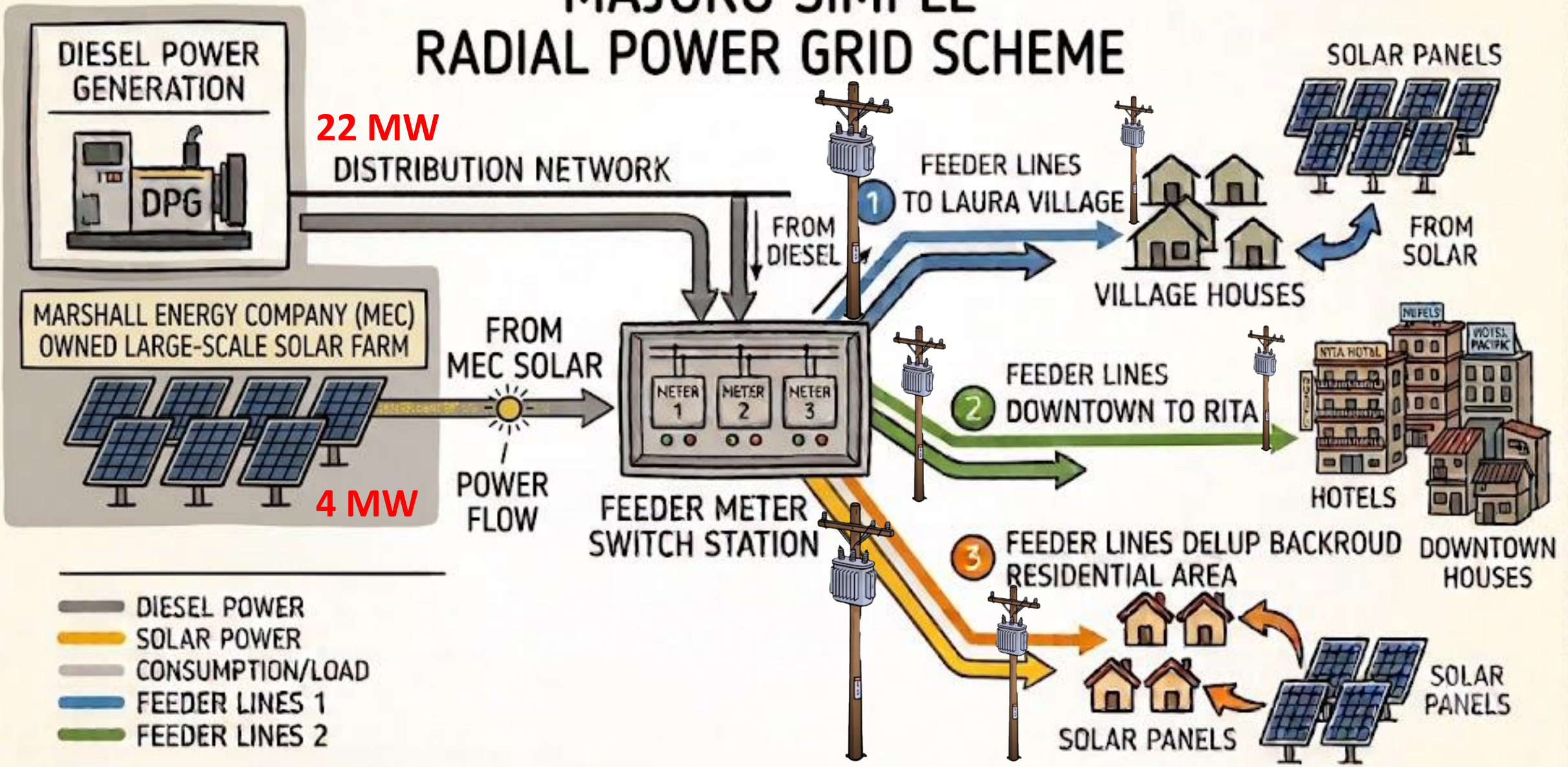
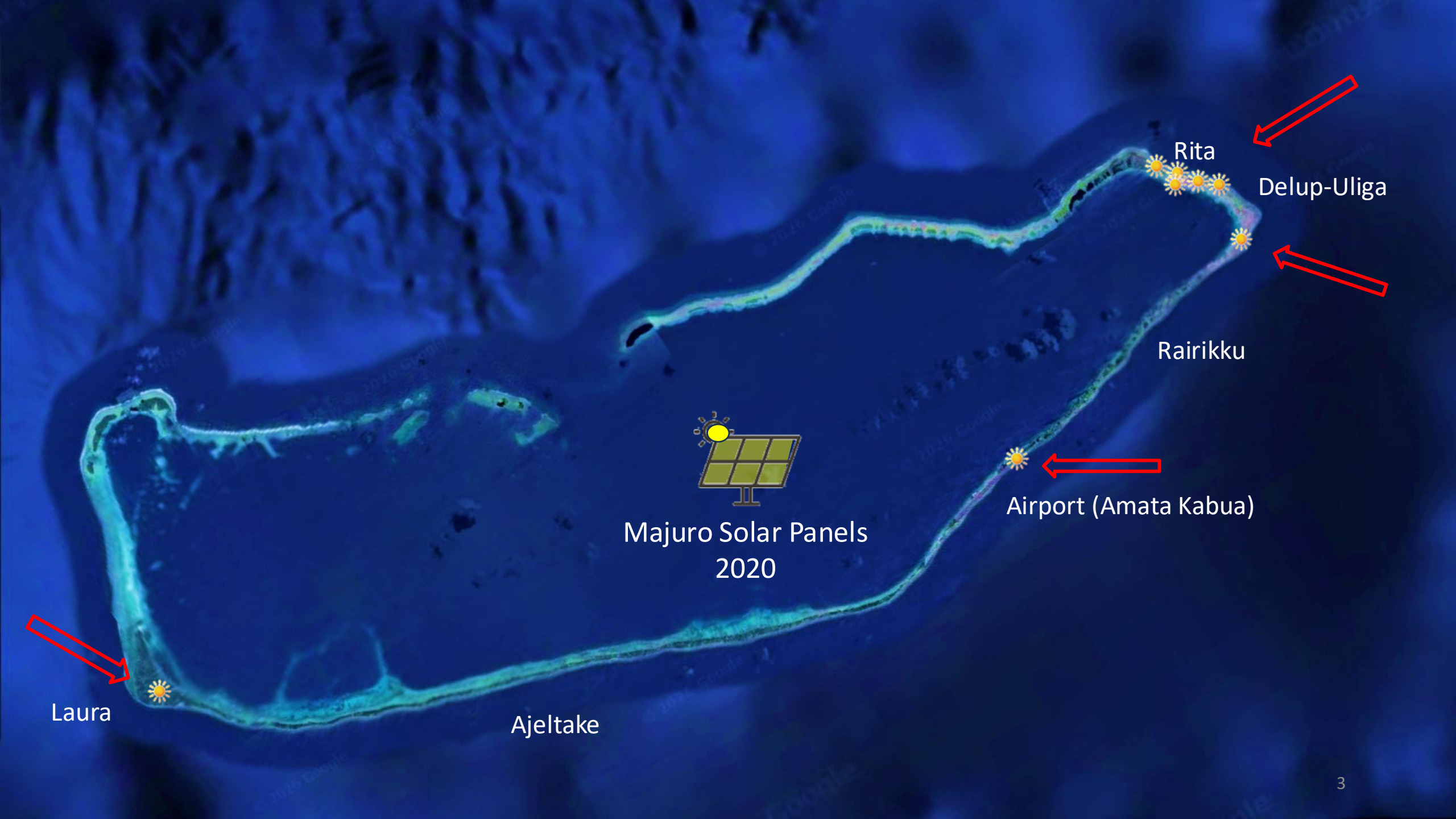
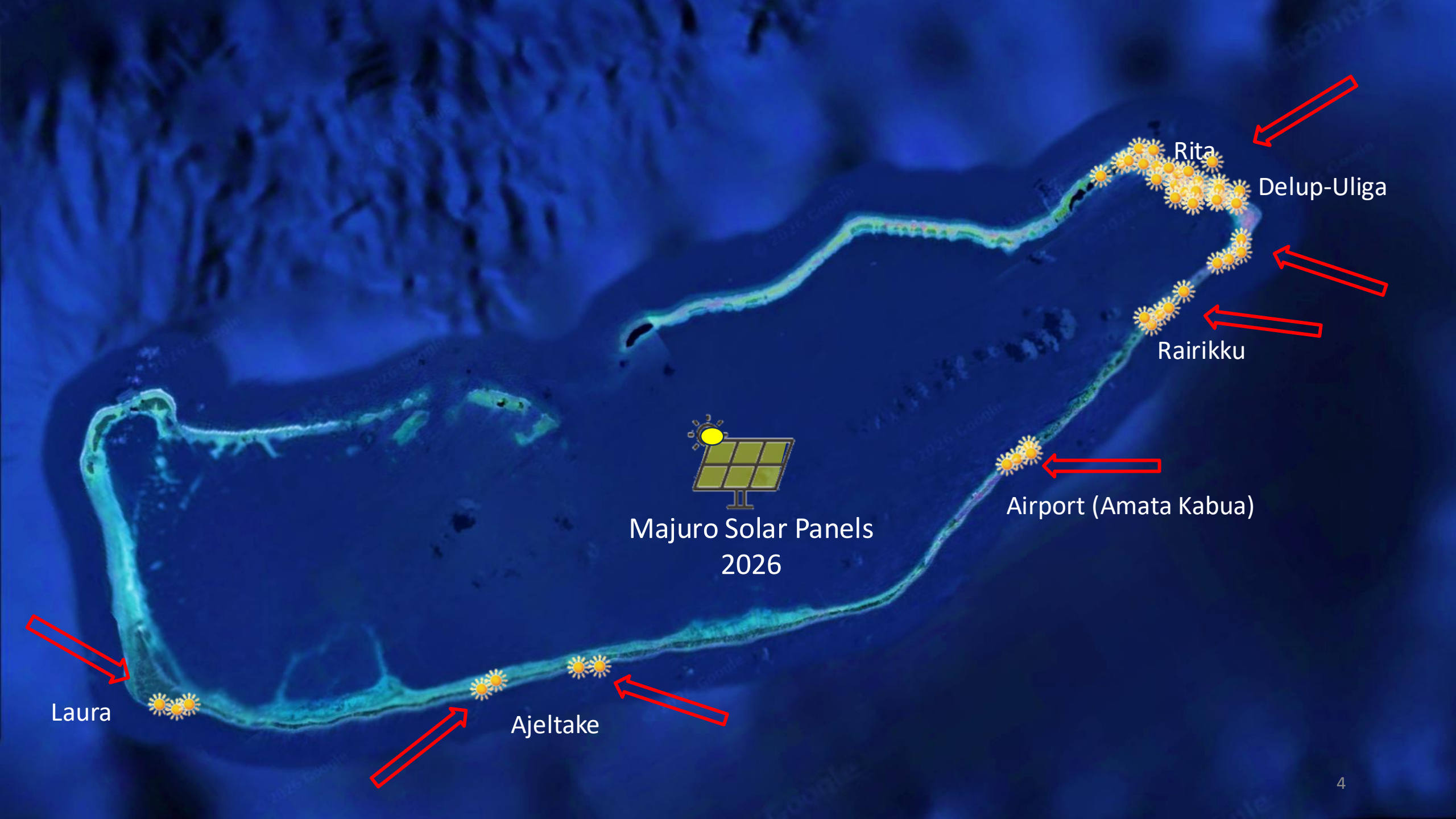
Grid Balance & Backup Capacity Charge

Introduction of New Solar Policy
MEC

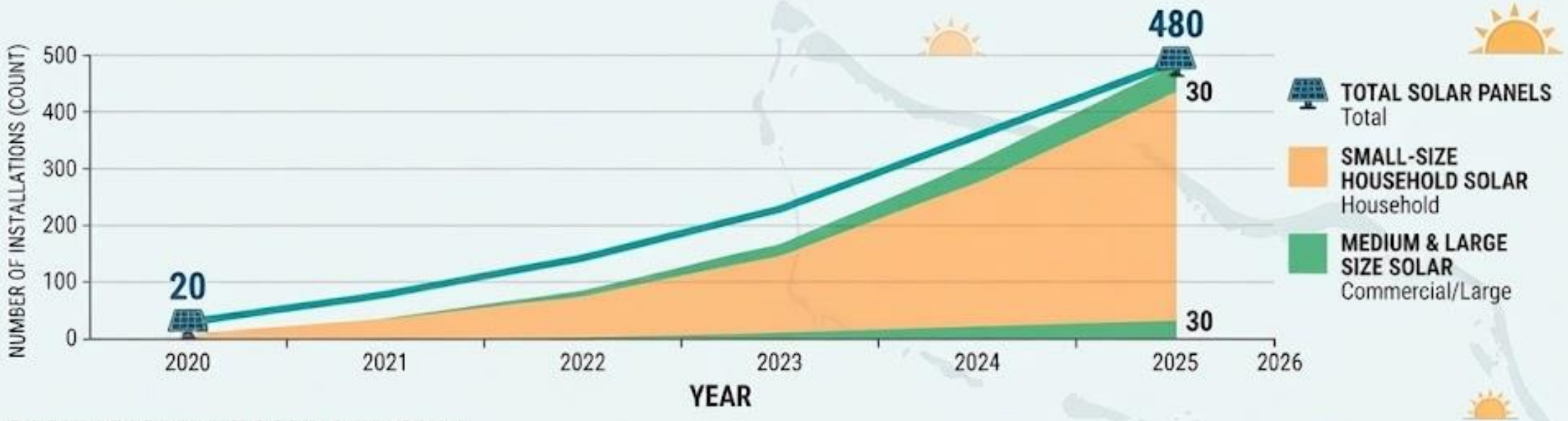
MAJURO SIMPLE RADIAL POWER GRID SCHEME



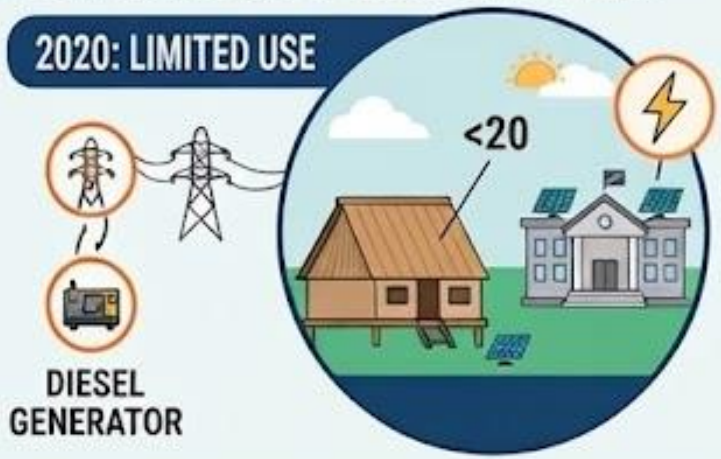

Rita
Delup-Uliga
Rairikku
Airport (Amata Kabua)
Majuro Solar Panels
2020
Laura
Ajeltake


Rita
Delup-Uliga
Rairikku
Airport (Amata Kabua)
Majuro Solar Panels
2026
Ajeltake
Laura

RAPID GROWTH OF SOLAR PANELS WITHIN MEC POWER NETWORK 2020 TO 2026.



COMPARISON OF 2020 AND 2026

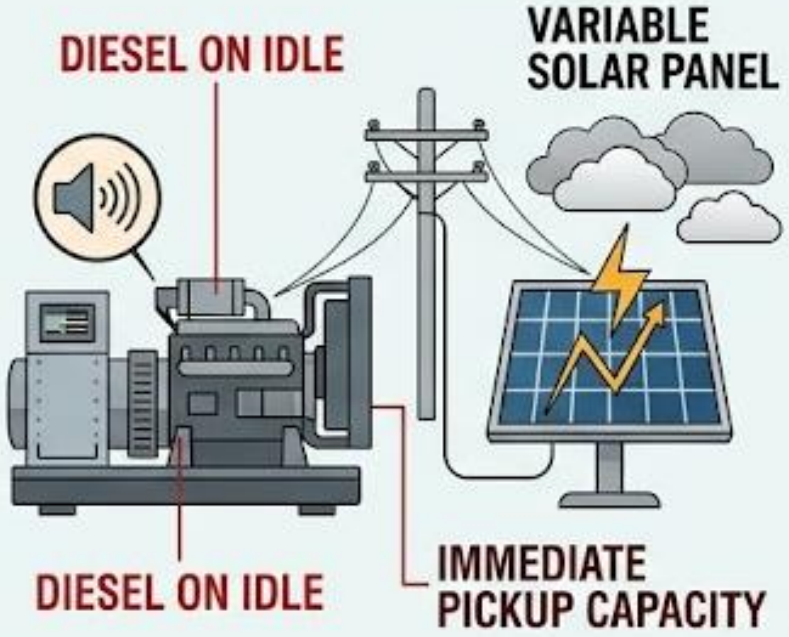


- Fewer than 20 installations
- Primarily government or unique cases

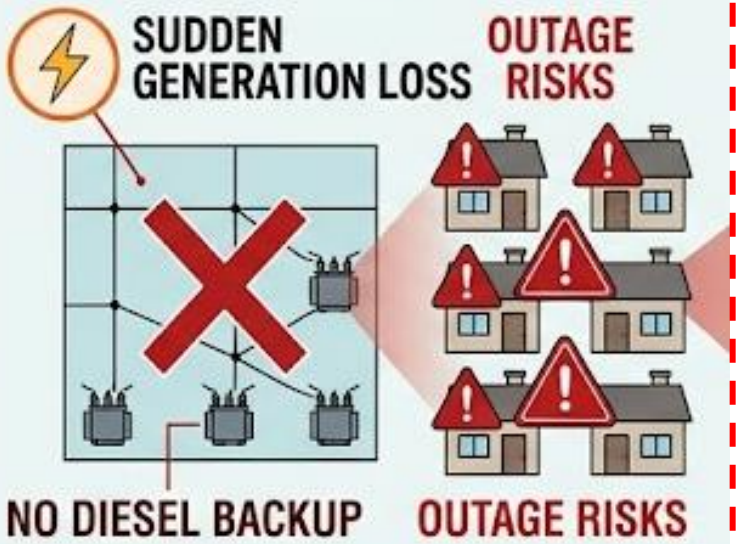
ADDITIONAL OPERATIONAL CHALLENGES: DIESEL AND GRID INTERACTION

- **Spinning Reserves:** Diesel generators must run at idle to instantly cover load fluctuations from cloud cover.
- **Grid Stability:** Sudden solar generation dips without backup can cause island-wide outages.
- **Infrastructure Wear:** Frequent, rapid ramp-up/down of diesel plants drastically increases maintenance costs.

SPINNING RESERVES & IDLING

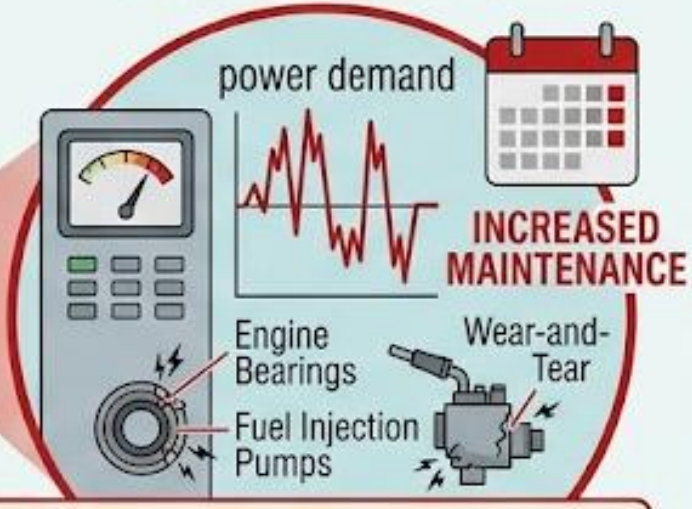


GRID INSTABILITY: SENSITIVITY TO DIPS



KEY CHALLENGES: Variable Load, Ramping Fatigue

INFRASTRUCTURE WEAR: RAMPING STRESS



RAPID CYCLING STRESS | **SIGNIFICANT COST INCREASE**

AVERAGE SAVINGS BY SOLARS

YOUR CURRENT AVERAGE CONSUMPTION: 1000 kWh/month

LOW SUNLIGHT
(e.g., UK)

1000 WATTS (1 kW)

SYSTEM PRODUCTION: ~72 kWh/month

YOUR SAVINGS: $48.38

$0.672/kWh: $48.38

OFFSET: 7.2%

REMAINING GRID USE: ~928 kWh

OFFSET:

MODERATE SUNLIGHT
(e.g., CENTRAL US)

1000 WATTS (1 kW)

SYSTEM PRODUCTION: ~108 kWh/month

YOUR SAVINGS: $72.58

$0.672/kWh: $72.58

OFFSET: 10.8%

REMAINING GRID USE: ~892 kWh

OFFSET:

HIGH SUNLIGHT
(e.g., SOUTHWEST US)

1000 WATTS (1 kW)

SYSTEM PRODUCTION: ~144 kWh/month

YOUR SAVINGS: $96.77

$0.672/kWh: $96.77

OFFSET: 14.4%

REMAINING GRID USE: ~856 kWh

OFFSET:

WHAT WOULD A FULL (100%) OFFSET LOOK LIKE?

14 kW (35-40 PANELS)

9.3 kW (24-28 PANELS)

7 kW (18-20 PANELS)

AVERAGE SAVINGS BY SOLARS

YOUR CURRENT AVERAGE CONSUMPTION:
1000 kWh/month

MODERATE SUNLIGHT

1000 WATTS (1 KW)

SYSTEM PRODUCTION:

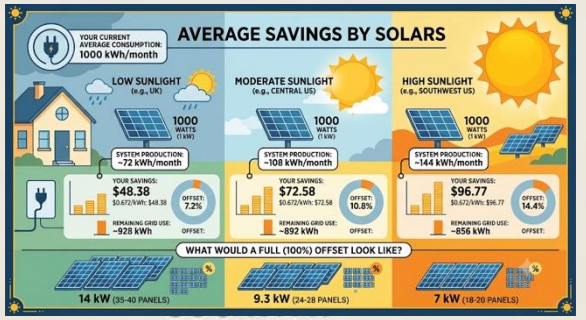
SYSTEM PRODUCTION:
~108 kWh/month

YOUR SAVINGS:
$72.58
$0.672/kWh: $72.58

OFFSET:
10.8%

REMAINING GRID USE:
~892 kWh

OFFSET:



WHAT WOULD A FULL OFFSET LOOK LIKE?

9.3 kW

(24-28) Solar Panels

AVERAGE SAVINGS BY SOLARS

YOUR CURRENT AVERAGE CONSUMPTION:
1000 kWh/month

MODERATE SUNLIGHT
(e.g., CENTRAL US)

1000 WATTS (1 KW)

SYSTEM PRODUCTION:

SYSTEM PRODUCTION:
~108 kWh/month

YOUR SAVINGS:
$72.58
$0.672/kWh: $72.58

OFFSET:
10.8%

REMAINING GRID USE:
~892 kWh

OFFSET:

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$0.672/kWh: 14.4%

REMAINING GRID USE:
~856 kWh

WHAT WOULD A FULL OFFSET LOOK LIKE?

9.3 kW

(24-28) Solar Panels

Securing Our Grid, Together!

50%

RENEWABLE PROJECTION

Centralized Management of Renewable Energy

To address the rapid expansion of solar panels, it is essential to modernize technical policies. The implementation of the **Backup Capacity Charge** is vital to ensure that the increased maintenance costs associated with this growth are fairly distributed within the community.

Global Best Practice for Backup Capacity Charge

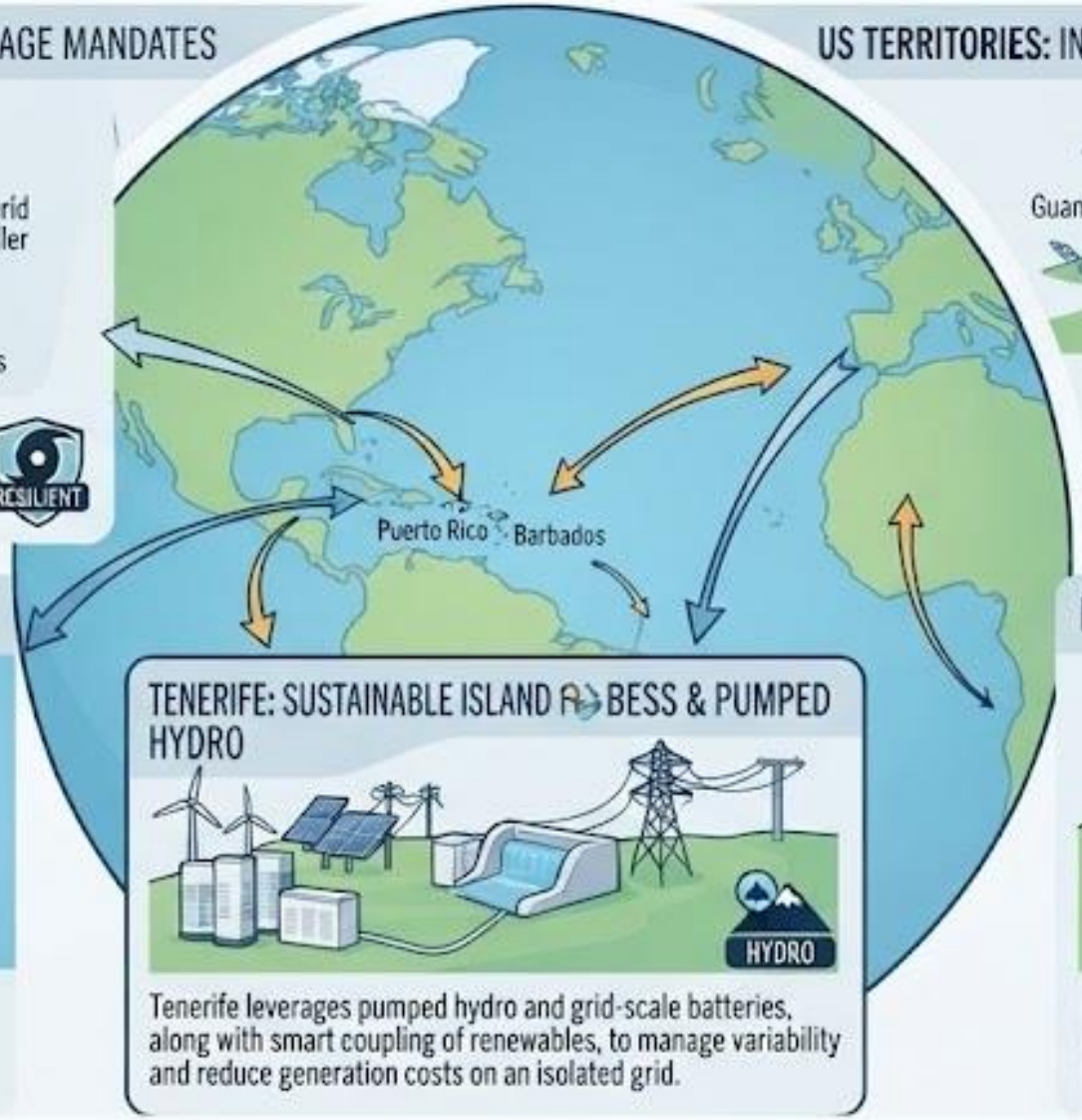
CARIBBEAN: MICROGRID RESILIENCE & STORAGE MANDATES

Island nations with high energy costs and hurricane risk implement strong incentives for on-site solar-plus-storage and islandable microgrids toools to reduce fossil fuel dependence and increase resilience.

RESILIENT

US TERRITORIES: INTEGRATED RENEWABLE & CAPACITY PLANNING

US territories utilize federal grants and capacity planning to deploy large-scale BESS for grid stability.
BESS for grid stability.



TENERIFE: SUSTAINABLE ISLAND BESS & PUMPED HYDRO

Tenerife leverages pumped hydro and grid-scale batteries, along with smart coupling of renewables, to manage variability and reduce generation costs on an isolated grid.

US TERRITORIES: INTEGRATED RENEWABLE & CAPACITY PLANNING

US territories utilize federal grants and capacity planning to deploy large-scale BESS for grid stability.

MALLORCA: SMART GRID FLEXIBILITY & STORAGE

Mallorca focuses on smart energy management, coupling residential solar with storage and utilizing demand response to achieve flexibility and meet decarbonization targets.

Caribbean Regulatory Responses

The Bahamas (Bahamas Power and Light - BPL): Under their Small-Scale Renewable Generation framework, the utility has historically integrated fixed customer readiness and **grid-access fees for grid-tied solar users to ensure that non-solar low-income customers do not bear the full cost of grid maintenance.**

Barbados: As a pioneer in Caribbean solar penetration, the Barbados Light & Power Company (BL&P) moved heavily toward introducing **fixed demand and grid asset charges for customers with solar generation to address the "Grid Maintenance expenses" and the problem of maintaining generation reserves.**

U.S. Island Territories

Guam (Guam Power Authority - GPA): GPA has intensely debated and restructured its net metering policies. The utility has repeatedly pushed for a specific **grid-access or standby charge for rooftop solar owners, arguing that solar users rely entirely on GPA's spinning baseload capacity to stabilize the grid during sudden tropical cloud covers.**

Hawaii (Hawaiian Electric Company - HECO): While not an outer island territory, Hawaii is the ultimate island case study for solar integration. Because its islands are completely isolated microgrids, HECO completely eliminated traditional net metering years ago. They replaced it with structures that impose **high fixed customer grid-readiness charges** and heavily penalize or **restrict export solar systems without battery storage**, forcing users to internalize their own backup needs.

Spanish Island Territories (The Canary Islands and Balearic Islands)

The "Sun Tax" (*Impuesto al Sol*): Though later repealed as utility-scale storage improved, Spain famously implemented a national **Backup/Standby Capacity Charge per kW of installed solar power.** This policy was explicitly driven by the needs of its isolated island networks (like **Mallorca and Tenerife**), **where the grid had to maintain 100% spinning thermal backup capacity to prevent immediate blackouts whenever cloud cover rolled over the islands.**

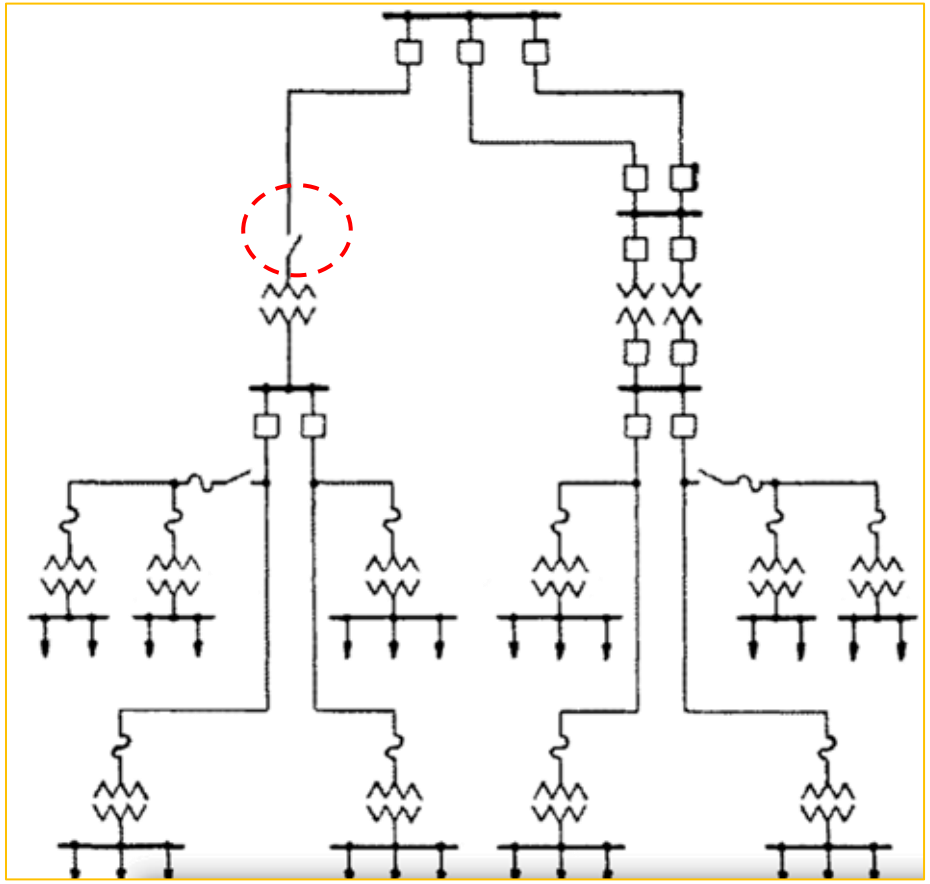
Financial Equity: The Cost Shift

Grid Cost Allocation

- **65%** Generation & Reserve Maintenance
- **25%** Distribution & Transmission
- **10%** Administration

"Without backup charges, the 65% maintenance cost is borne solely by non-solar, often lower-income, residents."

BACKGROUND



Radial Power Network (Drawing)

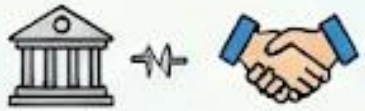
When a short circuit occurs on a feeder, its station breaker opens and interrupts the service to all consumers supplied by the feeder

- The current MEC Majuro distribution network is based on a radial design with outdated technology, making it highly susceptible to fluctuations and disturbances.
- The integration of variable renewable energy sources like solar panels requires sophisticated control mechanisms to manage power fluctuations and maintain grid stability. Systems not owned or operated by MEC may lack the necessary controls, posing risks to the safety and reliability of the Majuro grid infrastructure
- High penetration of renewables can lead to an overall reduction in short-circuit currents, potentially causing protection systems to malfunction. During periods of low demand, excess generation from distributed solar can cause reverse current flow, leading to operational challenges.

MEC GoGreen Initiatives & Projects

Funding Secured.

MEC Management has secured an exceptional amount of fundig for the development of solar facilities and for grid moderni-zation from various donors and financial institutions.



4MW Solar Connected.

4MW of solar currently being connected.

90% Completed

8MW in Planning & Funding.

Comprehensive Grid Modernisation and Stabilization.

Grid Load Balancing & Modernisation.

- Intelligent Demand Response
- Integration of advanced storage (BESS)
- AI/ML Grid Analytics & Optimization
- Smart Grid Infrastructure Upgrade

Comprehensive Grid Modern- and Stabilization.

CALCULATION METHODOLOGY

To compute an equitable backup capacity charge, MEC considered the actual fixed costs of generation and network facilities and the capacity factor of solar. The resulting backup charge ***is $0.02 per watt*** of installed solar capacity per month. This compensates MEC and its non-solar customers for investment and related fixed costs of facilities that solar customers can call upon 24/7 on an instantaneous basis.

Billing will be in advance for a **six-month** period, and the payment must be made within **45 days** of the invoice date

Let's assume that the installed capacity of the Solar System Facility = 1,000 watts

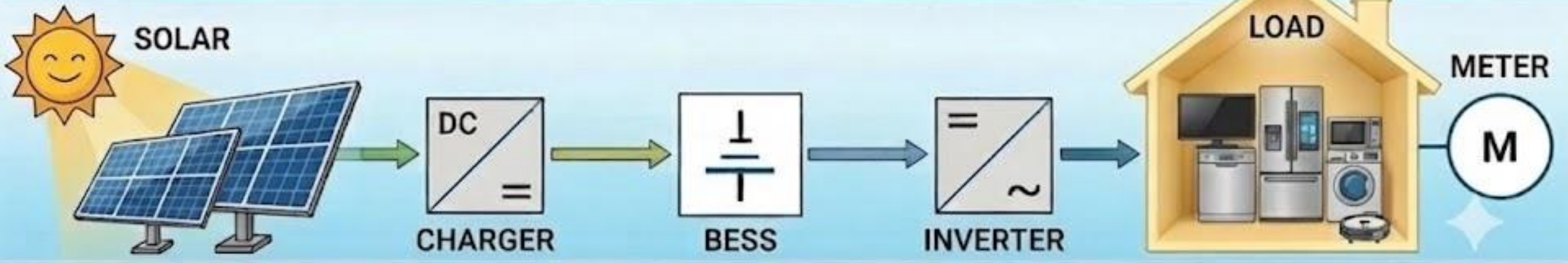
– 1,000 * $0.02 = $20 (Total installed capacity watts multiplied by fixed tariff $0.02)

GOVERNING PRINCIPLES OF REGULATION: 4 KEY TAKEAWAYS FROM UPCOMING SOLAR POLICY

1. NO CONNECTION: A private system CANNOT be connected on the utility side of the MEC customer meter.

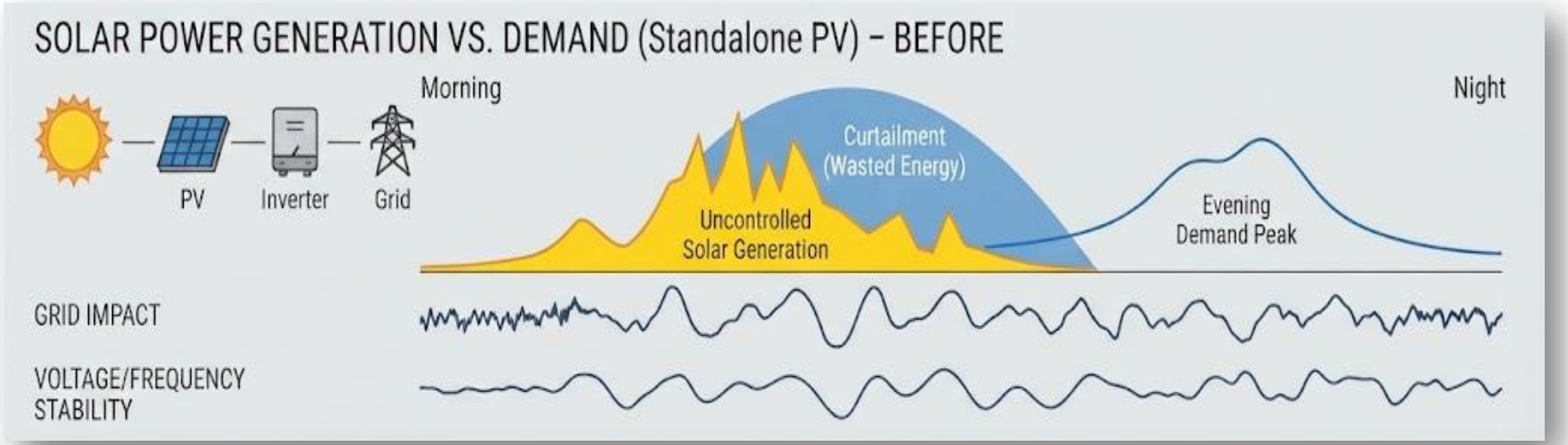
2. ALLOWED CONNECTION: Solar Home Systems (SHS) are allowed on the customer side of the MEC meter.

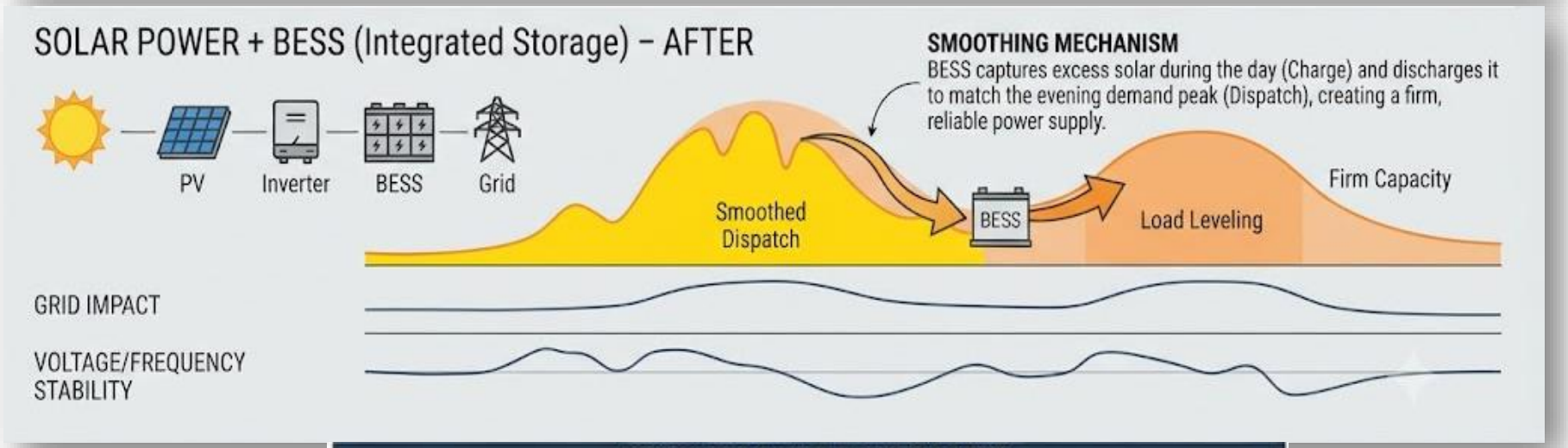
3. SOLAR PANEL SIZING:
Three different size classes are defined.



4. MANDATORY BESS & INVERTER: The system must include a BESS for dispatching energy, a hybrid inverter, and the solar array, or equivalent.

VARIABLE SOLAR VS BESS

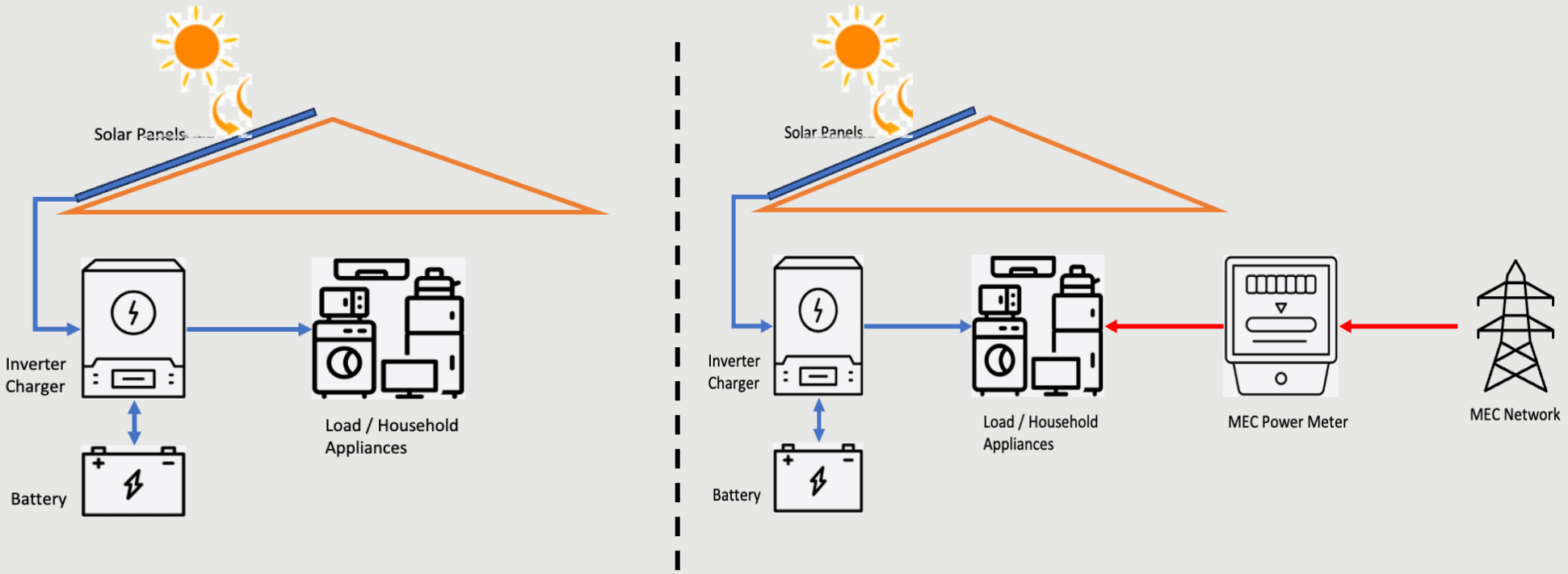




KEY DIFFERENCE SUMMARY		
Dispatchability	Uncontrolled	Dispatchable
Grid Interaction	Causes Stress	Provides Support
Energy Curtailment	High	Near-Zero
Overall Efficiency	Lower	Higher

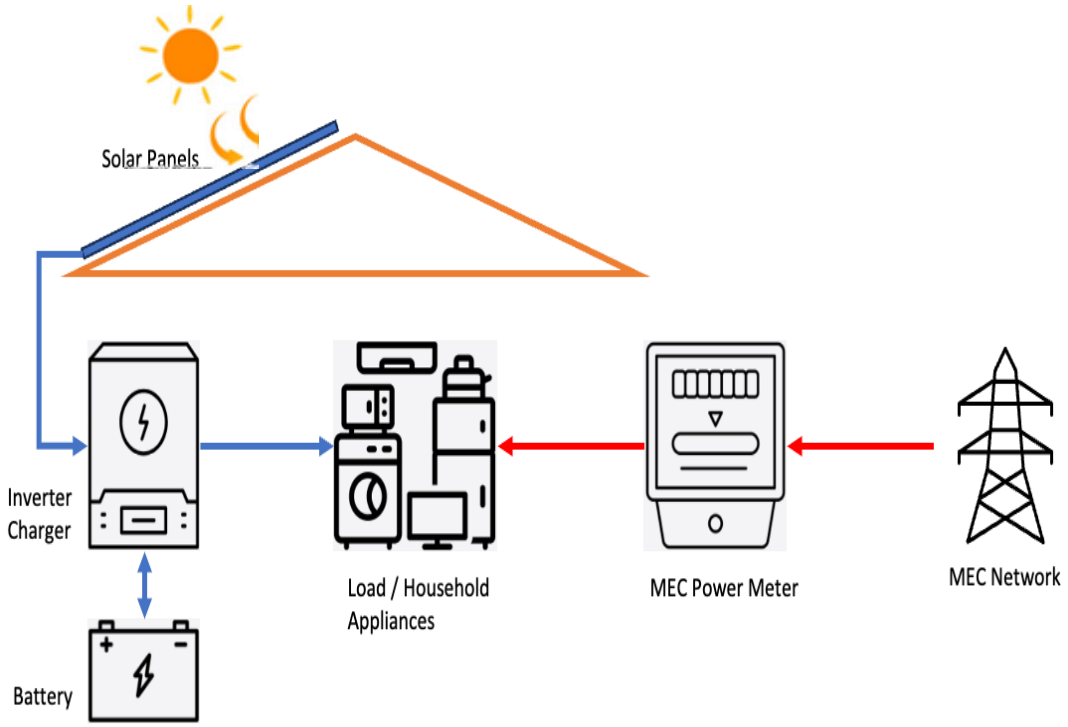
OFF-GRID OR ON-GRID PV SYSTEMS

Key Indicators for Identification



Feature	Off-Grid (User Type 0)	ON-Grid (User Type 1 and 2 - Any Solar Size)
Utility Revenue Meter	**NA**	**YES** (The M-symbol)
Physical Utility Link	**NO** (Fully Islanded)	**YES** (Connected to Transformer/Grid)
Battery Requirement	Optional (Hybrid)	MANDATORY

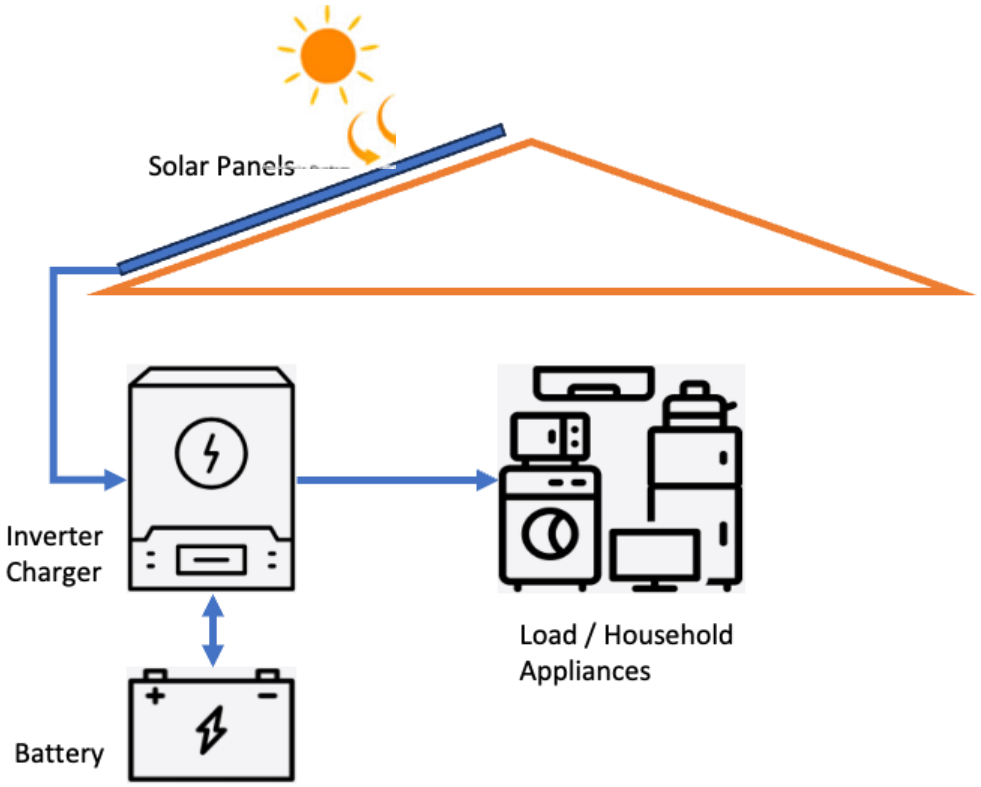
SOLAR HOME SYSTEMS (SHS)
ON-GRID



ON-Grid Technical Indicator (User Type 1 and 2):

- If an active line (Power Supply) exists between the **user property's breaker panel** and the **utility network**, the user's system is **On-Grid.**
- If there is a utility **Meter**, the customer is **ON-Grid.**
- MEC's Grid becomes the **"backup"** for the solar customer. When solar generation is not producing enough to cover the user's needs, the additional power is supplied from MEC's grid and recorded in the meter.
- **Policy Context**: These are the customers who would be subject to MEC's $0.02 per watt fixed charge, as they are still utilizing the grid infrastructure for stability. Unless their Solar System is S-Size.
- No energy can flow through the meter or bypass the meter into the MEC network. (No Export)

SOLAR HOME SYSTEMS (SHS)
OFF-GRID



Off-Grid Technical Indicator

- The absence of a utility service connection (no **wires** from MEC's network to the user's breaker panel)
- No utility **meter** serial number is associated with that account.
- **System Logic**: They use **Batteries** as their primary storage/backup. They do not interact with MEC's network because they are electrically isolated.
- **The "Ghost" Customer**: From a utility perspective, these are often "non-customers" or formerly active accounts that have been disconnected.

COMMON QUESTIONS & ANSWERS

Q: Why am I being charged a $ 0.02-per-watt fee for my solar panels?

A: This is not a "tax" on solar; it is a **Grid Stability & Maintenance Fee**. Even when your panels are producing power, you are still connected to the MEC network. We provide the essential "**back-up capacity**" that ensures 100% of your demand is met, even when your PV panels are not meeting your demand, at night or during the day when cloud cover reduces the output of your solar panels.

Q: Does MEC want to discourage renewable energy?

A: Quite the opposite! Given that the current MEC Majuro distribution network is based on a radial design with outdated technology, it is highly susceptible to fluctuations and disturbances. Directly connecting various individual solar systems to this network without centralized management can lead to power instabilities, overloading, and potential damage to both the grid and end-user equipment

Q: What strategies does the MEC employ to develop and integrate renewable energy in the RMI?

A: Based on technical studies, a limited amount of solar capacity can be connected to the current power system without causing power network instability. MEC has already planned to install 8,000 kW of its own solar capacity. As of today, MEC has successfully installed up to 4,500 kW of solar power generation systems and remains on track to meet its targets.


Thank You...