

GRANT REQUEST FORM (GRF)



New Agreement EPC-18-007 (To be completed by CGL Office)

ERDD	Rachel Salazar	51	916-445-5316
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Glint Photonics, Inc.	27-3734209
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High Efficiency Dynamic Lighting Systems

2/8/2019	3/31/2021	\$ 1,999,990
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ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	1/9/2019	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Rachel Salazar	Time Needed:	5.00 minutes

Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description
 GLINT PHOTONICS, INC. Proposed resolution approving Agreement EPC-18-007 with Glint Photonics, Inc. for a \$1,999,990 grant to further develop a novel luminaire system that provides automated control over the angular and spatial distribution of solid-state lighting. The system's functionality can dynamically target light to wherever it is needed, significantly improving light utilization efficiency and lighting quality compared to conventional LED luminaires. (EPIC Funding) Contact: Rachel Salazar (Staff presentation: 5 minutes)

1. Is Agreement considered a "Project" under CEQA?
 Yes (skip to question 2) No (complete the following (PRC 21065 and 14 CCR 15378)):
 Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:
 a) Agreement **IS** exempt. (Attach draft NOE)
 Statutory Exemption. List PRC and/or CCR section number: _____
 Categorical Exemption. List CCR section number: Cal. Code Regs., tit. 14, § 15306
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why Agreement is exempt under the above section:
 The project consists of collecting data, performing research, designing, and experimenting with lighting fixtures (luminaires), and further developing prototype lighting fixtures in existing laboratories. The prototypes will be installed in laboratories and in existing buildings for testing. Regarding outdoor lighting applications, the proposed technology has the capability to reduce glare. California Code of Regulations, title 14, section 15306 exempts basic data collection, research, experimental management, and resource evaluation activities that do not result in a serious or major disturbance to an environmental resource. The proposed project's data analysis, research, and development activities will have no significant effect on the environment and fall within the categorical exemption of section 15306.

b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
 Check all that apply
 Initial Study Environmental Impact Report
 Negative Declaration Statement of Overriding Considerations
 Mitigated Negative Declaration

Legal Company Name:	Budget
Regents of the University of California, Davis Campus	\$ 40,000
Teplin Scientific, LLC	\$ 5,000 (Match)

Legal Company Name:

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Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	17-18	301.001E	\$1,999,990
			\$
R&D Program Area: EERO: Buildings			\$1,999,990
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Name:	Peter Kozodoy	Name:	Peter Kozodoy
Address:	1520 Gilbreth Rd	Address:	1520 Gilbreth Rd
City, State, Zip:	Burlingame, CA 94010-1605	City, State, Zip:	Burlingame, CA 94010-1605
Phone:	650-646-4192 /	Fax:	- -
E-Mail:	peter@glintphotonics.com	E-Mail:	peter@glintphotonics.com

<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-17-308
<input type="checkbox"/> First Come First Served Solicitation	

1. Exhibit A, Scope of Work	<input checked="" type="checkbox"/> Attached
2. Exhibit B, Budget Detail	<input checked="" type="checkbox"/> Attached
3. CEC 105, Questionnaire for Identifying Conflicts	<input checked="" type="checkbox"/> Attached
4. Recipient Resolution	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Attached
5. CEQA Documentation	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Attached

_____ Agreement Manager	_____ Date	_____ Office Manager	_____ Date	_____ Deputy Director	_____ Date
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Exhibit A

Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Application Requirements Research
3		Luminaire Platform Optimization
4		Control System Development
5	X	Prototype Construction and Testing
6		Commercialization Preparation
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities
9		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
CCT	Correlated Color Temperature
CPR	Critical Project Review
IOU	Investor Owned Utility
PRD	Product Requirements Document
TAC	Technical Advisory Committee
TWh	Terawatt Hours
UL	Underwriters Laboratory

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund the development of a novel luminaire system that allows for dynamic reconfigurable light. This lighting system will allow for dramatic energy savings as well as enhancing the user experience in lit spaces.

B. Problem/ Solution Statement

Problem

Ratepayers in California's electric Investor Owned Utility (IOU) service areas, consume an annual amount of 41 terawatt hours (TWh) of electricity, on lighting, and yet the majority of the generated light is wasted. Spaces are typically over lit in order to achieve required light levels in all areas, for extended periods of time, unnecessarily. Wasted light is wasted energy, no matter how efficient the luminaire is. The U.S. Department of Energy estimates that 2x-3x efficiency improvements are possible through improved light utilization, which represents an enormous potential energy savings. What is needed is a low-cost and reliable smart lighting system that

¹ Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

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can dynamically and precisely control the light distribution in space, putting light wherever it is needed at any given moment.

Solution

The Recipient will develop, test, and commercialize new lighting products that provide automated control over the angular and spatial distribution of light. The luminaires use a novel optical system that is uniquely suited for low-cost, high-reliability motorization and automation. The luminaires are small, powerful, and can be seamlessly integrated into a wide variety of spaces with complex lighting requirements.

This system will feature sophisticated control software that enables automated scene changes (e.g., different colored lighting to highlight various focal points, such as used in theaters) and spatial light control across large areas. The networked luminaires will be controlled with a unified software platform that will allow for intuitive modification of light patterns and sensor integration for automatic responsive lighting control. These products will enable dramatic energy savings as well as increased quality of lighting through improved light utilization.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Improve light utilization efficiency by allowing dynamic light configuration
- Reduce the cost and complexity of automated steerable lighting systems
- Improve user experience and safety in lit spaces
- Enable greater market penetration of solid-state lighting
- Meet California's lighting energy use goals

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of lower costs and increased safety. Lower costs will be realized as a result of reduced electricity use in lighting that operates at higher utilization efficiency. Up to 18.5 TWh of annual electricity use can be saved in the California IOU territories through the use of smart automated luminaires. Further cost savings accrue from a reduction in the number of luminaires required in many spaces, as flexible configurable luminaires can replace multiple conventional luminaires. Improved safety is a result of better lighting distributions that can minimize hazards, and eliminating the need to use ladders or cherry pickers to re-aim ceiling-mounted lights.

Technological Advancement and Breakthroughs:³ This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by enabling the deployment of a new generation of smart luminaires. These luminaires can achieve 2x-3x improvement in light utilization efficiency, with

² California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

³ California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

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widespread deployment saving up to 18.5TWh annually. The valuable new functionality of the luminaires will also help accelerate conversion to light emitting diode lighting, bringing additional near-term energy savings.

Agreement Objectives

The objectives of this Agreement are to:

- Optimize core luminaire performance to meet the market requirements;
- Develop the luminaire motorization system to meet long term durability targets;
- Develop intuitive systems for luminaire control that provide required feature sets
- Demonstrate a sensor-linked luminaire that tracks room occupants and directs a task light that follows their location
- Develop a beachhead luminaire product meeting all product requirements, and begin commercial sales

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following:

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Instructions for Submitting Electronic Files and Developing Software:

○ **Electronic File Format**

- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission's software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format.
- The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

○ **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:

- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting.

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The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The administrative portion of the meeting will include discussion of the following:

- Terms and conditions of the Agreement;
- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
 - An updated Project Schedule;
 - Technical products (subtask 1.1);
 - Progress reports and invoices (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide an *Updated Project Schedule, List of Match Funds, and List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

- Updated Project Schedule (*if applicable*)
- Updated List of Match Funds (*if applicable*)
- Updated List of Permits (*if applicable*)

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may

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schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule for Providing a Progress Determination* on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

CAM Products:

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval

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of the CAM.

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any state-owned equipment.
 - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
 - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
 - "Surviving" Agreement provisions such as repayment provisions and confidential products.
 - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

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Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See Task 1.1 for requirements for draft and final products.)

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)
 - Credits page on the reverse side of cover with legal disclaimer (**required**)
 - Acknowledgements page (optional)
 - Preface (**required**)
 - Abstract, keywords, and citation page (**required**)
 - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
 - Executive summary (**required**)
 - Body of the report (**required**)
 - References (if applicable)
 - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
 - Bibliography (if applicable)
 - Appendices (if applicable) (Create a separate volume if very large.)
 - Attachments (if applicable)
 - Ensure that the document is written in the third person.
 - Ensure that the Executive Summary is understandable to the lay public.
 - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
 - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.

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- If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
 - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
 - The amount of each in-kind contribution, a description of the contribution type

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(e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.

- If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter (*if applicable*)
- Match Funds Reduction Notification Letter (*if applicable*)

Subtask 1.8 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
 - The schedule the Recipient will follow in applying for and obtaining the permits.

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

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Products:

- Permit Status Letter
- Updated List of Permits (*if applicable*)
- Updated Schedule for Acquiring Permits (*if applicable*)
- Copy of Each Approved Permit (*if applicable*)

Subtask 1.9 Subcontracts

The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts (*draft if required by the CAM*)

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
 - Technical area expertise;
 - Knowledge of market applications; or
 - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

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The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

Exhibit A Scope of Work

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Exhibit A Scope of Work

IV. TECHNICAL TASKS

*Products that require a draft version are indicated by marking “(draft and final)” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

TASK 2: APPLICATION REQUIREMENTS RESEARCH

The goal of this task is to develop a set of product system requirements through customer interaction. Interviews and other research will be synthesized into specifications that can be used to optimize the product design.

The Recipient shall:

- Research the required specifications for automated adjustable luminaire products, via in-person or telephone interviews with at least 20 customer groups in the lighting industry (e.g., lighting designers, lighting commissioning professionals, lighting installation contractors, building owners, tenants, and lighting policy experts).
- Define performance targets and feature lists for at least two valuable luminaire designs.
- Produce a *Product Requirements Document* (PRD) that includes but is not limited to:
 - Summary of feedback obtained from customer discussions
 - Summary of key requirements for at least two product designs, of which
 - at least one is a “beachhead” product chosen for strong commercialization potential and attainable technical performance
 - at least one is a “dynamic” product chosen as a general-purpose luminaire with maximum energy savings potential, and a platform for demonstrating automated task-tracking lighting
 - Specifications that may be included in the summary include:
 - Required beam angles
 - Required steering range
 - Required lumen levels and efficacy
 - Required Correlated Color Temperature (CCT) and color uniformity
 - Target form factor
 - Mounting requirements
 - Required steering accuracy and slew rate
 - Target duty cycle and required durability (# cycles)
 - Target cost
 - Control system requirements: capabilities, connectivity, user interface, etc.
 - Target energy savings in installation

Products:

- Product Requirements Document (draft and final)

Exhibit A Scope of Work

TASK 3: LUMINAIRE PLATFORM OPTIMIZATION

The goal of this task is to optimize the optical, thermal, and mechanical design of the luminaire based on the research performed in Task 2. The key hardware will be designed and tested to ensure the product will meet the specified requirements.

The Recipient shall:

- Develop and optimize the luminaire optical system using computer modeling tools such as LightTools, ZEMAX, and MATLAB.
- Optimize the thermal design of the luminaire through modeling and experimentation on prototype luminaires.
- Optimize the design of the mechanical actuation system with embedded actuators through modeling and experimentation.
- Design and order custom components including optics, housings, light engine circuit boards, and mechanical components.
- Build and test prototype light engines to meet the various requirements of the PRD.
- Prototype and test mechanical actuation systems. Such testing to include at least:
 - Analysis of positioning accuracy
 - Analysis of operation at different ambient temperatures
 - Reliability analysis (positioning accuracy after repeated mechanical and/or temperature cycling)
- Summarize the luminaire platform design work in a *Luminaire Platform Design Report* that includes key elements of:
 - Optical design approach
 - Thermal design approach
 - Actuator and mechanical design approach
 - Performance of optimized system compared to target requirements

Products:

- Luminaire Platform Design Report (draft and final)

TASK 4: CONTROL SYSTEM DEVELOPMENT

The goal of this task is to develop the complete control system. This control system will allow the luminaires to work in concert to provide optimal light distribution and to integrate sensor response algorithms if desired. It will include a software interface that is intuitive and easy to use.

The Recipient shall:

- Investigate communications architectures and protocols for communications with luminaires, determining advantages and disadvantages of each system and determining which approach to adopt. Architectures to be considered include radio mesh network communications, WiFi, and wired connections, with or without the use of a centralized control unit.
- Optimize luminaire communication hardware via design/prototype/test loops.
- Investigate hardware platform and software design options for lighting control software
- Investigate software options for providing easy and intuitive user control over lighting distribution. Software should offer those features identified in the PRD, such as precision control over beam pointing, width, and intensity, with robust fault handling to ensure consistent operation

Exhibit A Scope of Work

- Develop a *Control System Test Plan* that provides an overview of the testing approach to debug various versions of the control software/firmware, ensuring that the products meet the intended performance.
- Produce control software/firmware version 1, which provides at least
 - Ability to address a single luminaire at a time
 - Ability to set pointing angle and beam width
- Produce control software/firmware version 2, which provides at least
 - Ability to address luminaires as an ensemble and to automatically provision them to produce a desired lighting distribution in a room
- Investigate sensor units to use for dynamic prototype demonstration, such as for achieving automated light steering for task lighting.
- Study approaches for implementing automated sensor response in control software and/or firmware
- Produce control software/firmware version 3, which provides at least
 - Ability to integrate sensor signals and run re-provisioning algorithms based on sensor input
 - Initial algorithms to re-provision lights based on sensor input in order to direct light beams toward individuals, creating roving task lights.
- Thoroughly test each software version, according to the *Control System Test Plan* also developed in this task, to debug and verify intended performance
- Produce *Control Hardware and Software Report* that includes but is not limited to:
 - Description of the selected control hardware approach
 - Description of sensor units to be employed for dynamic prototype demonstration
 - Summary of software approaches
 - Description of approach for integrating sensor input and providing an open environment for experimentation with different algorithms for responding to sensor signals.
 - Details of the final software packages
 - Performance testing results

Products:

- Control System Test Plan (draft and final)
- Control Hardware and Software Report

TASK 5: PROTOTYPE CONSTRUCTION AND TESTING

The goal of this task is to construct the prototype luminaires and evaluate their performance. Three milestone luminaires are planned.

The Recipient shall:

- Procure custom optical, electrical, and mechanical components as designed in Task 3.
- Build and test multiple luminaires in order to optimize design and performance.
- Achieve three milestone luminaires meeting all requirements as determined in the Task 2 PRD document.
 - Demonstrator luminaire designed to show optical performance and serve as a testbed platform for control system development.
 - Beachhead luminaire that meets requirements for initial remotely-adjustable luminaire product.

Exhibit A Scope of Work

- Dynamic luminaire is designed for general purpose use, provides fast steering, and can be used to demonstrate automated task-tracking and other unique and energy-saving applications.
- Test and evaluate all three luminaires to measure performance compared to PRD targets. Parameters to be evaluated include:
 - Beam angles
 - Steering range
 - Lumen levels and efficacy
 - CCT and color uniformity
 - Form factor
 - Mounting & thermal performance
 - Steering accuracy and slew rate
 - Reliability of steering: results of tests after mechanical cycling and thermal cycling
 - Target cost: Cost model analysis of design vs targets
 - Control system performance vs targets
- Produce *Demonstrator Luminaire Design & Performance Report* that includes but is not limited to:
 - Description of the design and construction
 - Details of the control system
 - Luminaire performance data
- Evaluate projected energy savings in an installation for *Beachhead* luminaire:
 - Develop a representative room to be analyzed, construct in Dialux (or similar) lighting design software
 - Develop lighting design for room using conventional luminaires
 - Develop lighting design for room using *Beachhead* luminaires
 - Analyze lighting quality and ease of adjustment in each case
 - Determine operational energy savings of *Beachhead* design and compare to target
- Produce *Beachhead Luminaire Design & Performance Report* that includes but is not limited to:
 - Description of the design and construction
 - Details of the control system
 - Luminaire performance data
 - Projected energy savings
- Evaluate projected energy savings in an installation for *Dynamic* luminaire:
 - Develop a representative room to be analyzed, construct in Dialux (or similar) lighting design software
 - Develop lighting design for room using conventional luminaires
 - Develop lighting design for room using *Dynamic* luminaires, utilizing task-tracking capability
 - Analyze lighting quality in each case
 - Determine operational energy savings of *Dynamic* design and compare to target
- Produce *Dynamic Luminaire Design & Performance Report* that includes but is not limited to:
 - Description of the design and construction
 - Details of the control system
 - Luminaire performance data
 - Control system performance data: measured performance of task-tracking lighting system, fidelity to target, etc.
 - Projected energy savings

Exhibit A Scope of Work

Products:

- Demonstrator Luminaire Design & Performance Report (draft and final)
- Beachhead Luminaire Design & Performance Report (draft and final)
- Dynamic Luminaire Design & Performance Report (draft and final)

TASK 6: COMMERCIALIZATION PREPARATION

The goal of this task is to perform the required design and testing to commercialize the luminaire. This includes industrial design work and testing by Underwriters Laboratory or an equivalent certification authority.

The Recipient shall:

- Develop a commercialization plan that specifies:
 - Industrial design strategy
 - Planned product qualification and certification process
 - Marketing plan and sales channel plan
 - Initial product introduction strategy with schedule
- Complete industrial design effort and develop final production design.
- Develop supply chain and production strategy.
- Complete external testing through Underwriters Laboratory (UL) and other testing vendors.
- Produce *UL Certification and External Photometric Testing Report* that includes but is not limited to:
 - Results of UL testing
 - Results of photometric testing
 - Any remedial actions required
- Carry out pilot installation of *Beachhead* luminaires:
 - Determine pilot installation location
 - Carry out pilot installation of at least 10 luminaires in location
 - Train occupants on how to provision and re-aim luminaires
 - Measure performance of luminaires in use (lux, glare, pointing accuracy)
 - Survey occupants on quality of light, steering functionality, user interface, etc.
- Produce *Pilot Installation Evaluation Report* that includes but is not limited to:
 - Details of installation
 - Results of performance measurement
 - Results of occupant survey
 - Any installation or operation issues observed
 - Any design tweaks undertaken or planned as a result of pilot installation feedback

Products:

- UL Certification and External Photometric Testing Report
- Pilot Installation Evaluation Report

TASK 7: EVALUATION OF PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

Exhibit A Scope of Work

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
 - Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
 - For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.

Exhibit A Scope of Work

- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 8: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

The Recipient shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
 - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
 - A description of the intended use(s) for and users of the project results.
 - Published documents, including date, title, and periodical name.
 - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
 - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
 - The number of website downloads or public requests for project results.
 - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Exhibit A Scope of Work

- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

TASK 9: Production Readiness Plan

The goal of this task is to determine the steps that will lead to the manufacturing of technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

- Prepare a *Production Readiness Plan*. The degree of detail in the plan should be proportional to the complexity of producing or commercializing the proposed product, and to its state of development. As appropriate, the plan will discuss the following:
 - Critical production processes, equipment, facilities, personnel resources, and support systems needed to produce a commercially viable product.
 - Internal manufacturing facilities, supplier technologies, capacity constraints imposed by the design under consideration, design-critical elements, and the use of hazardous or non-recyclable materials. The product manufacturing effort may include "proof of production processes."
 - The estimated cost of production.
 - The expected investment threshold needed to launch the commercial product.
 - An implementation plan to ramp up to full production.
 - The outcome of product development efforts, such as copyrights and license agreements.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Other areas as determined by the CAM.

Products:

- Production Readiness Plan (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: GLINT PHOTONICS, INC.

RESOLVED, that the State Energy Resources Conservation and Development Commission (Energy Commission) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the Energy Commission approves Agreement EPC-18-007 with Glint Photonics, Inc. for a \$1,999,990 grant to further develop a novel luminaire system that provides automated control over the angular and spatial distribution of solid-state lighting. The system's functionality can dynamically target light to wherever it is needed, significantly improving light utilization efficiency and lighting quality compared to conventional LED luminaires; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on January 9, 2019.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat