



**SOUTHERN SKY
RENEWABLE ENERGY RI**

Providence Water

REQUEST FOR PROPOSALS

Renewable Energy Projects

FOR PUBLIC RECORD

Submitted To:
Patti Jordan
City of Providence
Board of Contract and Supply
25 Dorrance St
Providence, RI 02903



**Prepared for
City of Providence, Rhode Island
Providence Water**

June 25, 2018

**Board of Contract and Supply
Request For Proposals – Renewable Energy Projects**

Presented by:

Southern Sky Renewable Energy Rhode Island, LLC
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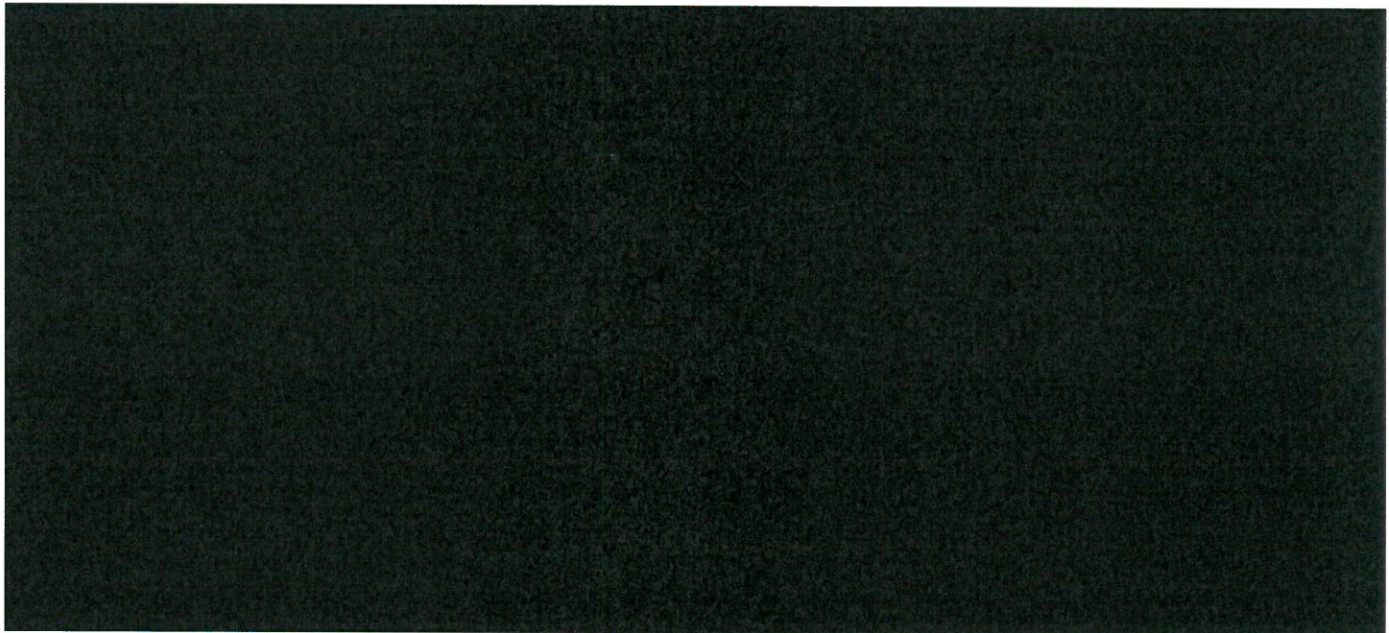


June 25, 2018

Patti Jordan
City of Providence
Board of Contract and Supply
25 Dorrance St
Providence, RI 02903

Dear Mrs. Jordan,

Southern Sky Renewable Energy Rhode Island, LLC ("SSRERI") is pleased to submit the attached proposal in response to the City of Providence ("City") Request for Proposals for Renewable Energy Projects in conjunction with Providence Water. Ralph A. Palumbo, President, will act as the point of contact to the City during the RFQ/RFP process.



The SSRERI project team is pleased to provide this proposal, which will provide Providence Water with energy savings on an annual basis and a hedge against retail power volatility. We look forward to taking the next steps with the City to move through RFP process into a long term mutually beneficial relationship.

Sincerely,

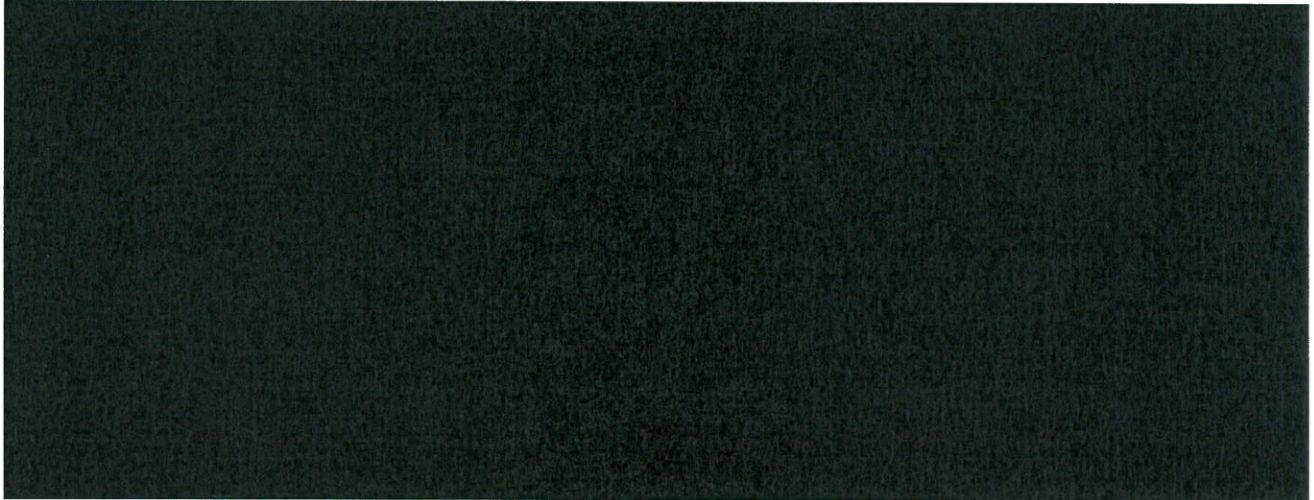


Ralph A. Palumbo
Managing Director

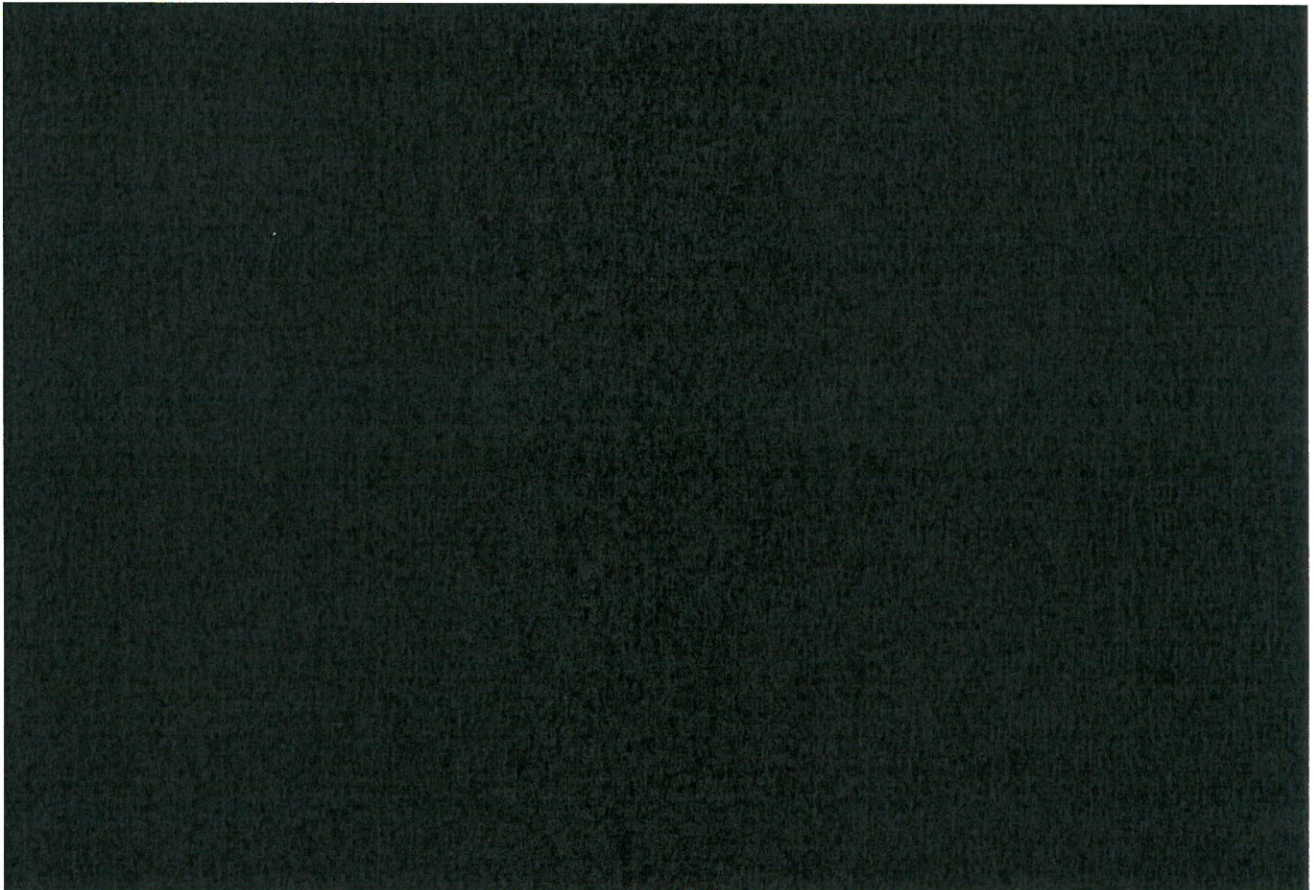
Table of Contents

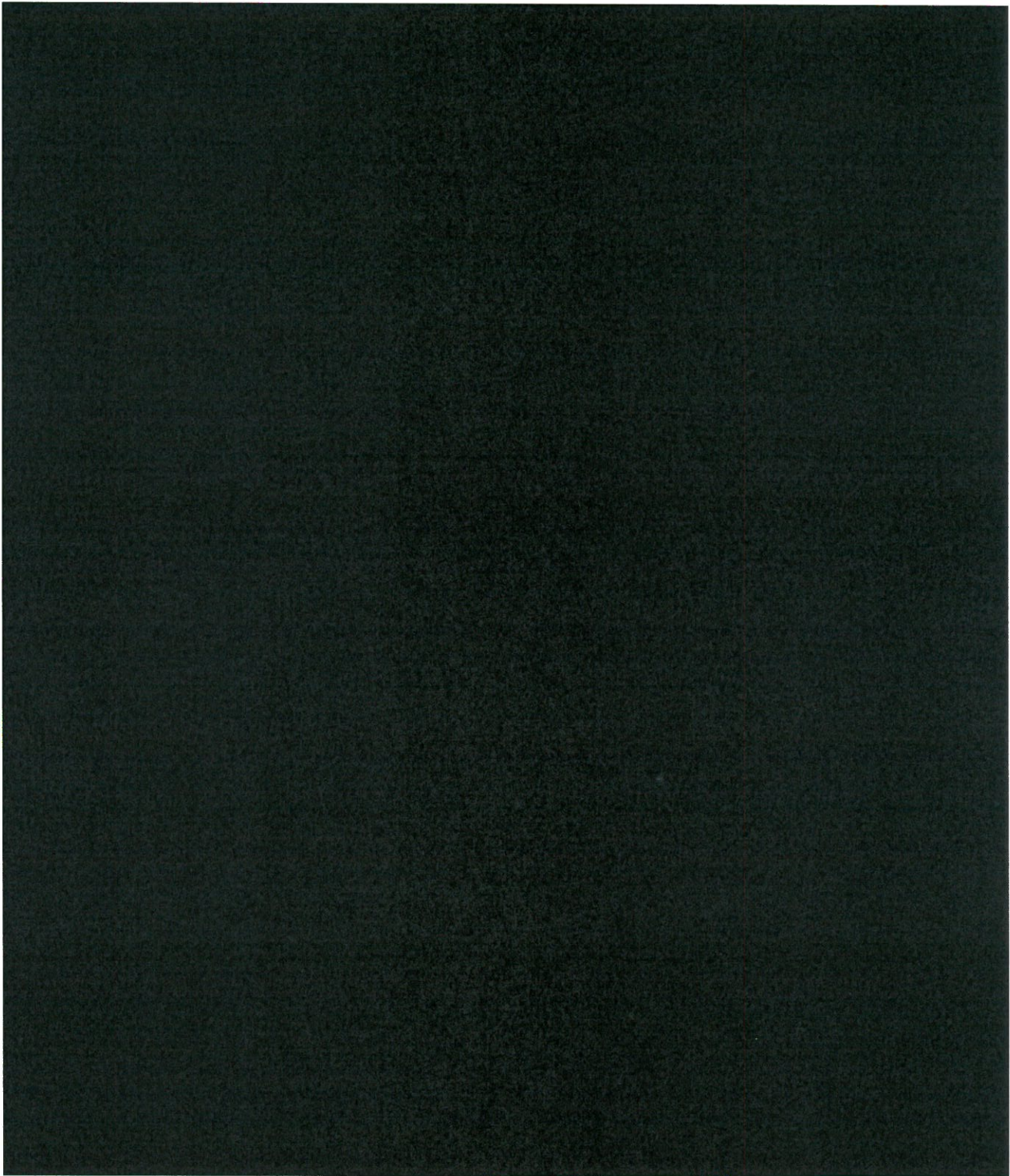
1. Executive Summary	6
2. Company Overview & Project Team	6
3. Public-Private Partnerships	8
4. Proposed Photovoltaic Projects.....	9
5. Hydroelectric Proposals	11
6. Facility Operation & Maintenance	11
7. Project Team Subcontractors	11
8. Financial Viability.....	12
9. Qualifications & Project References.....	12
10. Client References	19
11. Exhibits	20

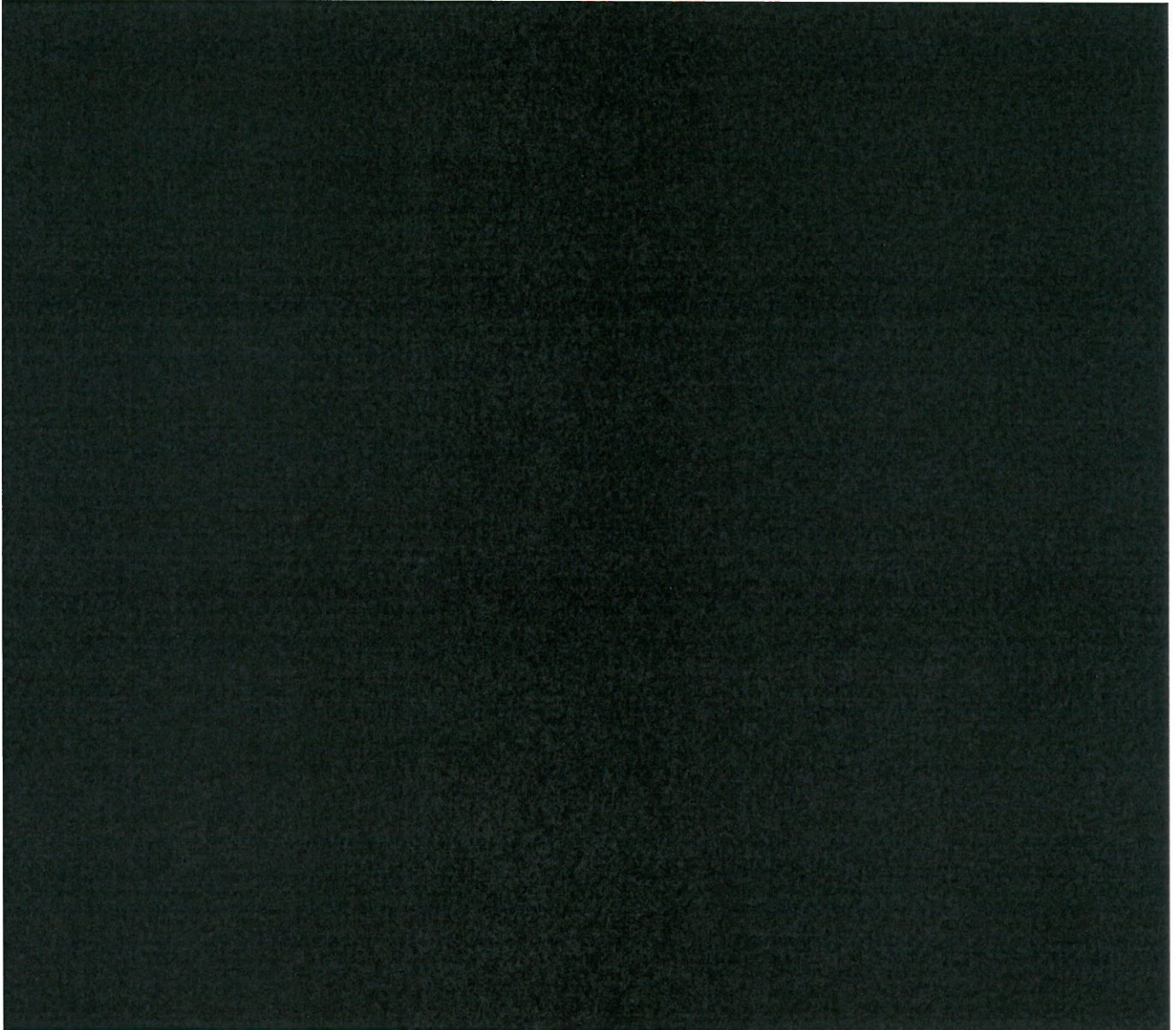
1. Executive Summary



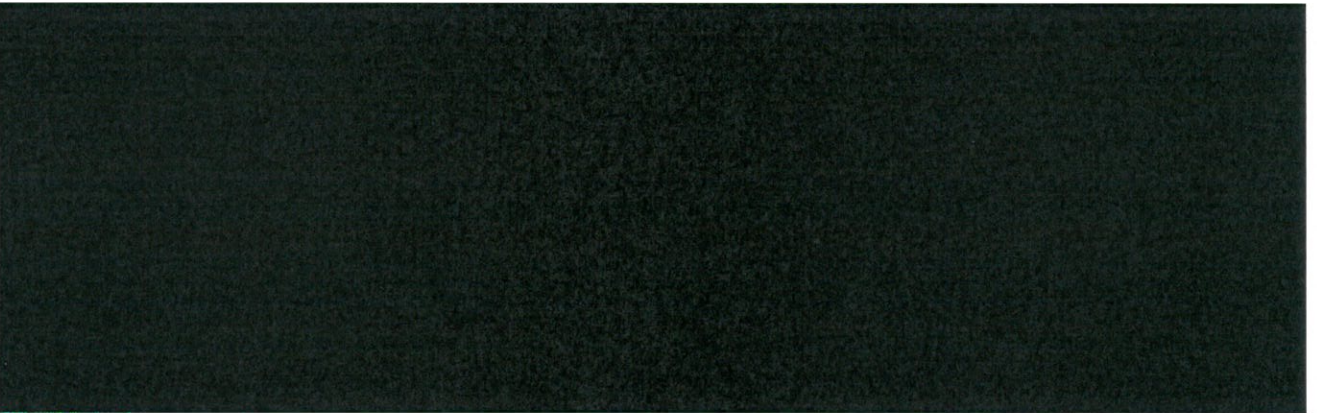
2. Company Overview

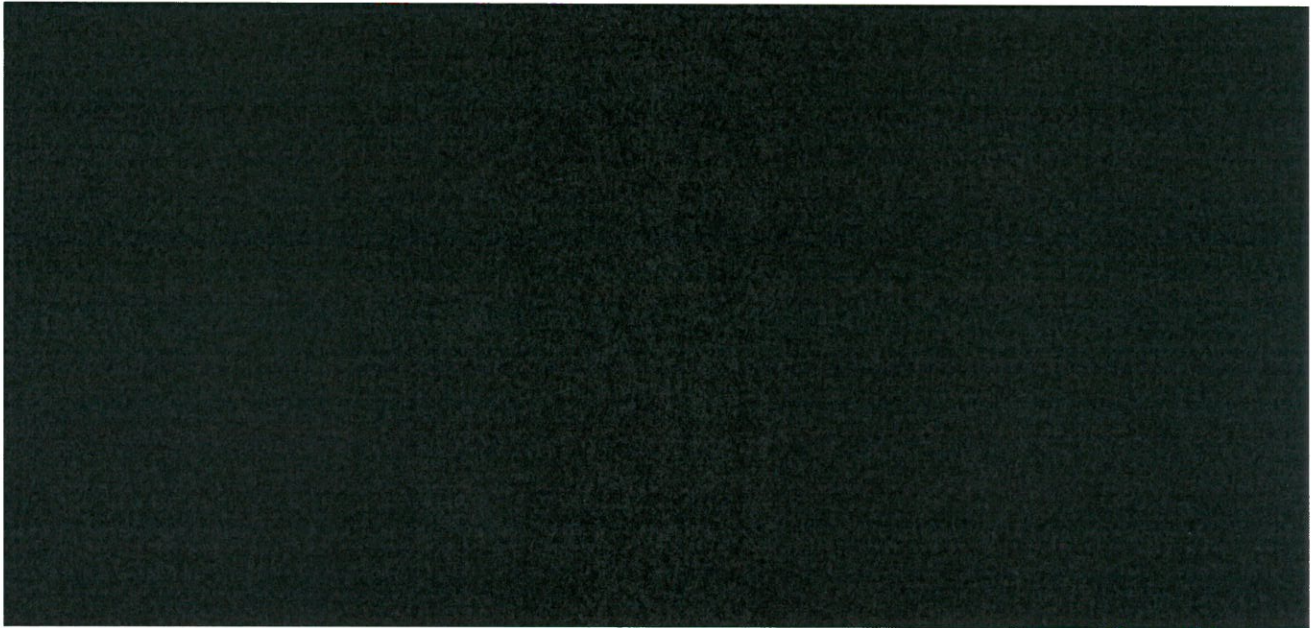




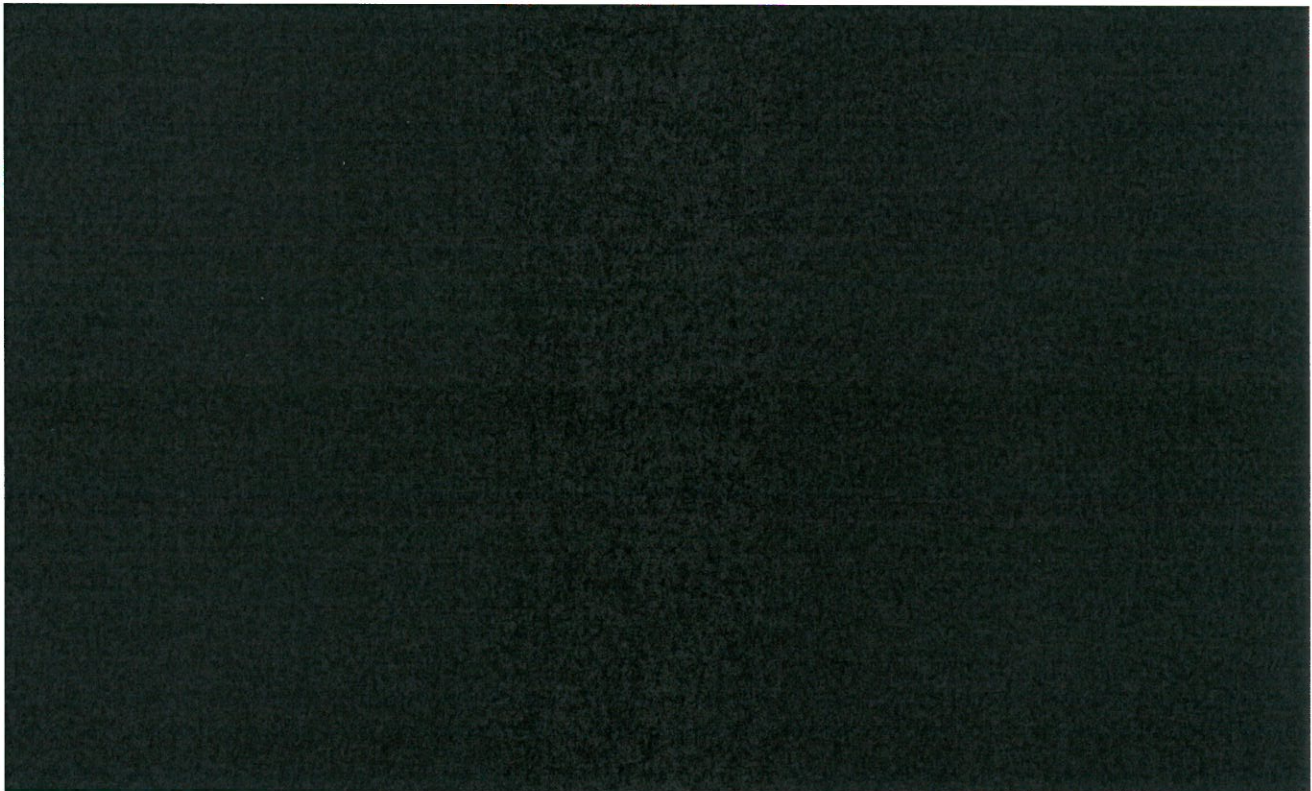


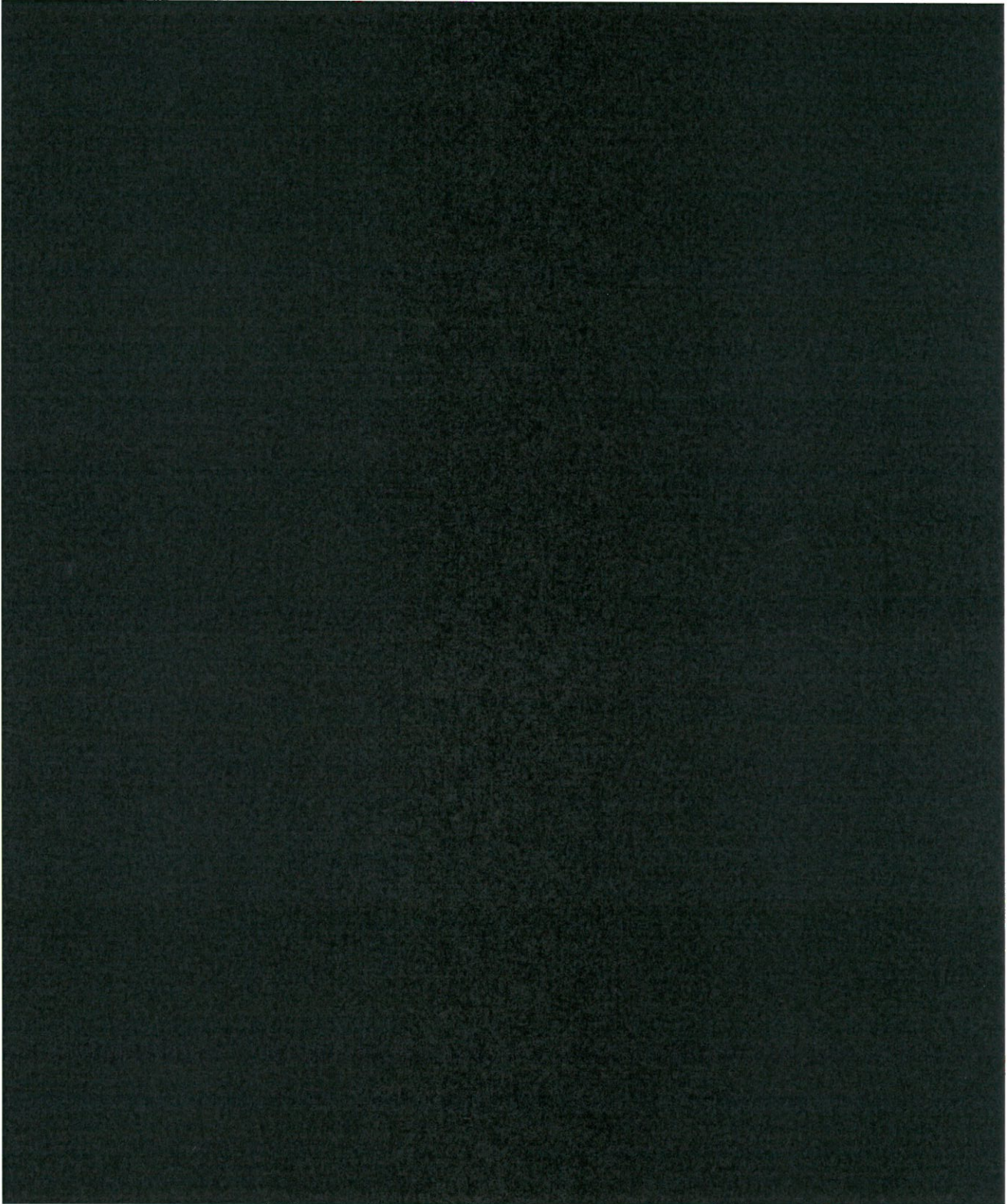
3. Public – Private Partnership

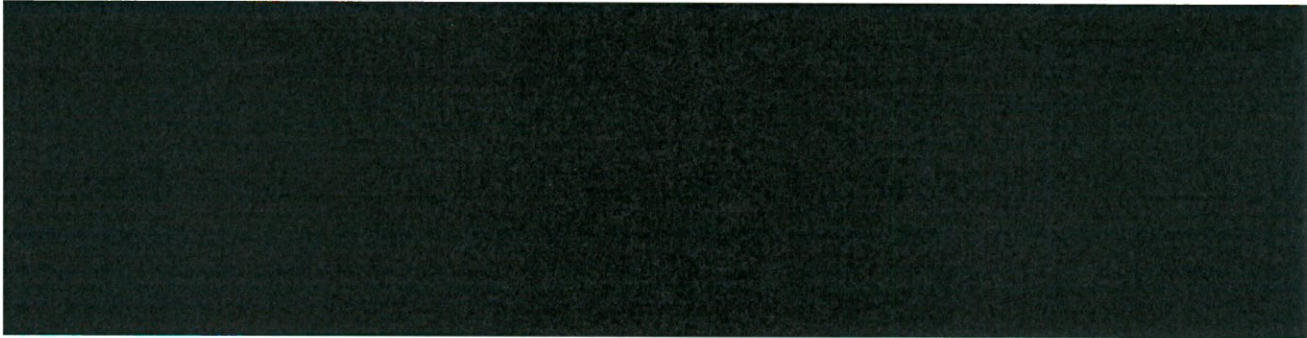




4. Proposed Photovoltaic Projects



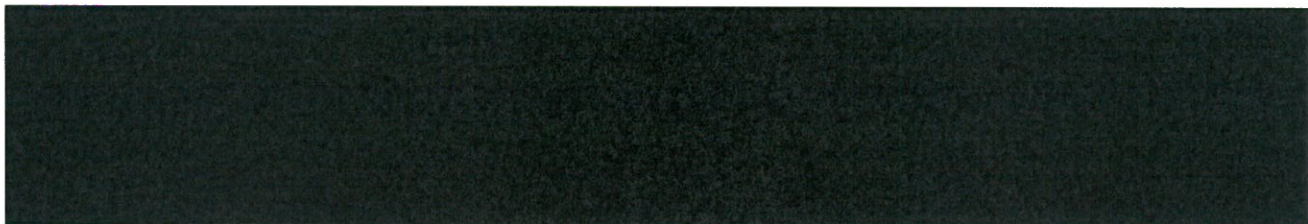




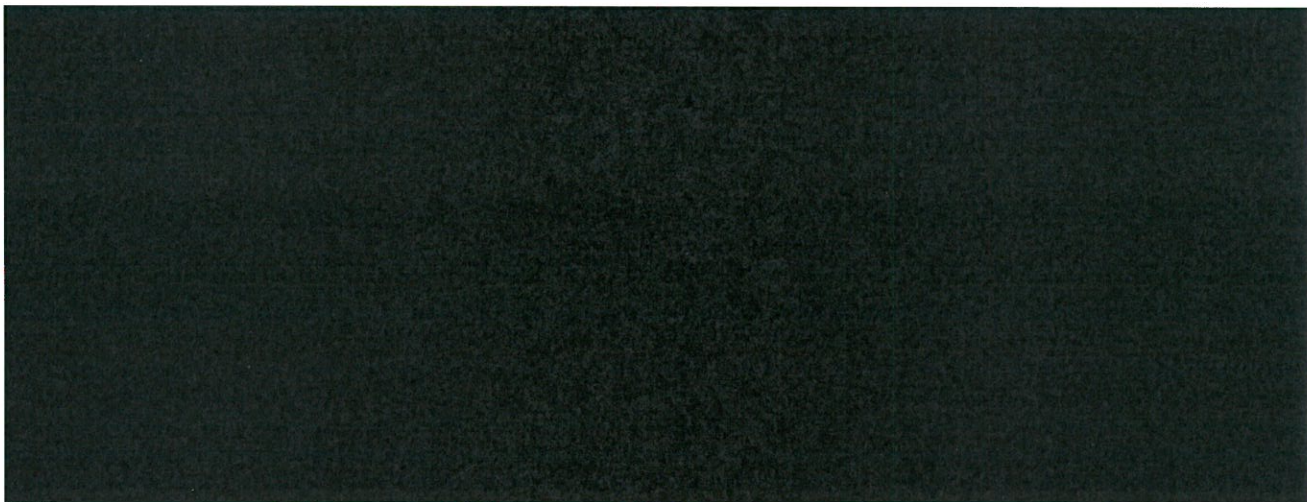
5. Hydroelectric Proposals



6. Facility Operation and Maintenance



7. Project Team Subcontractor



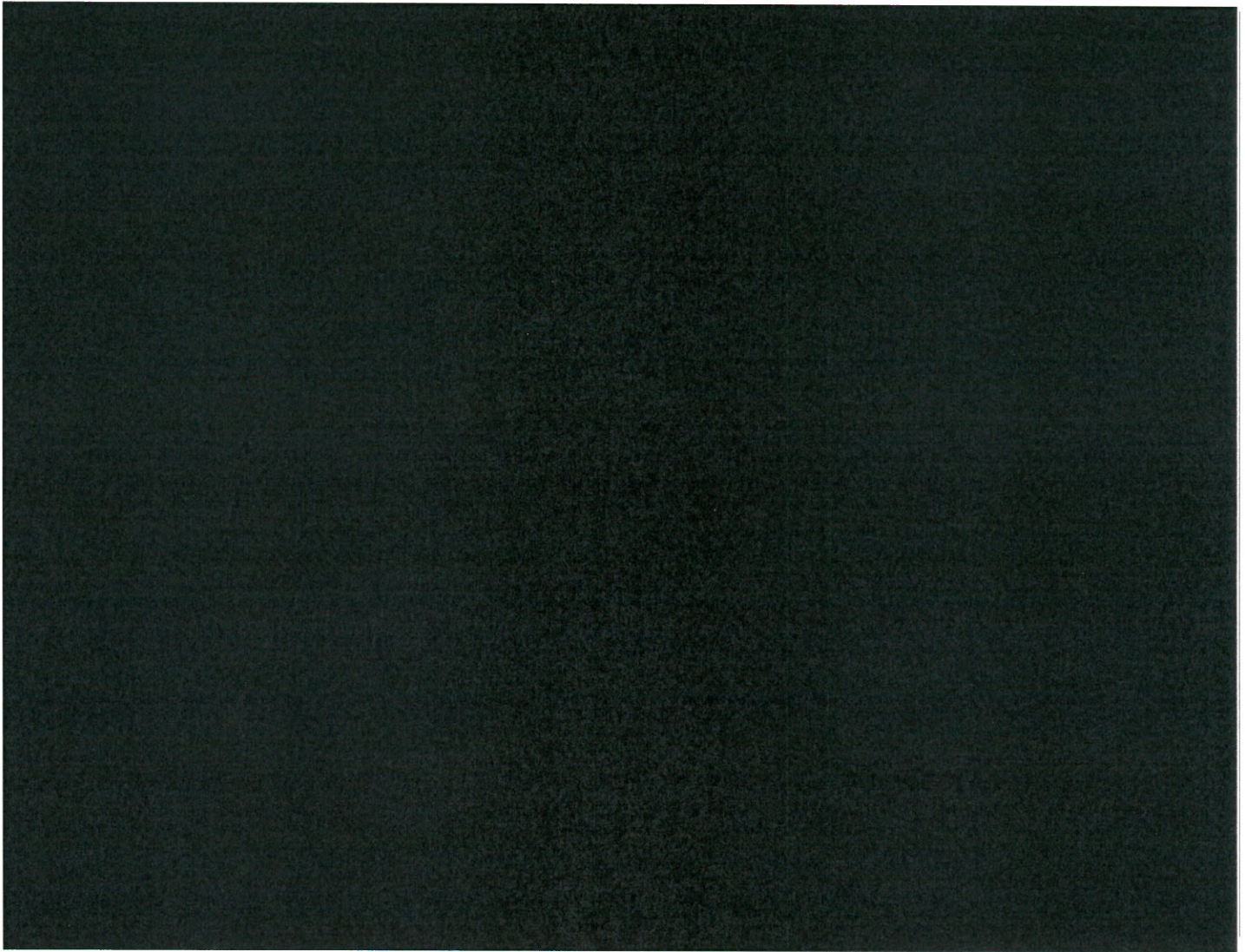


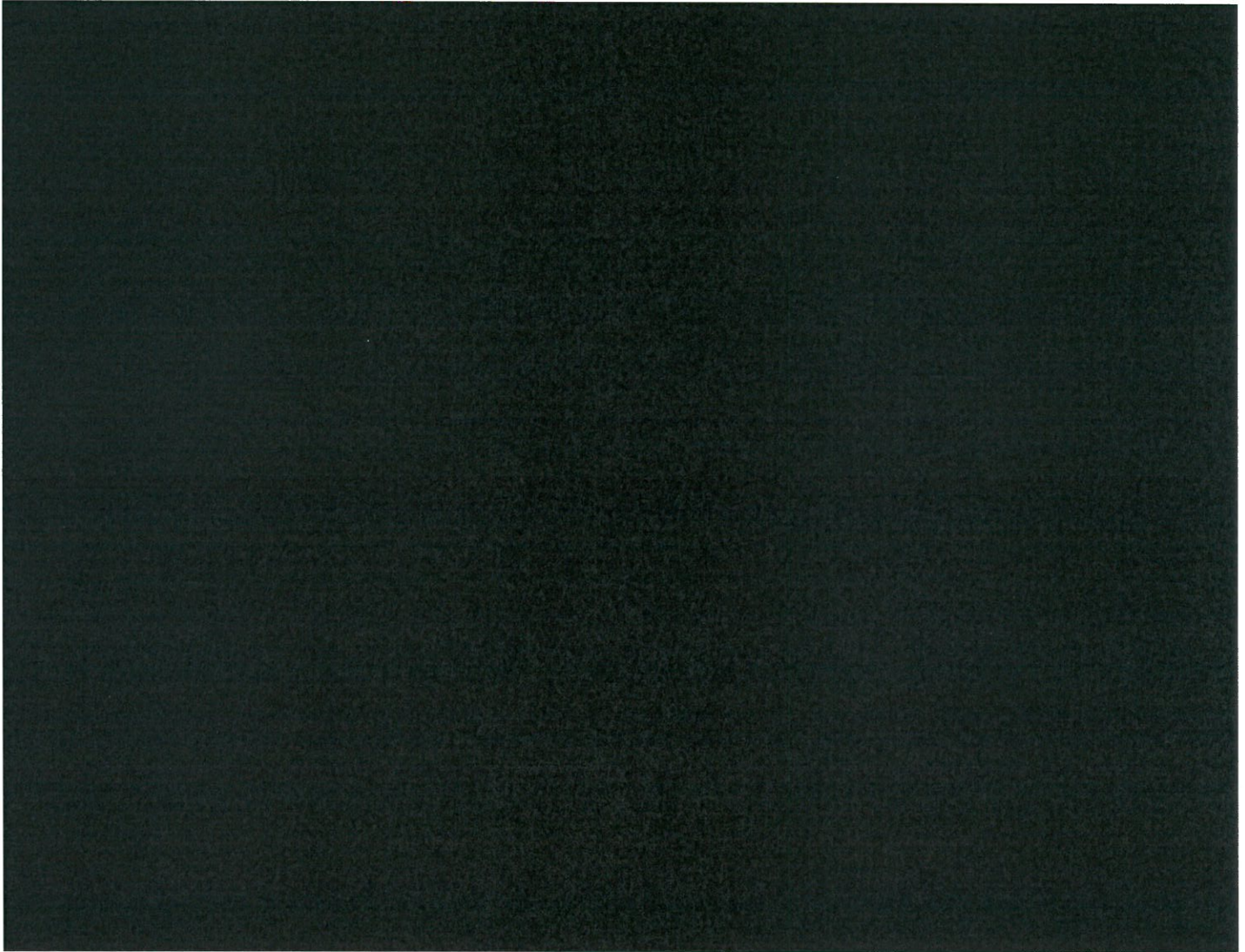
8. Financial Viability



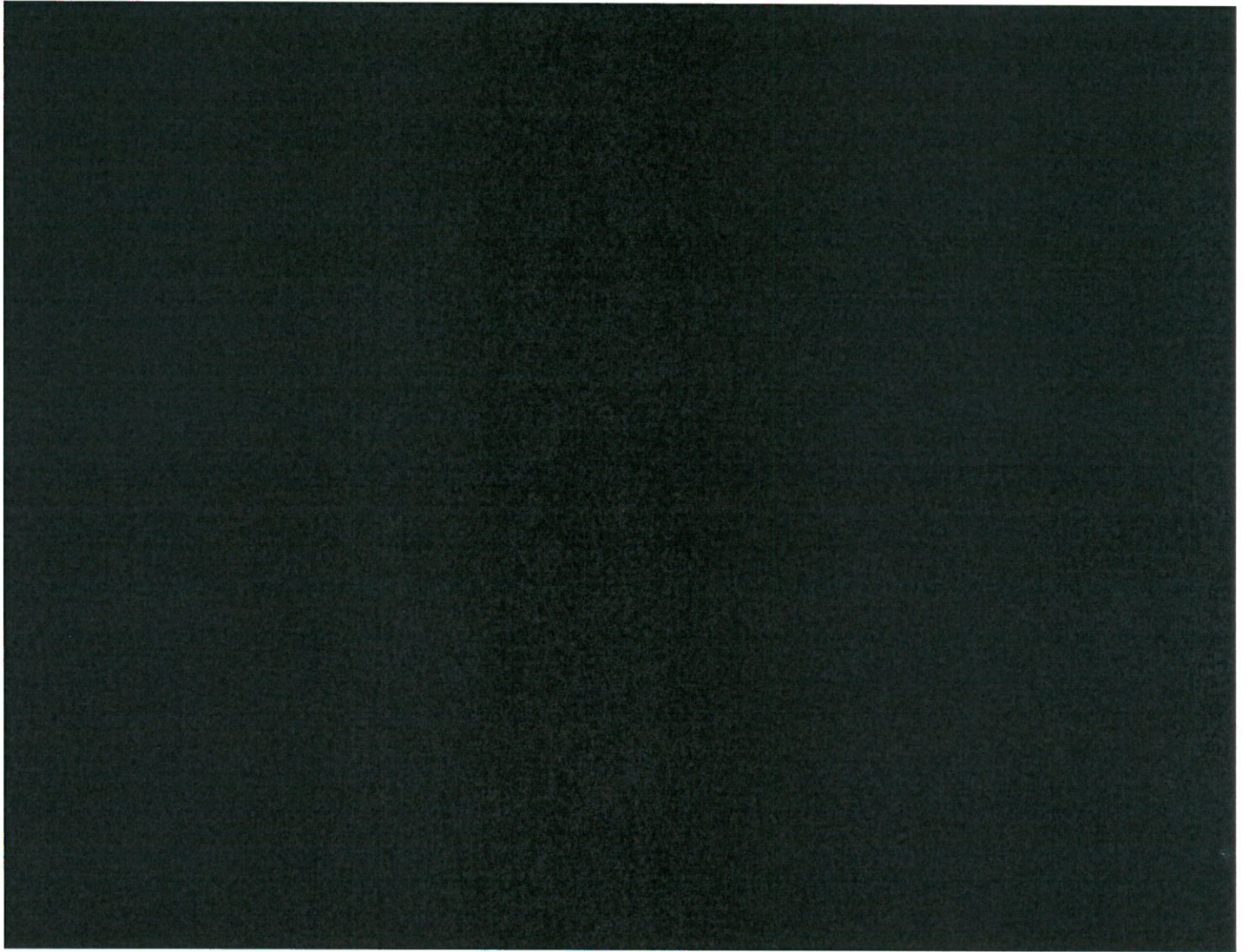
9. Qualifications & Project References

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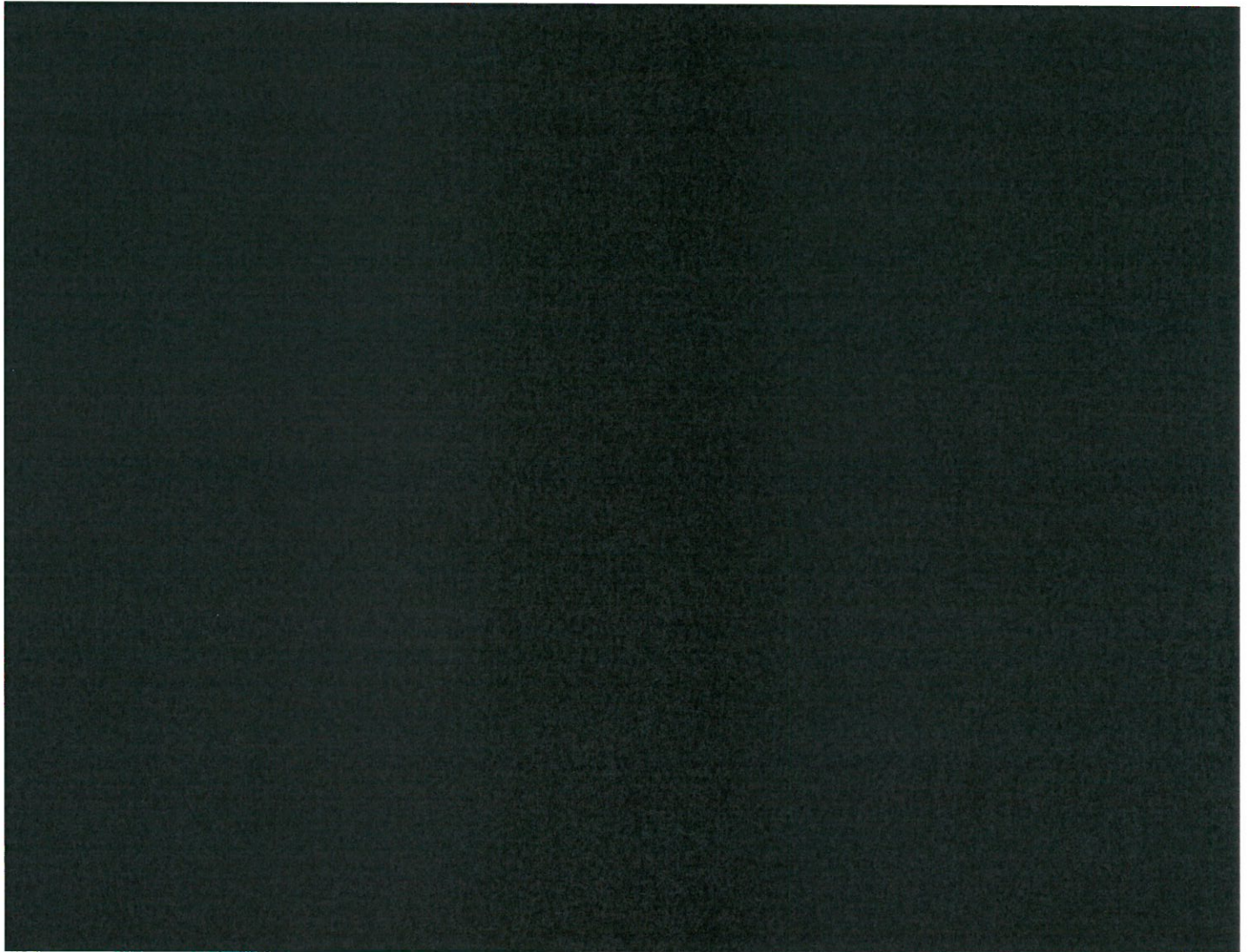




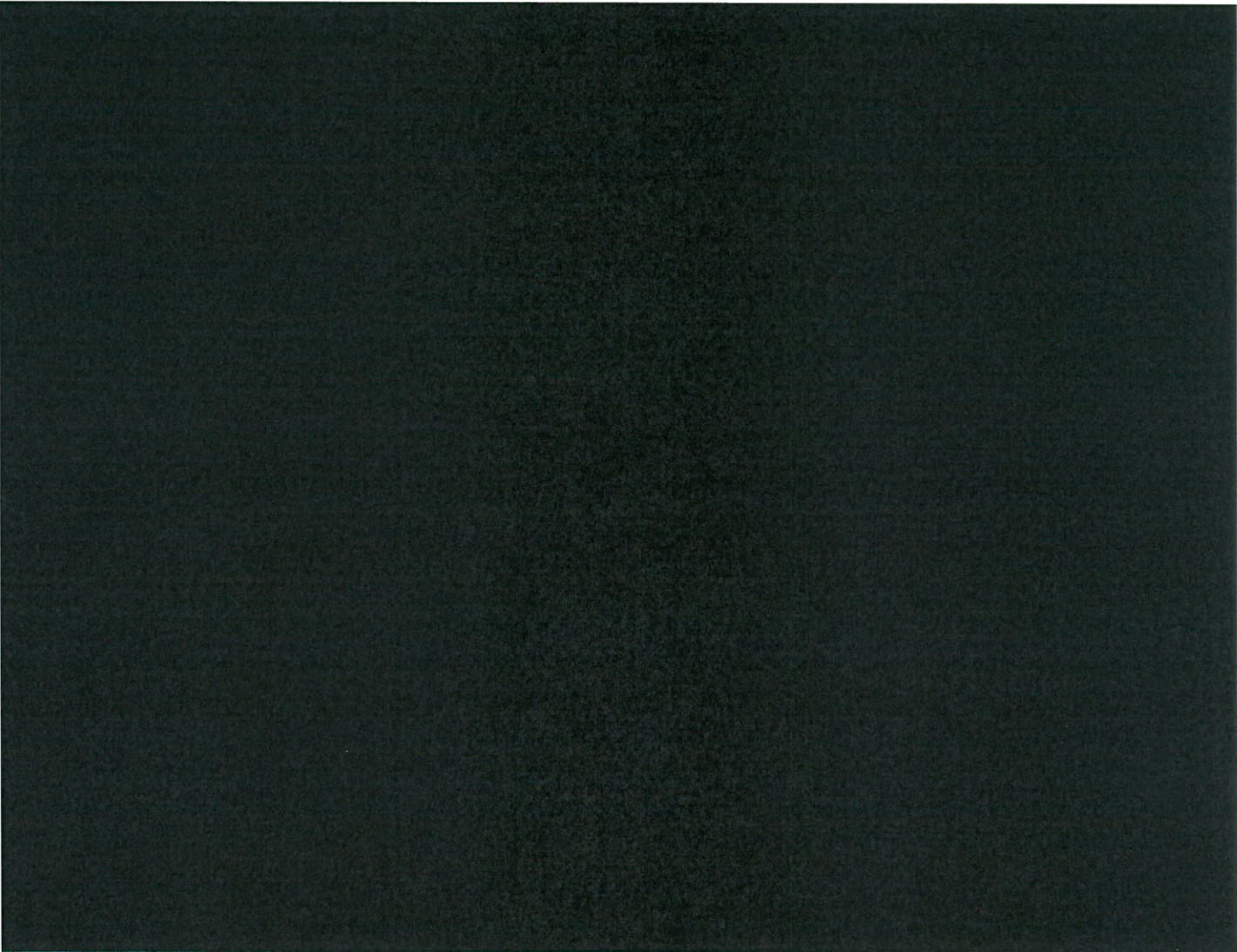
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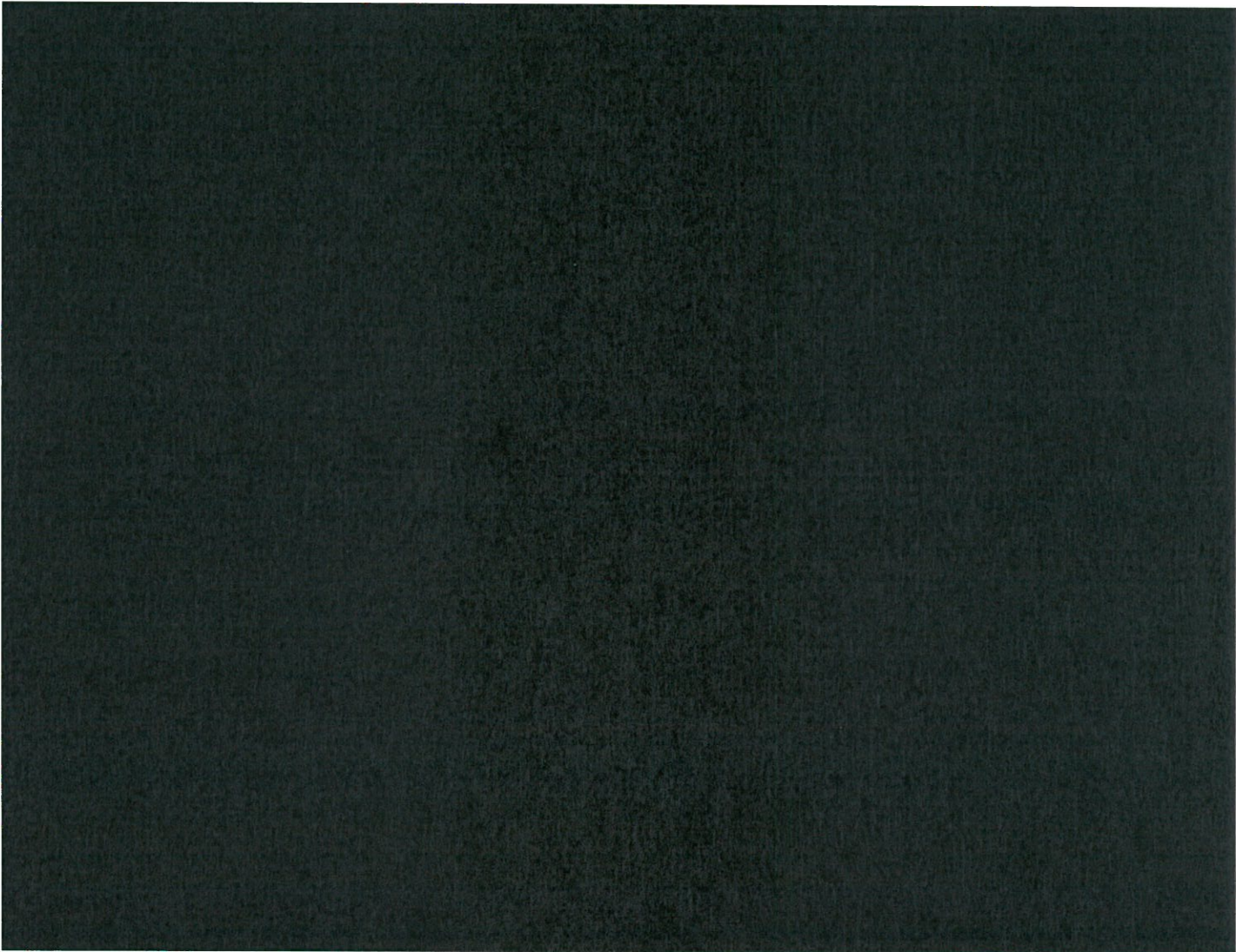
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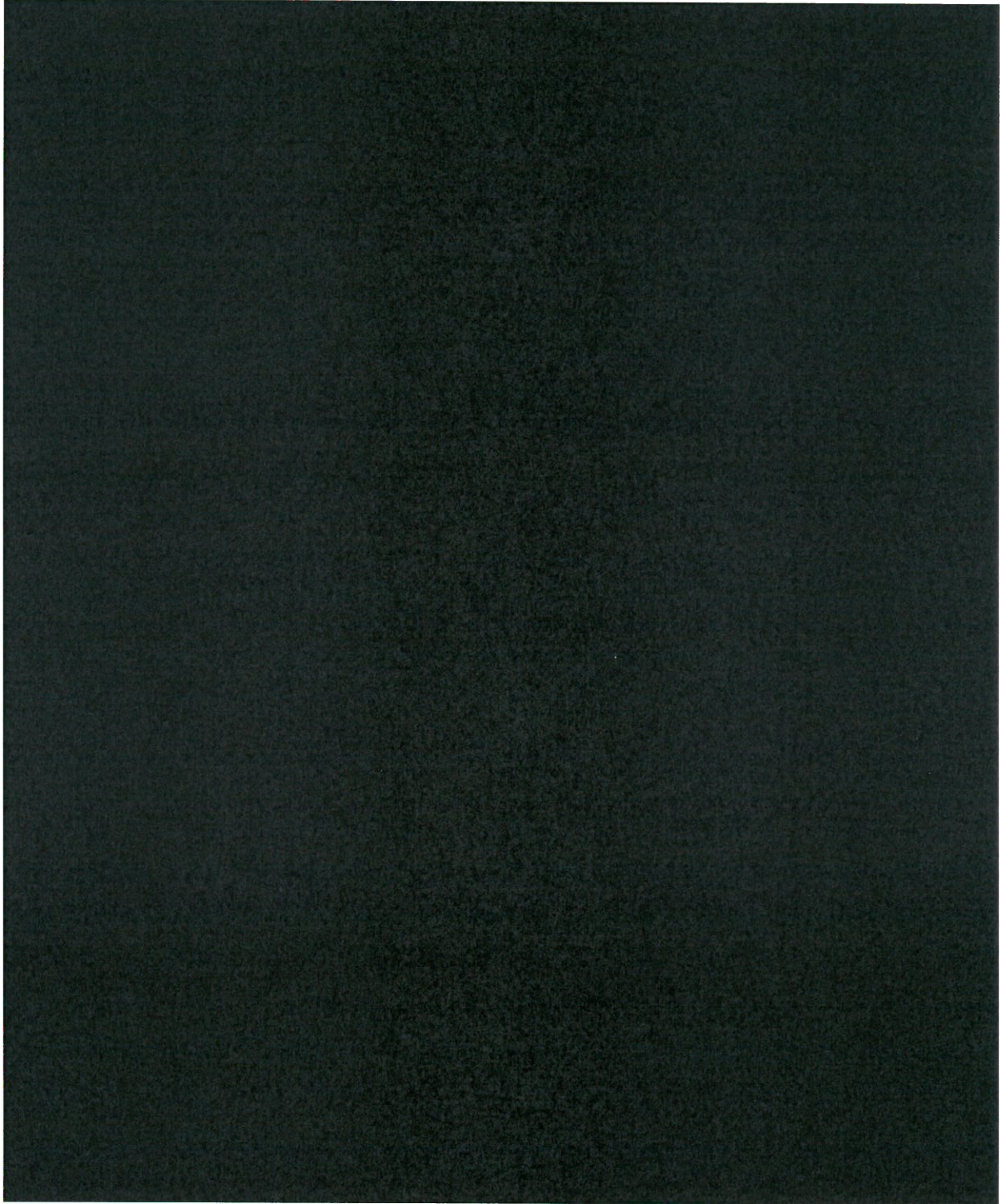
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10. Client References



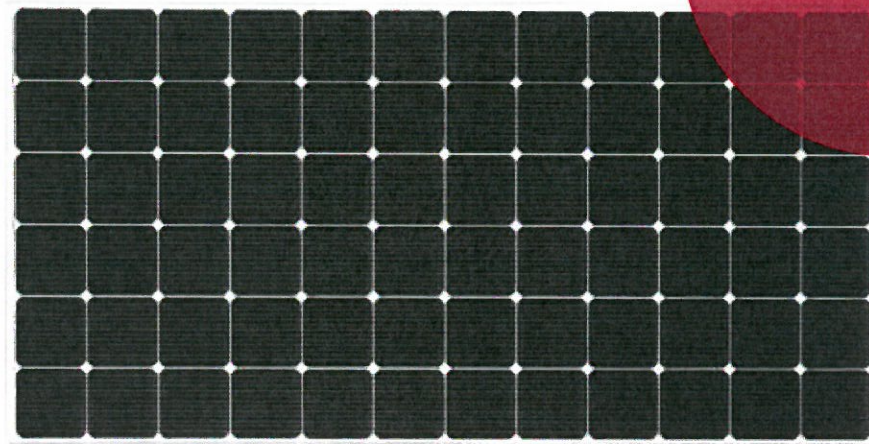
11. RFQ/RFP Response: Exhibits

SSRERI only included the requirements of the RFQ/RFP within this document. If the **Providence Water** is interested in the following additional information, please refer to the Exhibits.

1. **Exhibit I - Project Design**
2. **Exhibit II - Project Pipeline**
3. **Exhibit III - Project Gantt Chart**
4. **Exhibit IV – Insurance**
5. **Exhibit V - Financial Analysis**
6. **Exhibit VI - Draft “NMFA”**
7. **Exhibit VII - Equipment Specs**
8. **Exhibit VIII - O&M Plan**
9. **Exhibit IX – Transmittal Letter**

EXHIBIT VII

Equipment Specs



LG NeON™ 2 72cell

LG410N2W-A5 LG405N2W-A5 LG400N2W-A5 LG395N2W-A5

72 cell

LG's new module, LG NeON™ 2, adopts Cello technology. Cello technology replaces 3 busbars with 12 thin wires to enhance power output and reliability. LG NeON™ 2 demonstrates LG's efforts to increase customer's value beyond efficiency. It features enhanced warranty, durability, performance under real environment, and aesthetic design suitable for roofs.



Enhanced Performance Warranty

LG NeON™ 2 has an enhanced performance warranty. The annual degradation has fallen from -0.6%/yr to -0.55%/yr. Even after 25 years, the cell guarantees 1.2% more output than the previous LG NeON™ 2 modules.



High Power Output

Compared with previous models, the LG NeON™ 2 has been designed to significantly enhance its output efficiency, thereby making it efficient even in limited space.



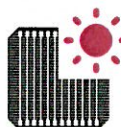
Aesthetic Roof

LG NeON™ 2 has been designed with aesthetics in mind; thinner wires that appear all black at a distance. The product may help increase the value of a property with its modern design.



Outstanding Durability

With its newly reinforced frame design, LG has extended the warranty of the LG NeON™ 2 for an additional 2 years. Additionally, LG NeON™ 2 can endure a front load up to 5400 Pa, and a rear load up to 4300 Pa.



Better Performance on a Sunny Day

LG NeON™ 2 now performs better on sunny days thanks to its improved temperature coefficient.



Double-Sided Cell Structure

The rear of the cell used in LG NeON™ 2 will contribute to generation, just like the front; the light beam reflected from the rear of the module is reabsorbed to generate a great amount of additional power.

About LG Electronics

LG Electronics is a global player who has been committed to expanding its operations with the solar market. The company first embarked on a solar energy source research programs in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry, and materials industries. In 2010, LG Solar successfully released its first Mono X® series to the market, which is now available in 32 countries. The LG NeON™ (previously known as Mono X® NeON) and the LG NeON™2 won the "Intersolar Award" in 2013 and 2015, which demonstrates LG Solar's lead, innovations and commitment to the industry.

Mechanical Properties

Cells	6 x 12
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	161.7 x 161.7 mm / 6 inches
# of Busbar	12 (Multi Wire Busbar)
Dimensions (L x W x H)	2024 x 1024 x 40 mm 79.69 x 40.31 x 1.57 inch
Front Load	5400Pa
Rear Load	4300Pa
Weight	21.7 kg
Connector Type	MC4
Junction Box	IP68 with 3 Bypass Diodes
Cables	1200 mm x 2 ea
Glass	High Transmission Tempered Glass
Frame	Anodized Aluminium

Certifications and Warranty

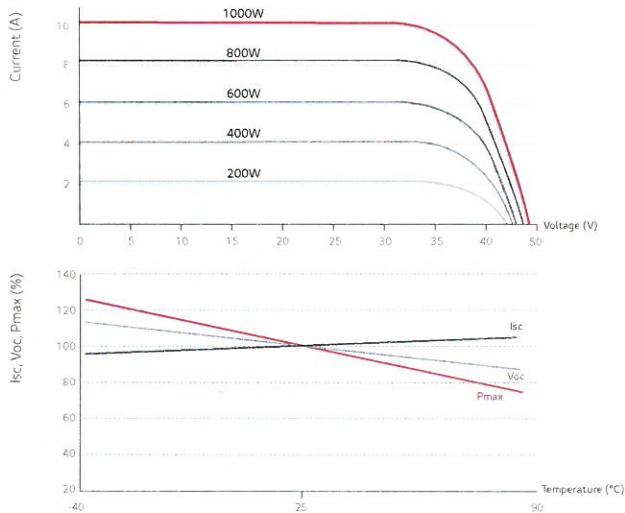
Certifications	IEC 61215, IEC 61730-1/-2 UL 1703 IEC 61701 (Salt mist corrosion test) IEC 62716 (Ammonia corrosion test) ISO 9001
Module Fire Performance (USA)	Type 1
Fire Rating (CANADA)	Class C (ULC / ORD C1703)
Product Warranty	12 years
Output Warranty of Pmax	Linear warranty**

** 1) 1st year : 98%, 2) After 2nd year : 0.55% annual degradation, 3) 25 years : 84.8%

Temperature Characteristics

NOCT	45 ± 3 °C
Pmpp	-0.36%/°C
Voc	-0.26%/°C
Isc	0.02%/°C

Characteristic Curves



Electrical Properties (STC *)

Module	410W	405W	400W	395W
Maximum Power (Pmax)	410	405	400	395
MPP Voltage (Vmpp)	41.4	41.0	40.6	40.2
MPP Current (Imp)	9.91	9.89	9.86	9.83
Open Circuit Voltage (Voc)	49.5	49.4	49.3	49.2
Short Circuit Current (Isc)	10.55	10.51	10.47	10.43
Module Efficiency	19.8	19.5	19.3	19.1
Operating Temperature	-40 ~ +90			
Maximum System Voltage	1500 (UL)			
Maximum Series Fuse Rating	20			
Power Tolerance (%)	0 ~ +3			

* STC (Standard Test Condition): Irradiance 1,000 W/m²; Ambient Temperature 25 °C, AM 1.5

* The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion

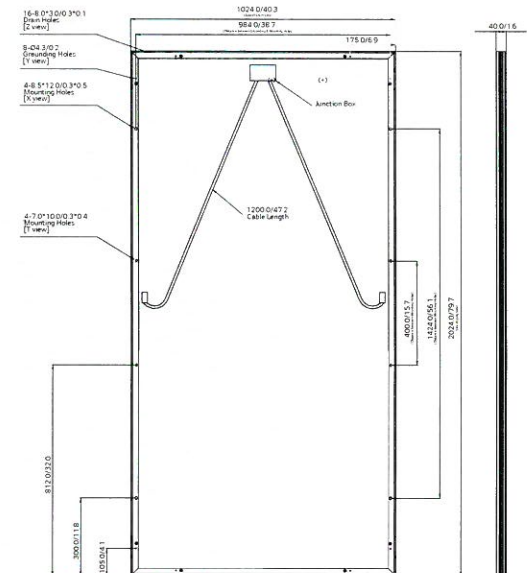
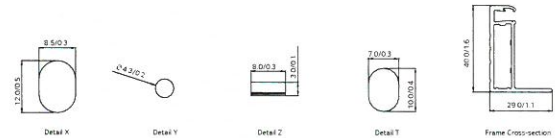
* The Typical change in module efficiency at 200W/m² in relation to 1000W/m² is -2.0%

Electrical Properties (NOCT*)

Module	410W	405W	400W	395W
Maximum Power (Pmax)	304	300	296	293
MPP Voltage (Vmpp)	38.3	38.0	37.6	37.2
MPP Current (Imp)	7.92	7.91	7.88	7.86
Open Circuit Voltage (Voc)	46.3	46.2	46.1	46.0
Short Circuit Current (Isc)	8.47	8.44	8.41	8.38

* NOCT (Nominal Operating Cell Temperature): Irradiance: 800W/m²; ambient temperature 20 °C, wind speed 1m/s

Dimensions (mm/in)



* The distance between the center of the mounting/grounding holes.



North America Solar Business Team
 LG Electronics U.S.A. Inc.
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 www.lgsolarusa.com

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 01/01/2017

Innovation for a Better Life





Ground Mount Solutions



Driven | Ballasted

DESIGN • ENGINEERING • MANUFACTURING • INSTALLATION



Complete Single-Source Solutions

RBI Solar's ground mount solar systems are designed and engineered for each customer's site specific conditions to minimize the field installation labor by eliminating field welding, drilling, or other on-site fabrication. Our meticulous project planning and precise execution combine to provide you with solar racking solutions that are tailored to the unique conditions of your location while reducing your overall total project costs. RBI provides a wide range of PV mounting systems in various sizes to offer freedom and flexibility to support every type of PV module.

Why choose RBI Solar?

- Single-source solutions aide in reduction of overall total project costs
- Streamlined production process
- Wider selection of component parts
- Higher strength steel with corrosion protection
- Uses less steel without sacrificing strength
- Pre-assembled components available
- Quick response & efficient communication
- Follow contours to mitigate civil/site work
- Nationwide installation services
- ETL Classified to UL Standard 2703
- 20-yr limited warranty
- 85+ years manufacturing experience & bankable financial backing





Ground Mount Solutions

- Customizable, site-specific solutions
- Multiple foundations available
- ETL classified to UL Standard 2703



Ballasted Mounting Solutions

- Two ballast foundation offerings
- Perfect for landfills, brownfields and non-penetrable sites



Design & Engineering

- Licensed in-house engineers
- Structural and foundation design
- Stamped drawings, including foundations
- Code compliance
- On-site pile testing



Manufacturing

- Multiple manufacturing facilities
- National & International capabilities
- ARRA compliant availability

Installation

- Dedicated Project & Construction Managers
- Highly skilled & specialized installation crews
- Company-owned post driving equipment

Our Job is to Make Yours Easier

Single-Source Provider

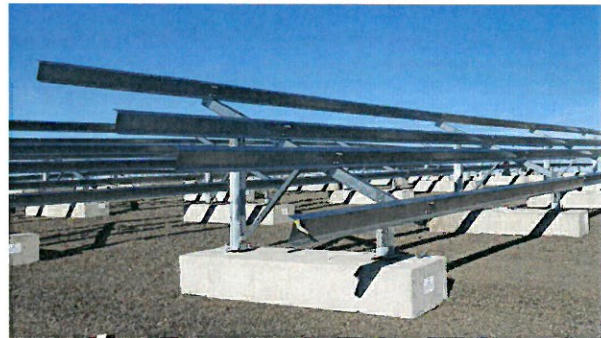
DESIGN

RBI Solar's in-house designers provides complete structural and foundation design. It is our focus to deliver the most effective and efficient racking solution for each project's site specific conditions.



ENGINEERING

Our licensed in-house engineers incorporate and analyze data from certified geotechnical reports, on-site pile testing and all applicable codes/loading considerations when designing each individual project.



MANUFACTURING

Having multiple state-of-the-art manufacturing facilities with vertical integration and refined manufacturing protocol, ensure RBI Solar delivers on overall quality of product with reduced lead times for material delivery to job sites.

INSTALLATION

RBI Solar provides single-source responsibility with in-house project management and a network of installation crews. Overall project coordination allows RBI Solar to focus on delivering projects on time and within budget.

**Solar Racking Solutions
from the Industry's Most Trusted Team**

Contact us at info@rbisolar.com or (513) 242-2051

www.rbisolar.com





Envirotran Solar Transformer

As a result of the increasing number of states that are adopting aggressive Renewable & Alternative Energy Portfolios, the solar energy market is growing—nearly doubling year over year. Cooper Power Systems, a key innovator and supplier in this expanding market, is proud to offer Envirotran™ transformers specifically designed for Solar Photovoltaic medium-voltage applications. Cooper Power Systems is working with top solar photovoltaic developers, integrators and inverter manufacturers to evolve the industry and change the way we distribute power.

In accordance with this progressive stance, every Cooper Power Systems Envirotran Solar transformer is filled with non-toxic, biodegradable Envirotemp™ FR3™ dielectric fluid, made from renewable seed oils. On top of its biodegradability, Envirotemp™ FR3™ fluid substantially extends the life of the transformer insulation, saving valuable resources. What better way to distribute green power than to use a green transformer? In fact, delaying conversion to Envirotran transformers places the burden of today's environmental issues onto tomorrow's generations.

Cooper Power Systems can help you create a customized transformer based on site specific characteristics including temperature profile, site altitude, solar profile and required system life. Some of the benefits gained from this custom rating include:

- Reduction in core losses
- Improved payback on investment
- Reduction in foot print
- Improved fire safety
- Reduced environmental impact

You can be assured that Envirotran Solar transformers, when evaluated on total ownership cost (TOC), will save you money on losses and maintenance. For example, the following breakdown shows the savings you could experience by allowing Cooper Power Systems to site-optimize the transformer design.

Finally, when it comes time for decommissioning of your Envirotran Solar transformer, virtually all materials, from the durable core and cabinet steel to the biodegradable Envirotemp™ FR3™ fluid, can be easily and economically recycled or reclaimed. Envirotran Solar transformers are truly helping make a brighter future possible.

Rating	No Load	Load	No Load Loss ¹	Load Loss	Price	Total
1000 kVA	1,600 W	8,280 W	\$15,720	\$3,530 ²	\$32,000	\$51,250
Optimized	1,250 W	6,690 W	\$12,280	\$5,070 ³	\$27,000	\$44,350
						14%

Notes

1 Based on 20 yr, 5% interest, 9c/kWh

2 21% average loading

3 28% average loading

Values above for illustrative purposes only. Actual values will depend on many factors not discussed here.

Cooper Power Systems

by **EAT•N**

Why Envirotran Solar Transformer?

Environmentally Desirable

Envirotran Solar transformers are friendlier to the environment. While traditional liquid-filled transformers use mineral oil or synthetic oils, Envirotran transformers use the revolutionary, vegetable oil-based, dielectric coolant, Envirotemp™ FR3™ fluid. Envirotemp™ FR3™ fluid is made from soybeans, making it both non-toxic and non-hazardous. Moreover, since Envirotemp™ FR3™ dielectric fluid is petroleum independent, it doubles as a valuable renewable resource with a carbon-neutral footprint.

Because Quality Matters

Choosing the reliable and durable Envirotran Solar transformer allows you to save a substantial amount of money. It all starts with the superior performance of Envirotemp™ FR3™ fluid, preserving and protecting the paper insulation found in each coil wound by Cooper. So whether your goal is to maximize power handling performance or delay capital

expenditures, the Envirotran transformer answers the call. This extended insulation life coupled with the non-hazardous properties of Envirotemp™ FR3™ fluid makes the Envirotran Solar transformer design and industry leader in quality and reliability.

High Fire Point

With a fire point above 300 °C, you can rest assured the likelihood of a fire in a transformer filled with Envirotemp™ FR3™ fluid is nearly nonexistent. With more than 30 years of field experience, no Cooper Power Systems less-flammable fluid-filled transformer has resulted in a pool fire. Mineral oil, while exhibiting reliable dielectric properties, typically does not provide an adequate margin of fire safety during transformer failure. With a fire point at nearly double (300 °C compared to 155 °C) of mineral oil, switching to an Envirotran Solar transformer filled with Envirotemp™ FR3™ fluid will greatly minimize the long term risk associated with catastrophic transformer failures.



Product Scope

Type	Three Phase, 50 or 60 Hz, 65 °C Rise (55 °C, 55 °C/65 °C), 75 °C, 65/75 °C
Fluid Type	Envirotemp™ FR3™ fluid
Size	45 – 12,000 kVA
Primary Voltage	2,400 – 46,000 V
Secondary Voltage	208Y/120 V to 14,400 V
Coil Configuration	2-winding or 4-winding or 3-winding (Low-High-Low), 3-winding (Low-Low-High)
Specialty Designs	Inverter/Rectifier Bridge
	K-Factor (up to K-19)
	Vacuum Fault Interrupter (VFI)
	UL Listed & Labeled and Classified
	Factory Mutual (FM) Approved
	Solar/Wind Designs
	Differential Protection
Seismic Applications (including OSHPD)	

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

Eaton's Cooper Power Systems Business
2300 Badger Drive
Waukesha, WI 53188
Eaton.com

Eaton is a registered trademark.

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YASKAWA

SOLECTRIA XGI 1500

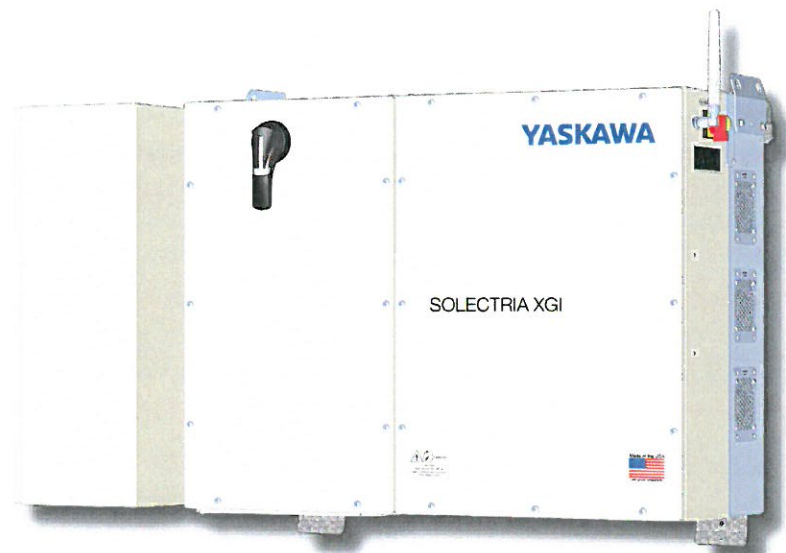
Premium 3-Ph Transformerless Utility-Scale Inverters

Features

- Made in the USA with global components
- Buy American Act (BAA) compliant
- Four models: 125kW/125kVA, 125kW/150kVA, 150kW/166kVA, 166kW/166kVA
- Flexible solution for distributed and centralized system architecture
- Advanced grid-support functionality Rule 21/UL1741SA
- Robust, dependable and built to last
- Lowest O&M and installation costs
- Access all inverters on site via WiFi from one location
- Remote diagnostics and firmware upgrades

Options

- Attachable string combiner for distributed architecture
- Plug & play MC4 or H4 connectors for the attachable string combiner
- Web-based monitoring
- Extended warranty



Yaskawa Solectria Solar's XGI 1500 utility-scale string inverters are designed for high reliability and built of the highest quality components that are tested and proven to last beyond their warranty. The XGI 1500 inverters provide advanced grid-support functionality and meet the latest IEEE 1547 and UL 1741 standards for safety. The virtual HMI allows users to connect wirelessly to the inverters using a smart phone or tablet, to accelerate commissioning. The XGI 1500 inverters are the most powerful 1500VDC string inverters in the PV market, and engineered for both distributed and centralized system architecture. Designed and engineered in Lawrence, MA, the XGI inverters are assembled and tested at Yaskawa America's facilities in Buffalo Grove, IL. The all new XGI 1500 inverters are Made in the USA with global components, and are compliant with the Buy American Act.



SOLECTRIA SOLAR

SOLECTRIA XGI 1500

Specifications

	XGI 1500-125/125	XGI 1500-125/150	XGI 1500-150/166	XGI 1500-166/166
DC Input				
Absolute Maximum Input Voltage	1500 VDC	1500 VDC	1500 VDC	1500 VDC
Maximum Power Input Voltage Range (MPPT)	860-1250 VDC	860-1250 VDC	860-1250 VDC	860-1250 VDC
Operating Voltage Range (MPPT)	860-1450 VDC	860-1450 VDC	860-1450 VDC	860-1450 VDC
Number of MPP Trackers	1 MPPT	1 MPPT	1 MPPT	1 MPPT
Maximum Operating Input Current	147.6 A	147.6 A	177.1 A	196.0 A
Maximum Operating PV Power	127 kW	127 kW	152 kW	169 kW
Maximum DC/AC Ratio	1.5	1.5	1.5	1.5
Maximum Rated PV Input (at 1.5 DC/AC Ratio)	188 kWdc	188 kWdc	225 kW	250 kW
Attachable String Combiner (Optional, engineered for use with XGI 1500 inverters)				
Maximum Number of DC Inputs	18		24	
Fuse Rating Options	15 A, 20 A, 25 A, 30 A		15 A, 20 A, 25 A, 30 A	
Fuse Configuration Options	Both polarities fused (NEC 2014), Positive polarity fused (NEC 2017)			
PV Connector Options	Amphenol H4, Multi-Contact MC4			
DC Disconnect	Isolated by use of integrated 2-Pole DC Disconnect on the XGI 1500 inverter			
Dimensions and Weight	Height: 29.5 in. (749 mm) Width: 15.1 in. (385 mm) Depth: 12 in. (305 mm) Weight: 30 lbs (13.6 kg)			
AC Output				
Nominal Output Voltage	600 VAC, 3-Ph	600 VAC, 3-Ph	600 VAC, 3-Ph	600 VAC, 3-Ph
AC Voltage Range	-12% to +10%	-12% to +10%	-12% to +10%	-12% to +10%
Continuous Real Output Power	125 kW	125 kW	150 kW	166 kW
Continuous Apparent Output Power	125 kVA	150 kVA	166 kVA	166 kVA
Maximum Output Current	120 A	144 A	160 A	160 A
Nominal Output Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Power Factor (Unity default)	+/- 0.85 Adjustable	+/- 0.85 Adjustable	+/- 0.85 Adjustable	+/- 0.85 Adjustable
Total Harmonic Distortion (THD) @ Rated Load	<3%	<3%	<3%	<3%
Grid Connection Type	3-Ph + N/GND	3-Ph + N/GND	3-Ph + N/GND	3-Ph + N/GND
Fault Current Contribution (1 cycle RMS)	144 A	173 A	192 A	192 A
Efficiency				
Peak Efficiency	98.8%	98.8%	98.8%	98.7%
CEC (pending) Average Efficiency	98.5%	98.5%	98.5%	98.5%
Tare Loss	<1 W	<1 W	<1 W	<1 W
Temperature				
Ambient Temperature Range	-40°F to 140°F (-40C to 60C)		-40°F to 140°F (-40C to 60C)	
De-Rating Temperature	122°F (50C)		113°F (45C)	
Storage Temperature Range	-40°F to 167°F (-40C to 75C)		-40°F to 167°F (-40C to 75C)	
Relative Humidity (non-condensing)	0 - 95%			
Operating Altitude	9,840 ft (3 km)		9,840 ft (3 km)	
Communications				
Advanced Graphical User Interface	WiFi			
Communication Interface	RJ-45 Ethernet			
Third-Party Monitoring Protocol	SunSpec Modbus TCP/IP			
Web-Based Monitoring	Optional			
Firmware Updates	Remote and Local			
Testing & Certifications (pending)				
Safety Listings & Certifications	UL 1741, IEEE 1547, UL 1998			
Advanced Grid Support Functionality	Rule 21, UL 1741SA			
Testing Agency	ETL			
FCC Compliance	FCC Part 15, Class A			
Warranty				
Standard and Options	5 Years Standard; Options for 10, 15 and 20 Years			
Enclosure				
Acoustic Noise Rating	55 dBA @ 1 m			
DC Disconnect	Integrated 2-Pole 250 A DC Disconnect			
Mounting Angle	Vertical only			
Dimensions	Height: 29.5 in. (750 mm) Width: 38.4 in. (975 mm) Depth: 15.1 in. (384 mm)			
Weight	230 lbs (104 kg)			
Enclosure Rating and Finish	Type 4X, Polyester Powder-Coated Aluminum			

Specifications subject to change.

SOLECTRIA SOLAR

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