

PPRC's Lean and Green Assistance

Lean Manufacturing's Promise – Production Transformation
PPRC's Promise – Environmental Performance

Merging Lean and Green: Steps to Integrate Environmental Tools with Lean Manufacturing

What?

Many environmental considerations and tools can be incorporated and integrated into lean training, value stream mapping (VSM) exercises, and kaizen events. Many of these steps inherently in tandem with lean principles.

Why?

Most companies and manufacturers have the capacity to improve productivity and environmental performance, even the most state-of-the-art manufacturers. Recently, several pilot projects in Washington State have incorporated environmental aspects into lean activities, with significant improvements and cost savings in both manufacturing efficiency and environmental efficiency. Additional advantages to adding “green” to lean are reducing regulatory and compliance burdens, reduced waste handling and disposal, reduced liability and healthier employees due to worker exposure, supplemental cost savings to lean improvements, and the potential for longer-term continuation and commitment to sustain the gains achieved.

How? (For Lean Consultants and In-House Lean Champions)

At initial lean planning sessions, explain the benefits of using environmental tools in tandem with lean. Clarify that this is a smart business move, that it will not require significantly more time or expenditure, and will reap extra cost savings. Provide or present case study examples (www.pprc.org/solutions/leangreen2.cfm). Then, determine interest in trying this during a lean implementation. If it's a “go,” basic suggestions follow. Many of the tips are gleaned from U.S. EPA's Lean and Environment Toolkit, while others have been successfully applied at actual pilot lean and environment projects.

Preparation

- Let PPRC do the legwork for you by requesting a *Lean and Green Rapid Response* from PPRC at leangreen@pprc.org. This is an easy and quick way for lean specialists to learn the most recent and salient pollution prevention (P2) opportunities for a specific industry sector, or specific process(es).
- Be advised that baseline environmental inputs, and outputs, along with environmental cost metrics relevant to the project will be needed in addition to the standard lean metrics.

Training

- In the course of presenting on lean wastes, include discussions and examples of “environmental waste,” such as excessive or toxic materials use, pollution, emissions, effluents, scrap, and hazardous waste streams.
- Incorporate an environmental element into the lean simulation exercises, such as adding a mock solid or hazardous waste stream to the simulation kits, such as water-color paints or play-doh. Contact leangreen@pprc.org for specific ideas.

Value Stream Mapping (VSM)

- Request environmental, health, and/or safety personnel to participate in the VSM.
- Before the VSM event, request quantitative data on energy, solid or hazardous wastes, emissions, and effluents associated with the processes being evaluated. Also document the toxicity characteristics of any hazardous substances used in the process. (Example log below)

Consumed Material or Resource Salient to the Project	Amount per Unit Time or Unit of Output	Unit Examples
Energy		<i>Therm or BTU/month</i>
Water		<i>Gallon or ccf/day</i>
Raw Material 1		<i>Pounds, sheets, etc./month</i>
Raw Material 2		<i>Pounds, gallons, etc./ unit product</i>
Other Consumables		<i>Number, pounds, etc. per unit product</i>
Emissions generated		<i>Pounds VOCs, etc. per unit product</i>
Effluents generated		<i>Gallons and concentrations of contaminants</i>

- As applicable, obtain unit costs of energy purchase, solid waste disposal, hazardous waste disposal, wastewater treatment, and the purchase cost of any raw materials for which some portion winds up as an unusable waste stream or non-value added product.
- During the current state VSM:
 - Inquire with participants about inputs to each process, such as raw materials, energy, water, and hazardous substances or chemicals of concern. If hazardous substances are used, inquire about employee exposure risk of each substance.
 - Inquire about outputs to each process, such as emissions, effluents, and wastes.
 - Use an icon, symbol, or visual tagging at each process block that has environmental hazard(s) or waste, or consumes significant energy or water, and/or generates emissions or effluents. Include the icon for processes that generate unusable scrap and defects. Use the visuals to highlight environmental problems or challenges. (Green is a good color).
 - Use “Materials Line(s)” and/or “Resources Line(s)” directly underneath the standard timeline of the value stream map. This is valuable in illustrating the amount of material (or resources) used vs. the amount of material (or resources) that end up in the products and add value. Multiple lines could show, for example, solvent use on one line, a raw material (wood) on another, and water on a third.
 - Using the environmental metrics previously provided by the facility and/or their supply chain, quantify the baseline costs of environmental inefficiencies and wastes associated with energy, water, raw materials, emissions such as volatile organic compounds, and wastes.
- During report-outs, emphasize the cost and other impacts of their environmental wastes and inefficiencies that may not have been very obvious prior to this exercise. Include exposure, safety, waste handling, energy and water consumption, etc.

Kaizen Events

- Include environmental input and output metrics in process mapping or other analysis tools. For 5S or ClosedMITT audits, supplement the audit questions with environmental considerations. (Suggestions available from leangrean@pprc.org.)
- Invite input or participation from the supply chain if there are opportunities to reduce toxics or wastes as a result of suppliers’ products or services.
- Collect salient waste, emissions, and effluent data during and after the kaizen events.
- Use environmental data previously provided (by facility and/or supply chain), and data collected to reflect post-kaizen event(s), to quantify the cost savings of lean and environmental improvements.
- In the report-outs, highlight the environmental cost savings as well as less tangible environmental improvements such as reduced worker exposure, reduced permitting or compliance efforts, reduced liability, improved public perception of the company, happier/safer workers, etc.

Sources: The EPA’s lean webpage - www.epa.gov/lean/
2006 Lean and Environment Toolkit (Version 1.0) - www.epa.gov/lean/toolkit
Case Study at Canyon Creek Cabinet Company - www.ecy.wa.gov/biblio/0604024.html