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International perspective on EE in the cement sector

Energy Efficiency in the Cement Sector

What is being done now, and what are the emerging technologies?

International perspectives for Vietnam

Tuesday, April 21 st 2026



Challenges in a Vietnamese context

Vietnam’s cement sector is strategically important because it is both energy-intensive and under pressure from cost, competitiveness, and decarbonization. Cement plants face a double challenge: they need to reduce fuel and power consumption while also addressing emissions from both calcination and combustion.

For Vietnam, this is not only an environmental issue. It is a question of production cost, export competitiveness, and long-term resilience in a market with tighter environmental requirements and increasing pressure on input costs.

Key message:

Energy efficiency in cement is one of the most practical ways to improve both competitiveness and carbon performance.

Where energy is used in cement plants

The largest energy use in cement production is tied to clinker production, especially in the kiln, preheater, precalciner , and clinker cooler. Thermal energy dominates in the high -temperature process, while electricity use is concentrated in grinding, fans, conveyors, compressors, and auxiliaries.

In practical terms, the biggest efficiency levers are usually:

- kiln and preheater efficiency
- clinker cooler performance
- grinding efficiency
- air leakage reduction
- waste heat utilization
- lower clinker factor in finished cement

Key message:

The cement sector’s main energy challenge is still the thermal performance of clinker production, but electricity use in grinding and auxiliaries is also a major improvement area.

What is being done now internationally

Across leading cement markets, the current efficiency agenda is built around proven measures rather than breakthrough technologies.

- The most common actions are:
- upgrading to or optimizing dry -process preheater and precalciner kilns
- improving process control and automation
- modernizing clinker coolers, burners, fans, and drives
- improving grinding systems, especially with roller presses and vertical roller mills
- deploying waste heat recovery for on -site power generation
- increasing use of alternative fuels
- reducing the clinker -to-cement ratio by using supplementary cementitious materials such as slag, fly ash, pozzolana, calcined clay, and limestone

Key message:

International best practice combines process efficiency, fuel substitution, and clinker substitution.

What is most relevant for Vietnam now

For Vietnam, the highest -priority efficiency opportunities are not exotic. They are practical measures that can be implemented across a broad plant base.

The most relevant areas are:

- better operational control and process stability
- lower clinker factor where standards and material supply allow
- higher use of alternative fuels where waste systems are reliable
- better kiln thermal efficiency
- waste heat recovery at suitable plants
- better plant -level monitoring, benchmarking, and maintenance

Vietnam’s challenge is less about identifying technologies and more about scaling implementation, plant by plant, with the right mix of standards, financing, and operating discipline.

Key message:

The biggest opportunity for Vietnam is disciplined execution of proven measures across the existing fleet.

Best near-term opportunities for existing plants

For existing cement plants, the strongest near -term opportunities are usually:

- energy audits and performance diagnostics
- advanced process control for kiln, cooler, and grinding systems
- combustion optimization and burner upgrades
- reducing false air and system leakages
- clinker cooler upgrades
- high-efficiency motors and variable speed drives
- grinding optimization
- higher blending ratios in cement
- stronger preventive and predictive maintenance

These measures are attractive because they are relatively mature, easier to finance than major technology shifts, and often give a stronger short -term business case.

Key message:

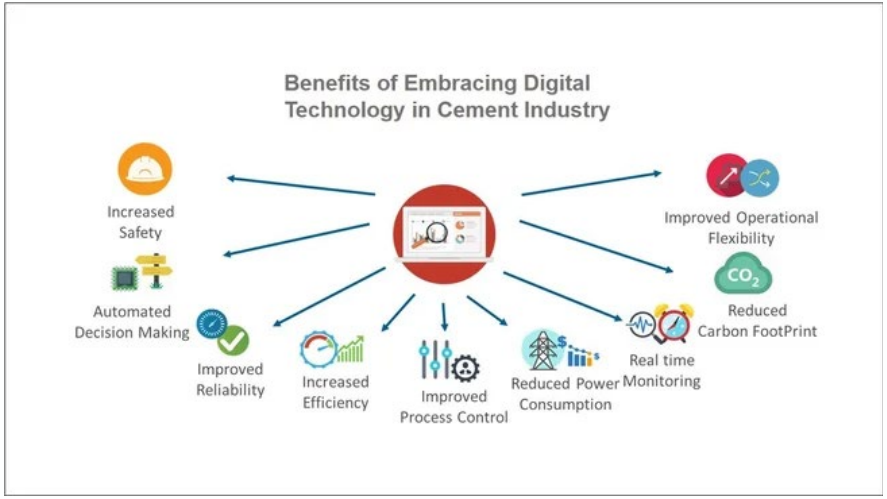
Vietnam should start with the measures that improve performance now, not wait for future technologies.

Emerging technologies internationally

Emerging technologies in cement should be separated into what is commercial now, what is scaling, and what is still longer term.

Commercial now or near -commercial:

- AI-based process optimization
- digital twins and advanced monitoring
- broader rollout of waste heat recovery
- high-performance grinding technologies
- advanced quality control for blended cements



Emerging technologies internationally

Scaling internationally:

- calcined clay and new supplementary cementitious materials
- integrated waste pre -processing for alternative fuels
- advanced low -clinker cement formulations
- heat integration concepts linked to carbon capture

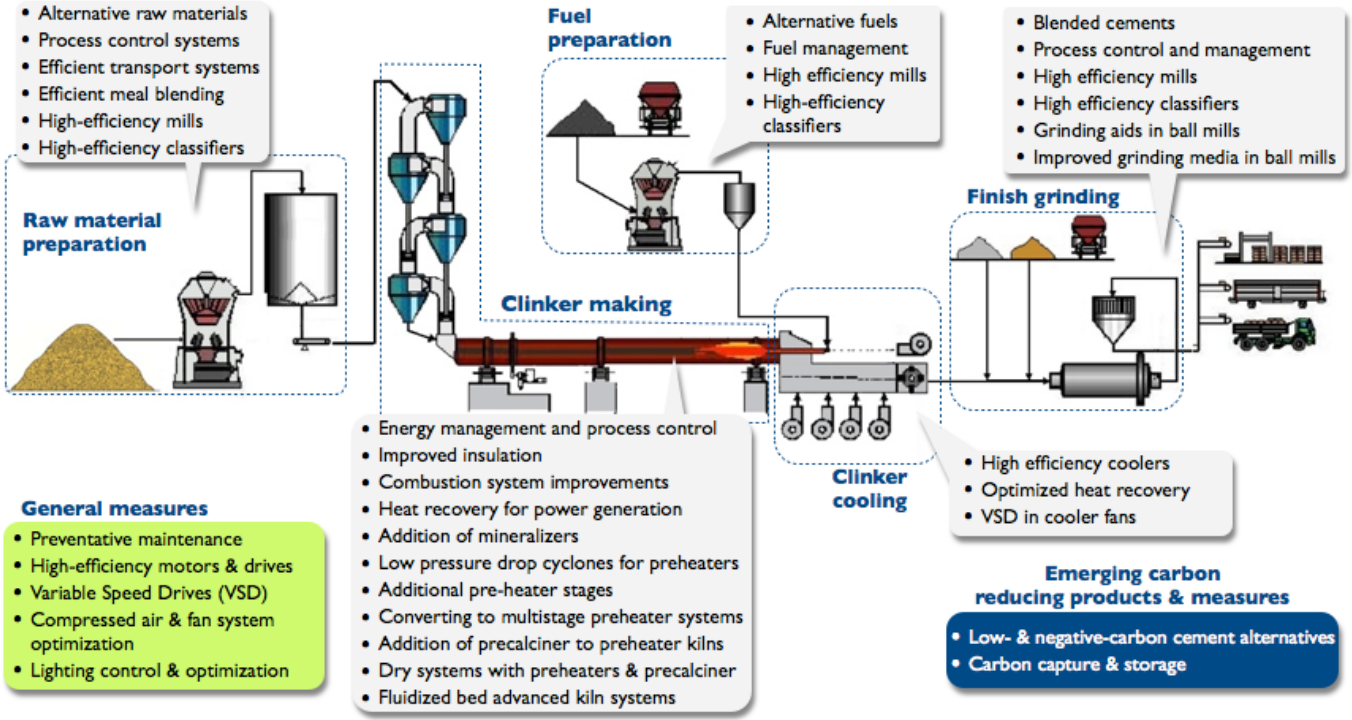
Longer-term technologies:

- carbon capture, utilization and storage
- electrified kilns
- hydrogen for high -temperature heat
- novel low-clinker or alternative binder systems

Key message:

For the next years, the most realistic opportunities for Vietnam remain digitalization, blending, alternative fuels, and waste heat recovery.

Emerging technologies internationally (Example)



Ref: https://www.globalefficiencyintel.com/new -blog/2017/technologies -energy-emission-cement-concrete -

International lessons for Vietnam

International experience points to a few clear lessons.

- First, countries that move fastest tend to combine technical measures with policy support, standards, and financing.
- Second, alternative fuels scale only when there is a functioning waste collection, sorting, and pre -processing system outside the plant gate.
- Third, digital tools create value only when plants already have stable operations, good instrumentation, and disciplined follow -up.

Another important lesson is that there is no single silver bullet. The best-performing cement sectors improve through multiple smaller gains, supported by a few larger investments such as waste heat recovery or major kiln upgrades.

Key message:

Energy efficiency in cement is not only a plant engineering issue. It is also a question of sector setup, raw material access, waste infrastructure, and investment conditions.

Closing message

International experience shows that the biggest gains come from combining better operation, targeted investments, and stronger sector frameworks. Vietnam should therefore prioritize measures that are practical today and scalable across the sector.

- Prioritize robust measures first, especially process control, kiln stability, grinding efficiency, and maintenance.
- Reduce clinker factor wherever technically and commercially feasible.
- Screen waste heat recovery systematically for large and stable clinker lines.
- Build the external ecosystem for alternative fuels, not only the in -plant retrofit.
- Strengthen plant data, KPIs, and benchmarking to identify the biggest gaps in performance.
- Prepare for long -term decarbonization technologies, but do not let that delay current efficiency action.

The next wave of efficiency gains in Vietnam's cement sector will come from combining better operation, lower clinker factor, selective retrofit investments, waste heat recovery, and stronger sector coordination.

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THANKS!

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