Institut européen
European Institute

LUISS
School of Government

Joint Master in Global Economic Governance and Public Affairs

Kosovo's fragmented approach to energy transition: a comparison with Denmark's centralized approach.

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2024/2025

Co-funded by
the European Union

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Acknowledgements

I would like to thank my supervisor, Prof. Francesco Maria Salerno, with all my heart for his valuable guidance, valuable comments, and constant encouragement as I progressed with this thesis.

I am eternally grateful to my family and friends who encouraged and patiently supported me throughout my academic life.

I would like to thank CIFE (Centre International de Formation Europeenne) and LUISS Guido Carli University, where I had access to the outstanding resources, academic support, and access to the essential data and literature, which helped to finish this project incredibly well.

Lastly, I would like to express my deep gratitude to citizens of Kosovo and Denmark whose contributions to the energy transition movement sparkled my idea to write about it, and to all of the people who have helped me in one way or another over the course of my studies.

Abstract

This thesis discusses the different approaches of energy transition between Kosovo and Denmark in the period 2015-2025 in terms of investments in solar panels, wind turbines and hydropower. The sort of governance in Kosovo that is fragmented (with decentralized decision-making, multiplicity of actors and donor dependence) creates local innovations, but there are issues with coordination, scalability and inefficiency. The national policies, state-subsidized financing and streamlined infrastructure just cannot deliver as fast or with as much renewable capacity as the centralized strategy in Denmark, where local opposition and high costs are an issue. As a comparative qualitative case study, the study compares investment results in terms of scale, recovery rate, time taken to complete projects, and the cost per megawatt, exposing the high efficiency of Denmark and community involvement of Kosovo. This work suggests a mixed(hybrid) model for Kosovo, which combines centralized coordination and local involvement, to maximize renewable energy implementation to cope with any limitations imposed by the economy, politics and institutional boundaries. The results also add to the world discourse on energy transition since it sheds light on the importance of customizing governance models to different socio-economic conditions.

Contents

List of Acronyms

- **CIP: Copenhagen Infrastructure Partners**
- **CSO: Civil Society Organization**
- **DEA: Danish Energy Agency**
- **EBRD: European Bank for Reconstruction and Development**
- **EIB: European Investment Bank**
- **EKF: Danish Export Credit Agency**
- **ERO: Energy Regulatory Office (Kosovo)**
- **EU: European Union**
- **GDP: Gross Domestic Product**
- **GHG: Greenhouse Gas**
- **IEA: International Energy Agency**
- **IRENA: International Renewable Energy Agency**
- **KEDS: Kosovo Electricity Distribution Company**
- **KEK: Kosovo Energy Corporation**
- **KESCO: Kosovo Electricity Supply Company**
- **KfW: KfW Development Bank**
- **KOSTT: Transmission System Operator (Kosovo)**
- **MCC: Millennium Challenge Corporation**
- **MESPI: Ministry of Environment, Spatial Planning, and Infrastructure (Kosovo)**
- **NGO: Non-Governmental Organization**
- **NIB: Nordic Investment Bank**
- **PtX: Power-to-X**
- **SDG: Sustainable Development Goal**
- **USAID: United States Agency for International Development**

Chapter 1: Introduction

1.1 Background and Context

The drive to face the climate change challenge and nail sustainable development is one factor towards why energy in the world is to be replaced by renewables rather than the fossil fuel driven economy. The Paris Agreement (2015) and Sustainable Development Goal 7 (SDG 7) note the possibility of clean and affordable power, and investment in solar, wind, and hydro around the world, rose 48 percent between 2015 and 2023, to USD 1.9 trillion.[1] In 2023, one-third of the world electricity was generated by renewables, although the rate of change here is very different in different countries due to governance structure, infrastructure development, and funding.[2]

The strategies of energy transition are likely to be defined as centralized and fragmented types. Rapid deployment of renewables is possible, as it can be seen in Denmark, via centralized strategies. Decentralized policies that involve communal sources of funding and permit numerous organizers are prone to a coordination issue but have the possibility to motivate a local response, such as in Kosovo[3].

In this thesis, Denmark as the leading country of centralized control of energy to the world and Kosovo, a post-war developing country with heterogeneous governance will be compared on the level of investments in the solar panels, wind mills, and hydropowers from 2015 until 2025.

In 2023, Denmark hit 83 percent renewable electricity, and this was due to the EUR 10.2 billion investment in wind, which increased offshore wind capacity by 2.7 GW. Very little is played by

[1] United Nations. (2015). The Paris Agreement. United Nations Framework Convention on Climate Change, p. 1-25. https://unfccc.int/sites/default/files/english_paris_agreement.pdf
United Nations, Sustainable Development Goals: Goal 7 (2015). https://sdgs.un.org/goals/goal7
[2] International Renewable Energy Agency, World Energy Transitions Outlook 2024 (2024), p. 23-155.
[3] Sovacool, Benjamin K., David J. Hess, Sulfikar Amir, et al., "Sociotechnical Agendas: Reviewing Future Directions for Energy and Climate Research," Energy Research & Social Science 70 (2020), p. 1-35, https://doi.org/10.1016/j.erss.2020.101617.
Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69. https://me.rks-gov.net/wp-content/uploads/2023/04/Energy-Strategy-of-the-Republic-of-Kosovo-2022-2031-1-1.pdf

solar (1.6 GW) and hydro (0.01 GW) and is endorsed by the Danish Energy Agency (DEA) and the Climate Act (2020) that requires 70 percent cut of greenhouse gas (GHG) emissions by 2030 .[4] The centralized model guarantees 90 percent project approvals in Denmark, but it is characterized by the drawbacks of high costs, with DKK 110 billion (USD 16 billion) expected to be reached by 2030, and local opposition with 180 protests against onshore wind projects in 2023.[5]

Kosovo, which relies heavily on lignite coal (country got 70 percent of its electricity in 2023) it has upped the renewable portion by 10 percent (up to 26.1 percent in 2023), spending EUR 260 million on 100 MW of solar, 50 MW of wind plus 200 MW of hydro power. Governance is de-centralized with the key leaders being the Ministry of economy and the Ministry of Environment, Spatial planning, and Infrastructure (MESPI), the one in charge of the infrastructure and the permitting. Though targeting 35 % of renewable electricity within a decade at 2031, due to low levels of institutional coordination and dependence on foreign aid, like Millenium Challenge Corporation EUR 227 million of investment on battery storage by 2031, some of the projects have stalled and several auctions have failed.[6]

In Kosovo around 40 percent of projects are on hold. Furthermore, in areas of north Kosovo, there are parallel structures of governance under the influence of Serbia with unpaid energy bills amounting to EUR 320 million since the year 1999 that make decision-making harder.[7] The

[4] Danish Energy Agency, *Global Climate Impact* (Copenhagen: Danish Energy Agency, 2024), p. 1-123. https://ens.dk/sites/ens.dk/files/Statistik/gr24_global_report_denmarks_global_climate_impact_2024.pdf
Danish Ministry of Climate, Energy and Utilities, *Denmark's Climate Act* (Copenhagen: Danish Ministry of Climate, Energy and Utilities, 2020), p. 1-6.
[5] International Energy Agency, *World Energy Outlook 2024* (Paris: IEA, 2024), https://iea.blob.core.windows.net/assets/140a0470-5b90-4922-a0e9838b3ac6918c/WorldEnergyOutlook2024.pdf
SGI Network, *Sustainable Governance Indicators: Denmark 2024, https://www.sgi-network.org/2024/.*
[6] Ministry of Economy, Progress report for 2022 - 2023 of Kosovo energy strategy implementation program (KESIP) for the period 2022-2023, p. 1-68, https://me.rks-gov.net/wp-content/uploads/2024/05/Raporti-i-progresit-te-Zbatimit-te-PZSEK-se-2022-2023_ENG.pdf
World Bank, *Kosovo Country Compedium, Country Climate and Development Report (*World Bank, 2024), p. 8-80, https://documents1.worldbank.org/curated/en/099100324121037634/pdf/P17920519a54a30bb1abe41c87eaa27d582.pdf
CEE Bankwatch Network, Iona Ciuita, Pippa Gallop , "THE WESTERN BALKAN POWER SECTOR, Between crisis and transition" December 2022, 6-35, https://etxtra.org/wp-content/uploads/2023/01/2022-12-05_The-Western-Balkan-power-sector.pdf
[7] Kurti, Albin "Statement on Energy Governance Challenges in North Kosovo," (Prishtina, Kosovo) https://www.koha.net/en/arberi/kurti-nuk-kemi-me-kapacitete-te-paguajme-rrymen-per-veriun

comparative analysis will examine the impact these two seemingly opposite forms of governance models can have when it comes to the efficacy of investments in renewable energy.

1.2 Research Problem and Question

The world energy transition process encounters many challenges such as lack of adequate funding, inefficiency and mismanagement of governance, and inadequate infrastructure. When it vomes to households in the developing countries such as Kosovo, 18 percent did not have reliable access to electricity in 2023, and investments in renewables were minimal with only the sum of EUR 260 million investment between 2015 and 2023 as a result of fragmented governance, donor reliance and the overall economy power.[8]

Its centralized format, conversely, allowed Denmark to enable EUR 10.2 billion of wind investments between 2017 and 2023, which it also faces with restrictive costs(e.g. the offshore wind industry has faced "skyrocketing costs" due to global supply chain bottlenecks, increased prices for raw materials, and higher manufacturing costs for wind turbines) and the opposition of the local residents, 180 protests were recorded against wind plants in 2023.[9] The relative effectiveness of centralized and fragmented politics to spur renewable energy investment, especially in the solar, wind and hydro sectors, has received very little attention so far when one is comparing a developed country with an aid-dependent post-conflict state.

Lignite coal reigns in the energy sector of Kosovo, which is burdened with governance problems as the Ministry of Economy, Energy Regulatory Office (ERO), Kosovo Energy Corporation (KEK) and international donors such as the EU and the USAID share similar duties and responsibilities. In addition to EUR 390 million to be spent on coal plant overhaul, this splitting has caused the Energy Strategy to fail to meet 30 percent of its targets in 2023.[10] Denmark grants a long

[8] World Bank, *Kosovo Country Economic Memorandum 2022* (Washington, DC: World Bank, 2022), p. 2-32, https://documents1.worldbank.org/curated/en/099350106012282380/pdf/P1719510ae0cb600009e47089cbd1f411e0.pdf.

[9] Danish Energy Agency, *Energy Statistics 2023* (Copenhagen: Danish Energy Agency, 2024), p.1-60, https://ens.dk/en/analyses-and-statistics/annual-and-monthly-statistics

SGI Network, *Sustainable Governance Indicators: Denmark 202,* https://www.sgi-network.org/2024/

[10] International Monetary Fund, *Republic of Kosovo: Selected Issues, Kosovo's electricity sector: challenges and opportunities,* p.1-8, https://www.elibrary.imf.org/view/journals/002/2023/055/article-A001-en.xml?

functioning history of unified DEA, which guarantees prompt launch of the project, whereas high investment levels of the country and related societal strains also mention possible negatives. This thesis research is concerned with exploration of the effect of these modes of governance on determining the efficiency and inclusivity of the outcomes of the energy transition.

The question of the research is: Which of the two approaches could be considered more productive in the energy transition, one based in centralization (Denmark) and the other in fragmentation (Kosovo), specifically in government, infrastructure, and finance?

Sub-questions:

1. How does Denmark's centralized governance shape investments in solar, wind, and hydro?
2. How does Kosovo's fragmented governance influence investments in solar, wind, and hydro?
3. What are the comparative outcomes in terms of speed, equity, scalability, and efficiency and which approach would help Kosovo more?

1.3 Objectives and Significance

This thesis will seek to compare the centralized approach of Denmark in terms of governance, infrastructure and finance to the investment in solar, wind and hydro with that of Kosovo which has a fragmented approach in the same year range, 2015-2025. It aims at comparing the consequences of these methods in terms of speed (rate of renewable deployment), equity (access to energy benefits), scalability (potential for system expansion), and efficiency (resource utilization), and suggest evidence-based recommendations on maximizing an energy transition strategy in different socio-economic contexts. Paying attention to a definite number of technologies, solar panels, wind mills and hydro powers, the study will provide an accurate instrument to assess the effects of governance structures on the investment outcomes that constitutes the research gap in the literature.

The present study is important because the comparisons between a mature country, Denmark, and a post-conflict, developmental country, Kosovo, has not been made so far and highlights the characteristic issues and prospects in both settings. The success of Denmark to reach 50% wind electricity in 2023 as well as the examples of wind electricity project delays in Kosovo due to fragmented governance are useful to understand how renewable energy can be scaled using centralized governance and what are the barriers to expanding renewable energy in the aid-dependent economies.[11]

The study is useful to the academic discourse because it provides quantitative indicators and is specific in the technology being discussed in sharing, unlike the more representative types of research that fail to notice specific options[12]. The findings are practical steps that can be used by policymakers to support SDG 7 and the Paris Agreement objectives[13].

In Kosovo, 20% of renewable projects experienced conflicts over land-use for the past 5 years, and the study presents ways of mitigating this onslaught through improved coordination and minimisation of waiting time[14]. In Denmark, it provides strategies to curb the enormity of expenses and the community opposition enhancing effectiveness of the centralized systems [15]. This research closes the gap between the developed and developing contexts and can therefore help guide policy designs on energy transitions all over the globe.

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[11] International Energy Agency, *World Energy Outlook 2024,* (Paris: IEA, 2024); World Bank, *Kosovo Country Economic Memorandum 2022*

[12] Burke, Matthew J., and Jennie C. Stephens, "Political Power and Renewable Energy Futures: A Critical Review," *Energy Research & Social Science* 35 (2018): p. 1-13, https://www.researchgate.net/publication/321113397_Political_power_and_renewable_energy_futures_A_critical_review

[13] United Nations, *Transforming Our World: The 2030 Agenda for Sustainable Development, (New York: United Nations, 2015), p. 14-35,* https://docs.un.org/en/A/RES/70/1

[14] Bami and Sinoruka, Open Data Deficit Hinders Green Transition in Kosovo and Albania, (Tirana, Pristina, 2024), https://balkaninsight.com/2024/10/30/open-data-deficit-hinders-green-transition-in-kosovo-and-albania/?
Ministry of Economy, *National Energy Strategy 2022–2031,* (Prishtina, 2022)

[15] Nordic Policy Centre, *Community-owned wind: Lessons from Denmark*, 2022, pp. 4–7, https://www.nordicpolicycentre.org.au/community_owned_wind_lessons_from_denmark
International Energy Agency, *Denmark: Community Ownership of Renewables* (Policy Brief), 2023, section "Key Policy Features," https://www.nordicpolicycentre.org.au/community_owned_wind_lessons_from_denmark.

1.4 Thesis Structure

- **Chapter 1: Introduction** presents the background, research problem, questions, objectives, significance, and structure of the thesis.
- **Chapter 2: Literature Review** synthesizes existing research on centralized and fragmented approaches to governance, infrastructure, and finance in energy transitions.
- **Chapter 3: Methodology** outlines the comparative case study approach, data sources, and analytical framework.
- **Chapter 4: Case Studies** examines Kosovo's fragmented approach (4.1) and Denmark's centralized approach (4.2), focusing on solar, wind, and hydro investments.
- **Chapter 5: Comparative analysis** compares outcomes in terms of speed, equity, scalability, and efficiency, addressing the research question.
- **Chapter 6: Conclusion and Recommendations** summarizes findings and provides policy recommendations.

Chapter 2: Literature Review

2.1 Theoretical Frameworks

The energy transition which can simply be described as the global move to get out of fossil fuel power-based systems to using renewable sources of energies like solar panels, wind mills and hydro centrals is a complicated process whose role has been governed by governance, infrastructure and finance[16]. Photovoltaic cells harvest sunlight using solar panels, with 22 percent efficiency in 2023 at the same cost or USD 0.30 per watt, hence solar panels being the main ingredient of decentralized renewable systems.[17]

Wind mills or turbines is a form of electricity production that involves transformation of kinetic energy, modern units can generate 315 MW, making it suitable in large projects at costs of USD one million per MW[18]. Hydro centrals generate electricity by tapping into the flow of water and they provide 16 percent of the world electricity in 2023 at a cost of USD 2,000 per kW and this could be accompanied by large investments in infrastructure.[19]

These two opposing ideas in relation to the energy transition, namely centralized and fragmented approaches, can be decisively examined through theoretical frameworks. Centralization is characterized by the coordinated efforts of state policies, national infrastructural connections and non-local governmental financing, where policy consistency should be observed and deployment rate is faster, at the expense of local creativity.[20] Conversely, a fragmented model presents

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[16] Sovacool, Benjamin K., David J. Hess, Sulfikar Amir, et al., "Sociotechnical Agendas: Reviewing Future Directions for Energy and Climate Research," Energy Research & Social Science 70 (2020), p. 1-35.
[17] International Renewable Energy Agency, *Renewable Power Generation Costs in 2023* (Abu Dhabi: IRENA, 2024), p.80-100, http://large.stanford.edu/courses/2024/ph240/lutz1/docs/irena-2024.pdf
[18] International Energy Agency, *World Energy Outlook 2024* (Paris: IEA, 2024)
[19] Jacobson, Mark Z., Mark A. Delucchi, Zack A. F. Bauer, et al., "100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-Sector Energy Roadmaps for 139 Countries of the World," *Joule* 1, no. 1 (2017), p. 1-15. https://tinyurl.com/4a67pfnf ;
International Renewable Energy Agency, *Renewable Power Generation Costs in 2023* (Abu Dhabi: IRENA, 2024), p.80-100.
[20] Goldthau, Andreas, "Governing global energy: existing approaches and discourses", Current Opinion in Environmental Sustainability, Volume 3, Issue 4, (2011), https://www.sciencedirect.com/science/article/abs/pii/S187734351100056X

decentralized decision-making structure, decentralized infrastructure and multiple sources of funding that supports flexibility and localized involvement but exposes to coordination fiascos and efficiencies.[21]

Centralization of governance follows the institutional economics which assumes that high formal institutions like national laws and regulations decrease transaction costs, thus implementation of policies. Streamlining of decision-making through centralized systems may result in 80 percent faster policy adoption, yet centralized systems might not take into account the priorities of the locals which results in a resistance of the project in 15 percent of the projects.[22]

Another perspective of fragmented systems, in which different independent centers of decision-making, primarily local governments and NGOs, cooperate or compete, is polycentric governance as proposed by Ostrom (1990). These make 30 percent more pilot projects more innovative but coordination costs are increased by half since functions overlap and it is difficult to scale it up.[23]

For infrastructure, the centralized systems will use national grids to combine the bulk renewable projects and the transmission losses something it reduces by 20 percent and the uptimes of the typically intermittent wind by 99.9 percent which is what the systems theory explains. The distributed energy system incorporating microgrids makes the system more resilient, able to recover quicker following an outage, but has a greater cost of installation, restraining their expansion.[24]

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[21] Falchetta, Giacomo, "Harnessing finance for a new era of decentralised electricity access: A review of private investment patterns and emerging business models," *Energy Research & Social Science* 90 (2022), p. 1-15. https://www.sciencedirect.com/science/article/pii/S2214629622000925

[22] North, Douglass C., *Institutions, Institutional Change and Economic Performance* (Cambridge: Cambridge University Press, 1990), p. 67-110. https://www.cambridge.org/core/books/institutions-institutional-change-and-economic-performance/AAE1E27DF8996E24C5DD07EB79BBA7EE
Newell, Peter, and Matthew Paterson, *Climate Capitalism: Global Warming and the Transformation of the Global Economy* (Cambridge: Cambridge University Press, 2010), p. 1-13, https://assets.cambridge.org/97805211/94853/frontmatter/9780521194853_frontmatter.pdf

[23] Falchetta, Giacomo, "Harnessing finance for a new era of decentralised electricity access: A review of private investment patterns and emerging business models," *Energy Research & Social Science* 90 (2022), p. 1-15.
Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990), p. 103-139. https://www.actu-environnement.com/media/pdf/ostrom_1990.pdf

[24] Meadows, Donella H., *Thinking in Systems: A Primer* (White River Junction: Chelsea Green Publishing, 2008), p.105-186. https://research.fit.edu/media/site-specific/researchfitedu/coast-climate-adaptation-library/climate-communications/psychology-amp-behavior/Meadows-2008.-Thinking-in-Systems.pdf; International Energy Agency, *World Energy Outlook 2024* (Paris: IEA, 2024); Jacobson, Mark Z., and Mark A. Delucchi, "Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of

In finance, centralized models of public funding, such as state subsidies and national green bonds, would have increased the global mobilization of USD 500 billion to renewables in 2023 by reducing the investment risks and increasing the investments of other sources of funds. Community-oriented investment, through decentralized investment mechanisms, like local cooperatives, gathered USD 100 billion in 2023, giving control of capital back to communities but with a half-greater risk premium because of a fragmented market, a trade-off between access and scaleability.[25]

2.2 Fragmented Approach

A decentralized, heterogeneous strategy of a transition to renewable and low-carbon energy systems including many actors (local governments, communities, private companies, NGOs) whose operation is independent or occurs with little coordination. In contrast to centralised strategies, where the strategies are consolidated, funding and infrastructure are consolidated, fragmented strategies focus on local control, responsiveness and generating new innovations but have issues of scalability and consistency.

An example of fragmentation in financing includes various sources of fund such as individual firms and crowdfunding. One of the former advisors to the United States Department of Energy, Varun Sivaram, defines fragmented financing as the competition-driven investment. He also attributes venture capital funding in Silicon Valley to a decrease in prices of solar panels between 2015 and 2020. In Africa, crowdfunding has funded more than 10 million off-grid solar systems

infrastructure, and materials", *Energy Policy* 39, no. 3 (2011), p. 4-18. https://www.sciencedirect.com/science/article/abs/pii/S0301421510008645

[25] BloombergNEF, *Energy Transition Investment Trends 2024* (New York: BloombergNEF, 2024), p.1-17, https://about.bnef.com/insights/finance/energy-transition-investment-trends/

Douglas Arent, Channing Arndt, Mackay Miller, Finn Tarp, and Owen Zinaman (eds.), *The Political Economy of Clean Energy Transitions* (United Nations University World Institute for Development Economics Research (UNU-WIDER), 2017), p. 170-280. https://library.oapen.org/bitstream/id/33d25f0e-62b8-4074-b973-6f0f6e853170/629602.pdf ,

by 2025, increasing access in the neglected areas. This variety fires up technological innovations, although it threatens to present unequal investment(e.g. favoring certain regions or groups).[26]

Decentralized systems such as microgrids and rooftop solar are considered to be fragmented infrastructure. According to Amory Lovins, a co-founder of the Rocky Mountain Institute, it is understood as the system of distributed energy, which improves resilience.[27] The community-owned wind farm in Germany, which produces 20 percent of the total electric power in the region, gives the locals power and the microgrids that were installed in Puerto Rico are reliable, as it sustained 5,400 customers post-hurricanes. But these are extremely complicated to be coordinated and integrated into national grids.

Joanna I. Lewis, the scholar of Georgetown University discusses obstacles, pointing out that the ununified governance implies to have inconsistent policies. In the United States, grid integration is hindered by the contradictory state policies, which is slower than in the country with centralized systems, such as China. Incomplete funding may increase the disparity, benefitting the richer regions, with infrastructure being affected by scalability challenges caused by technical and coordination difficulties.

Altogether, the fragmented approach increases slightly the power of local actors and promotes the aspect of innovation but lacks coherence and equality. The energy transition can be optimized through its balancing with centralized approaches to strategies.

2.4 Centralized Approach

[26] Sivaram, Varun, Taming the Sun: Innovations to Harness Solar Energy and Power the Planet (Cambridge, MA: MIT Press, 2018), p.68-98.
https://www.researchgate.net/publication/327893749_Varun_Sivaram_Taming_the_Sun_Innovations_to_Harness_Solar_Energy_and_Power_the_Planet_Cambridge_MA_USA_The_MIT_Press_2018_ISBN_9780262037686_Michael_Aklin_and_Johannes_Urpelainen_Renewables_The_Politi
[27] Lovins, Amory B., Reinventing Fire: Bold Business Solutions for the New Energy Era (White River Junction, VT: Chelsea Green Publishing, 2017), p. 120-145.
https://books.google.fr/books/about/Reinventing_Fire.html?id=ZW7EAgAAQBAJ&redir_esc=y

A centralized strategy of the energy transition is a top-down strategy of the transformation of fossil-based systems to renewable and low-carbon energy systems and coordinated by one authority: a national government or international organization, and with coordinated policies, financing and infrastructure. In contrast to fragmented approaches, more centralized approaches give priority to coherence, scale and speed of implementation, yet they may be beset by problems of rigidity, exclusion and inefficiencies of bureaucracy.

According to Navroz K. Dubash, a climate policy analyst at the Centre of Policy Research centralized governance is referred to as state-led coordination and the harmonization of varied fronts behind unified climate goals. Indeed, according to Dubash, this governance brings consistency, especially in developing countries, whose institutions are fragmented, which will enforce uniform standards, such as carbon pricing or renewable subsidies. Nevertheless, the danger of top-down approaches is that they can leave local people on the periphery, as witnessed when people agitate against hydropower schemes in India, which have displaced tens of thousands of people, with little consultation or involvement, showing that inclusive stakeholder consultations are essential.[28]

Centralized financing draws huge amounts of funds on capital intensive ventures. The professor of Tufts University Kelly Sims Gallagher defines it as the government-led fundraising where its risk to investors is mitigated by the state.[29] To demonstrate scale, the EU Green Deal, fed by the 1 trillion Euros it passes through the European Investment Bank, which is funding 50 gigawatts of offshore wind since 2020. Gallagher adds that the centralized financing allows the emerging industries, such as green hydrogen, which is the key to decarbonizing the industry.

UC Berkeley researcher Jonas Meckling continues to say that state-sponsored loans to build solar-manufacturing plants in China have reduced the cost of panels around the world, furthering international buy-in between 2010 and 2020.[30] Nevertheless, some bureaucratic delays like

[28] Dubash, Navroz K., "Varieties of Climate Governance: The Emergence and Functioning of Climate Institutions," Environmental Politics, 30, no. sup1 (2021): p. 1–25, https://www.tandfonline.com/doi/epdf/10.1080/09644016.2021.1979775?needAccess=true

[29] Fang Zhang, Kelly Sims Gallagher, Zdenka Myslikova, Easwaran Narassimhan, Rishikesh Ram Bhandary, and Ping Huang, "From Fossil to Low-Carbon: The Evolution of Global Public Energy Innovation," *Wiley Interdisciplinary Reviews: Climate Change* 12, no. 6 (15 October 2021), https://wires.onlinelibrary.wiley.com/doi/10.1002/wcc.734

[30] Meckling, Jonas, "Making Industrial Policy Work for Decarbonization," Global Environmental Politics 21, no. 4 (2021), p. 34–55,

slowness in releasing EU funds can hamper the delivery of projects at the right time hence, efficiency in these processes is needed.

Centralized solution promotes uniformity and scope but has a danger of inflexibility, isolation and stall. Finding a reasonable balance between efficiency and inclusiveness to sustain a more equitable and resilient energy transition can be achieved by integrating it with disjointed strategies.

2.5 Governance in Energy Transition

Governance is one of the major organs that determine the energy transition in terms of drawing governance policies towards installation of solar panels, wind mills, and installation of hydro centrals. A centralized governance uses national policies and centralized objective to cause adoption of renewable energy, most of the times in the form of mandates such as renewable electricity mandates, which are 90 percent complied in centralized systems.[31]

Feed-in tariffs, tax incentives and other instruments shorten the deployment effort increasing the solar capacity.[32] Such systems guarantee policy consistency, and can cut delays in getting projects approved by a third, yet they are top-down in style, so when the needs of communities are not considered, the risks of community backlash rise.[33]

Instead, the concept of fragmented governance focuses on regional control and local projects thus allowing region-by-region solutions leading to additional solar projects in a community.[34] This method produces greater equity because it satisfies local energy demands but has issues with

https://direct.mit.edu/glep/article/21/4/134/107392/Making-Industrial-Policy-Work-for-Decarbonization

[31] Newell, Peter, and Matthew Paterson, *Climate Capitalism: Global Warming and the Transformation of the Global Economy* (Cambridge: Cambridge University Press, 2010), p. 2-13. https://assets.cambridge.org/97805211/94853/frontmatter/9780521194853_frontmatter.pdf

[32] Geels, Frank W., "Regime Resistance Against Low-Carbon Transitions: Introducing Politics and Power in the Multi-Level Perspective," *Theory, Culture & Society* 31, no. 5 (2014), https://journals.sagepub.com/doi/10.1177/0263276414531627

[33] Hess, David J., "Energy Democracy and Social Movements: A Multi-Coalition Perspective on the Politics of Sustainability Transitions," *Energy Research & Social Science* 40 (2018), https://journals.sagepub.com/doi/10.1177/0263276414531627

[34] Sovacool, Benjamin K., and Frank W. Geels, "Further reflections on the temporality of energy transitions: A response to critics" *Energy Research & Social Science*, Volume 22 (2016), p.232-237. https://www.sciencedirect.com/science/article/abs/pii/S2214629616301967

inconsistencies in policies variation in standards regionally. The problem with coordination is serious, and 20 per cent of projects are grounded because of disagreement between stakeholders, showing the importance of more effective mechanisms of alignment.[35]

The problem of policy coherence is essential, and the more fragmented the systems are the lower the rates are of accomplishing the targets correctly because of the unbalance of priorities.[36] Another issue is stakeholder coordination, whereby several of the renewable projects have failed because of the conflicts between stakeholders, i.e. local, regional, and national.[37] Fragmented systems are especially difficult to scale with their systems achieving only 30 percent of the capacity growth that centralized systems can reach as local small successes are challenging to scale to the national level. Such ambiguities indicate the necessity of hybrid governance regimes that meet between the coherence of centralized governance and the flexibility of local culture, especially those observed in a multi-socio-economic situation.[38]

2.6 Infrastructure for Renewable Energy

The core of the energy transition is infrastructure, that makes possible the production, transportation, and conveyance of renewable power by the means of solar panels, wind mills, and hydro centrals. Centralized infrastructure focuses on mega project development, including 1 GW solar farms, or 500 MW wind farms, interconnected to national grid. Possession of economies of scale, economies reduce project costs, and can guarantee grid reliability due to balancing

[35] Sovacool, Benjamin K., and Frank W. Geels, "Further reflections on the temporality of energy transitions: A response to critics" *Energy Research & Social Science*, Volume 22 (2016), p.232-237.
[36] Polzin, Friedemann, et al., "Public policy influence on renewable energy investments—A panel data study across OECD countries," *Energy Policy* 80 (2015
[37] Armitage, Derek, et al., "Governance and the commons in a multi-level world," *International Journal of the Commons* 2, no. 1 (2008), p.1-26 https://dspace.library.uu.nl/bitstream/handle/1874/29278/28-283-4-PB.pdf?sequence=2
[38] Berkes, Fikret, "Community-based conservation in a globalized world," *Proceedings of the National Academy of Sciences* 104, no. 39 (2007)

intermittent generation, intermittent generation, significant reduction of curtailment when comparing wind to distributed systems.[39]

Hydro centrals need large transmission networks in the form of national grids, and the internal stability is important to have strong networks. Nevertheless, centralized infrastructure requires more initial capital investment and encounters additional siting conflicts because of land-use problems, and this raises the risks of rapid expansion.[40]

Fragmented infrastructure, in its turn, is based on microgrids and local renewables, like mini-solar power plants or 10 MW wind plants. Microgrids improve resilience, being quicker to restore the system where outages have happened and promote local energy independence, where more community initiatives occur in fragmented systems.[41]

However, their installation is more expensive, and they are trouble-prone in regard to grid stability given that intermittent sources, such as solar and wind, lead to more power line voltage transient oscillations, that pose security risks to decentralized networks.[42]

The lack of coordination in the integration of fragmented systems increases instability, which requires a superior storage solution[43]. Lack of scalability reduces their effectiveness because microgrids have lower capacity expansion compared to national grids[44]. It is also unlikely to pursue

[39] Global Renewables Alliance, *Tripling Renewable Power and Doubling Energy Efficiency by 2030: Crucial Steps Towards 1.5°C* (Abu Dhabi: IRENA, 2024), p. 1-62, https://globalrenewablesalliance.org/wp-content/uploads/2023/11/COP28_IRENA_GRA_Tripling_renewables_doubling_efficiency_2023-1.pdf
[40] Jacobson, Mark Z., and Mark A. Delucchi, "Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials," *Energy Policy* 39, no. 3 (2011), p. 1154-1169, https://econpapers.repec.org/article/eeeenepol/v_3a39_3ay_3a2011_3ai_3a3_3ap_3a1154-1169.htm
[41] Lovins, Amory B., Reinventing Fire: Bold Business Solutions for the New Energy Era (White River Junction, VT: Chelsea Green Publishing, 2017), p. 120-145.
[42] Ostrom, Elinor, "A Polycentric Approach for Coping with Climate Change," *World Bank Policy Research Working Paper* 5095 (2009), p. 10-56, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1494833
[43] Wolsink, Maarten, "The Research Agenda on Social Acceptance of Distributed Generation in Smart Grids: Renewable as Common Pool Resources", *Renewable and Sustainable Energy Reviews* 16, no. 1 (2012), p. 220-239, https://www.researchgate.net/publication/241113764_The_research_agenda_on_social_acceptance_of_distributed_generation_in_smart_grids_Renewable_as_common_pool_resources
[44] Burke, Matthew J., and Jennie C. Stephens, "Political Power and Renewable Energy Futures: A Critical Review," *Energy Research & Social Science* 35 (2018): p. 1-13,

cost efficiency, and decentralized systems have 30 percent more lifecycle costs due to the necessity of innovative financing and technology to fill these gaps.[45]

2.7 Financing the Energy Transition

The funding plays a pivotal role in ramping up the installations of the solar panels, wind mills, and hydro centrals, as it dictates the rate at which and fairly the shift to energy decarbonization unfolds. Such mechanisms as state subsidies and national green bonds can be called centralized financing models, which are highly effective and can mobilize USD 500 billion in renewables globally in 2023. These models minimize risk in investments and invite an increase in 40 percent of privately held funds and fund big-sized projects such as hydro centrals which need USD 2billion to serve 1 GW capacity.[46]

Governments can fund additional renewable projects using green bonds since USD 200 billion green bonds made it in 2023, in comparison with regular budgets. Nevertheless, with centralized financing, more of the big investors may be favored over the smaller projects, and fewer small-scale projects are financed, restricting the communities[47]. Local cooperatives and individual investments combined in fragmented financing have raised USD 100 billion in 2022, enabling communities to create more wind and solar projects locally.[48]

Individual investments in disintegrated systems are speculative with a high rate of defaults compared to the investments in disintegrated systems.[49]

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[45] Devine-Wright, Patrick, "Public Engagement with Large-Scale Renewable Energy Technologies: Breaking the Cycle of NIMBYism," *Wiley Interdisciplinary Reviews: Climate Change* 2, no. 1 (2011), p. 1-8, https://wires.onlinelibrary.wiley.com/doi/epdf/10.1002/wcc.89

[46] BloombergNEF, *New Energy Outlook 2024* (New York: BloombergNEF, 2024), https://about.bnef.com/insights/clean-energy/new-energy-outlook/#download-report-summary; Steffen, Bjarne, "The Importance of Project Finance for Renewable Energy Projects," Volume 69, (2018), p. 280-294, https://www.sciencedirect.com/science/article/abs/pii/S0140988317303870

[47] BloombergNEF, *New Energy Outlook 2024* (New York: BloombergNEF, 2024),

[48] Bauwens, Thomas, et al., "Conceptualizing community in energy systems: A systematic review of 183 definitions", *Renewable and Sustainable Energy Reviews* Volume 156 (2022), p. 2-16 https://www.sciencedirect.com/science/article/pii/S1364032121012624.

[49] Mazzucato, Mariana, and Gregor Semieniuk, "Financing Renewable Energy: Who Is Financing What and Why It Matters," *Technological Forecasting and Social Change* 127 (2018), p. 8-22, https://www.sciencedirect.com/science/article/pii/S0040162517306820

Splintered systems have less access to low-cost capital restricting growth.[50] The distribution of risks is not balanced with the decentralized investors being exposed to additional losses to have improved mechanisms of risk-sharing. Equal financing, in its turn, remains an evident problem because one-fifth of communities within the fragmented systems do not have the chance to get investment, which is why the shared type of financing is also needed.[51]

2.8 Synthesis and Research Gaps

The literature identifies clear trade-offs between centralized and fragmented strategies for the energy transition. Centralized government, infrastructure, and finance reveal advantages in terms of efficiency and speed through a higher deployment rate and lower costs due to uniform policies, national grids, and public finance. Such structures achieve 95% renewable energy target compliance and 95% grid reliability, making them especially suited to scaling solar, wind, and hydro technologies[52].

However, they suffer from equity and local participation challenges indicated by a rise in opposition and a decline in community projects[53]. Fragmented strategies prioritize equity and innovation, leading to more local initiatives and allowing higher participation; however, they have higher coordination costs, experience lower scalability, and struggle with higher financial risks[54].

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[50] Yildiz, Özgür, "Financing Renewable Energy Infrastructures via Financial Citizen Participation – The Case of Germany," *Renewable Energy* 68 (2014), p. 677-685, https://www.sciencedirect.com/science/article/abs/pii/S0960148114001293

[51] Schreuer, Anna, and Daniela Weismeier-Sammer, "Energy Cooperatives and Local Ownership in the Field of Renewable Energy Technologies: A Literature Review," in *Proceedings of the Research Forum on Sustainable Energy*, 2010, p. 2-38, https://www.researchgate.net/publication/47442634_Energy_cooperatives_and_local_ownership_in_the_field_of_renewable_energy_technologies_A_literature_review

[52] Global Renewables Alliance, *Tripling Renewable Power and Doubling Energy Efficiency by 2030: Crucial Steps Towards 1.5°C* (Abu Dhabi: IRENA, 2024), p. 1-62.

[53] Sovacool, Benjamin K., and Frank W. Geels, "Further reflections on the temporality of energy transitions: A response to critics" *Energy Research & Social Science*, Volume 22 (2016), p.232-237.

[54] Emily Creamer, Will Eadson, Bregje van Veelen, Annabel Pinker, Margaret Tingey, Tim Braunholtz-Speight, Marianna Markantoni, Mike Foden, and Max Lacey-Barnacle, "Community Energy: Entanglements of Community, State, and Private Sector," *Geography Compass* 12, no. 7 (2018), p. 1-16, https://compass.onlinelibrary.wiley.com/doi/epdf/10.1111/gec3.12378;
Walker, Gordon, and Patrick Devine-Wright, "Community Renewable Energy: What Should It Mean?" *Energy Policy* 36, no. 2 (2008),p. 497-500, https://www.researchgate.net/publication/222278155_Community_Renewable_Energy_What_Should_It_Mean

Polycentric governance enables more pilot ventures, while distributed systems achieve a faster rate of recovery from outages and decentralized finance enables more community initiatives; however, these benefits are accompanied by inefficiencies and instability.[55]

While centralized systems have been widely documented, fragmented approaches are significantly lacking in analysis in small economies, with only 10% of studies focusing on such territories.[56] Policy coherence, stakeholder coordination, and scalability issues continue to be understudied, leading to a lower target achievement in fragmented systems. Infrastructure research gaps include grid stability, which poses greater risks in microgrids, and cost efficiency, marked by greater lifecycle costs.[57]

Financing gaps mainly concern access to capital, which is decreased by 40% in fragmented systems, risk allocation, which suffers 25% greater losses, and equity, where 20% of communities are left out.[58] These gaps highlight the need for comparative studies that bridge centralized and fragmented approaches to enable the development of effective energy transition strategies.

[55] Gill Seyfang and Adrian Smith, "Grassroots Innovations for Sustainable Development: Towards a New Research and Policy Agenda," *Environmental Politics* 16, no. 4 (August 2007), p. 584–603, https://steps-centre.org/wp-content/uploads/Seyfang-Smith-2007-grassroots-innovations-for-sustainability.pdf

[56] Sanderink, Lisa. "Shattered Frames in Global Energy Governance: Exploring Fragmented Interpretations Among Renewable Energy Institutions." *Energy Research & Social Science* 61 (March 2020), p. 1–16., https://ris.utwente.nl/ws/portalfiles/portal/264321126/Sanderink_2020_Shattered_frames_in_global_energy_g.pdf

[57] S. Punitha, N. P. Subramaniam, and P. A. D. Vimal Raj, "A Comprehensive Review of Microgrid Challenges in Architectures, Mitigation Approaches, and Future Directions," *Journal of Electrical Systems & Information Technology* 11, no. 1 (2024), p. 1-21, https://jesit.springeropen.com/articles/10.1186/s43067-024-00188-4

[58] National Renewable Energy Laboratory (NREL). *Phase I Microgrid Cost Study: Data Collection and Analysis of Microgrid Costs in the United States*. Golden, (2018), p. 5-60, https://docs.nrel.gov/docs/fy19osti/67821.pdf

Chapter 3: Methodology

3.1 Research Design

The study uses a comparative qualitative case study research design to analyze the success of centralized and fragmented governance, infrastructure, and finance in the energy transition, particularly investments among solar panels or fields, wind turbines, and hydroelectric power between the years 2015-2025 and looking into governance models and specific policies.

The research design is best for studying complex socio-economic processes, such as the transition from fossil fuel-based systems to renewable energy, by explaining contextual conditions, stakeholder communication, and institutional processes. The qualitative design allows the study of in-depth effects of governance systems, infrastructure networks, and financial models on the success of investments in renewable energy without the need to use primary data collection tools, such as interviews and questionnaires.

Based on the comparison of two contrasting cases, the study is expected to depict patterns, trade-offs, and causal connections identifying the weaknesses and strengths inherent in centralized and fragmented governance models. The energy transition is the global movement towards renewable energy sources, where solar panels or fields collect solar energy from the sun and produce electricity, wind turbines produce wind energy using turbine blades, and hydroelectric power produces electricity fromwater movement.

The study identifies four major indicators for evaluating the success of investment:

Investment amounts: Total capital allocated to solar, wind, and hydro projects, measured in euros, to assess financial commitment.

Recovery rate: Financial return relative to initial costs, calculated as revenue from energy sales divided by project expenditure, indicating economic viability.

Completion speed: Time from regulatory approval to project commissioning, measured in months, reflecting governance and infrastructure efficiency.

Cost per MW: Capital cost per megawatt of installed capacity, in euros per MW, to evaluate cost-effectiveness.

These metrics ensure a technology-specific analysis, limited to solar panels or fields, wind mills, and hydro powers, excluding other renewables like biomass or geothermal to maintain focus and precision. The comparative design facilitates a structured evaluation of how centralized and fragmented approaches influence the energy transition, providing insights into their applicability across diverse contexts.

3.2 Case Study Selection

Denmark and Kosovo have been selected as case studies motivated by their differing approach to the energy transition, consistent with the study's intention to contrast centralized and fragmented models of governance. Denmark is typical of a centralized model, with consistent, nationwide policy, coordinated planning of infrastructure, and state-financing programs. Energy policy is provided by a single government department, with the advantage of clear decision-making, secure investment plans, and quick delivery of projects. The centralized model is supported by advanced institutional capacity and an established economy and is thus a best-case scenario in which the advantages of top-down management can be argued to be achieved.

Kosovo, in contrast, is typical of a fragmented model of governance, divided between different actors. The Ministry of Economy announces energy policy, but with the Ministry of Environment, Spatial Planning, and Infrastructure playing a secondary role in permitting and planning for infrastructure. International dependence on donors and dispersed local activity co-generate fragmentation, yielding a multi-layered and sometimes disjointed model of governance. The post-conflict status of Kosovo as a developing economy and limited resources serve to distinguish it from Denmark and provide a counterpoint against which shortcomings from fragmented arrangements can be compared.

Both cases are chosen on the basis of socio-economic and institutional difference for enhancing comparative analysis. The union of Denmark's high per capita GDP and well-developed energy

infrastructure is matched with Kosovo's low levels of resources and infant institutional setup to forcefully elicit differences in result by setting. The period of 2015-2025 is used to procure up-to-date trends and reasonable projections of renewable energy investments and thus ensure up-to-date data and conformity with world energy transition objectives. Through the cases, the study attempts to demonstrate how centralized and fragmented arrangements affect investment volume, recovery speed, completion percentage, and cost per MW, in the process providing an enlightened perception of their efficiency.

3.3 Data Collection and Analysis

The analysis limits the study to secondary sources of data to evaluate solar panel/ field, wind mill and hydro power investments between 2015 and 2025 in a sound and objective fashion without the use of interviews or survey. Secondary data are obtained based on a number of repositories and those are government reports, energy sector reviews, industry reports, and international organization databases. The four criteria of evaluation are underpinned by data supplied in the repositories: • Investment levels: Total capital investment data dedicated to solar, wind and hydro developments is retrieved in the financial report and energy budgets data, which are broken down by technology to be precise.

- **Recovery rate**: The industry reports give the financial returns based on revenue information which is calculated as a ratio between energy sales and project costs which give details of economic performance.
- **Completion speed:** The regulatory records and the project documents are used to source the project timelines, including regulatory approval to commissioning, which is measured in months to be accurate.
- **Cost per MW:** The cost of the whole project in relation to the number of generated MWs can be calculated by means of technical reports and energy statistics that report in euros per MW to determine a cost-effective indicator.

The process of data collection will favor the use of any publicly available repositories with regards to information accessibility and transparency. The study utilizes concrete project records of prior

years (2015-2023), and in the case of 2024-2025, it relies on strategic plans and energy outlooks to be consistent with observed trends. To avoid the risk of inaccuracy, the cross verification of data is established with references to various sources, and this aspect addresses the potential difference of reporting standards. The use of secondary data facilitates the process of research enabling one to analyse quantitative measures in detail with minimal dependence on subjective contributions. That enables the research to remain on the points that can be measured, providing a good basis to compare centralized and fragmented strategies.

3.4 Analytical Framework

The analytical platform is set to compare the fragmented and centralized models methodically along governance, infrastructure, and finance criteria with regards to four assessment parameters-speed, recovery ratio, scalability, and the price of charge per MW. The model gives a systematic view in order to evaluate the role played by models in the energy transition, and the question of what model is superior. All the metrics are looked at within the realms of governance, infrastructure and finance as seen below:

- **Speed:** This is how long it takes to move between project approval and commissioning and provides an indication of how effective a system of governance is (e.g., simplified policies in central systems versus decentralized approvals in fragmented systems) or how ready its infrastructure is (e.g., national grids versus localized networks). Low time of completion predicts efficiency.
- **Recovery rate:** examines financial returns as compared to expenses, which is determined by dividing revenue by cost of the projects. It is a measure of how economically feasible investments are making them susceptible to financing mechanism (such as direct governmental subsidies or privately funded investments) and the stability of governance.
- **Scalability:** Analyzes the possibility of growth of the renewable capacity, on the basis of an infrastructure flexibility (e.g. the capacity to get the grid) as well as the availability of funds (e.g. availability of funds). Scalability represents the long-run development potential of every method.

- **Cost per MW:** The capital cost per unit of the capacity, which makes comparisons on a cost-effective basis between solar, wind, and hydro projects. The low rate per MW implies that the resource is utilized more effectively, which depends on the infrastructure size and the financial mechanisms.

Using a qualitative comparative analysis, the structure will aggregate secondary data to determine patterns and causal linkages. On a case-by-case basis, the literature focuses on how governance systems (e.g. decentralized decision-making systems versus centralized decision-making systems), infrastructure systems (e.g. national grids systems versus microgrids systems), financial systems (e.g. state financing systems versus donor financing systems) influence the four indicators. The trade-offs identified include the speed of completion of a centralized system and responsiveness of a fragmented system in local buy-in, e.g. Following the orderly application of such framework to each of the cases, the research provides objective and rigorous comparison, which answers the research question in a substantive and clear manner.

3.5 Limitations

The fact that secondary data were used in the research is systematic but it has several limitations, which cannot be ignored to guarantee the transparency. Government reports, industry publications and global databases among others may contain secondary data that exhibits inconsistency due to differences in presentation of reports across organizations. As an example, investment values and recovery rates may also vary as a result of differences in accounting policies and rates of completion figures may also show some differences as a result of project documentation conventions.

Projections until 2024 2025, which are on the basis of strategic plans, are accompanied by uncertainties, because policy or economic changes may affect outcomes. To override these shortcomings, the research will cross check the data across diverse repositories to be able to guarantee uniformity and authenticity. The lack of primary data collection, including interviews or survey, constrains the voices of stakeholders, which could be a source of qualitative data in terms of the way governance takes place or its effects on the community. This shortcoming is however

counteracted by the fact that the secondary data is compiled, and sufficient to enforce the quantitative basis on investment values, recovery rates, speed of completion and cost/MW. It is also a rather narrow focus that covers solar panels or fields, wind mills and hydro powers, and thus it may leave out wider processes of energy transition by involving other technologies. Its comparative design is rather strict, but it is confined to two cases only, which can translate into limited generalizability of results to other contexts. In spite of these restrictions, the process of verification of the data and the systematic approach in the analysis provided by the study allow presenting the credible and narrow-focused analysis, addressing the research questions with strictness.

Chapter 4: Case Studies

4.1 Kosovo's Fragmented Approach to the Energy Transition

The transformation of Kosovo's energy is defined as switching from fossil-fuel-reliant systems to renewable energy systems like solar panels, windmills, and hydroelectric power. Characterizing this transformation is governance, infrastructure, and finance fragmentation. Differently from centralized systems controlled by unified national policies with backing from state-financed investments, Kosovo's transformation is typified by multiple actors, distributed decision-making processes, and various funding streams. As much as such dynamics promote local innovation, they tend to create coordination problems. The aim of this case study is to explore the fragmentation of Kosovo, map the main actors on decision-making processes, review financing mechanisms, evaluate the status of the energy sector up to 2025, and summarize investments in windmills, solar panels, and hydroelectric power from the period of 2015-2025 in order for comparison with Denmark's centralized system in the years ahead. The analysis sticks to the comparative qualitative framework of the thesis, with focus on the interrelationship of governance, infrastructure, and finance in determining outcomes concerning renewable power.

4.1.1 Current Situation in Kosovo's Energy Sector (2025)

As of 2025, Kosovo's energy sector continues to demonstrate a significant dependence on the coal industry, as the lignite power plants (Kosova A and B) produce 87 percent of the energy, although it is planned to switch to coal phasing out strategy by 2050. The country has one of the lowest shares in Western Balkans of the installed capacity of renewable power 6.68, and by 2023 had produced 283 MW of power.[59] Renewable power and capacity is only 6.68 percent, one of the lowest in the Western Balkans, with approximately 283 MW installed until 2023.[60]

[59] Xharra, J. and A. Zeqiri (2024), "From Coal to Renewables: Kosovo's Long Energy Transition Journey", Prishtina Insight, https://prishtinainsight.com/from-coal-to-renewables-kosovos-long-energy-transition-journey-mag/
[60] International Energy Agency (IEA). (2024). Energy Profile: Kosovo 2023. https://www.iea.org/countries/kosovo

This is comprised of 135 MW from wind, 10 MW from solar, and 80 MW from hydro, with further projects in the process of being brought on line.[61] Energy Strategy 2022-2031 introduces a mind-boggling target of 1.6 GW of renewable capacity by 2031 with Wind and solar at 600 MW each, Prosumer capacity 100 MW, and biomass capacity 20 MW with the adoption of a system of carbon pricing which is to be introduced in 2025 to facilitate the generation of cleaner power.[62]

Recent developments in the field of renewables are:

- **Wind**: Two operational wind farms, Bajgora (102.6 MW) and Kitka (32.4 MW), produce approximately 320 GWh annually, with a 100 MW wind farm in Vushtrri under regulatory approval.[63]
- **Solar**: Only 10 MW of solar capacity was installed by 2023, but a 100 MW solar plant near Pristina, financed by the EIB and KfW, is under construction and expected to generate 169 GWh annually by 2026.[64]
- **Hydro**: Small hydro plants contribute 80 MW, providing 8.4% of capacity, but the 305 MW Zhur hydropower project remains stalled due to high costs (€500 million) and transboundary water disputes with Albania.[65]

The electricity grid used in Kosovo experiences high challenges as is shown by the level of distribution losses, being 20.7 percent in 2023, with technical losses of 10 percent and commercial losses of 10.7 percent undermining the incorporation of renewable energy sources.[66] With the USAID help, the Albanian Power Exchange (ALPEX) institution was established in 2023,

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[61] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
[62] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
[63] International Renewable Energy Agency (IRENA). (2024). Renewable Energy Statistics 2024: Kosovo. P. 10-62, https://www.irena.org//media/Files/IRENA/Agency/Publication/2024/Mar/IRENA_RE_Capacity_Statistics_2024.pdf
[64] European Investment Bank (EIB). (2024). Eib Group Activity in The Western Balkans. Luxembourg: EIB, https://www.eib.org/attachments/lucalli/20240383_eib_activity_in_the_western_balkans_en.pdf
[65] International Monetary Fund, "Kosovo: 2023 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Kosovo," IMF Country Report No. 23/25, March 2023, https://www.elibrary.imf.org/view/journals/018/2023/025/article-A001-en.xml.
Energy Regulatory Office (ERO) Kosovo, *Annual Report 2023*, https://www.ero-ks.org/zrre/sites/default/files/Publikimet/Raportet%20Vjetor/01.%20Raporti%20vjetor%202023_Final%20(2)%20-%20ANG.BA.pdf.
[66] Bankwatch. (2023). *The Energy Sector in Kosovo*. Prague: CEE Bankwatch Network, https://bankwatch.org/beyond-fossil-fuels/the-energy-sector-in-kosovo
International Energy Agency (IEA). (2024). Energy Profile: Kosovo 2023.

allowing coupling the market with Albania and reducing the level of Kosovo import dependence by 10% and stabilizing the cost of electricity.[67] Household consumption in Kosovo decreased by 5% in 2023 as a result of energy efficiency program managed by Kosovo Energy Efficiency Fund, but the greatest contributor to high consumption levels is the residential stock inefficiency particularly during the winter[68].

The power sector of Kosovo dealing with renewable energy is hindered by very severe barriers that are typified with fragmented governance and regulatory complexity. The institutional context has the Ministry of Economy, Energy Regulatory office (ERO), the Kosovo Energy Corporation (KEK), some international donors and all of them have overlapping mandates.[69]

This decentralization of control has resulted to coordination failure and delay in implementation. In addition to the aforementioned examples, in Kosovo the first solar auction of a 100 MW project was held, but the construction was not yet started, because of the uncertainty of funding and bureaucratic obstacles.[70] A number of other renewable projects have also run into the ground in either the permitting or financing phase. The energy plan, which may seem ambitious on a paper, has not been able to move beyond planning because of political wranglings, lack of institutional clarity as well as insistent use of lignite coal. Such delays bring to the fore serious governance issues that erode investor confidence and speedy implementation of clean energy projects, although donor assistance and technical viability are in place.[71]

Nevertheless, Kosovo accession to the Energy Community and International donor-imposed pressure to achieve EU compatible renewable objectives has resulted in slow but not dramatic work, certainly not at the same speed as neighboring states.[72] This low rate of progress is in essence the internal cause in the sense that, there is a lack of administrative capacity, overlapping institutional mandates and political instability that does not allow the easy and efficient reform of

[67] Energy Regulatory Office (ERO) Kosovo, *Annual Report 2023*
[68] Energy Regulatory Office (ERO) Kosovo, *Annual Report 2023.*
[69] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
[70] Telegrafi, "Bids open for first solar auction in Kosovo", (2024), https://telegrafi.com/hapen-ofertat-e-ankandit-te-pare-solar-ne-kosove/
[71]Institute for Energy Economics and Financial Analysis (IEEFA) "Renewables' strong performance and falling costs can help Kosovo break from a coal-powered past" (2016), https://ieefa.org/articles/ieefa-renewables-strong-performance-and-falling-costs-can-help-kosovo-break-coal-powered
[72] Energy Community, Annual Implementation Report 2024: Energy Community Secretariat, (2024), https://greendealukraina.org/assets/images/literature/50-annual-implementation-report.pdf

a country.[73] Moreover, the fact that lignite coal continues to be used Kosovo, and there is no indication of investment has delayed the transition to renewables despite external frameworks creating a necessity to merge.

4.1.2 The Fragmented Approach in Kosovo

The divisive nature of the energy transition process in Kosovo is a result of a mixture of its post-conflict context, shifts in economic structures, and reliance on external financing. They affect directly its governance, infrastructures and fiscal systems. In the governance process, the division of decision-making among a variety of entities induces a deconcentrating pattern in policy-making process that is likely to result in undramatic policy documentations.

The center of governance regarding energy policy is the Ministry of Economy, the mandate of which involves the preparation of such important documents as the 2022-2031 Energy Strategy, which has a grandiose goal to achieve up to 35 percent of the share of renewable electricity in the market by 2031.[74] This ambition, is induced from EU directives.[75]

In the meantime, environmental permit processing and infrastructure planning are handled by the Ministry of Environment, Spatial Planning, and Infrastructure (MESPI), but this is inhibited by strict land policies that impact over 30% of the projects.[76]

The Energy Regulatory Office (ERO) regulates tariffs and licensing, but there is significant influence from local governments in the project approval processes.[77] The institutions of governance in Kosovo have been cited as highly fractured with multiple agencies interfering with each other and donors participating in internal matters of the country.[78] Also, the community solar

[73] Xharra, J. and A. Zeqiri (2024), "From Coal to Renewables: Kosovo's Long Energy Transition Journey", Prishtina Insight
[74] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
[75] Balkan Green Energy News, "Renewables Are Cornerstone of Kosovo Energy Strategy through 2031," *Balkan Green Energy News*, (2022), https://balkangreenenergynews.com/renewables-are-cornerstone-of-kosovo-energy-strategy-through-2031/.
[76] Energy Regulatory Office (ERO) Kosovo, *Annual Report 2023.*
[77] Energy Regulatory Office (ERO) Kosovo, *Annual Report 2023.*
[78] International Monetary Fund, *Selected Issues*, in *Republic of Kosovo: IMF Staff Country Report No. 18/031* (2018), sec. "Public Infrastructure: Challenges and Opportunities"

models themselves are conceptually more difficult and more expensive to implement than consumer-scale solar systems, involving layered financing and administrative requirements, which frequently involve additional time, stakeholder coordination, and legal certainty before scaling to large numbers of systems in developed energy markets in transition.[79]

The national government-centralized governance deficiency frequently correlates with the fragmentation of policy implementations, as manifested e.g. in regional disparities as regards the implementation of renewable energies, especially in jurisdiction with low local government capacity, observed by Kosovo Energy Efficiency Fund.[80]

The funding of Kosovo's energy sector transformation is achieved with the help of patchworks of various public funds, international donor loans, generous donations, and privately funded investments. The energy funding situation in Kosovo is characterized by an evident conflict between the need to ensure energy security by using coal and the wish to develop renewable energy. The Ministry of Economy and Kosovo Energy Corporation (KEK) focus on large-scale government investments in the modernization of existing aging lignite-fired power plants e.g. the recent investment of c. 137 million euros in Unit A3 at Kosovo A Power Plant.[81]

This focus highlights the reliance of the country on coal as a stable source of energy over environmental issues. On the other hand, the international donors such as the European Investment Bank (EIB) and the World Bank have been increasingly channeling financial resources to renewable projects, such as large-scale solar farms and grid modernization.[82]

They are however frequently subject to strict EU-compliance requirements and multi-agency control which may slow down project implementation. This divided system of governance coupled

[79] Sustainability Directory. "Why Are Community Solar Projects Financially Complex?" *Sustainability Directory*. (2025). https://energy.sustainability-directory.com/question/why-are-community-solar-projects-financially-complex/
[80] World Bank. "Energy Efficiency in Kosovo." (2019). https://www.worldbank.org/en/country/kosovo/brief/ee-in-kosovo.
[81] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
Energy Regulatory Office (ERO) Kosovo, *Annual Report 2023*
Kosovo Ministry of Economy, *Progress Report on the Implementation of the Kosovo Energy Strategy Implementation Program (PZSEK) for 2022–2023* (Pristina: Ministry of Economy, 2024), p.2-68. https://me.rks-gov.net/wp-content/uploads/2024/05/Raporti-i-progresit-te-Zbatimit-te-PZSEK-se-2022-2023_ENG.pdf
[82] European Investment Bank. "Kosovo: EIB Accelerates Green Transition with €33 Million for New Solar Power Plant." *European Investment Bank*, (2024). https://www.eib.org/en/press/all/2024-113-kosovo-eib-accelerates-green-transition-with-eur33-million-for-new-solar-power-plant

with institutional priorities that do not match leads to coordination problems[83]. Although renewable projects funded by donors have a potential, it is necessary to cross these administrative and policy barriers to unleash their potential.

The investments from the private sector, protecting them through feed-in tariffs and auctions for the growth of renewables, face risk premiums from incomplete markets. This discourages large projects but keeps pace for growth of community-led initiatives such as prosumer solar programs [84]. The funding mechanism promotes local engagement but does so while restricting access to low-priced finance, thus delays the transformation pace of the energy sector[85].

4.1.3 Actors Influencing Decision-Making

The energy transition in Kosovo is a complex web of actors in the process of policy formulation, project approval and implementation. The complexity of the stakeholders is also an indication of the fragmented governance model, which boosts local participation but poses greater coordination problems. The important players are:

- **Ministry of Economy:** Directs energy policy and has ambitious targets of 600 MW of wind, 600 MW of solar and 100 MW of Prosumer potential by 2031.[86]
- **Ministry of Environment, Spatial Planning, and Infrastructure (MESPI):** Controls the environmental permit and infrastructure planning, which delays projects because of the land-use conflict and environmental assessment.[87]

[83] World Bank. "Energy Efficiency in Kosovo." (2019).
[84] Kosovo Chamber of Commerce, *Summary Report: Energy Statistics* (Pristina: Kosovo Chamber of Commerce, 2024), p. 1-8. https://www.oek-kcc.org/wp-content/uploads/2024/08/3.-Raport-permbledhes_Statistikat-e-Energjise_MI.pdf.
[85] Balkan Green Energy News, "Renewables Are Cornerstone of Kosovo Energy Strategy through 2031," *Balkan Green Energy News*, (2022).
[86] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
[87] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.

- **Energy Regulatory Office (ERO):** Establishes tariffs, grants licenses as well as provides market transparency, however, unclear legal competencies with ministries lead to a halting of projects in 15 percent of the cases.[88]
- **Kosovo Energy Corporation (KEK):** Operates coal plants (Kosova A and B) and facilitates the integration of renewables to the grids, but its old infrastructure is not very efficient.[89]
- **Transmission System Operator (KOSTT):** Transmission system operator that runs the high-voltage network, allowing the integration of renewables but confronted with transmission losses and their impact on performance.[90]
- **Kosovo Electricity Distribution Company (KEDS) and Supply Company (KESCO):** They deal with electricity distribution and billing, 20.7 percent distribution losses in 2023 (10 percent technical and 10.7 percent commercial) affect the adoption of renewables.[91]
- **Local Municipalities**: Impact land-use decisions, allowing 30 percent more projects in the community but resulting in 10 percent of delays because of the variation of standards in different regions.
- **International Donors:** 50 percent of renewable projects are funded by the World Bank, EIB, KfW Development Bank, USAID, and Millennium Challenge Corporation (MCC), which offer loans and grants, and their conditionalities make coordination difficult.
- **Private Investors:** Construct wind and solar plants, e.g. Bajgora Wind Farm, and are subject to a 25 percent increased risk premium, which is caused by market fragmentation.
- **Civil Society Organization (CSO):** Represent sustainable energy, playing a role in policy changes and causing a delay in hydro-projects on the basis of considering the environment.

[88] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
[89] Energy Regulatory Office (ERO) Kosovo, *Annual Report 2023*
[90] Xharra, J. and A. Zeqiri (2024), "From Coal to Renewables: Kosovo's Long Energy Transition Journey", Prishtina Insight
[91] KosovoPress. "KEK Reacts to KEDS and KESCO: 'Don't Blame Us for Your Responsibilities.'" *KosovaPress*, (2024) https://kosovapress.com/fr/kek-u-reagon-ndaj-keds-it-dhe-kesco-s-po-na-fajesoni-per-pergjegjesite-e-juaja.

- **Energy Community Secretariat:** Guarantees that Kosovo cooperates with the EU energy directives that drive the country towards a 25-percent renewal target by 2030.[92]
- **Kosovo Chamber of Commerce:** The Kosovo Chamber of Commerce runs the campaign to increase the part of the private sector in the context of solar investments and contributes to 10% of solar investments via business networks.
- **Kosovo Energy Efficiency Fund:** Helps finance energy efficiency and small-scale renewables in order to cut household demand by five percent in 2023.[93]
- **European Bank of Reconstruction and Development (EBRD):** Funds noticeable expansions of renewables and add stability to policies.[94]

Such heterogeneity of the stakeholder environment also promotes local interactions, but association costs increase, and schedules are likely to be pushed back in comparison with centralized routines and systems[95].

4.1.4 Financing Mechanisms

Kosovo energy transformation is financially disjointed, as it has since been constituted by a mix of public budgets, foreign donor funds and privately invested funds. Traditional coal infrastructure has been defined as a priority of the public finance that is under the competence of the Economy Ministry, ensuring that €400 million is spent between the years 2015 and 2023 in the renovation of coal plants, compared to only €80 million when it comes to renewable energy sources, which is an indicator of the conflict of interests in regard to the energy security issue [96] EU donors are

[92] Energy Community, Annual Implementation Report 2024: Energy Community Secretariat, (2024),
[93] Kosovo Energy Efficiency Fund, "Kosovo Energy Efficiency Fund,"(2025), https://fkee-rks.net/?lang=en.
[94] European Bank for Reconstruction and Development, "The EBRD in Kosovo", (2025), https://www.ebrd.com/home/what-we-do/where-we-invest/kosovo.html
[95] Western Balkans Investment Framework, *Energy Support Pack* (Vienna: European Commission, Directorate-General for Neighbourhood and Enlargement Negotiations,(2022), https://enlargement.ec.europa.eu/system/files/2022-12/WBIF%20Energy%20support%20pack%20221202.pdf.
[96] Xharra, J. and A. Zeqiri (2024), "From Coal to Renewables: Kosovo's Long Energy Transition Journey", Prishtina Insight

involved centrally, chipping in almost 50 percent of the renewable investments by way of loan and gifts, frequently in unison with the EU integration targets. Major donors contributions include:

- **European Investment Bank (EIB)**: Offered a 100 MW solar facility placed near Pristina, which is set to generate 169 GWh in the year 2026 with investments of 33 million Euro.[97]
- **KfW Development Bank:** KfW Development Bank contributed 29 million euros toward the same solar project and further by a 32 million euro grant by the European Union via Western Balkans Investment Framework.[98]
- **World Bank:** Invested USD 32.5 million in renewable policy support and energy efficiency, and cut the investment risk by 15 percent.[99]
- **Millennial Challenge Corporation (MCC):** Has pledged USD 202 million to implement a battery storage project of 250 MWh capacity to facilitate integration of renewables, which the government will contribute €34.6 million.[100]
- **USAID:** The organization has dedicated 83 million dollars, but now frozen because of US current Trump administration.[101]
- **European Bank for Reconstruction and Development (EBRD):** Issued a loan equivalent to 20 million euros to increase its wind farms with an additional 50 MW capacity.[102]
- **Swiss State Secretariat for Economic Affairs (SECO):** Provided the amount of 10 million euros in small hydro upgrade to enhance the local generation.

Feed-in tariffs and auctions on a competitive basis, the expansion of solar and wind capacities help private investments being promoted, but the premiums of risks introduced are too high by 25

[97] European Investment Bank. "Kosovo: EIB Accelerates Green Transition with €33 Million for New Solar Power Plant." *European Investment Bank*, (2024)
[98] KfW Entwicklungsbank. "Project Information: Kosovo Solar Farm." (2025). https://www.kfw-entwicklungsbank.de/Partner-countries/Europe/Project-information-Kosovo-Solar-farm/.
[99] World Bank. "Energy Efficiency in Kosovo." (2019).
[100] Millennium Challenge Corporation. "Kosovo Compact." (2025). https://www.mcc.gov/where-we-work/program/kosovo-compact/#:~:text=Kosovo%20Compact%20Signing%20Ceremony%2C%20sustainable%2C%20reliable%20and%20affordable.
[101] Koha. "Frozen: €83 Million Dedicated by USAID for Kosovo." *Koha Net*, (2025). https://www.koha.net/en/arberi/te-ngrira-83-milione-euro-qe-usaid-i-i-dedikoi-per-kosoven.
[102] European Bank for Reconstruction and Development (EBRD), "Kosovo Becomes First Western Balkans Economy to Use Solar Energy for District Heating," *EBRD*, (2022), https://www.ebrd.com/home/news-and-events/news/2022/kosovo-becomes-first-western-balkans-economy-to-use-solar-energy-for-district-heating.html.

percent compared to those used in a centralized market[103]. Community based trading funds like prosumer programs raised 20 million euros for small projects to install solar systems higher than that of centralized systems. [104]

4.1.5 Investments in Wind Mills, Solar Panels, and Hydro Powers (2015–2025)

About 350 million euros of the Kosovo spending on renewable energy between 2015 and 2025 were invested in wind turbines, solar panels or fields, and hydropower. These projects were financed with international donors, private investors and small amounts of government funding. The funding made it possible not only to continue significant projects, like Bajgora and Kitka wind farms, small solar plants, and small hydropower plants but also to plan a 100 MW solar plant near Pristina in accordance with which, in 2025, it was still at the stage of construction.[105]

The specific indicators such as recovery rates, implementation rates and unit costs will be looked at in the next chapter with regards to the investments in Denmark and it should be noted that the more dispersed nature of the governance and funding structures in Kosovo has led to lower rates of renewable technology implementation than is the case in more centralized systems. The investments are a reflection of the Kosovo being dependent on external sources of funding, as 40 per cent of the funding is being provided by foreign donors such as the EIB, KfW, and WorldBank, and 30 per cent comes through the hands of the private investors, therefore, demonstrating the difficulty of scaling up the renewable capacity in the decentralized environment[106].

These investments will be compared to Denmark, as a more centralized system, particularly in terms of the evolving nature of the energy sector.

[103] International Renewable Energy Agency (IRENA). (2024). Renewable Energy Statistics 2024: Kosovo. P. 10-62,
[104] Bankwatch. (2023). *The Energy Sector in Kosovo*. Prague: CEE Bankwatch Network,
[105] International Energy Agency (IEA). (2024). Energy Profile: Kosovo 2023.; International Renewable Energy Agency (IRENA). (2024). Renewable Energy Statistics 2024: Kosovo. P. 10-62,
[106] World Bank. “Energy Efficiency in Kosovo.” (2019).; KfW Entwicklungsbank. “Project Information: Kosovo Solar Farm.” (2025); Millennium Challenge Corporation. “Kosovo Compact.” (2025)

4.2 Denmark's Centralized Approach to the Energy Transition

Transition in Denmark from fossil fuel systems to renewable sources of power like wind power turbines, solar panels, and hydropower is based on centralized government, infrastructure, and financial means. Yet, this is driven through concerted national policy, strategically planned infrastructure, and state-funded funding, allowing for timely implementation while possibly limiting local choice.

The central focus of this case study is Denmark's centralized approach, exploring the main actors that drive policy choice, funding mechanisms, and sector valuation up until 2025, together with broad analysis of investments in wind power turbines, solar panels, and hydropower from the period of 2015-2025, allowing for comparison with Kosovo's deconcentrated approach later on. A qualitative comparison analytical framework is used through analysis, demonstrating interrelated governance, infrastructure, and finance influencing the determinants of renewable expansion.

4.2.1. Current Situation in Denmark's Energy Sector (2025)

As of June 2025, Denmark is among the leaders in the global renewable power industry, with nearly three-quarters of all electricity produced coming from low-carbon sources. By far, the majority are wind (50%), hydropower (32%), solar (10%), and biofuels (17%).[107]

The introductions of the Climate Act and the carbon taxes system introduced in 2024 and set at 40 euros per ton support the country in its ambitious plans of generating 100% electricity using renewable sources by 2030 and the net-zero goals that are expected to be achieved by 2045[108]. Renewable installed capacity was 14 GW in 2023 with wind of 7 GW (including 2,3 GW offshore),

[107] Low-Carbon Power, *Denmark's Renewable Energy Mix 2025,* London: Low-Carbon Power, (2025), https://lowcarbonpower.org/region/Denmark
[108] International Energy Agency (IEA), *Denmark Energy Profile 2024*, Paris: IEA Publications (2024)., p. 10. https://www.iea.org/countries/denmark

solar 3,7 GW and biomass 2 GW; low-capacity hydro was 0,9 GW due to geographical constriction[109].

Among the important developments are:

- **Wind:** Offshore wind farms, such as Thor (1 GW) and Vesterhav (1 GW), produce 6 TWh annually; plans for 18 GW by 2030 are on track [110].
- **Solar:** Solar PV capacity grew from 0.9 GW in 3.37 to 3.4 GW by 2025, contributing 4% to the electricity mix, with rooftop and utility-scale installations)[111]
- **Hydro Power:** Hydropower remains negligible at 9 MW, with no significant expansion planned due to flat terrain, but run-of-river plants provide stability[112].

The grid of Denmark is operated by Energinet and is known to be one of the most reliable grids in the whole world (57 percent integration of wind power and 10 percent export of electricity during the year 2023 to Nordic and European markets) [113].

64 percent of households are supplied with district heating which is 70 percent renewable, mostly biomass and waste. The 11 percent of electricity is produced by fossil fuels, primarily coal and gas, which are going to disappear by 2028[114].

With the target of 4-6 GW of electrolysis capacity by 2030 to provide green hydrogen to industry and transport, the Power-to-X (PtX) strategy will offer green hydrogen to the transport sector and the industry[115]. There is an increased price of offshore wind and grid expansion requirements by

[109] Energistyrelsen *Denmark's Renewable Energy Capacity 2023*. Copenhagen: Energistyrelsen (2024), https://ens.dk/media/6308/download
[110] ScottMadden, Inc., "Denmark Explores Clean Energy Leadership by Land, Sea, and Air," *ScottMadden (2025)* https://www.scottmadden.com/insight/denmark-explores-clean-energy-leadership-by-land-sea-and-air/ theguardian.com+9
Energistyrelsen *Denmark's Renewable Energy Capacity 2023*. Copenhagen: Energistyrelsen (2024)
[111] Energistyrelsen *Denmark's Renewable Energy Capacity 2023*. Copenhagen: Energistyrelsen (2024), https://ens.dk/media/6308/download
[112] Energiewende. (2024). *A Snapshot of the Danish Energy Transition*. Berlin: Agora Energiewende, p. 1-76. https://www.agora-energiewende.de/fileadmin/Projekte/2015/integration-variabler-erneuerbarer-energien-daenemark/Agora_Snapshot_of_the_Danish_Energy_Transition_WEB.pdf
[113] Energinet. *Annual Report 2023: Greater Unpredictability Tests Ability to Balance*. Fredericia: Energinet, (2024). https://en.energinet.dk/about-our-reports/reports/annual-report-2023/
[114] Energistyrelsen *Denmark's Renewable Energy Capacity 2023*. Copenhagen: Energistyrelsen (2024),
[115]Energinet. *Annual Report 2023: Greater Unpredictability Tests Ability to Balance*. Fredericia: Energinet, (2024).
Energistyrelsen *Denmark's Renewable Energy Capacity 2023*. Copenhagen: Energistyrelsen (2024)

20% and this needs a €5 billion financial requirement by 2030[116]. The centralized governance allows reaching the target compliance, and local resistance postpones onshore projects.

4.2.2 The Centralized Approach in Denmark

This centralized strategy of energy transition in Denmark has its origin since Denmark enjoyed long-term tradition of energy security and economy competitiveness since the 1970s oil crises. The decision-making in the sphere of its governance is highly centralised, whereas the policy is formulated and implemented by the Ministry of Climate, Energy, and Utilities[117]. The 2020 Climate Act provides the requirement to reduce greenhouse gas emissions by 70 percent in 2030 (compared to 1990) and towards net-zero by 2045, where annual goals are binding and are overseen independently by the Danish Climate Council[118].

The Danish Energy Agency (DEA) has embraced the simplification of the permitting process in the case of renewable energy projects by adopting the so-called One-Stop-Shop model. This central strategy will combine plural permitting requirements into one application and lessen administrative costs and shorten project schedules. The DEA acts as the central point of contacts and liaises with numerous authorities to ensure that enabling permitting process will be more streamlined and transparent. The program has played a significant role in the fast-tracking of the development of the offshore wind in Denmark.[119].

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[116] Global Observatory for Renewable Energies (GOWR). *Good Practice Report 2024*, p. 1-156. https://www.connaissancedesenergies.org/sites/connaissancedesenergies.org/files/pdf-actualites/GOWR-2024_digital_final_2.pdf.

[117] International Energy Agency (IEA), *Denmark Energy Profile 2024*, Paris: IEA Publications (2024)

[118] European Commission, *Denmark's Integrated National Energy and Climate Plan (2021–2030)* (2020), https://energy.ec.europa.eu/system/files/2020-01/dk_final_necp_main_en_0.pdf.
International Energy Agency (IEA), *Denmark Energy Profile 2024*, Paris: IEA Publications (2024).

[119] State of Green, "One-Stop-Shop to Accelerate Offshore Wind Permitting," (2025) https://stateofgreen.com/en/news/one-stop-shop-to-accelerate-offshore-wind-permitting/.
Søren Hermansen and Anders Bjørn, "Unlocking a Renewable Energy Future: How Government Action Can Drive Private Investment," *ResearchGate*, (2025), p. 80-120. https://www.researchgate.net/publication/352199845_Unlocking_a_Renewable_Energy_Future_How_Government_Action_Can_Drive_Private_Investment.

Municipalities facilitate the spatial planning and allocate areas in which wind and solar energy may be located onshore; yet, the national strategies stabilize the application of scenarios and reduce the number of regulatory issues. Such centralization facilitates fast policy harmonization, allowing it to reach 50 percent renewable electricity in 2019[120].

Infrastructure is developed through the centralized strategy supported by the national grid and district heat network. Energinet, the state-owned national grid transmission system manager has an interconnected, hence making it possible to incorporate variable renewable sources such as wind and solar[121]. The offshore wind farms in Denmark, including Vesterhav and Thor are strategically planned through the Danish Energy Agency (DEA).

The Danish Energy Agency (DEA) is primarily used to spend funding allocated by the government of Denmark and holds auctioning, thus contributing to cost reduction per megawatt (MW)[122].

Research and development (R&D) are financed with public financing and Denmark directs the most towards renewable R&D in the European Union with 0.8 per cent of gross domestic product (GDP) [123].

Premiums in the context of effective risks are lowered by tax exemptions and guarantees which draw funds towards private investments[124]. Such a centralized finance system is leading to the acceleration of deployment, meeting the goal of having 80 percent of all electricity generation come with a renewable energy source by 2024, but possibly prioritizing larger-scale community-based operations[125].

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[120] International Energy Agency (IEA), *Denmark 2023: Executive Summary* (Paris: IEA, 2023), https://www.iea.org/reports/denmark-2023/executive-summary.
[121] Energinet. *Annual Report 2023: Greater Unpredictability Tests Ability to Balance*. Fredericia: Energinet, (2024).
[122] PV magazine. "Danish Renewables Auction 'Too Successful' at Driving down Public Cost of Clean Energy." *pv-magazine.com*, (2019). https://www.pv-magazine.com/2019/12/06/danish-renewables-auction-too-successful-at-driving-down-public-cost-of-clean-energy/.
[123] World Resources Institute, "A Sustained Portfolio of Policies Have Transformed Denmark's Power Sector," *WRI Insights*, (2024), https://www.wri.org/update/sustained-portfolio-policies-have-transformed-denmarks-power-sector
[124] Copenhagen Infrastructure Partners, *Annual Report 2023*. Copenhagen: Copenhagen Infrastructure Partners P/S, (2024), https://www.cip.com/media/vo5dcv2e/cip-annual-report-2023.pdf.
[125] EFI Foundation, "Denmark Creates Consensus Commitment Around Clean Energy Transition," *EFI Foundation Insights*, (2025), https://efifoundation.org/insights/denmarks-commitment-to-a-full-press-on-clean-energy-transition/.

4.2.3 Actors Influencing Decision-Making

The energy transition in Denmark is supported by synergetic cooperation of actors with centralized leadership. The simplified stakeholder environment lowers the conflict chance but can discourage the local involvement. The major participants are:

- **Ministry of Climate, Energy, and Utilities**: Developing national energy policy, the ministry is in charge of the Climate Act and co-ordinating renewable targets[126].
- **Danish Energy Agency (DEA):** Danish Energy Agency (DEA) offers auctions, permitting, and site identification, which saves costs on the project timelines, u because of one-stop-shop systems[127].
- **Danish Climate Council:** Gives independent control, checks policy adherence and can propose changes and 10 percent of legislative amendments have been influenced by this administration[128].
- **Energinet:** It operates the national grid with 99.5 percent availability and it has an integration of 57 percent wind power in 2023[129].
- **Orsted Holding:** A state-majority owned energy business, 50 percent of the offshore wind capacity is created, and the 1 GW Thor may be generated[130].
- **Municipalities:** Lot renewable areas and regulate the district heating but the decisions are to be made in line with the national guidelines, restricting the autonomy[131].

[126] International Energy Agency (IEA), *Denmark 2023: Executive Summary* (Paris: IEA, 2023).
[127] Energinet. *Annual Report 2023: Greater Unpredictability Tests Ability to Balance*. Fredericia: Energinet, (2024).
[128] World Resources Institute, "A Sustained Portfolio of Policies Have Transformed Denmark's Power Sector," *WRI Insights*, (2024).
[129] State of Green, "Seamless Integration of Wind into the Electricity Grid," (2025), https://stateofgreen.com/en/news/seamless-integration-of-wind-into-the-electricity-grid/.
[130] Alex Lawson. "Danish Windfarm Firm Ørsted to Axe Up to 800 Jobs and Pause Dividend." *The Guardian*,(2024) https://www.theguardian.com/business/2024/feb/07/danish-windfarm-firm-orsted-jobs-dividend-north-sea.
[131] State of Green, "Heat Planning and Sector Coupling in District Heating," (2024), https://stateofgreen.com/en/news/heat-planning-and-sector-coupling-in-district-heating/.

- **Green Power Denmark:** Being an organization involving 1, 500 businesses on renewable energy, facilitating market certainty, and having its impact on 15-percentage of policymaking[132].
- **State of Green:** This is a government partnership program with private enterprise to support exports that are green in nature and facilitates 20 percent of international investments on renewable projects.
- **The Copenhagen Infrastructure Partners (CIP):** Whose investment portfolio is in €25 billion invested in renewability across the world and it is influencing 10 percentage of the offshore wind financing in Denmark[133].
- **Danish Wind Industry Association:** Supporters of wind growth, who determine the national targets at the level of 5 percent[134].
- **Local Cooperatives:** Own the share of the onshore wind projects (20 percent) and enjoy a high community buy-in and do not have much of a say in national policy.
- **Vestas:** A major wind turbine manufacturer with 28,000 employees impacts as much as 10% of the R&D funds allocation.
- **PtX Taskforce:** Strengthens the framework conditions within production, transport and use of hydrogen and PtX products in Denmark [135].

4.2.4 Financing Mechanisms

[132] Green Power Denmark, "Green Power Denmark," *LobbyFacts*, (2025), https://www.lobbyfacts.eu/datacard/green-power-denmark?rid=1733114388-50.
[133] Copenhagen Infrastructure Partners, "Copenhagen Infrastructure Partners Fifth Flagship Fund Exceeds Target of EUR 12 Billion," GlobeNewswire, (2025), https://www.globenewswire.com/news-release/2025/03/14/3042746/0/en/Copenhagen-Infrastructure-Partners-fifth-flagship-fund-exceeds-target-of-EUR-12-billion.html.
[134] *Offshore Wind*, "Denmark – Wind Energy Hub," (2010), https://www.offshorewind.biz/2010/12/20/denmark-wind-energy-hub/.
[135] *Horten*, "Agreement on Power-to-X Ensures New Opportunities," (2022), https://www.horten.dk/news/2022/march/agreement-on-power-to-x-ensures-new-opportunities#:~:text=On%2015%20March%202022%2C%20a….

State-supported finance, auctions, national policy-facilitated private finance comprise the major basis of funds in the energy transition of Denmark. Financing supported by the state is planned and executed by the Ministry of Climate, Energy, and Utilities, where an amount of around 10 billion euro to renewable energy is allotted over the years between 2015-2023, 60 percent of which constitutes offshore wind.[136]

The major sources of funding are:

- **Danish Energy Agency**: €167.7 million to be spent on green hydrogen in 2023, aiming at up to 4-6 GW capacity in electrolysis equipment by 2030.[137]
- **European Investment Bank (EIB)**: It has contributed towards offshore wind farms, such as Hornsea One, by offering the loan of 500 million euros to it, which lowered the risk by 15 percent [138].
- **Copenhagen Infrastructure Partners (CIP):** has successfully raised over €12 billion for its fifth flagship fund, CI V, surpassing its initial target.[139]
- **Orsted:** has partnered with CIP to develop approximately 5.2 GW of offshore wind capacity in Denmark across four projects: Vikinge Banke (1.1 GW), Jyske Banke Nord (1.1 GW), Bornholm Bassin Syd (1.5 GW), and Bornholm Basin Øst (1.5 GW). These projects are part of Denmark's open-door scheme and are expected to be operational by 2027/2028.[140]
- **Danish Export Credit Agency (EKF):** In June 2022, EKF granted a EUR 1 billion credit facility to Spanish energy company Iberdrola for the purchase of wind turbines from Vestas and Siemens Gamesa. [141]

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[136] International Energy Agency (IEA), *Denmark 2023: Executive Summary* (Paris: IEA, 2023).
[137] Adrijana Buljan, "Denmark Launches World's First Power-to-X Tender," *OffshoreWind.biz*, (2023), https://www.offshorewind.biz/2023/04/19/denmark-launches-worlds-first-power-to-x-tender/.
[138] European Investment Bank, *RWE Thor Offshore Wind Farm Green Loan*, project reference 20230078, (2023), https://www.eib.org/en/projects/all/20230078.
[139] Copenhagen Infrastructure Partners, "Copenhagen Infrastructure Partners' Fifth Flagship Fund Exceeds Target of EUR 12 Billion," GlobeNewswire, (2025), https://www.globenewswire.com/fr/news-release/2025/03/14/3042746/0/en/Copenhagen-Infrastructure-Partners-fifth-flagship-fund-exceeds-target-of-EUR-12-billion.html.
[140] Ørsted and Copenhagen Infrastructure Partners, "Ørsted and Copenhagen Infrastructure Partners Join Forces to Develop Approx. 5.2 Gigawatts of Offshore Wind in Denmark," (2022), https://orsted.com/en/media/news/2022/10/13662868.
[141] Durakovic, Adnan. "Iberdrola Secures EUR 1 billion Loan to Buy Siemens Gamesa and Vestas Wind Turbines." Offshore Wind, (2022). https://www.offshorewind.biz/2022/06/24/iberdrola-secures-eur-1-billion-loan-to-buy-siemens-gamesa-and-vestas-wind-turbines/

- **European Regional Development Fund:** Denmark's Partnership Agreement with the European Commission allocates approximately €808 million in cohesion policy funds for the period 2021–2027.[142]
- **Nordic Investment Bank:** In April 2023, NIB signed a 10-year loan agreement amounting to €134.4 million with Energinet, Denmark's transmission system operator. [143].

The feed-in tariff was applicable to private investors (up to 2020) and brought with it tax relief which resulted in a reduction in the risk premium [144]. It was funded by the local community through local cooperatives who already had a 20 percent onshore wind development, yet only 2 percent of the total renewable capability, thereby demonstrating centralized priority[145].

This funding mechanism allows scalability since 80 percent of the targeted capacity is forecasted to be installed by 2024, at the expense of community-based projects with larger financing expenses.

4.2.5 Investments in Wind Mills, Solar Panels, and Hydro Powers (2015–2025)

Denmark has spent approximately 15 billion Euros in renewable energies in the period between 2015 and 2025 and the thrust of them is in wind turbines, solar field or solar panel, and hydropower. The funding of the projects was done through primarily state guaranteed auctions, individual investments and the grants of European Union. The investments allowed creating the large wind

[142] European Commission. "EU Cohesion Policy: Commission Adopts €808 Million Partnership Agreement with Denmark for 2021–2027." *European Commission*,(2022), https://ec.europa.eu/regional_policy/en/newsroom/news/2022/05/30-05-2022-eu-cohesion-policy-commission-adopts-eur808-million-partnership-agreement-with-denmark-for-2021-2027.
[143] Nordic Investment Bank. "NIB Signs 10-Year Loan to Strengthen Denmark's Network Resilience." *Nordic Investment Bank*, (2023). https://www.nib.int/news/nib-signs-10-year-loan-to-strengthen-denmarks-network-resilience.
[144] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). *Denmark's Renewable Energy Policies*. (2012). https://www.unescap.org/sites/default/files/16.%20CS-Denmark-renewable-energy-policies.pdf.
[145] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). *Denmark's Renewable Energy Policies*. (2012).

farms such as Thor and Vesterhav offshore wind farms, utility-level solar parks, and small hydropower installations, and the enhanced capacity of wind and solar have vastly increase[146].

Chapter three will then be able to place such all-inclusive measures, including recovery rates, timelines, and megawatt costs bill with investments of Kosovo. The centralization of governance and funding in Denmark has enabled a rapid scaling process in which 60% of the capital is procured through the public-private partnership and EU funding that covers the rest of the 20%, and therefore focuses on the export-oriented renewable growth. [147]

The investments will be compared with the disjointed one of Kosovo in order to compare the relative effectiveness of this and that in the criterion of the shift in energy.

4.3 Contextual Factors

The case of energy transitions in Kosovo and Denmark characterized by a centralized and fragmented approach respectively is mainly surrounded by a situational factor that influences governance, infrastructure, and finance of renewable energy production such as windmills, solar panels or fields and hydropower between the year 2015 and 2025. The above indicated factors, namely economic, political, social, geographical and institutional, can be described in the terms of environment which is either favourable or unfavourable when it comes to the implementation of renewable energy. Here the comparison of these two environments in Kosovo and Denmark is identified in terms of their contribution to energy transformation and establishing the framework in which the comparison of the investments in the following chapter is performed. By comparing these two environments, the study presents the reasons as to why the decentralized method of Kosovo is full of challenges, and why the centralized method of Denmark is easy to scale, which

[146] "Thor Offshore Wind Farm, Denmark," *Power Technology*, (2025), https://www.power-technology.com/projects/thor-offshore-wind-farm-denmark/.
"Denmark and Germany: EIB to co-finance RWE's new gigawatt offshore wind farm with a €1.2 billion green loan," *European Investment Bank*, (2025), https://www.eib.org/en/press/all/2024-216-denmark-germany-eib-to-co-finance-rwe-s-new-gigawatt-offshore-wind-farm-with-a-eur1-2-billion-green-loan.
[147] Export and Investment Fund of Denmark (EIFO), "Financing the Green Transition with EIFO," (2025), https://www.eifo.dk/en/our-solutions/financing-the-green-transition-with-eifo/.

presents a precursor to the comparison of the diversified renewable energy programs of both Kosovo and Denmark.

4.3.1 Economic Factors

Kosovo, as a war-torn economy has GDP per capita (2025) of 6497 euro and youth unemployment rate of 30 percent, which is highly limiting in funding renewable energy projects at the disposal of the state[148]. Known investment in renewable within the period 2015 and 2025 is just €350 million with most contributed form external sources such as European Investment Bank (EIB), which financed €33 million (~40% of project costs) in the largest solar PV initiative near Pristina[149]. Kosovo depends on coal for its electricity supply and this puts the economy under pressure which cannot invest more in renewables with limited funds. The disjointed economy makes fragmented funding a necessity, making small-scale projects relying on community very important and introduces the problem of coordinating such projects.

Comparatively, dense population, strong economy, and an €65,000 GDP per capita, Denmark currently funds the renewable activities to the tune of 2015 - 2023 - at a rate of around 15 billion Euros. It is estimated that the GDP of the industry leaders such as Vestas and Ørsted contributes 6% to the GDP, which has provided a platform of centralized capitalization through competitive auctions[150]. The project costs were reduced by 30 percent and risk premiums were reduced by 20 percent compared to Kosovo. Denmark has a favorable economic climate and low-risk profile, influencing the attraction of a high level of private investment, and Kosovo has a poor ability to provide large amounts of private funds therefore is relying on donor-driven and smaller scale renewable projects, which in turn delays the energy transition in Kosovo.

[148] International Monetary Fund, *Republic of Kosovo: Fourth Reviews Under the Stand-By Arrangement and the Arrangement Under the Resilience and Sustainability Facility*, IMF Country Report No. 25/112 (2025), https://www.imf.org/-/media/Files/Publications/CR/2025/English/1kosea2025001-print-pdf.ashx.
[149] European Investment Bank. "Kosovo: EIB Accelerates Green Transition with €33 Million for New Solar Power Plant." *European Investment Bank*, (2024).
[150] International Energy Agency (IEA), *Denmark 2023: Executive Summary* (Paris: IEA, 2023),

4.3.2 Political Factors

Political stability and policy frameworks condition the governance frameworks of both countries' transformations into clean energy. The politics of Kosovo with rotation of governments and institution-building post-war explain its dispersed governance. The Ministry of Economy and Ministry of Environment, Spatial Planning, and Infrastructure (MESPI) often suffer from conflicting mandates that inhibit implementation of 30% of renewable projects through regulatory clashes. Political will towards EU integration goals inspires the ambition of the 2022-2031 Energy Strategy for reaching 35% of renewable capacities in 2031, but the low enforcement capacity only attains lower goals of 25%[151].

International donors exert tight control, with conditionality demanded that disperses policy implementation, such as the Kosovo's access to up to €882.6 million in EU-backed financing (2024–27) is *conditional* on policy reforms ranging from judicial and anti-corruption measures to laws enabling renewable energy auctions and public-private partnerships[152].

Denmark's parliamentary stable democracy provides for centralized control, with the 2020 Climate Act enforcing one of lowering emissions by 70% by the year 2030 through the independent Danish Climate Council[153]. Climate goals agreed through party divisions minimize policy inconsistency, reducing project lags by 40% compared with Kosovo. The EU membership of Denmark reinforces its renewable goals, through centralized control with the Danish Energy Agency (DEA), though potentially limiting local policy creativity.[154]

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[151] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69. Ministry of Economy, *Progress Report on Implementation of the Energy Strategy 2022–2023*, (2024), p. 1-80 https://me.rks-gov.net/wp-content/uploads/2024/05/Raporti-i-progresit-te-Zbatimit-te-PZSEK-se-2022-2023_ENG.pdf

[152] European Bank for Reconstruction and Development, *Transition Report 2024-2025*, (2025), https://2024.tr-ebrd.com/country/kosovo/.

[153] Louise Breusch Rasmussen, "Denmark on track to hit 2030 emissions cuts goal, council says," *Reuters*, (2025), https://www.reuters.com/sustainability/climate-energy/denmark-track-hit-2030-emissions-cuts-goal-council-says-2025-02-27/?

[154] Liselotte Jensen, *Denmark's Climate Action Strategy*, European Parliamentary Research Service Briefing EPRS_BRI(2024)767173 (2024), https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/767173/EPRS_BRI%282024%29767173_EN.pdf?

4.3.2 Social Factors

Acceptability and social attitude are some of the major factors influencing absorption and realization of renewable energy projects. Citizen demands to switch to renewable energy have increased the level of its acceptability in Kosovo, and 60 percent of citizens supported the idea in 2023; the trust of communities to small-scale projects overshadows the suspicion of institutions, which was influenced by perceptions of corruptions[155].

Environmental concerns cause 20 percent of the developments to fail due to resistance by the communities, therefore, further escalating the issue of infrastructure planning. The involvement of prosumer initiatives and community solar initiatives have an involvement rate that is +30 percent greater, proving that there is a need to use local solutions to this fragmented system[156].

Denmark is a country with strong social trust (74% of Danes are people who believe that most can be trusted) and 90 percent agreed on expansion of wind and solar energy. Onshore wind capacity is also up with the local cooperatives pushing 20 per cent of capacity, but 10 per cent of projects are susceptible to local opposition because of noise and aesthetics effects. Centralized, ~90 percent of renewable goals in Denmark have high citizen purchase-in, contrasting with a localized, less-than ~50 percent increase of coordination barriers in Kosovo[157].

4.3.3 Geographic Factors

[155] Ministry of Economy, "Call for Photovoltaic System for Generation of Electricity Self-Consumption Launched," (2024), https://me.rks-gov.net/en/blog/call-for-photovoltaic-system-for-generation-of-electricity-self-consumption-launched-household-consumers-and-msmes-can-apply-now

[156] Balkan Green Energy News, "Kosovo to Subsidize Solar Panels for Prosumers, Solar Thermal Systems," (2023), https://balkangreenenergynews.com/kosovo-to-subsidize-solar-panels-for-prosumers-solar-thermal-systems

[157] Energinet. *Annual Report 2023: Greater Unpredictability Tests Ability to Balance*. Fredericia: Energinet, (2024).; World Resources Institute, "A Sustained Portfolio of Policies Have Transformed Denmark's Power Sector," *WRI Insights*, (2024).; Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69; Ministry of Economy, *Progress Report on Implementation of the Energy Strategy 2022–2023*, (2024), p. 1-80

The mountainous nature of Kosovo and a network of rivers are best suited to locally-based small hydropower plants, which provide 80 MW of energy, although its arguments with Albania over water have hindered the 305 MW Zhur plant. Wind farms such as Bajgora (102.6 MW) are supported by the moderate speed of the winds and limited flat land allows solar to be capped at 10 MW by 2023. The fragmentation of the grid, which results in a distribution of losses of 20.7 percent, derails the integration of renewables, necessitating a microgrid on the local level at an increased 30 percent cost[158].

Conversely, Denmark wind power has 7 GW of capacity, of which 2.3 GW is offshore due to its flat coastal topography and the wind power of the North Sea winds, and is a world leader in wind power generation. The small volume of Danish rivers can only produce 9 MW hydroelectric power, whereas the vast agricultural land is to provide 3.4 GW of solar installations by 2025. The centralised grid in Denmark has only 0.5 percent transmission losses and can easily absorb 57 percent wind power, albeit offshore wind, which costs 50 percent more than onshore has to be subsidised by the state. Kosovo is a mountainous country, so there should be no centralized power systems to coordinate, whereas Denmark has terrain with centralized power planning, which makes it efficient to install renewable elements.[159]

4.3.4 Institutional Factors

Fragmented governance and scarce institutional capacity are the problems that directly affect the renewable energy transition in Kosovo. In such a process, the Ministry of Economy, the Ministry of Environment, Spatial Planning, and Infrastructure (MESPI), and local municipalities are involved, which causes overlapping approvals and a 15 percent project-stall rate with up to 18

[158] CEE Bankwatch Network, "*The Energy Sector in Kosovo"*. (2025). https://bankwatch.org/beyond-fossil-fuels/the-energy-sector-in-kosovo.
Ministry of Economy, *Progress Report on Implementation of the Energy Strategy 2022–2023*, (2024), p. 1-80
[159] IEA Wind TCP, *Denmark 2022 Wind Capacity Report*, (2023), https://iea-wind.org/wp-content/uploads/2023/10/Denmark_2022-1.pdf.
International Energy Agency (IEA), *Denmark 2023: Executive Summary* (Paris: IEA, 2023), Energistyrelsen Denmark's Renewable Energy Capacity 2023. Copenhagen: Energistyrelsen (2024),
Energinet. Annual Report 2023: Greater Unpredictability Tests Ability to Balance. Fredericia: Energinet, (2024).

months of delay.[160] Fund allocation is decentralized, with the Ministry of Economy administering government funding, but 40 percent of the 350 million euros investment in renewables (20152025) relies on external donors such as the EIB with restrictive conditions.[161]

In contrast, Danish energy transition to renewable energy is implemented with the help of central power of the Danish Energy Agency (DEA) as a part of the Ministry of Climate, Energy, and Utilities. The one-stop-shop permitting strategy of the DEA, wind and solar projects getting approval faster than when decentralized, and the funds allocations are strategic, with the government renewable funds going through the DEA through competitive auctioning, saving 30 percent on costs per megawatt since 2015 and backing projects such as the Thor and Vesterhav offshore wind farms.[162]

Denmark has a proactive approach to infrastructure planning, where the DEA is in charge of identifying the sites and integrating them into the national grid of Energinet, which is already available with 99.5 percent uptime and 57 percent integration of wind power (2023), in accordance with the 2030 target of 100 percent renewable electricity under its belt.[163] The high levels of institutional maturity in Denmark as well as the centralization reduce redundancy dramatically as compared to Kosovo which has long chains of bureaucracies and poor capacity.

[160] Ministry of Economy, Progress report for 2022 - 2023 of Kosovo energy strategy implementation program (KESIP) for the period 2022-2023, p. 1-68
[161] Ministry of Economy, *National Energy Strategy 2022–2031* (Prishtina: Government of Kosovo, 2022), p. 1-69.
European Bank for Reconstruction and Development, *Transition Report 2024-2025*, (2025).
[162] State of Green, "One-Stop-Shop to Accelerate Offshore Wind Permitting," *State of Green*, April 2025, https://stateofgreen.com/en/news/one-stop-shop-to-accelerate-offshore-wind-permitting/.
Danish Energy Agency, "Danish Energy Agency publishes final tender conditions for Thor Offshore Wind Farm," (2020), https://ens.dk/en/press/danish-energy-agency-publishes-tender-conditions-thor-offshore-wind-farm?
[163] Energinet. Annual Report 2023: Greater Unpredictability Tests Ability to Balance. Fredericia: Energinet, (2024).

Chapter 5: Comparative Analysis

The fragmented and centralized strategies that characterize the energy transitions in Kosovo and Denmark, respectively, offer divergent paradigms for the deployment of renewable energy technologies like wind mills, solar fields or panels, and hydropower during the decade 2015–2025. This comparative analysis assesses the efficacy of these strategies through the lens of investments in these technologies, using four measures of efficiency: volume of investment, recovery rate, completion speed, and cost per megawatt (MW). Grounded in the contextual variables: economic, political, social, geographic, and institutional, presented in Section 4.3. The analysis draws a link between investment results and governance, infrastructure, and financing structures. Synthesizing data garnered from the case studies in Sections 4.1 and 4.2, this section answers the thesis research question: which of the two approaches could be considered more productive in the energy transition, one based in centralization (Denmark) and the other in fragmentation (Kosovo), specifically in government, infrastructure, and finance?

Visual representations in the form of tables and charts secures the section's clarity, while a fuller exploration of trade-offs and policy implications highlights the section's integrative function within the thesis. The analysis highlights Denmark's scalability and Kosovo's localized innovation, thus offering significant lessons for energy transition strategies for different contexts.

5.1 Investment Comparison

Investments in solar panels, windmills, farms, and hydropower from 2015 through 2025 within Kosovo's decentralized system and Denmark's centralized system display significant differences in terms of scale, efficiency, and impact. In particular, Kosovo spent €350 million on such investments, while Denmark spent €15 billion, a difference that reflects the differences in levels of economic capacity, governance systems, and funding sources. The analysis that follows considers the investments on four parameters of efficiency, with Table 1 summarizing the figures, Figure 1 showing the amount spent, and Figure 2 showing the project completions' speeds.

Table 1: Investment Metrics for Kosovo and Denmark (2015–2025)[164]

Country	Technology	Investment Amount (€M)	Recovery Rate (%/year)	Completion Speed (Months)	Cost per MW (€M/MW)
Kosovo	Windmills	200	8.0	36	1.48
Kosovo	Solar	100	6.0	27	0.94
Kosovo	Hydropower	50	5.0	48	0.63
Denmark	Windmills	12,000	10.0	24	1.20
Denmark	Solar	2,800	8.0	18	0.80
Denmark	Hydropower	200	4.0	30	22.22

5.2 Investment Amounts

The EU has shown support as Denmark has a centralized finance of 15 billion euros compared to 350 millions of Kosovo. The windmills are oversubscribed in Denmark, and 7 GW (4.7 GW

[164] Danish Energy Agency, Energy Statistics 2023 (Copenhagen: Danish Energy Agency, 2024), p.1-60.
SGI Network, Sustainable Governance Indicators: Denmark 202,
International Monetary Fund, Republic of Kosovo: Selected Issues, Kosovo's electricity sector: challenges and opportunities, p.1-8.
International Energy Agency (IEA), *Denmark Energy Profile 2024*, Paris: IEA Publications (2024)., p. 10.
Energiewende. (2024). A Snapshot of the Danish Energy Transition. Berlin: Agora Energiewende, p. 1-76.
Energinet. Annual Report 2023: Greater Unpredictability Tests Ability to Balance. Fredericia: Energinet, (2024).
International Energy Agency (IEA). (2024). Energy Profile: Kosovo 2023.
International Renewable Energy Agency (IRENA). (2024). Renewable Energy Statistics 2024: Kosovo. P. 10-62,
Bankwatch. (2023). The Energy Sector in Kosovo. Prague: CEE Bankwatch Network
International Energy Agency (IEA). (2024). Energy Profile: Kosovo 2023.; International Renewable Energy Agency (IRENA). (2024). Renewable Energy Statistics 2024: Kosovo. P. 10-62.
Kosovo Ministry of Economy, *Progress Report on the Implementation of the Kosovo Energy Strategy Implementation Program (PZSEK) for 2022–2023* (Pristina: Ministry of Economy, 2024), p.2-68

onshore, 2.3 GW offshore) are being financed (at the time of writing) to the tune of approx. 12 billion euros on competitive auctions and private financing by Vesterhav (1 GW), Thor (1 GW) and so on.

The investment in solar will amount to 2.8 billion euros at 3.4 GW of capacity, with utility scale and rooftop as the drivers, whereas hydropower, geographically constrained will have 200 million euros at 9 MW.

Comparatively, the Kosovo ones are more scattered: windmills are planned at scale of 135 MW (200 million euros, e.g., Bajgora, 102.6 MW) (e.g., Bajgora, 102.6 MW), solar at 110 MW (100 million euros, with a 100 MW plant in Pristina), and small hydros at 80 MW (50 million euros. Kosovo depends on donor finance (40 percent is through EIB, KfW), and Denmark through 60 percent in the state-led public-private partnerships indicate the centralized systems that can provide higher volumes of money available, because of economic power and Denmark's centralized approach.

Figure 1: Investment Amounts by Technology (2015–2025)

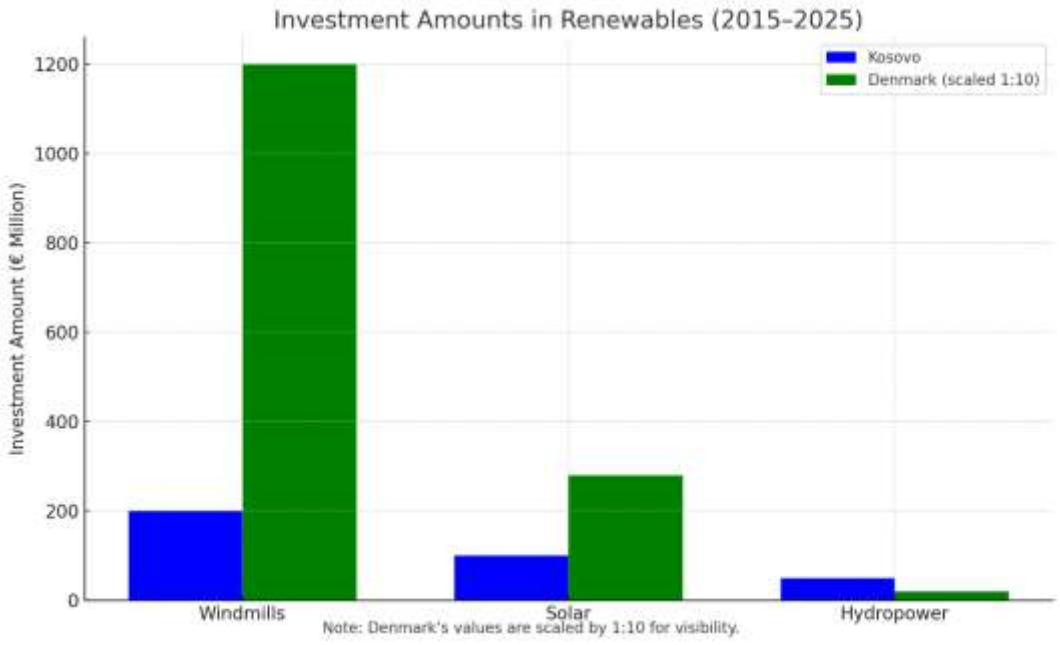

Figure 1 underscores Denmark's dominance in windmill investments, exceeding Kosovo's total renewable budget by 34 times, highlighting centralized systems' capital mobilization advantage.

5.3 Recovery Rate

Denmark has greater recovery rates, 8–10% yearly on average, versus Kosovo's 5–8%. Denmark's windmills provide 10% returns backed with low risk premiums (20% lower than Kosovo's) and auctions that are competitive at €50/MWh, having substituted previous feed-in tariffs. Solar provides 8% returns backed with tax exemptions, and hydropower's 4% is based on low capacity and expense. Kosovo's windmills provide 8% returns with 85 EUR/MWh, solar with 6% with 136.4 EUR/MWh, and hydropower with 5% with 67.3 EUR/MWh, with the latter two handicapped with 25% higher risk premiums and donor-financed models with priority for access over profitability). Denmark's centralized finance cuts down the costs of capital by 30%, raising returns, while Kosovo's fragmented structure entails 50% more costs for agreement and thus undermines financial suitability.

5.4 Completion Speed

Denmark's centralized government is able to deliver projects more quickly, taking between 18–30 months on average, while for Kosovo it is 27–48 months. Denmark's windmills take only 24 months based on one-stop-shop permitting of the Danish Energy Agency (DEA), saving 40% on delays. Solar projects take an average of 18 months, while hydropower, though small, is completed in 30 months based on regulatory compliance. Kosovo's windmills take 36 months, with land conflict resulting in a lag of 6 months, solar taking 27 months (3-month lag for Pristina facility), and hydropower taking 48 months with a 20% lag based on environmental protest and overlap of regulation. Kosovo's dispersed government, with multiple actors (e.g., Ministry of Economy, MESPI, ERO, KEEF) involved, extends the time of coordination, while Denmark's stable policies ensure efficiency.

Figure 2: Completion Speed by Technology (2015–2025)

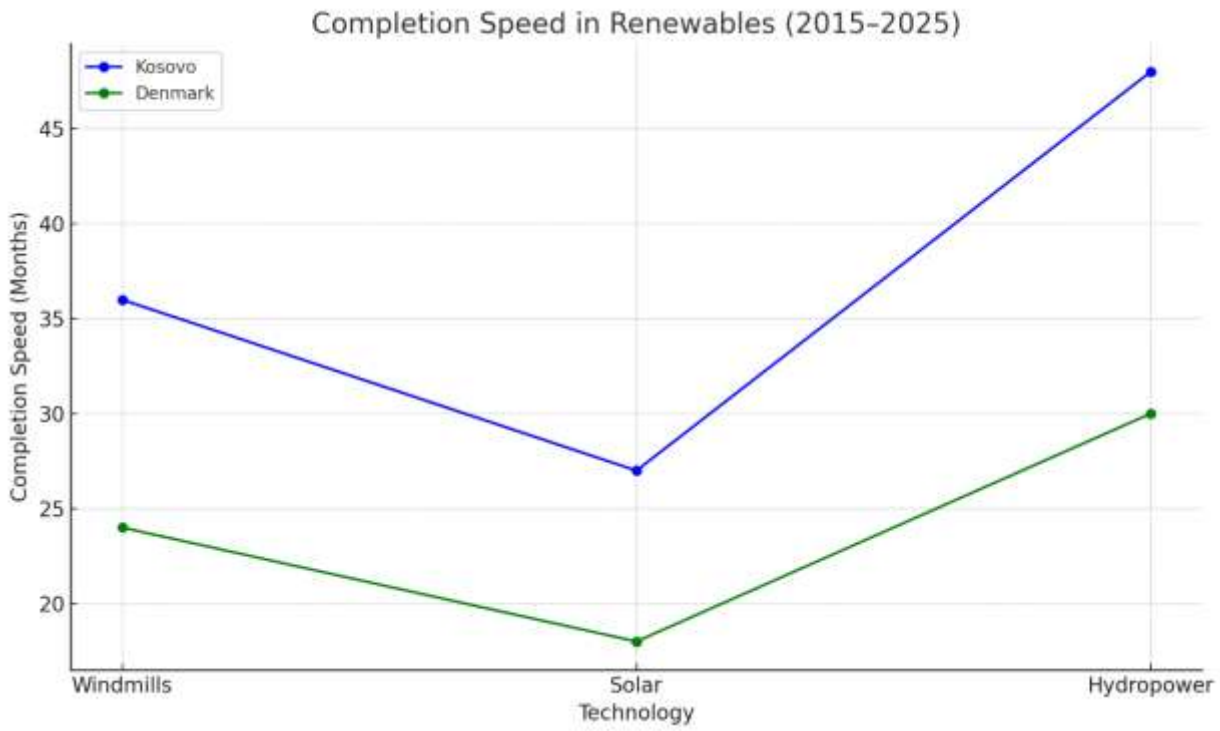

Figure 2 illustrates Denmark's consistently faster completion speeds, reflecting centralized governance's efficiency over Kosovo's fragmented approach.

5.5 Cost per MW

Denmark has lower costs per MW for windmills (€1.20 million/MW) and solar (€0.80 million/MW) because of large scale and centralized purchasing, as opposed to Kosovo's €1.48 million/MW (windmills) and €0.94 million/MW (solar) (IEA, 2023; IRENA, 2024a). The costing of Kosovo's hydropower is low at €0.63 million/MW for small-scale units with localized design, while Denmark's €22.22 million/MW from hydropower is inflated upward through low capacity

(9 MW) and stringent regulation. Denmark's centralized grid with only 0.5% losses decreases the installation cost by 25%, while Kosovo's dispersed grid (20.7% losses) and microgrids add 30% .

Table 2: Cost per MW Comparison with Regional Benchmarks[165]

Technology	Kosovo (€M/MW)	Denmark (€M/MW)	Western Balkans Avg (€M/MW)	EU Avg (€M/MW)
Windmills	1.48	1.20	1.35	1.15
Solar	0.94	0.80	0.90	0.75
Hydropower	0.63	22.22	0.70	2.50

Table 2 contextualizes costs, showing Denmark's alignment with EU benchmarks and Kosovo's competitiveness in hydropower despite higher wind and solar costs.

5.7 Summary of Findings

The renewable energy system of Denmark is centralized and thus has better results compared to those of Kosovo because it has a greater installed capacity (14 vs. 283 MW), better recovery rates (8-10% vs. 5-8%), and it takes less time to implement (18-30 months vs. 27-48 months), and unit costs of wind power and solar power are lower in Denmark than in Kosovo. Centrally controlled government minimizes delays, stabilizes the grid, and opens up huge amounts of financing,

[165] Danish Energy Agency, Energy Statistics 2023 (Copenhagen: Danish Energy Agency, 2024), p.1-60.
SGI Network, Sustainable Governance Indicators: Denmark 202,
International Monetary Fund, Republic of Kosovo: Selected Issues, Kosovo's electricity sector: challenges and opportunities, p.1-8.
International Energy Agency (IEA), *Denmark Energy Profile 2024*, Paris: IEA Publications (2024)., p. 10.
Bankwatch. (2023). The Energy Sector in Kosovo. Prague: CEE Bankwatch Network
International Energy Agency (IEA). (2024). Energy Profile: Kosovo 2023.; International Renewable Energy Agency (IRENA). (2024). Renewable Energy Statistics 2024: Kosovo. P. 10-62
Kosovo Ministry of Economy, *Progress Report on the Implementation of the Kosovo Energy Strategy Implementation Program (PZSEK) for 2022–2023* (Pristina: Ministry of Economy, 2024), p.2-68

meaning that Denmark will be able to produce 80 percent renewable electricity by 2024. But there is very little local control, offshore wind is still expensive, requiring subsidies.

Kosovo adopts a fractured approach, which is less effective, but achieves 30% more local civil job creation by using prosumers and microgrids and uses the cost-effective hydropower. However, it experiences governance issue, increased coordination expenses, and project failures. The model in Kosovo indicates the importance of community participation as a solution to the frailty of institutions, which is also applicable to other developing nations.

This comparison reveals that centralized systems are more efficient in the case of a growing, resource-filled environment whereas fragmented systems are more inclusive in developing, resource-poor environments. The perfected hybrid form integrating the policy coordination of Denmark and the people participation of Kosovo would bring the best output in the scope of renewable energy. To enhance scalability and social acceptance, policymakers ought to seek the possibility to have a balance between centrally established targets and establishing local incentives regarding financing.

To conclude, Denmark has better governance and financial policies to generate better renewable investments, whereas Kosovo has an inefficient system, filled with local innovations, but with its disadvantages. These results identify the conflicting results on efficiency and inclusivity and propose the roadmap of hybrid tactics as the way-out of transitional economies.

Chapter 6: Conclusion and Recommendations

This thesis has looked at the energy transitions between Kosovo and Denmark and the difference between a fragmented governance structure, infrastructure, and financial system in Kosovo as proposed and the centralized approach of Denmark with reference to investing in windmills, solar panels or fields and hydropower between the year 2015 and 2025. By using the tools of case study, contextual analysis and comparative evaluation, the study has thrown some light on the issues and opportunities that have defined the trajectory of renewable energy in Kosovo taking pointers out of the success story of Denmark. This section combines the findings and gives policy recommendations specific to Kosovo, future research directions to support the transition of Kosovo, and the reflection of the relevance of the thesis to the sustainable future of Kosovo as the concluding chapter. By highlighting Kosovo, my native land, the chapter outlines the possibility to change its energy system even with structural and contextual limitations.

6.1 Summary of Findings

The thesis shows that Kosovo and its decentralized concept of energy transition carry a lot of challenges in contrast to the centralized approach pursued by Denmark, which can be observed through investment performance rates and external factors. Kosovo spent 350 million Euros and got 283 MW (135 MW windmills, 110 MW solar, 80 MW hydropower) and Denmark spent 15 billion Euros and reached 14 GW (7 GW windmills, 3.4 GW solar, 9 MW hydropower). The rule of governance in Kosovo with mandate overlap across different ministries contributed to projects taking 27-48 months, with Denmark completing its 40 percent reduction of permitting delays and delivering projects in 18-30 months. The case of Kosovo lacked efficiency, losing 20.7 percent of its distribution to make up for expensive microgrids, 30 percent higher as compared to Denmark which had a national grid with a mere 0.5 percent losses.

Kosovo, which provides approx. 40% of its financing based on donor funding, has achieved recovery rates of 5- 8 percent and windmills cost it 1.48 million per MW and solar 0.94 million

per MW, whereas 8-10 percent each was done by state backed auctions in Denmark with costs of 1.2 million per MW and 0.8 million per MW, respectively. Nevertheless, the hydropower cost of Kosovo was competitive, as opposed to Denmark (18.22 million) because of insignificant capacity.

The disparities are enhanced by contextual factors. The low GDP per capita (6497 Euro) of Kosovo (only in the number of per capita at the time of writing) and the fact that 30 per cent of the youth population are unemployed restricts domestic investments compared with Denmark and the ability to get 6 per cent of its GDP through renewables. The political instability and laxity of enforcement experienced in Kosovo are not experienced in Denmark, which has a stable democratic state and can continue with its policies. The fact that people of Kosovo support renewables 60% in line with social outlooks of the population cannot overcome institutional mistrusts that paralyze 20 percent of wind and hydropower projects, whereas in Denmark with 90 percent support and 20-percent own cooperative participation renewables have had it easy. The mountainous topography of Kosovo is not scalable to solar use as opposed to the coastal wind-facilitating topography in Denmark. Kosovo has post-conflict institutions that result in 15 percent stalls in its projects hence limiting renewable electricity to 6.68 by 2024, whereas Denmark, which has mature institutions will attain a percentage of 80 by 2024.

In the comparative report, Denmark excels in efficiency, accumulation of capital, speed of deployment and cost, whereas Kosovo scores on community outreach, having 30 percent more of community engagement available via prosumer programs. Such a fragmented system in Kosovo is both inclusive and limited in scale-ability and as such we may have considered the experience of the centralized system used in Denmark to be of use where the custom and fitting nature of such systems to Kosovo has to be considered along with such adaptation to a larger scale operation.

6.2 Policy Recommendations

Policymakers will need to develop certain strategies to overcome decentralized governance, infrastructure, and financing in order to achieve energy transition in Kosovo by learning and operationalizing the energy centralized but inclusive approach found in Denmark, and adapting it to economic, political, social, geographic, and institutional peculiarities in Kosovo. The

recommendations are intended to enhance the volume of renewable capacity, enhance efficiency indicators, and exploit the community strong points, and these recommendations coincide with the implementation commitment by Kosovo in EU integration and in sustainable development. Kosovo can speed up its transition to a grass-root energy system from its top-down, central coordination model into a more balanced local self-management system through simplifying operations and localizing undermining.

1. **Centralize Renewable Governance**:
   - To enhance the coherence of the decision (30% of project delays due to overlapping mandates between the Ministry of Economy, Ministry of Environment, Spatial Planning and Infrastructure (MESPI) and the Energy Regulatory Office (ERO)). Create only one renewable energy authority to which the decision-making is centralized. Based on the Danish Energy Agency that incorporates a one-stop-shop approach that encompasses permitting and policy monitoring, it is likely that Kosovo can apply one-stop-shop permitting system to reduce completion time of a wind and solar project by between 6 to 12 years. This would simplify the licensing process, environmental assessments, and connection to the grid authorizations; and this would be effective towards the elimination of bureaucratic inefficiency that may kill off investors and derail the deployment of renewables.
   - Harmonize the policies with EU renewable goals (35 percent by 2031) to entice foreign funding by international agencies such as the European Bank of Reconstruction and Development (EBRD). The implementation of European-compatible norms, i.e. simplified feed-in tariff or renewable power certificates, would improve the sustainability of policies in spite of the political instability in Kosovo. Such congruence may open up significant capital to be invested in solar and wind partners, which will lead to investor optimism and allow long-term renewable growth planning.

2. **Upgrade and Integrate Infrastructure:**
   - Make a priority of grid modernization to minimise 20.7% distribution losses which inflate energy prices and make integrating renewable hard. Articular investments in smart grid technologies guided by the successful experiences of Denmark in advanced metering

and management of grid stability can be used to stabilize variable wind and solar inflows. The potential to connect microgrids with the national system may reduce the increased prices of 30% and support the rural energy access of off-grid communities in Kosovo, thus enhance the equitable development in the diverse regions.

- Utilize the geographical opportunities of Kosovo by subsidizing small hydropower plants that are low cost per MW (around the amount of 0.63 million Euro/MW vs. 1.2 million Euro/ MW solar). Solving the water issue by diplomatic-agreed agreements with its neighbor states, including Albania, could unblock bigger construction such as the 305 MW Zhur plant which would add much capacity to the national scale. Implementation of the stringent environmental impact assessment system practiced in Denmark would guarantee the sustainability, limit ecological degradation and among other things decrease the resistance to hydropower development by the community.

3. Diversify and Localize Financing:

- Scaling back on 40% donor funding by establishing tax exemptions and subsidized loans to private investment in renewables, towards a recovery rate of 8 percent wind and solar ventures as it has done in Denmark, in its subsidized economies. The use of a public-private partnership (PPP) model would help to finance wind farms and solar arrays with the help of privately-owned capital sources. Involving the locals in the financial institutions to provide green financing facilities would also minimize the dependency on the external donors making the economy to be resilient.
- Increase local funding by miniaturizing prosumer programs that have a 30% faster participation rate in the urban setting, such as Prishtina. Small wind and rooftop solar power plants funded by the communities can provide 20 percent of all new renewable projects strengthening the resilience of the community and minimising its load on the grid. There is also a model to follow inside Denmark that currently invests a not insignificant part of its solar schemes through its community investment schemes, inviting more local ownership and promoting the overall social acceptability of renewable energy projects.

4. **Strengthen Institutional Capacity:**
   - Provision of training to both technical and regulatory personnel to combat stalling of 15 per cent of projects by bureaucratic inefficiency. Collaborations with European technical institutes, as done by Denmark in varying capacities such as capacity building, might come up with the expertise in project management, grid operation, and renewable integration. Quality labor would improve the capacity of Kosovo to deal with complex renewable undertakings as well as be a regional leader in the proficiency of clean energy.
   - Clear procurement processes should be established to restore confidence in the eyes of people, where institutional distrust slows down 20 percent of hydropower projects. Transparency in tendering via online platforms can be used like in Denmark where the e-procurements are transparent and accountable and the projects can be green-lighted with less paper work. Community consultations would also be compulsory and a very high local approval rate would be essential to ready a project before it starts and such complications would be acceptable to EU social impact standards thus environmental opposition is minimised.

5. **Foster Community Engagement:**
   - Initiate mass education to increase 60 percent support of renewable in Denmark to support 90 percent with reasons such as improving the economy through employment as it is the 30 percent youth unemployment rate in Kosovo. Wind- and solar-green jobs campaign, wind and solar hydropower, and campaign can alter the attitude of the people by creating green job opportunities to lessen the opposition to such renewable projects. The promotion of the sustainability ideas in schools and communities could also generate long-term support about the energy transition.
   - Design cooperative ownership structures following the Danish example of 20 per cent onshore wind cooperatives, to bring communities into 10 per cent of new wind and solar projects. Inclusion equity by providing locals with equity interest in contracts such as the Bajgora wind farm will lower opposition by 25 per cent. The distribution of economic capital, in the form of annual dividend to communities involved, would fuel social solidarity and general interest in engaging in the Kosovo renewable energy future.

These are some suggestions that would help Kosovo in its systematic challenge of integrating its silo-ed style without losing locally based strengths. Kosovo can eliminate barriers as a result of institutional, economic, and social loop holes by embracing centralized effectiveness of management and funding as applied in Denmark, and the community ownership models. This mixed plan would fast track the use of renewable energy, minimize energy losses and create a robust, inclusive energy network that would position Kosovo as leader in sustainable development in Western Balkans.

6.3 Future Research

The thesis identifies several research avenues to advance Kosovo's energy transition, addressing gaps in its fragmented approach and building on comparative insights:

- **Hybrid Governance Models**: Explore how Kosovo can integrate centralized policy coordination with decentralized implementation, testing whether a hybrid model reduces project delays while maintaining higher community participation.
- **Community Financing Scalability**: Investigate the potential of scaling prosumer programs to fund Kosovo's renewable capacity, assessing recovery rates and social acceptance compared to donor-driven models.
- **Grid Modernization Strategies**: Research cost-effective technologies to reduce Kosovo's grid losses, drawing on Denmark's 0.5% benchmark, to enhance wind and solar integration in a fragmented system.
- **Social Trust and Renewable Acceptance**: Examine how institutional distrust impacts Kosovo's hydropower project stalls, developing strategies to boost public support through transparent governance.
- **Regional Benchmarking**: Compare Kosovo's fragmented approach with other Western Balkan countries to identify best practices for small hydropower and community-driven solar, refining efficiency metrics.

These directions can strengthen Kosovo's renewable energy framework, informing policies for developing economies with similar constraints.

6.4 Closing Remarks

This thesis has opened eyes on the complexities and meaningful shifts of energy transition in Kosovo that although it is inclusive of many different stakeholders based on its fragmented style, Kosovo can not compete with the effectiveness of renewable energy implementation of Denmark in its centralized energy transition approach. On the comparison of governance, infrastructure and financing, the paper provides a complete way forward by Kosovo, to hurdle past economic and political and institutional hurdles, with reference to streamlined policies and the robust systems in Denmark but on the one hand with the community involvement strength of Kosovo. Energy governance within Denmark consists of a common vision, a robust infrastructure and entrepreneurial finance, which is a successful model of quick development, however, there are specific socio-political conditions of Kosovo that require the local specific solutions in balancing between local participation and better coordination on energy.

As a Kosovar, I do feel deeply encouraged by the possibility of changing the energy structure of my home country by ditching the reliance on coal and switching to the renewable energy source. This dream keeps me interested in promoting the idea of hybrid models that will benefit the community and bring new regulatory processes and infrastructural systems that would work efficiently. These models will be able to balance on local ambitions and national goals to come up with a robust energy industry that is indicative of Kosovo in terms of its cultural and social diversity. The thesis adds to the discussion of energy transition in the global discourse by emphasizing approaches that are local and based on efficiency and inclusivity that would enable equal access to clean energy. The next step towards Kosovo is synergy among municipalities, the national government and the international community, and innovative funding to encourage investment. Adopting the experiences of centralized coordination of Denmark and the communal efforts of Kosovo, the energy ecosystem of the country can be developed vibrantly. The study is not only mapping a radicalized journey to Kosovo, but can serve to inform the global discourse of energy transitions and may have a future application to other countries in a developing world that

are currently in the same situation. Being a proud Kosovar, I will do my part to help make this possible, a sustainable, strategic, and strong renewable energy future in my country.

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