Fox Islands Wind Project
Project Quality Management Plan (Part 2)

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PSS Version History

Version #	Date	Author	Key Differences
1.0	10/12/2024	Group 2	Initial Draft
1.1	10/13/2024	Group 2	Revised Quality Improvement Plan (Part I)
1.2	10/16/2024	Group 2	Project Quality Management Plan (Part II) 3. QUALITY CONTROL/METRICS 4. QUALITY IMPROVEMENT PLAN/METHODOLOGY 5. QUALITY ASSURANCE PLAN

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1. INTRODUCTION

1.1. Purpose of Quality Management Plan

The Quality Management Plan (QMP) will define the quality objectives, standards, and roles and responsibilities for the Fox Islands Wind Project. This plan has been developed to ensure that the deliverables meet and exceed stakeholder expectations in a safe manner:

- By reducing electricity costs
- Promoting environmental sustainability
- Ensuring continued community support

It is intended to provide a basis for guiding the quality planning, quality assurance, and quality control activities during the project life cycle. This QMP will also offer a structured method of overseeing performance against pre-determined quality parameters with plans for rectifying any off-type performance as and when necessitated. To address the possible issues for the construction and operating phases, and also the future sustainability of the project, this plan complies with the related laws and regulations as well as with the industry standards. In addition, it is the means of interaction with the project stakeholders, thus providing an open and consistent approach to meeting the chosen quality standards. Therefore, the QMP will improve overall project efficiency and bring maximum benefits to the community.

1.2. Parent or Sponsor Organization Overview

Project Background

Fox Islands Electric Cooperative was founded in 1974 as a community-owned transmission and distribution cooperative to serve the Fox Islands of North Haven and Vinalhaven, located off Maine's coast. FIEC provides the islands with electricity by purchasing power from the New England Grid and managing the local distribution network. This includes the submarine electric cable between the islands and the mainland for a constant electricity supply to the community. Fox Islands Wind Project aims to provide opportunities to reduce the cost of electricity on the islands by taking advantage of available local renewable wind energy with reduced reliance on imported electricity from the mainland. FIEC is dedicated to serving the year-round community's needs and addressing high energy costs among its residents while nurturing energy independence by leveraging renewable energy.

Project Overview

Electricity prices on the Fox Islands currently reach $0.29/kWh, primarily due to high delivery charges and the limited number of customers to absorb these costs. The high cost of electricity threatens the sustainability of the year-round community. As a result, FIEC is researching alternative energy solutions, starting with a wind speed study by the University of Massachusetts Renewable Energy Research Laboratory, which confirms the viability of a wind project.

The community votes overwhelmingly in favor of the wind project, with 384 to 5 votes, giving it the green light to proceed. The Fox Islands Wind Project aims to build three 1.5 MW wind turbines, capable of generating enough electricity to cover more than half of the island's electricity needs annually.

Budget Breakdown

The estimated total project cost for the Fox Islands Wind Project is $14.5 million.

- For a total installed capacity of 4,500 kW, three turbines will be provided at 1.5 MW each, giving a cost per kilowatt of approximately $3,222.22.
- This includes $10 million for the wind turbine equipment and installation, at an average cost of $2,222.22 per kW.
- $2 million for site preparation and construction, at an average cost of $444.44 per kW
- $1 million for integration with the electrical grid, at an average of $222.22 per kW
- $500,000 for environmental and permitting costs, at an average of $111.11 per kW
- $1 million for contingencies and miscellaneous expenses, at an average of $222.22 per kW.

Major Deliverable	Sub-Deliverable	Estimated Cost (USD)
1. Initiation & Planning		
	1.1 Project Charter	$20,000
	1.2 Scope Statement	$15,000
	1.3 Wind Analysis & Environmental Study	$50,000
	1.4 Stakeholder Management Plan	$10,000
	1.5 Communication Plan & Meetings	$5,000
2. Education Materials & Community Vote		
	2.1 Project Management Education Materials	$5,000
	2.2 Community Vote	$5,000
3. Risk Management Plan		
	3.1 Risk Identification and Assessment	$7,000

	3.2 Risk Mitigation Strategies	$3,000
4. Financing and Permitting		
	4.1 Investor Agreement & Loan Procurement	$1,000,000
	4.2 Tax Equity Investors	$4,500,000
	4.3 Legal Documents	$25,000
	4.4 Permitting Strategy	$15,000
5. Procurement and Construction		
	5.1 Procure Wind Turbines and Construction Materials	$10,000,000
	5.2 Permit & Site Selection	$25,000
	5.3 Material Shipment Schedule	$5,000
	5.4 Construction Schedule Management	$10,000
	5.5 Site Preparation and Construction	$2,000,000
	5.6 Safety Management Plan	$15,000
6. System Testing & Grid Integration		
	6.1 System Testing	$25,000
	6.2 Grid Integration	$20,000
	6.3 Performance Monitoring and Reporting	$10,000
7. Quality Management		
	7.1 Quality Management Plan	$15,000
	7.2 Quality Control and Assurance Processes	$10,000
	7.3 Continuous Improvement Initiatives	$5,000
8. Community Engagement		
	8.1 Public Information Sessions	$15,000
	8.2 Ongoing Stakeholder Communication	$5,000
9. Budget Allocation Plan		
	9.1 Budget Allocation	$10,000
	9.2 Logistics & Weather Investigation	$10,000
10. Project Closure		
	10.1 Final Project Review	$10,000
	10.2 Handover and Training	$10,000

1.3. Define Quality Standard

One of the fundamental steps in project quality management is establishing clear, well-defined quality standards that guide the entire process from design to implementation. These standards assist in the fact that every detail of the project – from the design of the turbine to the assessment of the impact on the environment – follows generally accepted standards. The Fox Islands Wind Project should incorporate the following internationally recognized standards:

- ISO 9001: This is the most commonly used quality management standard worldwide, and guarantees that the procedures of a project deliver the expectations and legal standards of customers. The Fox Islands Wind Project could therefore use ISO 9001 to implement a clear working model for the entire project to monitor and enhance each phase to adhere to stringent quality measures across the design, production, and deployment of the wind project (International Organization for Standardization [ISO], 2015).
- IEC 61400: This standard is peculiar to wind turbines and contains design specifications for wind turbine systems. It contains provisions for physical protection, geometric configuration, and behavior under different environmental loads. Adhering to the IEC 61400 guidelines will assist the Fox Island Wind Project to standards of equipment durability, safety, and reliability, especially under the conditions around Fox Island (IEC, 2019).
- ISO 14001: This standard is more specific to environmental management systems making it appropriate for renewable energy projects including wind farms. It enables the organization to discharge its environmental obligations logically to enhance its sustainability. In the case of the Fox Islands Wind Project, implementation of the ISO 14001 standard signifies that the project tackles environmental concerns of the projects in a way that is in agreement with the environmental legislation of the country its location and generally recognized Iso principles of environmental management (ISO, 2015).
- Internal Quality Benchmarks: Besides external sources, the Fox Islands Wind Project can also develop its internal quality standards that are compatible with the company goals, as well as that of the environmental impact and safety standards on the company's performance. Such could be noise reduction standards, recommended service life of turbines, and improved energy storage beyond compliance with legally prescribed standards.

1.4. Parent Organization Quality Policy

Fox Islands Electric Cooperative is committed to providing safe, affordable, and sustainable electric power to its customers. In a nutshell, our policy of quality stands on the cornerstone is of:

- **Providing a quality renewable energy solution** that meets the needs of all stakeholders of the project. It tends to bring down electricity costs for residents from **\$0.29/kWh to approximately \$0.05/kWh**. The drastic reduction in electricity costs is expected to go a long way toward improving the financial stability of year-round residents, who are sensitive to electricity costs compared to wealthy seasonal residents.

- **Ensuring the regulatory requirements are met** and considering the latest best practices in the industry: the **project will follow all set guidelines** related to renewable energy and safety; thus, it ensures all regulations touching on the project life will be met.
- **Enhancing continuous improvement in all aspects of energy generation, distribution, and customer service.** The Fox Islands Wind Project will act as a model for any other small island communities grappling with similar problems to realize just how feasible locally generated renewable energy can be.
- **Community involvement for transparency and development of contentment with the wind energy project.** Attract seasonal residents based on the sustainability feature of the project.

The project also has other objectives, including **carbon footprint reduction** associated with electricity consumption on the islands by a large generation of the required electricity on the island, hence reducing the necessity to use the mainland grid. This will offer long-term savings. Another subsidiary objective of the project is the **sale of the excess energy to the mainland during the off-peak periods** and, therefore, even reduce further costs to residents.

Aspect	Quality Requirements	Quality Planning	Quality Assurance	Quality Control
Noise Levels	Maintain noise levels: 60 dBA (day), 50 dBA (night)	Set standards based on Maine DEP regulations.	Train team on noise management protocols.	Regular noise monitoring with calibrated meters.
		Establish noise monitoring locations.	Conduct audits to verify compliance.	Compare measurements against DEP standards.
		Identify potential community impact from noise.	Quarterly review and analysis of noise data.	Use SPC charts to track noise levels over time.
Environmental Impact	Minimize disruption to local ecology.	Conduct an environmental assessment.	Ensure ongoing compliance with mitigation measures.	Perform environmental audits (flora/fauna).
	Monitor wildlife, vegetation, and water quality.	Set metrics for ecological health monitoring.	Train on best practices for ecological preservation.	Track changes in biodiversity indices.

		Plan for mitigation based on assessment outcomes.	Quarterly environmental review.	Document and act on environmental standards.
Community Satisfaction	Address noise and visual impact concerns.	Identify community expectations via surveys and meetings.	Regular community feedback sessions.	Conduct surveys to gauge satisfaction.
	Conduct community meetings before and after construction.	Develop a plan to handle community concerns post-construction.	Provide public access to project updates and results.	Analyze survey data and take corrective action if necessary.
Turbine Reliability	Target: 11,600 MWh annual output.	Establish performance benchmarks for turbines.	Conduct training on maintenance procedures.	Measure turbine output and downtime.
	Ensure turbines withstand island weather conditions.	Set metrics for downtime, and maintenance frequency.	Internal audit for performance and maintenance.	Compare energy output to target metrics.
		Plan for preventive maintenance.	Quarterly review of maintenance and reliability metrics.	Investigate the root cause if performance deviates from targets.

2. HOUSE OF QUALITY MATRIX

2.1. Role of the HOQ in Project Quality Management

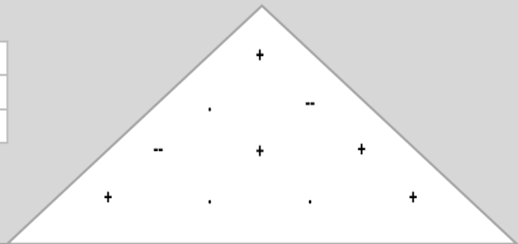
The House of Quality (HOQ) matrix refers to a strategic tool in Quality Function Deployment that links customer requirements to a project's technical specifications. It systematically connects the 'what' – customer needs – with the 'how' – technical solution – so that project teams know which features to prioritize and identify trade-offs during the design phase. As for the Fox Island Wind Project, the HOQ matrix can be useful in the identification of key customers' needs, such as ''Reliable Energy Supply'' and ''Environmental Sustainability'' as well as to check on the technical specifications. Therefore, by prioritizing the requirements based on their importance, the project team will be able to assign the highest priority to the solution that will address the most critical needs of the local community and, at the same time, ensure that technical choices like turbine type and maintenance strategies are aligned with these priorities (Hauser & Clausing, 1988).

Furthermore, the HOQ matrix helps carry out trade-offs and competitive benchmarks, which are essential for making informed design decisions (Govers, 1996). For example, a strong relationship between the customer's requirement for long-term durability and a technical feature such as advanced turbine design can help guide the team toward investing more resources in this area. At the same time, the competitive analysis section allows the project team to compare their solution with others in the market, ensuring that the Fox Island Wind Project maintains a competitive edge by focusing on features that matter most to customers. In this way, the HOQ not only helps optimize the technical aspects of the project but also ensures that the final product is well-aligned with customer expectations.

2.2. House of Quality Matrix

House of Quality

Project title:	Fox Islands Wind Project
Project leader:	Dia Khosla, Giang Trao (Vanessa), Ray Wang
Date:	Oct 7, 2024



Correlation:		
+	.	--
Positive	No correlation	Negative

Relationships:			
9	3	1	
Strong	Moderate	Weak	None

	1: low, 5: high	Desired direction of improvement (↑,0,↓)	↑	0	↑	↑	0		Competitive evaluation (1: low, 5: high)			
	Customer importance rating	Functional Requirements (How's) → Customer Requirements - (What's) ↓	Wind Turbine Capacity (MW)	Grid Integration	Noise Reduction Technology	Off-Grid Capabilities	Energy Storage Systems	Weighted Score	Satisfaction rating	EcoWinds Solutions	TerraTurbine Energy	Others
1	5	Reliable Energy Supply	9	3	1	3	1	85	4	4	5	4
2	5	Reduced Electricity Costs	3	9	9	3	9	165	3	3	2	4
3	4	Environmental Sustainability	3	1	9	1	1	60	2	2	2	3
4	3	Aesthetic Integration	3				1	12	3	4	1	3
5	4	Efficient Operation	3	3	1	3	9	76	3	3	5	2
6	2	Local Job Creation	1	3	1	1	1	14	3	4	4	2
7	3	Long-Term Durability	1	3	9		3	48	3	3	4	3
8	2	Energy Independence	3	3	1	1	1	18	2	3	1	3
9	3	Corrosion - Resistant	9	3	1	3	1	51	4	4	4	3
		Technical importance score	131	106	124	59	109	529				
		Importance %	25%	20%	23%	11%	21%	100%				
		Priorities rank	1	4	2	5	3					
		Current performance	3	4	2	2	4					
		Target	5	5	4	4	5					
		Benchmark	5	5	4	4	5					
		Difficulty	4	3	4	4	5	1: very easy, 5: very difficult				
		Cost and time	4	4	2	2	3	1: low, 5: high				
		Absolute Weight	131	111	127	101	109					
		Absolute Factor	0.23	0.19	0.22	0.17	0.18					
		Relative Weight	32.8	22.2	29.2	11.1	22.9					
		Relative Factor	0.28	0.18	0.24	0.09	0.19					
		Priority to improve	2	4	1	3	5					

Fox Islands Wind Project - House of Quality Matrix

Summary

- Noise Reduction Technology has the highest priority for improvement, given its high importance and relatively lower cost and difficulty.
- Wind Turbine Capacity (MW) is also a high priority, with significant room for improvement, although it has a higher associated cost and difficulty.
- Grid Integration and -Grid Capabilities are moderate priorities.

- Energy Storage Systems has the lowest priority for improvement due to its high difficulty and existing effective performance.

Prioritization of these technical requirements makes it easier for the Fox Island Wind Project to channel its efforts into the best areas to invest in while being economical and avoiding complex problems. It is evident here that potential for sizeable, near-term enhancements are observed with Noise Reduction Technology and Wind Turbine Capacity while improving Grid Integration as well as revising Off-Grid Capabilities should be considered as feasible, but longer-term objectives. Again, the Energy Storage Systems as efficacious as they are need to be revisited in the future when the project is falling into place and when new technologies are available rendering enhancements in this aspect cheaper. This strategic prioritization is in concord with the concept of House of Quality where the result is both a customer-oriented prioritization and technical feasibility.

2.3. Company A & B Overview

Company A: EcoWinds Solutions

EcoWinds Solutions has established itself as being reliable in the renewable energy industry, especially in wind energy solutions: economical and harmonized installations. As a firm that promotes environmental conservation and friendly urban architectures, EcoWinds has developed into an expert on construction projects that adapt both to advanced technology for efficient energy usage and natural landscapes that characterize given regions. Hence, when developing the HOQ, we chose EcoWinds Solutions as the company to be compared, given that their strengths are in affordable, aesthetically integrated wind solutions that would be appropriate for the Fox Island Wind Project.

Company B: TerraTurbine Energy

TerraTurbine Energy is recognized for providing clients with its long-term durability and reliable energy supply in the wind energy industry. Focusing on building infrastructure that stands the test of time, TerraTurbine has successfully numerous high-performance wind projects for areas that offer challenging environmental conditions. Their focus on reliability and cutting-edge energy storage systems has made them a go-to provider for large-scale projects requiring stable and long-lasting energy solutions. We chose TerraTurbine Energy for comparison because their expertise in reliability and durability is vital for ensuring the Fox Island Wind Project meets its long-term energy goals.

2.4. Key takeaways

Prioritizing Energy Reliability and Cost Reduction

- <u>Top Customer Concerns</u>: Reliable Energy Supply and Reduced Electricity Costs both have the highest importance ratings (5).

- Technical Focus: Wind Turbine Capacity (relationship score of 9) and Grid Integration (score of 3) should be prioritized to enhance energy reliability and cost-effectiveness.

The highest customer importance ratings are given to Reliable Energy Supply and Reduced Electricity Costs, highlighting that these are the primary concerns for the Fox Island stakeholders. The technical focus on Wind Turbine Capacity and Grid Integration, which have strong relationships with these customer requirements, aligns with these priorities. This suggests that increasing turbine capacity and optimizing grid integration should be top priorities to enhance energy reliability and cost-effectiveness, ultimately improving customer satisfaction. By focusing on these areas, the project can ensure it delivers on critical operational needs (Hauser & Clausing, 1988).

Environmental Sustainability and Efficiency

- Sustainability Priority: Despite having slightly lower importance (4), Environmental Sustainability remains crucial.
- Technological Links: Noise Reduction Technology (relationship score of 9) strongly aligns with environmental sustainability goals.

Even though Environmental Sustainability is rated with slightly lower importance, however, it remains essential for the project. The high compatibility between Noise Reduction Technology and environmental sustainability means that there is a strong incentive to invest in technologies that reduce impact on the environment. Similarly, Efficient Operation is connected with Energy Storage Systems as well which again, has a score of 9 with Energy Storage Systems, the efficient operation of a system can be maintained and energy can be stored to provide for continued smooth running. These findings align with prior research, which emphasizes the importance of sustainability in energy projects (Govers, 1996).

Competitive Positioning

- Competitor Comparison: TerraTurbine Energy excels in Reliable Energy Supply and Efficient Operation, while EcoWinds Solutions leads in Aesthetic Integration.
- Fox Island Strengths: The project has competitive advantages in Wind Turbine Capacity but needs to focus on Noise Reduction Technology and Corrosion Resistance.

In comparison to competitors, TerraTurbine Energy leads in Reliable Energy Supply and Efficient Operation, while EcoWinds Solutions excels in Aesthetic Integration. Competitive advantages of the Fox Island Wind Project are high in Wind Turbine Capacity, but areas that require attention include Noise Reduction Technology and Corrosion Resistance. According to Akao (1990), by concentrating on these areas of operation as identified in the HOQ's "priority to improve", the constructive project will be able to stay relevant and also tackle any inadequacies in comparison to other industrial players.

Balancing Cost and Performance

- Key Technical Areas: Wind Turbine Capacity (25%), Noise Reduction Technology (23%), and Energy Storage Systems (21%) are the most important technical areas.

- Challenges: Improvements must balance cost and time constraints, particularly for Energy Storage Systems and Noise Reduction Technology, which are more difficult to enhance.

The technical areas with the greatest importance are all the technical areas that contribute directly to the nature and performance of the renewable energy project and have greater impacts on customer satisfaction as well, these include: Wind Turbine Capacity, Noise Reduction Technology, and Energy Storage Systems. However, these improvements will have to be balanced with cost and time factors that will always be key constraints. Similarly concluded in earlier research, cost-effective measures are integral in massive projects such as wind energy (Chan & Wu, 2002). Based on the matrix developed here, increasing the ratio of Energy Storage Systems and Noise Reduction Technology poses relative difficulty; making it important to address such areas in order to enhance the overall success of the project in the future.

Local Economic Impact

- Job Creation: Though Local Job Creation ranks low, involving local contractors can provide additional benefits.

While Local Job Creation ranks as the least important factor, but the project team should still consider how the maximal involvement of local contractors can help bring other advantages. According to Akao (1990), collaborating with local businesses and contractors not only addresses community economic concerns but may also improve stakeholder support, which is crucial for long-term project sustainability.

In conclusion, by utilizing the insights provided by the House of Quality matrix, the Fox Island Wind Project team defines the most important technical requirements to stakeholders and pays much attention to the key issues, such as reliable energy supply, cost reduction, and sustainable power generation. The matrix also identifies opportunities with regard to noise reduction and corrosion control to improve the competitiveness of the project. Making sure the performance metrics do not deviate from the cost aspects guarantees that the project will meet customer requirements and technical applicability for sustainable future development (Cohen, 1995).

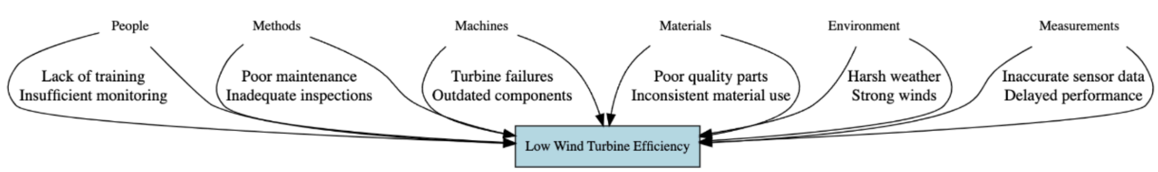
3. QUALITY CONTROL/METRICS

The Quality Control metrics will be on the different key performance standards and criteria on their measurements throughout the Fox Islands Wind Project. These will be tailored towards ensuring that the project will not deviate from the set environment, operation, and community standards.

3.1. Purpose of Quality Control/Metrics

Quality Control (QC) refers to the process of monitoring and evaluating specific project outputs to ensure they meet predefined standards and specifications. When applied to the Fox Islands Wind Project, QC implies checking the condition of the turbine components and the output produced, and the measurement of environmental impacts as well as community satisfaction in an endeavor that undertakes to provide quality, affordable, and sustainable power solutions. By applying consistent inspection, testing, and monitoring techniques, the project can address deviations from the expected performance, ensuring long-term reliability and efficiency (Crosby, 1979).

For example: Below is a diagram presenting possible causes of low wind turbine efficiency. The causes were divided into six groups of people: a lack of training; methods, poor maintenance; machines, turbine failures; materials, poor quality parts; environment, harsh weather; and measurements, inaccurate sensor data. Each one of those categories points out very specific issues that can be influential in making wind turbines less efficient.



This QC plan provides a guideline to help the Fox Islands Wind Project reach its operational objectives while honoring both environmental legislation and community relationships.

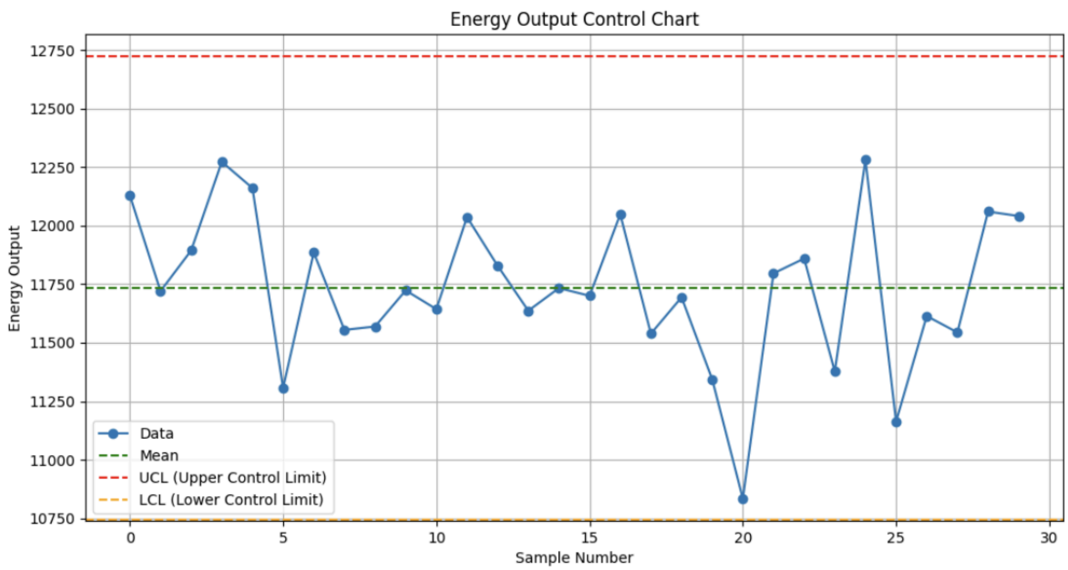
1. **Customer Requirement:** It describes the expectations from any given aspect of quality.
2. **Performance Standard:** Accomplishment of an expectation that is clear and measurable by the undertaking in question.
3. **QC Measurement Metric:** Explains the basis for quantitative measurement of performance, describing what will be measured.
4. **Control Criteria:** Specifies thresholds for taking corrective action.
5. **Response Action:** Shows the steps that will be taken if control criteria are not met.
6. **Frequency:** Indicates how often monitoring and reviews will be performed.

7. **Responsible Party:** Specifies who will be responsible for maintaining the standards and taking action.

Customer Requirement	Performance Standard	QC Measurement Metric	Control Criteria	Response Action	Frequency	Responsible Party
Reliable Energy Supply	Generate 11,600 MWh annually	Quarterly Energy Output (MWh)	Output below 2,900 MWh per quarter	Investigate causes (e.g., turbine issues)	Quarterly	QA and Operations Team
Noise Levels	Day: ≤ 60 dBA, Night: ≤ 50 dBA	Noise Monitoring (dBA)	Exceeds noise limits by 5 dBA	Adjust turbine speed, install dampeners	Monthly	Environmental Team
Environmental Sustainability	Protect local wildlife	Biodiversity Index Monitoring	10% decrease in biodiversity	Implement additional environmental measures	Bi-Annually	Environmental Team
Turbine Performance	Maximize turbine uptime (>95%)	Downtime as a % of operational hours	Downtime > 5%	Increase preventive maintenance checks	Monthly	Maintenance Team
Community Satisfaction	Score 4 or higher out of 5	Community Satisfaction Surveys	Satisfaction scores drop below 4	Conduct meetings, adjust operations	Bi-Annually	Community Relations Team
Noise Reduction Technology	Utilize sound-dampening technology	Effectiveness of noise reduction systems	Noise levels exceed set thresholds	Evaluate and enhance noise reduction technologies	Quarterly	EnvironmentalTeam
Off-Grid Capabilities	Maintain energy independence	Quarterly energy output (MWh)	< 2,900 MWh per quarter	Investigate turbine issues or grid problems	Quarterly	QA and Operations Team
Reduced Electricity Costs	Achieve target cost of $0.29/kWh	Energy cost per kWh	Cost exceeds the set target	Optimize grid usage or renegotiate contracts	Monthly	Finance and Operations
Aesthetic Integration	Maintain community visual appeal	Community feedback on visual impact	Complaints from > 10% of residents	Conduct town hall meetings or adjust operations	Quarterly	Community Relations Team
Efficient Operation	Maximize turbine uptime	Turbine uptime (%)	Uptime < 95%	Increase maintenance frequency	Monthly	Maintenance Team
Local Job Creation	Support local employment	Local job creation numbers	Decrease in jobs below target	Partner with local institutions for more training	Bi-Annually	HR and Operations Team
Long-Term Durability	Ensure turbine lifespan meets expectations	Turbine lifespan (years)	Deviation from the expected lifespan	Schedule preventive maintenance earlier	Yearly	QA and Maintenance Team
Energy Independence	Self-produce at least 50% of energy needs	Percentage of energy self-produced	Less than 50% of energy is self-produced	Enhance off-grid capabilities or reduce reliance on grid	Quarterly	QA and Operations Team
Corrosion Resistance	Use materials with a lifespan of 20+ years	Condition monitoring and inspections	Any signs of wear/corrosion	Replace parts and apply anti-corrosion treatments	Yearly	Maintenance Team
Grid Integration	Achieve seamless integration with the grid	Integration performance metrics	Delays or failures in grid responsiveness	Analyze integration performance, and adjust systems as needed	Monthly	Operations Team
Energy Storage Systems	Ensure operational efficiency of storage solutions	Storage system efficiency metrics	Efficiency drops below 90%	Upgrade or recalibrate storage systems	Quarterly	Maintenance Team
Noise Levels (Maine DEP regulations)	Day: ≤ 60 dBA, Night: ≤ 50 dBA	Sound level monitoring at different community locations	Noise exceeds set limits	Slow down turbine speed, install sound barriers	Weekly	Environmental Manager
Turbine Reliability	Achieve target: 11,600 MWh/year	Monitor energy output and downtime using SCADA systems	Adjust maintenance schedule, replace faulty components	Monthly reviews	Operations Manager	Operations Team
Environmental Impact	Minimize disruption to local ecosystems	Environmental audits on wildlife, water, and vegetation	Non-compliance with the environmental protection plan	Implement mitigation strategies	Bi-annual	Environmental Officer

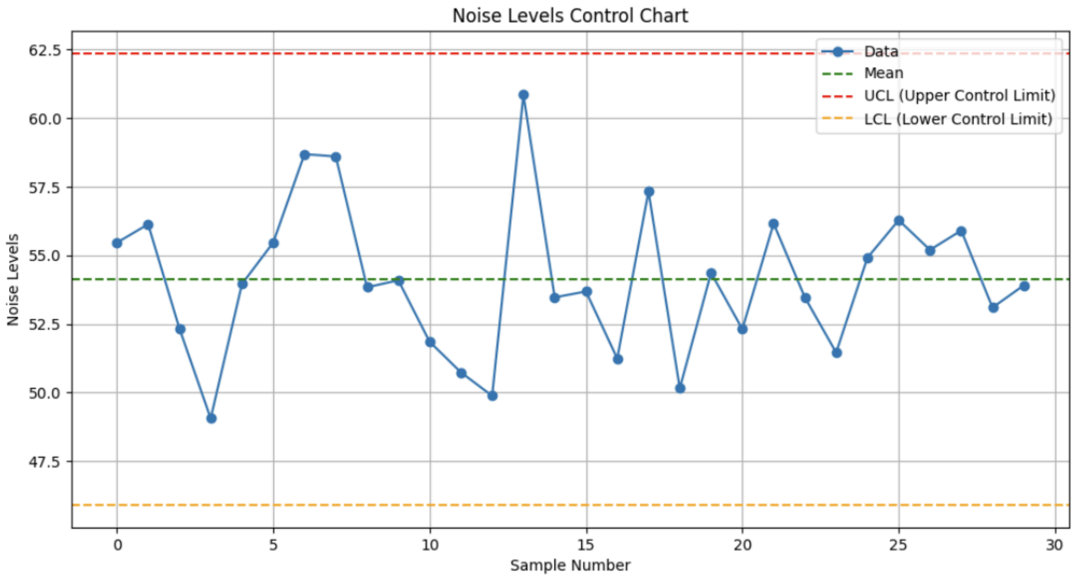
Corrosion Resistant Materials	Use corrosion-resistant materials with a lifespan of 20 years	Condition monitoring and inspections	Any signs of wear/corrosion	Replace parts and apply anti-corrosion treatments	Yearly	Maintenance Team

3.2. Energy Output Control Chart



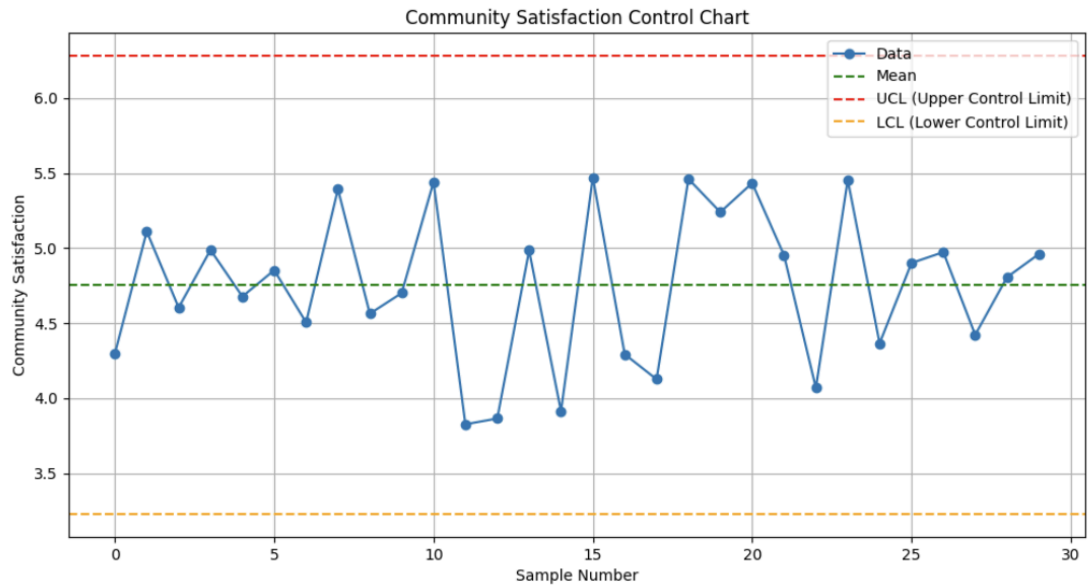
- **Purpose:** The graph below plots the energy output of the turbine versus time, superimposed on graphs of acceptable limits of operation.
    - **Data Points:** These are the measurements for the energy output of the turbine plotted in blue. The variation of the energy output values ranges between 11,000 MWh and 12,500 MWh.
    - **Mean:** The green dashed line represents the average energy output. This is the baseline or target level.
    - **UCL:** It is the upper limit, drawn by the red dotted line, where such a level of energy output means that a severe problem in the process has been reached form of overwork and/or hazard.
    - **LCL:** The brown dotted line shows the minimum acceptable limit. A reading below this limit would indicate that a turbine was underperforming and needed an investigation.
- **Insights**:
    - The chart indicates that the turbine output is generally within control limits.
    - One point to notice is a dip below the lower control limit around sample number 5, which if the output has dropped that much, may require corrective action.
    - Several points deviate from the control limits; there is some variability, but the overall system is still under control.

3.3. Noise Levels Control Chart



- **Purpose**: This chart monitors the noise levels produced by the turbine to ensure that they stay within acceptable thresholds.
  - **Data Points**: Measurements of noise levels (plotted in blue), with values fluctuating between 47.5 dB and 60 dB.
  - **Mean**: The green dashed line shows the average noise level. Ideally, data points should hover close to this value.
  - **Upper Control Limit (UCL)**: The red dashed line marks the maximum allowable noise level. Exceeding this limit indicates excessive noise, possibly leading to regulatory or community concerns.
  - **Lower Control Limit (LCL)**: The brown dashed line indicates the minimum acceptable noise level, which could be relevant for performance issues if the turbine is unusually quiet (indicating potential mechanical failure).
- **Insights**:
  - The noise levels are mostly within the control limits, but there are some points (around samples 10 and 13) that come close to the upper control limit, which might raise concerns about exceeding noise thresholds.

3.4. Community Satisfaction Control Chart



- **Purpose:** This control chart tracks the community's satisfaction over time to ensure that satisfaction levels remain within acceptable limits.
  - **Data Points**: The blue line represents community satisfaction measurements. These values range from approximately 3.9 to 5.3.
  - **Mean**: The green dashed line shows the average satisfaction level, which is around 4.7. This is the target satisfaction level.
  - **Upper Control Limit (UCL)**: The red dashed line indicates the maximum acceptable satisfaction level (around 5.8). Going above this might suggest an unusually high satisfaction level, which could be investigated further to understand the reasons.
  - **Lower Control Limit (LCL):** The orange dashed line marks the lower boundary of acceptable satisfaction (around 3.7). Dropping below this limit suggests dissatisfaction in the community, which would require corrective action.
- **Insights**:
  - The majority of the data points lie within the control limits, indicating that community satisfaction remains relatively stable.
  - **Sample 16** shows a noticeable drop below the lower control limit, indicating a significant decline in satisfaction. This anomaly may require further investigation to determine the cause of dissatisfaction during that period.

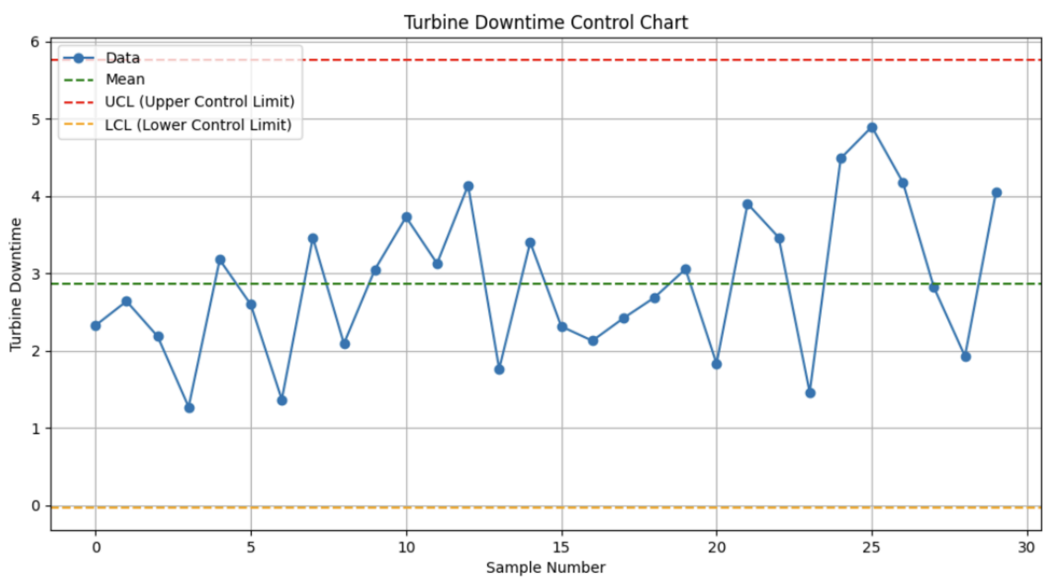
3.5. Turbine Downtime Control Chart

Here's how a control chart might look for tracking turbine output. Any points outside the control limits would trigger investigation and corrective actions.

Month	Turbine Output (MWh)	Upper Control Limit	Lower Control Limit
January	12,000	13,500	10,500
February	11,200	13,500	10,500
March	9,900	13,500	10,500
April	11,500	13,500	10,500

Most noise complaints originate from Turbines 1 and 2. Therefore, noise mitigation efforts should focus primarily on these two turbines.

Control Chart for Noise Complaints	
Turbine	**Number of Complaints**
Turbine 1	40
Turbine 2	30
Turbine 3	10
Turbine 4	5



- **Purpose**: This control chart monitors turbine downtime over time to ensure it remains within acceptable limits, helping maintain efficient operations.
    - **Data Points**: The blue line represents the turbine downtime, which fluctuates between 0.5 and 4.5 hours.
    - **Mean**: The green dashed line shows the average turbine downtime, around 2.5 hours. This is the expected or target level for downtime.

- **Upper Control Limit (UCL)**: The red dashed line marks the upper boundary (around 5.8 hours). Exceeding this line would suggest excessive turbine downtime, which could impact energy production.
- **Lower Control Limit (LCL)**: The orange dashed line is set at 0 hours. Falling below this line isn't possible in this context but would represent a perfectly efficient system.

- **Insights:**
  - All downtime values remain within the control limits, indicating that the turbine's downtime is under control.
  - **Samples 13-17 and 22-26** show notable spikes in downtime, approaching the upper control limit. These spikes may be due to operational or maintenance issues and could warrant further investigation to prevent extended downtime in the future.
  - Overall, while the system is stable, the variability near the control limits suggests the need for continued monitoring to prevent potential process issues.

3.6. Non-Compliance Report Form

The **Non-Compliance Report (**NCR) Form for the Fox Islands Wind Project is designed to help in finding and then completely overcoming any deviation from the quality requirements. Elaborating a format for finding out defects or damages, one can solve problems associated with design, materials, installations, or environmental concerns. The systematic and well-structured approach is considered ideal to ensure quality is maintained together with the project being on schedule (Crosby, 1979).

The form covers important areas of concern, including:

- Report Information: Records information such as report reference number, date, and the person/team reporting the issue.
- Description of Noncompliance: Details the type and nature of the noncompliance, including the location, date of the incident, and its impact on the project.
- Action Report: This describes the direct actions taken to solve the problem. It also covers the investigation into the root cause of the emergence of the problem.
- Corrective and Preventive Action Plan: Maps out how to rectify the existing problem and prevent it in the future, including all responsibilities and due dates.
- Closure: This step ensures that actions are reviewed and approved, with the issue formally closed when resolved. This ensures the effectiveness of corrective measures and maintains project integrity (PMI 2017).

Noncompliance Report (NCR) Form

Report Information	
NCR Reference Number	
Date of Report	
Reported By	
Department/Team	

Description of Noncompliance			
Location			
Date of Incident			
Noncompliance Type	☐ Design Deficiency ☐ Material Deficiency ☐ Installation/Construction Deficiency ☐ Environmental/Noise Noncompliance ☐ Safety Violation ☐ Other:	**Impact of Noncompliance**	☐ Safety Hazard ☐ Environmental Impact ☐ Delay in Project Schedule ☐ Cost Overrun ☐ Poor Performance/Output ☐ Other:
Detailed Description			

Action Report	
Immediate Actions Taken	
Root Cause Analysis	
Corrective and Preventive Action Plan	
Corrective Actions	
Preventive Actions	
Responsible Person/Team	
Deadline for Completion	

Person(s) Responsible for the Corrective/Preventive Action	**Approval of Corrective/Preventive Action**
______________________ *Name* *Date*	______________________ *Name* *Date*
CLOSING THE NONCOMPLIANCE REPORT	
Action Completed ______________________ *Name* *Date*	**Approved By** ______________________ *Name* *Date*

4. QUALITY IMPROVEMENT PLAN/METHODOLOGY

The quality improvement plan for the Fox Islands Wind Project will focus on continuous improvement in key areas such as turbine reliability, noise management, and environmental impact, using a combination of tools such as fishbone diagrams, control charts, and Pareto analysis.

4.1. Purpose of Quality Improvement Plan

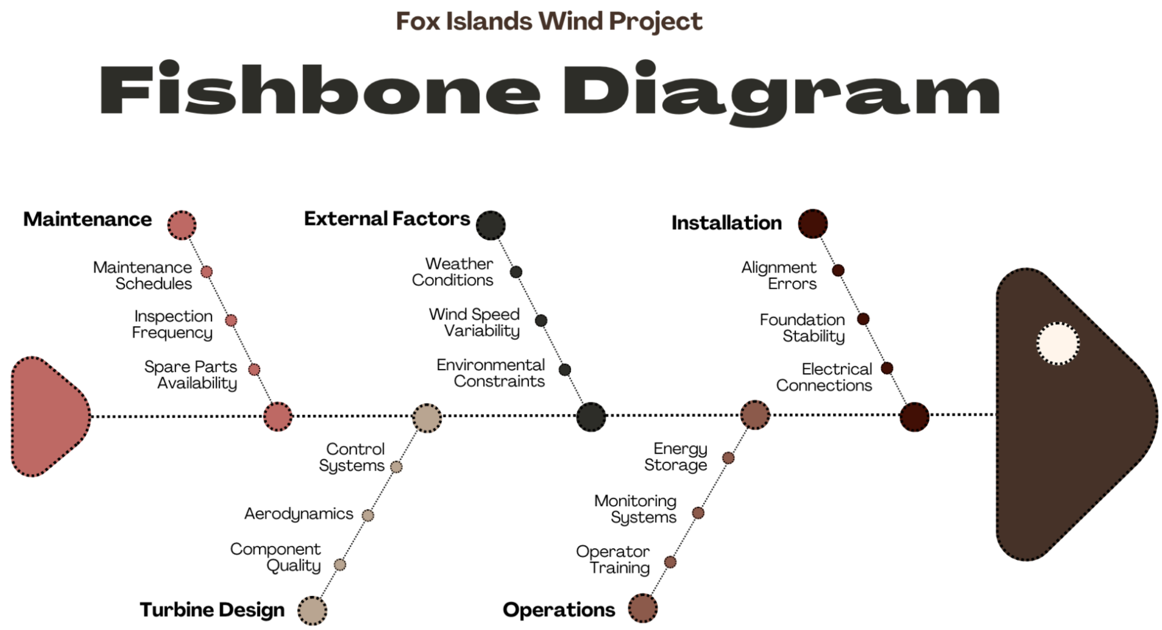
The Quality Improvement Plan (QIP) aims to improve the quality of various aspects of a project through evaluation of the processes and their outcomes to determine if changes that can lead to improvement are necessary. It provides an environment of feedback to do a loop of checking and rectification to sustain organizational performance, productivity, and customers's satisfaction (PMI, 2017).

Key goals for the Fox Islands Wind Project include:

- Enhancing Efficiency: Streamlining processes to eliminate bottlenecks, reduce costs, and optimize resource use.
- Continuous Improvement: Creating a feedback loop from audits and inspections to drive ongoing enhancements.
- Reliability and Performance: Regular reviews and testing to ensure consistent energy production and system reliability.
- Environmental Sustainability: Adhering to ISO 14001 standards to minimize ecological impacts.
- Stakeholder Satisfaction: Addressing community feedback on noise, aesthetics, and local employment.
- Risk and Defect Reduction: Proactively identifying and resolving issues to keep the project on track.

4.2. Quality Analysis Tools for Performance Improvement

Fishbone Diagram (Cause and Effect Analysis)
The Fishbone Diagram will be used to identify the root causes of any quality issues. For instance, if turbines are not achieving the expected 11,600 MWh energy output, a fishbone diagram will help explore factors such as maintenance procedures, turbine design, and external factors like weather conditions.



This example Fishbone Diagram for the Fox Islands Wind Project is a visual tool designed to identify the root causes of the issue: turbines that delivered only 11,200 MWh energy, which was not sufficient to meet the projected 11,600 MWh levels. It systematically categorizes potential contributing factors into five main areas:

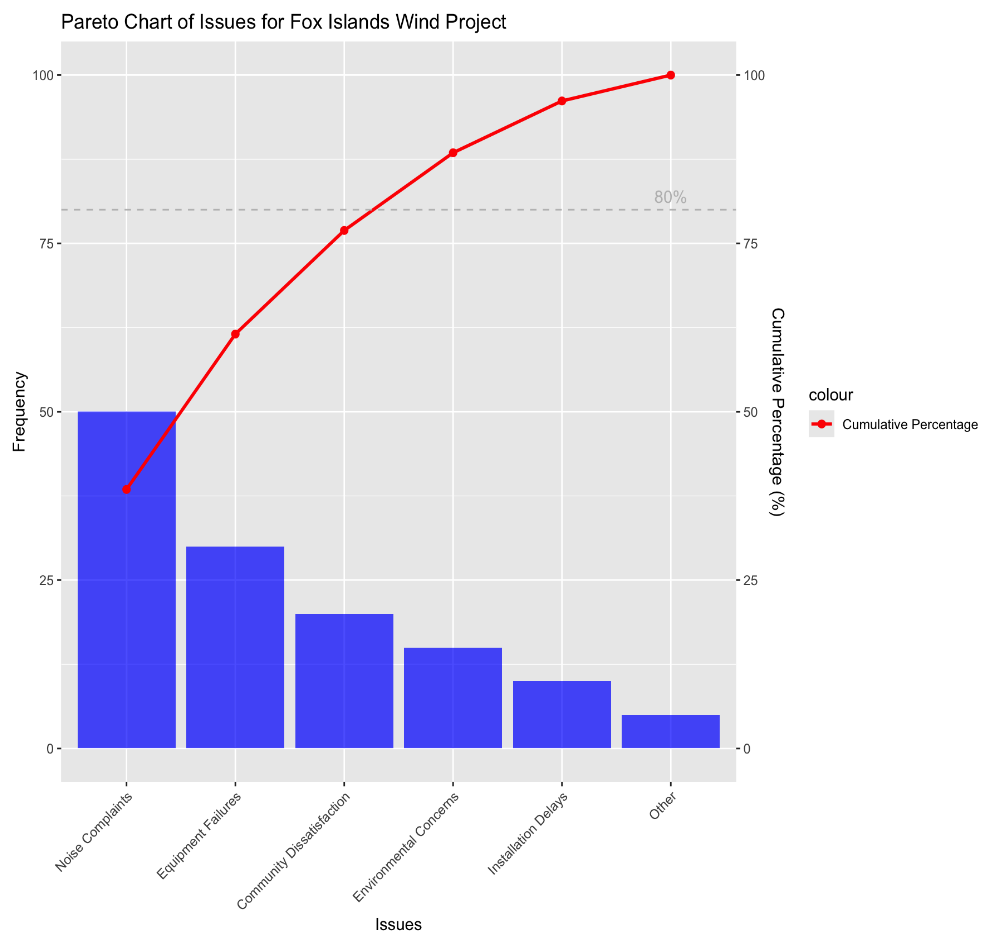
1. Maintenance: This category highlights aspects such as the frequency of maintenance schedules, the frequency of inspections, and the availability of spare parts. Lack of negligence in periodically servicing the equipment results in wear and reduced efficiency, impacting overall energy output.
2. Turbine Design: These include factors such as quality, aerodynamics, and control systems. Poor design or subpar components can lead to inefficiencies and reduced power generation, making it critical to address design-related issues to enhance performance.
3. External Factors: External influences, including weather conditions, wind speed variability, and environmental constraints, can significantly affect turbine performance. Understanding these factors helps in planning and adjusting operations to mitigate their impact.
4. Operations: Include operator training, inadequate monitoring techniques, energy management, and storage systems. In order to manage turbines effectively it is always important to train and monitor the technicians who handle them.
5. Installation: The installation phase can introduce issues such as alignment errors, foundation stability problems, and faulty electrical connections. Ensuring precise installation helps prevent performance issues related to mechanical stress or energy loss.

Control Charts

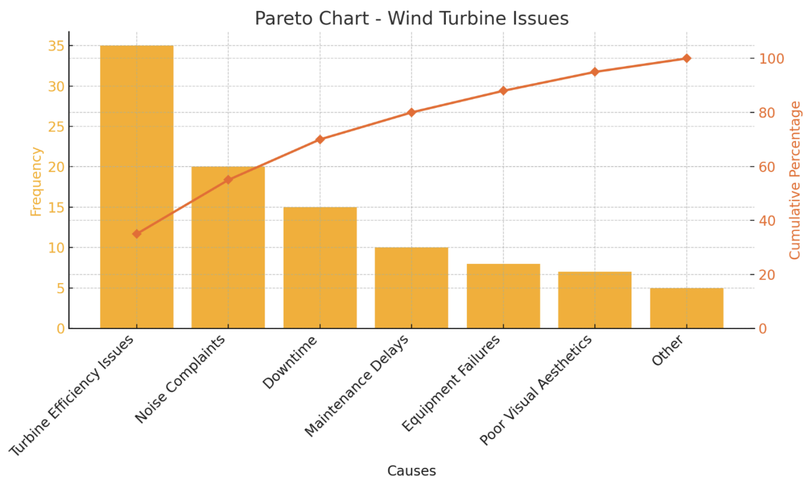
For continuous monitoring, control charts will be used to track the performance of the turbines over time. Variability in output will be analyzed to detect any deviations from expected performance. If outputs fall outside the control limits, immediate corrective actions will be initiated to bring performance back in line. We have referenced some control charts above in the quality control metrics for the Fox Islands Wind Project.

Pareto Analysis

Pareto analysis will help prioritize the most critical issues by showing which factors have the greatest impact on turbine reliability or community satisfaction. For example, if noise complaints are frequent, but energy output issues are more significant in terms of project goals, the latter will be addressed first. For example :



This chart follows the **Pareto Principle** (80/20 rule), implying that a small number of causes (Noise Complaints and Equipment Failures) account for the majority of the issues.



The Pareto principle (80/20 rule) is used here, showing that by focusing on the top few issues (like **Turbine Efficiency** and **Noise Complaints**), one can address a large portion of the overall problems.

Corrective and Preventive Actions (CAPA)
Once the root causes of any issues are identified, corrective actions will be taken to resolve the problem (e.g., adjusting turbine operations to meet energy targets). Preventive actions will also be implemented to ensure the problem does not reoccur (e.g., more frequent maintenance checks).

Responsibilities:

- The **Project Manager** will oversee the quality improvement plan, ensuring that all team members understand their roles.
- The **Quality Assurance Officer** will lead root cause analyses and implement process improvements.
- The **Operations Team** will be responsible for executing corrective and preventive actions.
- **Operations Manager:** The need to ensure that turbines' reliability is ensured and that preventive maintenance, if required, has taken place.
- **Environmental Manager:** Performs environmental audits and acts upon deviations in environmental performance indicators.
- **Community Relations Officer:** Ensures timely addressing of community concerns through regular feedback sessions.

By implementing this quality improvement methodology, the Fox Islands Wind Project aims to ensure that its deliverables consistently meet customer requirements, maintain environmental standards, and achieve project goals efficiently.

4.3. Plan-Do-Check-Act Cycle

To foster a culture of continuous improvement, our project will utilize the Plan-Do-Check-Act (PDCA) cycle, which consists of the following phases:

PDCA (Plan-Do-Check-Act) Cycle

The **PDCA cycle** is an iterative, four-step process that drives continuous improvement in quality management. It is a simple and effective tool for addressing problems and developing solutions over time.

1. **Plan**:
   - **Identify problems or areas for improvement**: Collect data from quality control metrics, customer feedback, and audits to identify where processes are falling short.
   - **Set objectives and goals**: Clearly define what needs to be improved and set measurable goals to track progress. For example, increasing energy output by 5% or reducing noise levels by 10%.
   - **Design a strategy to address the issue**: Develop a detailed plan outlining the steps needed to achieve the improvement, including resources, timelines, and responsibilities. This includes allocating teams to specific tasks or identifying training needs for staff. For instance, plan maintenance schedules to minimize turbine downtime or introduce noise reduction measures.
2. **Do**:
   - **Implement the plan**: Put the improvement plan into action on a small scale to test its effectiveness. For example, trial adjustments to turbine settings or introduce new maintenance protocols for a selected set of turbines.
   - **Monitor implementation**: Keep a close watch on the implementation process to ensure it's proceeding as planned. Any deviations from the planned actions should be noted for review in the next stage.
3. **Check**:
   - **Evaluate the results**: Compare the actual outcomes against the goals set in the planning phase. Use metrics like energy production rates, noise levels, and community satisfaction scores to assess effectiveness.
   - **Analyze performance data**: Review both successes and failures. Identify areas where the plan worked well and areas where it fell short. For example, if noise reduction measures were ineffective, determine why and how to address the issue.
4. **Act**:
   - **Standardize successful improvements**: If the plan was successful, implement the changes across the entire project or organization. Ensure the process is documented and incorporated into the standard operating procedures (SOPs). For

instance, adjust all turbines' settings based on successful trials and update SOPs accordingly.

- **Address failures and re-plan if necessary**: If the results did not meet expectations, identify why the plan failed and modify the strategy. The PDCA cycle can then be repeated until the desired outcomes are achieved.

Step	Description	Fox Island Wind Project
Plan	Identify issues, set goals, and design a strategy	Noise complaints, set a goal to reduce by 10%, develop a noise reduction plan
Do	Implement the plan on a small scale and monitor progress	Trial noise reduction measures on selected turbines
Check	Evaluate the results and analyze the data	Measure noise levels post-implementation, check community feedback
Act	Standardize the successful improvements or re-plan	Apply noise reduction to all turbines or adjust the plan

4.4. Define-Measure-Analyze-Improve-Control Methodology

Application to the Fox Island Wind Project:

- **Define**: Noise from turbines is causing dissatisfaction among local residents. The goal is to reduce noise levels by 10% within six months.
- **Measure**: Baseline noise levels and the number of complaints are recorded. Additional data is collected on turbine settings and environmental conditions.
- **Analyze**: After reviewing data, it is determined that turbine settings and wind conditions are the main causes of noise complaints.
- **Improve**: Noise reduction measures, such as adjusting turbine angles and installing noise suppression equipment, are piloted on selected turbines.
- **Control**: Successful solutions are rolled out across all turbines. Ongoing noise monitoring ensures the problem does not recur, and the process is documented.

The quality improvement plan follows the **DMAIC (Define-Measure-Analyze-Improve-Control)** methodology to ensure that the Fox Islands Wind Project meets customer and regulatory expectations, improves turbine reliability, and maintains environmental sustainability.

DMAIC (Define-Measure-Analyze-Improve-Control) Methodology			
Phase	**Actions**	**Description**	**Tools Used**
Define	Identify problem, set goals	Clearly define the problem or process requiring improvement and align goals with customer needs.	Project Charter, SIPOC Diagram
Measure	Collect data, establish metrics	Gather relevant data to assess current performance and create baseline metrics. Identify key performance indicators (KPIs).	Control Charts, Process Maps
Analyze	Identify root cause	Analyze collected data to determine the root causes of performance issues and explore potential solutions.	Fishbone Diagram, 5 Whys, Pareto Analysis
Improve	Implement solutions	Develop and test solutions to address the root causes of the problem. Conduct pilot testing on a small scale before full implementation.	Process Redesign, Pilot Testing
Control	Monitor process, standardize	Monitor the process to ensure sustainability. Implement control mechanisms and standardize improvements across the project.	Control Charts, Standard Operating Procedures (SOPs), Quality Audits

Identifying and Addressing Issues

Identifying issues will involve proactive monitoring of project performance using quality control tools such as control charts and surveys. Regular audits and feedback loops will be utilized to ensure any deviations from quality standards are promptly addressed.

When an issue is identified:

- **Root Cause Analysis**: Use tools like the 5 Whys or fishbone diagrams to delve into underlying issues.
- **Solution Brainstorming**: Engage stakeholders to explore potential fixes for identified issues.
- **Pilot Testing**: Test solutions in controlled settings to verify before broader implementation.
- **Feedback and Refinement**: Continually collect feedback to ensure changes align with project goals and community needs.

Step	Description	Tools Used
Root Cause Analysis	Investigate the root cause of quality issues to avoid superficial fixes.	Fishbone Diagrams, 5 Whys
Solution Brainstorming	Collaborate with the team to generate potential solutions and evaluate their feasibility.	Brainstorming, SWOT Analysis
Pilot Testing	Implement solutions in a controlled environment to test their effectiveness.	Pilot Programs, Data Collection
Feedback and Refinement	Gather feedback and adjust the solution for continuous improvement.	Customer Feedback, Continuous Audits

5. QUALITY ASSURANCE PLAN

Quality assurance management for the Fox Islands Wind project involves the establishment of a Quality Assurance Plan (QAP), a systemized framework demonstrating the processes, roles, and responsibilities for maintaining quality conformance in a project. The QAP plays a system-control role across the project's planning, implementation, and operations phases to ensure that the results meet expectations and legal requirements as well as respect environmental goals.

5.1. Purpose of Quality Assurance Plan

A Quality Assurance Plan (QAP) is a documented methodology employed to secure the achievement of the desired quality of a project. It is strategic, as its fundamental approach is dedicated to preventing errors while improving key project activities. The QAP outlines the roles and responsibilities as well as the processes and quality parameters by which a project is executed throughout the production process, and the finished products or delivered services meet consumers' requirements and are free from nonconformities (Juran, 1988). In addition, where quality control is a post-production process that addresses products, quality assurance is a proactive procedure whereby various activities, including planning, audits, and ongoing surveillance of activities, are conducted to ensure quality (Crosby, 1979). A well-defined QAP is essential in projects like the Fox Islands Wind Project to ensure that quality objectives, such as reliable energy supply and environmental sustainability, are met at each phase of the project.

5.2. Quality Assurance vs. Quality Control

Quality Assurance (QA)

- Focus: QA is process-oriented, ensuring that the methods and processes used during the project are efficient and aligned with the desired quality standards. It focuses on preventing defects by systematically improving processes throughout the project lifecycle (Garvin, 1987).

- Objective: The main goal of QA is to enhance processes to ensure that the final deliverables meet customer expectations and industry standards (PMI, 2017). It covers activities such as audits, process reviews, and compliance checks, ensuring that all stages of the project, from design to implementation, follow best practices.
- In the Fox Islands Wind Project, QA would include periodic assessments whose purpose would be to determine whether the construction of the turbines, transmission, and connection to the grid had been done according to the ISO 9001 standards.

Quality Control (QC)

- Focus: QC is product-oriented and focuses on identifying defects in the final deliverable. It involves testing, inspection, and validation of the output to ensure that it meets predefined specifications (Crosby, 1979).
- Objective: The main goal of QC is to identify and correct defects in the final product before delivery (Juran, 1988). It is the type of process that comes immediately after the production phase whereby wind turbines are inspected, and the functionality of energy output is tested in the Fox Islands Wind Project.
- In the Fox Islands Wind Project, QC would encompass checking the energy yield of the turbines to confirm that it has the capacity to spew 11,600 MWH annually and checking that noise levels adhere to local environmental regulations.

Similarities

- The goal of QA and QC is to meet the quality standard of the project product and align with the customer’s specifications (PMI, 2017).
- They are both elements of a quality management system that align the project outcomes with delivering dependable and stable energy to the community in the Fox Islands.
- QA and QC are two continuing activities, in which QA is an ongoing process optimization during the project implementation, while QC ensures that the final product meets specific performance criteria.

Differences

- QA is proactive, preventing defects through better process management, while QC is reactive, identifying and addressing defects after they have occurred (Deming, 1986).
- QA focuses on the processes used during the project, while QC focuses on the end product or deliverable (Garvin, 1987).
- QA is the overall procedure of checking the quality in all the phases before the delivery of the project, while QC is the procedure of examining the quality before the completion and delivery of a product.

5.3. Quality Assurance Plan

5.3.1. Quality Objectives

The main quality objectives for the Fox Islands Wind Project are:

- Reliable Energy Supply: Ensure the wind turbines produce a reliable, consistent supply of energy, meeting the annual target of 11,600 MWh.
- Environmental Sustainability: Minimize the project's impact on local ecosystems, ensuring compliance with environmental regulations.
- Cost-Effective Operations: Keep costs within budget while optimizing performance.
- Community Satisfaction: Engage with the local community to address concerns related to noise, aesthetics, and economic impact.

5.3.2. Quality Standards

The project will comply with the following international and internal quality standards:

- ISO 9001: Ensures that quality management practice is maintained throughout the project (ISO, 2015).
- IEC 61400: Standardises the specifications of wind turbines to guarantee operability, dependability, and reliability (IEC, 2019).
- ISO 14001: Helps to develop the necessary approach to environmental management, with emphasis on its sustainability and compliance with all the laws and standards (ISO, 2015).

Internal quality benchmarks will also be developed to address the project's unique requirements, such as noise reduction, turbine durability, and community satisfaction.

5.3.3. Roles and Responsibilities

Project Manager: Supervises the execution of the QAP to achieve all quality benchmarks.

Quality Assurance Team: Conducts audits, inspections, and testing to verify that the project meets quality objectives.

Construction Team: Manages quality during construction by ensuring that quality design specifications are followed and proper measures of environmental impacts are followed.

Community Engagement Team: Aids in the communication of stakeholders, and gathers information to ensure community satisfaction.

5.3.4. Quality Assurance Processes

At key phases of the project, quality assurance processes will be integrated to ensure consistent quality throughout the project lifecycle.

1. <u>Design Phase</u>:

- Refer to the design documents to know the compliance with quality characteristics and environmental requirements.
- Provide an environmental and conditions analysis that is likely to indicate risks related to reliability, maintainability, and safety.

2. Supplier Selection Phase:

- Allow suppliers' selection and evaluation based on how well they can meet project quality standards regarding turbine reliability and sustainability.

3. Construction Phase:

- Conduct regular inspections to ensure that building processes are in line with design specifications and safety protocols.
- Perform environmental audits to minimize disruption to local ecosystems, thereby meeting the requirements of ISO 14001.

4. Testing and Commissioning Phase:

- Conduct performance testing of turbines to meet benchmarks for energy output and reliability.
- Monitor any environmental impact during the ramp-up phase of operations and adapt as appropriate to limit/eliminate negative impacts.

5. Operational Phase:

- Design a structured methodology for periodic performance assessment of the turbines coupled with simultaneous associated environmental effects.
- Plan effective maintenance schedules to spend as little time as possible in prolonging the life of the turbines when it might not be necessary.

5.3.5. Audits and Reviews

Internal Audits: Conduct quarterly audits to check if all activities are meeting the required quality level, including construction work, supplier performance, and community engagement.

Third-Party Audits: External consultants will review the project at critical milestones to ensure compliance with industry standards (ISO 9001 and IEC 61400).

5.3.6. Corrective Actions

Identification of issues: Through regular audits and community feedback sessions, deviations from the set quality standards would be recorded.

Corrective action plan: Where necessary, the team shall draw up and implement corrective measures to do with turbine performance issues, environmental violations, or complaints from the community.

Follow-up/Monitoring: The corrective actions will be implemented then followed by monitoring for a certain period to ensure that the problem has been entirely resolved and will not recur.

5.3.7. Continuous Improvement

The QAP includes a process of continuous improvement. Emphasis is given to the identification of the lessons learned from each project phase. Issues are to be documented along with corrective actions so that the team may use the information for improving the future phases of the project and apply best practices to similar projects in the future.

5.3.8. Documentation and Reporting

All the quality assurance activities carried out will be documented in project reports. This report will comprise audit results, inspection, community feedback sessions conducted, and any corrective action taken to effect compliance. Regular reporting will help all the stakeholders stay abreast with the progress and quality status of the project.

5.4. Management Review Form

MANAGEMENT REVIEW FORM

PROJECT NAME	FOX ISLANDS WIND PROJECT		
REVIEW CONDUCTED BY		DATE OF REVIEW	

QUALITY OBJECTIVE REVIEWS				
QUALITY OBJECTIVE	TARGET PERFORMANCE	ACTUAL PERFORMACE	STATUS (MET/NOT MET)	COMMENTS/ACTION NEEDED
Reliable Energy Supply (MWh)	11,600 MWh			
Environmental Sustainability	Compliance with ISO 14001			
Turbine Downtime	< 2% annually			
Cost-Effective Operations	Within Budget			
Community Satisfaction	Noise < 60 dBA (Day), < 50 dBA (Night)			

REVIEW OF NON-COMFORMITIES & DEFECTS
LIST OF IDENTIFIED NON-COMFORMITIES
ROOT CAUSE ANALYSIS
CORRECTUVE & PREVENTIVE ACTIONS

PERFORMANCE OF QUALITY ASSURANCE SYSTEM
INTERNAL AUDITS
Have all scheduled internal audits been completed? (Yes/No) Comments:
THIRD-PARTY AUDITS
Have all required third-party audits been conducted? (Yes/No) Comments:
PROCESS EFFECTIVENESS
Assess the overall effectiveness of the Quality Assurance processes in place (Rate 1-5, 1 being poor, 5 being excellent): ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Comments:

RESOURCES & TRAINING
ADEQUACY OF RESOURCES
Are the resources (manpower, equipment, etc.) sufficient to maintain quality? (Yes/No) Comments:
TRAINING
Have all required quality assurance training programs been completed? (Yes/No) Comments:

COMMENTS AND APPROVAL			
RECCOMENDATION FOR IMPROVEMENT			
PROJECT MANAGER SIGNATURE		REVIEWER SIGNATURE	

This form helps in documenting the outcomes of a management review focused on quality assurance, allowing the project team to track progress, identify issues, and implement improvements.

Overall, the Fox Islands Wind Project Quality Assurance Plan is set to ensure the realization of the quality objectives: providing reliable, cost-effective, sustainable energy to the local community. It shall assist in assuring that the Fox Islands community benefits maximally from this project by ensuring that the work done is according to international standards through continuous monitoring and active involvement with all stakeholders.

6. SIGN OFF PAGE

Role	Name	Signature	Date
Project Manager	Giang Trao	Giang Trao	10/16/2024
Project Manager	Ray Wang	Ray Wang	10/16/2024
Project Manager	Dia Khosla	Dia Khosla	10/16/2024

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