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IEEJ Outlook 2026
Future of AI and Energy Demand: the Industry Sector

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60th Anniversary

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Outline

- Use cases of AI for the industry sector
- Energy savings potential of AI in the industry sector : Outlook by 2035
- Implications

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Use cases of AI for the industry sector

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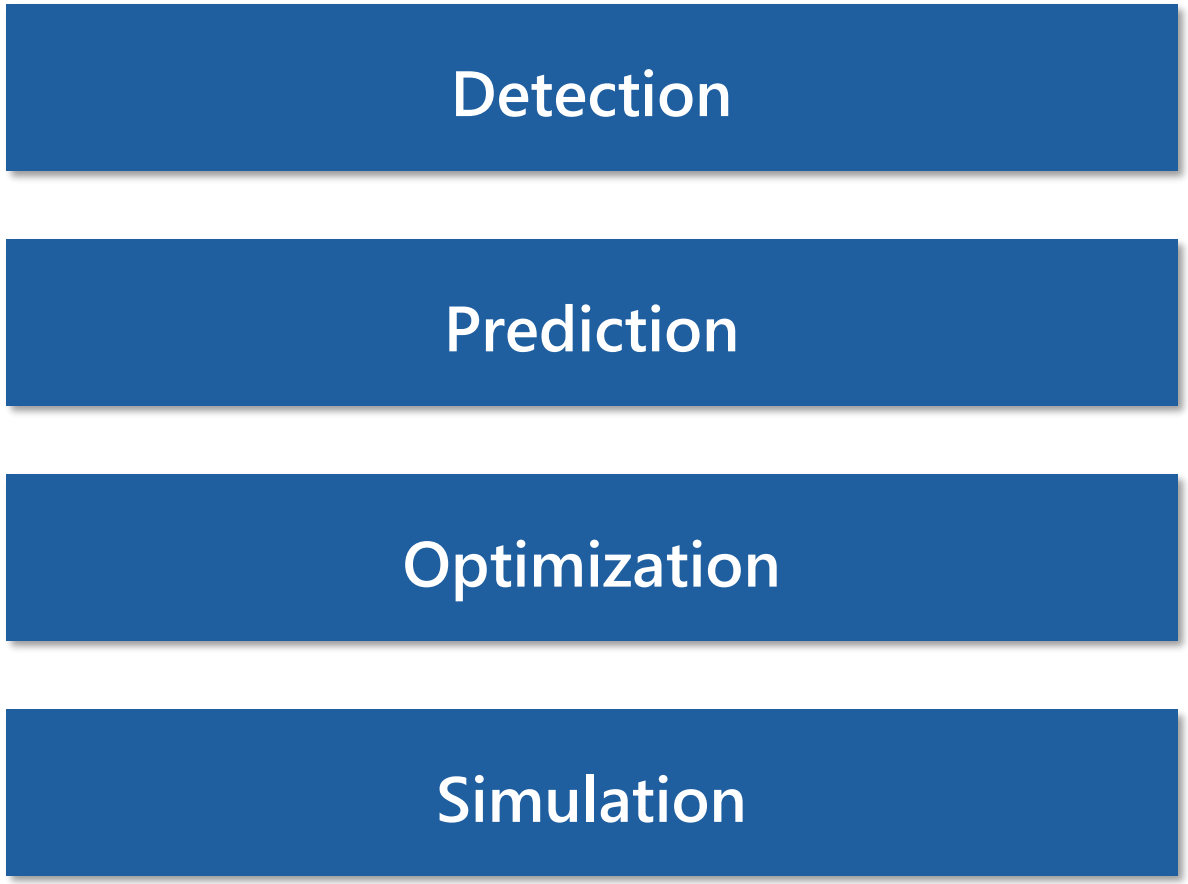
What contributions can we expect from AI for energy?

- AI is expected to deliver a wide range of benefits to the energy sector.



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Source： ICEF (2024). "Artificial Intelligence for Climate Change Mitigation Roadmap".

Example of AI Use in the Industry Sector (Global)

	Summary	Effect	Source
Detection/ Prediction	Methane leak detection using satellite, weather and geospatial data ×AI （gas field, industrial site and others）	n.a.	Univertity Collaboration （Canada）
Prediction/ Optimization/ Simulation	EAF: Reducing the use of alloying ferroalloys added to strengthen steel products	Maximum 15% CO2 reduction	Fero Labs（USA）
	EAF: AI optimization across the entire process—from scrap steel procurement, sorting, and blending to melting and downstream processes.	2～3% energy savings	CELSA（Spain）
	Cement: Optimization of in-furnace oxygen concentration in clinker production kilns, reducing clinker consumption through cement quality prediction.	2% energy savings and CO2 emissions reduction	CarbonRe（UK）
	Paper and pulp: Optimization of waste heat recovery and utilization processes at paper mills.	5～15% energy saving potential	Polytechnique Montreal

✓ The AI enables optimal control of product quality within acceptable ranges.

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Examples of AI Use in the Industry Sector (Japan)

Examples

Toshiba	▪ **Demand forecasting** using AI (weather and production planning). ▪ **Mathematical models** are used to control **boilers, generators, and chillers** with the aim of minimizing costs.
Azbil	▪ Implementing optimal control based on real-time plant data. ▪ Providing **technology** to **keep the model up to date with changes in the factories**
JFE Steel	▪ A **cyber-physical system (CPS)**. In addition to data such as temperature and pressure obtained by sensors, video information from inside the blast furnace is also collected in real time, and **the condition of the blast furnace is visualized on the CPS**.
Yokokawa × Sumitomo Chemical	▪ **Maintains the distillate quality and liquid level** in the distillation tower at appropriate levels while making maximum use of waste heat.

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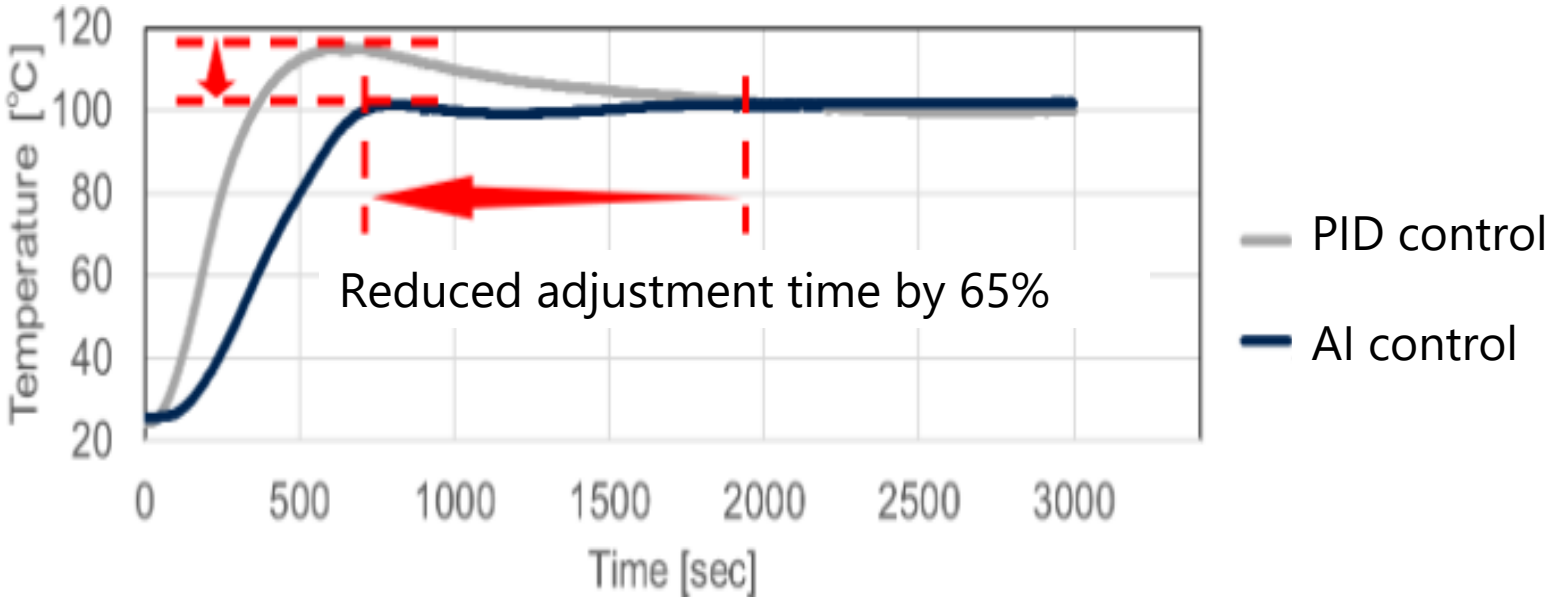
Source： https://www.global.toshiba/jp/company/energy/topics/digital-transformation/dx008-210324.html, https://www.azbil.com/jp/corporate/pr/library/review/pdf/Review2025_05.pdf, https://belgium.arcelormittal.com/en/arcelormittal-chooses-energiencys-artificial-intelligence-to-save-energy-in-steel-coils-processing/, https://www.jfe-steel.co.jp/products/solution/data-science/01-blast-furnace.html, https://www.yokogawa.co.jp/news/press-releases/2022/2022-03-22-ja/

Example of Yokokawa

Start-up adjustment time of a furnace: from 30 minutes to 10 minutes



- ✓ Yokogawa Electric provides solutions using AI in factories.
- ✓ By using AI to control furnace heating, Yokokawa managed to reduce startup and temperature adjustment time from 30 minutes to 10 minutes.

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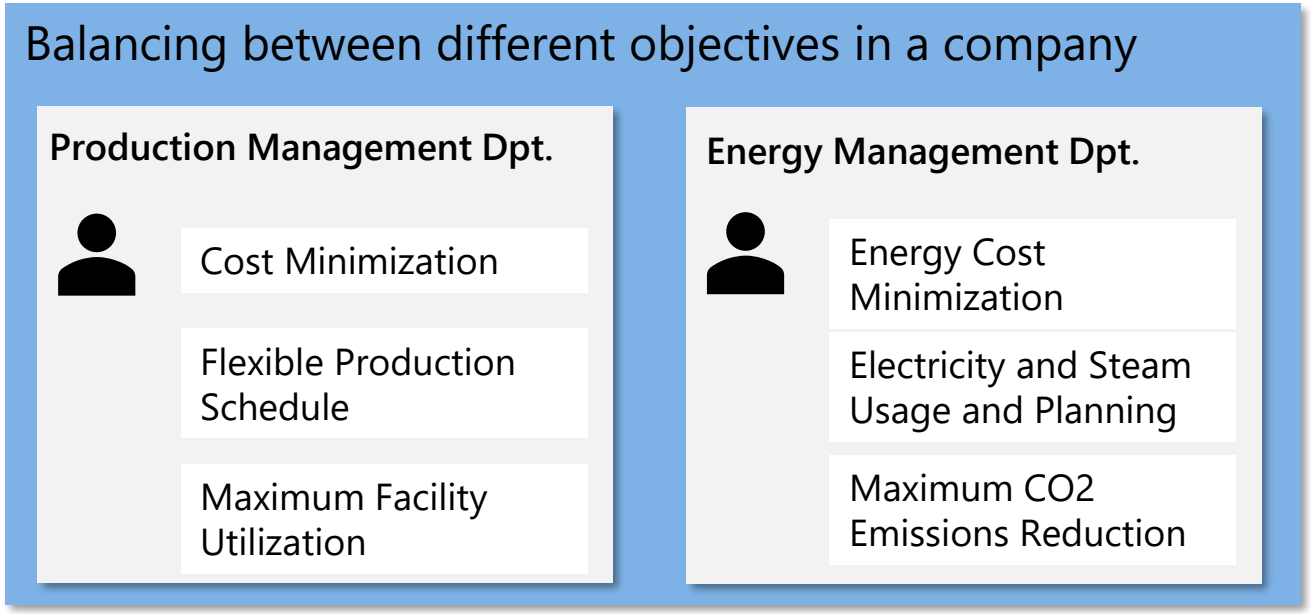
Source：https://www.yokogawa.co.jp/news/press-releases/2023/2023-02-27-ja/

Example of Sumitomo Chemical

Optimal production plan considering multiple variables



- ✓ Sumitomo Chemical utilizes Hitachi's newly developed collaborative planning engine, "TSPlanner (Team Synergy Planner)," and uses AI to present adjustment proposals for both production and energy plans.
- ✓ For example, it is possible to reduce energy consumption by optimizing the overall production plan so as not to exceed the contracted power limit.

Source：https://www.hitachi.co.jp/New/cnews/month/2025/03/0327.html

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Energy savings potential of AI in the industry sector : Outlook by 2035

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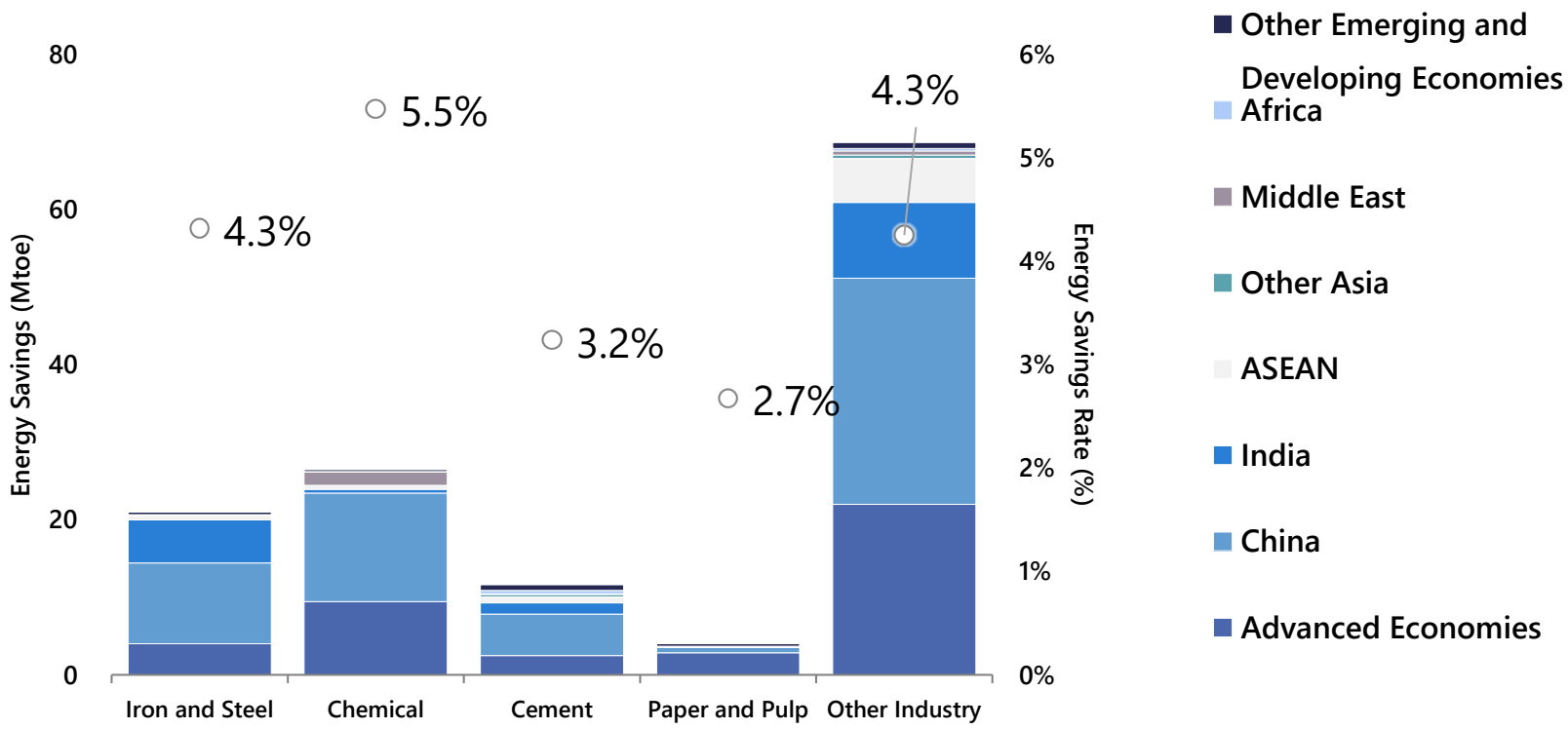
Use of AI has the potential to save about 2-6% of the industry's energy demand against ATS (Advanced Technologies Scenario)

Energy Savings Potential of AI and Energy Savings Rate (2035)



- The energy savings in the chemical industry will be the largest at 26 Mtoe, followed by the steel, cement and paper industries at 21 Mtoe, 11.5 Mtoe and 4 Mtoe, respectively. In addition to these, there will be a 68 Mtoe effect in non-energy-intensive industries such as the machinery industry.

Source：IEEJ (2025).

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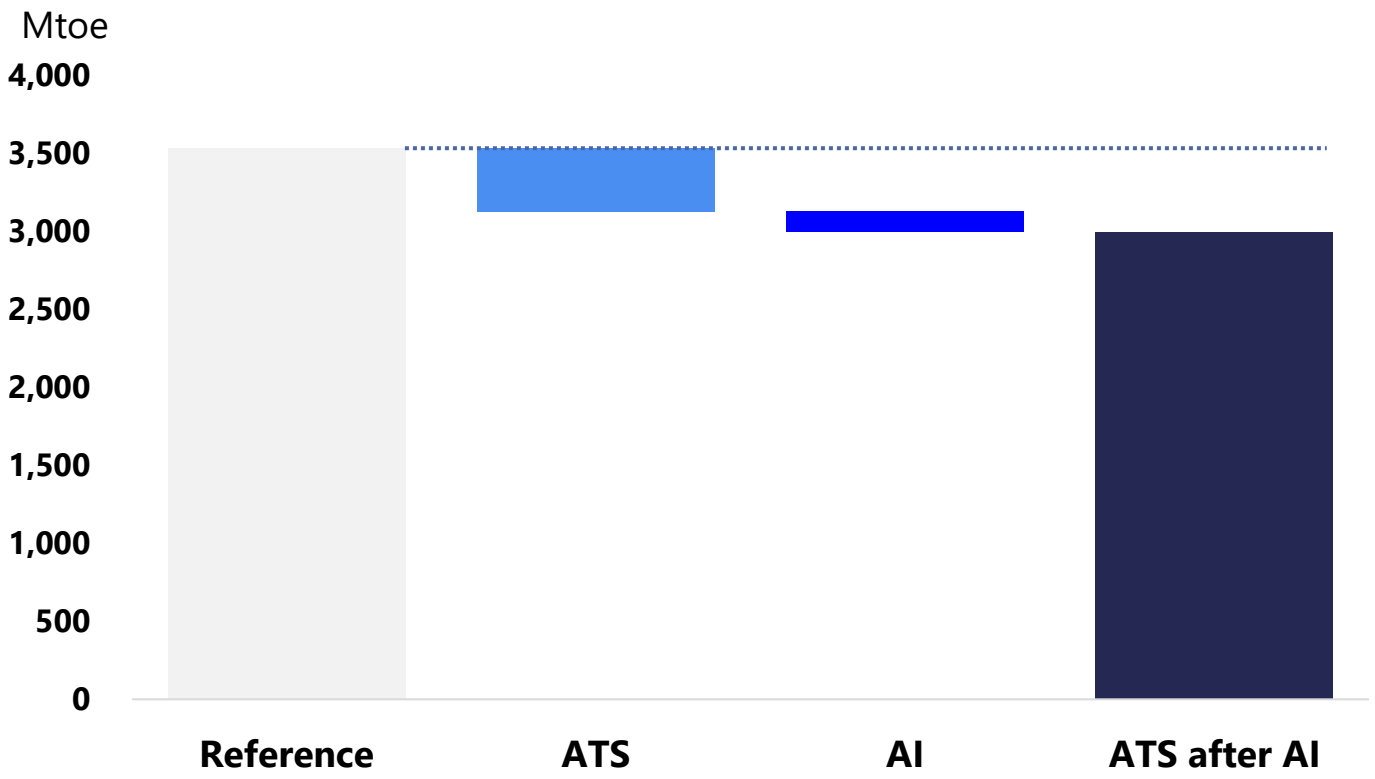
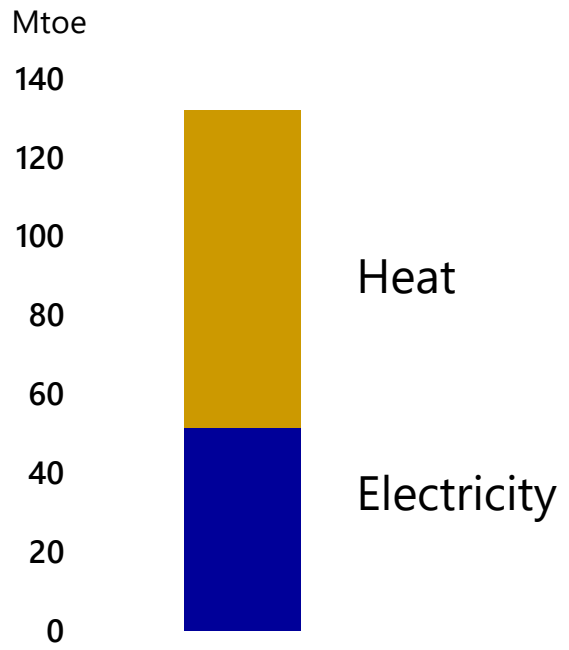
Coupled with advanced technologies and energy management, AI-enabled industries can achieve additional energy savings.

The Outlook for the Industry Sector (2035, World)



AI-enabled saving (2035, World)



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Source：IEEJ (2025).

Implications

- **The use of AI in the industry sector has great potential for energy savings.**
- **AI-enabled industries can save “heat” demand aside from electricity.**
- **There are various challenges to realize is energy savings potential.**
- **Policies will play important roles for its wider adoption.**
  - ✓ Human resource development and awareness building
  - ✓ Providing incentives for increased adoption
  - ✓ Sharing best practices
  - ✓ Cybersecurity measures
  - ✓ Measures against rebound effect

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