

US EPA ARCHIVE DOCUMENT

MEMORANDUM

To: Lynn Coleman and Hugh O'Neill, Washington State Department of Ecology
From: Jennifer Tice, Ross Strategic
Date: September 30, 2014
RE: Potential Enhancements or Additions to EPA's Lean and Environment "Toolkit" Publications Based on the Experiences of the Washington Lean and Green Program

Purpose and Background

The purpose of this memorandum is to describe ideas for how the experiences and lessons of the Washington Lean and Green Program over the past four years could be used to enhance, expand, and/or complement EPA's Lean and Environment Toolkit publications and related resources. The Washington Lean and Green Program provides integrated lean manufacturing and environmental technical assistance ("lean and green" assistance) to manufacturers to help them operate more competitively and sustainably. Several organizations collaborate to deliver services, as follows.

- Washington State Department of Ecology (Ecology), Technical Resources for Engineering Efficiency (TREE) Program provides environmental services
- Impact Washington, a National Institute of Standards and Technology Manufacturing Extension Partnership (NIST MEP) affiliate, delivers lean facilitation services
- Washington State University (WSU) Extension Energy offers energy assessments
- Pacific Northwest Pollution Prevention Resource Center (PPRC) provides additional environmental research and technical assistance

For more information about the Washington Lean and Green Program, see the Program's website at: <http://www.ecy.wa.gov/Programs/HWTR/lean/>.

The U.S. Environmental Protection Agency (EPA) has recognized that lean and green is an effective way to advance sustainable manufacturing. EPA has developed a series of lean and environment "toolkits" (see <http://www.epa.gov/lean/environment>) that provide practical strategies and tools for adding environmental issues to lean methods such as value stream mapping, kaizen events, and 5S. EPA, NIST MEP, and four other federal agencies also participate in the E3 Program (Economy, Energy, and Environment, <http://www.e3.gov/>), which provides lean and green assistance to manufacturing businesses in communities across the country.

Disclaimer: The author of this memo helped develop EPA's Lean toolkits and currently provides support to EPA for the E3 Program. Thus, this memo reflects the opinions of an informed subject expert, but should not be considered a neutral, third-party evaluation of the toolkit publications.

Relationship of EPA's Lean Toolkits to the Washington Lean and Green Program

Before describing potential enhancements to the EPA lean toolkits, it is useful to note a few key points about the relationship between the toolkits and the Washington Lean and Green Program:

- The Lean and Green Program is based on the overarching strategy outlined in the toolkits of integrating environmental issues into lean implementation. While not all of the process improvements in projects rely on lean methods, the lean process serves as the primary vehicle for change, even if that change is targeted towards environmental as well as operational issues.
- Specific ideas and tools from the toolkits were used in the lean and green projects (e.g., adding green metrics to value stream maps, using kaizen events to target environmental wastes, etc.), although the toolkits themselves were not necessarily used as a resource for those activities.
- The partners also used lean and green strategies and tools that were not included in the toolkits.
- Many of the lessons from the Lean and Green Program relate to the experiences of assistance providers (e.g., environmental agencies and NIST MEP centers). The EPA toolkit that has the most similar guidance is *The Environmental Professional's Guide to Lean and Six Sigma* (<http://www.epa.gov/lean/environment/toolkits/professional/resources/Enviro-Prof-Guide-Six-Sigma.pdf>). In fact, the Guide includes lessons from the first three lean and green pilot projects.

Potential Enhancements and Additions to EPA's Lean Toolkit and Related Publications

There are at least three types of potential enhancements and additions to EPA's Lean toolkit series that could be made based on the Lean and Green Program projects of 2010-14, including:

- Success stories
- Assistance provider recommendations
- Lean and green integration strategies and tools

Success Stories

The projects that Ecology, Impact Washington, and their partners supported from 2010 through 2014 provide lean and green success stories that could be added to the examples on EPA's Lean and Environment website and toolkits. These projects were with the following facilities:

- Accra-Fab, Inc., Liberty Lake, WA (metal fabrication and assembly)
- Cosmo Specialty Fibers, Cosmopolis, WA (produces dissolving wood pulp used as feedstock for products)
- Decagon Devices, Pullman, WA (manufacturer of electronic sensors)
- Dolco Packaging Co., Wenatchee, WA (produces polystyrene packaging)
- Kärcher, Camas, WA (manufacturer of industrial, commercial, and household washers)
- Heath Tecna, Bellingham, WA (manufacturer of composite interior parts for airplanes)
- National Industrial Concepts Global Manufacturing Solutions (NIC), Woodinville, WA (produces custom and turnkey sheet metal and mechanical products)
- SunOpta Healthy Fruit Snacks, Omak, WA (maker of fruit bars and fruit snacks)
- Western Chemical, Ferndale, WA (manufacturer of fish culture products, biosecurity supplies, and spawning agents)

See the Washington Lean and Green Program Report on 2010-14 Projects for highlights from these projects, and find case studies at: www.ecy.wa.gov/programs/hwtr/p2/success/p2success.html and <http://www.ecy.wa.gov/programs/hwtr/lean/cases.html>.

Aspects of the stories that could be useful for EPA include:

- Lean and green project results (operational and environmental savings from projects)
- Examples of the types of processes for which lean and green has been applied, and examples of lean and green approaches
- Photos from the projects
- Quotes from participants
- Videos developed by Impact Washington and Cimira Studios for the Accra-Fab project (see: <http://vimeo.com/43681916>) and for the overall Lean and Green partnership (see: <http://vimeo.com/43681917>)

Assistance Provider Recommendations

The Lessons Learned and Recommendations section of the 2010-14 Program Report are particularly relevant to other lean and environmental assistance providers, such as other MEP centers, P2Rx centers, and/or environmental agencies. EPA's *Environmental Professional's Guide to Lean and Six Sigma*, the toolkit oriented to environmental assistance providers, could incorporate the following from the report:

- Marketing and sales lessons and tips (on pp. 16-18 of the Report; this is relevant to Chapter 5 of the *Environmental Professional's Guide*, on how to talk about lean and environment)
- Tips for effective assistance provider and facility relationships (on p. 22 of the Report; this is relevant to the section on developing lean and environment service delivery partnerships in Chapter 6 of the *Environmental Professional's Guide*)
- Recommendations for lean and green service providers, such as developing standard operating procedures, maintaining partnership connections, using public funding to incentivize projects, fine tuning marketing, and supporting follow up (on pp. 22-25 of the Report; this is also relevant to Chapter 6 of the *Environmental Professional's Guide*)
- Tactical recommendations and tips for implementing lean and green projects (These tips, which are on p. 24 of the Report, apply to service providers as well as to facility staff looking to connect lean and environment, and also could make Chapter 6 of the *Environmental Professional's Guide*, on Lean and Environment Applications, more robust.)

EPA does not have toolkits that are focused specifically on lean service providers (e.g., MEP Centers), although NIST MEP has developed "Lean and Clean" presentations for use in the E3 and Green Suppliers Network programs. While many of the tips and recommendations from the Summary Report focus on environmental assistance providers, many are relevant to MEP Centers or other lean service providers. One possible next step would be for EPA to work with NIST MEP to identify how to effectively bring this information to other MEP Centers (e.g., through training materials, conference presentations, etc.).

Lean and Green Integration Strategies and Tools

The Washington Lean and Green Projects implemented many of the lean and environment integration strategies and tools described in EPA’s Lean toolkits, as well as others. The focus of most of EPA’s Lean toolkits is on strategies and tactics for integrating environmental (or “green”) considerations and tools into Lean methods; two other toolkits address how lean relates to particular audiences (environmental professionals and water/wastewater utilities). Toolkits that specifically focus on lean and environment integration strategies and tools include: *The Lean and Environment Toolkit*, *The Lean and Chemicals Toolkit*, *The Lean, Energy & Climate Toolkit*, and *The Lean and Water Toolkit*.

Along with the recommendations, lessons, and tips in the Summary Report relevant for lean and environmental assistance providers (described above), there are a number of specific types of enhancements or additions that could be made to EPA’s Lean Toolkits based on the experience of the Washington Lean and Green Projects. These are detailed in Table 1 below.

Table 1: Potential EPA Lean Toolkit Enhancements Related to Lean and Green Integration Strategies

Toolkit Enhancement/Addition	Description Based on Washington Lean & Green Projects
1. Provide more emphasis and examples on the process and cultural dimensions of lean (not just “tools”).	The Washington Lean and Green Projects highlight the importance of the human dimension of lean – people are often more important than the tools. The cultural and process dimensions of lean and green efforts could be emphasized more in the EPA Lean Toolkits. There are many examples of how Ecology helped staff address environmental issues in projects (e.g., through questioning staff). Another great example of how culture facilitates improvements is the red vests that kaizen event teams at Heath Tecna wear.
2. Describe when and when not to use environmental value stream mapping.	Ecology staff offered some lessons learned on when value stream mapping with environmental metrics was most useful, and when it was not as helpful. These lessons could be useful to add to the value stream mapping section of the Lean and Environment Toolkit, and/or others. Based on the Washington experience, lean and green value stream maps were most useful: <ul style="list-style-type: none"> • To raise awareness of a number of facility staff about environmental issues • To identify the important environmental issues or “pain” areas to address in improvement projects / kaizen events in the value stream • To expand the range of wastes and improvement opportunities that facilities experienced with lean consider in projects <p>Ecology staff found that some issues at facilities could be addressed through kaizen events or small focused projects, without the need for an initial value stream map, since the improvement opportunities had already been identified.</p>

Toolkit Enhancement/Addition	Description Based on Washington Lean & Green Projects
<p>3. Add facility-wide environmental opportunity assessment as an alternative to value stream mapping.</p>	<p>A value stream might not be the appropriate scale for determining lean and green opportunities in some cases. In addition, many environmental data are aggregated at the facility-level, not the product or value stream level. Ecology and Impact Washington have successfully used facility-level environmental opportunity assessments in projects where the facility was interested in focusing improvements on its major environmental impacts.</p> <p>The toolkit(s) could articulate the specific steps for this type of lean and green event, such as:</p> <ol style="list-style-type: none"> a. Review the categories of facility inputs and outputs, and their potential environmental, health, and safety impacts b. Decide on the scope of the future improvements (facility, product line, production area, office, etc.) c. Develop a process diagram with the facility as a box to visually show inputs and outputs at the facility scale d. Decide on what “lean” and “green” data to collect, and collect data on facility-wide inputs and outputs e. Present and discuss the data; decide where to collect additional data at a more refined scale f. Identify opportunities for improvement projects (e.g., kaizen events) <p>This opportunity assessment could be combined with identification of improvements as in the Energy “Treasure Hunts” described in <i>The Lean, Energy & Climate Toolkit</i>.</p>
<p>4. Add to the “toolbox” of methods to support kaizen events.</p>	<p>The primary vehicle for implementing lean and green improvements in the Washington Lean and Green projects was kaizen events, but, as is typical, many specific lean tools were used during those events. Many, including process mapping, standard work, root cause analysis, and 5S (or 5S+Safety), are described in the EPA Lean Toolkits.</p> <ul style="list-style-type: none"> • One that may be worth adding is the “Seven Ways” method of brainstorming solutions, as it can be very effective as a technique to uncover solutions to environmental wastes. • A kaizen newspaper, such as from the SunOpta or Heath Tecna projects, could be used as an example of how kaizen events lead to tangible action items for facilities.
<p>5. Highlight the strategy of using portable diagnostic tools to identify environmental wastes and costs in lean events</p>	<p>Portable diagnostic tools, such as infrared (IR) cameras, ultrasonic leak detectors, and flow detectors, are fairly inexpensive and can be very helpful for helping lean teams to “see” environmental wastes and improvement opportunities. They can provide powerful visuals (e.g., from IR cameras) and/or real-time data to inform process- improvement efforts. EPA’s toolkits would benefit from more prominently highlighting the use of these tools. <i>The Lean and Water Toolkit</i> describes</p>

Toolkit Enhancement/Addition	Description Based on Washington Lean & Green Projects
	water meters, but <i>The Lean, Energy & Climate Toolkit</i> does not mention using IR cameras to detect energy and heat wastes.
6. Articulate prep and follow-up needs associated with value stream mapping and kaizen events.	Lean and green projects typically require a certain amount of pre-event work to collect data before the events. To make the toolkits more robust, EPA could list typical data that should be collected by the facility and/or assistance providers prior to events to ensure success (e.g., energy utility bills, waste records and disposal costs, etc.). Other pre-event work, such as identifying event/project goals, could also be mentioned. Finally, the toolkits could provide recommendations on follow-up after events, including tracking data and action items following events to monitor progress.

The Washington Lean and Green Projects provide detailed and nuanced practical experience with combining lean and environmental improvement efforts. As described in this memo, there are several opportunities for the EPA Lean Toolkits to draw additional examples, strategies, and implementation tips from this rich experience.