Comparative Analysis of Singapore and France in Meeting Climate Obligations in terms of Green Investment and Circular Economy

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Abstract

Green investment and circular-economy strategies have become vital to national climate transitions; however, the economic and labour market effects vary widely across countries. This paper will compare Singapore and France to examine how structural conditions within the context of their economic scale, market dynamics, and institutional capacity cultivate the relationship between climate investment, employment, and progress toward COP28 goals. Through a comparative policy analysis supported by sectoral case studies, this paper will make the case that Singapore's climate strategy is fundamentally productivity driven, relying on capital-based technologies such as sustainable aviation fuel, hydrogen infrastructure, and automated waste-to-energy systems.

These investments have reinforced competition and energy security but also generated limited employment gains in an already challenging labour market. In contrast, France mobilizes green investment as both a decarbonization tool and an employment strategy. France Relance and France 2030, large-scale programs, alongside labour and circular economy initiatives under the Loi AGEC, create substantial job opportunities in regions facing persistent unemployment, particularly through the expansion of battery manufacturing and repair and reuse networks. The comparison demonstrates that climate policy outcomes are deeply shaped by structural constraints, and that effective progress toward global climate goals requires context-specific policy design, institutional agility, and coordinated technological and international cooperation.

1 Introduction

Singapore and France offer a clean comparison of how an advanced economy can mean very different constraint sets, and therefore very different climate-transition pathways. Singapore is a small, ultra-open city-state whose growth is tightly coupled to global trade and technology cycles, supported by unusually deep domestic capital pools and strong policy credibility. France is a large, diversified economy anchored in domestic demand, with greater sectoral breadth and a state that plays a heavier stabilising and industrial-policy role, but under tighter fiscal arithmetics.

These structural differences matter most where macro meets decarbonisation. France starts with

a structurally low-carbon electricity system, which is an advantage when scaling electrification, while Singapore began from a natural gas-dominant grid and strong dependence on imported energy sources, making the transition more about regional interconnection and efficiency. COP28's "same destination" agenda therefore translates into different feasibility constraints, because a common decarbonisation goal does not imply a common starting point or set of policy options. Each country's credible transition path depends on its energy system, fiscal space, industrial capacity, geography, and institutions.

2 Overview of Both Economies

2.1 Economic Structure

Singapore and France sit at opposite ends of the advanced-economy spectrum. Singapore is a small, highly open city-state, while France is fundamentally an economy that is large and diversified with a heavy emphasis on domestic sectors. This difference shapes almost every macro and climate-transition consideration.

Singapore's growth model is externally driven. Trade flows amount to approximately 322% of GDP (World Bank, 2025), and activity is concentrated across a services-dominated economy with services accounting for roughly 72% of GDP, led by wholesale and retail trade (18%), business services (16%), finance and insurance (13%) and transport and storage (10%), alongside a significant industrial base where manufacturing contributes approximately 21% of GDP, concentrated in electronics, petrochemicals and biomedical sciences (Trading Economics, 2025). Domestic consumption plays a limited role compared to external sectors. In December 2024, private consumption accounted for 31.5% of nominal GDP (CEIC Data, 2025), making it one of the lowest shares amongst all developed countries (CEIC Data, 2025). The economy is therefore highly sensitive to global trade, technology investment cycles, and regional demand.

France's economy, by contrast, is anchored in domestic demand. Services account for roughly 70% of GDP, with industry contributing close to 20%, manufacturing about 10%, and agriculture around 1.5% (World Bank, 2025). Household consumption and government spending both contribute to forming the backbone of growth (Final domestic demand excluding inventories contributed +0.7 percentage points to GDP growth, with household and public administration consumption together contributing +0.6 percentage points), which dampens exposure to global trade volatility (Insee, 2026). France's industrial base spanning various high value-added sectors like aerospace, automotive, pharmaceuticals, and luxury manufacturing (Business France, n.d.) also provides greater sectoral breadth than Singapore's more specialised industry structure which focuses more on pharmaceuticals and silicon wafers.

The most striking structural difference lies in energy. France's electricity system is dominated by nuclear power, which accounted for roughly 65–67% of generation in 2024, with renewables contributing close to 28%. As a result, nearly 95% of electricity generation is CO_2-free, and carbon intensity is exceptionally low at around 21gCO_2e/kWh (Enerdata, 2025). Singapore, by contrast, remains heavily dependent on imported energy (where 95% of electricity is generated using imported natural gas), with limited domestic generation options, making decarbonisation structurally more constrained (Energy Market Authority, 2025).

2.2 Savings, Investment, and Capital Availability

Singapore's climate transition is fundamentally shaped by its ability to self-finance. The economy exhibits an exceptionally high savings rate, with gross national savings at 47.5% of GDP in December 2024 (CEIC Data, 2024), broadly in line with its long-run average. This reflects its investment-export model and disciplined fiscal framework where fiscal prudence has always been the forefront of government policy. Combined with large sovereign wealth reserves, this provides a deep pool of domestic capital that can be mobilized for green investment without raising consumption taxes or relying on external borrowing.

France operates under a different financial logic. Household savings are expected to decline (from 14.8% in 2024 to 14.2% in 2026) (Dombrovskis, 2025), and public investment is constrained by persistent fiscal deficits and elevated public debt (which was 117.4% of GDP in Q3 2025) (Insee, 2025). While the French state plays a central role in directing investment, particularly in energy and industrial policy, financing these policies relies more heavily on public debt and EU-level funding mechanisms rather than excess domestic savings. This does not preclude large-scale climate investment, but it does narrow fiscal and intertemporal flexibility.

2.3 Growth Dynamics

The two economies also differ in how growth fluctuates over time.

Singapore's growth is volatile but structurally sound. Expansion tends to be strong during global electronics upcycles, capital-expenditure rebounds, and services inflows, while slowdowns are typically externally driven rather than the result of domestic imbalances. Over the past 10, 5, and 3 years, Singapore recorded compound annual growth rates of approximately 3.3%, 4.2%, and 2.1% respectively (Singstat, 2025). While this represents moderation from historical highs, it remains robust by developed-economy standards.

France exhibits lower but more stable trend growth. Structural constraints, such as weaker productivity growth, labour-market rigidities, and demographic pressures limit upside potential (IMF, 2025). However, economic scale, diversified demand, and a strong stabilising role for the public sector help cushion the economy during global downturns. Growth is less sensitive to external shocks, though this comes at the cost of lower long-run dynamism.

2.4 Fiscal Position and Policy Space

Both countries retain meaningful fiscal capacity, but it is rooted in different foundations.

Singapore follows a structurally conservative fiscal model, anchored by a balanced budget rule over the political cycle. Recurrent spending is restrained, but significant off-budget capacity exists through sovereign wealth returns. Mechanisms such as the Net Investment Returns Contribution and dedicated vehicles like the S$5 billion Future Energy Fund (MOF, 2026) allow Singapore to deploy fiscal resources counter-cyclically and fund climate investments without undermining long-term sustainability as green spending is drawn from reserve returns and pre-capitalised funds (instead of taxes or new debt), leaving the balanced-budget rule intact.

France runs persistent fiscal deficits and carries high public debt, reflecting a strong social-welfare model and an active stabilisation role for the state. While this reduces fiscal headroom,

it also stabilises household income and demand during downturns. Fiscal sustainability, particularly in the context of EU rules and rising climate-related spending needs, remains a central policy challenge.

2.5 Macro Strengths and Structural Constraints

Singapore's strengths lie in policy credibility, financial stability, institutional efficiency, and global capital connectivity. Its key vulnerabilities stem from a small domestic market, exposure to global trade and technology cycles, and demographic ageing.

France benefits from economic scale, diversified industrial capabilities, and a structurally low-carbon electricity system anchored by nuclear energy. These strengths are offset by high public debt, slower productivity growth, and the political difficulty of structural reform.

3 Singapore and France Progress towards COP28 Goals

COP28's UAE Consensus is often summarised by many to be mere symbolism, but its real significance is somewhat operational in nature, where the first Global Stocktake was conducted, which turns COP28 from a mere verbal token into a concrete delivery agenda. The consensus explicitly urges a transition away from fossil fuels in energy systems. At the same time, this direction is paired with a quantified global ambition to triple renewable energy capacity, as well as doubling the global average annual rate of energy-efficiency improvements by 2030. Implementation of all these is also reinforced through stronger attention to adaptation and resilience, plus the mobilisation of the 3 pillars of Climate Finance, namely mitigation, adaption and loss-and-damage.

A comparative reading of current progress and policies of Singapore and France against these COP28 pillars reveals a useful paradox. Both are broadly aligned with the headline objectives on the policy level, yet neither has a frictionless transition path. The difference is not ambition as much as constraint geometry. Singapore's binding constraints are primarily physical and systemic in nature. Due to land scarcity, solar energy can realistically supply only 10–20% of Singapore's power mix (Chandran, 2021) and natural gas continues to account for approximately 94–95% of power generation (GlobalData Energy, 2026). France's difficulties are more institutional and sectoral with limitations such as bottlenecks in permits issuance and planning (of green infrastructure), execution risk in legacy infrastructure, and politically hard-to-abate emissions outside the power sector. More strikingly, France missed the EU's binding renewable energy target in both 2020 and 2022 and reached its 23% renewables share 4 years behind schedule (Lafrance & Portala, 2026). COP28 narrows the global definition of progress, where most importantly, domestic realities determine the speed at which progress can be delivered.

The power sector is where the divergence is most structural. Singapore is a paradigmatic gas-based electricity system: official energy statistics emplaces natural gas at roughly the mid-90% range of generation (around 94–95% in recent years) (Energy Market Authority, 2025). This matters for COP28 in a specific way. Singapore does not have the benefits of an "easy win" of switching from coal to gas, as it is already on the cleaner end of the fossil spectrum (although still pollutive in nature). Yet COP28's direction of travel of transitioning away from fossil fuels fundamentally still implies that the long-run solution is not simply picking the easy way out. Crucially, the issue is not whether gas or oil but rather picking a truly clean energy source. The

challenge is therefore not only technical but also temporal: how quickly can a highly reliable gas system be diversified without undermining security of supply for a trade-dependent city-state?

France begins from a different baseline. Its electricity is structurally low carbon because nuclear remains the central pillar of generation (361.7 TWh in 2024, about 67% of total generation), complemented by growing wind and solar output (71.6 TWh in 2024, up from 45.8 TWh in 2019) (RTE, 2024). This gives France what might be called "built-in compliance" with one of COP28's most difficult demands, which is to decarbonize the power sector while scaling electrification across the economy. Where Singapore must decarbonize electricity and expand electrification at the same time, France can push electrification faster across the board without the immediate penalty of high marginal power emissions. There is a caveat to this advantage, which is that this would be highly conditional on reliability, due to how nuclear availability and grid adequacy still shape the effective carbon outcome at a root level.

Both countries also exhibit credible policy alignment, but through different instrument mixes. Singapore has tightened its long-term pathway, which is to achieve net-zero by 2050, and strengthened its near-term ambition through updated NDCs. It has also leaned hard into price-based policy: the carbon tax has been set at S$25/t$CO_2$e for 2024–2025, rising to §$45/t$CO_2$e for 2026–2027, with a stated intention to reach §$50–80/t$CO_2$e by 2030 (National Climate Change Secretariat, 2026). In COP28 terms, this is a governance signal. Such a policy ultimately seeks to reduce uncertainty and creates an economy-wide incentive to abate, even when land constraints limit domestic renewables deployment.

France's alignment is reinforced through the EU policy framework, through standards, sectoral mandates, and carbon pricing structures that broadly track COP28's intent. Yet it isn't free from implementation risk either. The obstacle is less due to a lack of direction, but rather more about the translation of direction into built projects and sustained execution. Renewable infrastructure and energy project deployments, for example, is not constrained by geography like land-scarce Singapore, but by the institutional bottlenecks — lengthy permitting timelines, local acceptance, and planning constraints (Casey, 2025). Recent public debate around French energy planning, including controversies over wind and solar targets, illustrates why COP28's global ambition can be locally hard to deliver even in a resource-advantaged setting like France (Hernandez, 2026).

The renewables pillar of *Tripling capacity by 2030* therefore becomes an instructive contrast. Singapore cannot meet that objective primarily through domestic build-out at scale, hence necessitating a hybrid strategy combining rooftop solar, efficiency, storage and, more importantly, regional interconnection and clean electricity imports. In other words, Singapore treats cross-border clean energy supply not as a marginal supplement but as a core decarbonisation lever. France, conversely, has the physical potential to scale wind and solar substantially, but faces the practical challenge of compressing permitting and delivery timelines (which are currently not favourable) to match the COP28 pace implied by 2030 targets.

Outside the power sector, the countries' transition bottlenecks almost invert. Singapore's economy-wide decarbonisation is constrained because a gas-dominant grid limits the immediate climate dividend of electrification. As such, deep reductions rely more heavily on a portfolio of options like international cooperation, market mechanisms, and technology pathways (e.g. low carbon fuels) to close the gap between lofty ambitions and constrained domestic abatement capacity. France's most stubborn emissions, by contrast, sit disproportionately in transport

and agriculture. Transport is widely identified as the largest national emitting sector, where decarbonisation requires infrastructure upgrades, behavioural changes, and political durability. EV adoption can reinforce this mechanism by supporting domestic clean-industrial value chains, but the rollout has been slower than a linear transition narrative suggests: battery-electric registrations in France fell 20.7% year-on-year in December 2024, with reduced 2025 incentives further weighing on growth (ACEA, 2025). Agriculture is similarly difficult because emissions are heavily non-CO_2 (notably methane), and rapid cuts collide with livelihoods, food systems, and rural political economy.

The broader comparative lesson is straightforward but often missed — COP28 alignment is a necessary condition for progress, not a guarantee of delivery. Singapore and France both endorse the pillars: fossil transition, renewables scale-up, efficiency acceleration, methane focus, and resilience financing. However, they very much sit on different parts of the feasibility frontier. Still, COP28 sets a common destination. It is up to individual countries to decide the routes and handle the binding constraints along the way.

4 Comparative Analysis in Green Investment and Circular Economy

Green investment and circular-economy policy sit under the same climate banner in Singapore and France, but it is pertinent to note that they operate as variedly different macroeconomic instruments because of the different binding constraints faced by both economies. A useful way to compare them is to treat green investment as a capital allocation problem (what technologies and infrastructure raise the economy's low-carbon production frontier), and the circular economy as a resource-productivity problem (how to reduce material throughput per unit of output via reuse, repair, recycling and recovery). Both aim to decouple growth from emissions. The difference in both is how they transmit into actual productivity and employment gains, as well as external competitiveness.

4.1 Green Investments

In Singapore, the dominant constraint is factors of production scarcity, where land is tight, labour markets are structurally taut, and the growth model is organised around high value-add industries (e.g. logistics, aviation, finance, advanced services). In that setting, green investment is best understood as competitiveness insurance, a way to preserve export competitiveness and reduce future regulatory or market exposure to carbon constraints. It shouldn't then be treated as a Keynesian employment lever, because it is aimed less at mass demand creation than at safeguarding efficiency, resilience, and long-run economic positioning. Economic policy therefore tilts toward favouring capital-deepening by optimizing energy efficiency and leveraging digitally enabled infrastructure that raise productivity and safeguard its global hub status. The employment channel is present but narrow, since job creation concentrates on high-skill complements to capital (e.g. engineering, compliance, risk) rather than labour-intensive buildouts. The labour-market effect is muted not because the investments are small, but because the marginal binding constraint is not the number of jobs but how much clean capacity and space do they have while maintaining energy security and cost competitiveness.

In France, the constraint set is different, since the context is now a larger domestic market, deeper industrial base, and regions with persistent unemployment. This makes improving the

labour market a first-order policy objective. Green investment therefore functions as industrial strategy plus demand support. Primarily, it is expected to decarbonise and re-anchor manufacturing, accelerate retrofits, and crowd-in private capex. This naturally yields broader employment spillover effects because many interventions are construction and supply-chain heavy (e.g. building renovation, rail and grid upgrades, renewables deployment, EV and battery ecosystems).

4.2 Circular Economy

Singapore's circular economy reinforces the same logic. With landfill scarcity and urban density, circularity is treated as a systems-efficiency problem: optimise land use, reduce waste, recover energy or material value, and stabilise utilities costs. Hence, there is a notable preference for integrated, automated infrastructure (e.g., the Tuas Nexus waste-and-water integration) that compresses waste intensity. This produces real welfare gains through lower externalities and better resource security. A strong caveat to note is how it may not generate large labour absorption, because the design objective is in throughput efficiency and reliability and not directly in employment scaling.

France's circular-economy agenda is also more labour-intensive, not by accident but by design intentionally. Repair, refurbishment, sorting, and reuse networks create local services and enterprises, and extended producer responsibility shifts incentives upstream in product design and downstream in collection and recovery. The macro trade-off is more subtle, where these activities often deliver high employment per euro but lower measured labour productivity growth than frontier clean-tech capex. France thus faces a genuine policy balancing act between job-rich circularity and productivity-rich decarbonisation, whereas Singapore's balancing act is between technology optionality and physical scarcity under tight labour markets.

Put differently, Singapore uses green investment and circularity to protect a high-productivity hub model under space and energy constraints. Meanwhile, France uses them to rewire its growth model while explicitly pricing in employment and territorial outcomes. Both can be growth strategies, but the growth they seek to optimise, and the channels through which it materialises are structurally different.

5 Limitations

A central limitation of this comparison is that it examines two countries operating under very different decarbonisation production functions. France benefits from a historically accumulated low-carbon electricity base, while Singapore's pathway is shaped by land scarcity, import dependence, and a gas-based power system. As a result, simple comparisons risk confusing inherited endowments with present policy quality. A country may look stronger in terms of absolute emissions because of legacy infrastructure, while another may look weaker despite making meaningful progress against tighter constraints, which fundamentally hampers their progress. Yet this does not weaken the paper's argument. It strengthens the central claim that climate performance should be evaluated relative to domestic feasibility conditions, rather than through headline outcomes alone.

A related limitation is that energy transitions unfold across different time horizons, and consequently, cross-country comparisons can flatten these distinctions. Apparent structural strengths

may prove to be more fragile over time because of factors like maintenance, financing, regulatory, or political constraints, while seemingly weaker starting points may still support credible progress through efficiency, adaptation, or regional integration. This means the comparison should not be read as a static ranking of national models. Still, the argument remains valid because the paper's purpose is not to identify a universally superior pathway but to show that successful climate policy depends on how well strategies fit each country's evolving constraints and opportunities.

Finally, the comparison inevitably gives substantial weight to the power sector, even though economy-wide decarbonisation also depends on transport, buildings, industry, and broader political coordination. This narrows the scope of what can be concluded, but it does not overturn the main finding. Even beyond electricity, the core issue remains the same, where climate ambition is most meaningfully judged not by uniform benchmarks, but by how effectively each country designs and sustains policy within its own institutional, economic, and physical constraints.

6 Conclusion

Singapore and France show that progress toward COP28 goals cannot be judged through a single template, because climate transitions are shaped by different structural constraints and policy capacities. Both are pursuing the common goals of decarbonisation, efficiency, and resilience, but they do so through very different pathways.

In Singapore, climate policy is constrained by land scarcity, imported energy dependence, and a highly open economy. As a result, green investment is aimed less at broad job creation and more at preserving competitiveness, strengthening efficiency, and improving long-term energy security. In France, the transition is more closely tied to industrial policy, employment, and regional development, with green spending and circular-economy measures generating wider domestic spillovers.

The main comparative lesson is that climate ambition is only meaningful when adapted to domestic realities. Singapore and France are not simply moving at different speeds toward the same target, but operating under different feasibility constraints. This reinforces the central argument of the paper: climate policy is most effective when it is credible, durable, and fitted to national conditions.

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