Mobile, Turnkey Broadband Access Solution for Rural Communities

MOBILE, TURNKEY SESAME SOLAR NANOGRID BROADBAND ACCESS SOLUTION FOR RURAL COMMUNITIES

SECTION 1: TECHNICAL

Section 1.1: Technical Approach

According to the 2020 FCC Broadband Development Report, there at approximately 19 million Americans without any access to Broadband internet connection, and 39% of Rural Americans lack access to internet service of 25 Mbps and higher. A 2019 USDA report on Computer Usage and Ownership reported that 25% of US farms have no access to internet at all. Lack of broadband connectivity presents quality of life shortcomings through lack of access to information, education, healthcare, government services, and business opportunities. This lack of access makes an already disadvantaged population more susceptible to adversity due to economic hardship and telehealth limitations.

Figure 1: Sesame Solar Towable Nanogrid

Sesame Solar proposes a Mobile Broadband Access Solution for use in these rural communities. The Sesame Solar Nanogrid Solution will be easily able to reach citizens in rural locations. The Sesame Solar Nanogrid is a simple, unique Solution that is completely self-contained. As shown in *Figure 1* below, the Sesame Solar Nanogrid is easily towed using a full-size pickup truck. It can be situated easily by the driver where it would be most effective for the community. This would make it a rapidly deployable Solution that could move easily from community to community.

Figure 2: Sesame Solar Nanogrid Easy Set-up

The Sesame Solar Nanogrid Solutions are very easy to deploy. Once the Mobile Broadband Access Solar Nanogrid is parked on a section of flat ground, it can be set-up in less than 15 minutes and starts producing solar power immediately. As shown in *Figure 2* below, this is all accomplished with one person. There is no need for a highly skilled or specialized operator. The solar panels stay protected and clean during transport and allow for immediate power generation once deployed. They require no

Figure 3: Sesame Solar Turn-Key Nanogrid Fully Deployed

special tools or skills to set up and can be restowed in the same amount of time. Sesame Solar Nanogrids come in two form factors: ISO Container and DOT certified Dual Axle Trailer. Each Sesame Solar Nanogrid can provide up to 53kWh of solar power. They are designed to be used alone or daisy chained together for higher power requirements. The Sesame Solar Nanogrids require no external power, which is ideal for a rural application where access to diesel fuel, external power or a generator may not be easily available. They are pre-engineered and have pre-configured components including solar arrays, lithium ion batteries, onboard invertors/chargers, and electronics to provide standalone, solar power.

The photo shown in *Figure 3*, is a fully deployed Sesame Solar Nanogrid Solution in a ISO Shipping Container. With the addition of broadband access equipment, the Sesame Solar Broadband Access Nanogrid Solution will support remediation of critical technology and capabilities gaps and will expand accessibility and bandwidth of broadband connectivity through rural communities and agricultural zones.

Sesame Solar has previous domestic deployments with the first and third largest broadband service providers in the United States with a total customer base of more than 33.3 million combined. The FCC has identified a broadband market gap of 20 million customers. This alone is incentive enough for our current broadband service customers to not only support development of our proposed Solution, but aggressively deploy it throughout Rural America to gain the additional market share.

Sesame Solar has a prime opportunity through the municipalities that are most impacted by the broadband gap. It is imperative to provide the local population with access to high speed internet to ensure childhood development is not further hindered or delayed. We have witnessed the adaptation of the remote learning experience and work from home requirements to help reduce the spread of infection during the current global pandemic. Lack of reliable broadband access all but ensures that children in the underserved, remote communities will fall behind in their education while their parents are unable to perform necessary work to sustain their livelihood.

With ever evolving agriculture technology and worsening soil erosion conditions, farmers across rural and middle America are making use of all available technology to gain a competitive advantage in production output and costs. This competition exists on a global scale and any gap in broadband accessibility puts already thin margins at risk. An agriculture combine costs near half a million dollars, making farmers all too familiar with the capital investments required to run large scale operations. As our technology becomes commercially available and viable for

agricultural use, Sesame Solar Nanogrids and its' ability to provide export power and broadband connectivity during outages events can reduce delays in production and would be invaluable for farms of all sizes.

Government Solicitations where Sesame Solar, Inc. has submitted similar solutions are follows:

- AFWERX – Phase 1 SBIR Award – Awarded – December 2019
- USDA – Phase 1 SBIR – Submitted October 2020

Section 1.2: Test/Evaluation

The Sesame Solar Nanogrids are currently available in a commercial, non-ruggedized configuration. Two Sesame Solar Nanogrid Medical Clinic Solutions are being used by Dominica's Ministry of Health to support their disaster relief efforts post Hurricane Maria, which damaged 90% of the buildings on the island and left thousands without power, water or needed medicines. The first was deployed in June 2018 and the second was deployed in October 2019. Four Sesame Solar Nanogrid Disaster Response Solutions are being used by leading broadband and telecommunication customers in the United States to support disasters throughout the nation. Two Sesame Solar Nanogrids were commissioned in 2019 and two were deployed in 2020.

SECTION 2: SOLUTION SUMMARY

Sesame Solar will work directly with telecommunication industry leaders to develop deployable broadband access solutions to be used by remote communities, individuals, and farmers to ensure continuity of access to broadband services. We will also design a ruggedized variant of our Solar Nanogrid Solution to house and fully power a Mobile Microsoft Azure Modular Datacenter (MDC) to support use scenarios ranging from mobile command centers, humanitarian assistance, military mission needs, mineral exploration, and other use cases requiring high intensity, secure computing on Azure. The Azure Modular Datacenters give customers a path to migrate apps to Azure while still running these workloads on-premises with low-latency connections to their own datacenter. This provides a steppingstone for transforming workloads to the Azure API with the option of continuing to run these apps on-premises, or in public or sovereign clouds. The patent pending design of the Sesame Solar Nanogrids will provide an off-grid Solar Nanogrid Solution for the Azure MDC providing datacenter scale compute resources needed around the world where there is a significant cloud computing and storage needs in areas with adverse conditions, where low communication, disrupted network availability and limited access to specialized infrastructure would have previously prevented taking advantage of cloud computing.

We have had initial communications with Land O' Lakes, a premier agribusiness company and a leading advocate for broadband expansion into rural areas, and plan to further consult and engage with them on our proposed Solution.

Technical Specifications:

Technical specifications for each Sesame Solar Nanogrid are found in *Figure 5* below.

Technical Specifications			
Model No		**TN 22.5**	**OGP 34**
Solar Array Power	kW	3.5	5.6
Total Battery Storage	kWh	22.8	34.2
Inverter Rating – 110/220 VAC	kW	4	6
Closed Dimensions	Ft.	14 x 7	20 x 8
Nanogrid Height	Ft.	8	8.5
Available Area Inside	Sq. Ft	65	95
Weight	Lbs.	6,500	7,800
Form Factor		DOT Dual Axle Trailer	ISO Shipping Container
Standard Shipping		Truck, Train, Ship, Cargo Plane, Helicopter, towed on a flatbed trailer	
Installation		Fully configured < 15 minutes	

Figure 4: Sesame Solar Nanogrid Technical Specifications

Warranty:

The Sesame Solar Nanogrid has a 1-year, end-to-end warranty except for power generation and electronics. Please see the table in Figure 6 below for details on the Third-Party Manufacturers extended warranties for each item from the date of delivery.

Item	Warranty
1) Lithium ion Batteries	8 years
2) Solar Panels	Up to 20 years
a) Material and Workmanship	5 Years
b) Power Output	20 Years
	90% of nominal rated power for years 1-10
	80% of nominal rated power for years 11-20
3) Inverter/ Charger	Standard 5 year, extended 10 year available

Figure 5: Warranty Table