The aggregate Cobb-Douglas production function stands as a central element in the renowned Solow-Swan model in economics, providing a crucial theoretical framework for comprehending the determinants of economic growth. This model not only guides policymakers and economists but also influences their decisions, fostering sustainable and inclusive development. In this study, we utilize a one-input version of a recent generalization of the Cobb-Douglas production function proposed by Smirnov and Wang, thereby extending the Solow-Swan model to incorporate energy production as a factor. We offer a rationale for this extension and conduct a comprehensive analysis employing advanced mathematical tools to explore solutions to this new model. This approach enables us to gain insights into seamlessly integrating environmental concerns related to energy production into economic growth strategies, ensuring long-term sustainability.