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First Solar Inc

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Introduction

First Solar Inc. occupies a unique and influential position in the history and present landscape of American industry. As the only U.S.-headquartered manufacturer among the world's top-tier solar companies, First Solar's journey embodies both the promise and the challenges of a nation's embrace of renewable energy. From its origins with visionary inventor Harold McMaster to its current role as a global leader in solar photovoltaic technology, First Solar's story is in many ways the story of America's own quest for energy independence, innovation, and sustainability.

This book traces the development of First Solar Inc. through its earliest days as a start-up in the 1990s, its transformational years in the first decades of the 21st century, and its current status as a bellwether on the S&P 500. The rise of the company parallels the dramatic changes in the solar industry itself — from niche environmental technology to a central player in the fight against climate change and the push for a cleaner, more resilient energy grid.

The company's pioneering use of cadmium telluride (CdTe) thin-film photovoltaic modules set it apart from the silicon-based technologies that have dominated solar manufacturing worldwide, particularly among competitors in China. First Solar's relentless focus on technological innovation, cost competitiveness, and environmental stewardship enabled it to ride the waves of policy booms and busts, European subsidy retrenchment, changing energy markets, and fierce global competition. Its integrated, automated manufacturing process and strong commitment to research and development have continually advanced the possibilities of solar energy.

Yet, the First Solar story is not just one of technological triumph. The company's journey has involved navigating trade tensions, shifting policy environments, and environmental and social expectations. The formation and dissolution of business units, strategic pivots toward utility-scale projects, and decisive leadership transitions have all contributed to the company's evolving identity. Its expanding manufacturing footprint in the United States, bold investments in next-generation perovskite technology, and robust financial position now stand as testament to its resilience and adaptability.

As the United States and the world move further into a clean energy future, First Solar's experience offers important lessons on innovation, adaptation, and the complex interplay between business, technology, and public policy. This book examines not only First Solar's past, but also its current strategies and the opportunities and risks that shape its path forward. In doing so, it highlights how a single company's commitment to excellence and sustainability can drive broader

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transformation within an industry and a nation.

Through detailed narrative, critical analysis, and strategic insight, 'First Solar Inc.: The Story of An American Company' provides a comprehensive portrait of a remarkable enterprise — and an essential chapter in the unfolding story of America’s energy revolution.

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CHAPTER ONE: The Vision of Harold McMaster

Every great company has a genesis story, a foundational moment when an idea takes root, often spurred by a singular vision. For First Solar Inc., that vision belonged to Harold McMaster, an inventor whose ingenuity spanned multiple industries long before "solar energy" became a household term. McMaster was, by all accounts, a force of nature—a man whose mind was constantly at work, tinkering, conceptualizing, and, most importantly, innovating. He was known as "The Glass Genius" by *Fortune* magazine, a moniker he earned through his groundbreaking work in glass manufacturing and tempering. Born in Deshler, Ohio, in 1916, McMaster’s inventive spirit showed itself early; by age 10 he had built a threshing machine and by 12, a car motor.

McMaster’s career began in 1940 as the first research physicist for Libbey-Owens-Ford Glass Company. It was here that he secured his first patent during World War II for a fighter pilot's rear-view periscope and developed a method for de-icing aircraft windshields using electric coatings. This early work laid the groundwork for a prolific career marked by over 100 patents in diverse fields, including glass tempering and bending, solar energy, and even rotary engines. His entrepreneurial drive led him to establish Permaglass Inc. in 1948, which quickly became a leader in producing curved and tempered glass for automotive and consumer markets. Later, in 1971, he co-founded Glasstech Inc., a company that manufactured and sold hundreds of glass-tempering systems worldwide. These ventures cemented his reputation as a pragmatic innovator with a keen business sense, capable not only of envisioning new technologies but also of bringing them to commercial viability.

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It was McMaster's deep understanding of glass and coatings that would eventually lead him to the nascent field of solar energy. His fascination with solar power was reportedly sparked by a vacation in sunny Arizona. He recognized that the primary cost driver for large-area solar arrays was the glass itself, and he theorized that the solar cell could be seen as simply another type of coating on glass. This seemingly straightforward idea was, in fact, revolutionary, challenging the prevailing notion that solar cells had to be complex, costly, and silicon-intensive.

In 1984, McMaster founded Glasstech Solar, initially aiming to produce cost-effective solar arrays. However, his early forays into amorphous silicon technology proved challenging, absorbing a significant $12 million without much progress. Undeterred, McMaster, with characteristic tenacity, offered to reimburse his 57 investors and then raised another $15 million to pursue a different path, leading to the creation of Solar Cells, Inc. (SCI) in 1990. He later partnered with J.D. Polk to establish the Florida Corporation in 1993.

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This was the true genesis of the technology that would underpin First Solar. McMaster and his team at SCI shifted their focus to cadmium telluride (CdTe) thin-film technology. At a time when crystalline silicon dominated the solar landscape, CdTe was an audacious choice. It was a less explored, less understood material in the context of solar energy, but McMaster saw its potential for lower manufacturing costs and greater efficiency. The goal was clear: to make solar electricity significantly more affordable and accessible.

The early 1990s were a critical period for SCI. The company was headquartered in Perrysburg, Ohio, a location chosen, no doubt, due to McMaster's extensive ties to the glass manufacturing industry in the region. The challenges were substantial. Perfecting the CdTe deposition process was paramount, requiring rigorous research and development to ensure consistent quality and efficiency on a large scale. This was not merely about creating a functional solar cell; it was about developing a manufacturing process that could produce them at a commercial scale with unprecedented cost-effectiveness.

McMaster’s vision for CdTe was that it could be manufactured with significantly less semiconductor material compared to silicon, thereby reducing material costs. The manufacturing process itself could be simpler, faster, and more automated, moving away from the batch processing common in silicon production. These fundamental principles, born from McMaster’s profound understanding of materials science and industrial processes, would become defining characteristics of First Solar’s future success.

While the broader solar industry in the 1990s was still very much in its infancy, characterized by high costs and limited deployment, there was a growing awareness of environmental issues. This nascent environmental consciousness, coupled with an increasing interest in renewable energy sources, provided a contextual backdrop for SCI's emergence. McMaster was not just building a company; he was, perhaps unknowingly, laying the groundwork for a technological paradigm shift that would eventually play a significant role in the global energy transition.

The significance of Harold McMaster’s contributions extended beyond the technical realm. His entrepreneurial spirit and willingness to take calculated risks were instrumental in bringing the CdTe vision to life. He wasn't afraid to pivot when initial approaches proved unfeasible, demonstrating a rare combination of scientific curiosity and commercial pragmatism. This resilience and adaptability, inherited from its founder, would become a hallmark of First Solar’s journey through the volatile solar market.

By the late 1990s, Solar Cells, Inc. had made substantial progress in refining its CdTe thin-film technology. For several years, the cells produced by SCI were considered

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among the most efficient of their kind. This early success, a testament to McMaster's foundational insights and the dedication of his team, positioned the company for its next significant transformation. The stage was set for SCI to transition from a pioneering research and development firm into a commercial entity poised to challenge the established norms of solar manufacturing. However, that next chapter would involve new leadership and a new name, carrying forward McMaster's groundbreaking work into the 21st century.

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