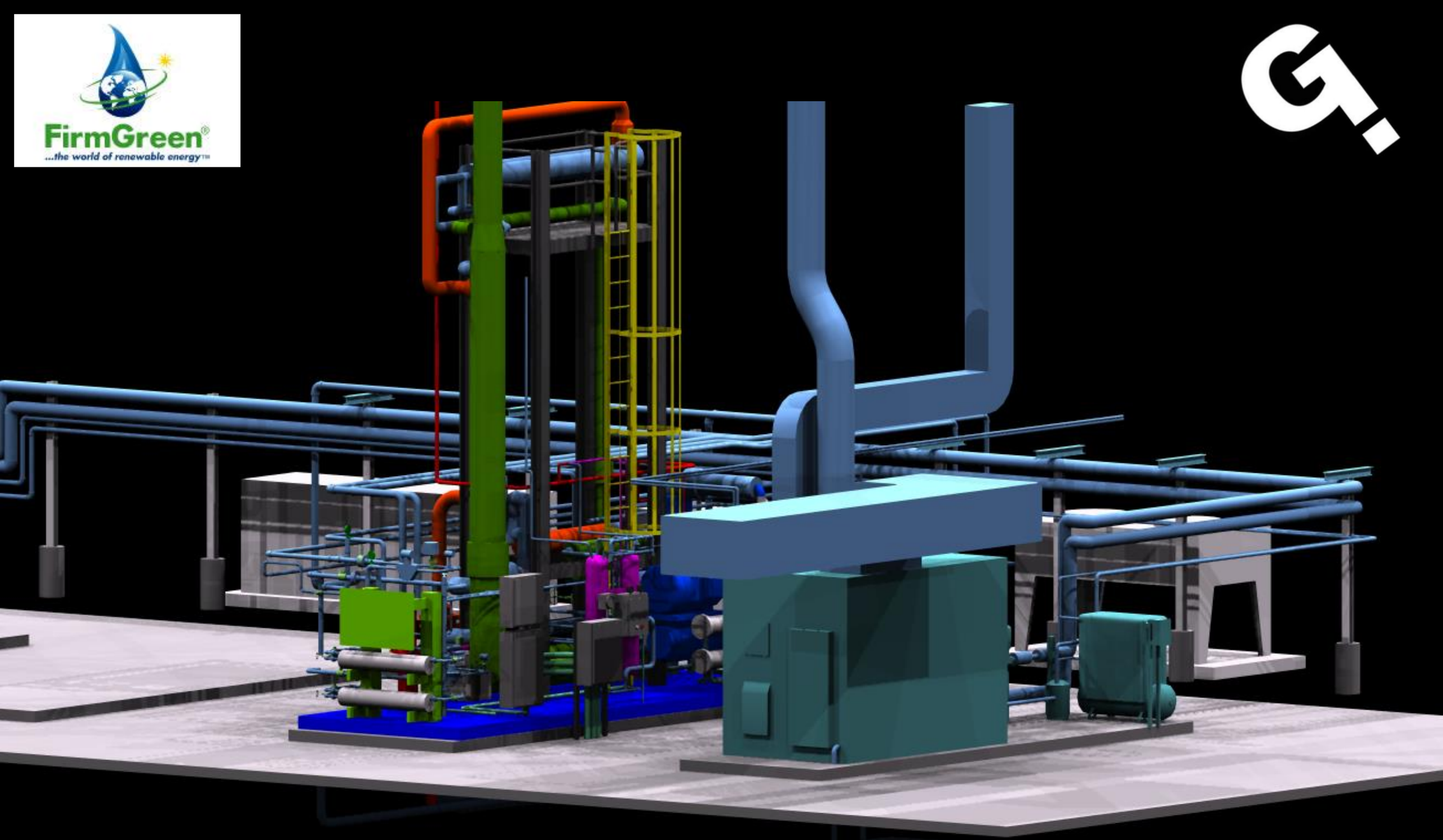
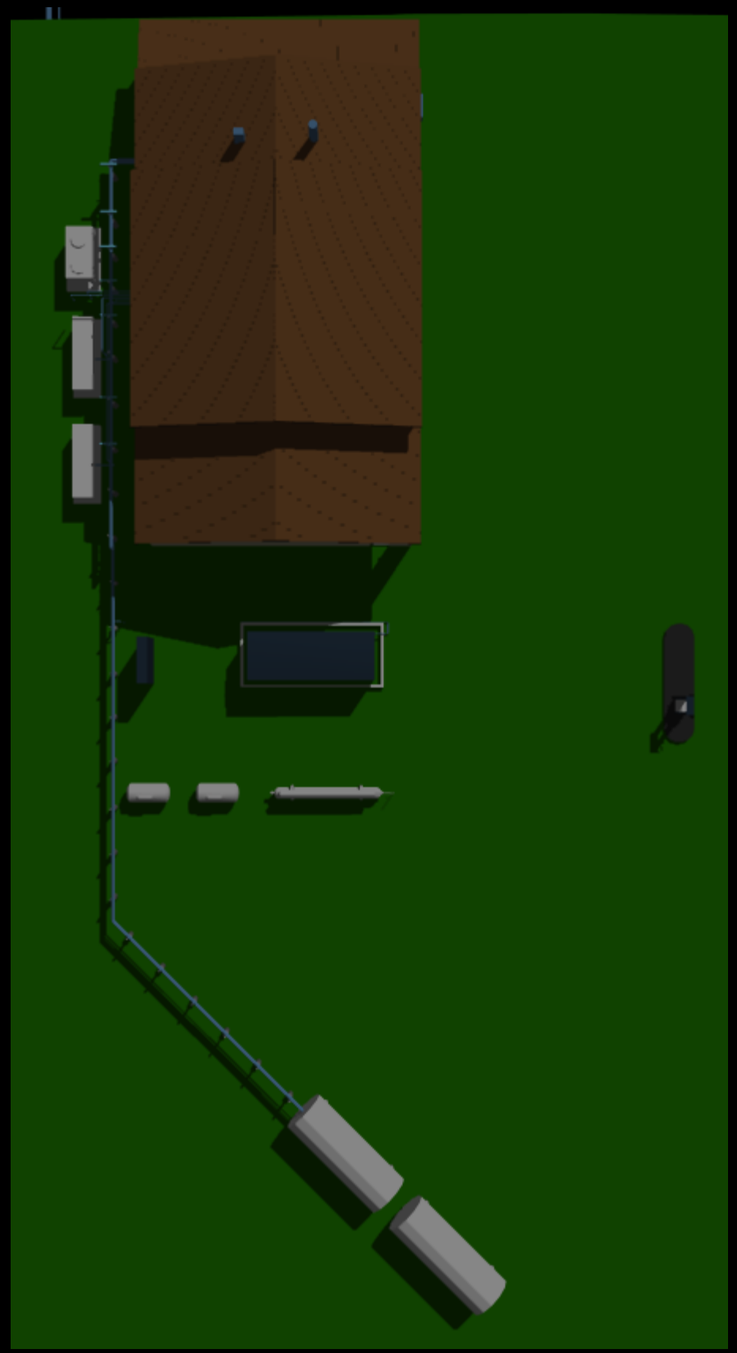
FirmGreen®
...the world of renewable energy™



FirmGreen 3D Laser Scanning & CAD Modeling Project Overview

FirmGreen Project Deliverables Overview



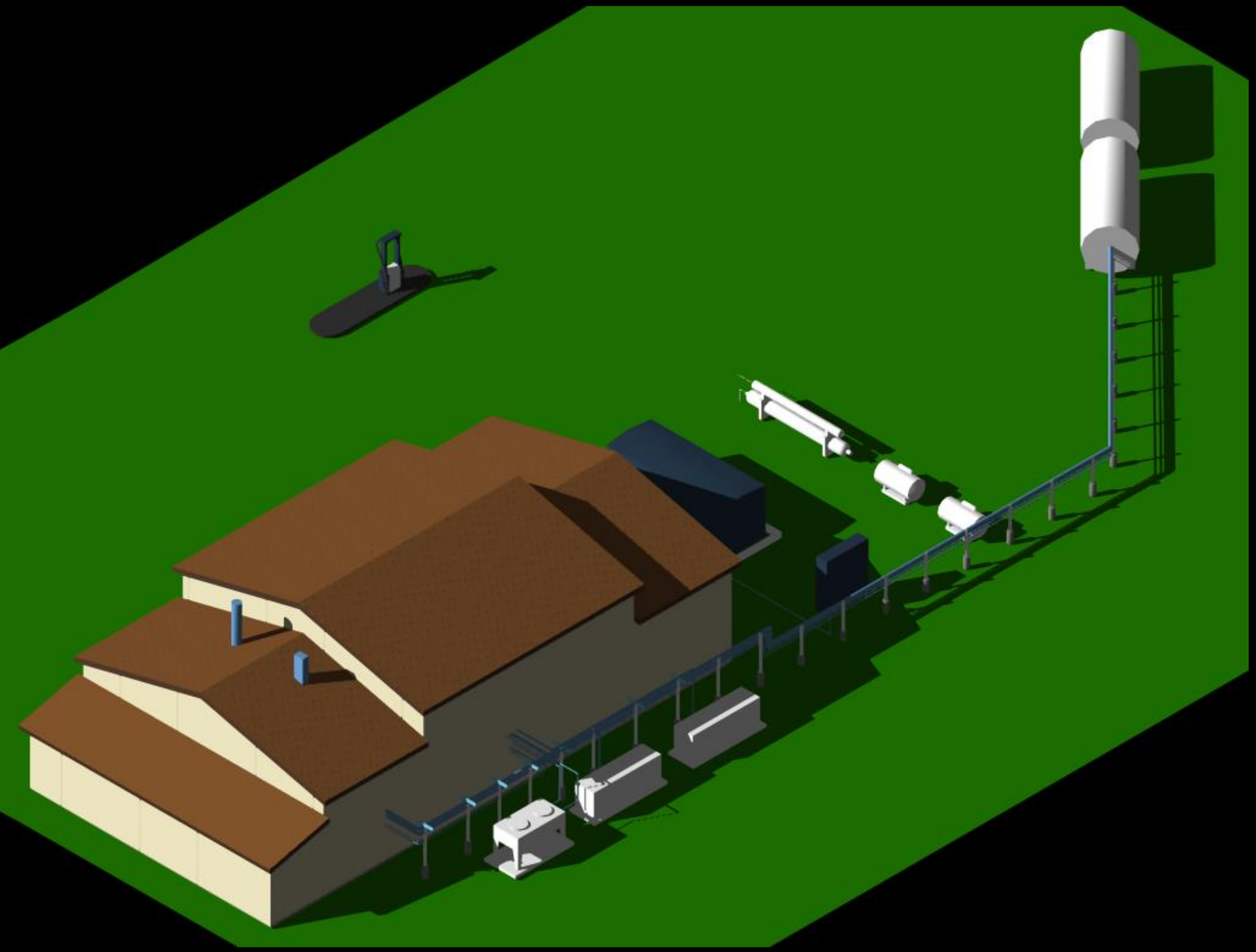
The FirmGreen Columbus, Ohio Site was laser scanned and modeled in 3D utilizing the latest technology available. 20 Individual 360 x 310 degree laser scans were captured at an accuracy level of 5mm across a span of 50m. The laser Scanner generated 500,000 vector points of true x,y,z coordinates applied per second of operation. This vast amount of 3D points is what the industry labels 3D Laser Point Clouds or Scan Worlds.

Once all 20 Scan Worlds were created, they were integrated / registered together thus creating a detailed, accurate three dimensional pointcloud model that can be viewed, measured and marked up via the web.

The 3D Laser Point Clouds were then used as a template to develop an accurate 3D CAD model. This CAD model can be used for numerous applications in the future. From marketing to detailed engineering studies and cost estimates. Ghost Industries created the following renderings and flythroughs that are being presented today from the Scan data and 3D CAD models being delivered to FirmGreen.

In the future, FirmGreen will be able to utilize this data not only for reverse engineering purposes, but continuous improvement and new project development as well.

FirmGreen Project Deliverables Overview



FirmGreen 3D Site Layout

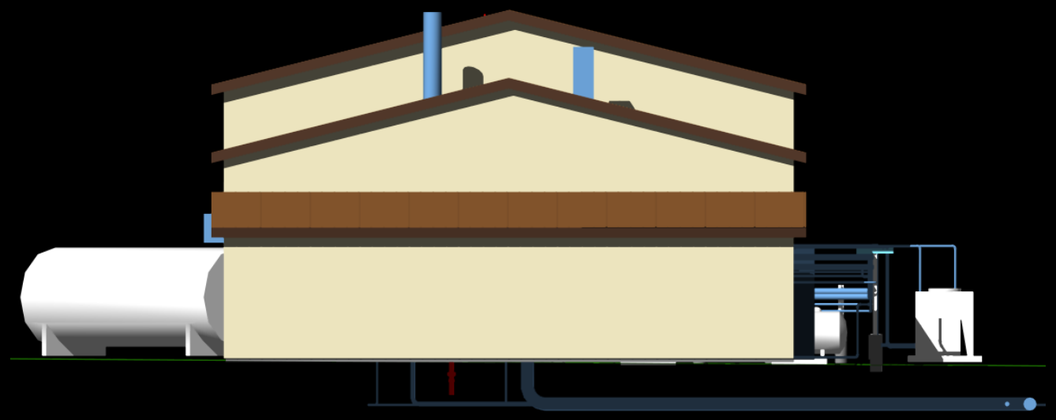
The AutoCAD 2008 based Site plan is comprised of accurate 3D solids that can be easily manipulated for numerous proposes. The layout can also be used to acquire linear takeoff dimensions and future site development to name a few.

The civil terrain was also laser scanned and modeled to reflect real world scenarios for future development.

Data Delivered: *AutoCAD 2008 format .dwg CAD file. .dwf "Drawing for the Web Format*

Viewer application(s) Delivered: *Autodesk Design Review 2009 - .dwg viewer & Autodesk 3D .dwf viewer.*

FirmGreen Project Deliverables Overview

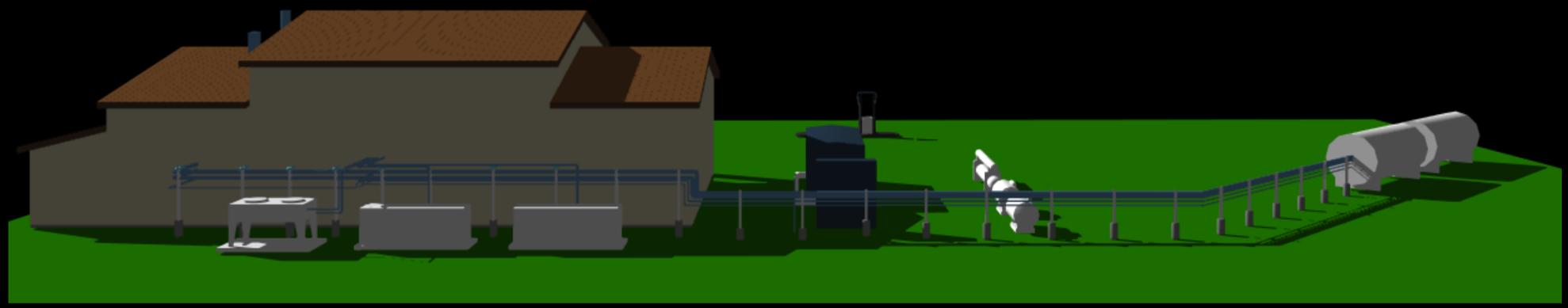


FirmGreen 3D Building Layout

The AutoCAD 2008 based Site & Building 3D layouts are incorporated into one CAD model. The detailed equipment / machine room is also integrated into the single CAD file. Endless sections, elevations & details can be generated from this layout.Also note, the underground utilities are also integrated into the layout based on the FirmGreen supplied AutoCAD layout. Dimensional accuracy for underground piping can not be verified as accurate.

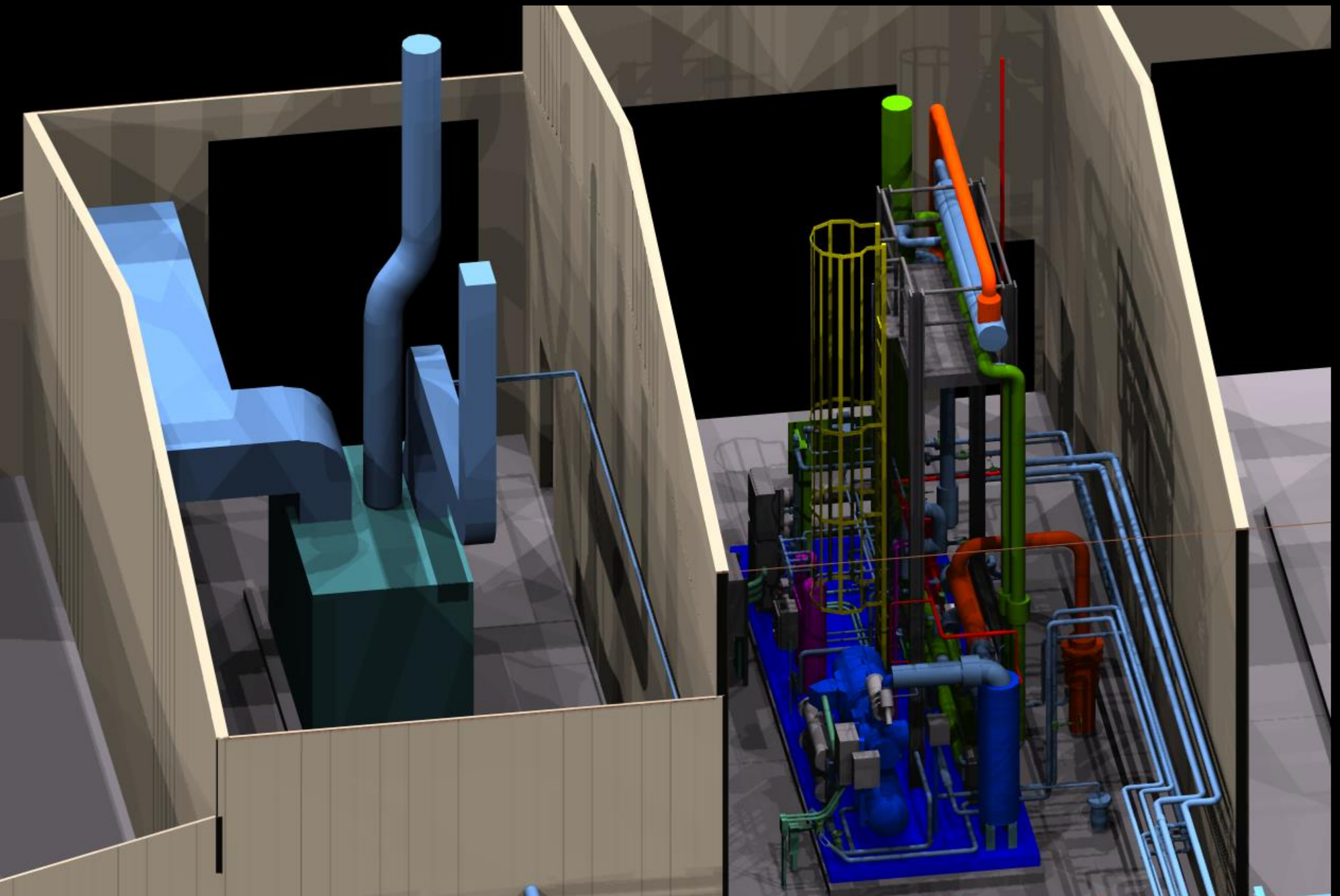
Data Delivered: *AutoCAD 2008 format .dwg CAD file. .dwf "Drawing for the Web Format*

Viewer application(s) Delivered: *Autodesk Design Review 2009 - .dwg viewer & Autodesk 3D .dwf viewer.*



FirmGreen Project Deliverables Overview

FirmGreen 3D Process & Equipment Layouts



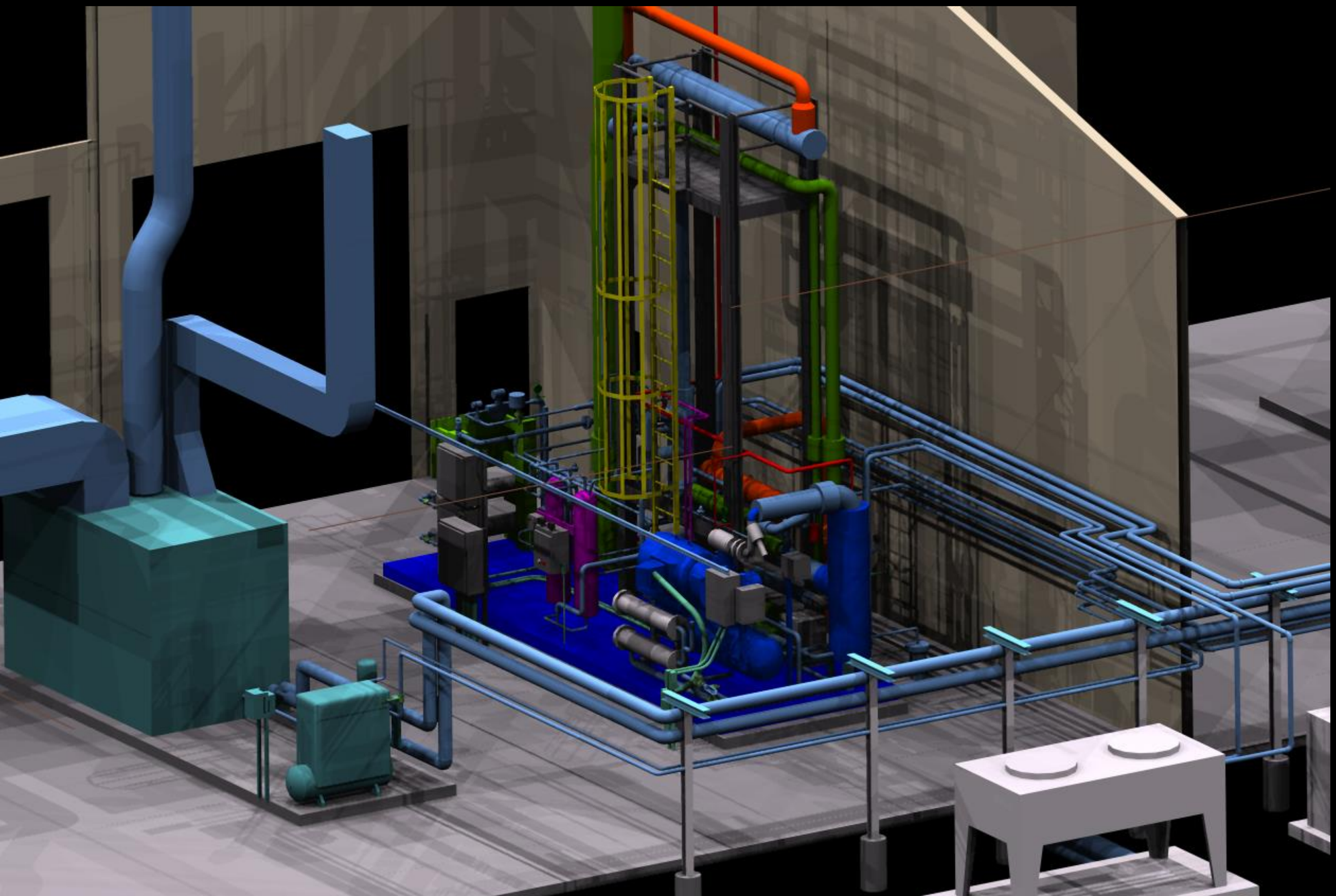
The Process & Equipment areas of the FirmGreen site was obviously the most time consuming portion of our as-built data capture and 3D modeling services provided. The layouts provided, again will enable FirmGreen to further develop the models or integrate them into new sites. Again, endless sections, elevations & details can be generated from this layout. The rendering your looking at was created using Autodesk's, Navisworks Manage 2009 Software.

Data Delivered: *Autodesk Navisworks .nwd 3D data file*

Viewer application(s) Provided: *Autodesk, Freedom Navisworks Viewer.*

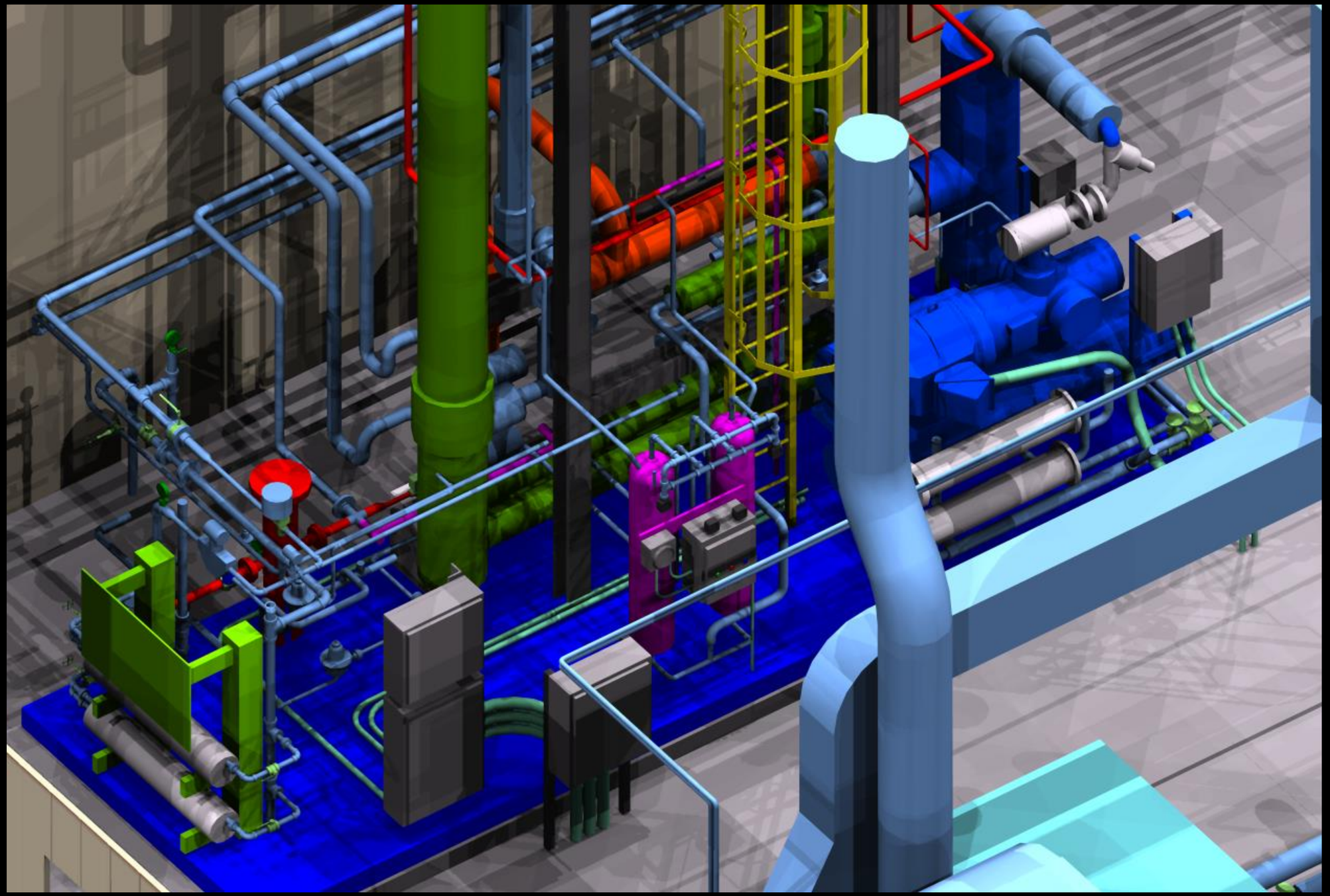
FirmGreen Project Deliverables Overview

FirmGreen 3D Process & Equipment Layouts



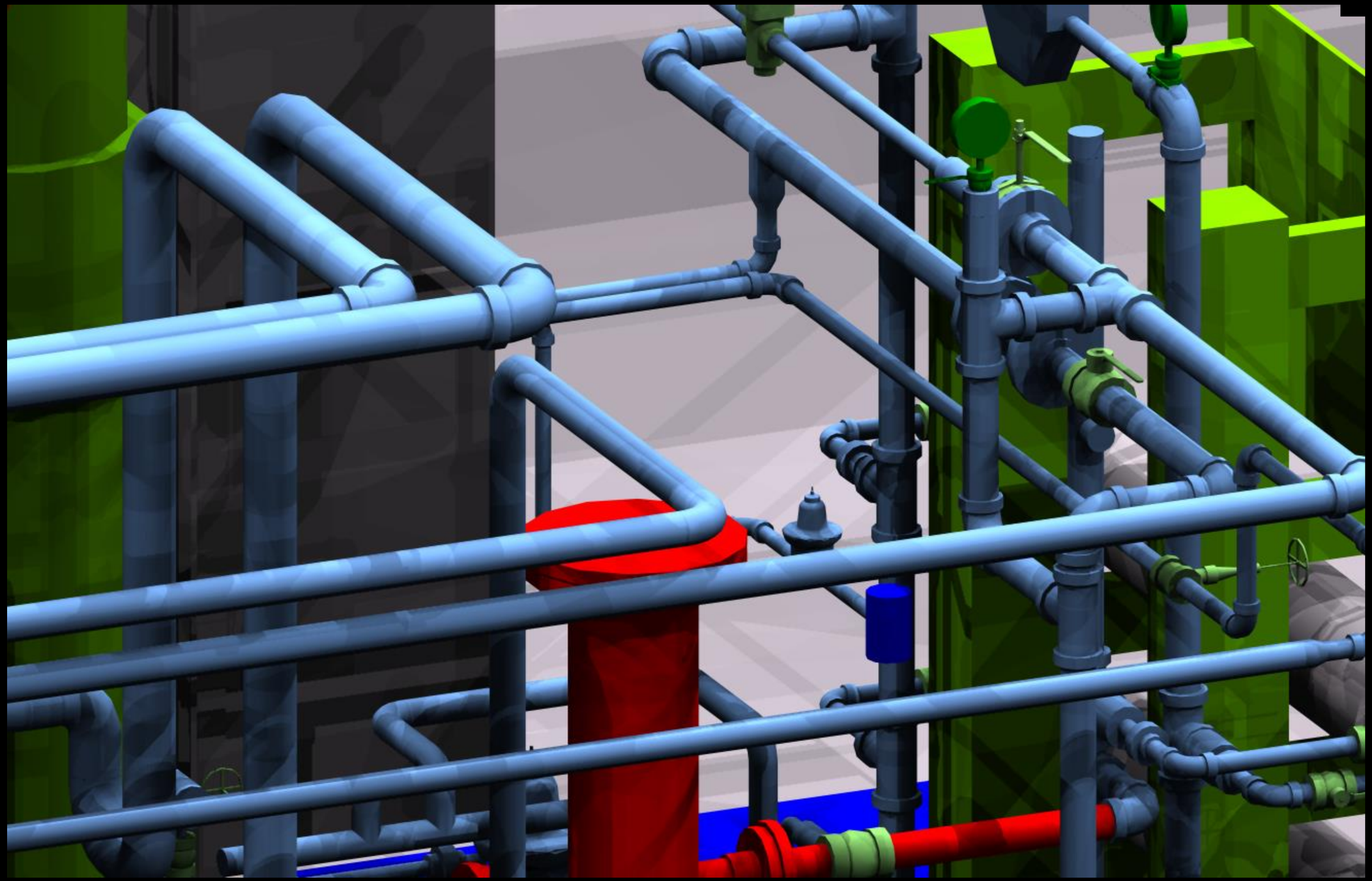
FirmGreen Project Deliverables Overview

FirmGreen 3D Process & Equipment Layouts



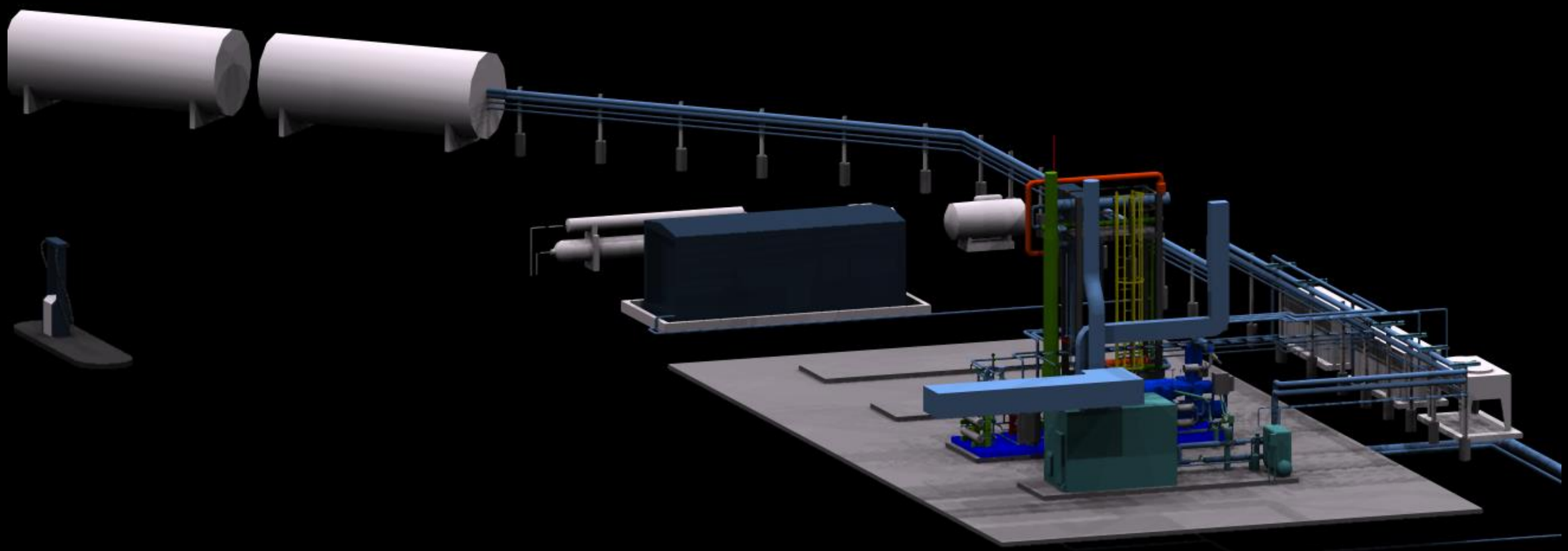
FirmGreen Project Deliverables Overview

FirmGreen 3D Process & Equipment Layouts



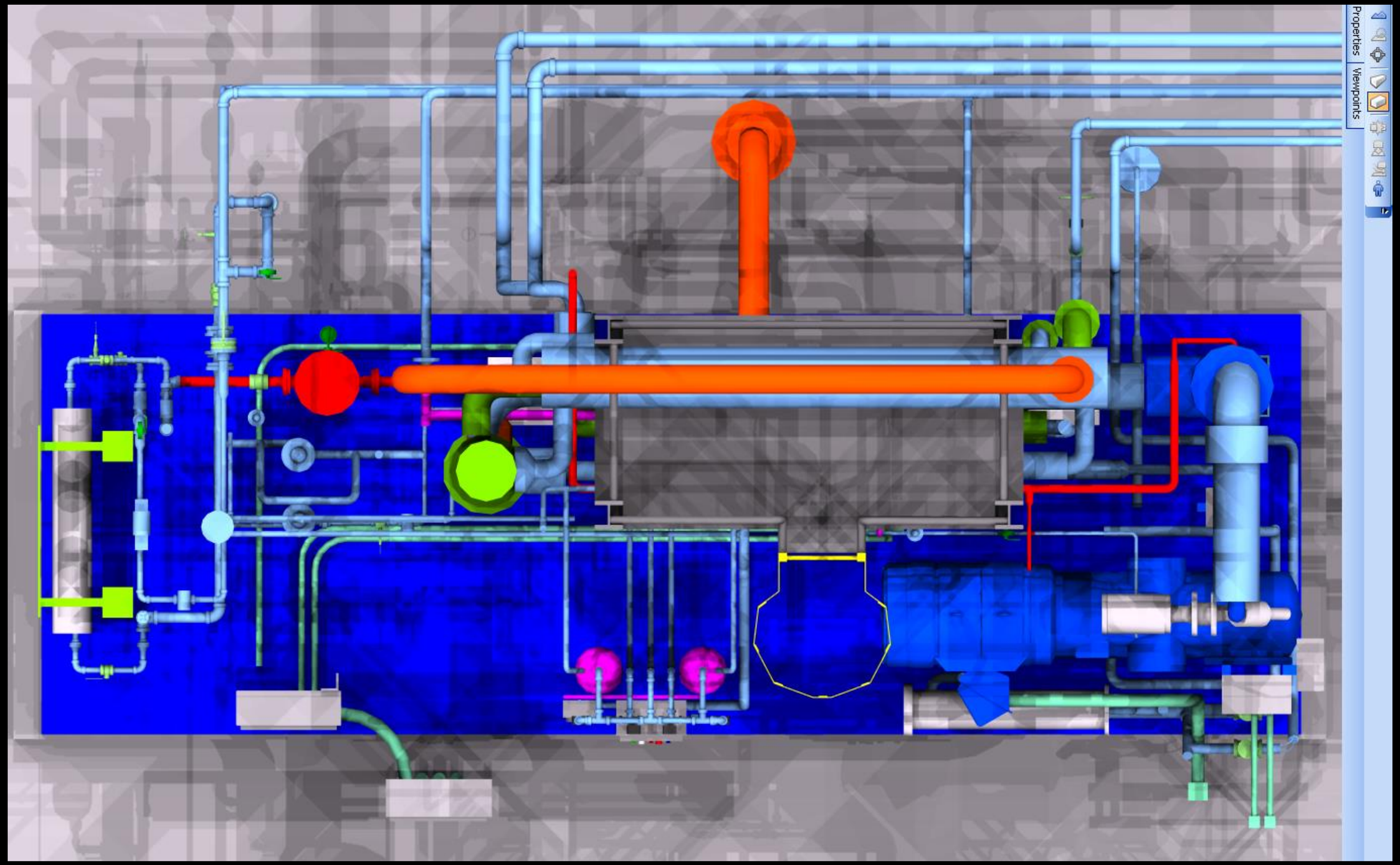
FirmGreen Project Deliverables Overview

FirmGreen 3D Process & Equipment Layouts



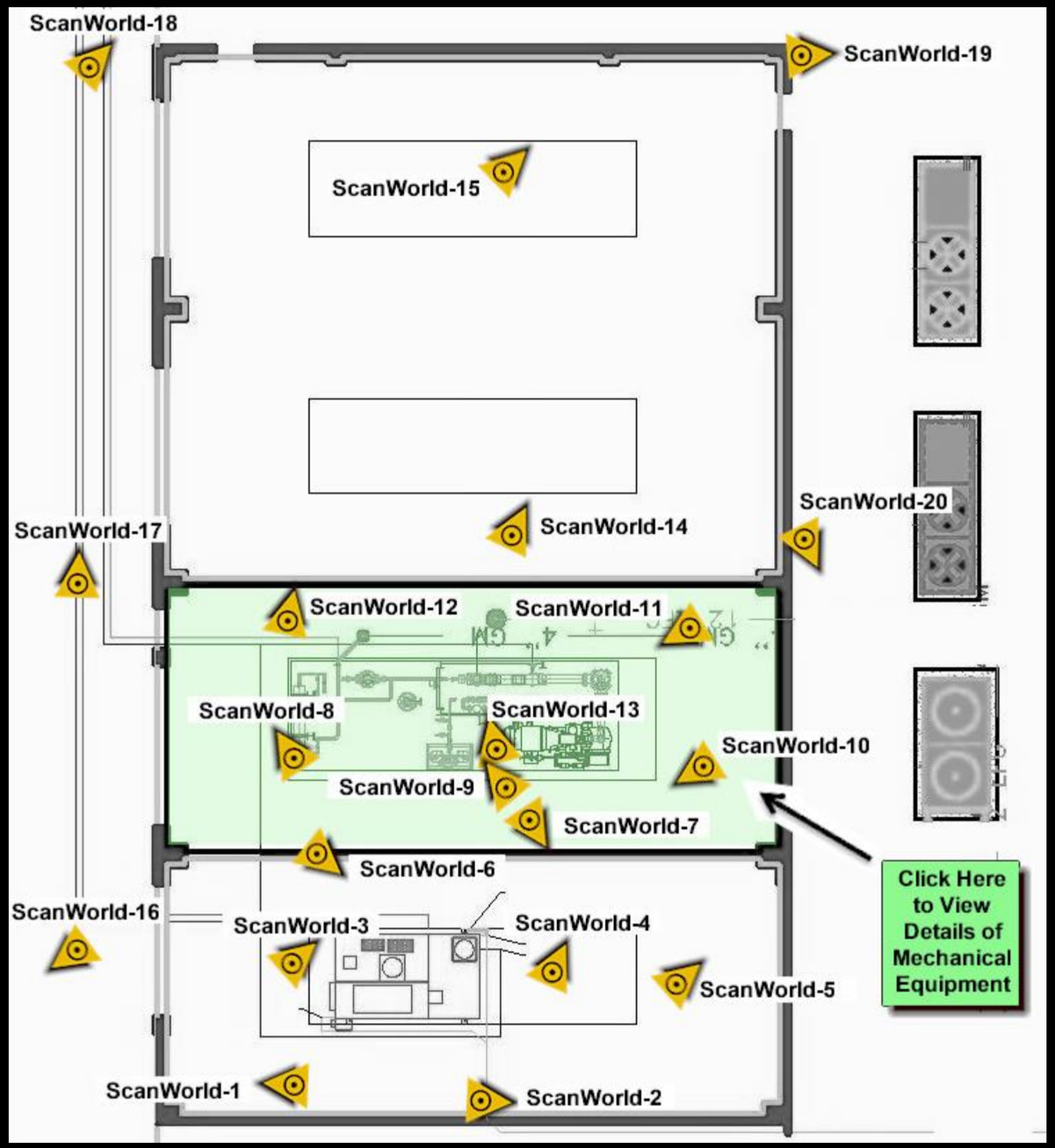
FirmGreen Project Deliverables Overview

FirmGreen 3D Process & Equipment Layouts



FirmGreen Project Deliverables Overview

FirmGreen 3D Laser Scan Viewing



The entire FirmGreen Site has been laser scanned and digitally captured using 20 Individual 360 x 310 degrees laser scans. By clicking on one of the 20 scan locations depicted by the yellow triangles, end users can easily access, view, measure & markup the entire FirmGreen site via a Web Site, currently hosted by Ghost Industries. The site enables instance, online access to the 3D Laser Scan Point Cloud Data. This site can be hosted by Ghost Industries or FirmGreen.

Data Delivered: *.html Interface data and .xml laser viewing data*

Viewer application(s) Provided: *Leica Trueview, Web Based Viewing that can be shared with FirmGreen employees and customers.*

FirmGreen Project Deliverables Overview

FirmGreen 3D Laser Scan Viewing

Insert TruView 3D Web Site Viewing Video from our web site.

FirmGreen Project Deliverables Overview

FirmGreen 3D Laser Scan Viewing

Insert New TruView 3D Web Site Viewing Video from our web site.