

# How To Future Proof Your Automation Investments from Pilot to Production

Utilizing a Pilot to Production Strategy  
to Prove Feasibility and Enable Successful  
Greenfield Projects



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# Introduction

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As countries advance initiatives in energy diversification, decarbonation, electrification, and circular supply chains, new industries are emerging and experiencing incredible growth. Whether it be lithium batteries, circular plastics, sustainable aviation fuel, carbon capture, or hydrogen, just to name a few, producers in these industries are looking for ways to get to production and grow quickly and efficiently, all while gaining expertise in new processes and rapidly changing technology. These complex dynamics culminate in a high-risk environment for new capital projects.

As producers look to develop capital projects in this environment, they are identifying the use of pilot plants as a tool to work through challenges at a much smaller scale, with less risk, and to prove commercial and technical viability before moving forward with large capital expenditures. This “pilot to production” approach can be very successful but comes with its own challenges and pitfalls. This document will detail the three main phases of this approach: the pilot plant, capital project execution, and plant operations, as well as highlight some considerations on how to best leverage your automation platform to drive success from pilot to production and beyond.



# Pilot Phase

No two pilot plants are the same, and all have their unique characteristics and requirements, but generally pilot plants are:

- Small in size
  - Generally, most pilot plants are 1-5 process units and less than 500 I/O.
- Come in varying form factors
  - Pilot plants can be as simple as a skid in a trailer, to a unit attached to an existing process, to a miniature version of a full-scale production plant.
- Have unknown lifespans
  - Pilot plant lifespans are uncertain, they are often only utilized and maintained for the time it takes to make the investment decision on the ultimate capital project.

While no two pilot plants will look the same, they do all typically have the same use case: to provide a low-risk environment to work through challenges and learnings that come with a new technology or process, and to demonstrate commercial and technical viability for a large-scale commercial scale production plant.

The small size and unknown lifetime of these pilot plants can lead to the use of a pilot scale automation platform. While this makes sense from a commercial standpoint, it is important to consider the key attributes that are needed for a truly successful pilot project.

## Key Attributes Needed from a Pilot Automation System



### Low & Predictable Capital Investment

Pilot plant solutions must provide a low cost of entry without large capital investments required for maintenance and updates.



### Easy Scalling from Pilot to Production

Start small, with the ability to quickly and easily scale up, both size and functionality, when and wherever needed, without redesign or extra cost.



### Flexible to Changes and Updates

Pilot processes are a learning and demonstration tool for capital project feasibility and technical readiness. These processes must be able to easily adapt to changing requirements.



### Easy to Deploy, Integrate, & Maintain

Pilot systems should be easy to get off the ground and integrate with process technology, and easy to maintain as demo requirements change.



### Enables Process Learnings & Insights

Pilot processes are a lower risk way to validate and improve process IP, and should provide process engineers the ability to analyze pilot performance and improve.



### Enables Large Capital Project Efficiencies

Pilot plants should be an enabler to a capital project, allowing developed project standards, technology, and architecture to be replicated for faster projects with reduced risk.

While many pilot scale automation solutions are great for small applications with a well-known set of requirements, they struggle to provide the level of flexibility and scaling that truly enables a pilot project to be successful. While many pilot plants start with small sets of I/O and simple control requirements, they often require an HMI, historian, I/O changes, ethernet integration, and other functionality to truly be successful. Adding and integrating these applications and functionality as “bolt-on” solutions to the existing pilot control system introduces challenges, complexity, and cost.

The DeltaV DCS is built from the ground up as a *system* that provides a full automation solution for the most complex large projects in the world. With the release of the DeltaV Flex System, you can now take advantage of all the functionality in DeltaV in small scale pilot applications, with a cost effective, predictable, and flexible commercial model. Not only does this give you the ability to easily manage change throughout the pilot project as requirements change, but also ensures you are developing your intellectual property on the same platform that will be used for your production plant. This enables simpler scaling and introduces efficiency and risk reduction for your large capital projects.



## Capital Project

While a pilot project's main goal is to work through technical challenges and answer feasibility questions required to achieve FID, it can also enable a more effective, lower cost, and successful capital project. A recent analysis done by the US Department of Energy focused on Sustainable Aviation Fuel (SAF) pilot projects found that many documented failures in the space were due to mistakes made during the scale-up, including changing process configuration between pilot, demonstration, and commercial scale<sup>1</sup>. Choosing an automation platform that is suitable not just for pilots but also for the largest and most complex commercial-scale projects in the world avoids the challenges that come from changing technology and configuration from pilot to production. DeltaV was designed to easily scale, and future proofs your pilot project investment.

Utilizing a best-in-class automation platform for your pilot system not only eliminates risk and scaling challenges, but it can also introduce efficiencies to reduce cost, further reduce risk, and shorten schedules on your capital project. This is accomplished by leveraging the process, control, and HMI design that was completed and validated during the pilot phase to start your projects configuration library. Since you are using the same platform, no logic changes are needed, and you are starting with a base logic library that has been validated, tested, and optimized on the pilot.

DeltaV includes simple, easy to use, class-based engineering capabilities for both control and HMI configurations, so leveraging your pilot configuration on your project is as easy as "copy-paste". As the project progresses, it is inevitable that new requirements will become apparent to successfully scale the pilot process to commercial production scale. With DeltaV, the same flexibility to scale in both size and functionality that enabled the successful pilot project will ensure you can quickly adapt to deliver an on-time and on budget project.

<sup>1</sup> SAF Grand Challenge Roadmap

# Plant Operations and Lifecycle

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As plants move from pilot to commercial production scale, the need for a highly flexible, scalable, future proof automation platform is just as important as during the pilot and project phase. As these new emerging industries continue to grow and evolve, producers will need to be agile to stay competitive. Often as producers move into production mode, the pilot process or skid is no longer useful and decommissioned. By utilizing the same

automation platform on your pilot process as your production system, your pilot system can continue to be useful for testing and validating new processes, technologies, and feedstocks before introducing them to the production plant. Pilot systems can also be a great tool for training and upskilling your operations teams.





## Conclusion

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Capital industrial projects are risky. This is even more true in new, emerging industries that have many unknowns and a constantly evolving technical and commercial landscape. The “pilot to production” concept can be a great tool to reduce risk and ensure successful, on time, and on budget capital projects. This is best realized when you leverage a best-in-class automation platform that can easily and simply scale from pilot to commercial production scale and provide the flexibility and functionality when and where you need it, from pilot, to production, and throughout the plant’s operation lifecycle.

The DeltaV Flex System enables pilot projects with a cost effective, flexible, and future proof solution. Please reach out to your local Emerson representative to discuss and learn more about how Emerson’s solutions can enable a successful pilot to production approach.

For more information, visit **[www.Emerson.com/DeltaV](http://www.Emerson.com/DeltaV)**.