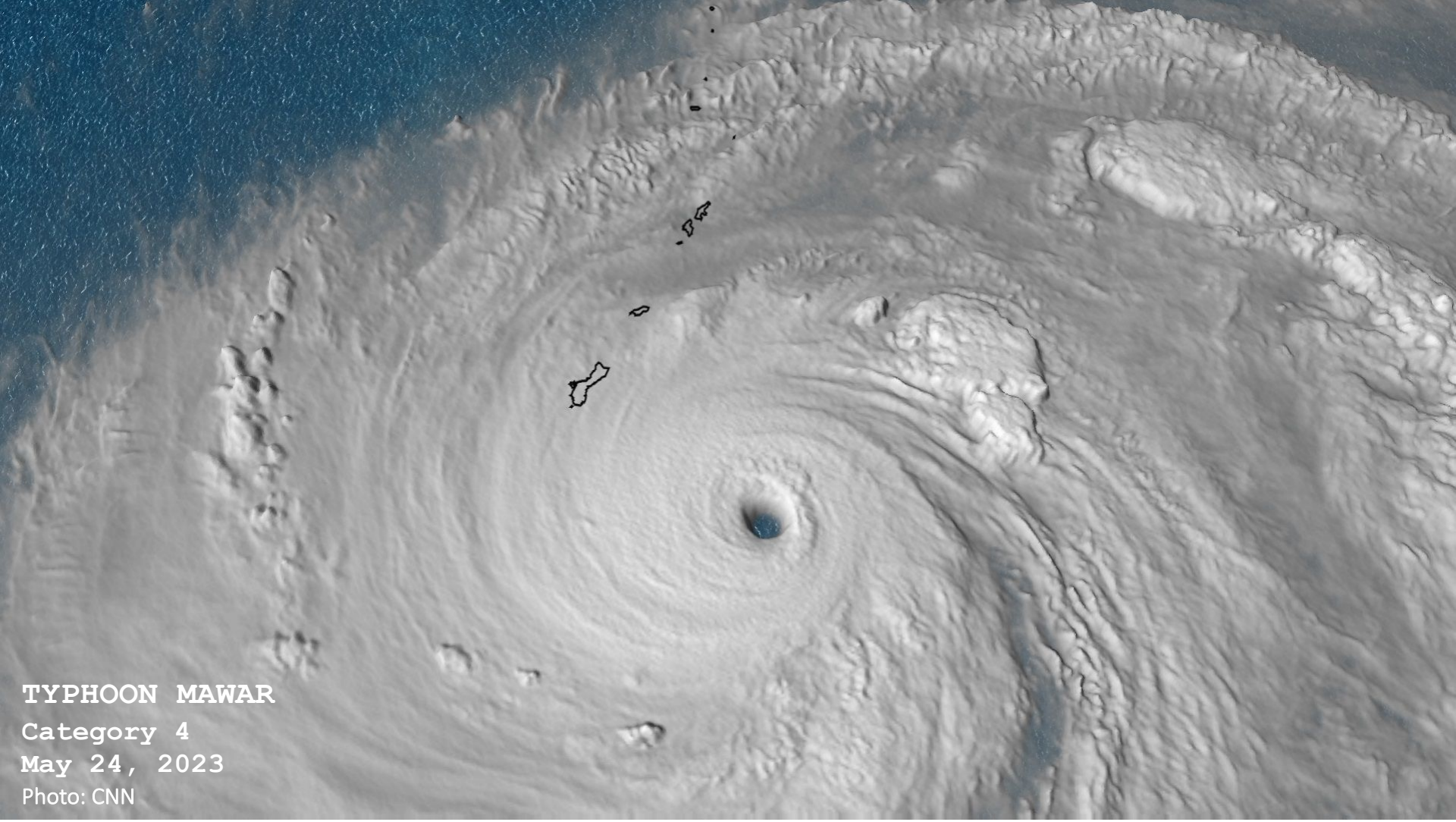


Business Recovery Summit – Utilities Update

Guam Chamber of Commerce

Hyatt Regency Guam | July 7, 2023

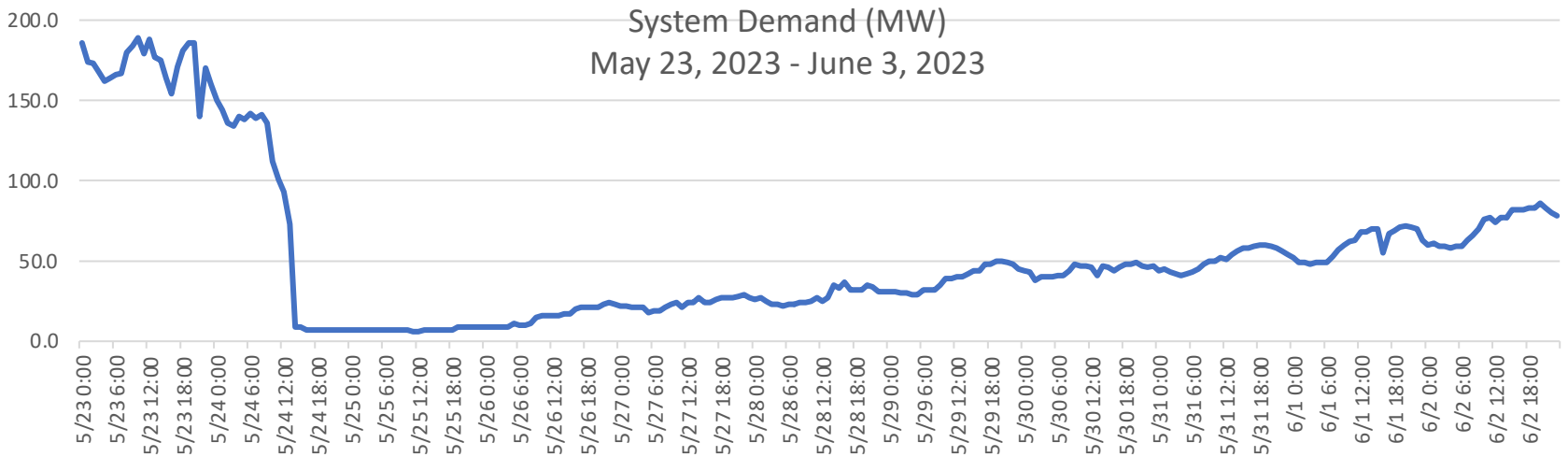
Guam Power Authority

John M. Benavente, P.E., General Manager

Typhoon Mawar: *Overview*

OVERVIEW

- The islandwide power system did not experience a blackout during Typhoon Mawar, despite the significant damage to the T&D system during the prolonged and relentless wind (up to 150 mph) and torrential rain.

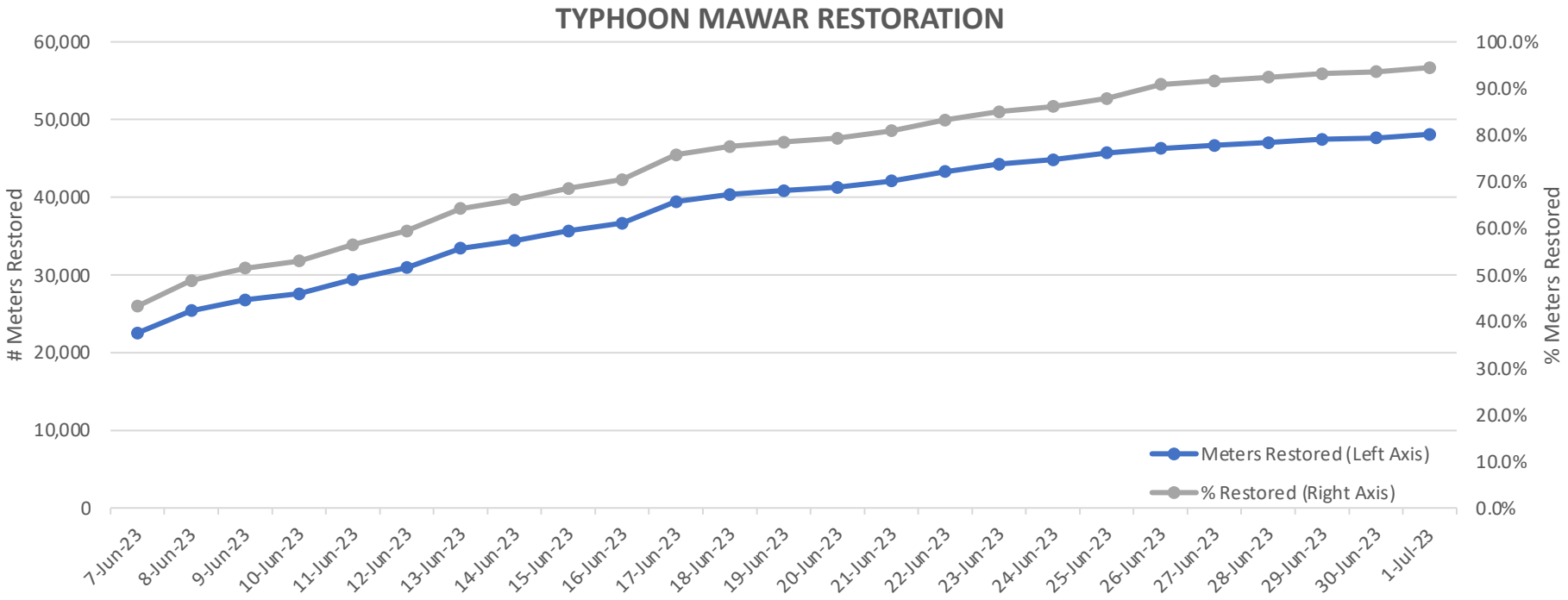


- GPA continued to serve ~7 MW load throughout the typhoon, mainly to Andersen Air Force Base, through underground transmission lines and the hardened Dededo combustion turbine structure.
- As a result of blackout avoidance, the quick recovery of customers served by underground T&D was possible, including the Guam Memorial Hospital and Tumon Bay hotels.

Typhoon Mawar: *Overview*

96.5% of customers restored as of July 6, 2023, 42 days after COR 4 was declared.

The graph below depicts the recovery progress beginning May 25, 2023, the day after the typhoon.



Preliminary Damage Estimate: $25M+ range but likely below $35M

Daily Peak Demand: Within 11% of prior typhoon levels.

Daily Net kWh Export: Within 10.8% of CY22.

Base Rate Revenue Loss: Est. $7.0M and is now tracking within 10.7% of pre-typhoon level. Normal revenues anticipated by August 2023.

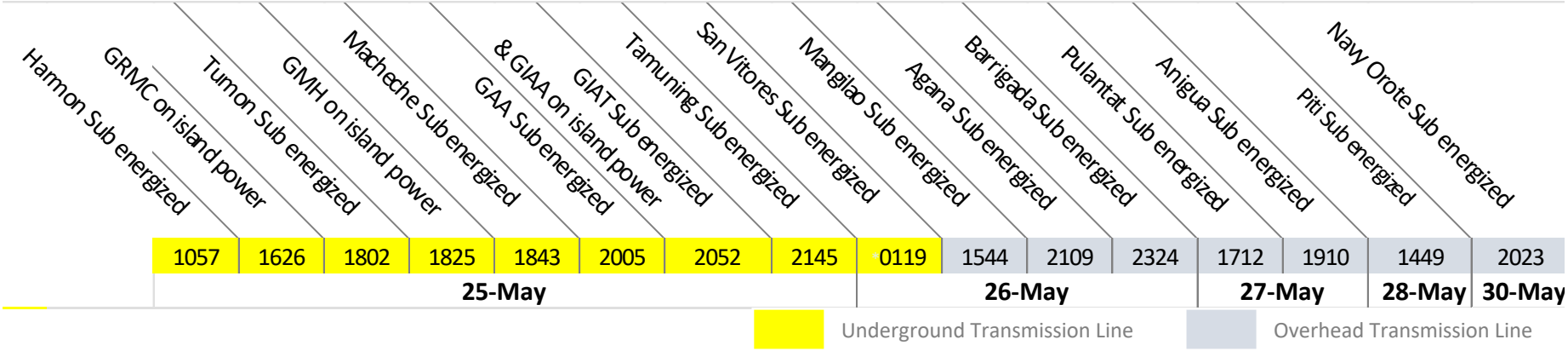
Debt-Service Coverage Impact: Estimation in progress but anticipate coverage as required by bond covenants will be met.

As of Jul 2, 2023

Typhoon Mawar: *System Restoration*

SUBSTATIONS

- Most substations had significant water and/or moisture accumulation from the wind-driven rain.
- Substations fed through underground transmission lines were able to be restored quicker than those fed through overhead transmission lines, as shown below



GENERATION

- Baseload generators suffered some damage but returned to service and supported restored customer load.
- Yigo 20 MW Combustion Turbine has not returned to service due to turbine and generator issues. A repair plan has been prepared but unit may not be available for two months. This situation impacts our reliability once the system has been fully restored.
- The New Ukudu Power Plant sustained substantial damages to its fuel oil and treated water storage tanks. A new commissioning date for the plant is likely late 2025.
- GPA is preparing to discuss the impact of the typhoon on the consent decree datelines which includes the retirement of Cabras 1&2. GPA does not have adequate generation capacity to retire Cabras any earlier than after commissioning of Ukudu.
- GPA will be looking at alternatives for generation capacity in order to meet reliability needs as it continues with the construction of the new 198 MW Ukudu Combined Cycle plant. It may mean we will have to bring in temporary power in order to maintain reliability.

Typhoon Mawar: *Transmission System*

TRANSMISSION SYSTEM

- All 115kV transmission lines sustained serious damage
- Most 34.5kV overhead transmission lines sustained serious damage
- Transmission line repairs require special resources (high-reach bucket trucks, high-voltage line crew) and outages to ensure the safety of personnel.

Hardened Transmission Lines

The hardened, underground 34.5kV transmission line providing AAFB energy remained online through the typhoon. AAFB outages were due to damaged distribution systems, not the GPA transmission delivery system.

Typhoon Mawar: *Distribution System*

DISTRIBUTION SYSTEM

- Concrete power poles survived Typhoon Mawar's 150+ mph winds. Trees, flying debris, lightning, etc. damaged crossarms, transformers, hardware, and power lines.
- 1,364 emergency work clearances have been received for customer related damages such as weather-heads. *As of July 6, 2023*
  - 706 have been completed and customer's power restored.
  - 658 are pending customer work completion and/or scheduling.

Typhoon Mawar: *Operations & Mutual Aid*

GPA's professional line crews, operators, dispatchers, engineers, and support teams have been working around the clock to restore service to all customers.

- A fleet of 20-30 bucket trucks have been operating daily for recovery efforts

Assistance/Mutual Aid

- Commonwealth Utility Corporation (CUC)
  - 12 linemen arrived on June 4th.
  - 1 bucket truck arrived Guam July 2nd.
- Snohomish PUD (Washington)
  - 15-person high voltage line team arrived on June 8th.
  - 2 high-reach bucket trucks and mechanic van also provided by SnoPUD, transported by FEMA
- Pohnpei Utility Corporation (PUC)
  - 8 linemen arrived on June 10th.
- NAVFAC & COMNAVMAR
  - Temporary use of bucket trucks for T&D line recovery pending FEMA-sourced bucket truck arrivals
- FEMA
  - Received 5 bucket trucks and emergency generators. 3 additional trucks pending arrival.

Materials & Supply

- GPA has maintained material inventory adequate for recovery.
- Current GPA inventory of poles, transformers, wires and other hardware can support the post-typhoon restoration efforts.
- Customers pending restoration of service are assured that GPA will restore their power soon.

Typhoon Mawar: *Mitigation & Resiliency Efforts*

A mitigation plan and estimate is being prepared for infrastructure improvements which would improve recovery time after super typhoons. I plan to present this plan and estimate to the CCU at its regular July work session.

Prior Mitigation Efforts Proved Successful

- This is the fastest recovery from super-typhoon winds the IWPS has ever experienced. This is the first time that the system did not experience a blackout from 150mph winds. The concrete pole system which ratepayers had been able to afford over the past few decades has served the entire island community well. This was also made possible by the investments made by the Air Force and through prior FEMA mitigation funds received to place transmission systems underground.

Post-Mawar Power Restoration

- The recovery from about 150mph Typhoon Mawar is the fastest it has been compared to other similar typhoons in the past. GPA has invested substantially in the electric grid infrastructure with over 98% of the system consisting of concrete and steel poles. Recoveries from similar typhoons has historically taken months in particular Typhoon Pongsona in 2002 took 3 months to recover from.

Infrastructure Hardening Necessary for Energy Resiliency

- It is imperative to upgrade the infrastructure much more in order to have the resiliency we need to protect the island and the nation.
- GPA will reach out to FEMA, US military branches and other federal entities to invest in Guam's future energy resiliency.

Infrastructure Resiliency Plan

One Guam

- Guam Power Authority is the sole provider of energy for the island community including the military.
- The island power grid must be ready for the conflicts facing the nation and from national disasters, especially super typhoons. Almost all critical military branches use Guam as their strategic base to defend the nation from adversaries. Billions of dollars have been spent in building up the bases in Guam including providing high tech missile defense systems.
- It is very important that the federal government and the local community work together to mitigate Guam's vulnerability to natural disasters and military conflicts.

Increased Natural & Bad Actor Threats

- The community and national defense environment today has changed substantially over the past two decades and it is important to prepare the Guam electrical grid's infrastructure to survive and recover from super typhoons. The national threat from China and North Korea has substantially increased and Guam's strategic importance requires our infrastructure to be resilient for potential conflict with unfriendly nations.

One Guam Infrastructure Resiliency Plan

- GPA has detailed a mitigation plan for its infrastructure to provide resiliency from all the threats, natural or otherwise. These critical investments will bolster utility (power, water and wastewater) resiliency.
- A full underground system, excluding 115kV transmission, may cost about $7B. GPA's ability to obtain funding for the billions in investments needed is doubtful. If GPA were able to secure funding, it will certainly double power rates, if not more, making island energy costs unaffordable.
- The investment of the federal government into Guam's infrastructure will provide returns over the decades to come.

Infrastructure Resiliency Plan

Detailed project descriptions will be presented at the July 2023 CCU meeting.

RESILIENCY PROJECTS

I. Underground Transmission Lines & Indoor Substations

Islandwide Power System Incl Assets Serving Military Facilities

II. Critical Distribution System Mitigation

Underground distribution feeders for Y, D, F & M-Series water wells, treatment facilities/reservoirs, wastewater treatment plants, lift and pump stations

Underground of Naval Hospital feeder; communications core sites; industrial sector feeders; GDOE public schools, GCC, UOG

Standby generator systems including ATS/fuel storage for critical facilities such as public health, medical facilities, typhoon shelters, youth facilities, DOC, etc.

Hybrid underground of various villages secondary lines and to replace overhead transformers with pad mounted transformers

III. Other Critical Resiliency Projects

Energy Storage Batteries (180MW/900MWh)

New 80MW Combustion Turbine Capacity

Standby generator upgrades placed in concrete housings with adequate fuel storage capacity for water and wastewater systems

T&D operations center. Backup SCADA. Fiber optic system. Physical facilities. GWA SCADA and motorized valves.

Bucket trucks, line equipment, underground linemen training

IV. All Remaining Distribution System

Convert remaining distribution systems to fully underground system

GUAM CCU

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