooring, by getting it re-milled for finish carpentry |
| Reuse or recycle wooden formwork |

| Waste Reduction: Foundations |
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| Stack old forms next to new ones for reuse |
| Reuse form ties |
| Minimize formwork cutting |
| Sell rebar for scrap or use it on another job |

| Waste Reduction: Substructure |
|---|
| Save excess PVC drainage piping for use on future jobs. Recycle the scraps and waste |
| Sell rebar and other steel waste for scrap or use it on another project |
| Use excess for fills, paving and drainage (channels?) |
| Save left-over masonry for future projects or return to supplier. Use damaged masonry block for site fill. |

| Waste Reduction: Roofing |
|---|
| Employ accurate cutting procedures (measure twice, cut once) |
| Asphalt roofing materials and aggregates can be recycled into road paving or patching material |
| Donate left over materials |
| Recycle plastic films like sheathing, shrink wrap and packaging |

| Waste Reduction: Interior construction |
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| Use risers and spacers when stacking multiple layers of drywall |
| Make sure building is water tight before completing drywall |
| Protect corners, edges etc. during transport and in high traffic areas |
| Store level and flat (upright storage could damage edges) |
| Set aside larger drywall scraps for use where filler pieces are needed |
| Ensure storage is water tight and leak free |
| Protect HVAC, ductwork from dust, dirt, damage and other hazards |
| Use a first-in, first-out policy for chemicals |
| Return unused items to suppliers |

| Waste Reduction: Physical footprint |
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| Create site access plans that minimize impacts on vegetation and impervious surfaces |

| Water Use Reduction |
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| Use eco-friendly porta potties |
| Use portable water collection system for greywater use during construction |
| Greywater for Irrigation |