TEN-YEAR STRATEGIC DEVELOPMENT PLAN FOR BALOCHISTAN'S ENERGY SECTOR

1. Executive Summary

The Ten-Year Strategic Development Plan for Balochistan's Energy Sector (2025–2035) sets forth a transformative strategy to harness and sustainably develop the province's vast renewable energy and fossil fuel resources. Emerging from the integration of national energy goals and Balochistan's strategic priorities, the plan aims to address power deficits, create sustainable employment opportunities, and foster socio-economic growth while aligning with national and global energy sustainability commitments.

This strategic plan is designed to yield significant economic growth, environmental sustainability, and social development, creating a lasting impact on livelihoods in the province. It provides a framework to attract increased private and public sector investments, foster innovation across the energy sector, and generate formal and informal employment for Balochistan's youth. Enhanced energy management and conservation measures will improve energy security, reduce emissions, and promote sustainable development.

With an in-depth analysis of current projects, potential investments, and proposed interventions, the strategic plan focuses on seven key objectives:

1. Introducing sustainable energy resource management systems.
2. Promoting renewable energy development and diversification.
3. Encouraging innovation through modern practices and technology adoption.
4. Building capacity and enhancing the skills of stakeholders.
5. Achieving economic diversification through value chain and infrastructure development.
6. Strengthening governance and regulatory frameworks.
7. Enhancing stakeholder participation and community engagement.

By focusing on these objectives, the plan seeks to drive inclusive development, increase local incomes, and strengthen community resilience against economic and environmental challenges. The proposed initiatives will not only stimulate the energy sector but also foster industrial growth, boost allied sectors, and enhance the overall socio-economic fabric of Balochistan.

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2. Introduction & Context

Balochistan's extensive coastline, abundant natural resources, and strategic geographic location present immense potential for developing a thriving energy sector that can catalyze economic growth. Historically, the province has faced underinvestment, fragmented management, and outdated infrastructure in its energy sector. These challenges have limited the potential for harnessing renewable and fossil fuel resources. The Balochistan Energy Department, with its mandate to oversee energy development and management, has introduced various policy measures and development plans aimed at revitalizing the energy sector.

The province's energy landscape is diverse, encompassing significant renewable energy potential from solar, wind, and tidal sources, as well as vast untapped oil and gas reserves. Despite these resources, energy production has not kept pace with the growing demand driven by industrial and urban expansion. The province's electricity demand is projected to rise significantly, particularly with major development projects like Gwadar and Reko Diq. Current energy deficits continue to hinder economic activities and negatively impact socio-economic development across the region.

To address these challenges, the government has prioritized energy sector development through policy reforms and strategic investments. Key initiatives include renewable energy projects, the establishment of public-private partnerships, and capacity-building programs to enhance stakeholder expertise in energy management. The Balochistan Energy Department has also launched regulatory frameworks aimed at streamlining project approvals, attracting private investments, and ensuring environmental sustainability.

Despite these efforts, the sector faces significant infrastructural and institutional challenges. Existing power generation and distribution infrastructure remain outdated, with inadequate capacity to meet rising energy demands. Limited energy storage, outdated transmission systems, and an overreliance on imported fossil fuels exacerbate the problem. Additionally, workforce development remains insufficient, with a lack of training programs tailored to the energy sector's evolving needs.

Given these challenges and opportunities, this Ten-Year Development Plan aims to transition Balochistan's energy sector into a sustainable and diversified economy that drives long-term economic growth, job creation, and environmental resilience. This strategy will guide comprehensive energy sector reforms, infrastructure upgrades, and human capital development to build a robust and resilient energy ecosystem for the province.

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3. Vision & Mission

Vision

"To transform Balochistan into a vibrant and resilient energy hub that drives sustainable development, ensures energy security, and fosters inclusive economic growth."

Mission

"To implement a coordinated 10-year strategy that promotes renewable energy development, modernizes energy infrastructure, encourages innovation, and empowers local communities through targeted investments, capacity building, and robust governance frameworks."

4. Strategic Objectives

a) **Sustainable Energy Resource Management:** Modernize traditional energy production methods by promoting renewable energy adoption and improving energy efficiency. Implement eco-friendly practices to manage energy resources sustainably and reduce carbon emissions.
b) **Renewable Energy Development and Diversification:** Establish and promote sustainable energy solutions, including solar, wind, tidal, and hybrid projects. Diversify the energy mix to reduce dependence on fossil fuels and increase energy resilience.
c) **Technology and Innovation:** Deploy modern monitoring, research, and digital solutions to enhance productivity and management in the energy sector. Invest in technology, research, and training centers to foster innovation in renewable energy production and distribution.
d) **Capacity Building & Community Empowerment:** Equip local stakeholders with the necessary skills and opportunities to actively participate in and benefit from the energy economy. Develop tailored training programs and support community-based energy initiatives.
e) **Economic Diversification & Value Chain & Infrastructure Development:** Diversify the economy through upgrading energy production facilities, establishing energy storage systems, developing transmission infrastructure, and promoting value-added industries. Expand energy access to underserved regions to spur industrial and economic growth.
f) **Regulatory Enhancement & Robust Governance:** Develop and enforce strong policy and governance frameworks to ensure transparency, compliance, and accountability in the energy sector. Streamline regulatory approvals to attract private sector investment.
g) **Strengthening Participatory Governance and Stakeholder Engagement:** Engage and facilitate private sector participation in energy sector investments, building trust through transparent communication and collaboration. Promote innovative financing mechanisms such as green bonds and public-private partnerships to support energy infrastructure projects, enhance regional connectivity, and drive job creation in Balochistan's energy sector.

a) Sustainable Energy Resource Management

Objective	Activities	Costing Considerations	Measurable Outcomes / KPIs in 10 Years
1.1 Renewable Energy Capacity Building	Train stakeholders on renewable energy technologies and best practices.	Training programs, workshops, and expert consultancy.	• Train 100% of relevant stakeholders in renewable technologies.
1.2 Expand Solar and Wind Energy Projects	Identify suitable sites; install solar panels and wind turbines.	Investment in solar and wind infrastructure, site studies.	• Add ≥500 MW of renewable energy capacity over 10 years.
1.3 Develop Hybrid Renewable Energy Systems	Promote hybrid systems (e.g., solar-wind or solar-battery integration).	R&D investment, hybrid system installation costs.	• ≥30% of new projects incorporate hybrid systems.
1.4 Microgrids for Remote Communities	Install microgrids in off-grid areas to ensure energy access.	Microgrid setup costs, community training, and maintenance.	• Electrify ≥90% of remote communities.
1.5 Enhance Energy Efficiency Standards	Develop and enforce energy efficiency standards across sectors.	Cost for standards development, audits, and compliance programs.	• Reduce overall energy consumption by ≥20% in 10 years.

Objective	Activities	Costing Considerations	Measurable Outcomes / KPIs in 10 Years
1.6 Improve Grid Integration of Renewables	Upgrade grid systems to handle higher renewable penetration.	Grid infrastructure investments and smart grid technologies.	• Increase grid renewable integration capacity by ≥40%.
1.7 Establish a Green Energy Certification	Develop certification processes for renewable energy sources.	Costs for certification bodies, stakeholder training.	• Issue certifications for ≥80% of renewable energy projects.
1.8 Energy Storage Solutions	Invest in large-scale storage (e.g., battery storage, pumped hydro).	Storage system costs, R&D, and operational expenses.	• Achieve ≥10% grid storage capacity for peak demand management.
1.9 Energy Diversification Strategy	Promote diversification into emerging technologies (e.g., hydrogen).	R&D funding, pilot project costs.	• Launch ≥5 pilot projects in new energy technologies.
1.10 Promote Public-Private Partnerships (PPPs)	Facilitate PPPs for financing and development of clean energy projects.	Legal framework development, stakeholder consultations.	• ≥10 new PPPs established for renewable energy development.
1.11 Smart Metering and Demand Response	Deploy smart meters and demand-response systems for better management.	Investment in smart metering and demand-response platforms.	• ≥75% adoption of smart metering across households and businesses.
1.12 Promote Energy Conservation Awareness	Launch awareness campaigns on energy-saving practices.	Public communication campaigns, outreach materials.	• Increase public awareness of energy conservation by ≥40%.
1.13 Improve Governance and Policy Framework	Develop comprehensive policies for renewable energy governance.	Policy drafting, legal fees, and public consultations.	• New energy policies adopted within 3 years.
1.14 Develop Sustainable Bioenergy Solutions	Promote sustainable bioenergy from agricultural and waste resources.	Bioenergy R&D, processing infrastructure, and pilot projects.	• Bioenergy contributes ≥10% of the energy mix by the 10th year.
1.15 Explore Offshore Wind Potential	Conduct feasibility studies for offshore wind farms.	Feasibility studies, site assessments, and environmental impact studies.	• Complete feasibility studies and initiate at least one offshore project.

b) Renewable Energy Development and Diversification

Objective	Activities	Costing Considerations	Measurable Outcomes / KPIs in 10 Years
2.1 Launch Small-Scale Solar and Wind Projects	Roll out small-scale solar and wind farms across rural areas.	Investment in solar panels, wind turbines, and operational costs.	• ≥200 MW capacity added from small-scale projects.
2.2 Develop Large-Scale Renewable Energy Projects	Expand utility-scale renewable energy projects.	Infrastructure investment and land acquisition costs.	• ≥500 MW capacity from large-scale renewable energy.
2.3 Promote Solar Agriculture Pumping Systems	Install solar pumping systems to support agriculture.	Solar pump installation, maintenance, and farmer training costs.	• ≥40% adoption of solar pumping systems across rural areas.
2.4 Hybrid Energy Solutions for	Promote solar-wind hybrid systems for	Hybrid system development and	• ≥20% of industries use hybrid systems for

Objective	Activities	Costing Considerations	Measurable Outcomes / KPIs in 10 Years
Industries	industrial applications.	infrastructure investment.	energy needs.
2.5 Expand Rooftop Solar Initiatives	Provide incentives for rooftop solar installations for households.	Cost for subsidies, training programs, and quality assurance.	• ≥50% of eligible households adopt rooftop solar systems.
2.6 Promote Energy Efficiency in Supply Chains	Encourage renewable energy use across entire supply chains.	Funding for renewable energy adoption and energy audits.	• ≥30% of businesses adopt renewable energy in supply chain operations.
2.7 Encourage Bioenergy Development	Develop bioenergy from agricultural and waste resources.	R&D for bioenergy technologies, infrastructure for waste processing.	• Bioenergy contributes ≥15% of total renewable energy capacity.
2.8 Promote Off-Grid Renewable Solutions	Deploy solar home systems and microgrids for remote areas.	Costs for solar systems, battery storage, and training programs.	• Electrify ≥90% of remote/off-grid areas.
2.9 Facilitate Renewable Energy Investments	Promote PPPs and private investment in renewable energy.	Legal facilitation costs, PPP structuring, and stakeholder engagement.	• ≥10 new PPP projects established for renewable energy development.
2.10 Develop Green Hydrogen Pilot Projects	Initiate green hydrogen production pilot projects.	Investment in R&D, electrolysis units, and pilot plant costs.	• At least 2 green hydrogen pilot projects operational within 5 years.
2.11 Expand Solar Desalination Systems	Deploy solar-powered desalination systems to provide clean water.	Investment in desalination technology and solar systems.	• Solar desalination meets ≥20% of clean water demand in target areas.
2.12 Energy Diversification into Emerging Tech	Explore wave, tidal, and geothermal energy for future diversification.	R&D funding, pilot project development, and environmental studies.	• Launch ≥3 pilot projects for emerging renewable energy technologies.
2.13 Promote Battery and Storage Solutions	Develop and deploy battery energy storage systems (BESS).	Costs for battery procurement, installation, and operational maintenance.	• ≥10% grid storage capacity installed for peak demand management.

c) Technology and Innovation

Goals	Activities	Costing Considerations	Measurable Outcomes / KPIs in 10 Years
3.1 Establish a Digital Data & Knowledge	Develop a centralized digital system to monitor and manage energy production,	Investment in IT infrastructure, smart grid hardware/software	• Achieve 100% digital integration across the energy

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Goals	Activities	Costing Considerations	Measurable Outcomes / KPIs in 10 Years
Management System	consumption, and distribution; integrate smart grid technology; provide training for system users.	development, ongoing maintenance, and user training.	production and distribution value chain. • Reduce grid downtime by 50%.
3.2 Document Cross-Border Energy Trade	Develop a reporting system integrated with customs and energy regulatory bodies; maintain trade records for transparency.	Administrative integration and system development costs.	• 100% documentation of cross-border energy trade data.
3.3 Reform Governance & Institutional Structures	Conduct institutional reviews of energy regulatory frameworks; restructure Balochistan Power Development Board, and Balochistan Energy Company Limited (BECL); revise operational protocols for efficient governance.	Consultancy, restructuring costs, and training expenses for new governance protocols.	• Implement governance reforms within 2 years. • Reduce administrative processing times by 40%. • Improve governance performance index by 30%.
3.4 Ease of Doing Business via E-Governance	Develop and deploy an e-governance platform for energy licensing, billing, and regulatory compliance; conduct user training.	Investment in platform development, integration, system maintenance, and user training.	• Reduce license and billing processing times by 50%. • Achieve a 95% satisfaction rate among energy sector businesses.
3.5 Promote Modern Energy Technologies & Best Practices	Implement smart meters, renewable energy storage solutions, and solar-powered microgrids; provide incentives for modern energy adoption.	Investment in smart meters, microgrid technology, incentives, and user training.	• Increase renewable energy adoption by 30%. • Improve energy storage efficiency by 25%.
3.6 Implement a Digital Energy Traceability System	Install digital monitoring and traceability systems across all energy distribution points; maintain an integrated data repository.	IT infrastructure, software development, system maintenance, and user training.	• Achieve 100% digitization of energy distribution systems. • Reduce energy theft incidents by 70%.
3.7 Develop a Mobile App for Energy Monitoring & Mapping	Develop and deploy an app for real-time monitoring of energy usage and outages; train users on how to use the app for improved energy management.	App development, maintenance, and user training expenses.	• App adoption by ≥80% of registered energy users. • Reduction in energy management-related incidents by 30%.

d) Capacity Building & Community Empowerment:

Capacity Building & Community Empowerment	Key Actions	Required Resources	Indicators of Success
4.1 Enhance Capacity Building & Institutional Competence	Improve the skills and performance of energy institutions and stakeholders. Organize regular training sessions, seminars, and knowledge-sharing workshops; develop mentorship programs.	Investment in training materials, expert facilitation, and continuous professional development.	• Conduct at least 20 training sessions per year. • Improve institutional performance ratings by 50% over 5 years.
4.2 Strengthen Research & Extension Infrastructure	Allocate resources and develop a strategy for improved research and extension services in the energy sector; promote collaboration between research institutions and industry.	Budget for research centers, training programs, and outreach activities.	• Strategy implemented within 2 years. • Increase in research outputs by ≥30% over 5 years.
4.3 Promote Research, Development & Innovation	Drive R&D and technological innovation to enhance energy efficiency and renewable energy technologies. Establish innovation hubs, research centers, and foster partnerships.	Funding for R&D initiatives, technology incubators, and innovation grants.	• Initiate at least 15 R&D projects. • Secure 5 patents/innovations. • Increase technology adoption by 30%.
4.4 Promote Innovative Technologies & Practices	Introduce innovative energy technologies such as solar, wind, and energy storage systems; sponsor R&D projects in energy efficiency.	Funding for R&D, technology trials, and pilot projects.	• Initiate ≥5 pilot projects within 3 years. • Adoption of innovative energy practices in ≥40% of installations.
4.5 Expand Extension Services via Mobile Units	Establish mobile units to provide technical support and solutions for energy access, particularly in rural and underserved areas.	Capital investment for mobile units, operational costs, and training.	• Deploy at least 10 mobile units within 2 years. • ≥80% user satisfaction rate in targeted areas.
4.6 Establish a State of the Art Data System	Develop an integrated digital system for energy data, consumption tracking, and grid performance using digital tools and IT platforms.	IT infrastructure, software development, training, and ongoing maintenance.	• System operational within 2 years. • 100% of energy usage data reported electronically; data accuracy improved by ≥80%.
4.7 Develop a Knowledge Management Platform	Create a digital platform for sharing research, best practices, energy efficiency techniques, and institutional knowledge in the energy sector.	Development and operational costs of the platform; training programs.	• Platform launched within 2 years. • ≥70% stakeholder engagement and regular usage.
4.8 Foster Collaborative Data Exchange	Establish collaborations with national, federal, and international organizations for data sharing, research, and best practices in energy production and consumption.	Partnership and coordination costs; capacity building for data management.	• At least 3 international partnerships established within 3 years.
4.9 Enhance Access to Clean & Affordable Energy	Promote programs that provide clean and affordable energy to underserved communities; establish	Budget for social programs, subsidies, and financial support.	• ≥20% increase in household access to clean energy. • Improvement in energy

Capacity Building & Community Empowerment	Key Actions	Required Resources	Indicators of Success
	programs for energy subsidies and affordable energy access.		affordability and reliability for underserved communities.
4.10 Promote Gender Balance & Vocational Training	Ensure equal employment opportunities, provide vocational training, and empower women and marginalized groups in the energy sector.	Training and capacity-building funds; targeted grants and incentives.	• Increase women's participation in the energy sector by ≥30%. • ≥80% of target groups complete vocational training programs.
4.11 Improve Healthcare, Sanitation & Community Infrastructure	Ensure access to clean energy solutions that contribute to healthcare, sanitation, and infrastructure (e.g., solar-powered healthcare facilities, clean cookstoves).	Public investment in energy infrastructure and partnerships with local authorities.	• Solar-powered solutions implemented in ≥90% of rural healthcare centers within 3 years. • Measurable improvements in community health and living conditions.

e) Economic Diversification, Value Chain & Infrastructure Development:

Goals	Activities	Costing Considerations	Measurable Outcomes / KPIs
5.1 Develop Basic Energy Infrastructure	Modernize energy generation and distribution infrastructure. Upgrade power plants, substations, and transmission networks.	Capital investments in energy infrastructure projects and ongoing maintenance.	• Upgrade 100% of critical infrastructure by 2030. • Increase energy reliability by ≥30%.
5.2 Modernize Post-Generation Practices	Promote the use of modern, cost-effective technologies (e.g., smart grids, energy storage systems) to minimize energy losses and optimize energy distribution.	Investment in technology transfer, training programs, and equipment subsidies.	• Reduce energy losses by 40% in the short term and 90% in the long term.
5.3 Mapping & Planning of Energy Infrastructure Needs	Carry out spatiotemporal mapping and develop a comprehensive plan for resilient public/private energy infrastructure (e.g., power plants, grids, renewable installations).	Mapping studies, planning consultancy, and initial capital planning.	• Mapping completed within 1 year. • Implementation plan approved with measurable targets.
5.4 Rehabilitation & Maintenance Program	Prepare and implement a program for rehabilitation and maintenance of existing energy infrastructure (e.g., power plants, transmission lines).	Budget for rehabilitation projects and ongoing maintenance contracts.	• Complete rehabilitation of ≥80% of targeted facilities within 5 years.
5.5 Regularize Unauthorized Energy Installations	Register and regularize informal, unauthorized power generation systems, such as mini-grids and off-grid solutions. Develop rules and guidelines for registration and monitoring.	Legal and administrative processing costs; IT system development for registration and monitoring.	• 100% registration and regularization of informal energy installations within 3 years. • Increase in energy system revenue by ≥20%.
5.6 Develop New Energy Infrastructure via PPP	Engage private sector partners to develop new energy projects (e.g., solar farms, wind turbines, hydropower stations).	PPP facilitation costs, public investment, and long-term operational funds.	• Initiate at least 50 new energy infrastructure projects within 5 years.

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Goals	Activities	Costing Considerations	Measurable Outcomes / KPIs
5.7 Modernize Energy Generation Facilities	Encourage upgrading of power plants to improve efficiency and meet modern energy demands.	Subsidies for energy plant modernization; low-interest loans.	• Modernize ≥50% of the energy generation fleet within 5 years. • Increase generation efficiency by ≥30%.
5.8 Develop Standard Operating Procedures (SOPs) for Energy Sites	Establish SOPs for energy generation, distribution, and maintenance to ensure safety and efficiency.	Capital expenditure on facility upgrades; training and SOP development costs.	• SOPs developed and implemented within 1–2 years. • Reduction in energy outages by ≥30%.
5.9 Incentivize Private Sector in Renewable Energy	Encourage private investments in renewable energy projects such as solar, wind, and bioenergy.	PPP models, tax incentives, and subsidized financing.	• ≥3 new private renewable energy projects initiated within 3 years. • Increase renewable energy share in the energy mix by ≥15%.
5.10 Promote Gender Balance in Energy Sector	Ensure equal employment opportunities, provide vocational training, and empower women and marginalized groups in the energy sector.	Targeted grants, training programs, and preferential incentives.	• Increase women's participation in the energy sector by ≥25% within 5 years.
5.11 Best Practices in Energy Generation & Distribution	Encourage operators to adopt resource-efficient, environmentally sound practices in energy production and distribution.	Investment in training, capacity building, and modern technology adoption.	• ≥75% of operators certified for best practices within 3 years. • Reduction in resource wastage by ≥20%.
5.12 Capacity Building for Energy Handling & Distribution	Implement awareness and training programs to improve energy handling and distribution practices across facilities and networks.	Budget for workshops, training sessions, and educational materials.	• Conduct ≥20 training sessions per year. • Measurable improvement in energy handling efficiency (survey score increase by ≥25%).
5.13 Annual Certification & Monitoring of Energy Processes	Ensure regular inspections and certifications of energy generation, transmission, and distribution facilities.	Funding for inspection teams, certification laboratories, and monitoring systems.	• Annual certification of ≥90% of energy facilities. • Reduction in service interruptions by ≥30%.
5.14 Enhance International Technology Cooperation	Strengthen linkages with international partners for technology transfer in renewable energy, energy storage, and distribution systems.	Funding for international collaboration programs and technology acquisition.	• At least 2 international technology transfer projects initiated within 3 years.
5.15 Implement Energy Standards & Quality Compliance	Ensure all energy facilities comply with international energy standards (e.g., ISO, IEC) through regular inspections.	Costs for periodic inspections, facility upgrades, and certification processes.	• ≥90% compliance rate with energy standards. • Increase energy export market acceptance rates by ≥20%.
5.16 Establish Integrated Energy Monitoring System	Develop a harmonized digital system for energy consumption, generation, and	IT infrastructure development, software integration, training,	• 100% digital coverage within 2 years.

Goals	Activities	Costing Considerations	Measurable Outcomes / KPIs
	distribution monitoring across networks.	and maintenance.	• Reduction in energy losses by ≥70%.
5.17 Define Clear Energy Standards	Develop and enforce rules for energy efficiency, emissions, and grid management to streamline energy generation and distribution.	Regulatory development, stakeholder training, and periodic audits.	• Standards published within 1 year. • ≥90% compliance among energy facilities.
5.18 Build Stakeholder Capacity in Energy Systems	Implement training programs for energy producers, distributors, and consumers on efficient energy practices and systems.	Funding for training programs, workshops, and communication materials.	• ≥80% of stakeholders trained within 2 years. • Improved energy efficiency audit scores by ≥30%.
5.19 Promote Market Competitiveness & Consumer Satisfaction	Enhance energy product quality, branding, and market access for both domestic and international consumers.	Investment in quality labs, marketing, and certification costs.	• Increase market share by 20%. • Achieve a consumer satisfaction rating of ≥90%.
5.20 Enhance Energy Market Access & Efficiency	Improve energy market information systems, promote digital platforms for energy trading, and establish transparent pricing systems.	Investment in digital platforms, marketing, and training programs.	• Market access improvements reflected in export growth ≥20%. • E-market adoption rate ≥70%.
5.21 Foster Public-Private Energy Partnerships (4Ps)	Use the 4Ps model to develop energy infrastructure, enhance financing options, and strengthen market linkages.	PPP facilitation costs, capacity-building grants, and infrastructure investments.	• Formation of ≥5 energy cooperative clusters within 3 years. • Increased income for participants by ≥30%.
5.22 Promote Local Manufacturing of Energy Equipment	Support local manufacturing of solar panels, wind turbines, and battery storage systems, and establish business centers in key energy hubs.	Capital investment in manufacturing facilities; incentives for local manufacturers.	• Establish at least 2 energy manufacturing hubs within 3 years.
5.23 Renewable Energy Tourism Development	Develop tourism around renewable energy installations (e.g., solar farms, wind parks) with visitor centers and educational tours.	Investment in infrastructure, marketing, and visitor center construction.	• Increase tourist arrivals by 20% over 5 years. • Achieve a visitor satisfaction rate ≥80%.
5.24 Eco-Tourism & Green Energy Projects	Promote eco-tourism combined with green energy (e.g., solar-powered accommodations, wind-powered parks) in energy-rich regions.	Costs for eco-friendly infrastructure, renewable energy installations, and environmental management.	• Increase eco-tourism visits by ≥30% within 5 years. • Generate revenue from green energy tourism with ≥15% annual growth.
5.25 Energy Access for Rural & Remote Areas	Expand energy access through off-grid solutions (solar, wind) in remote and underserved areas.	Capital investments for off-grid infrastructure, subsidies for energy access.	• Provide energy access to ≥50% of rural areas within 5 years. • Achieve a 20% increase in rural electrification.

f) Regulatory Enhancement & Robust Governance

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Goal	**Activities**	**Costing Considerations**	**Measurable Outcomes / KPIs**
6.1 Redefine Institutional Governance Setup	Review and restructure the design, functions, roles, responsibilities, and authorities of energy-related institutions, including regulatory bodies like the National Electric Power Regulatory Authority (NEPRA). Establish Provincial regulatory bodies (if necessary) as per Constitutional Provisions.	Consultancy for organizational review; costs for restructuring, capacity-building, and training expenses.	- New governance structure implemented within 2 years. - Performance improvement index of ≥30% in restructured units.
6.2 Establish the Energy Governance Council	Constitute a cross-sectoral council with representatives from government, industry, civil society, academia, and other relevant sectors; develop SOPs, review existing legislation, and monitor policy enforcement.	Operational costs for council meetings, stakeholder engagement, and coordination activities.	- Council operational within 1 year. - 100% of key policy recommendations reviewed annually. - Stakeholder satisfaction rating ≥90%.
6.3 Transfer Energy Infrastructure & Establish a Directorate/Company	Consolidate and transfer energy infrastructure management under a central directorate or specialized company to streamline operations. Consider potential PPP models.	Legal and administrative restructuring costs; capital expenditure for integration; PPP facilitation expenses.	- Directorate of Oil & Gas/Balochistan Renewable Energy Company established within 2 years. - 100% integration of energy infrastructure functions. - Launch at least 5 PPP projects within 3 years.
6.4 Revisit Energy Legislation for Policy Coherence	Conduct legal reviews of national energy laws and policies to identify space for provincial laws and policies to promote alignment with current technological trends, market demands, and international obligations.	Legal consultancy fees; costs for stakeholder consultations and legislative drafting.	- Revised energy legislation enacted within 2 years. - ≥80% alignment with international agreements and national energy strategies.
6.5 Translate International Obligations in Governing Instruments	Review international energy standards and agreements (e.g., Paris Agreement, SDGs) and revise governing instruments to reflect global best practices and treaties.	Legal review and amendment costs; expert consultancy fees.	- 100% of relevant international obligations integrated into updated energy instruments within 2 years.
6.6 Develop Legal Procedures for Renewable Energy Integration	Draft clear legal frameworks for integrating renewable energy sources (solar, wind, hydropower) into the national grid, and streamline licensing processes for renewables.	Legal drafting costs; stakeholder engagement costs; administrative setup expenses.	- 100% of renewable energy projects processed within 6 months of application. - Renewable energy share of national grid ≥20% within 3 years.
6.7 Develop Legal Procedures for Compliance & Monitoring	Draft clear enforcement guidelines; establish frameworks for compliance monitoring across the energy sector (e.g., energy efficiency, emission standards).	Legal and administrative costs; training and system development expenditures.	- Compliance rate of ≥90% in energy sector regulations within 2 years. - Reduction in policy violations by ≥50%.
6.8 Establish Coordination Mechanism via a	Set up a Directorate of Energy Governance, Monitoring, Coordination,	Organizational setup costs; staffing and operational	- Directorate operational within 1 year.

Goal	**Activities**	**Costing Considerations**	**Measurable Outcomes / KPIs**
Dedicated Directorate	and Public Relations to enhance coordination between energy agencies and stakeholders.	expenses; IT support for communication systems.	- Inter-agency coordination metrics improve by ≥40%.
6.9 Establish a Robust E-Governance System for Energy Sector	Develop and deploy an integrated Energy Management Information System (EMIS) for energy resource management, consumption monitoring, grid operations, etc.	Investment in IT infrastructure; software development and system integration costs; training and maintenance expenses.	- System fully operational within 2 years. - Data processing times reduced by ≥50%. - User satisfaction rate ≥95%.
6.10 Establish a Directorate of Energy Enforcement & Monitoring	Create a dedicated Directorate for enforcing energy laws, monitoring usage, and managing inspections (e.g., emissions, efficiency standards).	Capital investment in surveillance technology, personnel training, and operational costs.	- Directorate operational within 2 years. - Reduction in energy violations and non-compliance incidents by ≥70%.
6.11 Establish Energy Dispute Resolution System	Create specialized energy dispute resolution bodies or fast-track legal processes to address conflicts between energy producers, distributors, and consumers.	Administrative and operational costs; training and infrastructure expenses.	- Dispute resolution bodies operational within 1 year. - Case resolution times reduced by ≥50%.
6.12 Enforce Labour Rights in Energy Sector	Strengthen regulations for protecting the rights of workers in the energy sector, ensuring fair wages, social benefits, and work conditions.	Administrative, training, and welfare programme budgets.	- 100% of energy sector workers registered in digital system. - Reduction in labour disputes by ≥50%.
6.13 Prevent Environmental Harm & Protect Communities	Strengthen environmental protection laws in energy production (e.g., fossil fuels, renewables), and ensure communities impacted by energy projects receive proper compensation and support.	Environmental consultancy fees; public awareness campaigns; implementation of mitigation measures.	- Zero major environmental violations in the energy sector. - ≥90% compliance with environmental regulations.

g). Strengthening Participatory Governance and Stakeholder Engagement

Goal	**Activities**	**Costing Considerations**	**Measurable Outcomes / KPIs**
7.1 Strengthening Participatory Governance & Stakeholder Engagement	Ensure inclusive and transparent decision-making by engaging energy sector stakeholders, including communities, industry experts, and civil society. Establish advisory councils, hold regular consultation forums, and public workshops.	Budget for stakeholder events, communication platforms, and outreach programs.	- Hold quarterly stakeholder meetings with ≥90% attendance. - Achieve a stakeholder satisfaction index of ≥85%.
7.2 Establish a Grievance Redressal Mechanism	Develop an effective system for handling complaints and feedback within the energy sector. Set up dedicated communication channels, track grievance resolution, and report outcomes.	Operational costs for system development, staffing, and maintenance.	- Grievance mechanism operational within 1 year. - ≥90% of complaints resolved; average resolution time reduced by ≥50%.

Goal	Activities	Costing Considerations	Measurable Outcomes / KPIs
7.3 Promote Private Sector Engagement through Energy Projects	Enhance private sector participation in energy projects (e.g., renewable energy, power generation, transmission) through the leasing of government-controlled land or joint ventures.	Administrative, legal, and advisory costs for developing leasing and partnership frameworks.	- Increase in leased or privatized energy projects by ≥50% within 3 years. - Private sector investment increased by ≥30%.
7.4 Develop Cooperative Governance Rules for Energy Co-ops	Create rules for energy cooperatives (especially in renewable energy) to ensure transparency, accountability, and inclusive decision-making.	Legal drafting, stakeholder consultations, and capacity-building costs.	- Cooperative governance rules published within 1 year. - ≥80% of energy cooperatives adopting the new framework within 2 years.
7.5 Establish Federation of Energy Cooperatives	Encourage the formation of umbrella organizations (federations) for energy cooperatives to represent their interests and influence policy decisions.	Organizational setup costs, training, and coordination expenses.	- Federation of energy cooperatives established within 2 years. - Representation in policy decision-making increased by ≥30%.
7.6 Provide Startup Grants & Support Services for Energy Projects	Offer financial assistance, training, and infrastructure support to cooperatives and entrepreneurs engaged in renewable energy and energy efficiency projects, especially in underserved regions.	Seed funding via government programmes, PPP support, and capacity-building budgets.	- ≥15 energy cooperatives or startups receive grants within 3 years. - Beneficiaries (e.g., 50,000 households) report ≥25% improvement in energy access or efficiency.

I. Short Term Priorities (Years 1–3): Laying the Foundation

The focus in this phase is on establishing robust governance, essential enforcement mechanisms, and critical infrastructure that will support the sustainable development of the energy sector.

Priority 1: Institutional Strengthening & Capacity Building

Key Actions:

- Redesign service structures within the energy department with clear job descriptions.
- Improve recruitment, retention, and professional development strategies.
- Invest in modern energy monitoring, control, and surveillance mechanisms (e.g., smart grids, energy management systems).
- Roll out a robust system for energy auditing, renewable energy integration, and energy conservation programs.
- Ensure digital integration and data transparency across stations and facilities.
- Establish uniform rules for energy generation, distribution, and consumption standards.
- Develop guidelines for the gradual phase-out of non-renewable energy subsidies.

Expected Outcomes:

- At least a 40% increase in renewable energy generation.
- Improved real-time data collection, monitoring, and enforcement of regulations.
- Robust governance structures in place with a clear chain of accountability.

Priority 2: Modernize the Energy Infrastructure

Key Actions:

- Modernize the energy generation fleet, focusing on renewable energy sources like solar, wind, and hydropower.
- Expand energy transmission and distribution networks to underserved areas.
- Upgrade existing power plants with cleaner, more efficient technologies.
- Develop a modernized energy market, focusing on energy storage, grid stability, and energy efficiency.
- Enhance regulatory mechanisms to ensure energy sector compliance with environmental standards.

Expected Outcomes:

- Increased renewable energy capacity by 30% over 3 years.
- Improved energy efficiency in the existing infrastructure.
- Enhanced stakeholder engagement through transparent energy policy development.

Priority 3: Conduct Feasibility Studies for Major Energy Projects

Key Actions:

- Conduct feasibility studies on large-scale renewable energy projects (e.g., solar farms, wind turbines, hydroelectric plants).
- Develop data-driven recommendations based on environmental and socio-economic criteria for the integration of large-scale energy projects.

Expected Outcomes:

- Clear identification of high-priority energy sites for future investments.
- Informed investment decisions that align with sustainable energy development goals.

Priority 4: Design and Pilot Renewable Energy Systems

Key Actions:

- Design small-scale pilot projects for solar, wind, and hydropower solutions in various regions.
- Develop guidelines for integrating decentralized renewable energy systems into local communities (e.g., microgrids, solar-powered communities).
- Pilot smart grid technologies and microgrid solutions to improve energy access in remote areas.

Expected Outcomes:

- Demonstrated potential for renewable energy in rural and underserved areas.
- Increased public and private sector interest in investing in renewable energy projects.
- Increased energy access to over 100,000 households.

Priority 5: Promote Public-Private Partnerships (PPP) in Energy Projects

Key Actions:

- Prepare detailed, investment-ready project designs for renewable energy infrastructure.
- Align energy projects with sustainable development practices and local community benefits.
- Establish frameworks to encourage private sector investments in energy generation, transmission, and distribution.

Expected Outcomes:

- Increase in private sector investment by at least 20% over 3 years.
- Development of at least 5 PPP-based renewable energy projects.

II. Medium Term Priorities (Years 4–7): Scaling Up and Expanding Reach

The medium-term phase focuses on expanding energy production and infrastructure, scaling up renewable energy projects, and integrating new technologies to ensure sustainability.

Priority 1: Expand Renewable Energy Generation

Key Actions:

- Launch large-scale renewable energy projects (solar, wind, hydropower, and geothermal).
- Establish energy storage systems to support grid stability and ensure continuous supply.
- Implement incentive-based schemes for small-scale producers and community-based renewable energy projects.

Expected Outcomes:

- Renewable energy generation increased by 50%.
- Expansion of energy storage systems, with at least 10 large-scale facilities installed.

Priority 2: Enhance Energy Efficiency and Grid Modernization

Key Actions:

- Develop energy efficiency standards for industrial, commercial, and residential sectors.
- Upgrade the existing grid infrastructure to accommodate increased renewable energy input.
- Implement energy efficiency programs for industrial sectors and government buildings.

Expected Outcomes:

- Reduction in energy consumption by 20% in industrial and commercial sectors.
- Improved grid reliability and capacity, reducing transmission losses by 10%.

Priority 3: Expand Energy Access and Rural Electrification

Key Actions:

- Scale up rural electrification efforts through solar microgrids and decentralized energy solutions.
- Promote community-based energy solutions and integrate them into national energy planning.
- Provide subsidies or incentives for low-income households to adopt renewable energy systems.

Expected Outcomes:

- Provide electricity to 1 million new households.
- Increase rural electrification by 40%.

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III. Long Term Priorities (Years 8–10): Sustaining Growth and Innovation

In the long-term phase, the focus will be on fostering innovation, strengthening the energy sector's global competitiveness, and ensuring sustainability.

Priority 1: Foster Energy Research, Innovation, and Development

Key Actions:

- Establish renewable energy research centers in key regions to foster innovation in clean energy technologies.
- Expand digital energy platforms and data-driven management systems to optimize energy consumption and distribution.
- Promote partnerships with international technology developers to bring cutting-edge energy solutions to the region.

Expected Outcomes:

- Three fully operational research centers driving innovation in energy technology and management.
- Increased capacity for evidence-based policy adjustments in the energy sector.

Priority 2: Promote Energy Efficiency and Sustainability

Key Actions:

- Develop national energy efficiency programs that incentivize the adoption of energy-efficient technologies and practices in industry and households.
- Implement large-scale public awareness campaigns to promote energy conservation and sustainable consumption.
- Strengthen regulations on energy efficiency in construction and transportation sectors.

Expected Outcomes:

- National energy consumption reduction by 25% through improved efficiency.
- A 50% reduction in carbon emissions from the energy sector.

Priority 3: Position the Energy Sector as a Regional Leader

Key Actions:

- Host regional and global energy summits to showcase innovations and foster partnerships.
- Develop export hubs for renewable energy technologies and services.
- Strengthen regional and global partnerships for technology transfer, investment, and shared research.

Expected Outcomes:

- Energy exports surpass $2 billion annually.
- Full compliance with international energy standards, solidifying the region's leadership in renewable energy.

Short Term Priorities (Years 1–3): Laying the Foundation

S#	Project Name	Key Components	Estimated Cost (PKR) Million	Direct Jobs Created	Indirect Jobs Created	Expected Impact

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S#	Project Name	Key Components	Estimated Cost (PKR) Million	Direct Jobs Created	Indirect Jobs Created	Expected Impact
1	Renewable Energy Grid Integration & Smart Grid Project	Upgrade transmission lines, implement smart grid systems with real-time monitoring	6,000	3,500	2,000	Improved grid stability, higher renewable energy penetration
2	Energy Efficiency & Modernization of Industrial Plants	Upgrade plants with energy-efficient technologies, retrofitting systems	3,800	3,000	2,000	Reduction in energy consumption, increased industrial output
3	Solar Farm Development Pilot Project	Establish pilot solar farms (50-100 MW) with community involvement	7,000	1,500	700	Increased renewable energy capacity and community energy access
4	Energy Access and Rural Electrification Project	Expand rural electricity access via solar mini-grids and off-grid solutions	3,500	2,800	1,500	Enhanced energy access, improved livelihoods in rural areas
5	Modernization of Energy Monitoring & Control Systems	Implement a unified IT system for real-time energy data collection	1,000	80	150	Improved data integration, enhanced energy management
6	Wind Power Feasibility & Pilot Project	Conduct feasibility studies, establish small-scale wind power projects	5,000	1,800	1,000	Increased wind energy capacity, diversified renewable sources
11	Digital Energy Trading Platform Project	Develop a digital marketplace for energy trading	1,500	150	300	Enhanced market access, improved trading and pricing transparency
12	Waste-to-Energy Development Project	Establish waste-to-energy plants to convert waste into electricity	5,000	1,500	1,200	Waste reduction, energy generation from non-traditional sources
15	Energy Sector Startups & Innovation Support	Provide grants and technical assistance to energy startups	1,200	250	500	Increased innovation, job creation in the energy sector
Total			**39,000**	**14,580**	**9,150**	

II-Medium Term Priorities (Years 4–7): Scaling Up and Expanding Reach

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S#	Project Name	Key Components	Estimated Cost (PKR) Million	Direct Jobs Created	Indirect Jobs Created	Expected Impact
1	Renewable Energy Capacity Expansion Project	Build additional large-scale renewable energy projects (wind, solar), and integrate them into the grid	12,000	4,500	2,500	Increase renewable energy capacity, reduce dependency on fossil fuels
2	Smart Energy Management Systems and Grid Optimization Project	Upgrade grid infrastructure, implement smart energy management systems, and improve energy distribution	3,500	1,500	1,000	Enhanced grid reliability, optimized energy distribution
3	Oil and Gas Waste-to-Energy Project	Develop technology to convert oil and gas sector waste into usable energy (flare gas recovery, waste incineration)	2,000	800	500	Waste reduction, increased energy production from by-products
4	Oil and Gas Workforce Development and Training Initiative	Establish training programs to upskill workers in the oil and gas sector, focusing on safety, technology, and efficiency	500	300	150	Skilled workforce, improved safety standards, reduced sector risk
5	**200 MW Power Plant on Low BTU Gas**	Establishment of a 200 MW power plant utilizing low BTU gas as fuel	12,000	4,000	2,500	Increased energy production, reduced dependence on high-BTU fuels, enhanced energy security
Total			**30,000**	**11,100**	**6,650**	

Long Term Priorities (Years 8–10): Sustaining Growth and Innovation

S#	Project Name	Key Components	Estimated Cost (PKR) Million	Direct Jobs Created	Indirect Jobs Created	Expected Impact
1	Carbon Capture and Storage (CCS) Project	Develop CCS technologies and deploy them at scale to mitigate CO2 emissions from oil and gas extraction	4,000	1,200	1,000	Reduced carbon footprint, alignment with global environmental standards
2	Renewable Energy Innovation and Integration	Develop cutting-edge technologies for integrating renewable energy	2,500	700	900	Enhanced energy diversification, smooth integration of renewables into

TEN-YEAR STRATEGIC DEVELOPMENT PLAN FOR BALOCHISTAN'S ENERGY SECTOR

S#	Project Name	Key Components	Estimated Cost (PKR) Million	Direct Jobs Created	Indirect Jobs Created	Expected Impact
	Project	with existing oil and gas infrastructure				traditional grids
3	Develop an Oil and Gas Field (Block without Bidding)	Develop infrastructure and facilities to extract oil and gas from a new field without bidding	6,000	2,000	1,500	Increased energy production capacity, enhanced energy independence
4	International Partnerships for Clean Energy Transition	Forge partnerships with global organizations for knowledge sharing, clean energy technology development, and policy reforms	1,800	300	500	Boosted global cooperation, accelerated energy transition to cleaner sources
Total			**14,300**	**4,200**	**3,900**	

Summary of Job Creation

Project Category	Short-Term Direct Jobs	Medium-Term Direct Jobs	Long-Term Direct Jobs	Short-Term Indirect Jobs	Medium-Term Indirect Jobs	Long-Term Indirect Jobs
Renewable Energy & Smart Grid Projects	6,000	5,500	3,080	3,500	3,000	2,650
Oil, Gas, and Energy Management Projects	5,800	3,800	1,500	3,000	2,600	1,050
Advanced Energy Technology & Innovation	2,000	1,600	600	1,500	1,200	1,200
Total	**13,800**	**10,900**	**5,180**	**8,000**	**6,800**	**4,900**

7. Financial Plan & Budget Allocation

Source	Description	Estimated Contribution (%)
Government Funding	Development budget for energy infrastructure, grid modernization, rural electrification	20%
Private Sector Investments	Investments in renewable energy farms, oil & gas field development, energy efficiency	40%
Donors & International Aid	Grants and funding from organizations like the World Bank, ADB, and Green Climate Fund	20%
Public-Private Partnerships (PPP)	Joint ventures for renewable energy, energy storage systems, and grid infrastructure	20%

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Source	Description	Estimated Contribution (%)
Total		**100%**

Annual Budget Estimates (2025-2035)

Years 2025-2028 (Years 1-3): 20% Funding from Energy Department Development Fund

Category	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	Total
Renewable Energy Grid Integration & Smart Grid Project	1,200	1,200	1,200	0	0	0	0	0	0	0	3,600
Energy Efficiency & Modernization of Industrial Plants	760	760	760	0	0	0	0	0	0	0	2,280
Solar Farm Development Pilot Project	1,400	1,400	1,400	0	0	0	0	0	0	0	4,200
Energy Access and Rural Electrification Project	700	700	700	0	0	0	0	0	0	0	2,100
Modernization of Energy Monitoring & Control Systems	200	200	200	0	0	0	0	0	0	0	600
Wind Power Feasibility & Pilot Project	1,000	1,000	1,000	0	0	0	0	0	0	0	3,000
Digital Energy Trading Platform Project	300	300	300	0	0	0	0	0	0	0	900
Waste-to-Energy Development Project	1,000	1,000	1,000	0	0	0	0	0	0	0	3,000
Energy Sector Startups & Innovation Support	240	240	240	0	0	0	0	0	0	0	720
Total	**7,800**	**7,800**	**7,800**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**23,400**

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Years 2029-2032 (Years 4-7): 20% Funding from Energy Department Development Fund

Category	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	Total
Renewable Energy Capacity Expansion Project	2,400	2,400	2,400	0	0	0	7,200
Smart Energy Management Systems and Grid Optimization Project	700	700	700	0	0	0	2,100
Oil and Gas Waste-to-Energy Project	400	400	400	0	0	0	1,200
Oil and Gas Workforce Development and Training Initiative	100	100	100	0	0	0	300
200 MW Power Plant on Low BTU Gas	2,400	2,400	2,400	0	0	0	7,200
Total	**6,000**	**6,000**	**6,000**	**0**	**0**	**0**	**18,000**

Years 2033-2035 (Years 8-10): 20% Funding from Energy Department Development Fund

Category	2033-34	2034-35	2035-36	Total
Carbon Capture and Storage (CCS) Project	800	800	800	2,400
Renewable Energy Innovation and Integration Project	500	500	500	1,500
Develop an Oil and Gas Field (Block without Bidding)	1,200	1,200	1,200	3,600
International Partnerships for Clean Energy Transition	360	360	360	1,080
Total	**2,860**	**2,860**	**2,860**	**8,580**

Summary Table of Total Budget for 2025-2035 (By Year)

Year	Total Budget (PKR Million)
2025-26	7,800
2026-27	7,800
2027-28	7,800
2028-29	0
2029-30	6,000
2030-31	6,000
2031-32	6,000
2032-33	0
2033-34	2,860
2034-35	2,860
2035-36	2,860

TEN-YEAR STRATEGIC DEVELOPMENT PLAN FOR BALOCHISTAN'S ENERGY SECTOR

Year	Total Budget (PKR Million)
Grand Total	**64,520**

Revenue Generation Strategy

To ensure the financial sustainability of the energy sector, a comprehensive approach involving both direct and indirect revenue sources is crucial.

a. Direct Revenue Sources

1. **Renewable Energy Sales & Power Purchase Agreements (PPAs)**
   - Revenue from selling electricity generated through renewable energy projects (e.g., solar, wind) through Power Purchase Agreements (PPAs) with government and private buyers.
2. **Energy Efficiency Program Fees**
   - Income from energy efficiency programs aimed at industrial clients, where businesses pay for energy audits, retrofitting services, and performance-based energy savings solutions.
3. **Revenue from Oil and Gas Fields in Joint Ventures**
   - Income generated through joint ventures with private companies for the extraction and sale of oil and gas. Revenue-sharing agreements will be established to maximize profitability while maintaining long-term sustainability in energy supply.
4. **Carbon Credit Sales**
   - Generating revenue by participating in carbon credit markets through energy projects that reduce emissions, such as renewable energy generation or carbon capture projects.

b. Indirect Revenue Sources

1. **Public-Private Partnerships (PPP) Royalties**
   - Revenue from public-private partnerships in energy projects, including renewable energy generation and waste-to-energy, where private investors contribute capital in exchange for shared profits.
2. **Technology and Innovation Licensing**
   - Licensing energy-efficient technologies, smart grid systems, and other innovations developed through energy sector projects to other countries or companies.
3. **Knowledge Sharing & International Collaboration**
   - Generating revenue through global partnerships, collaborations with international organizations, and research commercialization, particularly for energy efficiency technologies, clean energy innovations, and sustainable energy solutions.

Financial Sustainability Measures

To transition to a more sustainable and self-sufficient energy sector, the following key measures will be implemented:

1. **Gradual Decrease in Government Dependence**
   - The energy sector will gradually reduce reliance on government subsidies by focusing on projects that generate long-term revenue streams, such as renewable energy generation, grid optimization, and carbon credit sales.
2. **Performance-Based Budget Allocation**
   - Budget allocation will be linked to the performance and impact of projects. High-performance projects that generate tangible results, like energy efficiency upgrades and renewable energy capacity expansion, will receive priority funding.
3. **Encouraging Private Sector Growth**
   - The sector will encourage private investment in energy infrastructure, renewable energy generation, and smart grid technologies by offering tax incentives, subsidies, and co-financing opportunities. Additionally, private investors will be involved in revenue-sharing models through public-private partnerships (PPP).
4. **Long-Term Energy Security & Innovation**
   - Ensuring the diversification of energy sources (renewable, waste-to-energy, and efficiency technologies) to reduce dependency on fossil fuels. The implementation of

projects like the **Carbon Capture and Storage (CCS)** initiative will attract global funding, improving environmental sustainability while reducing energy costs.

5. **Market-Driven Pricing Models**
    - The energy sector will implement market-driven pricing models for both renewable energy and energy efficiency services, where energy production costs are aligned with market rates, ensuring sustainability and reducing government funding needs.

Phase-Wise Implementation Timeline for Energy Sector Projects

Year	Key Milestones	Responsibility Departments/Entities
2025	- Completion of pilot renewable energy installations (e.g., solar, wind) and energy efficiency upgrades. - Establishment of joint venture agreements for oil and gas field development. - Start implementation of carbon credit certification process for renewable energy projects. - Initiate feasibility studies for future renewable energy capacity expansion.	Energy Department, Private Sector Partners, Finance, Balochistan Public Private Partnership Authority, Ministry of Energy (Petroleum Division) DGPC
2026	- Expansion of renewable energy capacity through additional solar/wind farms (up to 100 MW). - Rollout of energy efficiency programs for industrial plants (retrofits and audits). - Begin construction of waste-to-energy plants and smart grid integration. - Operationalize revenue-sharing models from oil and gas fields in joint ventures.	Energy Department, Renewable Energy Developers, Oil and Gas Companies, Construction Firms, PPP Authority
2027	- Fully operationalize the smart grid and integrate renewable energy sources into the grid. - Expansion of waste-to-energy projects with the launch of additional plants. - Initiate large-scale oil and gas workforce development and training programs. - Achieve at least 60% progress on carbon capture and storage (CCS) feasibility.	Energy Department, Smart Grid Providers, Waste-to-Energy Developers, Oil and Gas Industry, Training Institutes
2028	- Completion of first large-scale renewable energy projects (wind, solar),. - Implement new smart energy management systems to optimize energy distribution. - Begin construction of a 200 MW power plant utilizing low BTU gas. - Expansion of oil and gas workforce training initiatives.	Energy Department, Renewable Energy Developers, Smart Grid Providers, Oil and Gas Companies, Construction Firms
2029	- Begin commercial operation of new renewable energy plants and wind power projects.	Energy Department, CCS Technology Providers, Oil and Gas Companies, Storage Solution Providers, Private Sector

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Year	Key Milestones	Responsibility Departments/Entities
	- Scale up carbon capture and storage (CCS) technologies to mitigate CO2 emissions. - Operationalize new oil and gas waste-to-energy technologies (flare gas recovery). - Start construction of large-scale energy storage solutions to support grid stability.	
2030	- Finalize integration of energy management systems with the grid, ensuring optimized power distribution. - Begin construction of additional large-scale oil and gas-based power plants. - Achieve full implementation of energy efficiency upgrades across targeted industrial plants. - Establish comprehensive carbon capture infrastructure and establish partnerships for international collaborations.	Energy Department, Smart Grid Providers, Construction Firms, Private Sector, International Partners
2031	- Present detailed evaluation of the renewable energy sector's performance and strategic outcomes. - Consolidate lessons learned from oil and gas field joint ventures for future expansion. - Finalize post-construction reviews and long-term sustainability strategies for renewable energy and waste-to-energy projects.	Energy Department, DGPC, PPP Authority, Private Sector
2032	- Achieve full commercialization of oil and gas-based power plants. - Consolidate waste-to-energy and CCS projects as part of a national sustainability strategy. - Establish international partnerships for clean energy transition.	Energy Department, Oil and Gas Companies, Private Sector, International Partners
2033-2035	- Complete all ongoing energy sector projects and focus on scaling up successful models. - Achieve measurable reductions in greenhouse gas emissions and enhanced energy security.	Energy Department, Private Sector, International Partners, Environmental Agencies

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Monitoring, Evaluation & Reporting Mechanism for Energy Sector Projects

A. Key Performance Indicators (KPIs)

KPI	Metric	Target	Frequency
Economic Growth KPIs			
Renewable Energy Capacity Expansion	MW of new renewable energy capacity added (solar, wind, etc.)	1000 MW/year	Annual
Oil and Gas Revenue from Joint Ventures	Revenue generated from oil and gas field joint ventures	20% annual increase	Annual
Carbon Credit Sales	Revenue from carbon credit certification	$10 million annual revenue by Year 5	Annual
Employment KPIs			
Direct Employment Growth	Number of new direct jobs created in the energy sector (construction, operations)	5000 new jobs per year	Annual
Indirect Employment Growth	Number of new indirect jobs created in the energy value chain (e.g., in construction, manufacturing, and services)	1000+ jobs per year	Annual
Production Efficiency KPIs			
Renewable Energy Generation Efficiency	Ratio of energy produced from renewable sources vs total national energy consumption	20% of total energy from renewables by Year 5	Annual
Waste-to-Energy Conversion Efficiency	Percentage of waste converted to usable energy	70% conversion efficiency by Year 5	Annual
Smart Grid Efficiency	Percentage of energy distributed through smart grid systems, ensuring better load balancing and reduced transmission losses	85% of grid integrated with smart technology by Year 5	Annual
Sustainability KPIs			
CO2 Emission Reduction	% reduction in CO2 emissions through renewable energy projects and CCS (Carbon Capture and Storage)	15% reduction by Year 5, 30% by Year 10	Annual
CCS Deployment Rate	Number of CCS facilities operational	5 facilities by Year 7	Annual
Renewable Energy Adoption Rate	% of energy from renewable sources (solar, wind, etc.)	50% of total energy from renewables by Year 10	Annual
Regulatory Compliance Rate	% of energy companies compliant with new environmental and sustainability	95% compliance by Year 5	Annual

KPI	Metric	Target	Frequency
	regulations		
Innovation KPIs			
R&D Investment in Energy Sector	Percentage of total energy sector revenue allocated to research and development	2% of revenue by Year 5	Annual
Energy Research Centers Established	Number of new energy research centers or innovation hubs established	3 centers by Year 7	Annual
Technology Adoption Rate	Percentage of energy operators using advanced digital systems (smart grid technology, renewable energy monitoring tools)	100% adoption of smart energy systems by Year 5	Annual
Digital Energy Trading Platform	Number of transactions facilitated through the digital energy trading platform	1000+ transactions annually by Year 5	Annual

B. Monitoring & Evaluation Framework

1. **Monitoring**:
   - **Data Collection**: Continuous data gathering through project reports, monitoring tools (e.g., smart grid monitoring), field inspections, and financial audits.
   - **Performance Dashboards**: Real-time dashboards displaying key performance data across all projects (e.g., energy production, employment rates, emissions reduction).
2. **Evaluation**:
   - **Mid-term Evaluation**: At Year 3 and Year 5, evaluate the progress of key projects like renewable energy capacity, CCS deployment, and employment impact. Adjust strategies if targets are not met.
   - **End of Project Evaluation**: In Year 10, conduct a full evaluation based on final KPIs (energy generation, revenue from oil and gas joint ventures, emission reductions, etc.).
   - **Independent Audits**: Regular audits by external bodies to assess compliance with environmental regulations, financial transparency, and overall sector performance.
3. **Reporting**:
   - **Annual Reports**: Each year, the Energy Department will release an annual performance report including KPIs, project updates, and impact assessments.
   - **Stakeholder Engagement**: Reports will be shared with stakeholders (government bodies, private investors, international partners) for feedback and recommendations.
   - **Public Reporting**: Annual summaries of key energy performance data (e.g., renewable energy output, CO2 reduction) will be made publicly available for transparency

B. Reporting Framework

B.1. Reporting Frequency & Stakeholders

Report Type	Frequency	Target Audience
Operational Report	Monthly	Energy Department, Ministry of Energy, Project Management Teams
Performance Report	Quarterly	Ministry of Energy, PPP Authority, Finance Department
Financial Report	Bi-Annual	Finance & Planning Departments, Donors, PPP Authorities

Report Type	Frequency	Target Audience
Impact & Sustainability Report	Annual	Government, NGOs, International Partners, Stakeholders

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B.2. Report Structure & Key Components

📌 Executive Summary

- **Overview:** A summary of the overall energy projects' performance during the reporting period.
- **Key Achievements & Challenges:** Outline major milestones such as renewable energy projects, energy efficiency improvements, and smart grid systems, alongside challenges such as project delays or regulatory hurdles.
- **Investments & Expenditures:** Summarize total investments made, funds allocated to projects, and expenditure efficiency across different energy initiatives.

📌 **Section 1: Coverage & Accessibility** This section tracks infrastructure progress, access to energy, and operational coverage.

Indicator	Metric	Target	Current Status	Remarks
Renewable Energy Grid Reach	% of regions covered by renewable energy grids	100% coverage by Year 5	% coverage achieved	Grid expansion ongoing
Energy Access in Rural Areas	% increase in rural electrification	80% rural electrification by Year 5	% increase achieved	Rural solar and mini-grid projects underway
Renewable Energy Production	% of total energy production from renewable sources	40% renewable energy by Year 5	% of total production	Expansion of wind and solar farms
Digital Monitoring Systems	% of energy sites with smart grid integration	100% integration by Year 3	% integration achieved	Ongoing deployment of smart grid systems

📌 **Section 2: Resource Quality & Sustainability Monitoring** This section focuses on sustainability and environmental impact.

Indicator	Metric	Target	Current Status	Remarks
Carbon Emission Reduction	% reduction in CO2 emissions from energy projects	30% reduction by Year 5	% reduction achieved	Tracking emissions from renewable plants
Energy Efficiency	% reduction in energy consumption across industrial sectors	20% reduction by Year 5	% reduction achieved	Energy efficiency projects in full swing
Renewable Energy Integration	% of renewable energy in grid systems	60% integration by Year 7	% integration achieved	Focus on solar and wind projects

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📌 **Section 3: Infrastructure Development & Maintenance** Monitors the physical infrastructure, such as power plants, grid systems, and other related assets.

Indicator	Metric	Target	Current Status	Remarks
Renewable Energy Capacity	MW of installed renewable energy capacity	15,000 MW by Year 7	MW installed	Major solar and wind projects ongoing
Smart Grid Implementation	% of grid equipped with smart meters	100% integration by Year 5	% completed	Full smart grid system deployment underway
Waste-to-Energy Facilities	Number of waste-to-energy plants built	10 plants by Year 7	Number of plants	Starting with pilot plants in key regions

📌 **Section 4: Financial & Budget Utilization** Focuses on budget execution and funding management.

Indicator	Metric	Allocated Budget	Utilized Budget	Variance (%)	Remarks
Total Budget Utilization	% of budget spent on energy projects	PKR Billion	PKR Billion	–%	Ensuring budget adherence
Government vs. Donor Funding	% share in total funding	% Government, % Donors	% Government, % Donors	–%	Focus on increasing private sector investment
Cost Recovery from Oil & Gas Fields	% of revenue from oil and gas joint ventures	% recovery target	% recovery achieved	–%	Revenue from joint ventures increasing

📌 **Section 5: Community Engagement & Stakeholder Satisfaction** Evaluates stakeholder involvement and satisfaction levels.

Indicator	Metric	Target	Current Status	Remarks
Stakeholder Engagement	% of stakeholders actively engaged	≥90% engagement	% engagement	Regular coordination meetings with energy stakeholders
Training & Capacity Building	Number of training sessions and participants	≥20 sessions per year	Sessions conducted	Training programs for oil & gas sector and renewable energy
Community Satisfaction	Satisfaction index (via surveys)	≥90% satisfaction	Satisfaction score	Positive feedback from energy community

📌 **Section 6: Challenges & Recommendations**

- **Challenges:** Identify issues such as funding delays, regulatory compliance issues, or technical challenges in energy project execution.

- **Recommendations & Action Plan:** Suggest corrective actions such as policy revisions, stakeholder engagement strategies, or technological upgrades.
- **Conclusion & Next Steps:** Provide a summary of achievements, outline lessons learned, and set priorities for the upcoming reporting period.

C. Independent Monitoring & Evaluation (M&E)

• **Inter-Departmental Coordination & Stakeholder Engagement:** Ensure all relevant departments (Energy, PPP Authorities, and Environmental Agencies) are actively involved in project execution and monitoring.

• **Roles & Responsibilities:** Verify that roles between government entities, private partners, and other stakeholders are clearly defined.

• **Public-Private Partnerships (PPP) Strategy:** Assess the financial and operational performance of PPP-driven energy projects.

• **Citizen Engagement Mechanisms:** Implement feedback mechanisms, such as surveys and public consultations, to involve communities in energy-related decisions.

Conclusion & Way Forward

• **Summary of Expected Outcomes:** Reiterate key outcomes such as enhanced renewable energy generation, improved energy efficiency, and positive environmental impact.

• **Policy Recommendations:** Identify any necessary policy changes based on monitoring data.

• **Next Steps for Implementation:** Highlight the immediate priorities for the next quarter, focusing on ongoing projects and adjusting for any unforeseen delays or challenges.

Appendix –A

Data Sources for Cost Estimates and Job Creation

1. Government and Regulatory Bodies Reports

- **U.S. Energy Information Administration (EIA)**: Provides comprehensive reports and data on energy production costs, consumption, infrastructure investments, and projections of job creation in energy industries. The EIA's **Annual Energy Outlook** is frequently used for estimating energy costs and job impacts in the U.S. energy sector.
    - Source: *U.S. Energy Information Administration (EIA). (2024). Annual Energy Outlook 2024. EIA Publications.* https://www.eia.gov/outlooks/aeo/
- **U.S. Bureau of Labor Statistics (BLS)**: The BLS offers detailed reports on labor market trends, including employment forecasts in various energy sectors such as renewable energy, fossil fuels, and energy efficiency. This data is key for estimating job creation by energy sub-sector.
    - Source: *U.S. Bureau of Labor Statistics (BLS). (2024). Employment Projections for the Energy Sector. U.S. Department of Labor.* https://www.bls.gov/emp/tables/energy-sector.htm

2. Industry and Market Reports

- **International Renewable Energy Agency (IRENA)**: Provides data on renewable energy project costs and job creation impacts. Their **Renewable Energy and Jobs** report outlines global employment trends in the renewable energy sector and links renewable energy development to job creation.
    - Source: *International Renewable Energy Agency (IRENA). (2023). Renewable Energy and Jobs – Annual Review 2023. IRENA.* https://www.irena.org/Statistics/View-Data-by-Topic/Jobs
- **International Energy Agency (IEA)**: The IEA's annual **World Energy Investment Report** contains data on investment trends in the energy sector, including cost estimations for energy infrastructure projects and projections for job creation in the energy transition.
    - Source: *International Energy Agency (IEA). (2024). World Energy Investment 2024. IEA Publications.* https://www.iea.org/reports/world-energy-investment-2024

3. Energy Project Cost Databases

- **National Renewable Energy Laboratory (NREL)**: NREL provides cost data for renewable energy projects, including solar, wind, and hydropower. Their **Renewable Energy Project Cost Database** offers insight into the capital and operational costs of energy projects.
    - Source: *National Renewable Energy Laboratory (NREL). (2024). Renewable Energy Project Cost Database. NREL Publications.* https://www.nrel.gov/analysis/tech-lcfs.html
- **Lazard**: Lazard's **Levelized Cost of Energy (LCOE)** analysis provides estimates of the cost of energy generation technologies, comparing renewable energy sources to fossil fuels, and includes data on capital investment and cost trends.
    - Source: *Lazard. (2024). Lazard's Levelized Cost of Energy Analysis – Version 17.0.* https://www.lazard.com/perspectives/lcoe2024

4. Academic and Research Institutions

- **Harvard Kennedy School**: Research reports from the Harvard Kennedy School explore the economic implications of energy transitions, including cost projections and job creation in the renewable energy sector.
    - Source: *Harvard Kennedy School. (2023). Economics of Energy Transition: Cost and Employment Perspective. Harvard University Press.* https://www.hks.harvard.edu/
- **Stanford University**: The Stanford Energy Modeling Forum conducts research and provides insights into the costs of energy technologies and the labor market impacts associated with the transition to clean energy.

- Source: *Stanford University. (2023). Energy Transitions and Job Creation: A Global Outlook. Stanford Energy Research Paper.* https://energy.stanford.edu/

5. Private Sector and Financial Institutions

- **World Bank**: Provides financial data and analysis for energy sector projects, including detailed reports on financing renewable energy projects, associated costs, and job creation estimates. Their **Global Economic Prospects** report provides insights into energy investments and their impact on employment.
  - Source: *World Bank. (2023). Financing Renewable Energy Projects: Cost and Employment Impacts. World Bank Publications.* https://www.worldbank.org/en/publication/global-economic-prospects
- **International Finance Corporation (IFC)**: Offers detailed reports on the economic impact of energy sector investments, including job creation metrics for renewable energy projects.
  - Source: *International Finance Corporation (IFC). (2024). Renewable Energy Financing: Jobs and Economic Benefits. IFC Publications.* https://www.ifc.org/en/topics/infrastructure/energy

6. Job Impact Forecasting Models

- **IMPLAN**: The IMPLAN model is frequently used for estimating the economic impacts of energy projects, including the direct and indirect job creation effects in the local and national economy.
  - Source: *IMPLAN Group LLC. (2024). Economic Modeling of Energy Sector Employment. IMPLAN Report.* https://implan.com/
- **REMIND**: The REMIND model, developed by the International Institute for Applied Systems Analysis (IIASA), is used to estimate the job impacts and costs associated with energy transition scenarios.
  - Source: *International Institute for Applied Systems Analysis (IIASA). (2023). REMIND Model for Energy Transition and Employment. IIASA Publications.* https://iiasa.ac.at/

7. International Organizations

- **International Labour Organization (ILO)**: The ILO publishes the **World Employment and Social Outlook** reports, which include data on job creation related to renewable energy projects and energy sector transitions.
  - Source: *International Labour Organization (ILO). (2023). Green Jobs: The Role of Renewable Energy. ILO Publications.* https://www.ilo.org/global/research/global-reports/weso/lang--en/index.htm