JRSP - SECRETARIA
NEGOCIADO DE ENERGIA
DE PUERTO RICO
2019 SEP -6 AM 11:26

GOBIERNO DE PUERTO RICO
JUNTA REGLAMENTADORA DE SERVICIO PÚBLICO
NEGOCIADO DE ENERGÍA DE PUERTO RICO

IN RE: Revisión del Programa Comprensivo de Manejo de Vegetación de la Autoridad de Energía Eléctrica	Caso Núm. NEPR-MI-2019-0005 **ASUNTO:** Radicación del Borrador Final del Programa Comprensivo de Manejo de Vegetación

Moción en Cumplimiento de Orden

Al HONOROIBALE NEGOCIADO DE ENERGÍA DE PUERTO RICO:

Comparece la Autoridad de Energía Eléctrica de Puerto Rico ("Autoridad"), y presenta al Negociado de Energía de Puerto Rico ("NEPR") esta Moción en cumplimiento con la Resolución y Orden del del 22 de agosto de 2019, (Resolución) en el caso de epígrafe.

Mediante la mencionada Resolución, el NEPR ordenó a la Autoridad, en síntesis:

1. Comparecer a la Conferencia Técnica del 11 de septiembre de 2019, a las 10:00 am.
2. Asegurarse que sus representantes estén preparados para contestar preguntas del NEPR y proveer cualesquiera documentos adicionales.
3. Someter copia de la presentación que utilizará durante la Conferencia Técnica en o antes del 6 de septiembre de 2019, a las 12:00 pm.

En cumplimiento con la la mencionada Resolución, incluimos copia de la presentación que utilizará la Autoridad en la Conferencia Técnica del 11 de septiembre de 2019.

Por todo lo cual, la Autoridad respetuosamente solicita que el Honorable Negociado de Energía dé por cumplida la Orden del 22 de agosto de 2019, en lo que respecta a la radicación de la mencionada presentación.

Respetuosamente sometido, en San Juan, Puerto Rico, 6 de septiembre de 2019.

Autoridad de Energía Eléctrica de Puerto Rico

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CERTIFICACIÓN DE ARCHIVO Y NOTIFICACIÓN

Por la presente Certifico, que el 6 de septiembre de 2019, se radicó la presente Moción en la Secretaría del Negociado de Energía de Puerto Rico localizada en la Avenida Muñoz Rivera #268, Edificio Seaborne Plaza, Oficina 202, San Juan, Puerto Rico 00918, y a través de correo electrónico a: secretaria@energia.pr.gov y a la Oficina del Asesor Legal a las siguientes direcciones: sugarte@energia.pr.gov, y legal@energia.pr.gov.

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Puerto Rico Electric
Power Authority

COMPREHENSIVE VEGETATION MANAGEMENT PROGRAM

Transmission and Distribution Infrastructure

Transmission Lines (Miles)					
230KV		115KV		38KV	
OH	UG	OH	UG	OH	UG
423.34	0.63	679.71	30.43	1,463.81	85.61
423.97		710.14		1,549.42	
TOTAL 2,683.53					

Distribution Lines (Miles)									
7.62/13.20KV		4.80/8.32KV		4.16/7.20KV		2.77/4.80KV		2.40/4.16KV	
OH	UG	OH	UG	OH	UG	OH	UG	OH	UG
2,565.12	2,524.50	3,709.46	347.91	422.01	59.06	17.23	0.74	6,652.32	507.60
5,089.62		4,057.37		481.07		17.96		7,159.92	
TOTAL 16,805.95									

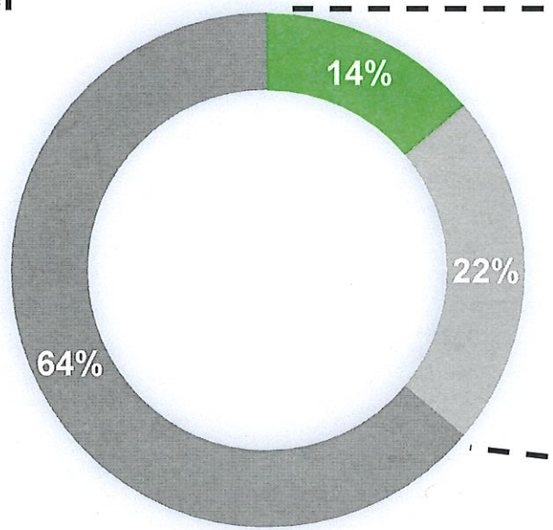
16,000 Miles of overhead circuit

Vegetation-Related Interruptions

Vegetation Management

PREPA Power Outages by Cause

- Vegetation
- Unkown
- Others



PREPA outages related to Vegetation Management represent ***approximately 14% of interruptions***

A large percentage of outages due to unknown causes ***may*** be related to vegetation

Comprehensive Vegetation Management is Critical to Provide Safe & Reliable Energy for Puerto Rico

Regulations Regarding Vegetation Management

Vegetation Management

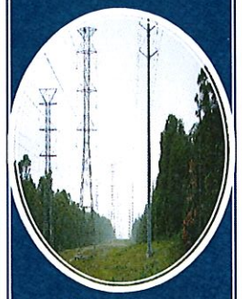
Vegetation that may damage ungrounded supply conductors should be removed. Factors to consider in determining the extent of vegetation management required include, but are not limited to: line voltages, species of vegetation growth rates and failure characteristics, the vegetation's location in relation to the conductors, the potential combined movement of vegetation and conductors during normal winds, and sagging of conductors due to elevated temperatures.

Puerto Rico's Energy Public Policy Act 17-2019, Section 1.16 requires PREPA:

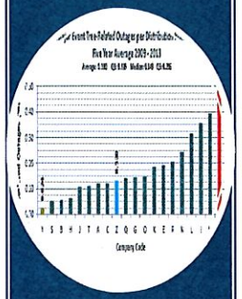
- Follow vegetation management industry best practices to protect the integrity of network assets
- Maintain at least ten (10) feet between the trees and easements for the transmission lines in accordance with the National Electric Safety Code Standard (NESC)
- Regularly patrolling and trimming any vegetation or materials that are next to the power lines
- Adopt the recommendations for tree trimming established by accepted industry standards, such as those stablished by the American National Standard Institute (ANSI)
- Produce periodic and detailed reports of compliance with the vegetation program
- Establish an appropriate and independent fund for the vegetation management program

Program Objectives

Maintain compliance with Federal and Puerto Rico safety, environmental and vegetation management regulations

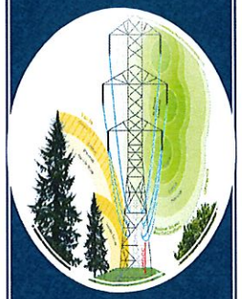


Manage vegetation for the safe and reliable operation of the transmission and distribution systems and substations



Minimize vegetation related interruptions

Establish a vegetation management multi-year, cycle-based maintenance program for transmission, distribution, and substation facilities



Establish clear specifications for all aspects of vegetation management

Reduce short- and long-term vegetation management expenses

Establish and maintain good relations with customers and landowners

Safety, Reliability and Resiliency are the Cornerstones of PREPA's Comprehensive Vegetation Management ("VM") Program

Safety Policy

PREPA and contracted personnel performing VM work shall adhere to Federal & Puerto Rico safety regulations

OSHA Standard 1910.269 is the Occupational Safety and Health Administration's vertical standard pertaining to work relating to the generation, transmission, and distribution of electricity. A specific section of OSHA 1910.269 requires that individuals performing tree work in proximity to power lines and other electrical infrastructure must be qualified and their training must be documented. OSHA 1910.269 also establishes minimum approach distances for tree workers based on their qualifications.

ANSI Z133 is the American National Standard for Arboricultural Operations – Pruning, Maintaining, and Removing Trees and Cutting Brush.

ANSI Z133 provides information that can be helpful in understanding and complying with the requirements contained in

OSHA Standard 1910.269.

What is in OSHA 1910.269

- Determine the voltage(s) of any lines that may pose a hazard before work begins.
- Ensure their body parts and any ladders, platforms, or aerial devices being used remain outside the minimum approach distance from any energized part.
- Use only insulated tools and equipment to remove branches and limbs that are in contract with, or are within the minimum approach distance of, energized parts.
- Not work during adverse weather conditions (high winds, icing, thunder and lightning, etc.) that make the work hazardous.

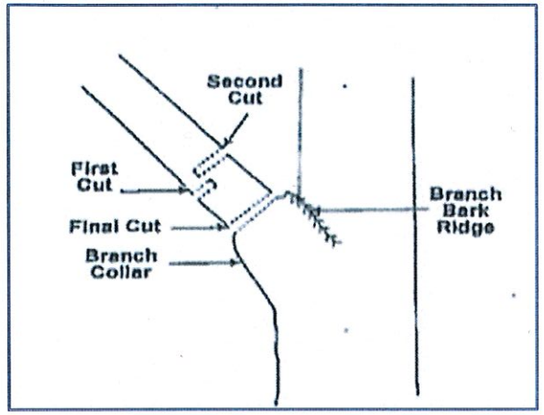
What is in ANSI Z133

- Safe use of Vehicles, Mobile, and Towed
- Equipment used in Arboriculture
- Portable Power Hand Tools
- Hand Tools and Ladders
- Tree Climbing

ANSI A300 Industry Best Practices

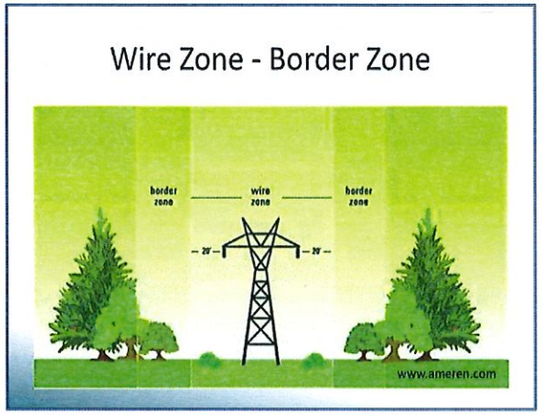
The American National Standards Institute (ANSI) A300 standards represent the industry consensus on performing tree care operations. They have been prepared by professionals in the industry and can be used to improve company efficiency and to prepare tree care contract specifications.

Portions of ANSI A300 refer specifically to Vegetation Management



Pruning Practices

Best practices for the physical work of mitigating vegetation in and around critical infrastructure



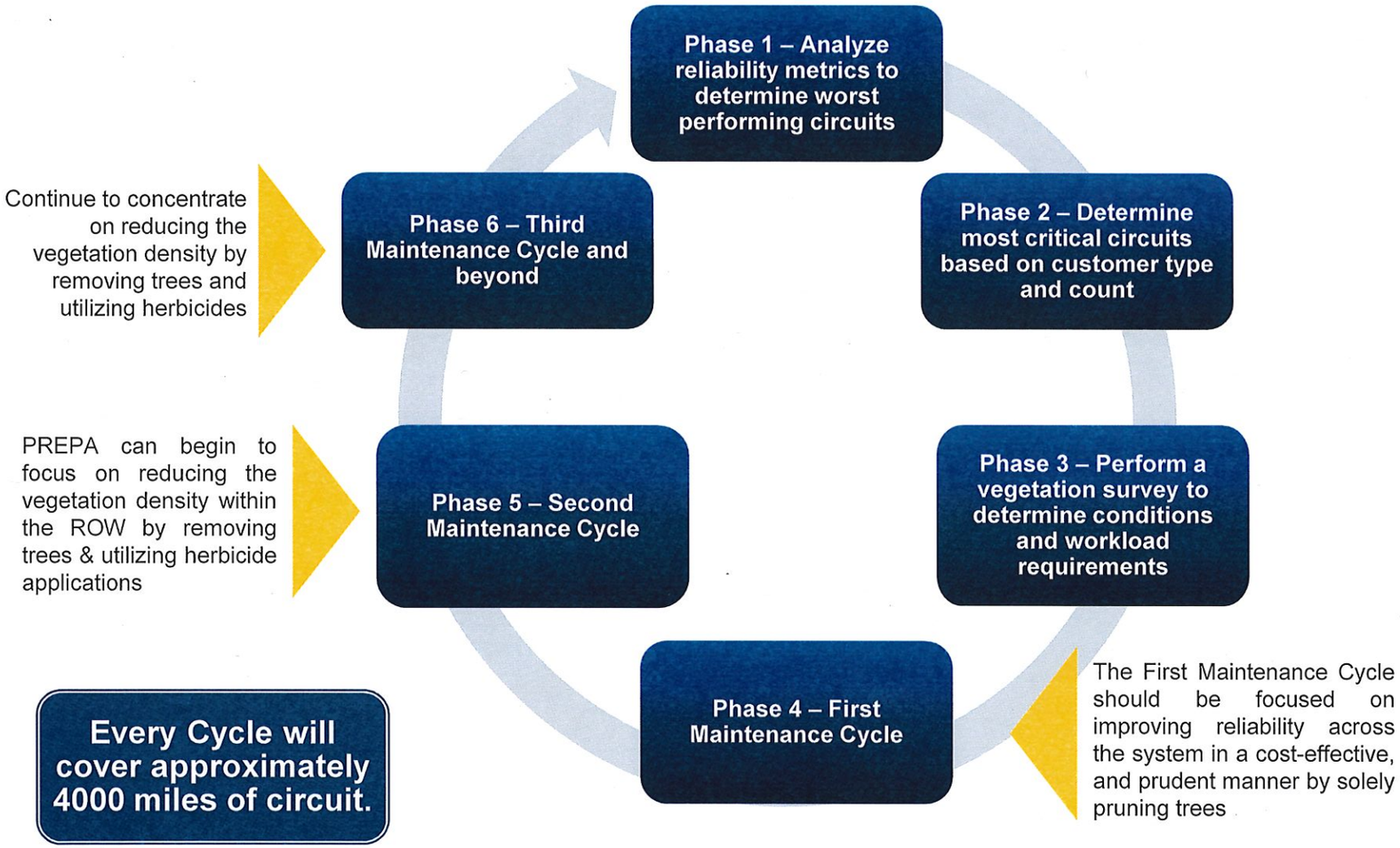
Integrated Vegetation

Creation and implementation of integrated vegetation management plans to ensure safe and reliable operations in and among utility systems

Tree Risk Assessment

Assessing vegetation for risk of interfering with the safety of the public and/or reliable operations of the utility's assets

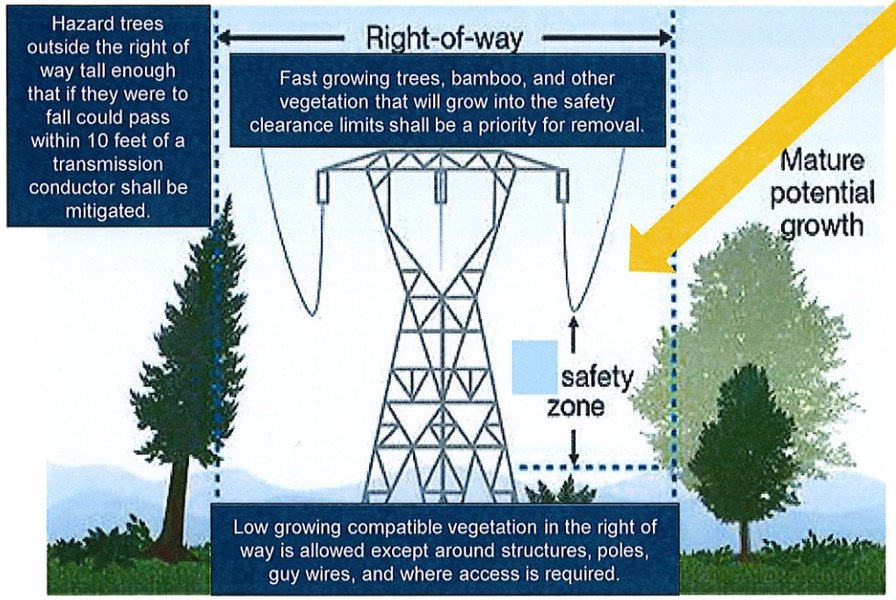
Cycle-Based Approach to Vegetation Management



Every Cycle will cover approximately 4000 miles of circuit.

A Cycle-Based VM Methodology will Produce Near-Term Improvements in System Reliability while Managing Within a Budget

Transmission Clearing & Pruning Standards

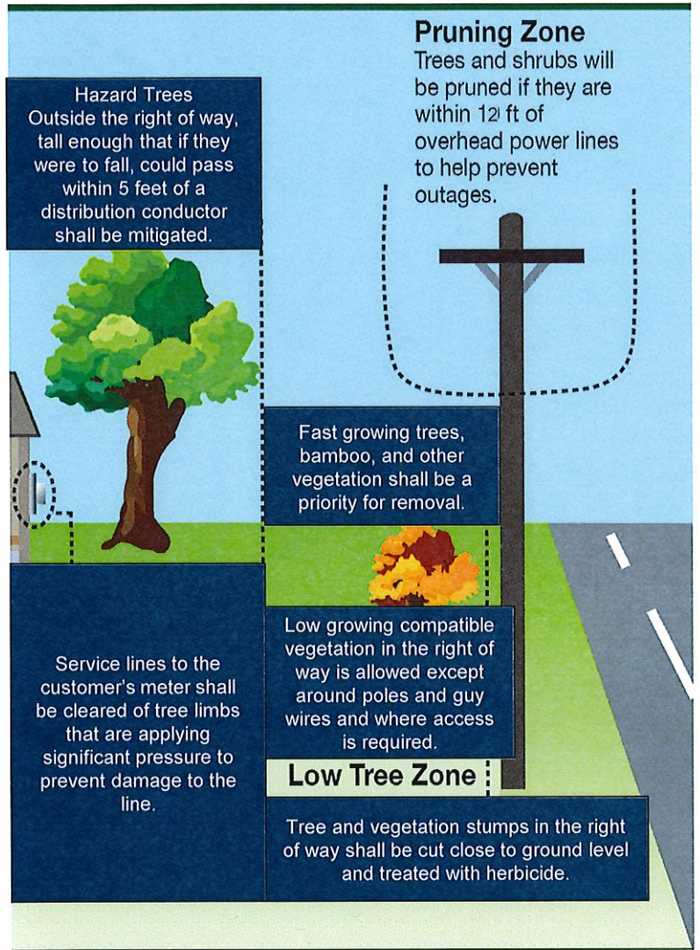


Safety Clearance Limits	
Voltage (kV)	Clearance (ft)
230	20
115 (36300,37400,38300 and 39000)	20
115	15
38	12

Right of Way Widths				
Construction Type	Zone	Voltage (kV)		
		38	115	230
Single Circuit	Urban	25'	30'	40'
	Rural	50'	100'	100'
Double Circuit Same Structure	Urban	25'	40'	60'
	Rural	50'	100'	100'
Double Circuit Diferent Structures	Rural	50'	100'	100'

- Trees and vegetation shall be cleared from the transmission conductors to the extent within the power line right of way so that the vegetation does not violate the safety clearance limits.
- No overhanging branches are allowed on or over transmission conductors.
- Hazard trees outside the right of way tall enough that if they were to fall could pass within 10 feet of a transmission conductor shall be mitigated.
- Fast growing trees, bamboo, and other vegetation that will grow into the safety clearance limits for transmission conductors prior to the next maintenance cycle shall be a priority for removal.
- Tree and vegetation stumps in the right of way shall be cut close to ground level and treated with herbicide.
- Vegetation growing around structures, poles, and guy wires shall be cleared to provide for a minimum of 10 feet of clearance. Vegetation cleared shall be treated with herbicide. Cone type or kudzu guards shall be installed to prevent vines from climbing guy wires.
- Low growing compatible vegetation in the right of way is allowed except around structures, poles, guy wires, and where access is required. Low growing compatible vegetation is defined as vegetation at its maximum mature height would not grow within PREPA's safety clearance limits.

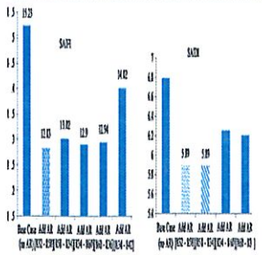
Distribution Clearing & Pruning Standards



Right of Way Widths	
Construction Type	Voltage (kV)
	13.2
Distribution line Primary and Secondary	10'

- Trees and vegetation shall be cleared to provide for a minimum of 12 feet of clearance to the sides and below the primary conductor.
- Vegetation shall be cleared to provide for a minimum of 15 feet of clearance above the primary conductor. Branches above 15 feet shall be removed or shortened so that if they broke and fell, the falling branches would not impact the primary conductor.
- Hazard trees, outside the right of way, tall enough that if they were to fall, could pass within 5 feet of a distribution conductor shall be mitigated.
- Fast growing trees, bamboo, and other vegetation that will grow into the safety clearance limits for distribution conductors prior to the next maintenance cycle shall be a priority for removal.
- Tree and vegetation stumps in the right of way shall be cut close to ground level and treated with herbicide.
- Vegetation growing around poles and guy wires shall be cleared to provide for a minimum of 5 feet of clearance. Vegetation cleared shall be treated with herbicide. Cone type or kudzu guards shall be installed to prevent vines from climbing guy wires. Vines ascending structures, poles and guys shall be cut at ground level and again beneath the lowest conductor and the guy wire insulators. All growth between the two cuts shall be removed from the pole and guy wires. Vines shall be left above the highest cuts for safety reasons.
- Insulated and bundled secondary (Triplex) up to the pole serving the customer, shall be cleared of vegetation to provide for a minimum of 5 feet of clearance.
- Service lines to the customer's meter shall be cleared of tree limbs that are applying significant pressure to prevent damage to the line and to prevent property damage.
- Low growing compatible vegetation in the right of way is allowed except around poles and guy wires & where access is required. Low growing compatible vegetation is defined as vegetation which at its maximum mature height would not grow within PREPA's safety clearance limits (12ft).

Cycle-Based Approach to Vegetation Management



Analyze reliability metrics to determine worst performing circuits based on vegetation outages. Determine most critical circuits based on customer type and count

$$SAIDI = \frac{\sum_{i=1}^{n} t_i \times u_i}{N} \qquad SAIFI = \frac{\sum_{i=1}^{n} u_i}{N}$$

The First Maintenance Cycle should be focused on improving reliability across the system in a cost-effective, and prudent manner by solely pruning trees

First 4-Year Cycle: Trees and vegetation shall be cleared to provide for a minimum of clearance to the sides and below the primary conductor per pruning specifications

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Second Maintenance Cycle PREPA can begin to focus on reducing the vegetation density within the ROW by removing trees & utilizing herbicide applications

Second 4-Year Cycle: Tree and vegetation stumps in the right of way shall be cut close to ground level and treated with herbicide

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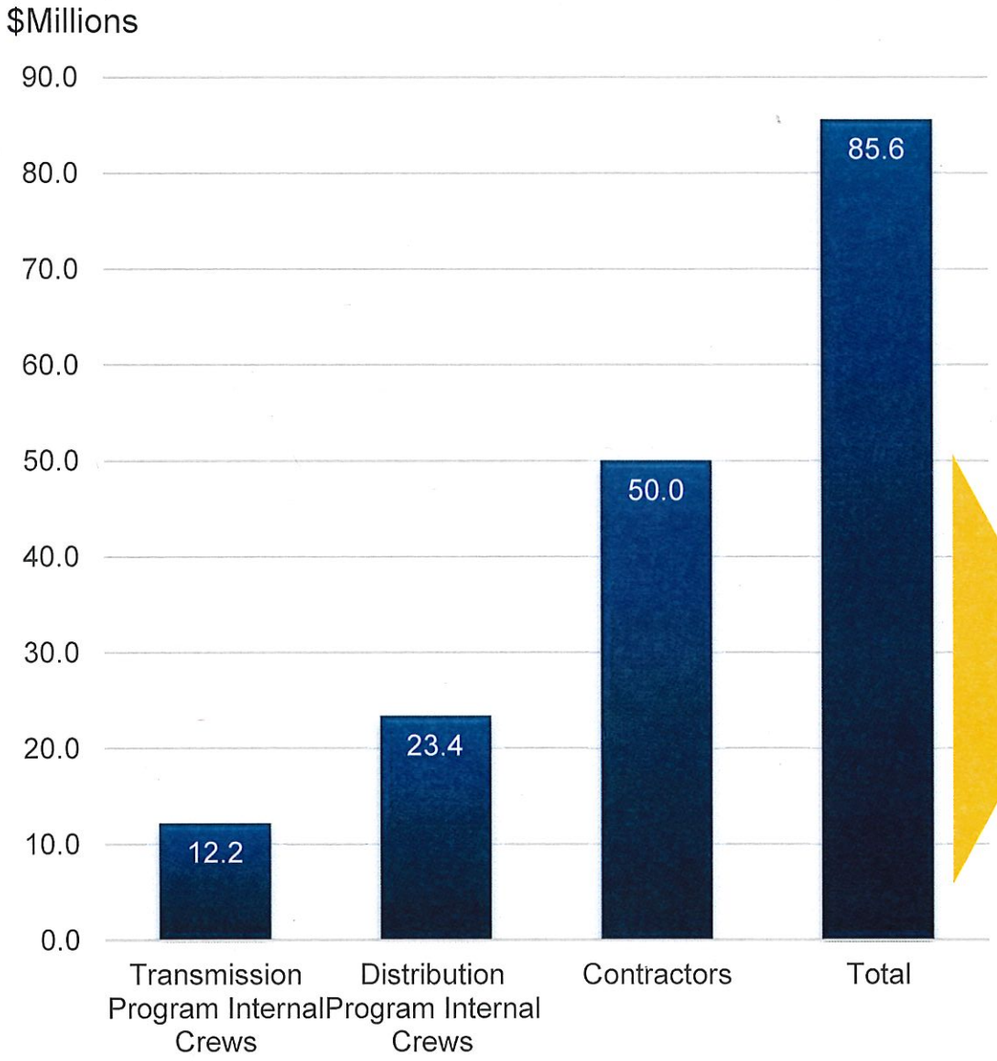
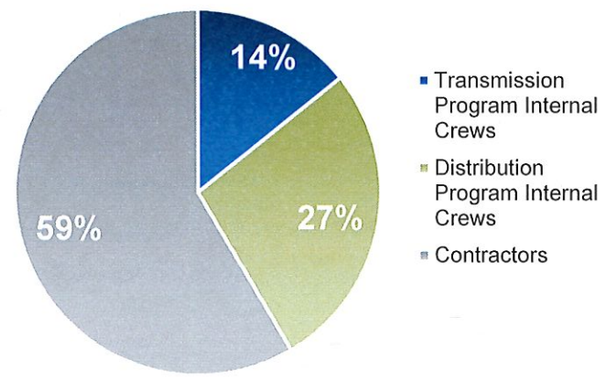
Third Maintenance Cycle and beyond continuing to concentrate on reducing the vegetation density by removing trees and utilizing herbicides

Third 4-Year Cycle: Tree and vegetation stumps in the right of way shall be cut close to ground level and treated with herbicide, Hazard trees, outside the right of way, tall enough that if they were to fall, could pass within 5 feet of a distribution conductor shall be mitigated

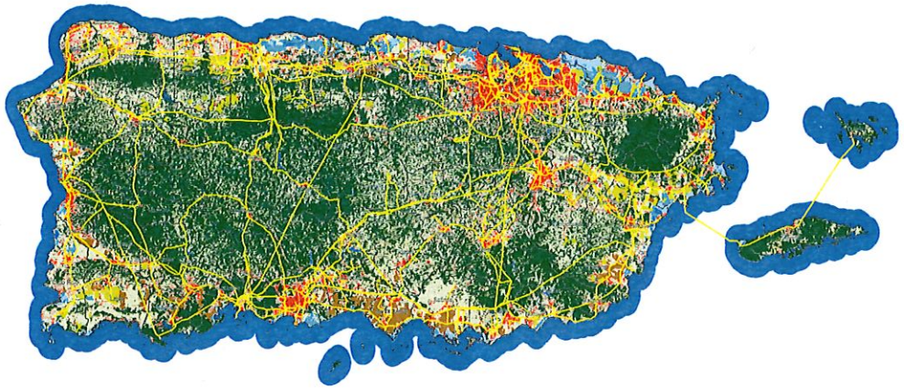
Vegetation Management Program Budget



PREPA will establish and maintain a budget for the vegetation management program. The budget will fund the transmission, distribution, and substation programs.



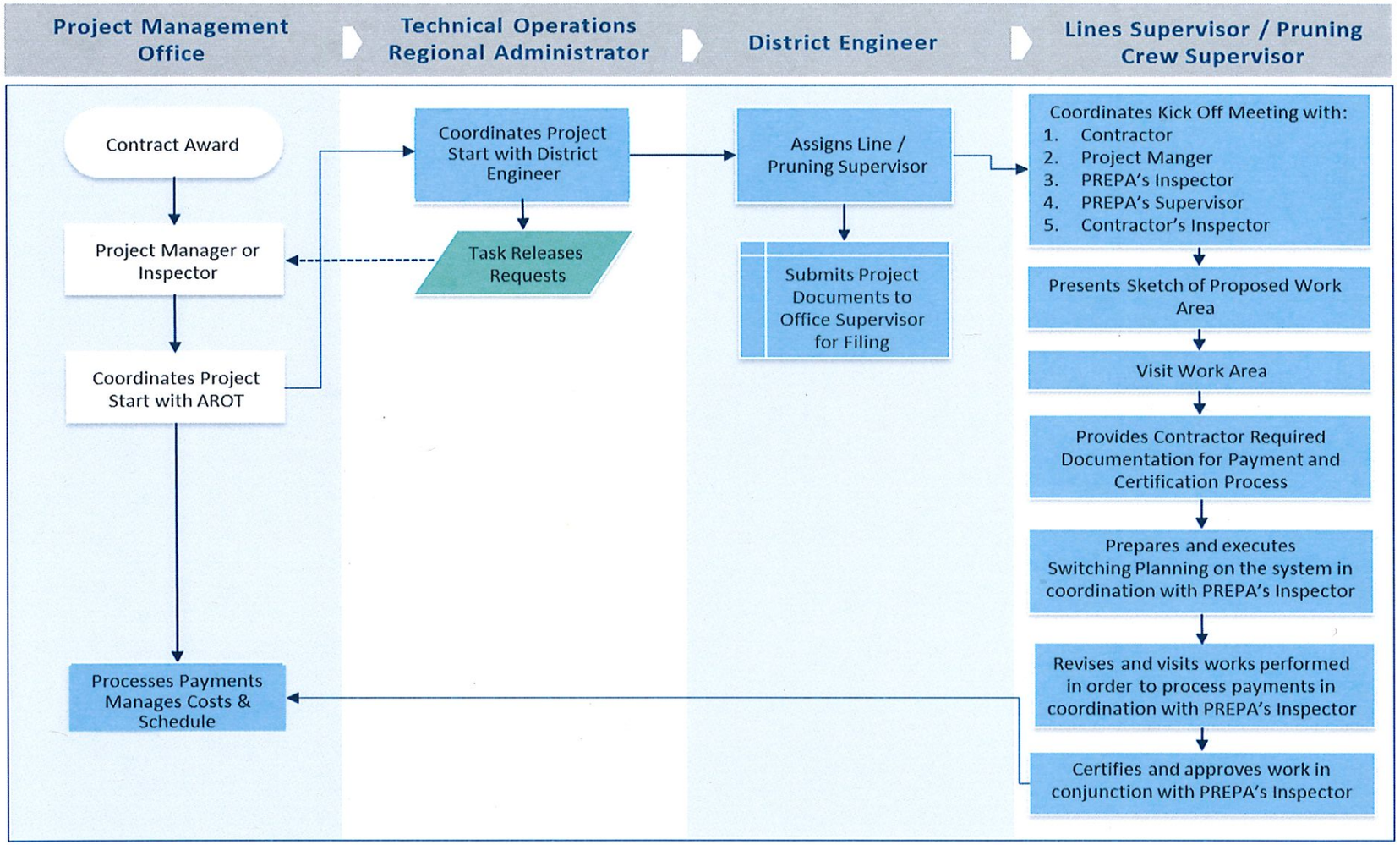
Vegetation Management Contracts



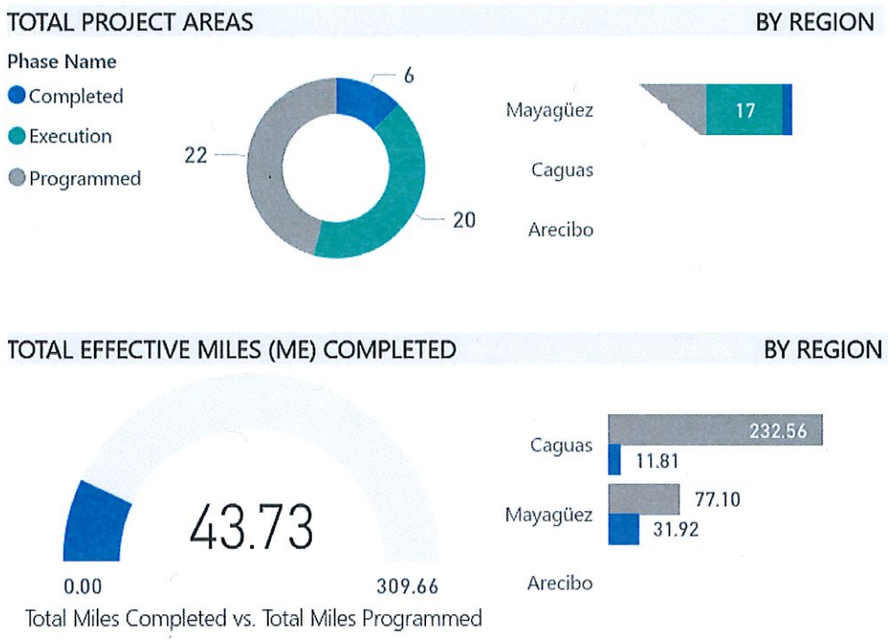
PREPA issued a Request for Proposals (RFP) to solicit offers from responsible and qualified companies which shall demonstrate their ability to provide vegetation management services. Proponents must demonstrate in their proposals their capability to conduct all works in compliance with the Scope of Services, which includes chemical treatments of the vegetation, clearing paths towards the power lines, coordinating accesses with property owners, cycle-based maintenance, dead/diseased tree removal and individual tree removals, emergency work, mowing, mulching, preliminary and periodic assessments of work, right of way clearing, waste removal and other auxiliary tasks required for completion of the objectives.

Phase 1 – Analyze reliability metrics to determine worst performing circuits ✓	**Phase 2 – Determine most critical circuits based on customer type and count** ✓	**Phase 3 – Perform a vegetation survey to determine conditions and workload requirements**

Vegetation Management Process



Vegetation Management Reporting



TRAINING PROGRAM

Abr-May Period	2 Companies	30 Employees	Completed Status
Jan-Feb Period	2 Companies	30 Employees	Completed Status

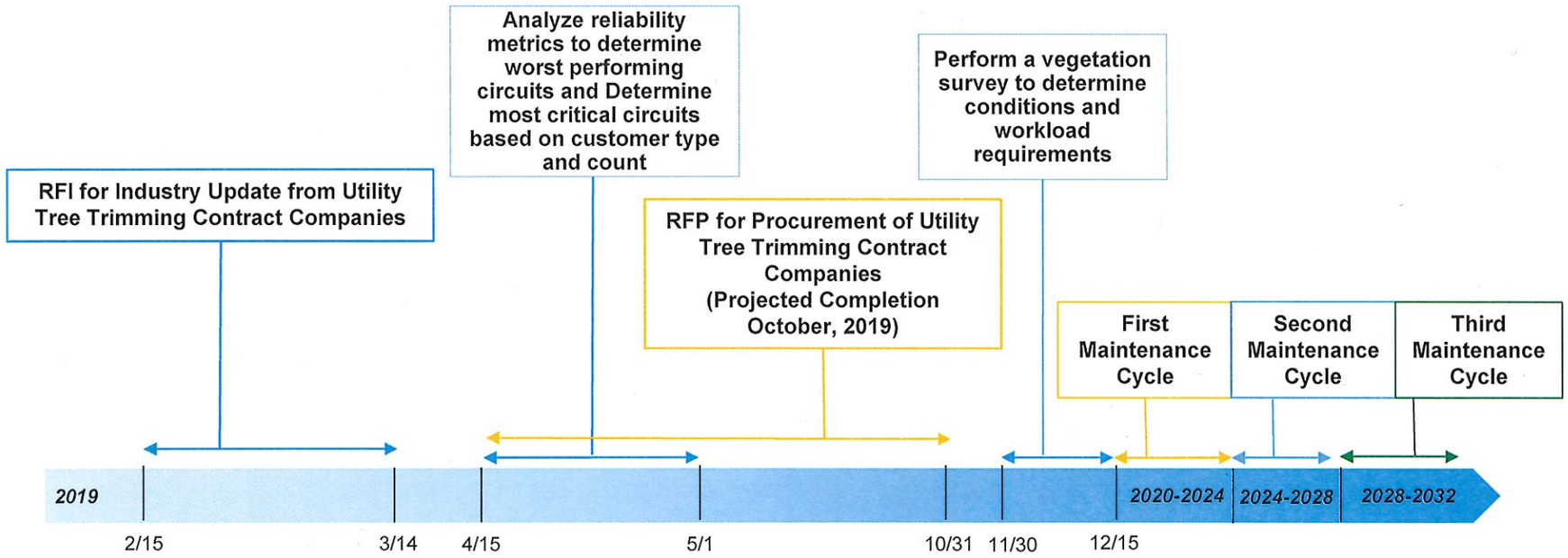
Total Trained

60

Employees

<u>PREPA intends to actively manage the Vegetation Management Program</u>

- Regular reporting of work progress and clearance status has been outsourced to a local Puerto Rican-provided, Acumenian, who provides cloud-based, real-time management reporting to support decision making

- By using a cloud-based tracking tool, along with existing PREPA IT tools, PREPA will be able to effectively manage, and communicate, the Vegetation Management progress both internally, as well as externally

Vegetation Management Program Timeline