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High Ambition Pathways for Korea to Achieve 60% NDC Target by 2035

NOVEMBER 2025

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Summary

The Republic of Korea (Korea) has announced a set of draft 2035 Nationally Determined Contribution (NDC) targets on November 6, 2025, to reduce greenhouse gas emissions between 50-53% (lower target) and 60% (upper target) from the 2018 baseline emission level.¹ The final target will be confirmed through government review before official submission to the UNFCCC at COP30. This target range reflects different levels of ambition: the upper NDC target of 60% is largely aligned with a high-ambition pathway consistent with rapid economy-wide decarbonization, whereas the lower NDC target of 50% or 53% is insufficient to consistently align with either Korea's 2050 carbon-neutrality goal or the global goal of limiting climate change to below 1.5°C.^{2,3} Furthermore, the draft NDC target allocates 36.5-39.3 MtCO₂ emissions reduction (or 4.9-5.3% of the reduction goal) to be achieved through international offsets, which have never been demonstrated at the proposed scale.

Multiple analyses from leading modeling teams have shown that the upper NDC target of 60% represents a high-ambition level of emission reduction that can be achieved through a carefully designed set of domestic policy actions, without heavy reliance on international offsets. To provide quantitative support for reaching this high-level target, this policy brief summarizes high-ambition pathways for Korea's 2035 NDC, drawing on complementary analyses conducted by research teams from the Center for Global Sustainability at the University of Maryland (United States) and the joint Seoul National University–Korea Advanced Institute of Science and Technology research team (Korea). Below we outline a set of actionable, near-term measures that can enable Korea to achieve the 60% target by 2035.

1 Yonhap. Gov't proposes minimum 50% reduction in greenhouse gas emissions (Korea Times, 2025), <https://www.koreatimes.co.kr/southkorea/environment-animals/20251106/govt-proposes-minimum-50-reduction-in-greenhouse-gas-emissions-by-2035>

2 Intergovernmental Panel on Climate Change. *Climate Change 2023: Synthesis Report* (IPCC, 2023), <https://www.ipcc.ch/report/ar6/syr/>

3 Climate Action Tracker. *South Korea country profile* (Climate Analytics & NewClimate Institute, 2025), <https://climateactiontracker.org/countries/south-korea/>



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Emission Pathways

Analyses from the two modeling teams show that the upper NDC target of 60% is both ambitious and achievable (Figure 1). Research by the Center for Global Sustainability (CGS), University of Maryland (UMD), identifies a *High Ambition* pathway delivering a 60-64% reduction⁴ by 2035 through domestic climate actions, before reaching net-zero by 2050. Joint research by Seoul National University (SNU) and Korea Advanced Institute of Science and Technology (KAIST) also finds that substantial emissions reductions of 54% to 64% are possible by 2035 with enhanced policy actions without relying on international offsets.⁵

The CGS *High Ambition* pathway was developed using a global integrated assessment model (the Global Change Analysis Model, GCAM-CGS).^{6,7} Emissions reductions are primarily driven by power sector decarbonization, accelerated electrification of transportation, and targeted industrial transformation. Accelerating renewable deployment, especially wind and solar, to 65% of generation by 2035, cancelling new coal and gas projects, and phasing out coal by 2035 are priorities for achieving a high ambition pathway. Additionally, limiting reliance on technologies with uncertain emissions reduction potential or economic viability, such as hydrogen or ammonia, which would increase Korea's import dependency, is needed. For more details, read the [Evaluating a High Ambition Pathway for Decarbonization in the Republic of Korea](#) report.

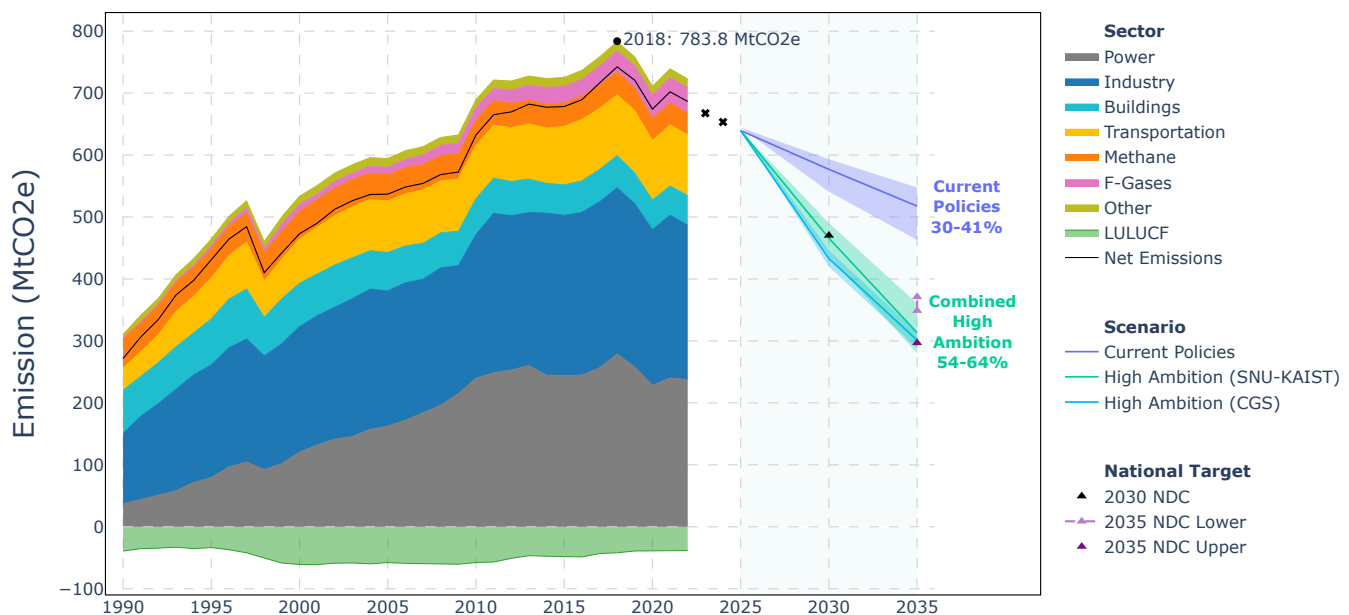


Figure 1: Korea's GHG emission pathways under *Current Policies* and *High Ambition* scenarios (including LULUCF). Historical data is from the Greenhouse Gas Inventory and Research Center of Korea.⁸ The figure shows three scenario pathways from 2025 to 2035: *Current Policies* (30-41% reduction range by 2035), *High Ambition* from SNU-KAIST analysis (54-64%), and *High Ambition* from CGS analysis (60-64%).⁹ Shaded areas represent the uncertainty ranges for each scenario. The triangle markers indicate Korea's 2030 NDC emission reduction target (40 %), the upper NDC target of 60%, and the lower NDC target of 50% and 53%, relative to 2018 baseline levels (742.3 MtCO₂e). The combined assessment range from both CGS and SNU-KAIST analyses (54-64%) demonstrates that the 60% target is achievable through enhanced policy action. "Other" includes residual emissions such as agriculture, waste, and fugitive emissions. "DAC" (Direct Air Capture) represents negative emissions from atmospheric CO₂ removal.

4 Based on gross-net emissions accounting, aligned with Korea's 2030 NDC. Korea's 2035 NDC uses net-net emissions accounting, resulting in lower percentage values for equivalent absolute emission reductions.

5 Choi, H., Park, S., & McJeon, H. *High-Ambition Climate Action in All Sectors Can Achieve a 60% Greenhouse Gas Emissions Reduction in Korea by 2035* (EarthArXiv preprint, 2025), <https://eartharxiv.org/repository/view/9937/>

6 J. Behrendt, M. Borrero, M. George, C. Bertram, A. Rader, D. Churlyayev, A. Kreis, J. Lou, N. Hultman and R. Cui. *Evaluating a High Ambition Pathway for Decarbonization in the Republic of Korea* (Center for Global Sustainability, University of Maryland, 2025), <https://cgs.umd.edu/research-impact/publications/evaluating-high-ambition-pathway-decarbonization-republic-korea>

7 *High Ambition Pathways Dashboard: South Korea* (Center for Global Sustainability, University of Maryland, 2025), <https://prod-cgs.oslabs.app/south-korea>

8 2024 National Greenhouse Gas Inventory of Korea, (Greenhouse Gas Inventory and Research Center of Korea (GIR), 2025).

9 The CGS analysis used a PRIMAP-hist for the 2018 baseline, which has lower total emissions. The pathway was adjusted to keep relative change from baseline consistent while using Korea's GIR historical data.

The SNU-KAIST research assesses Korea’s policy trajectory using a nationally customized GCAM-ROK model and finds that current policies fall short of the 2030 NDC and yield only about a one-third of the needed emission cut by 2035. In contrast, a high ambition domestic policy package—featuring a coal phaseout by 2035, upscaling renewable capacity by 12-15 GW per year, stronger industrial mitigation measures, and non-CO₂ abatement—can achieve 2035 emission reductions of 60% (range 54% to 64%) (Figure 2). For more details, read the [High-ambition climate action in all sectors can achieve a 60% greenhouse gas emissions reduction in Korea by 2035](#) preprint.



Figure 2: Sectoral contributions to GHG emissions reductions from 2018 to 2035 under the *Current Policies* and *High Ambition* scenarios. Bars represent absolute reductions relative to 2018 emissions, with percentage reductions shown in parentheses. The reductions are calculated against 2018 gross total emissions (783.8 MtCO₂e) in accordance with Korea’s 2030 NDC, but not updated to the newly announced net value accounting. Light blue bars indicate reductions under the *Current Policies* scenario, while dark blue bars represent additional reductions under the *High Ambition* scenario. “Other” includes residual emissions from sectors not covered under CH₄ or F-gases, such as agriculture, waste, and fugitive emissions. “DAC” (Direct Air Capture) represents negative emissions from atmospheric CO₂ removal. [source: Choi et al. (2025)¹⁰]

These analyses demonstrate that the lower NDC target of 50% and 53% fall short of the “highest possible ambition” called for by Article 4 of the Paris Agreement.¹¹ Furthermore, the lower NDC target creates significant challenges in achieving its 2050 carbon neutrality target. Implementing policies that can help Korea achieve rapid decarbonization will be critical for ensuring Korea achieves the upper NDC target of 60% by 2035 without relying on international offsets.

10 Choi, H., Park, S., & McJeon, H. High-Ambition Climate Action in All Sectors Can Achieve a 60% Greenhouse Gas Emissions Reduction in Korea by 2035 (EarthArXiv preprint, 2025), <https://eartharxiv.org/repository/view/9937/>

11 United Nations Framework Convention on Climate Change, Paris Agreement (UNFCCC, 2015), https://unfccc.int/sites/default/files/english_paris_agreement.pdf

Key Actions for High Ambition Emissions Reductions

Based on the assessments of high-ambition pathways, a set of key policy actions is summarized below that can support 61% GHG emissions reductions to achieve the 2035 NDC.

Power sector transformation

- Pursuing coal phaseout by 2035 with an orderly retirement schedule and cancellation of new coal.

- ▶ Scaling renewable capacity by about 12 to 15 GW per year, combining offshore wind, onshore wind, and solar PV, enabled by streamlined siting and permitting, grid modernization, expanded storage, and faster interconnection.
- ▶ Maintaining planned nuclear capacity through 2035 to complement renewables during the transition, while avoiding lock-in to ammonia-coal co-firing or imported hydrogen for bulk power generation.

Industrial decarbonization

- ▶ Steel: Accelerating deployment of hydrogen-based direct reduced iron (H_2 -DRI) and scrap-based electric arc furnaces (EAF), combined with a prohibition on blast-furnace lifetime extensions by 2035 and enhanced support for scrap collection, logistics, and quality improvement.
- ▶ Cement: Deploying low-carbon cements (e.g., LC3), improving process efficiency, and promoting clinker substitution—including slag—with updated standards and procurement.
- ▶ Chemicals: Expanding recycled plastics and bio-naphtha feedstocks, and selectively advancing green-hydrogen-based chemical production where cost-effective and strategically essential to reduce fossil feedstock dependence.
- ▶ Carbon pricing and finance: Strengthening the Korea Emissions Trading System (K-ETS) with carbon contracts for difference (CCfDs) and tightening allocation rules, while providing targeted incentives to de-risk first-of-a-kind projects and crowd in private capital.

Transport electrification

- ▶ Adopting a regulatory phase-out of new internal-combustion-engine-vehicle (ICEV) sales in the 2035–2040 window, aligned with infrastructure readiness and affordability.
- ▶ Prioritizing battery-electric vehicles (BEVs) over hybrids in sales targets and incentives, and accelerating the electrification of urban bus fleets with dedicated depot charging.
- ▶ Expanding nationwide charging infrastructure via building code requirements for high-rise and multi-unit dwellings and targeted highway-corridor networks.
- ▶ Promoting modal shift to public transit and active mobility through service, pricing, and urban design measures.

Building sector transformation

- ▶ Doubling annual efficiency-improvement rates from 2030 onward through enhanced standards, incentives, and performance-based compliance.
- ▶ Expanding Zero-Energy-Building (ZEB) codes to Grade 4 for private buildings $\geq 500 \text{ m}^2$ and scaling green retrofits for existing stock.
- ▶ Mandating zero-emission appliances over time, with a managed phase-out of gas heating post-2040, and electrifying space and water heating to reach roughly two-thirds electricity share in building final energy by 2035.

Non-CO₂ gas abatement

- ▶ Implementing methane pricing or taxation and performance standards across agriculture, waste, and energy, coupled with support for best-practice deployment.
- ▶ Establishing F-gas pricing and targeted abatement in semiconductors and other uses, aligned with Kigali Amendment implementation and technology switching.
- ▶ Advancing agricultural mitigation measures, such as water-saving irrigation and optimized fertilizer use, and enhancing biomethane recovery and utilization in waste systems.

Strategic technology deployment

- ▶ Leveraging readily available technologies, such as renewables, electric vehicles, and batteries, that already align with the strengths of the Korean industry, to deliver near-term emission reduction.
- ▶ Prioritizing clean hydrogen for hard-to-abate industrial uses, while avoiding over-reliance on the power sector, where renewables and storage are more cost-effective.
- ▶ Deploying carbon capture and storage (CCS) where unavoidable process emissions remain (e.g., cement and chemicals), with careful attention to storage readiness and monitoring.
- ▶ Scaling early-stage carbon-dioxide-removal technologies, such as direct air capture (DAC), to single-digit Mt by 2035, while safeguarding quality and cost-effectiveness.
- ▶ Bringing key additional technologies to market by 2035 to enable rapid upscaling beyond 2035, as needed for achieving net-zero.
- ▶ Enhancing land-sector sinks through sustainable forest management and land-use practices that align with biodiversity and resilience goals.

Coordinated action

Achieving a 60% reduction in GHG emissions by 2035 from 2018 levels will require coordinated action across all levels of government—central, provinces, and cities—as well as from businesses and other stakeholders.

- ▶ Provincial governments can play a leading role in driving emissions reductions in the power and transport sectors by updating local policies and siting frameworks, fostering circular economy incentives in industrial hubs, and advancing green mobility initiatives—ensuring that local and provincial policies align with the national target.
- ▶ Effective cross-ministerial and intergovernmental coordination is essential to align headline emissions targets with permitting, investment, and finance mechanisms. Mobilizing public and private capital at scale for clean grids, industrial retrofits, electrification infrastructure, and building upgrades will also be crucial.
- ▶ Regulatory harmonization and cross-ministerial coordination are necessary to clear bottlenecks in permitting and interconnection, while international cooperation on technology and supply chains can accelerate deployment. Social consensus and just-transition measures will be vital to ensure equitable outcomes for workers and local communities.

International Offsets

The draft NDC target continues the reliance on international offsets, allocating between 36.5-39.3 MtCO₂ emissions reduction (or 4.9-5.3% of the reduction goal) outside domestic actions. International offsets have not been demonstrated at the scale proposed. The reliance on international offsets also raises concerns about equity across countries and burden-sharing of global emissions. Research shows that large-scale international offsets can interfere with national environmental policies,¹² create potential inequities,¹³ and have not consistently delivered benefits to local communities.¹⁴ Additionally, international offsets have not been effective at reducing global emissions.^{15,16} Limiting reliance on international offsets would enhance the credibility of climate targets by focusing on domestic emissions reductions.

Path forward

The research from both CGS and SNU-KAIST underscores the feasibility of achieving the upper NDC target of 60% by 2035 and outlines priority actions needed to reach this target. Turning this ambition into actionable policies will be the focus of Korea's policymakers over the next decade. It also requires coordinated action across all levels of government—central, provinces, and cities—as well as from businesses and other stakeholders. Near-term milestones, such as rapid renewable buildouts of 12-15 GW per year, strengthening the K-ETS through CCfDs, and regular progress toward a 2035 coal phase-out, can help enable rapid emissions reduction to fulfill the upper NDC target of 60%. When paired with subnational coordination on siting, permitting, and grid upgrades, these measures can further accelerate deployment of clean technology and infrastructure. Clear 2026–2030 checkpoints—including the coal exit schedule, annual average wind and solar build rates, ZEV sales targets, and non-CO₂ controls—will keep Korea on track to achieve this ambitious goal. Beyond domestic benefits, fulfilling Korea's upper NDC target of 60% would position the nation both as a regional leader in Asia's clean energy transition and a global leader in decarbonization.

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