

Shell Energy and Chemicals Park Rotterdam: The Energy Transition at the Pernis Refinery

Gregory Unruh

George Mason University, USA

Fernanda Arreola

ESSCA School of Management, France

Abstract. This case examines Shell’s strategic dilemma in transforming its Pernis refinery in Rotterdam into a sustainable energy hub. By late 2023, CEO Wael Sawan faces mounting pressure to balance aggressive decarbonization investments (€2.1-2.4 billion in carbon capture, green hydrogen, biofuels, and electrification) against shareholder demands for profitable returns. Shell operates under multi-level regulatory pressures including EU carbon pricing, Dutch climate mandates, and a 2021 court ruling (later overturned on appeal in 2024) requiring 45% emissions reductions. The case reveals stark financial realities: eco-efficiency investments generate 18-35% returns while transformational projects show negative NPV without high carbon prices or subsidies. Meanwhile, competitors face asymmetric regulations - U.S. rivals operate without federal carbon pricing while state-owned enterprises face minimal climate accountability. Students analyze whether “profitable decarbonization” is achievable and examine trade-offs between regulatory compliance, financial performance, competitive positioning, and climate outcomes.

Keywords: decarbonization strategy; carbon pricing; regulatory arbitrage; sustainable investment; stakeholder capitalism; climate litigation.

1. Introduction

In 2023, managers at the Shell Pernis oil refinery in Rotterdam were reevaluating their plans for a massive transformation of the facility. In response to regulatory and public pressures, as well as a recent court ruling, Shell Pernis had announced ambitious plans to dramatically reduce carbon dioxide emissions and transition towards sustainable energy production. However, decarbonization would require massive upfront investments with the promise of uncertain paybacks in the future. The transition plans were putting substantial pressure on Shell’s financial performance and market valuation, something that was raising alarms. Recently appointed CEO Wael Sawan was expected to deliver on both bold climate action

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and the company's financial targets, goals that seemed to be at odds. Wael argued that what was needed was *profitable decarbonization* – clean energy investments that aligned with shareholder value. But how to make profitable decarbonization a reality was unclear.

2. Shell Pernis Refinery

The Shell Pernis refinery complex, located in Rotterdam, Netherlands, was one of the most advanced oil refineries in Europe (Figure 1). Established in the 1930s, Pernis began refining crude oil to meet the growing energy demands of regional industrialization. Over the ensuing decades, the plant expanded significantly, becoming a major hub for Shell's global refining operations. By the mid-20th century, Pernis was a vast petrochemical complex producing fuels, lubricants, and chemical feedstocks. Its strategic location in Europe's largest port enabled it to efficiently receive crude oil from around the world and distribute refined products across the continent.

Figure 1: Port of Rotterdam and Shell Energy & Chemicals Park Location¹



As of 2023, Shell operated a refining portfolio of eight facilities worldwide, capable of processing around 1.6 million barrels per day (bpd), distributed among

1. Google Maps