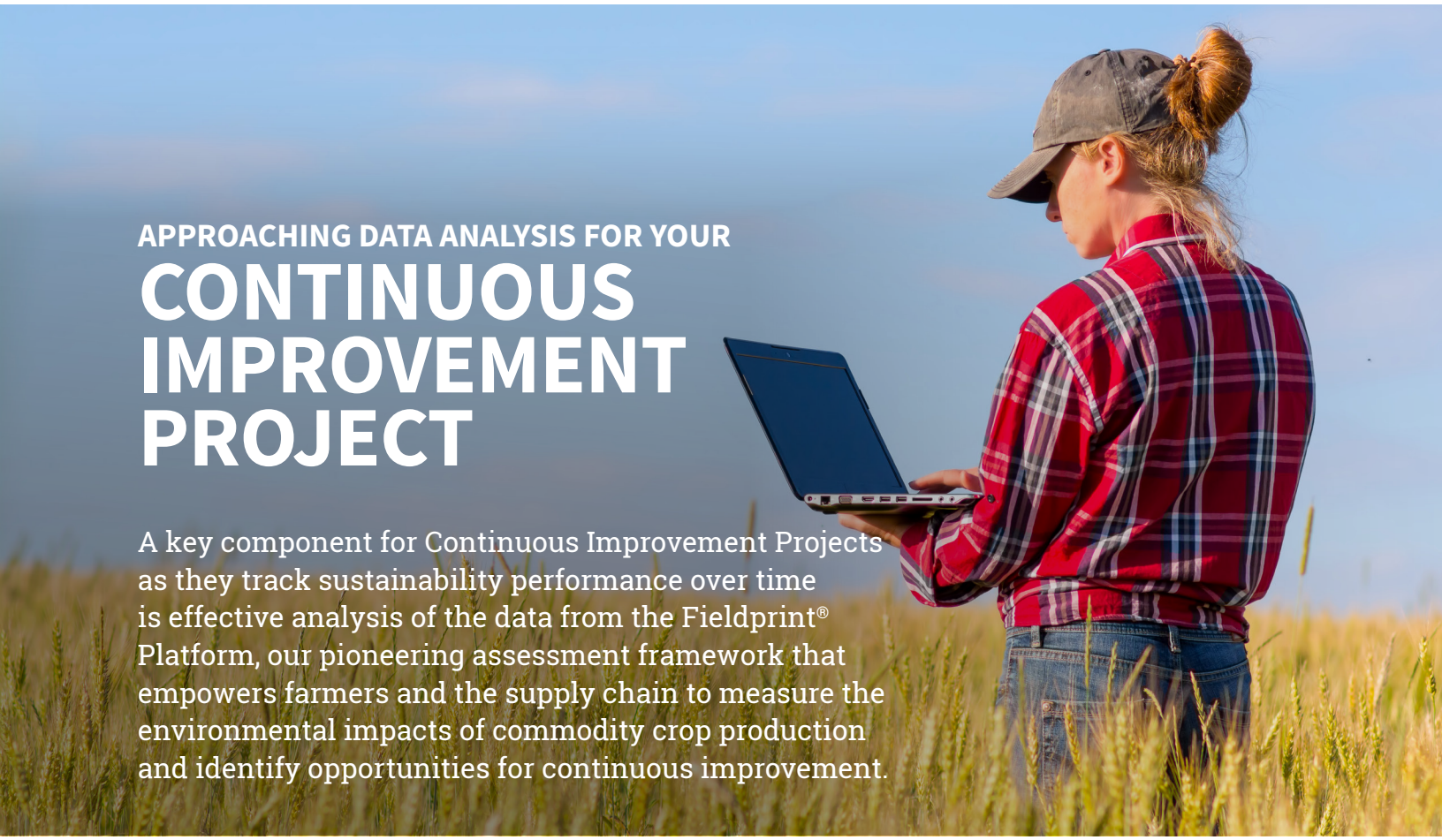

APPROACHING DATA ANALYSIS FOR YOUR

CONTINUOUS IMPROVEMENT PROJECT

A key component for Continuous Improvement Projects as they track sustainability performance over time is effective analysis of the data from the Fieldprint® Platform, our pioneering assessment framework that empowers farmers and the supply chain to measure the environmental impacts of commodity crop production and identify opportunities for continuous improvement.

Use this document to learn more about the principles for conducting data analysis for your project, both in the first year of the project and across subsequent years.

Principles of Data Analysis

Analyzing data that is generated by your Continuous Improvement Projects can provide a temperature check of performance and highlight opportunities to talk about how your project is driving continuous improvement over time. While analysis can be conducted on projects of any size, anonymized data sets should not be shared where less than 10 growers are represented in a Project Year in order to protect grower anonymity.

Projects are encouraged to analyze data using methods that are a good fit for the amount of data points and number of years that are available. Larger data sets may be able to use more sophisticated analysis tools, while smaller data sets can still be useful in identifying trends and improvement opportunities.

Making Public Claims About Your Data

If you identify a trend during data analysis which you would like to share publicly, these claims should be approved by Field to Market. Please submit a Claims Approval Form via Field to Market's Member Portal.

Understanding Your Data Analysis Results

The data may show that there are opportunities to make changes that were not originally targeted in your project's continuous improvement plan. For example, a project may need to use more advanced practices, such as nitrogen stabilizers.

Analysis of individual grower performance across the project may highlight opportunities within the project itself. Project Grower Meetings should be held to show where the project is starting, and show growers where performance is high, and where improvement is needed. This information should be tied back to the objectives of the projects. Also, for anonymity, this information should only be shown where projects have 10 or more growers, using anonymized data.

Analysis of First Year of Data

Your first year of data can serve as a one-year baseline that can be used to assess directional improvement over time. After quality assessment (ensuring that any "suspect values" (outliers) are explained and/or corrected as needed), an anonymized data set can also be used for:

- **Understanding the Baseline** – If you have already identified your project's baseline, then scatter plot the results of each grower anonymously for each metric. Are there growers who are performing particularly well on one or more metrics? What can be learned from those growers?
- **Calculate the Baseline** – If a baseline has not yet been established, you can use an anonymized data set to calculate one. For quantitative metrics, this can be a weighted average by grower of the metric (which will give a weighted average score per bushel), a range of the metric scores (which will show the highest to the lowest)

Projects need a weighted average to complete analysis to ensure parity no matter farm size. The example below explores how to determine a weighted grower average based and how these can be used to determine the overall project average for Greenhouse Gas Emissions (GHG). This example also depicts the process of how to use the weighted average when enrolled acres are higher than entered acres in the second table.

TABLE 1

Calculating Grower Average Yield (Entered Acres)

Farmer	Actual Field Production (bu)	GhG metric (CO2e/bu)	Total Field GhG (Co2E)	Grower Average GhG (CO2eq/bu)
1	4250	6	25500	
1	18000	9	162000	
1	31500	12	378000	
Total	**53750**		**565500**	
				10.52
2	17500	8	140000	
2	25000	10	250000	
Total	**42500**		**390000**	
				9.18

Using the weighted average entered acres yield to calculate enrolled acres average yields:

TABLE 2

Estimated Project Average Greenhouse Gas (lb CO2e/bushel)

Farmer	Total Enrolled/ Managed Bushels (Bu)	Estimated Grower Average GHG (lb CO2Eq/bu)	Total Estimated Farm Production (bu)
1	195455	10.52	2056364
2	944444	9.18	8666667
Total	1139899	10.52	10723030
		9.18	
Project Average		**9.41**	

Two or More Years of Data

With two or more years of data, your project can start to look for directional improvement. You should ensure that you have rerun project data using the most recent metric algorithms so that the comparison across years is valid.

Data analysis will differ between the five sustainability metrics which are quantitative, and the remaining three metrics which are qualitative.

QUANTITATIVE METRICS

Land Use
(acres per unit of production)

Energy Use
(BTU of energy used per unit of production)

Irrigation Water Use
(acre-inches of water applied per additional unit of production)

Greenhouse Gas Emissions
(pounds of carbon dioxide equivalent (CO_2e) per unit of production)

Soil Conservation
(tons of soil loss per acre)

Analysis Options:

- **Improvement vs. a Year-1 baseline:** Projects can use scatter diagrams of grower results for each metric for each year of data to look for directional improvement in the quantitative metrics.
- **Improvement in the range of outcomes observed within a project over time:** For example, a project with 20 fields entered could report the individual scores as a range (e.g. GHG Metric outcome ranged from 7.1-10.2 CO_2e/bu in year 1 of the project) and then report having seen improvement in that range over time with the low scoring performers rising to a higher standard, if the data supports that claim.

QUALITATIVE METRICS

Biodiversity
represented as the Habitat Potential Index

Soil Carbon
represented as the Soil Conditioning Index

Water Quality Index

Analysis Options:

- Projects may be able to reference the percent of growers who have improved over time to convey project improvement. This requires analysis of individual grower scores, and counting how many have improved.

Qualitative and Quantitative Metrics

- **Directional Improvement** - qualitative and directional language can be used to describe outcomes. For example, rather than reporting the HPI scores or GHG Emissions numerically, a project could state that some percentage of their enrolled farms had an improved HPI score
- **Aggregated data analysis** – Data can be aggregated as the weighted average value for metrics per grower per year instead of looking at individual fields

Statistical Analysis

Larger data sets with larger numbers of growers and acres may present opportunities for analysis that are more complex than can be appropriately described in this handout. Some previous analysis has included:

- Distribution analysis
- Trend analysis
- Defining a representative sample for future projects

Getting Help with Analysis

Projects may generate a significant amount of data over time. If you feel that you need a data analyst to support your Continuous Improvement Project data, you should look for the following qualifications in a data analyst:

- ☑ Experience in agronomic sciences
- ☑ General knowledge of how inputs vary by crop and where to find contextual information about crop production
- ☑ Proficient in a programming language to manipulate large data files
- ☑ Attention to detail; a single erroneous input could result in inaccurate Fieldprint Results
- ☑ Ability to generate summaries, graphs, and provide interpretations of the data given
- ☑ Ability to conduct data quality control, find suspected errors and outliers, and provide recommendations on how to fix them