AVEVA PI WORLD

Digitalization & AI in Cement Manufacturing

OYAK Cement 4.0 Project – Use Cases

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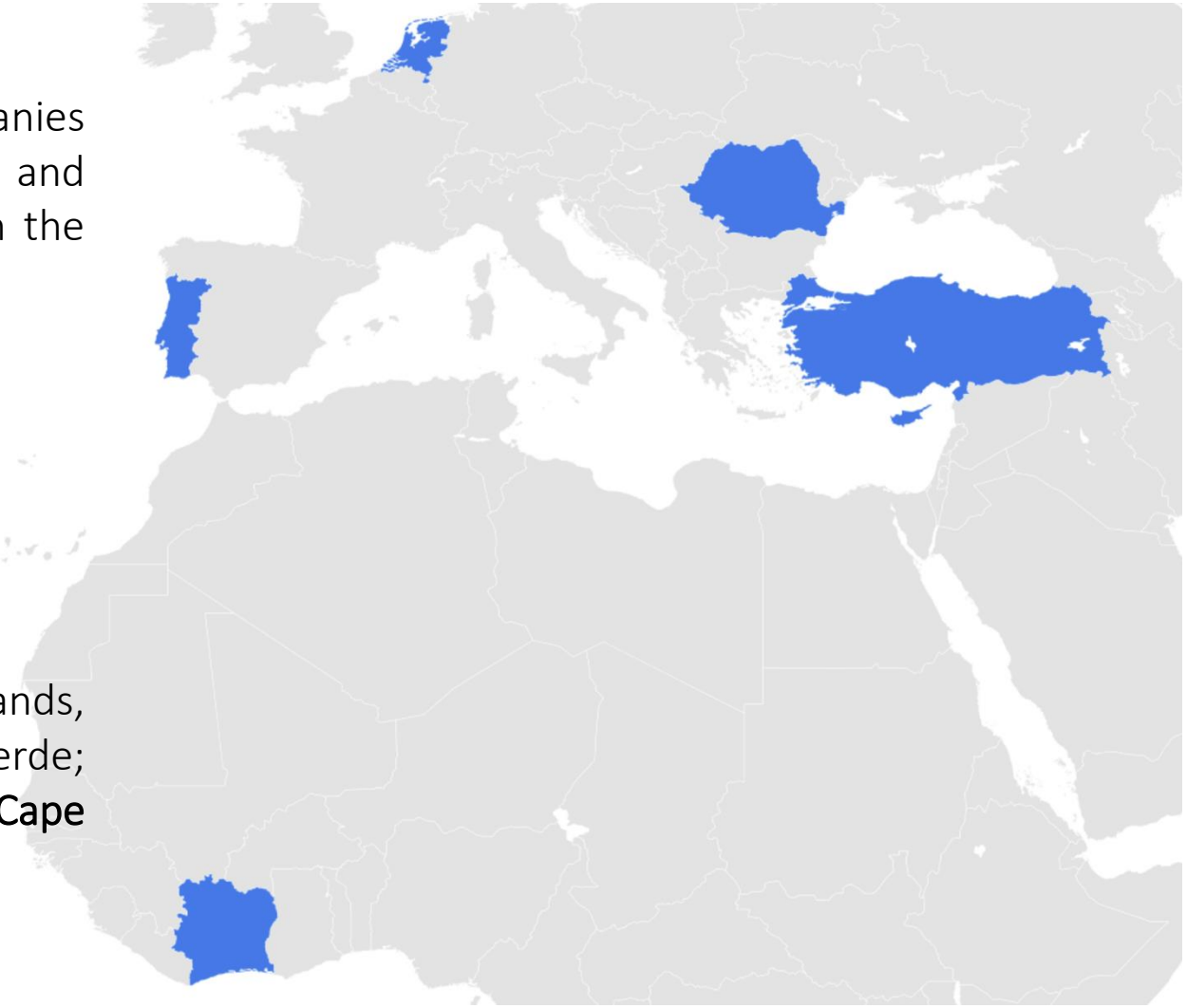
About CIMPOR Global Holdings BV

CIMPOR Global Holdings is a group of companies established by **Ordu Yardımlaşma Kurumu (OYAK)** and **Taiwan Cement Corporation (TCC)** that operates in the field of Cement, Concrete, Kraft Paper, and Bag.



CIMPOR Global Holdings operates in the Netherlands, Turkey, Portugal, Romania, Ivory Coast, and Cape Verde; incorporates the **OYAK Cement**, **CIMPOR Portugal & Cape Verde** and **CIMPOR Côte d'Ivoire** brands.

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Cement Operations of CIMPOR Global

OYAK Cement

Turkey's largest cement and concrete brand

Production capacity:
22.5M tons of cement
12.4M tons of clinker

CIMPOR Portugal & CV

The leader of the cement industry in Portugal and Cape Verde

Production Capacity:
5.5M tons of cement
8.4M tons of clinker

CIMPOR Côte d'Ivoire

World’s first greenfield calcined clay integrated cement plant

Production Capacity:
0.8M tons of cement
0.4M tons of calcined clay

https://cimporglobal.com/

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Digital Transformation Journey of CIMPOR GH

OYAK Cement 4.0 Project

Challenge

- Online visualization of cement plants in 3 different continents – *10 in Turkey, 4 in Portugal & Azores and 2 in West Africa*.
- AI Supported Industrial Ops – Priority Use Cases
  - In-process predictions to improve efficiency, productivity and quality of products
  - High reliability with predictive and prescriptive maintenance methodologies
  - Tracking CO2 emissions and predictive approach on NOx emissions

Solution

- Main architecture was developed by PI AF with standardized formats
- Drill-down original visualization structure was generated with PI Vision
- Classified tags and calculated artificial data are filtered, validated and transferred simultaneously to AI engine by the help of PI Integrator for BA
- AI supported predictions are collected in PI System, monitored and analyzed at PI Vision as actual, past and future data

Benefits

- Improved capacities, less energy consumptions and higher overall equipment efficiencies
- High accuracy and efficiency on pyro-processing and grinding stages with frequent F.CaO and fineness data
- Anomaly detections on equipments before failures, and predicting potential failures
- Predicting upcoming NOx emissions and managing the process & managing reducing actions
- Monitoring actual CO2 levels and actual effects of actions

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The Motivation of Digitalization in Cement Industry

Potentials with adaptive, compatible and manageable data infrastructure

- Operational activities in 18 different plants on 3 different continents
- Comparably high amount of data with high frequency (nearly 800 billions of individual records per year)
- Unique quality evaluation principles, and optimization & management of future results
- Continuous processes and relational efficiency effects
- Energy-intensive operations – direct effect of high efficiency on performance and the costs
- Low maintenance & service costs with high reliability and preventive actions
- Lastly but most importantly; potentials on CO2 reduction and the sustainability

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The Challenges

Collection of messy data and evaluation with a standard vision

- Well-organized and globally connected monitoring structure
- Standardizing hierarchical formation and designing a well-classified digital asset library
- Variety of data sources, connections and attributes
- Matching time-stamps of process, quality and maintenance data
- Dynamic editing options to revise, generate or derive without losing the raw data
- AI compatibility on both proper data transfers and analytical investigations on live data, and notifications

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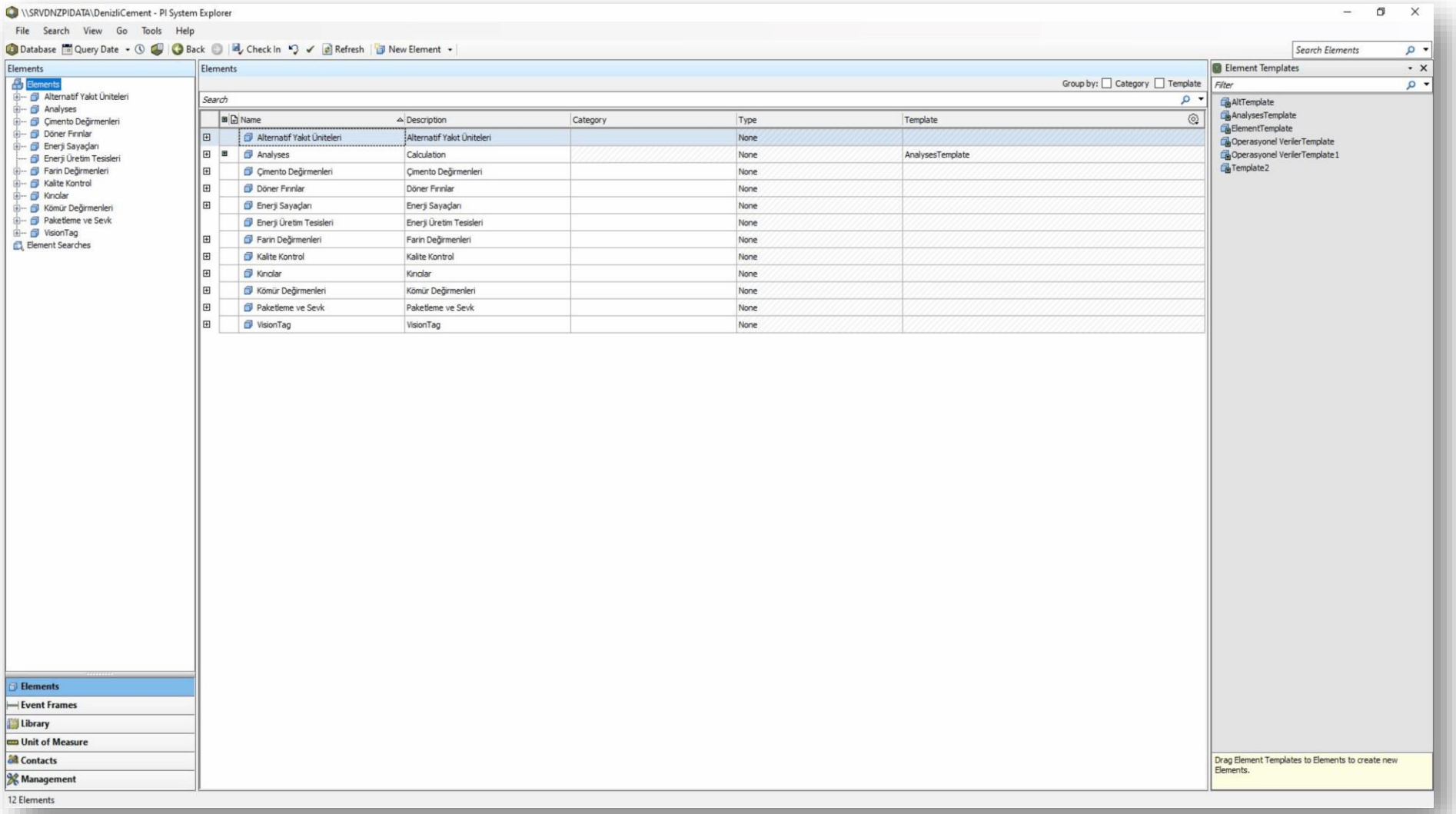
Strong Foundation with PI Explorer and PI AF



- Originally designed and structured by the project team
- Several artificial tags with complicated calculations
- Standardized formation and hierarchal structure on AF

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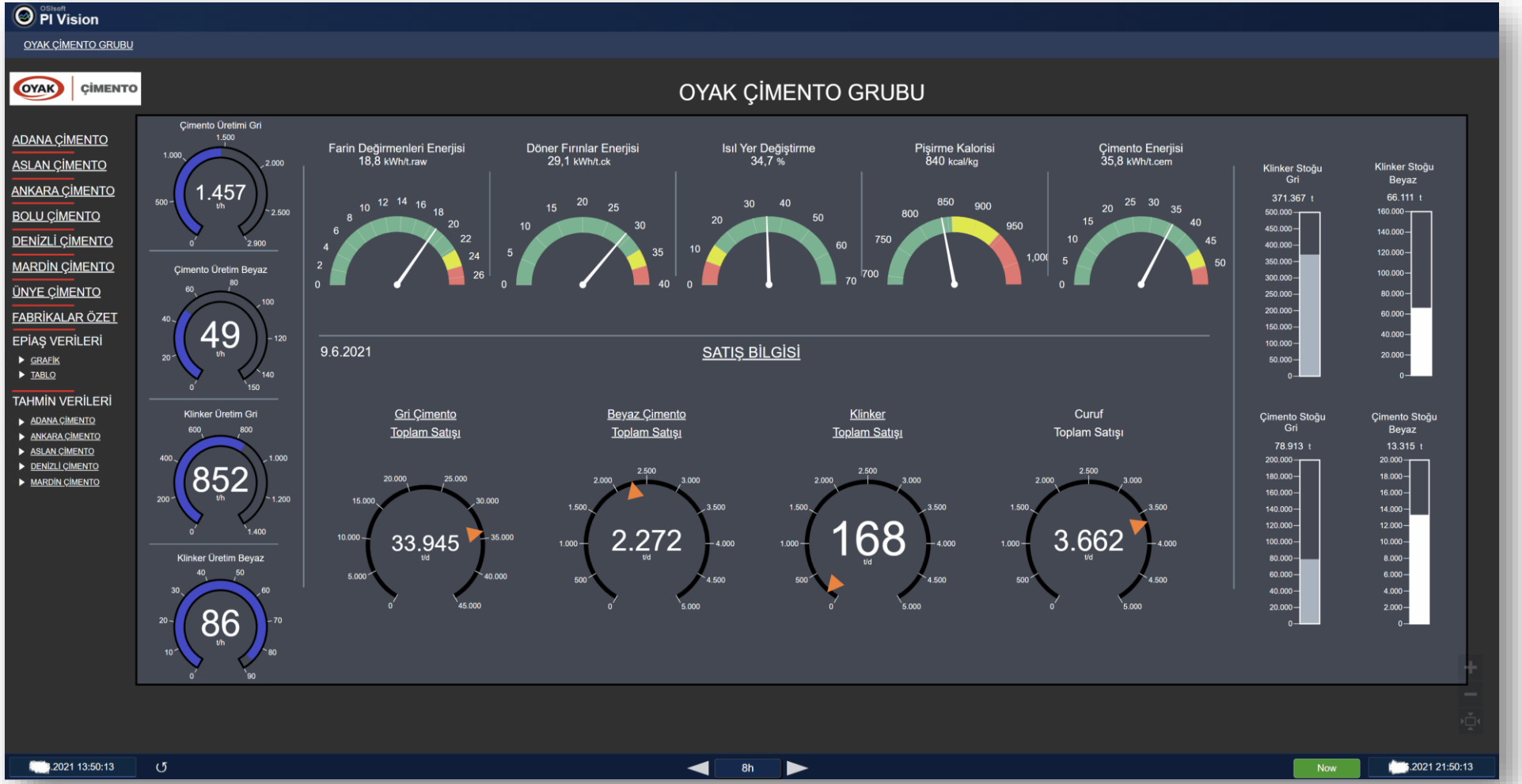
Visualization of OYAK Cement 4.0



- Unique design
- Drill-down formation
- ERP and Web based data integrations

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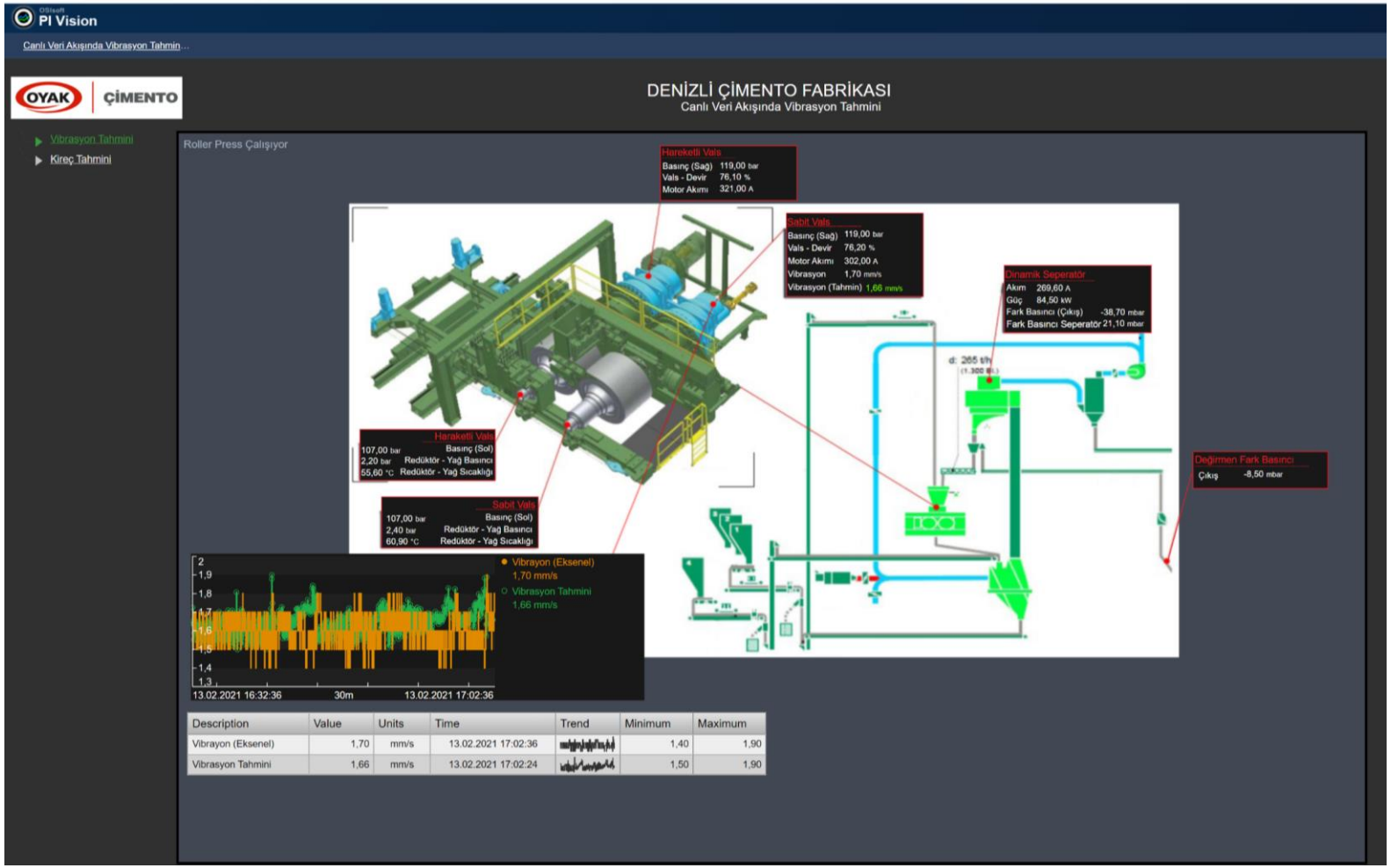
Data Collected, Archived, Visualized – and Then?

Not only monitoring - the real challenge is to touch operations directly



- Predictive maintenance with AI assistance and monitoring with PI Vision

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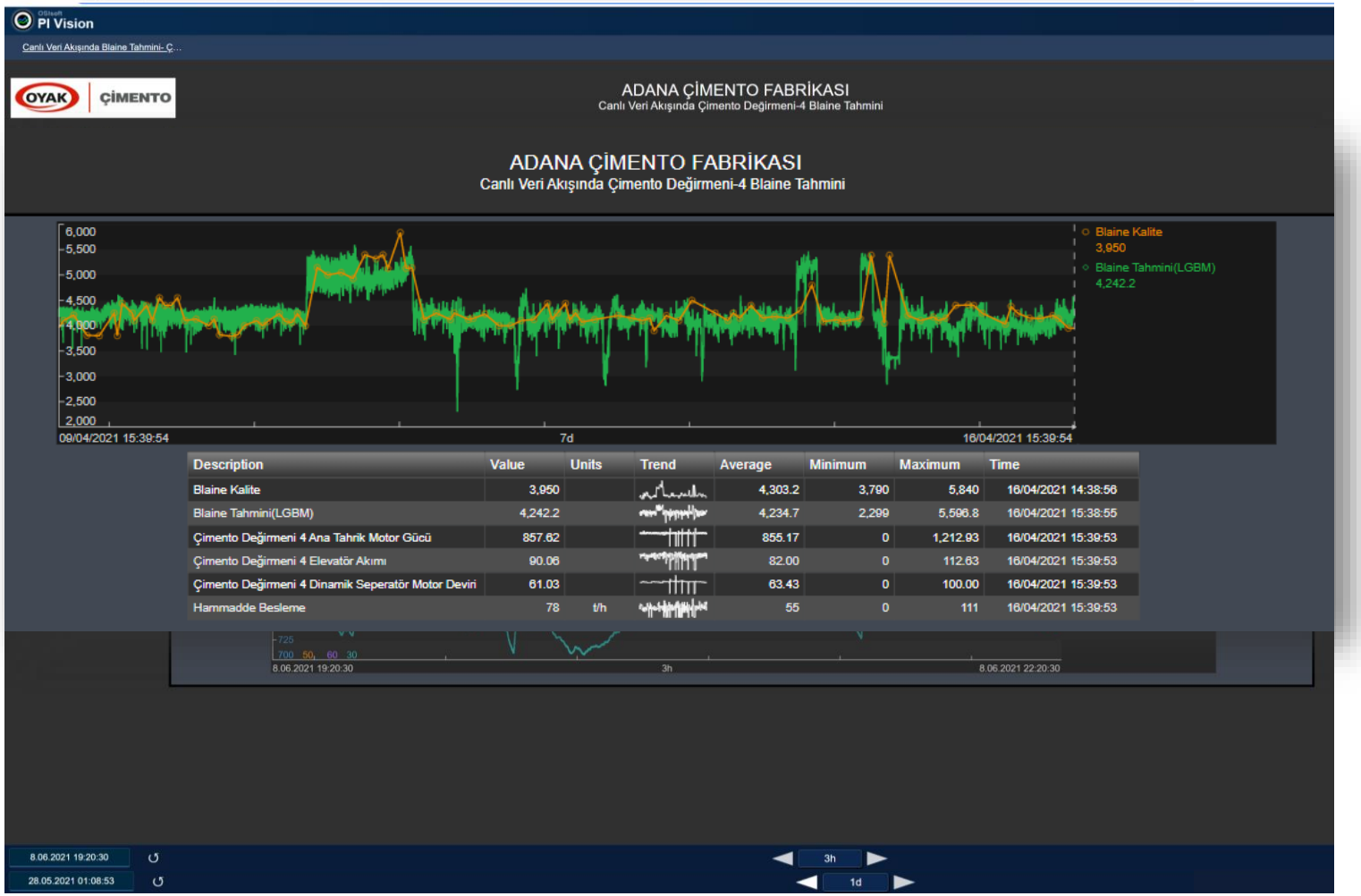

- In-process predictions
- Free lime predictions to improve process efficiency, stable operations and higher AF usage in kiln process
- Blaine and fineness predictions to improve energy efficiency and productivity, and also product quality
- Both AI assisted applications are indirectly affected CO2 emissions and carbon footprint of products

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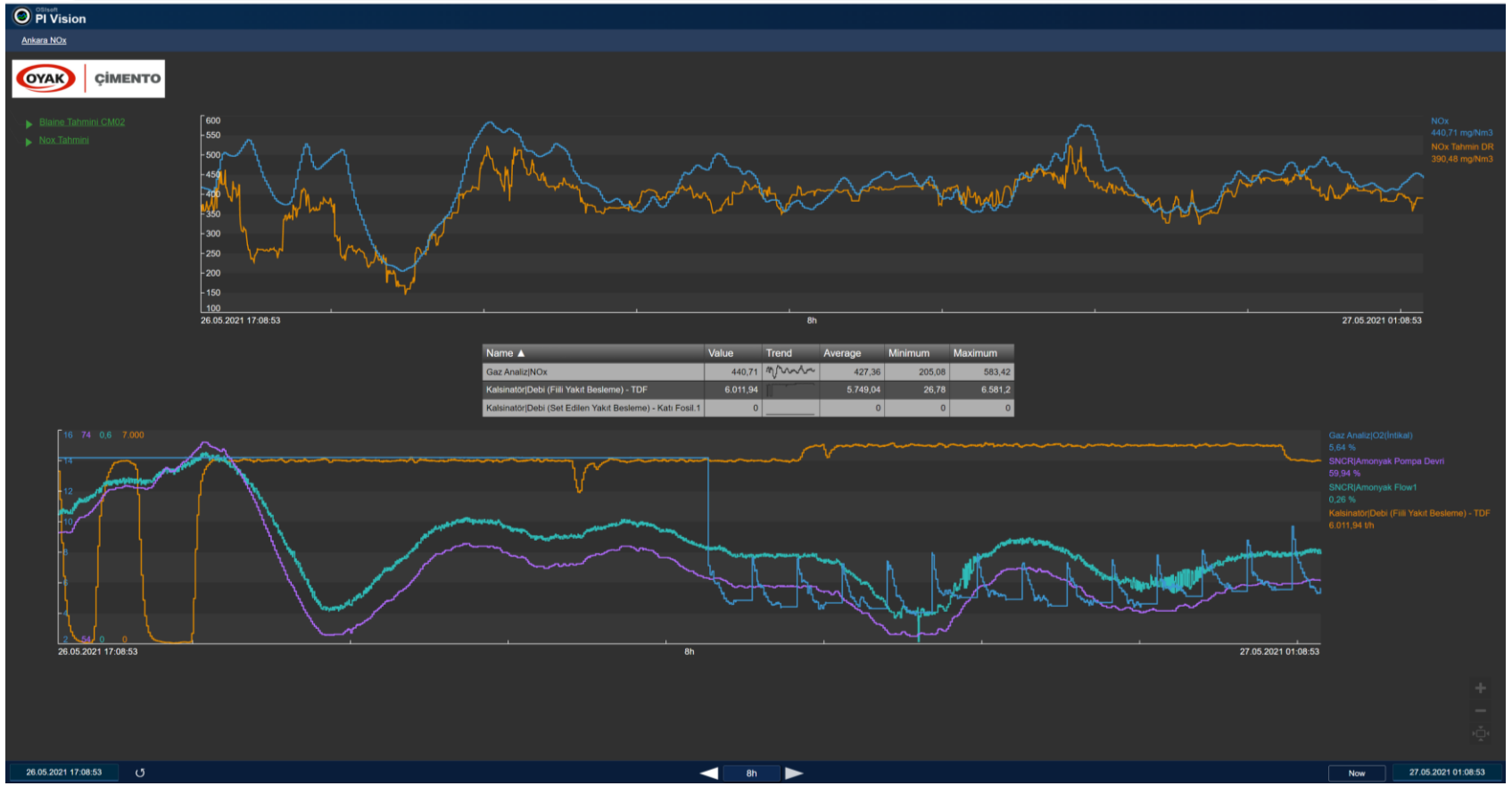
Not only monitoring - the real challenge is to touch operations directly



- Emission monitoring
- Online CO2 emissions
- NOx predictons

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Gains and the Potentials

Annual Effect of OYAK Cement 4.0 on CIMPOR Global

- Each **1% of heat energy saving** equals to **17,500 tons less coal consumption** per year
- Each **1% of electrical energy saving** equals to **12,600 MWh less energy consumption** per year
- Each **2% increase on TSR** equals to **30,000 tons less fossil fuel consumption** per year
- Each **1% decrease on clinker incorporation rate** in cement means **nearly 110,000 tons of clinker saving**
- Each 3% reduction on maintenance costs equal to nearly **1 Million € saving** per year
- Consolidation of all those efficiency improvements have positive economical effects, however one of the most critical effect is on sustainability

All those improvements mean
Nearly **140,000 tons of CO_2 reduction** in a year
which equals to carbon dioxide absorption of **6.5 Million trees** in a year.

Still additional use cases and potentials are available,
we are just in the beginning of **Digitalized and AI-Assisted Industrial Ops Transformation**

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“Processing operational data with AI has a booster effect on industrial performance, but there must be a strong, adaptive, compatible and manageable data infrastructure.

Otherwise, it will only be a nice story with some virtual results, and the story-tellers may change but it is still only a black hole for efforts, investments and time”

B.Fidan

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