



Project summary

Organization:
PT Wijaya (Persero) Tbk

Solution:
Energy production

Location:
Rorotan, North Jakarta, Jakarta, Indonesia

Project playbook:
AutoPIPE®, Cesium®, iTwin® Capture, iTwin® IoT,
MicroStation®, OpenPlant®, ProjectWise®,
ProStructures™, STAAD®, SYNCHRO™

Project overview

RDF Jakarta is being built to address the growing volume of urban waste.

WIKA delivered the project utilizing a digital construction management and green engineering approach.

Leveraging Bentley's integrated technology applications, they established a connected digital ecosystem and digital twin.

Fast facts

Working in a connected data environment streamlined workflows, saving approximately 52,000 work hours.

Bentley's digital applications minimized rework and optimized material usage to reduce overall project costs by 15%.

Through comprehensive reality capture and 4D construction sequencing, WIKA reduced survey time by 70% and potential safety incidents by 25%.

The project diverts over 30% of municipal waste from landfills, cutting 100,000 tons of annual carbon emissions.

PT Wijaya delivers the world's largest refuse-derived fuel facility in Jakarta

Bentley's digital ecosystems shortened construction by 20% and cut operational energy consumption by 15%

Addressing Jakarta's critical waste management crisis

With a population exceeding 10 million people, Jakarta generates over 7,500 tons of daily household waste, the majority of which is sent to the Bantargebang Integrated Waste Processing Site (TPST) in Bekasi. However, as the volume of urban waste continues to grow, so have concerns about the capacity of this site and other landfills around Jakarta. As a result, the Jakarta Provincial Government has invested INR 1.2 trillion to build the world's largest refuse-derived fuel (RDF) facility, capable of processing up to 2,500 tons of municipal solid waste per day into approximately 875 tons of alternative fuel. PT Wijaya Karya (WIKA) is leading the project, integrating cutting-edge waste-to-energy technology with advanced digital engineering.

"This pioneering project directly addresses Jakarta's critical waste management crisis, marked by rapidly overflowing landfills and escalating operational costs," said Octob Bhayu Hanggoro Putro, virtual design and construction coordinator at WIKA. The plant is expected to cut waste transport by nearly 50%, redirect approximately 30% of Jakarta's daily waste from landfills, and supply RDF as a clean substitute for coal in the industrial and power generation sectors. It diverts over 600,000 tons of municipal waste annually and cuts carbon emissions by 100,000 tons. Beyond its primary function of converting waste into fuel,

by recovering resources, minimizing waste generation, optimizing energy consumption, and reusing treated wastewater.

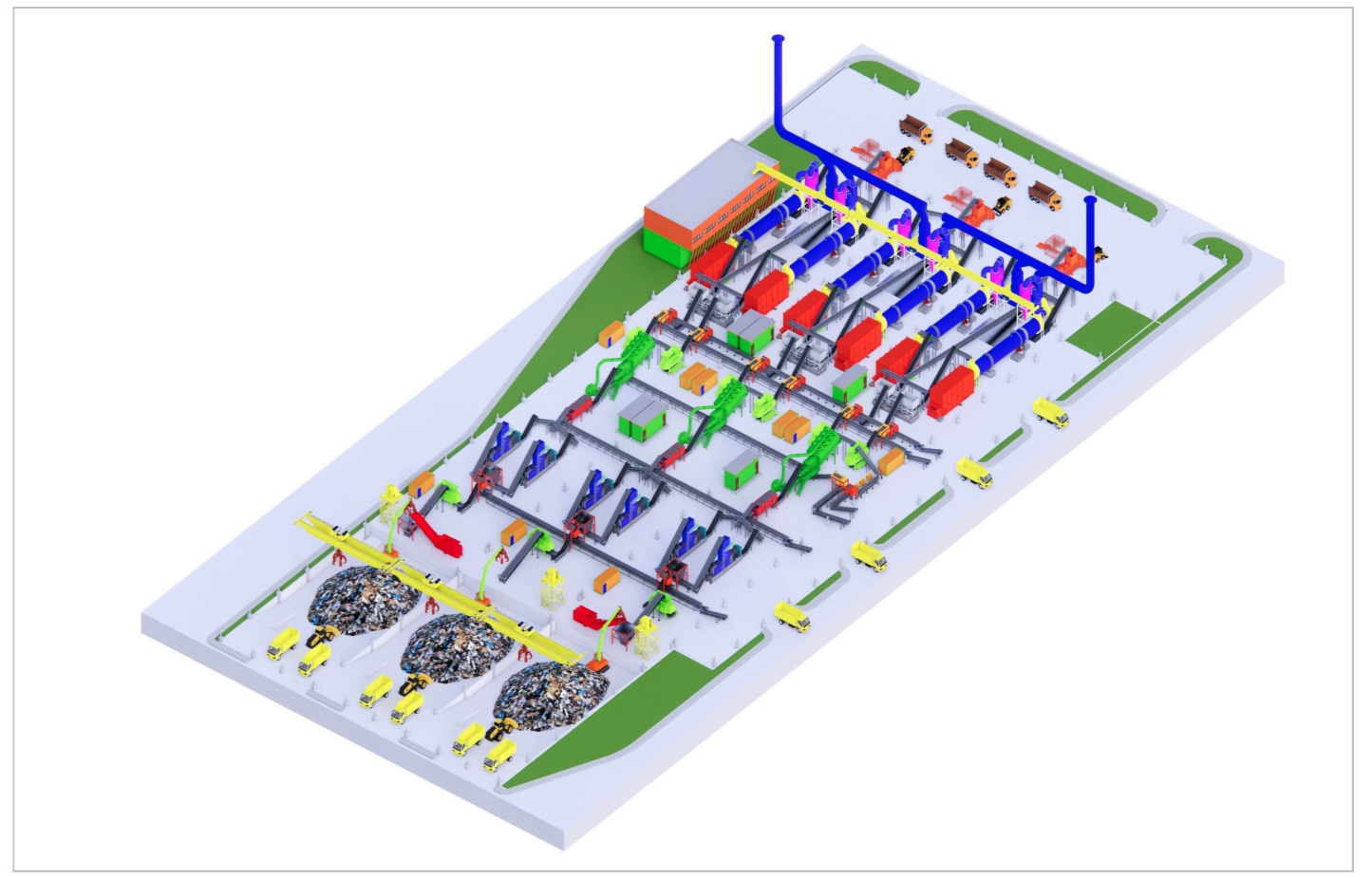
Fragmented workflows, site challenges, and schedule constraints

Delivering an RDF facility of this size presented complex data and workflow integration challenges, compounded by site, budget, and schedule constraints. Internally, the team needed to address fragmented workflows and disparate data. Externally, they faced technical and structural challenges with soft unstable soil conditions up to 10 meters in depth. Compliance with stringent environmental regulations further contributed to difficulties in planning, execution, and risk mitigation.

At the outset, WIKA used conventional methods that proved time consuming and error prone. They quickly realized they had to implement a more streamlined approach to design, construction, and multidiscipline engineering coordination. "The project demanded sophisticated interdisciplinary coordination across engineering, procurement, and construction phases," emphasized Putro. To successfully deliver the project, WIKA needed to transition from their fragmented manual processes to an integrated digital design, construction, and cost management approach.



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— *Sagarasenja Kartika Putra, Project Site Manager at WIKA*

Bentley applications streamline project execution

"Bentley software was strategically selected for its exceptional ability to integrate complex project workflows seamlessly, forming the digital backbone of RDF Jakarta's execution," said Putro. With the support of Bentley applications, WIKA established a connected digital ecosystem that integrated all stages of the project, enabling real-time 3D modeling, 4D construction sequencing, and 5D cost management.

The team used ProStructures to efficiently model steel reinforcement and structural components, while AutoPIPE and STAAD.Pro ensured resilient designs capable of withstanding Jakarta's seismic and geotechnical conditions. AutoPIPE and OpenPlant also helped with the reliability of critical piping systems for odor control and wastewater treatment. Meanwhile, ProjectWise provided the common data platform; SYNCHRO enabled dynamic construction scheduling to meet stringent deadlines; and Bentley's

iTwin applications allowed the team to perform visual site analysis and real-time environmental monitoring through drone-based surveys and IoT devices. Integrating MicroStation for facility modeling optimized spatial planning, and Cesium's 3D visualization tools further enhanced stakeholder engagement by providing immersive digital twin navigation throughout the project lifecycle.

Leveraging Bentley's robust suite of applications offered advanced interoperability, enabling real-time data sharing, clash-free coordination, and collaborative decision making across multidiscipline teams, stakeholders, and external contractors. All parties worked based on the same data, without duplication, overlap, or confusion. Working in a connected digital environment, integrating reality modeling and digital twins, WIKA broke down traditional data silos, standardized design, automated validation, and facilitated dynamic visibility over construction progress, risks, and costs, streamlining project execution. "The RDF Jakarta project embraced a fully digital delivery strategy, leveraging Bentley's integrated solutions to drive unprecedented efficiency, collaboration, and data-driven decision-making across all project phases," explained Putro.

Digital twins set global benchmark for sustainable urban waste management

Integrating collaborative modeling, digital twins, and visual construction planning accelerated workflows by 30% to commission the project within 10 months and reduce overall costs by 15%.

Going digital improved engineering productivity by 40%, shortened construction timelines by 20%, and enhanced multidiscipline coordination, allowing real-time model sharing, clash detection, and predictive 4D construction simulations that significantly reduced rework and mitigated risk. "By mitigating construction risks through 4D sequencing, geotechnical simulations, and real-time IoT monitoring, RDF Jakarta avoided costly delays and safety hazards," explained Putro. Using Bentley technology, WIKA achieved superior efficiency, significant material savings, and optimized lifecycle operations, delivering a projected 20% higher return on investment compared to original conventional methods.

By creating a digital twin combined with operational asset data and IoT inputs, WIKA enabled predictive maintenance strategies that minimize environmental risk and ensure regulatory compliance throughout the lifecycle of the RDF facility. Their technology-driven approach advances energy transition through RDF fuel production, cuts operational energy use by 15%, and promotes circular economy principles through wastewater reuse and resource optimization. The project embodies a scalable, resilient model for sustainable urban development supported by cutting-edge digital advancement. "RDF Jakarta's going digital strategy sets a new industry benchmark, demonstrating how fully integrated digital workflows can deliver not only major economic gains but also environmental and societal impact far beyond conventional project delivery models," concluded Putro.