The Pitfalls of Green Deals: Introduction and Synthesis

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Abstract Green Deals have been introduced across Western economies as large-scale, mission-oriented innovation policies (MOIPs) intended to combine economic growth with environmental sustainability. Rooted in the concept of an "entrepreneurial state," these initiatives reflect renewed confidence in governments' ability to direct technological and industrial transformation. However, their outcomes have frequently diverged from expectations. This volume examines the theoretical foundations and empirical results of Green Deals, highlighting the institutional, economic, and behavioral factors that contribute to their shortcomings. Drawing on perspectives from evolutionary economics, public choice theory, and behavioral political economy, the contributors analyze a wide range of cases, including Germany's *Energiewende*, Italy's Superbonus, and the European Union's hydrogen and battery programs. Across these examples, recurring challenges such as rent-seeking, mission capture, optimism bias, and distorted incentives are identified. The findings indicate that while Green Deals have advanced ambitious sustainability goals, they often undermine competitiveness and fiscal stability while generating limited environmental benefits. The volume concludes by outlining alternative pathways that emphasize incremental, technology-neutral, and institutionally grounded approaches to sustainability—approaches that align more closely with long-term economic resilience and effective environmental policy.

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Introduction

Historically, environmental policy has depended on tools such as taxes, regulations, and bans to advance sustainability goals. In recent years, however, there has been an increasing convergence between environmental and industrial policy. Governments throughout the Western world are now implementing so-called Green Deals—broad industrial policy frameworks designed to achieve sustainability objectives.

This shift in policy direction has unfolded alongside a relative weakening of Europe's economic competitiveness. Since the 2008–2009 financial crisis, the European Union has gradually fallen behind both China and the United States. Although economic performance can be assessed through multiple indicators, Europe seems to be trailing on nearly all of them. The seriousness of this decline was underscored by Mario Draghi in a report commissioned by the European Commission and released in late 2024 (Draghi 2024).

Policymakers—particularly within Europe—have advanced Green Deals as a strategy to merge environmental sustainability with economic revitalization. This renewed focus on major state-led initiatives has gained further support from economists such as Mariana Mazzucato and Dani Rodrik, who advocate a more interventionist state role in shaping markets and directing economic progress (e.g., Mazzucato 2018a, 2021; Rodrik 2022).

As part of the concept of "mission-oriented innovation policy" (MOIP), governments are encouraged to steer economies toward overarching societal goals such as sustainability, inclusiveness, and resilience. Drawing on historical precedents like the US Apollo program, this perspective has reshaped how many policymakers and commentators understand the state's role in driving innovation.

These ideas have inspired leaders and institutions worldwide to launch ambitious green industrial strategies under banners such as Green Deals or Moonshots. European Commission President Ursula von der Leyen (2019) has even described the European Green Deal as Europe's "man on the moon moment," while US Secretary of Energy under the Biden administration, Jennifer Granholm (2022), has called the fight against climate change "our generation's moonshot."

In this volume, we rely on the OECD's (2021, p. 15) definition of a Mission Oriented Innovation Policy (MOIP) as "a co-ordinated package of policy and regulatory measures tailored specifically to mobilise science, technology and innovation in order to address well-defined objectives related to a societal challenge, in a defined timeframe."

Relatedly, we define a Green Deal as a comprehensive set of mission-oriented innovation policies (MOIPs) encompassing multiple domains and explicitly aimed

at advancing sustainable development through a broad array of policy instruments, including industrial policy. Green Deals are frequently promoted as strategies to reconcile environmental objectives with economic competitiveness; however, some interpretations instead emphasize the necessity of economic sacrifice to achieve sustainability goals. This understanding broadly aligns with Mazzucato's (2021, p. 137ff) conceptualization, in which "Green New Deals" are presented as paradigmatic missions—ambitious, systemic initiatives particularly suited to large-scale political and economic intervention.

From this perspective, Green Deals have clearly given policymakers a pronounced role as primary agents behind desirable changes. Here is a typical formulation: "Moving to a greener low carbon economy means redirecting all sectors and all actors—public, private and civil society—towards economic growth in a sustainable and inclusive direction" (Kattel et al. 2021, p. 18).

Despite the scale and scope of these Green Deals and broad agreement on the urgency of the climate challenge, these extensive initiatives have so far been implemented across several Western countries with relatively limited critical scrutiny (Henrekson et al. 2024a, 2024b). Academic analyses remain scarce, particularly regarding the risks of failure and unintended consequences associated with MOIPs.

The absence of critical scrutiny is alarming. The EU's flagship battery venture, Northvolt in Sweden, ended in the country's largest bankruptcy since the 1930s. Across Europe, hydrogen projects are being cancelled despite the prospect of securing billions of euros in subsidies. Meanwhile, energy prices continue to rise, industrial output is falling in countries such as Germany, and electricity consumption is declining, even though electrification is meant to play a central role in the green transition. The blackout on the Iberian Peninsula in April 2025 further underscored growing concerns about the reliability of intermittent energy sources such as solar and wind power.

Are these setbacks simply part of the unpredictable and complex dynamics of economic development? After all, overinvestment, bubbles, and bankruptcies are integral features of a capitalist economy (Schumpeter 1934). Or do the cancellations, shutdowns, and foreclosures instead reflect the consequences of misguided policies? Since these policies have been implemented based on academic advice, our focus is directed toward the theories underpinning Green Deals and their effects on the economies where they have been adopted.

This introductory essay is organized as follows. The next section outlines the purpose of the volume and situates it within the broader literature on innovation policy and environmental sustainability. We then introduce the concept of Green Deals and trace its intellectual foundations. The essay continues with concise summaries of the individual contributions, presented in three parts. This is followed by a synthesis of the empirical evidence drawn from the case studies, highlighting recurring patterns of failure and the eight key takeaways identified. The final sections discuss alternative policy pathways and present the main conclusions of the volume.

The Purpose of This Collective Volume

As we will see, the literature on innovation systems and innovation policy has thus far paid relatively little attention to climate policy failures. This volume therefore focuses explicitly on the challenges surrounding Green Deals.

Its purpose is threefold. First, given the limited scholarly attention to the shortcomings of Green Deals, it seeks to document contemporary cases in which large-scale sustainability initiatives have failed to deliver the expected results. Second, it aims to identify and apply relevant theoretical frameworks that can help explain the mechanisms underlying such failures. Third, it explores alternative pathways for fostering economic recovery and advancing sustainable development.

Moonshots and Green Deals

The EU Green Deal is the Union's flagship strategy to reach climate neutrality by 2050 while fostering sustainable growth and protecting ecosystems (European Commission 2019a). It sets out sweeping reforms across energy, transport, manufacturing, agriculture, and finance, backed by a large-scale investment program designed to attract both public and private capital. At its core lies an ambitious financing framework. Through the European Green Deal Investment Plan, the EU has pledged to mobilize at least EUR 1 trillion in sustainable investments over the next decade (European Commission 2020a).

The Russian invasion of Ukraine in 2022 underscored the EU's dependency on fossil fuel imports and led to the launch of the REPowerEU Plan. This package builds on the Green Deal by focusing on energy savings, faster deployment of renewables, and diversification of energy supplies (European Commission 2022). The plan lays down concrete measures for scaling up renewable electricity production and reducing dependence on Russian fossil fuels.

Among the priority areas identified, renewable hydrogen has received particular emphasis. The Commission's Hydrogen Strategy outlines ambitions to install at least 40 GW of renewable hydrogen electrolysers in the EU by 2030, producing up to 10 million tonnes of renewable hydrogen (European Commission 2020b).[1] REPowerEU further strengthens this by calling for both 10 million tonnes of domestic production and an additional 10 million tonnes of imports by 2030 (European Commission 2022). Hydrogen is viewed as a key energy carrier for sectors where direct electrification is challenging, such as steel, chemicals, and heavy transport.

Offshore wind has been positioned as a cornerstone of Europe's clean energy transition. The EU's Offshore Renewable Energy Strategy sets ambitious targets, including 60 GW of offshore wind by 2030 and 300 GW by 2050, compared to

[1] 40 GW corresponds to the effect of roughly 25 state-of-the-art nuclear reactors. Producing 10 million tonnes of hydrogen through electrolysis requires approximately 550 TWh of electricity, corresponding to one-fifth of current total electricity production in the EU.

just 12 GW in 2020 (European Commission 2020c). To put this in perspective, the 2050 target would be nearly five times the total installed capacity of France's 57 nuclear reactors, which stood at around 63 GW in 2025. The strategy also emphasizes innovation in floating wind and marine energy technologies, alongside the need for cross-border cooperation on grid infrastructure. Progress reports published in 2023 note that while investment is gathering pace, achieving the 2050 goal will require sustained additional annual financing on the scale of hundreds of billions of euros (European Commission 2023a).

Solar energy deployment is advancing in parallel under REPowerEU, which includes measures to streamline permits, expand rooftop solar installations, and boost domestic panel manufacturing (European Commission 2022). Together, solar and wind are expected to form the backbone of the EU's renewable electricity system by mid-century.

Decarbonizing transport is a central pillar of the Green Deal. The EU has adopted new CO_2 emission standards for cars and vans, mandating that all new passenger vehicles and light commercial vehicles registered from 2035 must be zero-emission (European Commission 2023b). This regulation is part of the broader *Fit for 55* legislative package, which aims to cut greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.

Beyond regulation, the Green Deal signals a shift toward more interventionist industrial policies. The EU has embraced a mission-oriented approach, channeling support into strategic value chains such as batteries, solar panels, and electrolyzers. This industrial policy shift reflects not only the need to build domestic capacity for the energy transition but also a growing awareness of geopolitical vulnerabilities in global supply chains (European Commission 2024a).

Taken together, the Green Deal amounts to an extensive mix of legislation, tariffs, and supply-side measures in which certain technologies receive preferential treatment and targeted support. It represents a large-scale economic experiment endorsed by many scholars across several disciplines, but whose long-term implications for Europe's competitiveness and resilience remain uncertain.

Influences Behind the Green Deal

As noted earlier, the concept of a Green Deal is closely tied to the idea of mission-oriented innovation policies (MOIPs). Both MOIPs and the broader notion of an "entrepreneurial state" have been the subject of relatively limited but growing scholarly scrutiny in recent years (Wennberg and Sandström 2022; Muldoon and Yonai 2023; Kantor and Whalley 2025; Kirchherr et al. 2023). However, comparatively little attention has been devoted to examining the specific features and implications of Green Deals themselves.

Mariana Mazzucato's Impact

Mariana Mazzucato is widely regarded as one of the leading scholars shaping the EU's Green Deal and the growing convergence of environmental and industrial policy. While her influence is significant, it is also clear that she is part of a broader literature that lends intellectual support to these policy directions.

Few academics have played a more prominent role in defining the policy architecture of the Green Deal. Her concept of mission-oriented innovation has been explicitly adopted by EU institutions and woven into major policy frameworks. As the founding Director of the UCL Institute for Innovation and Public Purpose (IIPP), Mazzucato has a strong platform and ample resources for wielding influence. The IIPP is also quite explicit about this influence, e.g., writing that they are "working closely with the European Commission and the United Nations on the use of mission-oriented innovation to achieve growth that is more inclusive and sustainable" (Mazzucato and McPherson 2018, p. 6).

Mazzucato's ideas on Green Deals have been taken up and debated in a variety of international contexts. In the G20-commissioned report *Principles for an Inclusive and Sustainable Global Economy*, she argued for integrating mission-oriented strategies into global economic policy as a means to foster sustainable development and confront shared challenges (Mazzucato 2025). Her influence has also extended to Latin America, where she has promoted mission-oriented approaches to issues such as sustainable mobility and environmentally responsible commodity exports (Mazzucato 2023).

One of her most significant contributions remains the 2018 report to the European Commission, *Mission-Oriented Research & Innovation in the European Union: A Problem-Solving Approach to Fuel Innovation-Led Growth.* In the introduction, she recalls that:

> The European Commissioner for Research, Science and Innovation, Carlos Moedas, invited me to draft strategic recommendations on mission-oriented research and innovation in the EU, to guide the future European Union Framework Programme for Research and Innovation. (Mazzucato 2018b, p. 2)

Her role was not limited to thought leadership; she also served as special advisor to Commissioner Carlos Moedas. In 2019, he officially launched five "moonshot initiatives," explicitly inspired by the Apollo 11 mission, designed to tackle some of the world's most pressing challenges. These missions aimed to "deliver solutions to some of the greatest challenges facing our world, such as cancer, climate change, healthy oceans, climate-neutral cities and healthy soil and food."[2]

Taken together, Mazzucato's contributions as an academic writer, public intellectual, and advisor converge in a mission-oriented logic that has become deeply embedded in the European Green Deal. This influence stretches from the broader framing of the Green Deal as a transformative climate strategy, to the EU's main R&D funding program, Horizon Europe's research missions, and to the design agenda of

[2] European Commission (2019b).

the New European Bauhaus, a policy and funding initiative focusing on achieving a green transition in the built environments (European Commission 2024b, 2025).

Her ideas also gained traction through public commentary and media debate. In a widely cited *Financial Times* article, she argued that "[e]conomic growth has not only a rate but also a direction. … Europe has an opportunity to seal one of the most important deals of a generation" (Mazzucato 2019). Such statements provided not only intellectual scaffolding but also rhetorical momentum, reinforcing institutional narratives about the Green Deal's purpose.

At its core, her work reflects a renewed confidence in the capacity of governments to steer markets and mobilize change. This belief is captured in her assertive claim:

> Governments are the only actors capable of underwriting the scale of investments required; of coordinating multiple actors around the common goal of decarbonization; and of ensuring the costs and benefits of a green transition are distributed equitably across society so that social injustices are tackled alongside environmental crises. (Mazzucato 2022, p. 93)

Three Generations of Innovation Policy

Mariana Mazzucato's ideas capture a broader shift among European scholars toward a more hands-on role for the state in driving innovation. Over time, thinking about innovation policy has evolved through three main "generations" (Bergkvist et al. 2022).

First Generation: Fixing Market Failures

The earliest approach was rooted in neoclassical economics and the idea of *market failure*. Markets do not always provide enough investment in research and development (R&D), because knowledge is hard to own and easy to share. Firms therefore underinvest, knowing they cannot capture all the returns (Nelson 1959; Arrow 1962).

Governments were expected to step in and "fix the market" by funding R&D, supporting education and skills, and building strong intellectual property systems (Smith 2000). From the 1960s onward, this logic justified large public investments in universities, labs, and subsidies for private R&D (OECD 1998).

Second Generation: Building Innovation Systems

By the 1980s, scholars such as Nelson and Winter (1982) began to see innovation not as something that could be centrally directed, but as an evolutionary process shaped by learning, routines, and firm diversity. Policy, in this view, should focus less on control and more on creating fertile ground for experimentation and capability-building.

This inspired the innovation systems perspective (Freeman 1987; Lundvall 1992; Nelson 1993), which emphasized networks of firms, universities, public agencies, and users. The key challenge was no longer just market failure, but *system failure*, i.e., when the networks and institutions that support innovation are weak or poorly connected (Woolthuis et al. 2005).

Governments were now seen as facilitators who could strengthen these systems by promoting collaboration, supporting clusters, improving infrastructure, and encouraging knowledge exchange (Kline and Rosenberg 1986).

Third Generation: Missions and Directionality

As global problems like climate change and inequality grew more urgent, critics argued that second-generation policy lacked clear purpose. The third generation of innovation policy aims to give innovation direction—to steer it toward solving major societal challenges (Schot and Steinmueller 2018).

Left alone, markets and institutions tend to reinforce the status quo and incremental change (Geels 2004). Mission-oriented policies instead call on governments to take a proactive role: to set bold goals, coordinate actors, and guide investment toward sustainability. The goal is not only to fund innovation but to shape the markets where they can thrive.

This approach has been developed by scholars such as Jacobsson and Bergek (2006), Geels (2002), and Hekkert et al. (2007). They argue that policies must work at multiple levels—supporting experimentation, transforming established systems, and aligning innovation with wider social goals.

Yet, one issue often goes missing: government failure. A review of over 7,000 innovation-policy articles found that only 11% even mentioned problems such as rent-seeking, lobbying, or regulatory capture (Kärnä et al. 2023). Few explored them in depth. As a result, today's enthusiasm for Green Deals and mission-oriented innovation sometimes overlooks the risks and limits of expanding the state's role too far.

How to Read This Collective Volume

The volume is structured into three parts. Following this introduction, *Part I* provides an overview of Green Deals (Stenkula 2026), together with several theoretical perspectives employed throughout the volume (Cheang 2026; Muldoon and Yonai 2026; Schnellenbach 2026). *Part II* presents a set of empirical case studies highlighting failed MOIPs (Björnemalm and Sandström 2026; Deshaies 2026; Fahlén

et al. 2026; Johansson and Kriström 2026; Henrekson 2026; Sandström 2026; Hellstrand and Gärdebo 2026; Capone and Stagnaro 2026). *Part III* turns to alternative approaches to environmental policy, discussing different strategies for achieving both sustainability and economic development (Grafström 2026; Mund 2026; Hjortsberg 2026).

Part I: Theoretical Perspectives

The contributions in Part I of this volume provide an overview of Green Deals and present theoretical perspectives that explain why missions related to Green Deals often fail.

Defining Features of Green Deals

In "Green Deals around the World," Mikael Stenkula (2026) outlines the defining features of Green Deals across several representative contexts. He argues that mission-oriented innovation policy (MOIP) has fundamentally reshaped both environmental and industrial strategies, steering them toward direct public investment and publicly supported financing. The analysis contrasts the European Union's Green Deal with the US approach, while also examining initiatives in the UK, Germany, and Sweden.[3] Green Deals mark a departure from more conventional environmental policies that emphasize regulation and taxation to come to grips with negative externalities while remaining neutral regarding which technologies that are most appropriate to achieve the desired goals.

Evolutionary Perspectives

In "The Incoherence of Modest Industrial Policy," Bryan Cheang (2026) critiques the revival of industrial policy debates, arguing that Green Deals and mission-oriented innovation policies (MOIPs) clash with the evolutionary and unpredictable nature of modern economies.

He focuses on the tension between Dani Rodrik's "modest" industrial policy and Mariana Mazzucato's more ambitious, mission-oriented approach. Cheang contends that modest industrial policy—balancing transformative goals with humility and

[3] In addition to the 29 countries covered by Stenkula (2026), a mere handful of developed countries have passed legislation imposing climate neutrality ("net zero") by 2050, namely Canada, Australia, New Zealand, South Korea, Switzerland, Lichtenstein, and Iceland. Among the other 160 countries in the world, only six (Armenia, Chile, Colombia, Fiji, Moldavia, and South Africa) have enacted a clear national statute mandating net-zero by 2050.

experimentation—is theoretically incoherent. The very uncertainties that justify modesty make large-scale structural transformation impossible, since transformation demands directionality, coordination, and strong state capacity.

Drawing on the literature on complexity and public governance (Hayek 1967; Colander and Kupers 2016; Page 2011), Cheang notes that economies are adaptive systems characterized by radical uncertainty (Henrekson et al. 2022). In such contexts, modest policies—favoring decentralized experimentation and open learning—are justified but inherently limited in transformative power.

Traditional industrial policy, by contrast, has always been transformative, involving structural reconfiguration, infrastructure, and institutional redesign (Hirschman 1958; Kuznets 1971; Lin and Monga 2017). Historical examples from East Asia (Chang 2006) and modernization theory (Rostow 1960; Myrdal 1970) show that transformation has required strong, directive states.

Rodrik's adaptive, network-based approach (Hausmann and Rodrik 2006; Aiginger and Rodrik 2020) acknowledges uncertainty but, according to Cheang, underestimates the coordination needed for transformation. Mazzucato's *entrepreneurial state* (2013, 2021) is more consistent, openly embracing mission-oriented intervention—but missions require convergence and alignment, which conflict with genuine pluralism.

Cheang's core claim is that industrial policy cannot be both modest and transformative. Real modesty limits ambition to incremental reforms; genuine transformation demands coherence and authority, risking illiberal outcomes (Scott 1998; Pennington 2010). The real divide, he concludes, lies not in policy tools but in first principles: whether to accept epistemic modesty in complex systems or pursue transformative state-led change despite its risks.

The Political Economy of Green Deals

In their contribution entitled "Raiders of the Entrepreneurial State: A Baptist and Bootlegger Analysis," Jeffrey Muldoon and Derek Yonai (2026) critically examine the notion of an "entrepreneurial state" (Mazzucato 2013), and reframe its implications for innovation, regulation, and rent-seeking through the lens of the "Bootleggers and Baptists" theory developed by public choice scholars. Muldoon and Yonai argue that instead of stimulating productive entrepreneurship, state-led industrial policy opens abundant opportunities for "plunder" by well-connected insiders ("Bootleggers") who exploit the state's moral legitimacy, often provided by well-meaning "Baptists" advocating the common good.

Drawing on Bruce Yandle's (1983) foundational work, and its later elaboration by Smith and Yandle (2014), the authors demonstrate how coalitions of moral advocates and opportunists often join forces to push for regulations and policies. In these counterintuitive alliances, Bootleggers secure rents and regulatory advantages under the cover of the Baptists' social legitimacy. Classic examples include blue laws on alcohol, as well as more recent large-scale environmental initiatives.

At the core of Muldoon and Yonai's study is an exploration of how coalition logic has shaped recent developments in environmental and industrial policy. Drawing on both historical and contemporary cases—the phasing out of incandescent lightbulbs (where manufacturers profited from promoting higher-cost alternatives), the US retreat from nuclear power (where fossil fuel interests and environmentalists found common cause), and the Paris Agreement (where multinationals positioned themselves to benefit from state-supported technologies)—they argue that well-intentioned interventions often end up enabling rent-seeking and crony capitalism at the public's expense. Their critique of Mazzucato's "entrepreneurial state" thesis centers on its neglect of standard public choice problems, particularly the friction and collective action failures inherent in real-world politics.

Muldoon and Yonai's central contribution is to demonstrate, through concrete empirical examples, that idealistic missions, whether aimed at green transition or industrial leadership, are regularly subverted by Bootlegger–Baptist coalitions. These dynamics not only fail to deliver the mission's intended social value but also routinely redistribute wealth to the politically powerful, undermining both innovation and market discipline.

Behavioral Aspects of Green Deals

In his contribution entitled "Behavioral Political Economy and Environmental Policy: Explaining Persistent Deviations from Efficient Policies," Jan Schnellenbach (2026) highlights that the design and implementation of Green Deals are almost never guided by neutral efficiency considerations alone. Instead, they are deeply shaped by behavioral dynamics—biases, heuristics, and expressive political behavior—which distort both citizen preferences and policy choices.

The behavioral political economy perspective stresses that voters, politicians, and bureaucrats systematically deviate from rationality in ways that undermine the efficiency of environmental policy. Following Downs' (1957) theory of rational ignorance, Caplan (2007) argues that individuals have incentives to indulge in "rational irrationality," since the marginal impact of a single vote is negligible. As a result, citizens often embrace "bliss beliefs" about the environment, views that signal virtue or identity rather than reflect careful cost–benefit assessments. By contrast, dissenting opinions are stigmatized as unvirtuous and carry high social costs that few are willing to bear.

Politicians, in turn, respond to these expressive preferences (Brennan and Lomasky 1993), amplifying availability cascades (Kuran and Sunstein 1999) and dread-risk perceptions (Slovic 1987). According to Schnellenbach, this dynamic renders Green Deals vulnerable to emotionally salient but economically inefficient outcomes. The German nuclear phase-out is a frequently cited case, where dread risk shaped policy design even at the cost of higher emissions. Likewise, public support for "degrowth" policies often rests on anti-market biases and neglect of innovation potential, despite evidence that technological change is central to sustainable growth.

In this view, behavioral distortions create "policy traps," resulting in policies that are symbolically resonant but economically counterproductive.

Part II: Empirical Evidence

Part II of the collective volume provides empirical illustrations of why Green Deal policies hardly ever work out as intended. In doing so, it addresses the underexplored theme of innovation policy failure.

The Ethanol Car Bubble

In "Exploring Failed Green Innovation Policy: The Rise and Fall of Ethanol Cars in Sweden 2003–2015," Rickard Björnemalm and Christian Sandström (2026) analyze Sweden's ethanol car bubble (2003–2015). Their case study shows how strong political backing, EU biofuel directives, and targeted subsidies such as the 2006 "pump law," green car rebates, and congestion tax exemptions created a temporary boom in ethanol cars—exceeding 20% of new sales in 2008—followed by a sharp decline.

The failure can be traced to three factors: weak technological and environmental fundamentals; consumer backlash fueled by poor performance and rising costs; and the capture of policy design by vested interests. Although formally technology-neutral, the pump law excluded electricity. Car manufacturers and the agricultural lobby exploited subsidies, while long-term transformative alternatives were neglected.

The study highlights the risks inherent in mission-oriented and so-called innovation policy 3.0 approaches. While rhetorically centered on transformation, such policies may in practice reinforce existing paradigms when shaped by powerful stakeholders. Echoing Kärnä et al. (2023), the authors argue that failure should be treated as a central concern in the study of innovation policy, not be relegated to an afterthought.

The German Energiewende

Launched in the early 2000s, Germany's *Energiewende* has long been seen as a model for large-scale renewable energy transitions. By rapidly expanding solar and wind power, Germany aimed to replace both nuclear and fossil fuels, inspiring the European Green Deal and its goal of EU-wide carbon neutrality by 2050. Germany itself pledged to reach neutrality by 2045.

In "The German *Energiewende*: A Green Deal Template or Planned Failure?", Michel Deshaies (2026) highlights several weaknesses. To replace stable nuclear

and fossil-based generation with variable wind and solar, three key conditions are required: large overcapacity, extensive and costly grid expansion, and massive storage capacity. Yet Germany focused mainly on deploying renewables, giving far less attention to grids and storage. Even optimistic projections for hydrogen or other energy carriers cannot eliminate the need for huge renewable capacity.

Electricity makes up only about 20% of Germany's total energy use; the remaining 80%—mainly transport, heating, and industry—still depends on oil and gas. This means deep decarbonization must go far beyond the power sector.

The *Energiewende* has also driven sharp increases in household electricity prices, which doubled between 2001 and 2013 as renewable subsidies rose from EUR 5 billion to EUR 25 billion. Prices climbed further to EUR 0.458/kWh in 2023, leaving Germany with the highest household electricity costs in Europe, around 40% above the EU average. Industrial exemptions shift much of the burden onto households, prompting criticism of regressive redistribution and fears of deindustrialization as energy-intensive firms consider relocating abroad.

While the *Energiewende* has been influential in promoting renewables and shaping European policy, it also exposes the technical and economic constraints that complicate achieving net-zero emissions by mid-century.

The Costs of a Fossil-Free Future

Per Fahlén, Magnus Henrekson, and Mats Nilsson (2026) present a harsh critique of the EU's and UK's electrification-centric decarbonization strategy in their study entitled "In Pursuit of the Green Transition—Electricity at Any Cost?". By virtue of empirical analysis and comparative scenario modeling, they conclude that increasing shares of intermittent renewables are strongly and robustly associated with higher system costs, price volatility, and uninternalized externalities.

Their approach is grounded in recent system studies and cross-country cost comparisons (e.g., Manzolini et al. 2024; Idel 2022; Ueckerdt et al. 2013). They underline that advocates of weather-dependent electricity sources generally base their argument on the fact that the average cost per unit of electricity generated by a land-based wind mill or solar panel is quite low. However, this disregards system-level costs caused by the combined effect of intermittency and dispersed production. Adding these integration costs undermines the case for wind and solar power. Integration costs rise at an accelerated rate when a significant and growing share of electricity comes from intermittent sources. Integration costs include costs caused by the mismatch between supply and demand over time, balancing costs, and grid infrastructure costs. There are also a number of aspects that are seldom properly reckoned with such as far greater space requirements (several orders of magnitude), noise and microparticle pollution, disturbed and compressed biotopes, reduction in property values, greater need for metals and other materials in grids, and the need for extensive storage facilities.

The authors' analysis directly challenges the EU, individual member countries such as Spain and Germany as well as the UK, regarding their mission-oriented energy policies that neglect the operational and economic complexity involved. The authors also caution that "renewable" should not be conflated with "sustainable," contending that full system stability, cost, and societal impacts must be analytically integrated. Their evaluation shows that only scenarios prioritizing dispatchable resources and baseload power, chiefly nuclear power, consistently reconcile climate targets with reliability and affordability.

Green Industrial Megaprojects

In "Green Industrial Megaprojects: A Welfare Economics Perspective," Per-Olov Johansson and Bengt Kriström (2026) offer a stark and much-needed reminder that economics is not about money or markets for their own sake. The ultimate goal of economic activity is social welfare; prosperity only matters when it translates into better lives in terms of health, opportunity, dignity, and security. By means of cost–benefit analysis (CBA), they make a critical evaluation of large-scale, state-supported green transition projects. The authors emphasize the normative underpinnings of CBA, drawing attention to Hume's Law (an "ought" cannot be derived from an "is") and the need for explicit value judgments in policymaking. They highlight well-documented problems in the governance of megaprojects, including optimism bias, lack of transparent evaluation, and insufficient analysis of trade-offs.

Using the hydrogen-based steel plant investment in Boden in northern Sweden as a case study, the authors apply state-of-the-art general equilibrium CBA to the project and conclude that the plant may generate private profits under certain favorable conditions but its net social benefits are unlikely to be positive, given that the EU Emissions Trading System already internalizes most emissions-related costs. Without rejecting climate action or industrial policy more broadly, the analysis underscores the necessity for rigorous, transparent evaluation before committing large public resources to green industrial projects.

Hydrogen and Steel

In the essay "HYBRIT: A Hubristic Hydrogen-Based Steel Project," Magnus Henrekson (2026) analyzes a huge project aiming to make sponge iron production fossil-free by using hydrogen produced from renewable electricity. The project in question is HYBRIT, a high-profile Swedish initiative led by the state-owned mining company LKAB. Framed as a cornerstone of Sweden's green transition and the EU Green Deal, HYBRIT was promoted as a potential game-changer for global CO_2 reduction, yet it faced major technological, economic, and infrastructural hurdles.

HYBRIT's feasibility rested on a set of highly uncertain assumptions—including sustained low electricity prices, elevated carbon costs, and the availability of large-scale hydrogen storage—while simultaneously facing competition from international green steel producers and exerting pressure on northern Sweden's energy system.

In the end, growing criticism and shifting priorities prompted LKAB to indefinitely shelve its sponge iron ambitions and redirect its focus toward high-grade iron ore and rare earth metals extraction. The case illustrates how political enthusiasm can outpace technological and economic realities, reinforcing the need for independent and rigorous evaluation of large-scale green industrial projects.

Northvolt's Bankruptcy

In "Explaining Northvolt's Bankruptcy and the Dilemma of Green Deals," Christian Sandström (2026) examines the unintended consequences of green industrial policies by analyzing the bankruptcy of Northvolt, Europe's largest initiative to establish an independent battery manufacturing facility. Founded in 2017 and growing rapidly to nearly 6,000 employees by 2023, Northvolt struggled to scale production and remained dependent on Chinese suppliers—undermining EU's ambition of strategic autonomy. In March 2025, the company filed for bankruptcy.

The study identifies four main factors behind Northvolt's collapse: distortions in corporate incentives created by generous public support; excessive risk-taking; a fundamental mismatch between the long-time horizons needed to build industrial capabilities and the political and financial pressures for rapid expansion; and pervasive cognitive biases. The latter were amplified by a deeply entrenched societal consensus in Sweden on the urgency of the green transition.

Taken together, the case illustrates how even the most ambitious Green Deals can unintentionally foster systemic vulnerabilities in high-tech industrial ventures.

The Planetary Diet

In their study "The Planetary Diet: An Illusory Recipe," Stefan Hellstrand and Johan Gärdebo (2026) critically examine the Swedish Food Agency's 2025 dietary guidelines, which advocate a transition from meat and dairy to plant-based proteins in line with the global "planetary diet" framework. The authors argue that the guidelines rest on a weak scientific foundation and its application would compromise food security and agricultural stability in Sweden and elsewhere, particularly during geopolitical crises. It highlights the bureaucratic and ideological momentum underpinning the green transition, driven by the European Union, NGOs, a growing number of agenda-driven environmental research institutes, and academic counseling bodies such as the Swedish Climate Policy Council, which advocate phasing out animal husbandry despite its historical importance in Nordic diets.

The guidelines' proposed reductions in red meat (65–82%) and dairy (54–70%) consumption risk increasing import dependence and biodiversity loss. By contrasting historical Nordic dietary practices, shaped by harsh climatic conditions, with the planetary diet's ambitious targets, the authors contend that such policies are infeasible and could provoke political unrest, as evidenced by farmer protests and rising populist movements across Europe. The study criticizes the Swedish Climate Policy Council's reliance on the planetary boundaries framework, arguing that it overlooks practical agricultural constraints and risks exacerbating food insecurity and societal instability.

Italy's Superbonus

In their essay "Italy's Superbonus and the Capture of Climate Policy by Modern Monetary Theory," Luciano Capone and Carlo Stagnaro (2026) analyze how Italy implemented an environmental policy that produced the largest budget deficit in Europe since the Second World War. The program allowed households to claim a 110% tax credit for expenses incurred in improving the energy efficiency of buildings and enhancing their seismic resilience. These tax credits were fully transferable to third parties, such as construction companies or financial institutions. In total, the policy generated costs amounting to approximately EUR 220 billion, equivalent to about 10% of a single year's GDP, while delivering limited environmental benefits and fostering widespread tax fraud.

Capone and Stagnaro trace the origins of this policy to a small network of economists inspired by Modern Monetary Theory (MMT), a heterodox school of thought asserting that governments issuing their own currency are not financially constrained by taxation or borrowing, since they can create money to fund public spending. According to the authors, this group gained significant influence within the Italian government in 2020 and was able to advance the Superbonus policy in subsequent years. The measure was further facilitated by the temporary suspension of the European Union's fiscal rules during the pandemic, which effectively removed traditional budgetary constraints and enabled unprecedented fiscal expansion.

Part III: Alternative Paths Forward

Part III of this volume explores alternative approaches to reconciling economic growth with environmental sustainability. Under this heading, the three essays are only briefly summarized. Policy recommendations are further elaborated toward the end of this introductory essay.

In "A Silent Transition: Growth with Less Environmental Weight," Jonas Gratström (2026) presents empirical evidence showing how Western economies have historically combined environmental concerns with economic development. By reviewing data on emissions, energy use, and natural resource consumption, he argues

that sustainability can be achieved through gradual, evolutionary change rather than through sweeping "green transition" initiatives.

Ernest Mund's (2026) essay, "Nuclear Technology Transition towards SMR and Generation-IV," examines technological advances in nuclear power, suggesting that some of the traditional risks and costs may be mitigated by next-generation reactor designs.

The section concludes with Jacob Hjortsberg's (2026) contribution, "'State-ification' of the Entrepreneur—or 'Entrepreneurialization' of the State? How Singapore Challenges both Mazzucato and Her Critics." Taking a broader institutional perspective, Hjortsberg argues that while entrepreneurial states are desirable, current efforts to create them often devolve into state-centric entrepreneurship. Drawing on evidence from Singapore, he outlines alternative ways of structuring entrepreneurial states.

Eight Takeaways

Having summarized the contributions of the volume, this section integrates and synthesizes the empirical findings in light of the theoretical perspectives outlined earlier—public choice, evolutionary economics, and behavioral political economy. Taken together, these lenses illuminate why mission-oriented policies so often fall short of their stated ambitions and provide the analytical foundation for the seven interrelated factors identified in the prequel to this volume (Henrekson et al. 2024a). The empirical studies in Part II demonstrate that these seven factors are equally applicable to Green Deals:

1. Wicked problems cannot be solved through missions.
2. Politicians and government agencies are not exempt from self-interest.
3. Missions distort competition.
4. Policymakers lack information to design missions efficiently.
5. Missions are subject to rent-seeking and mission capture.
6. Government support distorts incentives and creates moral hazard.
7. Missions ignore opportunity costs.

After discussing these seven takeaways and applying them to Green Deals, we then address an additional eighth aspect, namely the behavioral dimension of Green Deals.

Wicked Problems Cannot Be Solved Through Missions

Climate change and related environmental challenges are "wicked" in the sense Rittel and Webber (1973) and Richard Nelson (1977) used the term, referring broadly to complex and systemic problems. There are no simple solutions to this type of problem. Nelson and co-authors argued that moonshot policies "are not the right

models for new programs aimed at the challenges we now face" (Foray et al. 2012, p. 1697).

The *Energiewende* (Deshaies 2026) and the premature shutdown of nuclear power in Germany (Schnellenbach 2026) can be regarded as green missions aimed to address a complex problem. The social and economic consequences are substantial, including declining industrial competitiveness, dependency on Russian gas, and sharply increased electricity costs. At the same time, climate change remains a global challenge where Germany's relative reduction of emissions is insignificant compared to increases taking place elsewhere, especially in China and India.

Politicians and Government Agencies Are not Exempt from Self-Interest

Political decision-making, much like business, is shaped by self-interest. The Northvolt case (Sandström 2026) illustrates this dynamic where former cabinet ministers served as advisors and shareholders in the company, with one moving on to a senior post within the European Union, while others became registered lobbyists for firms tied to the green transition. Similarly, the ethanol car case (Björnemalm and Sandström 2026) reveals how a serving cabinet minister maintained close ties to interest groups that profited from expanding the domestic ethanol industry.

Missions Distort Competition

Baumol (2005) characterizes mature capitalism as a system of oligopolistic competition, where a limited number of firms in each sector strive to outperform one another through innovation and renewal. Green Deals, however, often disrupt this process by privileging certain technologies and by disproportionately favoring some firms over others.

Renewables such as solar and wind power, for instance, have received substantial public support without being required to internalize all associated costs (Fahlén et al. 2026). At the same time, political decisions—rather than market dynamics—drove the premature closure of all nuclear power plants in Germany and half of those in Sweden, sidelining the underlying economic competitiveness of alternative energy sources.

Policymakers Lack Information to Design Missions Efficiently

As Cheang (2026) observes, mission-oriented innovation policies are, by design, anything but modest. They inevitably take the form of large-scale initiatives, carrying the inherent risk of being implemented with insufficient regard for prevailing conditions. Alves (2024) further emphasizes that building the necessary capabilities is a slow process, whereas missions are often launched in an atmosphere of urgency. This mismatch heightens the risk that mission-driven resources will be out of sync with labor markets, supply chains, and other critical institutional factors.

The empirical cases analyzed in this volume also indicate that policymakers do not possess the information required to craft Green Deals properly. One telling example is Hellstrand and Gärdebo's (2026) analysis of how "the planetary diet" is fed into the government bureaucracy and down the road is translated into misinformed and harmful policy guidelines.

This dynamic is also evident in the persistent quality problems that plagued Northvolt (Sandström 2026), as well as in the HYBRIT project to produce fossil-free sponge iron (Henrekson 2026). At full scale, HYBRIT would have required as much electricity as the entire Finnish economy. Yet, despite well-known challenges associated with large-scale hydrogen use, the project attracted enormous political prestige in both Stockholm and Brussels.

Missions Are Subject to Rent-Seeking and Mission Capture

Several of the empirical contributions illustrate how special interest groups capture Green Deals, shaping them in ways that will benefit themselves but may prove unsustainable both economically and environmentally.

The ethanol case (Björnemalm and Sandström 2026) demonstrates how the Federation of Swedish Farmers successfully lobbied for political backing. Parliamentary alliances, combined with EU regulations, gave ethanol a strong push, allowing social and political forces to override underlying technological and economic realities.

As Muldoon and Yonai (2026) point out, idealists and rent-seekers often find themselves aligned. They highlight the unlikely coalition of environmentalists and oil companies in the United States, both of which sought to undermine nuclear power.

Such dynamics are common in the context of Green Deals. In consensus-driven environments, rent-seeking tends to proceed largely unchallenged, with few voices willing to question initiatives—even when opportunity costs are high or projects may yield negative social value (Johansson and Kriström 2026).

Government Support Distorts Incentives and Creates Moral Hazard

When risks are increasingly borne by the public sector through government loans, credit guarantees, or subsidies for innovation, it may give rise to moral hazard. Firms will take on more risk because they know that another party will bear a large share of the costs of those risks. This effect is illustrated both by the Northvolt bankruptcy (Sandström 2026) and attempts to make steel using hydrogen (Johansson and Kriström 2026).

Missions Ignore Opportunity Costs

Several of the large-scale efforts toward sustainability described in this volume illustrate how opportunity costs are frequently ignored.

The financial, physical, and intellectual resources devoted to, e.g., hydrogen could have been allocated to alternative technologies or policies with greater potential impact. Upon assessing the effectiveness of hydrogen-supporting policies, these opportunity costs tend to be overlooked. By overlooking the opportunity costs, policymakers risk misallocating scarce resources and undermining the effectiveness of sustainability strategies.

Behavioral Aspects

Several of the empirical contributions in this volume highlight the importance of behavioral factors in explaining the dysfunctions of Green Deals. While numerous well-documented biases may apply, three stand out:

1. Rational irrationality, individuals rationally decide to hold beliefs that are not congruent with facts when the individual cost of irrationality is zero.
2. Expressive political behavior, actions are driven more by the desire to express identity, emotions, or moral beliefs than to achieve practical political outcomes, for example, voting, protesting, or posting to signal values rather than change policy.
3. Availability cascades, statements come to feel truer if they are often repeated (Schnellenbach 2024).

Together, these three biases help explain why voters and policymakers adopt policies that are ultimately misguided. Germany's premature closure of 23 nuclear power plants, paired with an increased reliance on intermittent energy sources, offers a striking example (Deshaies 2026).

These behavioral dynamics also shed light on the rapid political ascent of HYBRIT (Henrekson 2026) and the hydrogen-based steel mill project in Boden. As Johansson and Kriström (2026) observe, megaprojects are frequently shaped by optimism bias, with opportunity costs insufficiently weighed. Moreover, climate change and other environmental challenges have created a powerful "loss frame" (Tversky and Kahneman 1981), in which the perception of existential threat serves to justify the pursuit of large-scale projects whose practical feasibility may be limited.

Alternative Paths and Policy Recommendations

Having pointed out a collection of interrelated factors which explain the ongoing failure of Green Deal policies in Europe, this collective volume also points out alternative paths toward the ultimate goal of attaining carbon neutrality. These alternatives do not stray from the ambition to adhere to sustainability in the original wider sense that includes economic and social aspects (United Nations 1987).

Crafting effective sustainability policies ultimately requires aligning policy design with the dilemmas identified in this volume. Behavioral biases, evolutionary dynamics, and public choice challenges such as rent-seeking are not reasons to abandon environmental policy. Instead, they represent constraints that must be acknowledged and integrated into policy design.

More from Less?

As Grafström (2026) documents, environmental improvements can indeed be achieved alongside economic growth. Between 1990 and 2021, CO_2 emissions in the EU fell by 28% while the economy expanded by more than 50%. Over the same period, emissions of major pollutants such as lead (−95%), sulfur dioxide (−93%), and arsenic (−90%) declined sharply. Notably, electricity consumption has remained largely unchanged since 1990, even as the EU economy continued to grow.

These findings align with McAfee's (2019) argument, where he shows that the United States has undergone a process of dematerialization over the past half-century. McAfee identifies four interrelated drivers of how greater wealth can be generated from fewer resources, including capitalism, technological innovation, consumer responsibility, and regulation.

Capitalism, understood as a system of private, profit-maximizing firms, makes resource use costly and thus incentivizes efficiency. For instance, while a soft drink aluminum can weighed 85 g in the 1950s, today it weighs only about 13 g, an 85% reduction in material use for the same product. Similarly, design and material advances have reduced the raw plastic in a PET bottle by 80–85% over the past five decades.

Consumer demand has likewise played a central role. A prime example is how growing public awareness of the dangers of chlorofluorocarbons (CFCs) spurred demonstrations and pressure campaigns, contributing to the eventual global ban (Dugoua 2025).

The Role of Modesty

While each of the examples above represents significant improvement, they have unfolded incrementally over extended periods. The four factors identified by McAfee—capitalism, technological innovation, regulation, and consumer demand—have co-evolved in these cases. Similar dynamics are evident in the sharp reductions of pollutants such as sulfur dioxide (Schmalensee and Stavins 2009). In the case of leaded petroleum, for example, strong industry resistance delayed regulation, while consumer activism and regulatory agencies ultimately drove change (Newell and Rogers 2003).

As Cheang (2026) observes, mission-oriented innovation policies cannot afford to be modest in their implementation. Yet this very ambition carries the risk of drifting out of alignment with the technological and economic realities of a given context. By contrast, the approach outlined by McAfee does not rest on the government declaring sweeping visions such as net-zero targets for CO_2 emissions. This does not mean that public action toward sustainability is unnecessary. Rather, its role is to reinforce, guide, and complement the evolutionary interplay of markets, technology, regulation, and consumer behavior.

Adapting to Global Trends

Because many environmental challenges transcend national borders, no single country or even the EU can afford to diverge significantly from other major economies. This is especially true for CO_2 emissions. In 2023–2024, the EU-27 accounted for just 6% of global emissions, despite representing 14% of the global economy. Efforts in Europe to cut emissions will therefore have only limited global impact unless other regions follow suit.

Nor can the EU, the United States, or China stray too far from the rest of the world in emission controls, particularly if ambitious policies fail to deliver on their parallel promises of prosperity and industrial competitiveness.

Investments in Nuclear Power

An implication of Mund's analysis is that the EU and its member states should consider greater long-term investment in nuclear power. With proper maintenance, nuclear reactors built today are expected to generate electricity for close to a century, which is a time horizon well-suited to the kind of durable infrastructure investment required for the energy transition. This is particularly important given the substantial political risks associated with nuclear energy. In countries such as Sweden and Germany, reactors have been shut down prematurely as a result of political decisions rather than technical or economic considerations.

At the same time, the findings in this volume provide a cautionary perspective on such investments. Nuclear projects are not immune to the same challenges highlighted throughout this volume, including political capture, rent-seeking, optimism bias, and shifting societal preferences. These risks underscore the need to weigh carefully the governance and institutional conditions under which large-scale nuclear investments are undertaken.

Conclusion

Across Europe and the wider Western world, concerns are growing about the long-term competitiveness of mature economies. Green Deals have been launched in many countries with the ambition of combining sustainable development with continued economic growth.

Yet, six years into the EU's Green Deal, it has become increasingly evident that large-scale efforts to transform Europe into a clean, fossil-free, and prosperous economy are not delivering as intended. The contributions in this volume explore why this is the case and consider what alternative approaches might be more effective.

Our review of Green Deals and the academic literature underpinning them shows that these policy efforts have been shaped above all by perspectives rooted in innovation systems and mission-oriented approaches. Because this literature has paid limited attention to the dynamics of policy failure (Kärnä et al. 2023), policymakers have often been guided by scholars who placed considerable faith in government intervention while neglecting the constraints and challenges such interventions entail.

This collective volume introduces three complementary perspectives that help explain why Green Deals so often fall short of their ambitions: evolutionary economics (Cheang 2026), political economy and public choice (Muldoon and Yonai 2026), and behavioral economics (Schnellenbach 2026).

Taken together, these strands of literature provide much of the explanation for why Green Deals have failed to deliver on their promises. The empirical contributions in this volume cover a wide range of cases, such as the early ethanol car bubble (Björnemalm and Sandström 2026), Germany's *Energiewende* (Deshaies 2026), the hidden costs of wind power (Fahlén et al. 2026), hydrogen-based steel and iron ore

projects (Johansson and Kriström 2026; Henrekson 2026), the Northvolt bankruptcy (Sandström 2026), the planetary diet (Hellstrand and Gärdebo 2026), and Italy's Superbonus (Capone and Stagnaro 2026).

Part III turns to possible alternative paths forward. It discusses more conventional approaches to environmental policy (Grafström 2026), examines the long-term potential of nuclear technology (Mund 2026), and considers alternative institutional models for cultivating a genuinely entrepreneurial state (Hjortsberg 2026). The contributions gathered under this heading are more limited in scope and are intended primarily as a platform for comparing and contrasting different policy approaches. Given the limited scholarly attention thus far to the shortcomings of existing Green Deals, an inquiry into the mechanisms underlying these disappointing outcomes is both timely and essential.

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