# GREENER CLEANUPS

# ESTIMATING ENVIRONMENTAL FOOTPRINTS USING SEFA

**S**PREADSHEETS *FOR* **E**NVIRONMENTAL **F**OOTPRINT **A**NALYSIS

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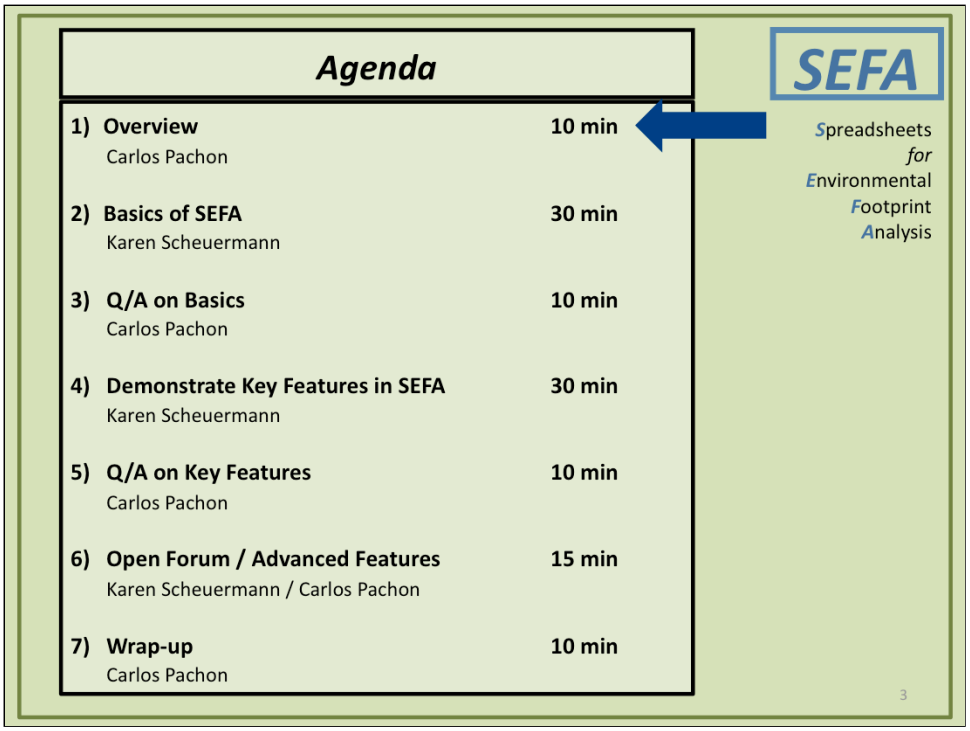
Karen Scheuermann, US EPA Region 9

October 28, 2014


Purpose of SEFA Webinar
→ Provide a basic understanding of SEFA
→ Demonstrate general organization and specific functions of the SEFA worksheets
→ Open forum for discussion of footprint analyses and advanced features in SEFA
Notes:
This webinar will be very technical, getting into the details of the SEFA worksheets
Participants should already have a solid understanding of greener cleanups
Participants should already be familiar with EPA's Footprint Methodology
SEFA
Spreadsheets for Environmental Footprint Analysis
Additional experience likely needed to run a footprint analysis on SEFA
2


Agenda
1) Overview 10 min
Carlos Pachon
2) Basics of SEFA 30 min
Karen Scheuermann
3) Q/A on Basics 10 min
Carlos Pachon
4) Demonstrate Key Features in SEFA 30 min
Karen Scheuermann
5) Q/A on Key Features 10 min
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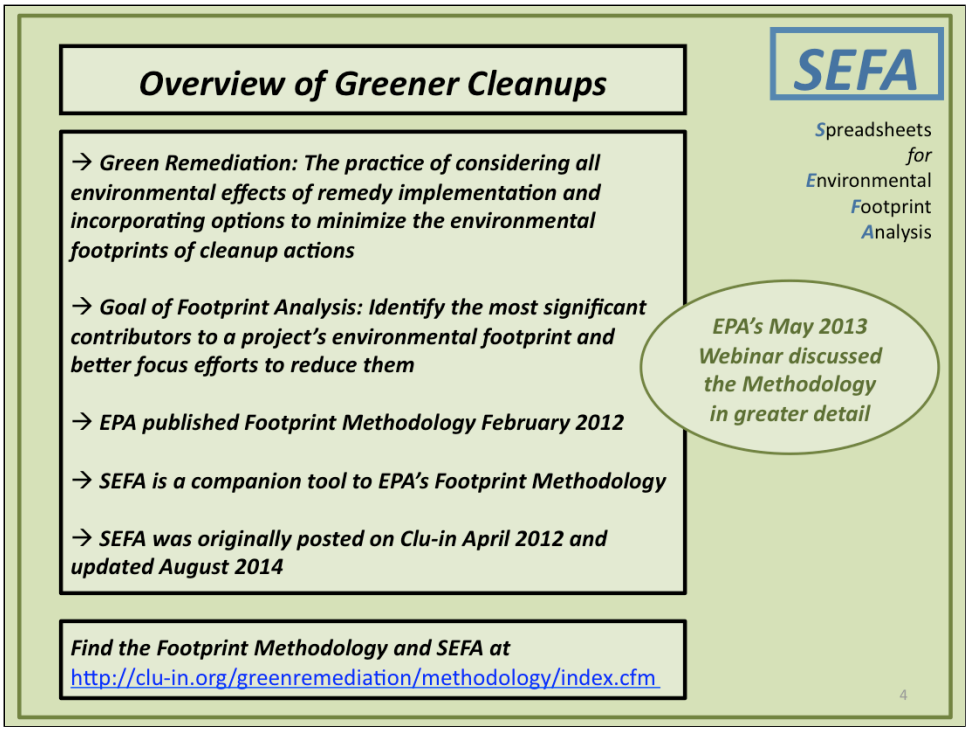
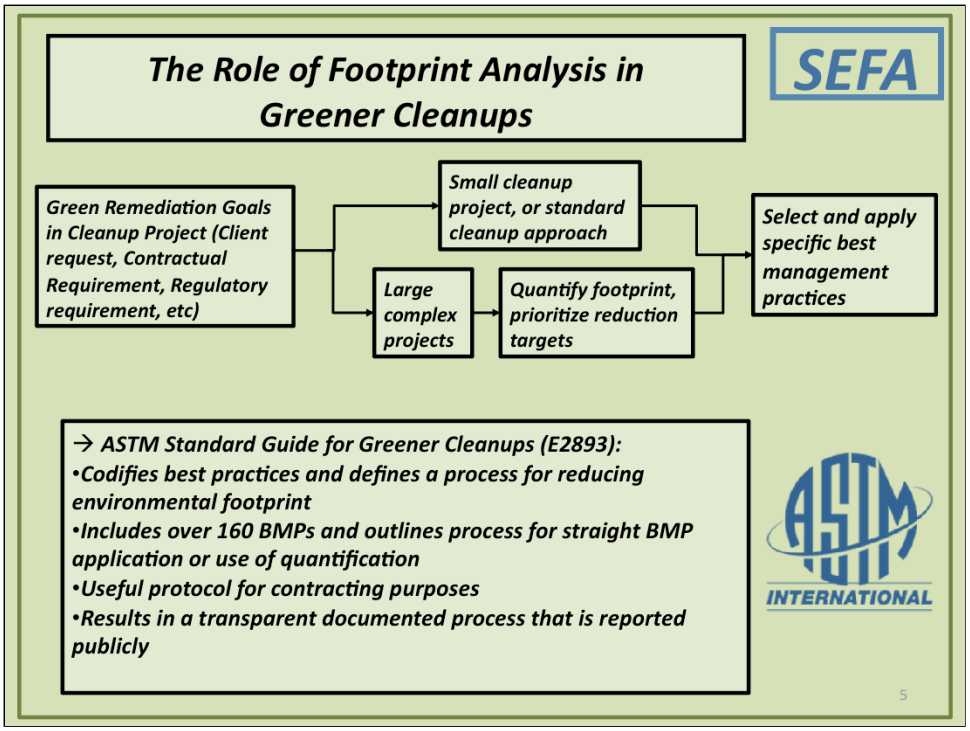
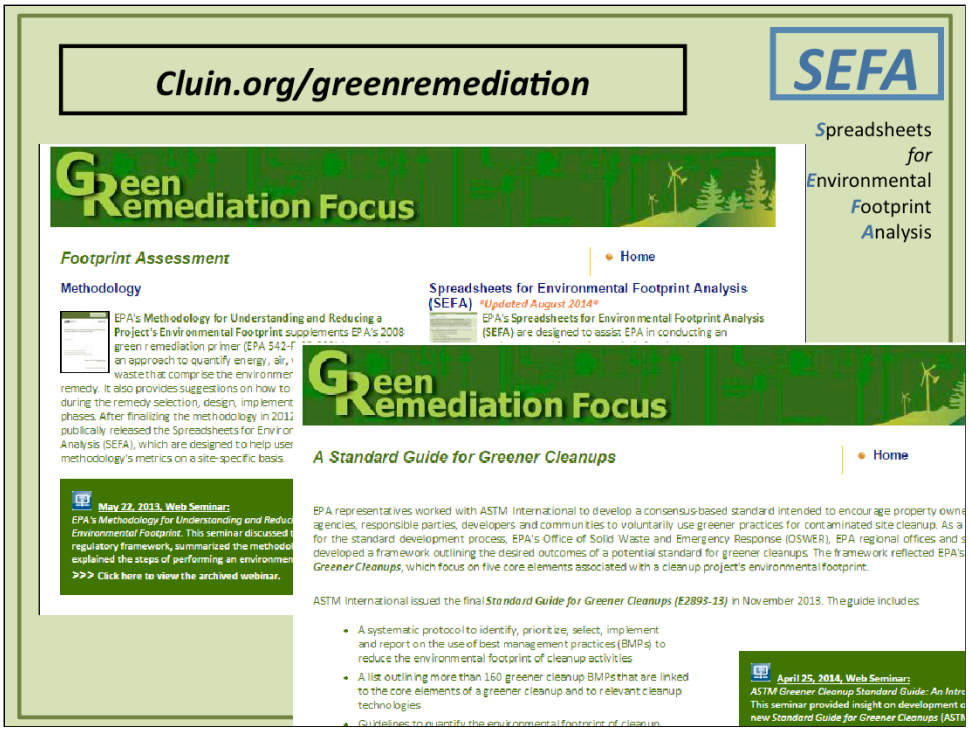
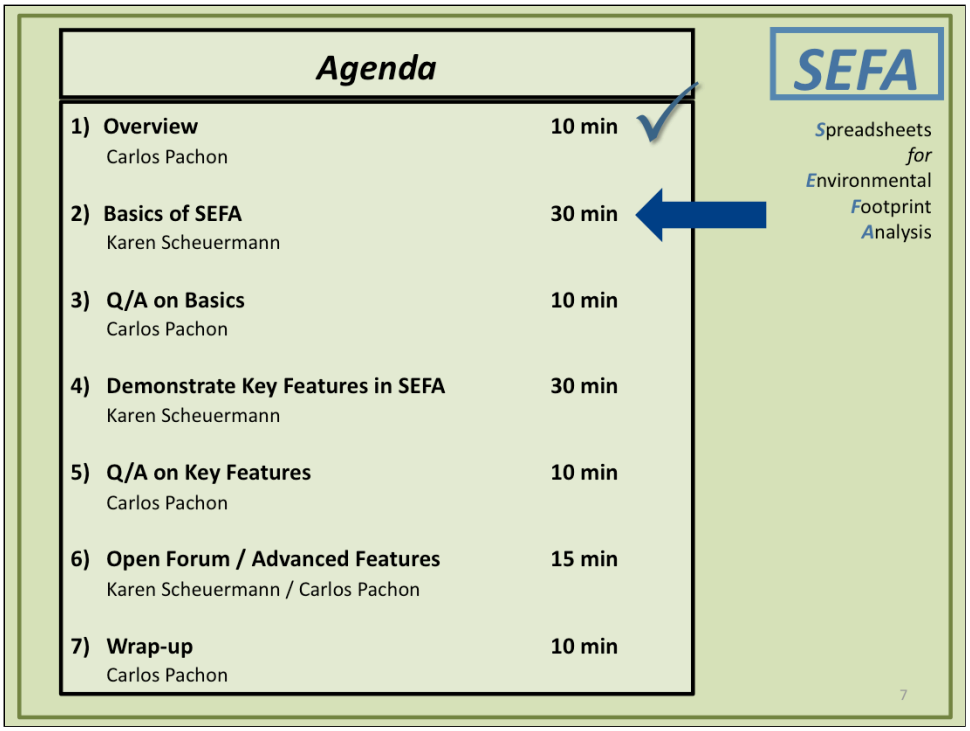
6) Open Forum / Advanced Features 15 min
Karen Scheuermann / Carlos Pachon
7) Wrap-up 10 min
Carlos Pachon
SEFA
Spreadsheets
for
Environmental
Footprint
Analysis
3


Overview of Greener Cleanups
SEFA
Spreadsheets for Environmental Footprint Analysis
→ Green Remediation: The practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions
→ Goal of Footprint Analysis: Identify the most significant contributors to a project's environmental footprint and better focus efforts to reduce them
→ EPA published Footprint Methodology February 2012
→ SEFA is a companion tool to EPA's Footprint Methodology
→ SEFA was originally posted on Clu-in April 2012 and updated August 2014
EPA's May 2013 Webinar discussed the Methodology in greater detail
Find the Footprint Methodology and SEFA at
http://clu-in.org/greenremediation/methodology/index.cfm
4


The Role of Footprint Analysis in Greener Cleanups
SEFA
Green Remediation Goals in Cleanup Project (Client request, Contractual Requirement, Regulatory requirement, etc)
Small cleanup project, or standard cleanup approach
Large complex projects
Quantify footprint, prioritize reduction targets
Select and apply specific best management practices
→ ASTM Standard Guide for Greener Cleanups (E2893):
•Codifies best practices and defines a process for reducing environmental footprint
•Includes over 160 BMPs and outlines process for straight BMP application or use of quantification
•Useful protocol for contracting purposes
•Results in a transparent documented process that is reported publicly
ASTM INTERNATIONAL
5


Cluin.org/greenremediation
SEFA
Spreadsheets for Environmental Footprint Analysis
Green Remediation Focus
Footprint Assessment
Home
Methodology
Spreadsheets for Environmental Footprint Analysis (SEFA)
*Updated August 2014*
EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint supplements EPA's 2008
EPA's Spreadsheets for Environmental Footprint Analysis (SEFA) are designed to assist EPA in conducting an
May 22, 2013, Web Seminar:
>>> Click here to view the archived webinar.
Green Remediation Focus
A Standard Guide for Greener Cleanups
Home
EPA representatives worked with ASTM International to develop a consensus-based standard intended to encourage property owners
agencies, responsible parties, developers and communities to voluntarily use greener practices for contaminated site cleanup. As a
for the standard development process, EPA's Office of Solid Waste and Emergency Response (OSWER), EPA regional offices and s
developed a framework outlining the desired outcomes of a potential standard for greener cleanups. The framework reflected EPA's
Greener Cleanups, which focus on five core elements associated with a cleanup project's environmental footprint.
ASTM International issued the final Standard Guide for Greener Cleanups (E2893-13) in November 2013. The guide includes:
A systematic protocol to identify, prioritize, select, implement and report on the use of best management practices (BMPs) to reduce the environmental footprint of cleanup activities
A list outlining more than 160 greener cleanup BMPs that are linked to the core elements of a greener cleanup and to relevant cleanup technologies
April 25, 2014, Web Seminar:
This seminar provided insight on development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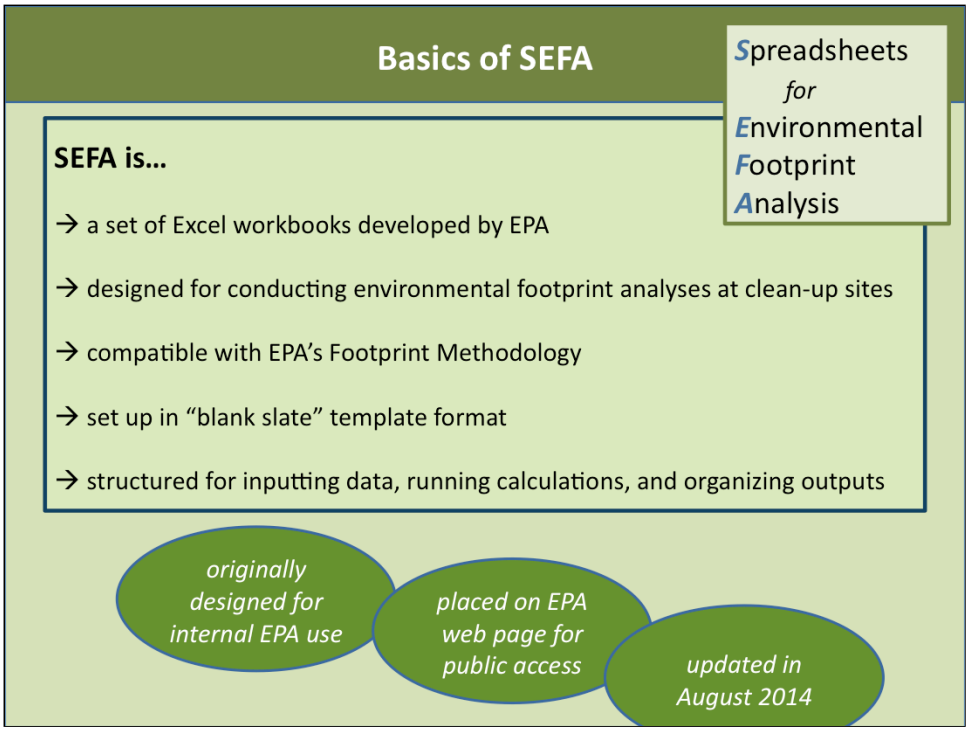
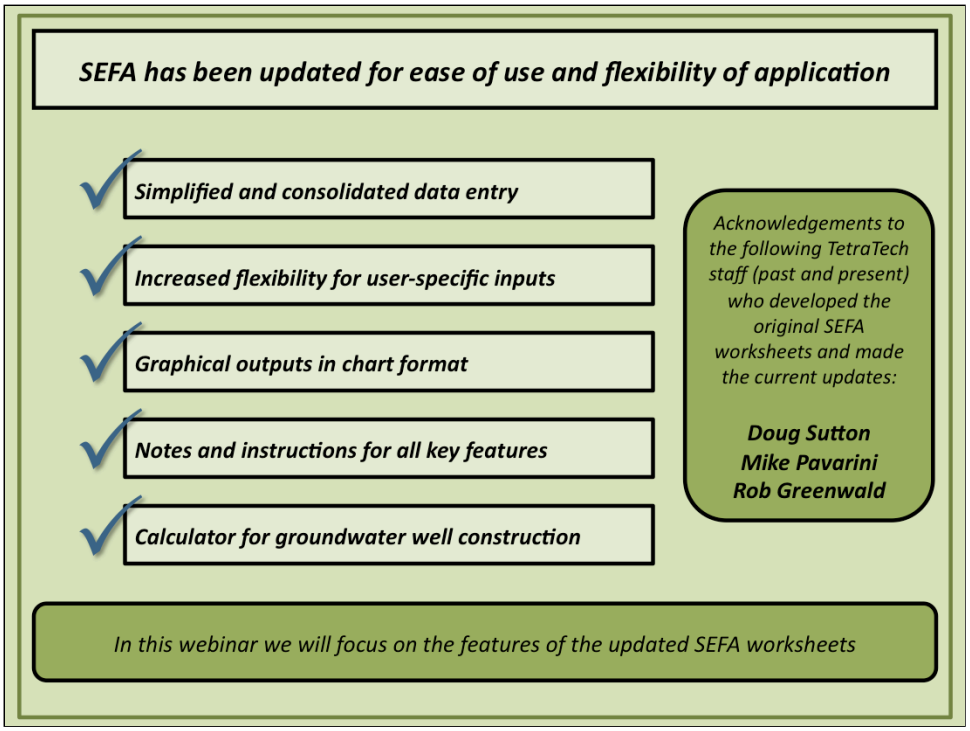

Basics of SEFA
Spreadsheets for Environmental Footprint Analysis
SEFA is…
→ a set of Excel workbooks developed by EPA
→ designed for conducting environmental footprint analyses at clean-up sites
→ compatible with EPA's Footprint Methodology
→ set up in "blank slate" template format
→ structured for inputting data, running calculations, and organizing outputs
originally designed for internal EPA use
placed on EPA web page for public access
updated in August 2014




**Notes**

→ ***Simplified and consolidated data entry***

* all site and remedy data entry is consolidated in one workbook
* drop-down menus expanded for ease of selecting inputs

→ ***Increased flexibility for user-specific inputs***

* user overrides added for fuel usage rates
* capacity increased for user-defined footprint conversion factors

→ ***Graphical outputs in chart format***

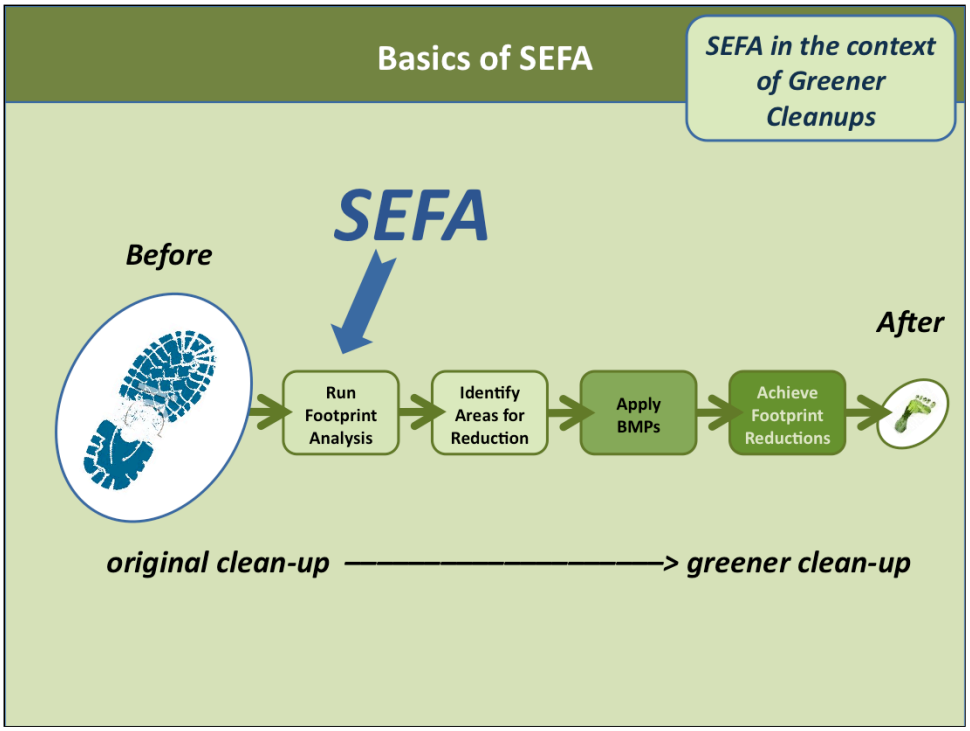
* bar charts and pie charts for results in energy usage and air emissions
* automatically populated

→ ***Notes and instructions for all key features***

* notes and instructions expanded and placed on new tabs in the excel workbooks
* abbreviated reminders and notes remain in the data entry tabs

→ ***Calculator for groundwater well construction***

Terminology and labels have also been updated for clarity and consistency.



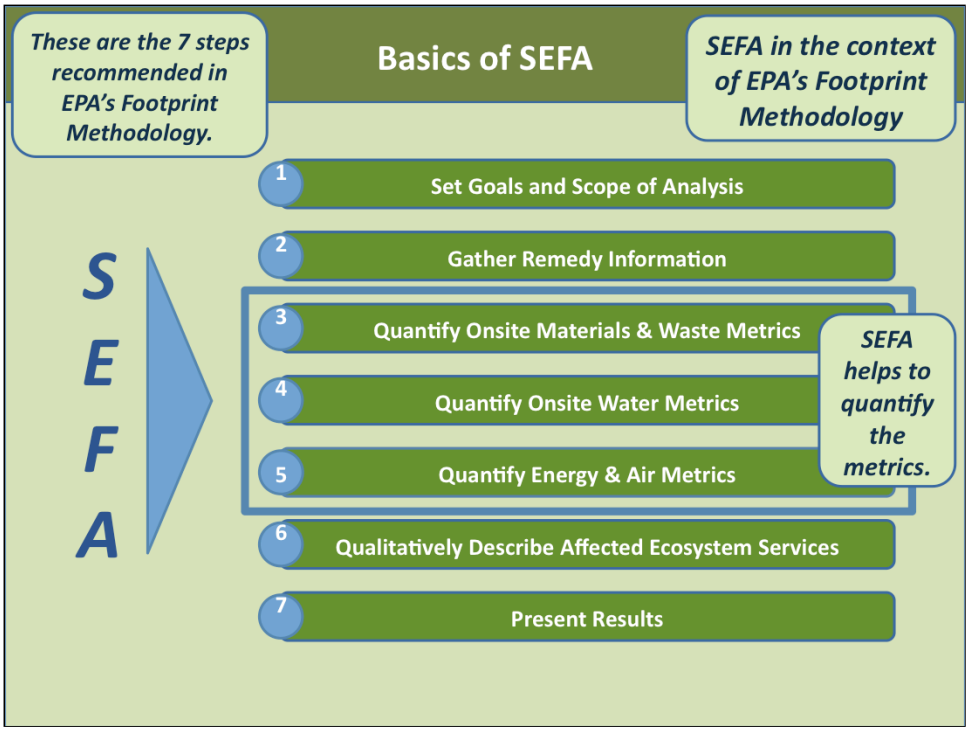

**Notes**

→To move from the larger footprint (before) to the smaller footprint (after), you will likely go through the following steps:

* Identify Areas for Reduction
* Apply BMPs
* Achieve Footprint Reduction

→If you choose to do a footprint analysis, it would be most beneficial before you identify areas for reduction.

→EPA's Footprint Methodology and SEFA can help you with the footprint analysis.




**Notes**

These seven steps are described in detail in EPA's Footprint Methodology.

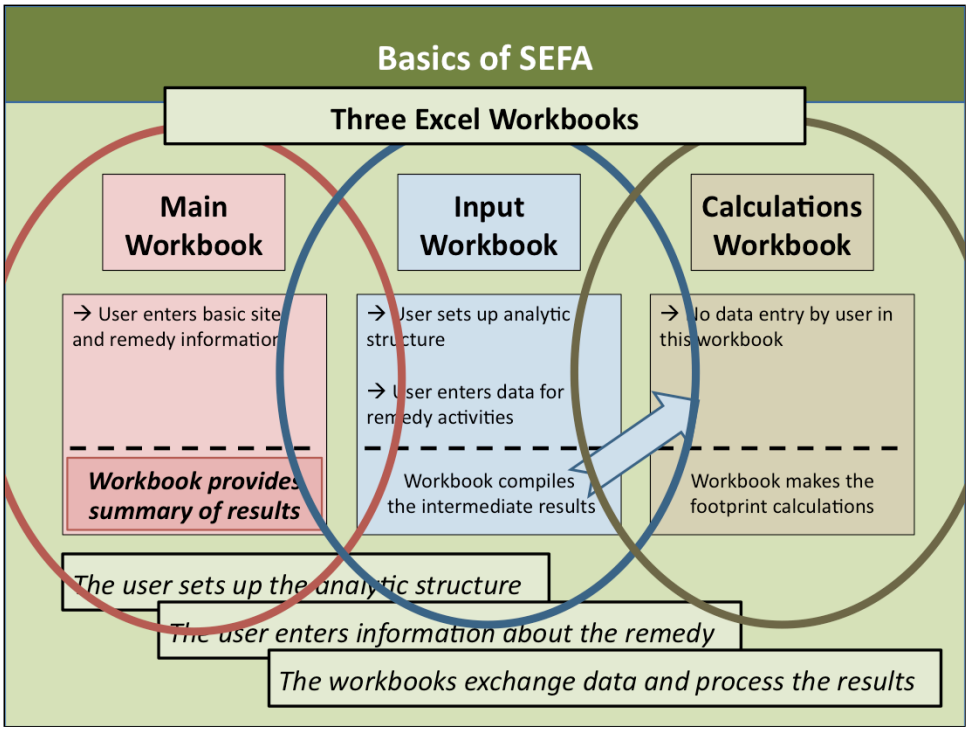
→Step 1. The project manager should establish the goals and scope of the footprint analysis to ensure that the questions of interest for the site and remedy are addressed. This is an important step, because the design of the footprint analysis will depend on the goals and scope. SEFA does not help with Step 1.

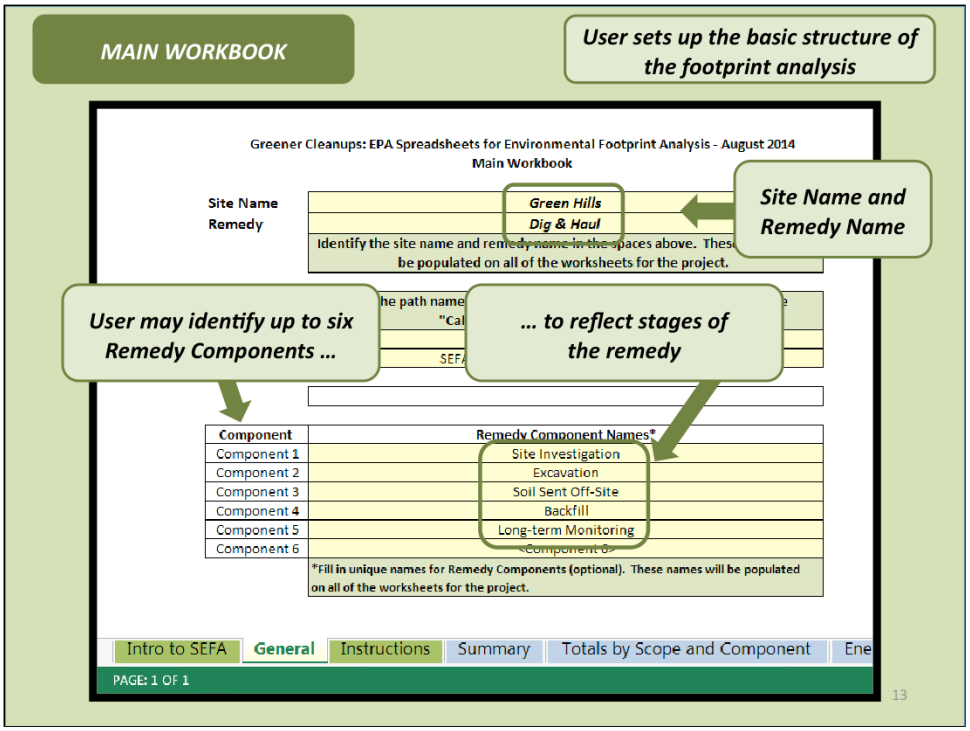
→Step 2. The project manager (or contractors or in-house experts conducting the footprint analysis) will gather the data required for the analysis. SEFA does not help with Step 2.

→Steps 3, 4, and 5. These are the "number crunching" steps of the Footprint Methodology. SEFA is designed to assist with Steps 3, 4, and 5.

→Step 6. The project manager should prepare a qualitative description of affected ecosystem services. SEFA does not help with Step 6

→Step 7. SEFA provides the numerical results of the analysis, but in Step 7 it will be up to the project manager to present and interpret the results.

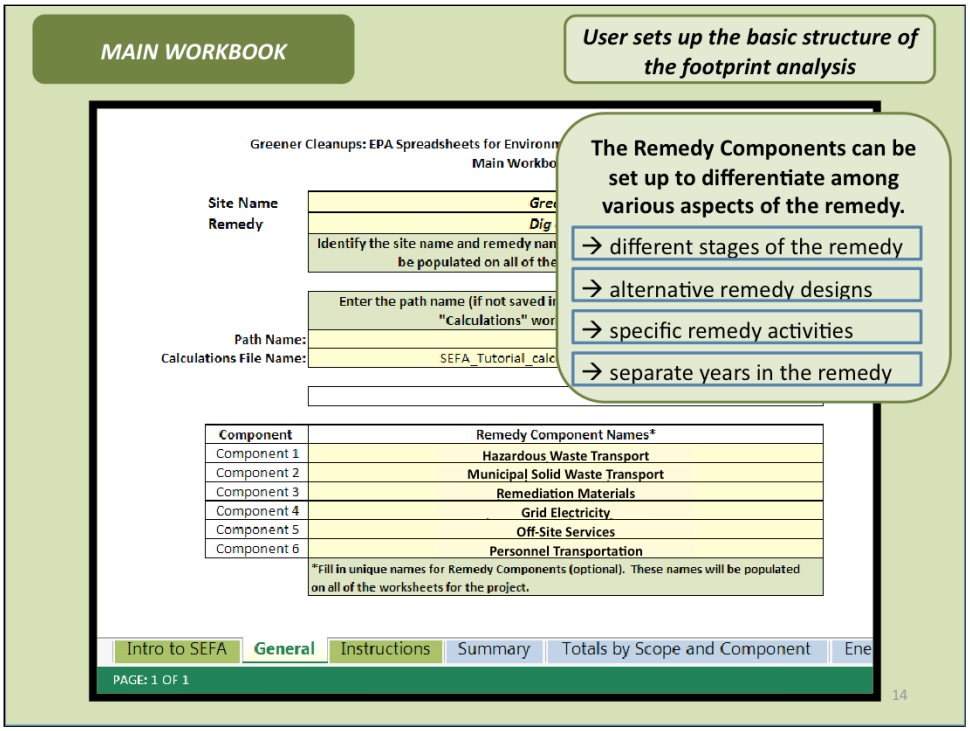

Basics of SEFA
Three Excel Workbooks
Main Workbook
Input Workbook
Calculations Workbook
→ User enters basic site and remedy information
Workbook provides summary of results
→ User sets up analytic structure
→ User enters data for remedy activities
Workbook compiles the intermediate results
→ No data entry by user in this workbook
Workbook makes the footprint calculations
The user sets up the analytic structure
The user enters information about the remedy
The workbooks exchange data and process the results




**Notes**

→ This is a screen shot of the tab in the Main Workbook where the user sets up the basic structure of the footprint analysis.

→ There is also space at the bottom of the worksheet for adding a narrative description of the Site and Remedy.




**Notes**

→The way in which you set up the Remedy Components will depend on the goals and scope of the footprint analysis.

→For example:

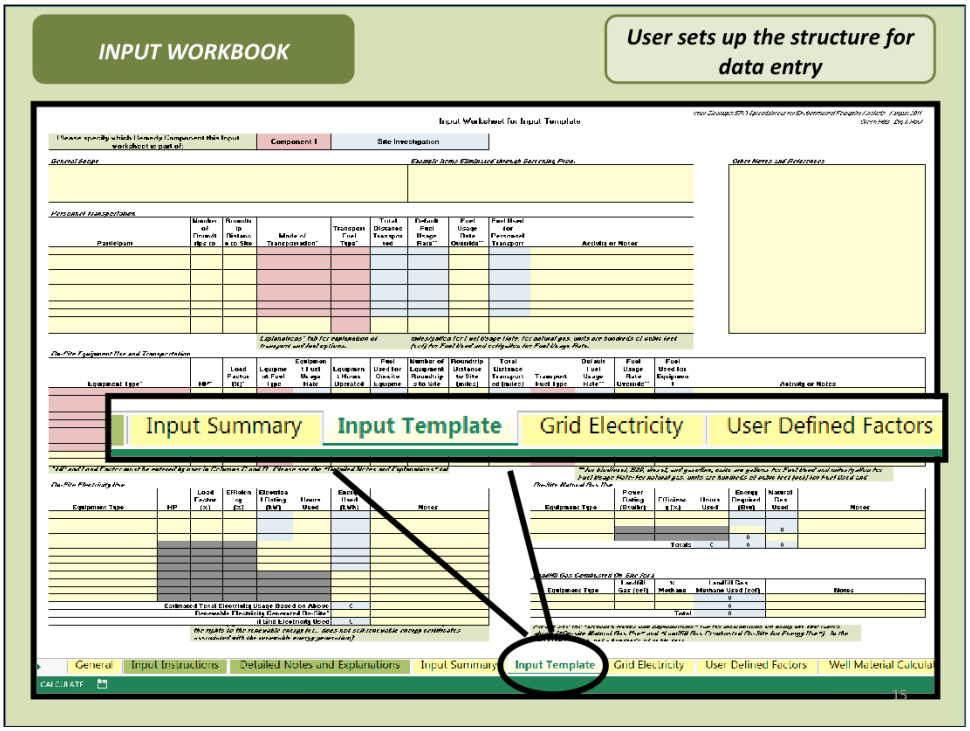
* ***Different stages of the remedy.*** You may have questions about how the footprints for the various stages of the remedy differ from one another (illustrated here for a dig & haul remedy).

* ***Alternative remedy designs.*** You may want to compare permutations of the same basic remedy (illustrated here for a pump & treat remedy).

* ***Specific remedy activities.*** You may want to consolidate all similar activities into key groups such (illustrated here for fuel usage, waste management, etc.)

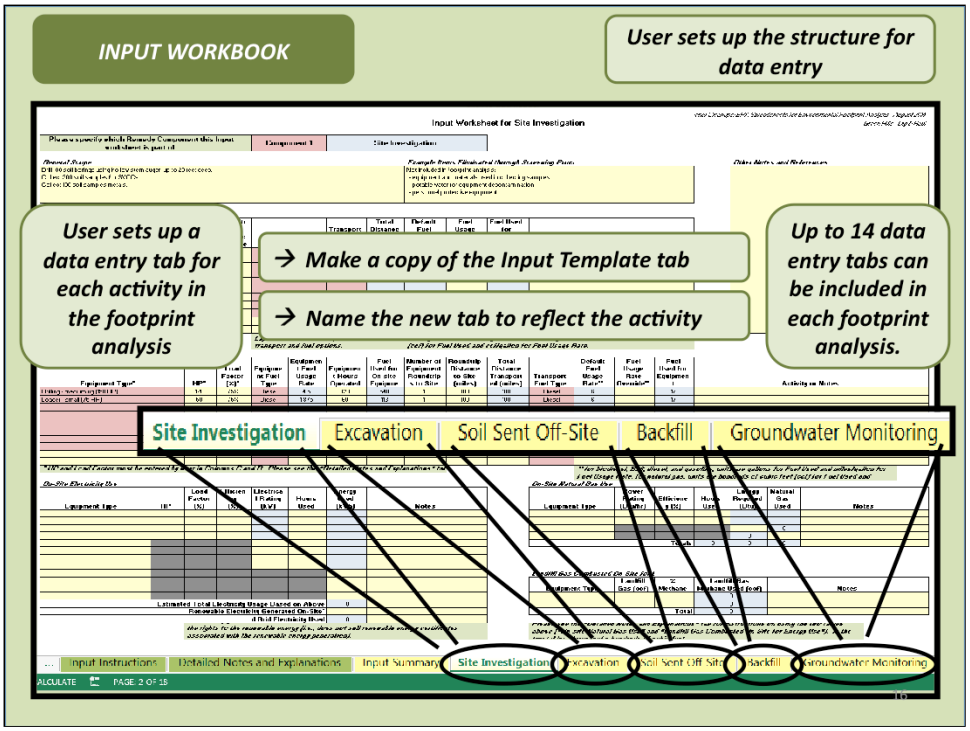
* ***Separate years in the remedy.*** You may want to track the footprint for each year of the remedy (illustrated here for a bioremediation remedy).

→The user should establish the goals and scope of the footprint analysis in advance, and then set up the Remedy Components to reflect the goals and scope.



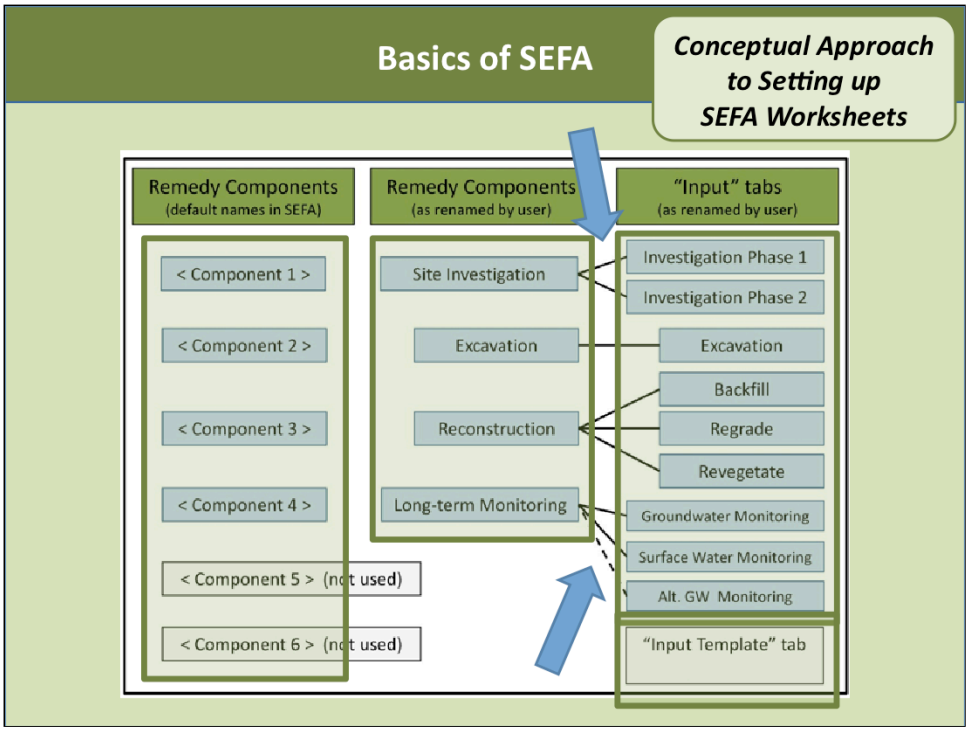

**Notes**

→This is a screen shot of the main data entry tab in the Input Workbook where the user enters specific information about the remedy.




**Notes**

→The number of tabs you make and what activities you use them for will depend on the goals and scope of the footprint analysis.




**Notes**

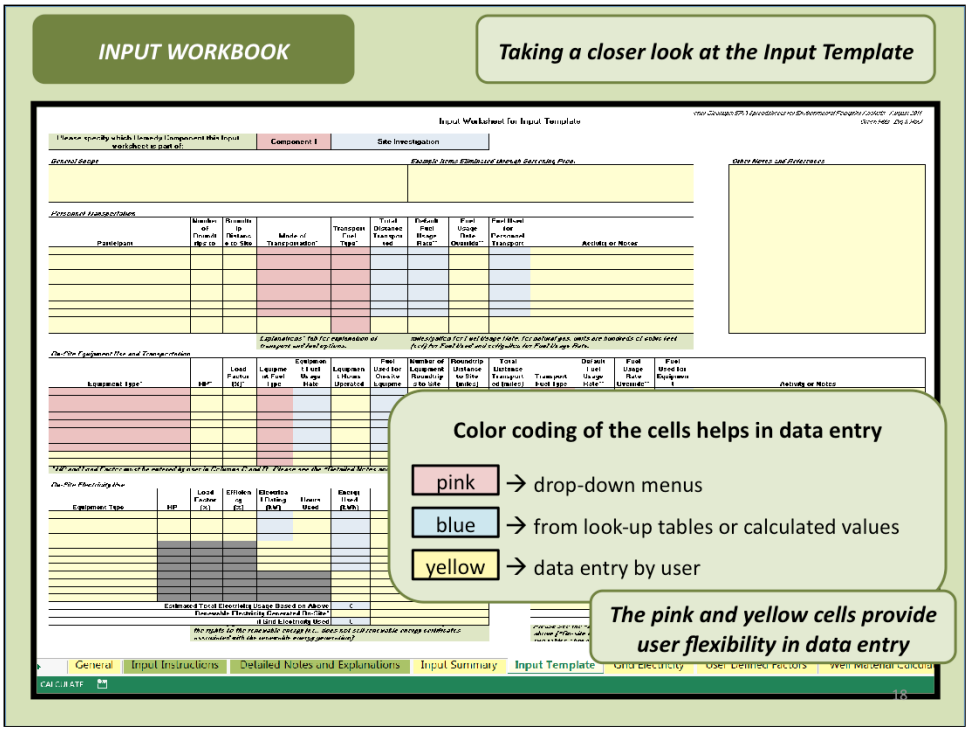
→This illustrates the conceptual approach to organizing the Remedy Components and the data entry tabs.

→SEFA is set up with default names for the Remedy Components (Main Workbook), and a single Input Template tab (Input Workbook).

→In this schematic representation:

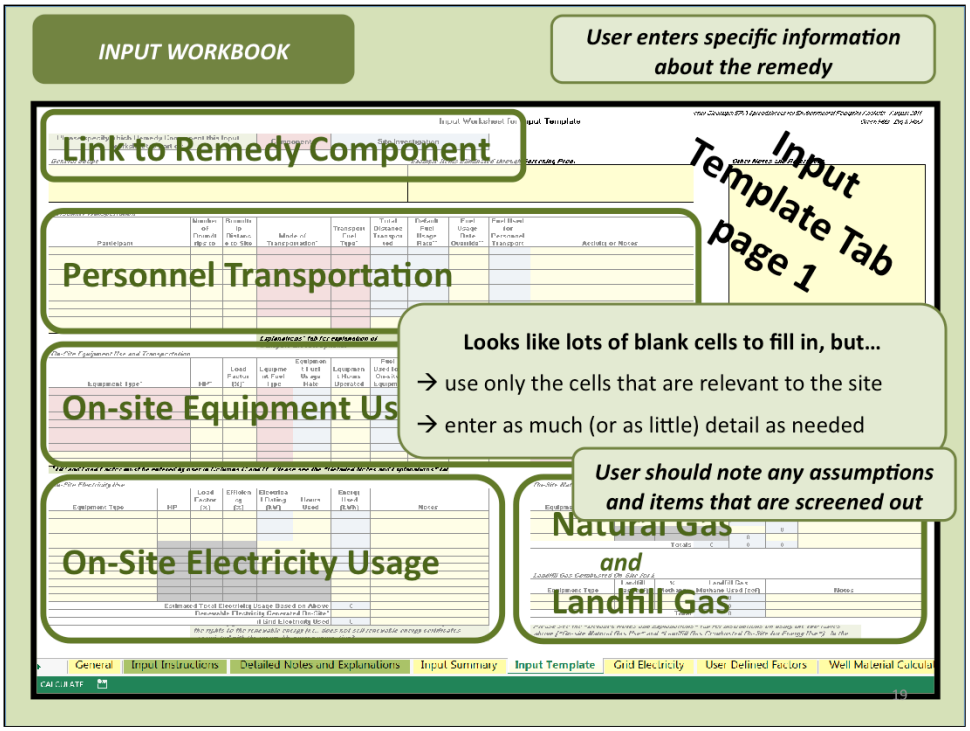
* Four of the Remedy Components have been named by the user.
* Data entry tabs have been made for nine separate activities.
* Each of the activities is associated with the one of the Remedy Components.

→This allows flexibility for the user to subdivide the Remedy Components, if that is useful for the goals of the footprint analysis.



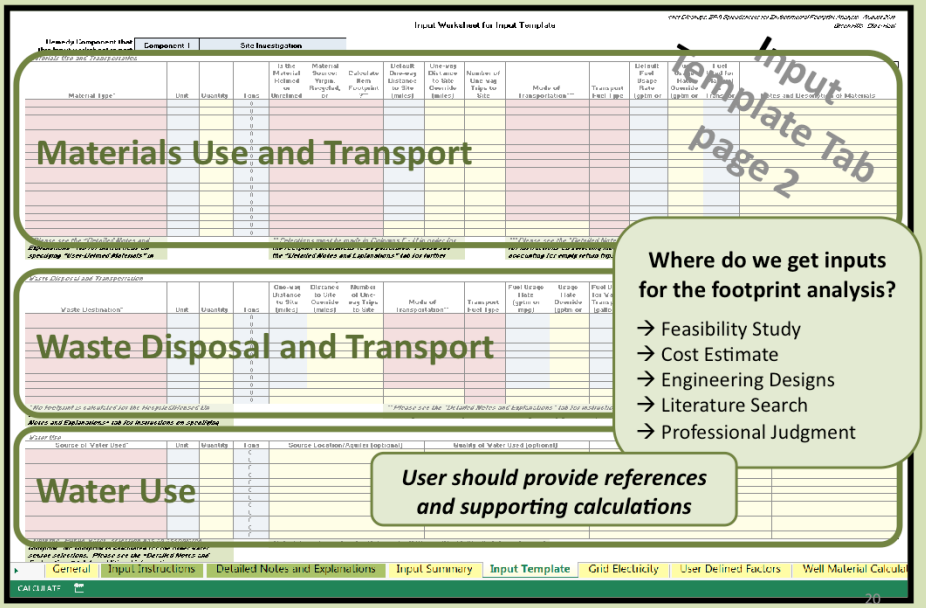

**Notes**

→Reminder: this is data entry worksheet where the majority of the remedy information is entered.


INPUT WORKBOOK
User enters specific information about the remedy
Link to Remedy Component
Input Template Tab page 1
Personnel Transportation
On-site Equipment Us
Looks like lots of blank cells to fill in, but…
→ use only the cells that are relevant to the site
→ enter as much (or as little) detail as needed
User should note any assumptions and items that are screened out
On-Site Electricity Usage
Natural Gas
and
Landfill Gas
General
Input Instructions
Detailed Notes and Explanations
Input Summary
Input Template
Grid Electricity
User Defined Factors
Well Material Calcula

**INPUT WORKBOOK**

***User enters specific information about the remedy***



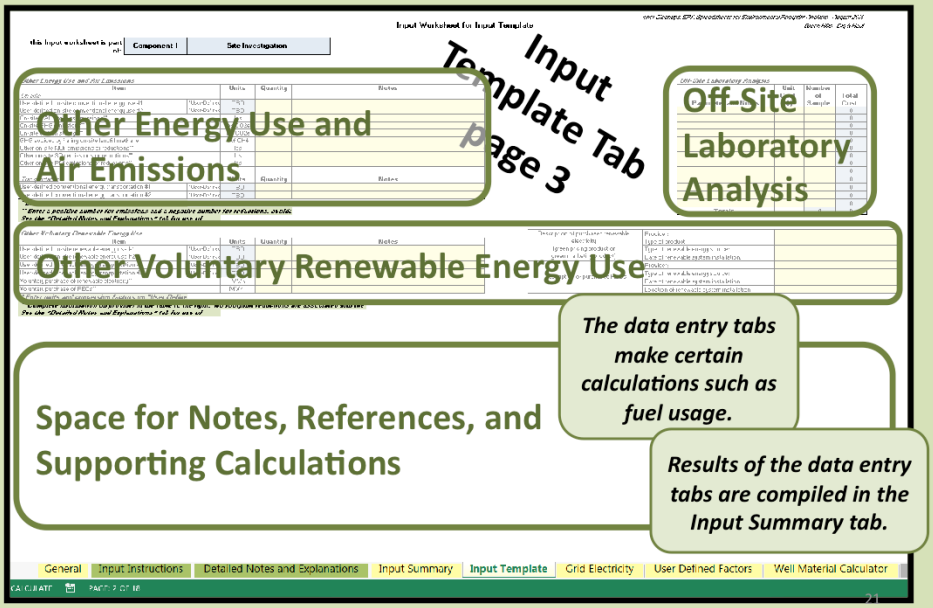

**Where do we get inputs for the footprint analysis?**

- → Feasibility Study
- → Cost Estimate
- → Engineering Designs
- → Literature Search
- → Professional Judgment

***User should provide references and supporting calculations***

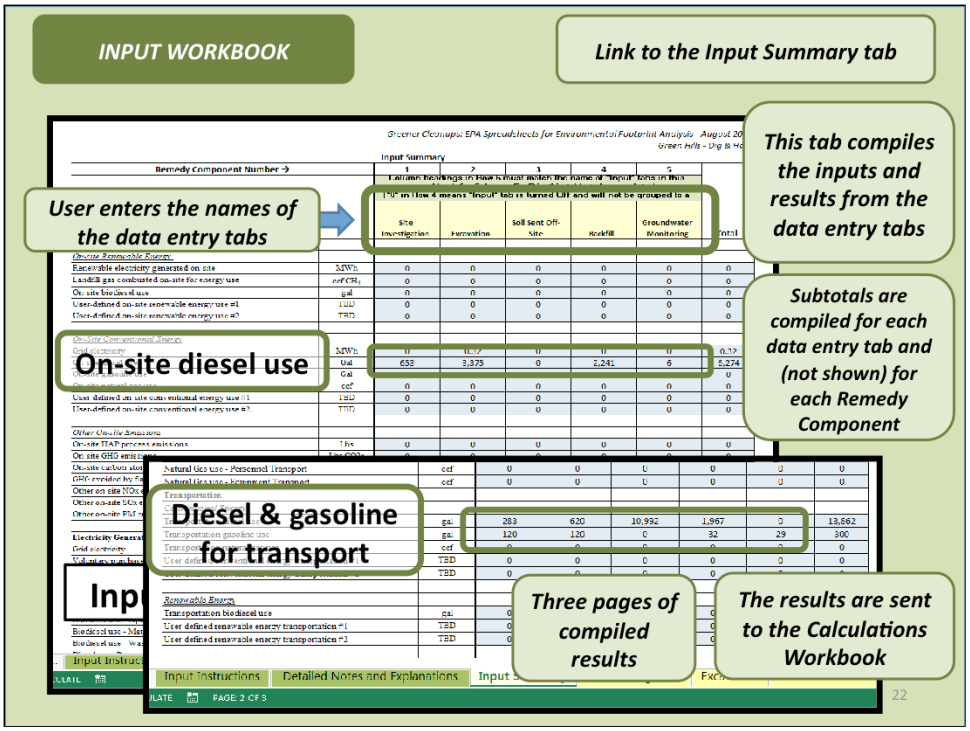
**INPUT WORKBOOK**

***User enters specific information about the remedy***




***The data entry tabs make certain calculations such as fuel usage.***

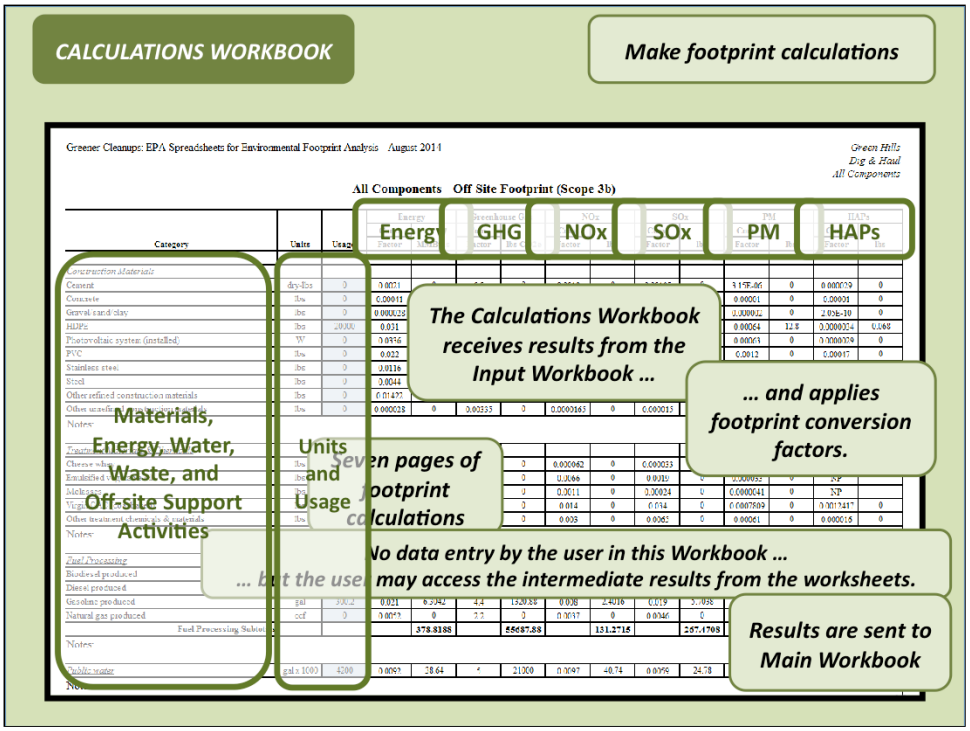
***Results of the data entry tabs are compiled in the Input Summary tab.***




**Notes**

→This is a screen shot of the Input Summary tab in the Input Workbook.

→A maximum of 14 data entry tabs can be compiled at one time on this tab.




**Notes**

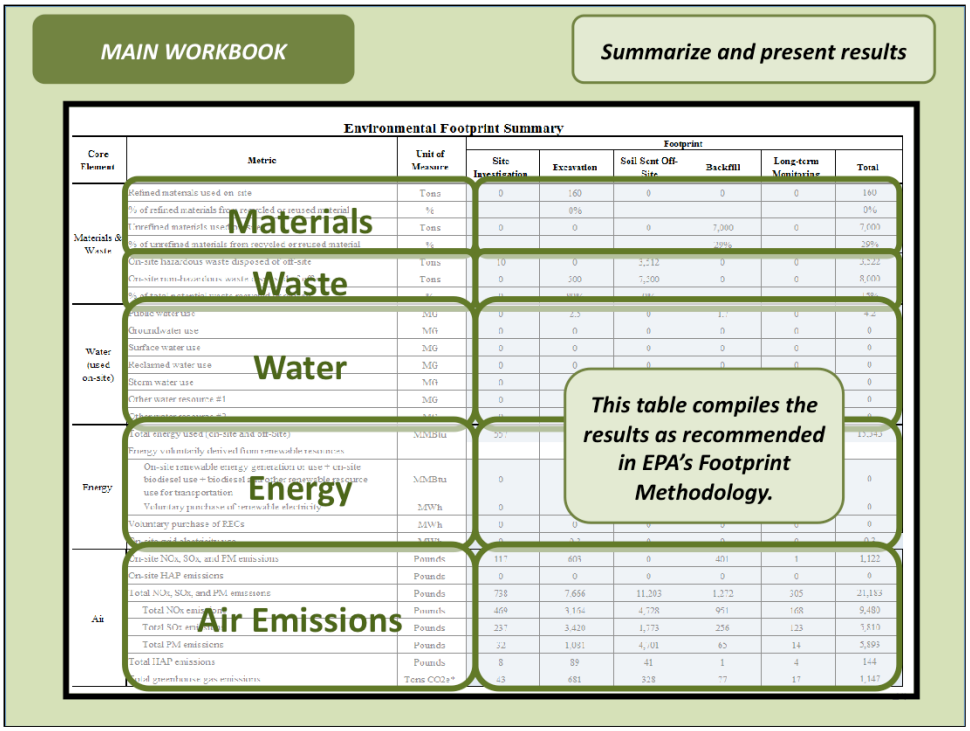
→This is a screen shot of one of the tabs in the Calculations Workbook which receives the results of the Input Workbook. This is where the footprint calculations are made.

→There is a calculations tab for each Remedy Component, and for all Remedy Components combined.

→The footprint conversion factors in this table are based on information from public sources and references are included in the SEFA workbooks.

→The intermediate results in the Calculations Workbook are useful for understanding nuances of the footprint.

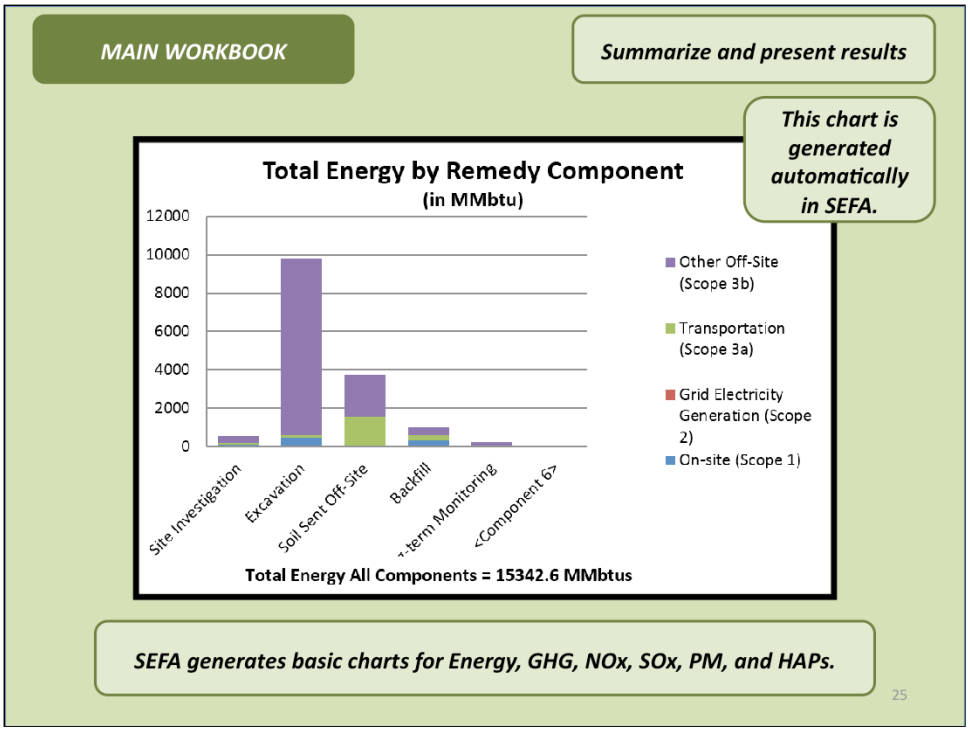
→The metrics on this worksheet are calculated and compiled as suggested in the Footprint Methodology.




**Notes**

→ This is a screen shot of the Summary Table in the Main Workbook, where the results of the footprint analysis are presented.

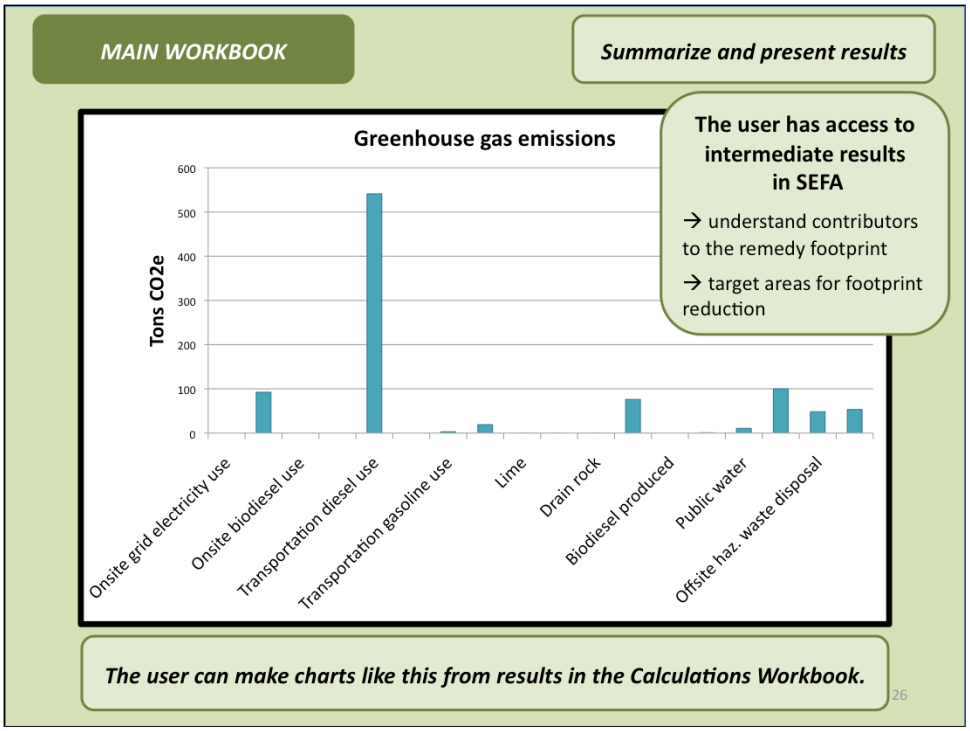
→ The metrics on this worksheet are presented as suggested in the Footprint Methodology, for the core elements of Materials, Waste, Water, Energy, and Air Emissions.




**Notes**

→This is an example of a chart that is generated in the Main Workbook.

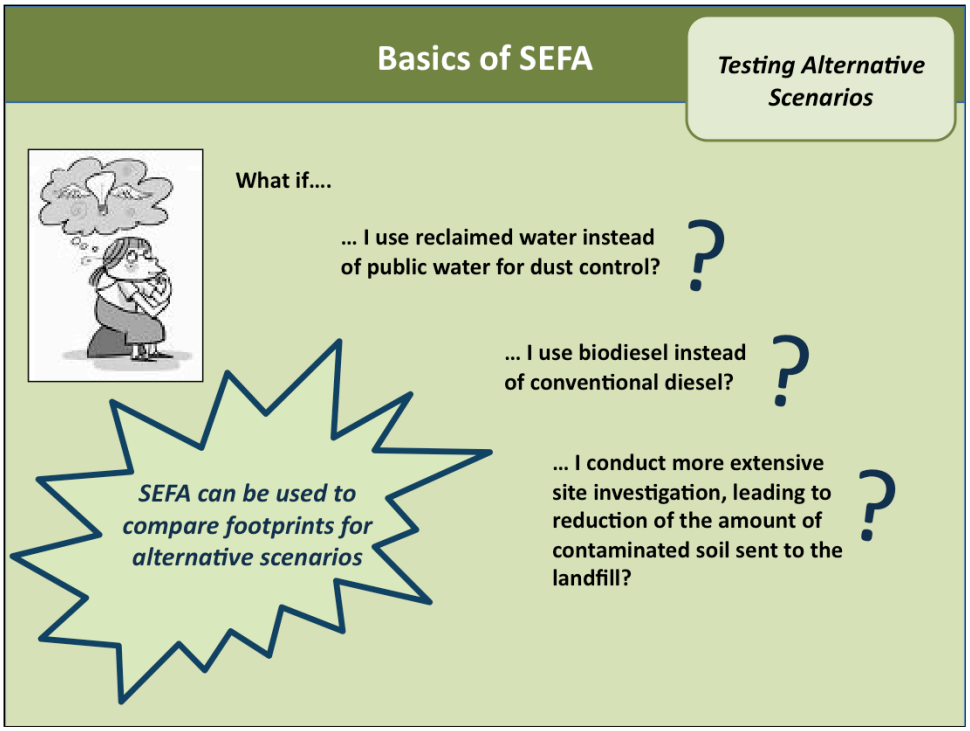
→This type of chart is useful for identifying which Remedy Components have the largest footprints.




**Notes**

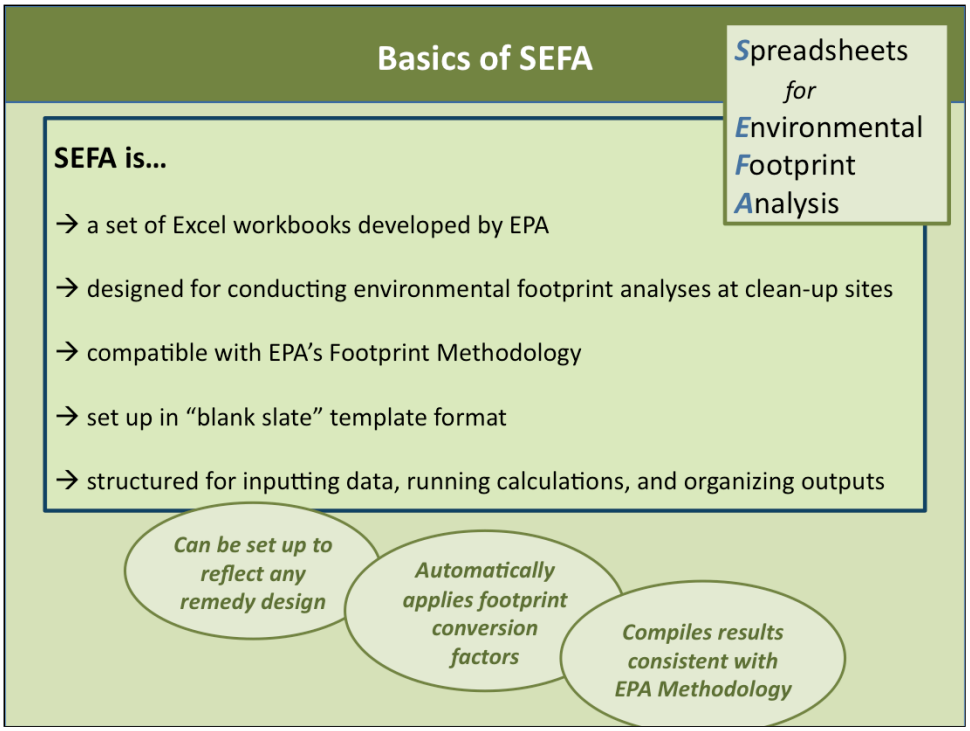
→This is an example of a chart that the user can make with relative ease from the intermediate results in the Calculations Workbook.

→This chart is not provided automatically by the SEFA workbooks.




**Notes**

→ The SEFA workbooks are designed to allow the user to assess alternative scenarios or BMPs fairly easily.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SEFA is…
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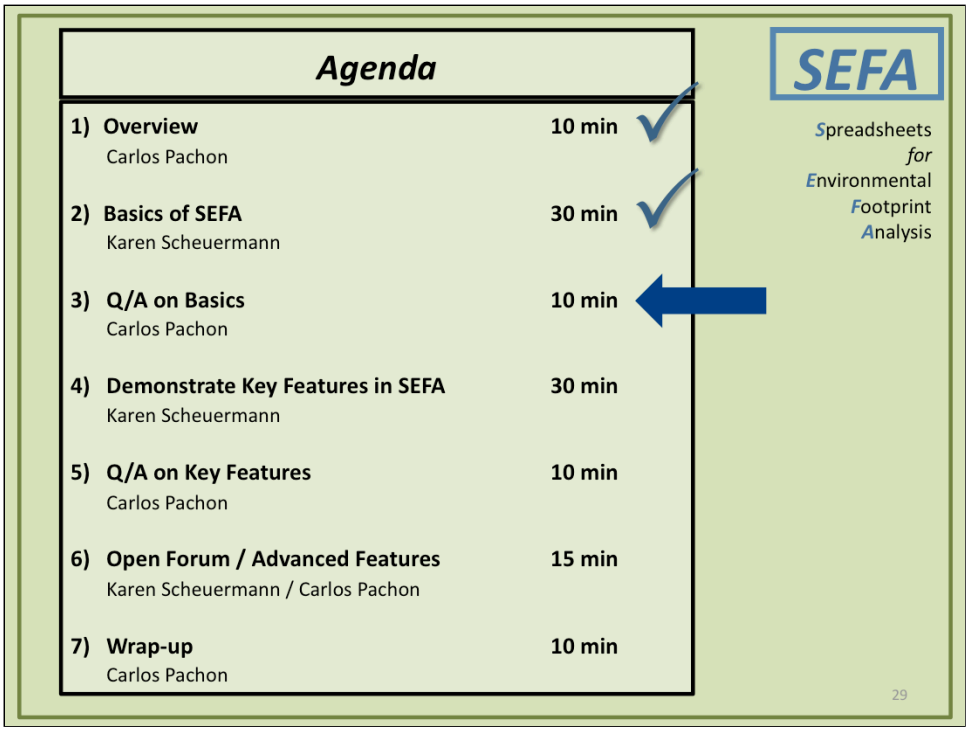
→ compatible with EPA's Footprint Methodology
→ set up in "blank slate" template format
→ structured for inputting data, running calculations, and organizing outputs
Can be set up to reflect any remedy design
Automatically applies footprint conversion factors
Compiles results consistent with EPA Methodology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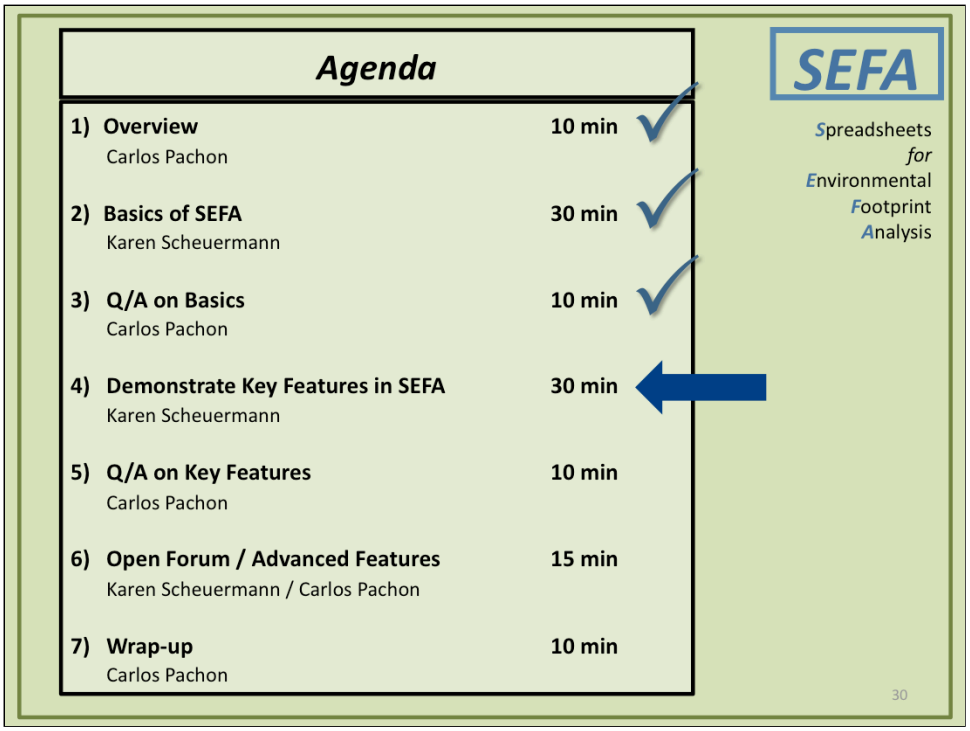
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## Demonstrate Key Features in SEFA

***(A) Brief walk-through of the workbooks***

→ *Highlight some features that don't show up on screenshots*

→ *Will visit only a few tabs in the workbooks*

***(B) Demonstrate three key features in SEFA***

→ *Add a new activity to the remedy*

→ *Provide the fuel mix for grid electricity*

→ *Add new remedy material with unique footprint conversion factors*

***Instructions in SEFA provide information on these three features***

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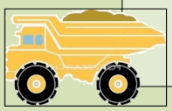
## Demonstrate Key Features in SEFA

*Our Hypothetical Site*

*Simple Dig & Haul Remedy*



**Remediation at "Green Hills" Site**

- conduct site investigation
- excavate contaminated soil
- transport soil to off-site landfill
- backfill excavated areas
- pump and treat system
- conduct groundwater monitoring

*In this demonstration a new activity (regrading) will be added to the remedy.*

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## Demonstrate Key Features in SEFA

*Instructor opens SEFA Workbooks and demonstrates key features in the worksheets*

***All three workbooks must be open at the same time***

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## Demonstrate Key Features in SEFA

*Recap*

→ *this has been a very simple site and remedy*

→ *for a real site, can enter as much or as little detail as may be appropriate*

***SEFA provides:***

→ *format for data entry*
→ *application of footprint conversion factors*
→ *compilation of results*

***The user:***

→ *sets up structure of analysis to reflect site*
→ *provides remedy inputs and documentation*
→ *enters data directly into the spreadsheets*

***Your footprint analysis can be tailored to specific questions at your site***

***EPA is using SEFA at some of our cleanup sites and we welcome the use of SEFA by site owners and PRPs***

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## Demonstrate Key Features in SEFA

*Instructions in SEFA provide full information on these features*

*Tutorial illustrating all features of SEFA will be available on Clu-in*

**SEFA has additional features such as:**

- **Modeling renewable energy sources**
- **Modeling carbon storage (e.g. from planting trees)**
- **Overriding fuel usage rates**
- **Representing alternative modes of transport and fuels**

***These and other features in SEFA allow flexibility for accurately modeling specific site and remedy conditions.***

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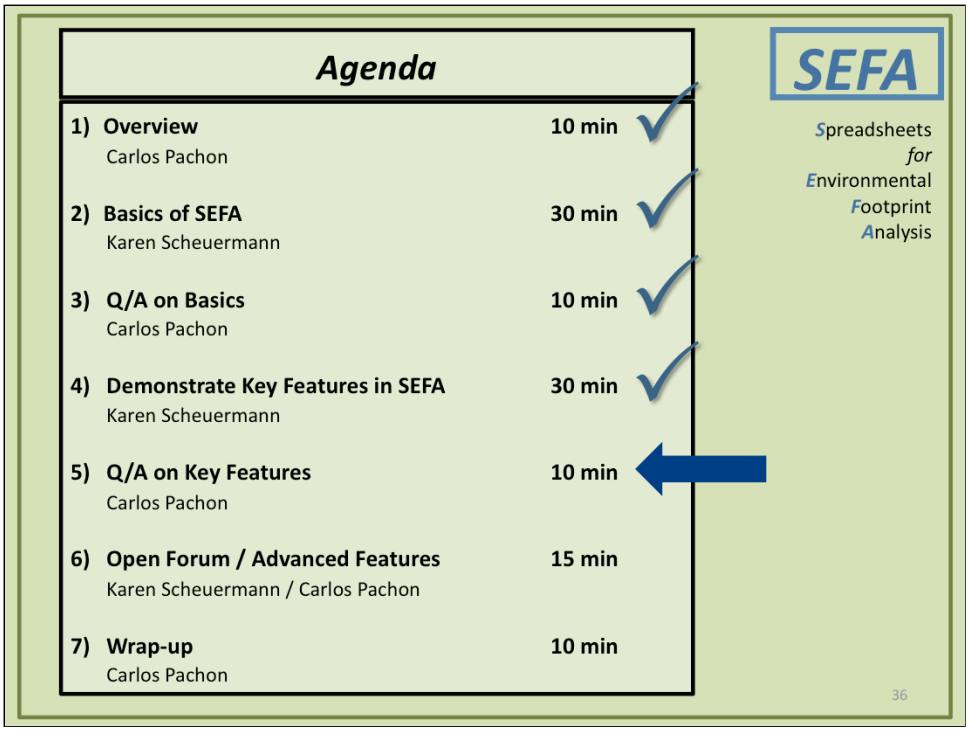
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3) Q/A on Basics 10 min
Carlos Pachon
4) Demonstrate Key Features in SEFA 30 min
Karen Scheuermann
5) Q/A on Key Features 10 min
Carlos Pachon
6) Open Forum / Advanced Features 15 min
Karen Scheuermann / Carlos Pachon
7) Wrap-up 10 min
Carlos Pachon
SEFA
Spreadsheets
for
Environmental
Footprint
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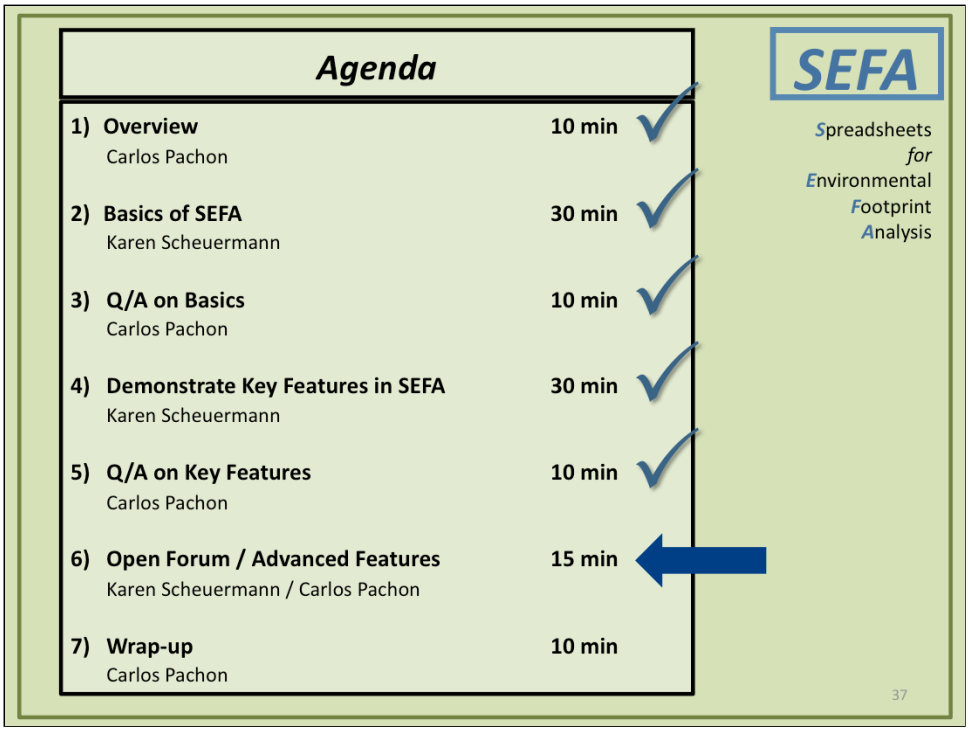
Agenda
1) Overview
Carlos Pachon
10 min
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SEFA

Spreadsheets *for* Environmental Footprint Analysis

# *Wrap-up*

- → ***SEFA is one part of EPA's Greener Cleanups approach***
- → ***The SEFA worksheets are available on EPA's Clu-in website***
- → ***EPA is continuing to use SEFA for our footprint analyses***
- → ***We welcome the use of SEFA by site owners and PRPs***
- → ***We'd love to hear of your experiences. If you have interesting application of SEFA let's get the word out.***

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## Estimating Environmental Footprints Using SEFA

### *Resources*

**Footprint Methodology (full document)**
www.clu-in.org/greenremediation/subtab_b3.cfm

**Footprint Methodology (2-page fact sheet)**
www.clu-in.org/greenremediation/methodology/docs/GR_Overview_of_Footprint_Methodology_FS_3-29-12.pdf

**SEFA Worksheets**
www.clu-in.org/greenremediation/subtab_b3.cfm

### *Contacts*

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***Other Related Topics***

**BMP Fact Sheets**
*www.clu-in.org/greenremediation/*

**Profiles of Green Remediation**
*www.clu-in.org/greenremediation/tab_d.cfm*

**Archived Webinars**
*www.clu-in.org/greenremediation/subtab_b6.cfm*

*Thank you for your interest in Greener Cleanups!*

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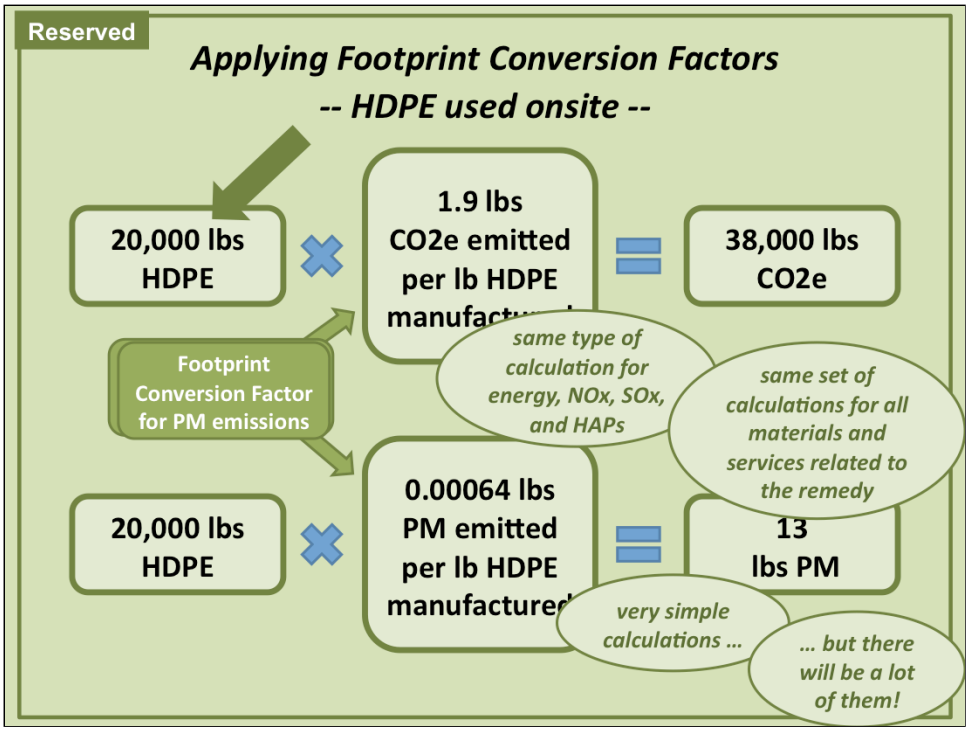


**Notes**

→ This slide reserved for use if needed to demonstrate the application of footprint conversion factors.