

[TOP] 4 UTILITY TRENDS

4 Trends that are Transforming Utility Infrastructure Design and Management

Explore how new technologies and concepts are changing the way our changing utilities infrastructure is designed and managed.

Improvements in design, modeling, visualization and collaboration tools are driving change in utility design. From communication the intent of substation design early in the proposal stage to aggregating big data sources such as 2D and spatial data to aid in design tasks and collaboration, DLT has identified four design and engineering trends that are bringing new ways to increase efficiencies, reduce costs, and attract and retain talent.

[1] BIM for Utilities – From Communicating Design Intent to Attracting Top Talent

Using only 2D data during the utility infrastructure design phase makes for tedious and time-consuming constructability reviews and simulations and represents one of the biggest challenges to cost-overruns and project delays.

With the advent of building information modeling (BIM), the sharing of 3D intelligent models for design reviews is making it easier for stakeholders to quickly assess potential construction and operational issues before construction.

But BIM is more than a 3D model, it's an entire process for creating and using that model for planning, designing, building and managing infrastructure and gives accurate, accessible and actionable insight throughout project lifecycles.

Since utilities drive some of the largest construction budgets applying the principles of BIM to update old and build new infrastructure can help improve cost control and reduce construction waste (below the typical 30% level).

BIM Delivers Results

Duke Energy has improved substation design productivity by 50% by increasing its reliance on intelligent model-based design tools.

Nashville Electric Service generates BOMs as much as 80% faster. It's also much easier to create more accurate BOMs reducing amount of wasted time on multiple rounds of quality checks to ensure the correct materials made it to job sites.

Consider a typical substation project. Engineers gather existing conditions data and analyze the site, making decisions to meet project requirements. Then they create preliminary plans for the substation and the surrounding environment. Finally, these proposals are shared with stakeholders for review. The public will want to see what the substation will look like from different vantage points and understand how it might change the neighborhood. So communicating intent in new ways is critical.

With BIM tools for infrastructure design (like Autodesk Infrastructure Design Suite), design concepts are displayed in a real-world 3D environment that even non-technical stakeholders can understand. Designers can show multiple scenarios and make changes on the fly, speeding up the approval process and decreasing the risk of costly changes down the line.

[1] BIM for Utilities – From Communicating Design Intent to Attracting Top Talent *(Continued)*

Many utilities are interested in having a single environment of databases to capture all of their assets, or having “one version of the truth.” Intelligent model-based design standards play a vital role in deriving maximum value from the one database environment by linking it more deeply to a range of optimized workflows. When changes are made to plans, the intelligent model updates all associated connections including design checks, material list and cost updates.

BIM also has unexpected benefits for utilities – improving retention of design staff and attracting workers looking to work with the latest 3D modeling, visualization and simulation tools.

A 2012 McDonnell Group survey of leading utilities summarizes the benefits of BIM:

- Sharing potential designs with customers and stakeholders early in the design process mitigates risk
- Optimizing processes for fine-tuning designs prior to final approval
- More accurately predict project timelines
- Better realization of already lean-running staff and improved recruitment and retention
- A single version of the truth. Having a consistent set of processes supporting the engineering standards embodied in various design tools.
- Workflows that help maintain and track compliance with standards.
- Greater efficiency of O&M systems and processes.



Sub-station model analysis in downtown Seattle using Autodesk InfraWorks 360

1. *Designing Operational Excellence*, McDonnell Group, December 2012
2. *Top 10 Technology Trends Impacting the Energy and Utility Industry in 2013*, Gartner.

[2] Cloud-Based Design and Collaboration

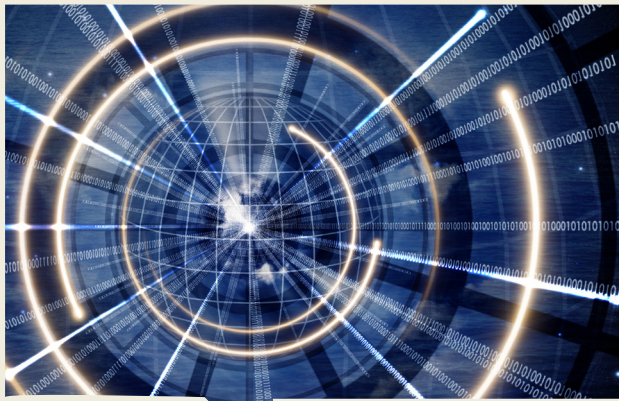
Although the utility industry trails other sectors in cloud adoption due to security and reliability concerns, the need to reduce costs and focus on core competencies is driving cloud approval.

But moving design flow to the cloud doesn't just reduce cost; it improves both collaboration and flexibility. Cloud software, like the free AutoCAD® A360 web and mobile app, for example, gives designers access to the most current information and lets them view, create, edit, and share CAD drawings nearly anytime, anywhere. More than just a CAD viewer, AutoCAD 360 uses DWG™ technology to enable designers to redline drawings on-site, document as-builts, and share files.

The cloud also helps automate field processes by combining mobile and intelligent design at the point of construction. Tools like Autodesk's BIM 360™ Field iPad app lets users create and update issues in the field, run safety and quality checks while the BIM 360™ Glue® iPad app which lets users access, review, and mark-up substation designs on the go.

[3] Big Data – Getting More from GIS, Raster, Civil and CAD Data

Smart grid development is generating unprecedented amounts of data, but it's not the only source of big data that utilities must contend with. CAD, spatial, raster, laser scans, point clouds, and other forms of data hold significant worth for engineers and designers, but in the past, deriving value from that data has been a challenge.



As big data assimilation and analytics tools evolve, utilities are finding ways to make good decisions quickly and bring more intelligence to the design process. Tools like Autodesk InfraWorks 360™, for example, is an infrastructure modeling and visualization tool that simplifies the creation of large-scale infrastructure models from existing big data sources, including 2D CAD, raster, GIS, City GML, and point clouds as well as data from AutoCAD, Revit, Civil 3D, and Map 3D.

InfraWorks also aggregates various data sources to aid in preliminary substation design analysis tasks. Designers can quickly build large models from GIS, civil, BIM and raster data. They can even incorporate detailed models from other software such as AutoCAD® Civil 3D, Revit® and Inventor®.

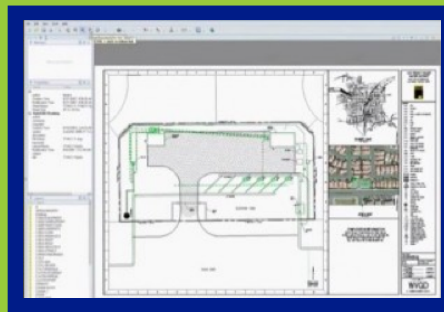
Leveraging these big data imports and analysis features included in the software, InfraWorks models can include the full 3D context of the surrounding area of a project or substation.

Another interesting development is the addition of a configurable interface in AutoCAD Utility Design (a model-based electrical distribution design software) that supports two way integration with GIS systems and asset databases like Map 3D.

[4] Effective Data Management

Faced with an aging utilities infrastructure, companies are investing in technology to improve the way they manage the data associated with planning and design on capital improvement projects and maintenance of assets in operation.

In Nevada, the Las Vegas Valley Water District is one such use case. The utility provider uses Autodesk Infrastructure Map Server and AutoCAD® Map 3D to implement web-based GIS data management systems and maintain and share highly accurate spatial information throughout its organization, regardless of format. This gives a wide variety of users the ability to employ a common spatial data source for their various business processes, regardless of whether they have engineering or GIS expertise. And because the data is web-based, users can publish and share CAD, GIS map, and asset data in the field.



Las Vegas Valley Water District uses Autodesk tools to maintain and share spatial information across its organization, regardless of format. This supports collaboration and ensures one of the most automated systems in a water utility today.

Additional Resources

If you are ready to learn more about Autodesk solutions for transportation and infrastructure projects, take advantage of these additional resources:



The Autodesk Government Team at DLT Solutions

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