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Business Domain
Energy & Utilities

Project Type
3D CAD Modeling, Digital Twins

3D CAD Modeling for Power Grid Modernization

Client

A regional electricity distributor in Central Europe managing thousands of kilometers of overhead lines. The client operates in both urban and rural areas and is actively modernizing its infrastructure to meet smart grid standards.

Project

Goal: Create accurate 3D CAD models of existing power line infrastructure to support asset modernization, risk analysis, and integration into smart energy platforms.

Scope: 48 km of lines, ~1,200 poles, using SHP, LIDAR, and photos.

Objective

The client aimed to convert fragmented 2D records into accurate 3D CAD models. The models were to:
- Digitize legacy 2D pole profile drawings
- Visualize spatial relationships and clearance risks
- Enable grid modernization and integration into a digital twin platform

Team Reinforcement

Intetics provided a team of CAD and GIS experts. We joined the Client's planning group as an extension team, delivering Civil 3D expertise and production workflow automation.

![intetics logo](Where software concepts come alive™)

Challenge

To plan for future smart grid upgrades and ensure regulatory compliance, the Client needed a spatially accurate digital model of its physical network. But building 3D CAD models from scratch at scale required specific domain knowledge, advanced tooling, and reliable execution capacity.

The Client needed to modernize infrastructure management across several operational zones. This required the transformation of fragmented 2D documentation into a standardized, geospatial 3D asset base — a task too complex for existing in-house tools and resources.

The Client lacked internal 3D CAD Modeling expertise and needed a scalable, accurate solution to meet smart grid and digital twin demands.

To address this challenge and ease engineering workload, they partnered with Intetics.

Quick Facts

✓ **Region:** Central Europe

✓ **Network Length modeled:** 48 km

✓ **Poles processed:** ~1,200

✓ **Duration:** 8 weeks

✓ **Delivery format:** DWG & NWD

Technologies

Autodesk Civil 3D / AutoCAD / Navisworks / Dynamo / LiDAR / SHP / CSV / DWG / IFC / AutoCAD scripts / PDF / cloud file sharing

Solution

★ **01**

Standardized Data Preprocessing

All input data (LiDAR, SHP, photos, 2D CAD) normalized using automated preprocessing scripts.

Coordinate systems validated early using GIS QA tools.

★ **02**

3D CAD Modeling Pipeline

Intetics developed a streamlined process to convert 2D pole and attachment data into fully georeferenced 3D models using Civil 3D. The pipeline integrated coordinate data, elevation points, and asset attributes into spatially accurate CAD files.

★ **03**

Semi-Automated Feature Placement

Custom templates and automation scripts were used to efficiently place poles, conductors, and attachments in 3D space. This reduced manual effort while ensuring consistency across dozens of kilometers of infrastructure.

★ **04**

Scalable Production with Remote In-Sourcing®

A dedicated Intetics team delivered results on a rolling basis, enabling fast validation and iterative feedback. The process supported phased rollout across multiple zones without overwhelming the client's internal resources.

★ **05**

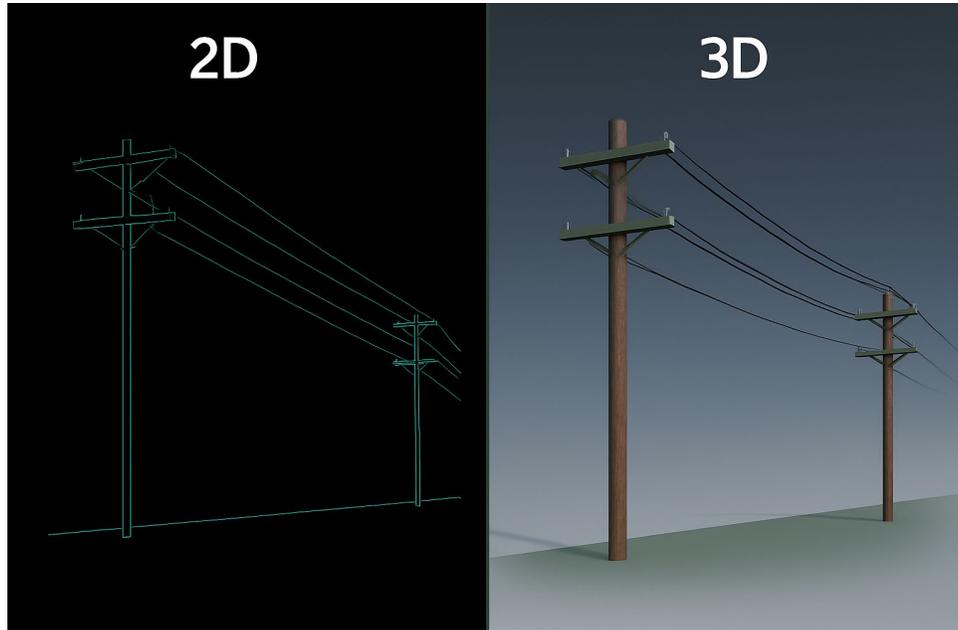### Smart Grid & Digital Twin Readiness

Delivered models with structured IFC exports, enriched with metadata, also compatible with digital twin platforms using standard APIs (WFS, REST).

Integrated BIM LOD 300 compliance using Navisworks export workflows.

2D   3D

Client Reference

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Intetics didn't just deliver a model — they became a strategic partner in our modernization roadmap. Their team felt like an extension of ours.

Elena, Infrastructure Modernization Lead

Benefits and Results

⭐ **20%** faster redesign planning for modernization areas since prebuilt models speed up routing and engineering decisions.

⭐ **30%** less manual effort during inspections due to modeled towers and terrain that reduce fieldwork.

⭐ Clear visual overview of critical infrastructure.

⭐ Scalable solution adopted for additional regions.

⭐ Smart Grid Integration enabled via geospatially tagged 3D models.

⭐ **Digital Twin Ready:** All data structured for BIM and smart infrastructure platforms.

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Techstack:

Layer	Tools / Systems Used
CAD/BIM	Autodesk Civil 3D, AutoCAD
Data Sources	SHP (Shapefiles), CSV, LiDAR (point clouds)
Visualization	Autodesk Navisworks
Automation	AutoCAD scripts
QA & Review	PDF reports, coordinate validation tools
Delivery Format	DWG, Navisworks NWD, IFC (optional export)

Team: 21

Project Manager,
GIS/LiDAR specialists,
3 CAD Modelers,
QA/Tech Lead