
D3/CI: From a Plant Perspective

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TEAMWORK

D3/CI success stories
need 9-D+ teams

Dynamic
Diverse
Discover/Detect
Dialogue/Discussion
Detailed/Discerning
Direction



MINDSET





EACH FACILITY HAS A UNIQUE STORY



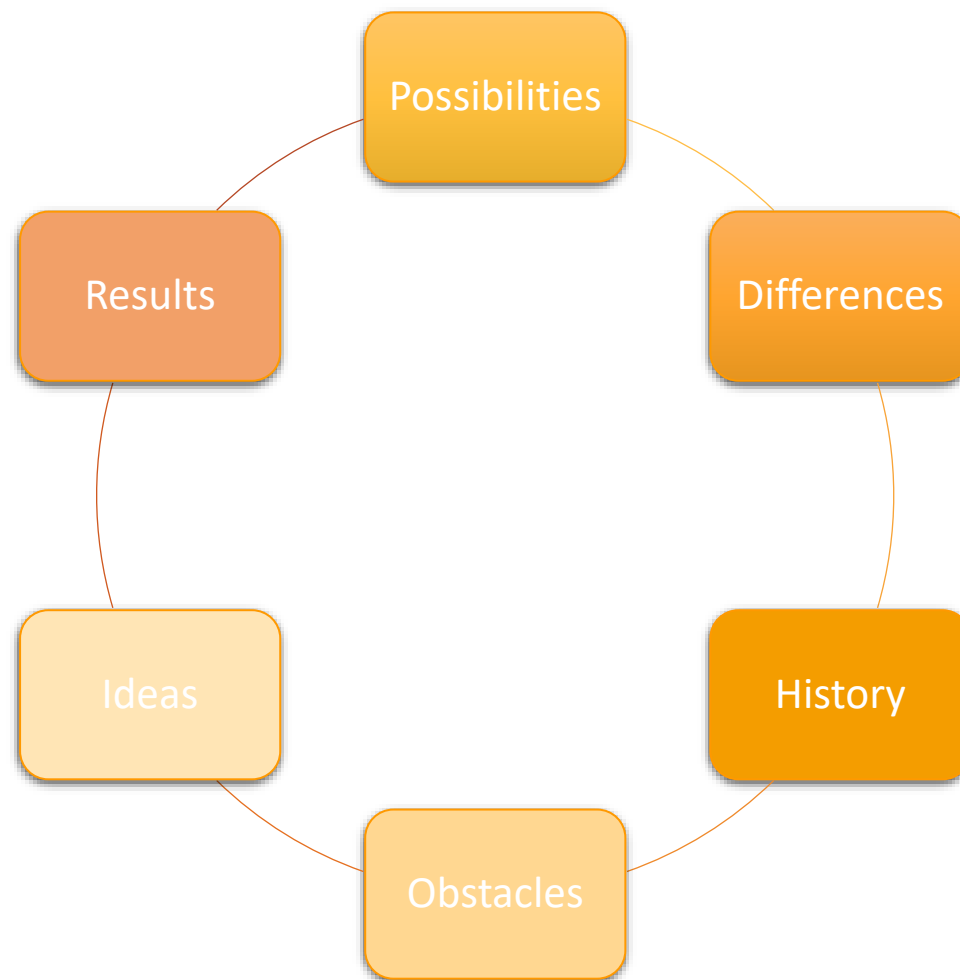
Understand your story and be able to tell it

- Know the why's, how's

Your own yield, your own feedstock, your own process idiosyncrasies---

- Day to day
- Crop year Oct-Sept
- Crop year to Crop year
- Ops team A to Ops team B
- Farmer A to Elevator Z
- Cleaning routines
- Normal operations
- Optimizations
- Production Goals

WITHIN YOUR UNIQUE STORY LOOK FOR



How To Prepare for Project?

What does the facility need to know about the project before starting?

What does D3/CI look at?

What is the facility's technology?

What is a realistic timeline?

What can hold up the timeline?

What does the facility need to know about the project before starting?

Become an expert in the regulations.

- Literature is available on the CARB and EPA websites about the regulation.
- ASTM E 3181

Learn what is involved in the calculations:

- The calculation looks at the dry mass of the renewable feedstocks of starch and cellulosic content.
- **Dry mass of what has been converted/ Dry mass of what is capable of being converted.**

What other resources are needed?

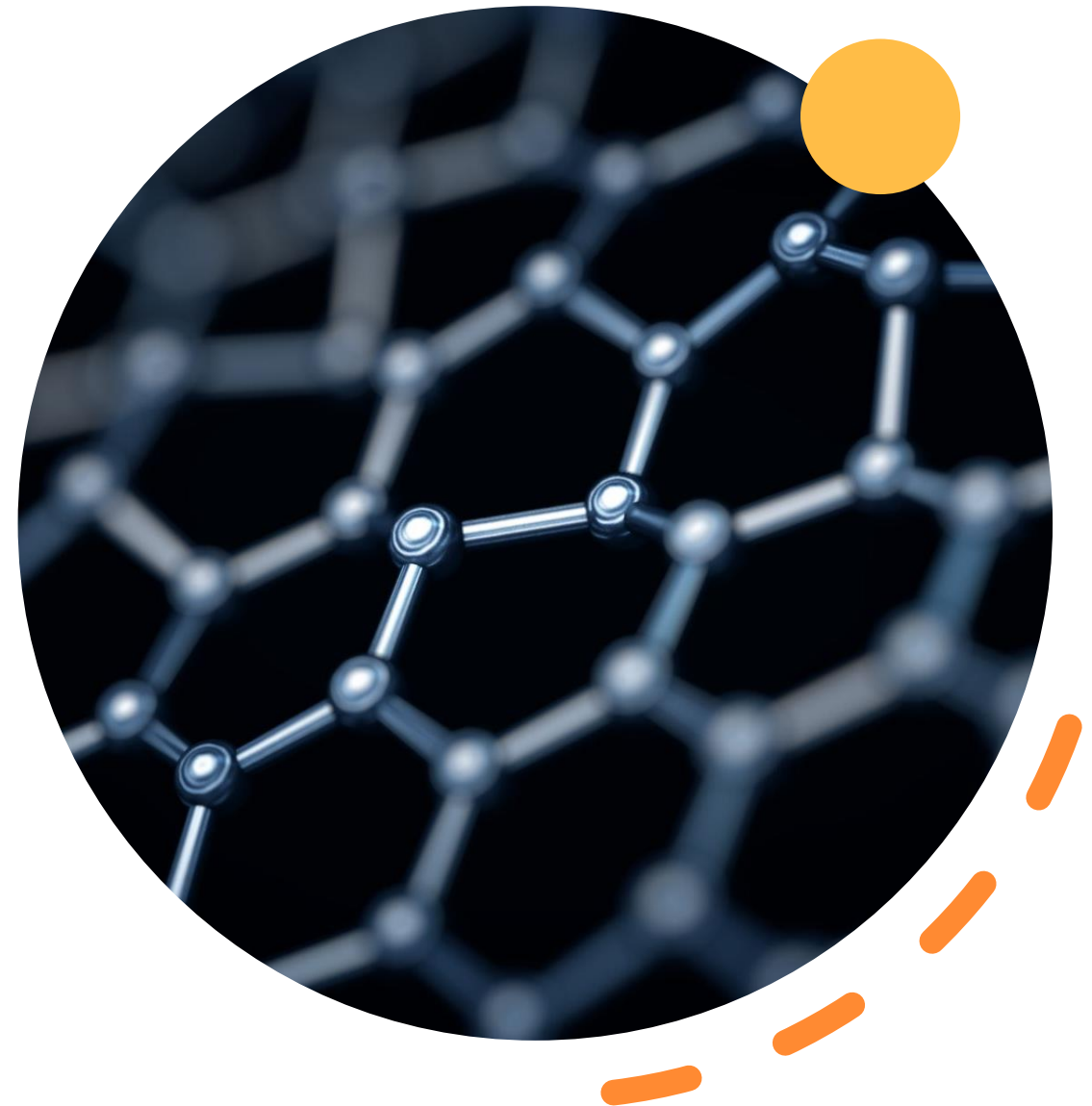
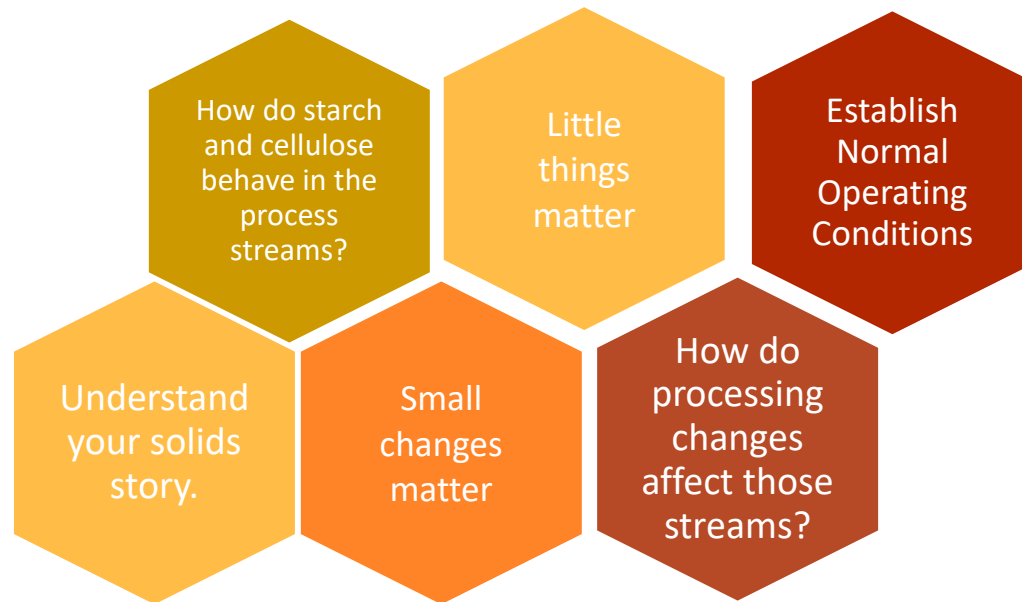
- Third Party Engineering Firm
- Analytical Testing Laboratory
- Validation and Verification Firm

What Does D3/CI Testing Look At?

- Important! The calculation is using the dry mass of starch and cellulosic content.
- Where does the starch and cellulosic content originate?

solids

D3/CI Is A New Perspective On Solids

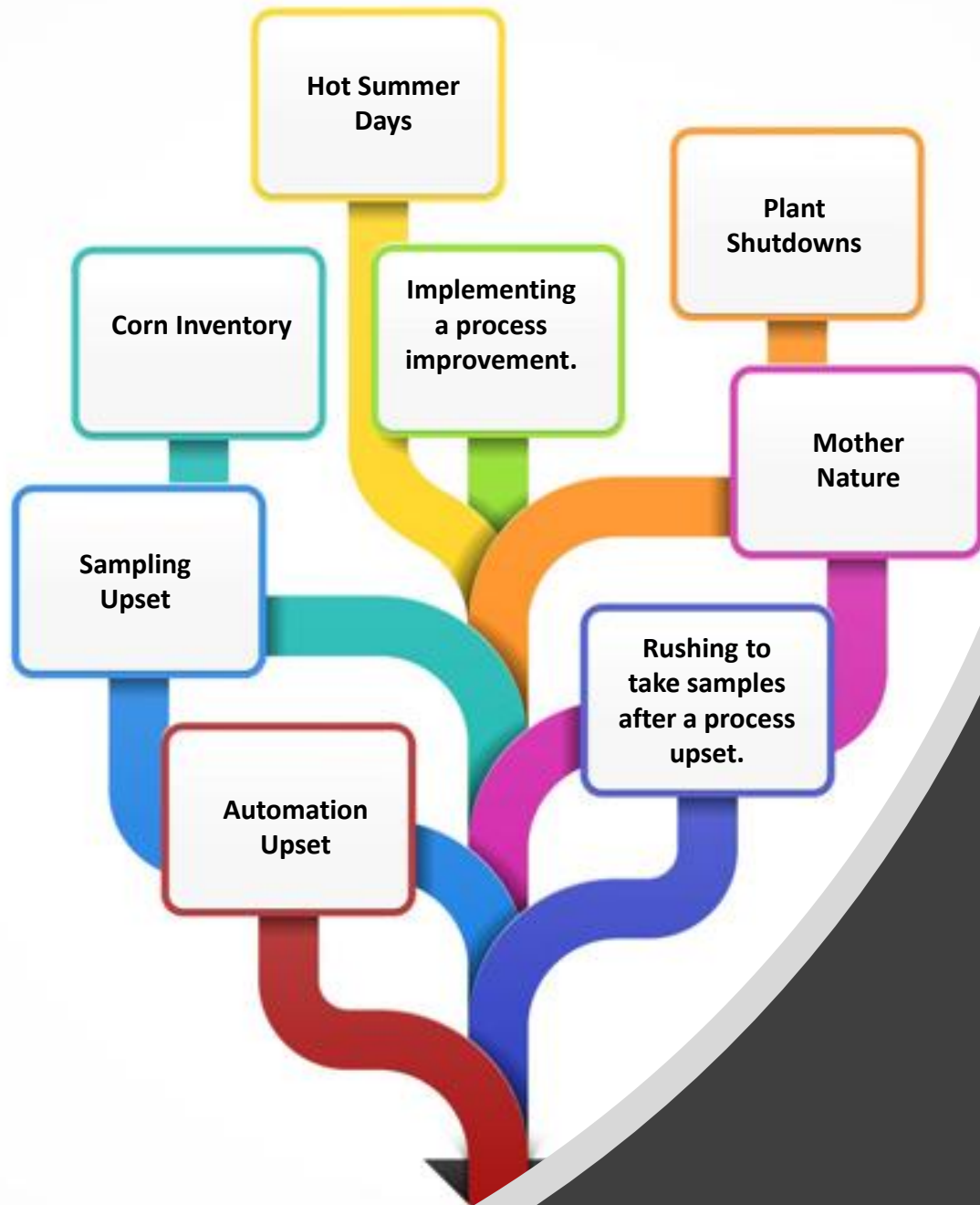


What Is the Facility's Technology?

- What is a technology?
 - **It is the process that the facility uses to convert cellulosic components to fuel.**
 - We look at the process following what the EPA and CARB are looking for.
 - Enzymatic, etc
 - **This process will need to meet the following criteria according to 40 CFR 80.**
 - “At registration or during registration updates under § 80.1450(d)(3), all producers seeking to use a cellulosic biofuel pathway that converts cellulosic biomass to fuel (currently rows K (ethanol), L, M, and N of Table 1 to § 80.1426, or as otherwise approved by EPA), must demonstrate that their production process has the ability to convert cellulosic components to fuel by including
 - **(1) a process diagram with all relevant unit processes labeled and a designation of which unit process is capable of performing cellulosic treatment;**
 - **(2) a description of the cellulosic biomass treatment process; and**
 - **(3) a description of the mechanical, chemical, and biochemical mechanisms by which cellulosic materials can be converted to fermentable sugars or biofuel products.**
 - In addition, an **independent professional engineer** must verify that the equipment to perform each of the relevant unit processes required to convert cellulosic biomass to biofuel is in place as part of registration, in order to demonstrate that the conversion process will derive the finished fuel from cellulosic components.”

What Is A Realistic Timeline?

- Plant decided to start down the path of D3/CI.
- Select a technology pathway—Enzyme, processing
- Run the technology pathway to ensure plant is running in steady state with new technology online.
- Select an engineering firm, analytical laboratory, and verification firm.
- Start initial work with analytical body.
 - Testing plan is established. Initial work before collection period starts
 - Initial work to meet statistical requirements for D3/CI programs.
 - Start the **90 day** data collection period for CARB.
 - During this window is when a Temporary pathway is applied for at CARB. The CI score during this window is 50.
 - This is the window for the plant to start its sample collection and show how consistently it runs. This is done by looking at the consistency between certification sampling and meeting the statistical criteria set forth by the regulatory bodies.
 - **20% CV between batches in the certification sets**
 - **10% RPD between certification batches**
 - Once the 90 day data collection is complete and all the statistics are met it is submitted to CARB by the engineering firm.
 - Once CARB approves then a verification audit is completed.
 - The audit body send the findings to CARB.
 - CARB reviews and approves. Updated CI score is approved, and provisional pathway is in use.



What Can Hold Up The Timeline?



