



REQUEST FOR PROPOSALS

ROD BRIND'AMOUR ARENA LIGHTING EFFICIENCY UPGRADES STRATHCONA GARDENS RFP 08-21

ISSUE DATE

August 17, 2021

CLOSING DATE AND TIME

October 1, 2021
3:00 PM Pacific Time

CLOSING LOCATION

Strathcona Regional District
990 Cedar Street
Campbell River, BC V9W 7Z8

CONTACT PERSON

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TABLE OF CONTENTS

A.	PROJECT SUMMARY	3
B.	ADMINISTRATIVE REQUIREMENTS.....	3
1.0	DEFINITIONS.....	3
2.0	TERMS AND CONDITIONS	3
3.0	EVALUATION.....	3
4.0	ALTERNATIVE SOLUTIONS.....	4
5.0	CHANGES TO PROPOSALS	4
6.0	PROPOSANTS’ EXPENSES.....	4
7.0	CURRENCY AND TAXES.....	4
8.0	SUB-CONTRACTORS AND PARTNERSHIPS	4
9.0	CONFLICT OF INTEREST	4
10.0	ACCEPTANCE OF PROPOSALS.....	4
11.0	CANCELLATION OF RFP.....	5
12.0	EXECUTION OF CONTRACT	5
13.0	LIABILITY FOR ERRORS	5
14.0	MODIFICATION OF TERMS	5
15.0	FREEDOM OF INFORMATION	5
16.0	USE OF DOCUMENT	5
17.0	CONFIDENTIALITY OF INFORMATION	5
C.	SUBMISSION REQUIREMENTS	6
18.0	PROPOSAL SUBMISSION	6
19.0	SITE INSPECTION/MEETING	6
20.0	ENQUIRIES	7
21.0	ADDENDA.....	7
22.0	DISCLAIMER	7
23.0	EVALUATION CRITERIA.....	7
D.	SPECIFICATIONS AND SCOPE OF WORK.....	8
24.0	SERVICES	8
25.0	WARRANTIES	8
26.0	PRODUCTS AND MATERIALS.....	8
27.0	PROJECT SCHEDULE	8
28.0	KNOWLEDGE OF THE WORK	8
29.0	WHMIS	8
30.0	PROJECT SPECIFICATIONS.....	8
31.0	CHANGE IN SCOPE	10
E.	CONTRACT CONDITIONS	11
32.0	COMPLIANCE WITH LAWS	11
33.0	LAWS OF BRITISH COLUMBIA	11
34.0	INDEMNITY	11
35.0	INSURANCE	11
36.0	REGISTRATION WITH WORKSAFEBC.....	12
F.	PROPOSAL FORM.....	13

A. PROJECT SUMMARY

The Strathcona Regional District (the “Regional District”) is seeking proposals from qualified firms for the supply and installation of energy efficient LED Lighting, light control system and motion sensors in the Rod Brind’Amour arena at the Strathcona Gardens recreation facility located in Campbell River, BC. The proposed equipment must be designed in such a manner that during light depreciation they still provide enough light to meet or exceed the lighting level recommendations by IES (Illuminating Engineering Society) or equivalent.

Strathcona Gardens is a facility with 2 ice rinks, swimming pools and indoor fitness areas. We are looking to upgrade the current lighting in the Rod Brind’Amour arena including all dressing rooms, mechanical rooms, washrooms, custodial rooms, offices, lobby, hallways, event rooms & fitness room.

Proponents shall base their Proposal on furnishing everything including all labour, materials, tools, equipment, permits, and all necessary supplies and incidentals required to complete the project in full compliance with the provisions and requirements of this RFP document. Any deviation from the requirements set out in this document must be fully disclosed in the proposal. Elevated lift platforms can be provided as long as the users have all the required safety certifications and up to date documentation.

B. ADMINISTRATIVE REQUIREMENTS

1.0 DEFINITIONS

Throughout this RFP, the following definitions apply:

“closing” means the closing date and time specified on the first page of this Request for Proposals.

“contract” means the written agreement resulting from this Request for Proposal executed by the Strathcona Regional District and the Contractor.

“contractor” means the successful proponent to this Request for Proposal who enters into a written Contract with the Strathcona Regional District.

“must”, “shall” or “mandatory” means a requirement that must be met in order for the proposal to receive consideration

“project” means that work to be completed in accordance with this RFP.

“proponent” means an individual, company or partnership that submits, or intends to submit, a proposal in response to this Request for Proposals.

“proposal” means a submission in response to this Request for Proposals.

“RFP” means this Request for Proposals.

“should” or “desirable” means a requirement having a significant degree of importance to the objective of the Request for Proposal.

2.0 TERMS AND CONDITIONS

The terms and conditions applicable to this Request for Proposals are contained within this document. Submission of a proposal in response to this RFP indicates acceptance of all terms and conditions contained herein or in any addenda issued by the Regional District.

3.0 EVALUATION

Proposals will be evaluated by the Regional District based on the criteria identified herein. The intent of the Regional District is to enter into a contract with the proponent whose

proposal represents the best value to the Regional District based on the Regional District’s evaluation of the proposals received.

4.0 ALTERNATIVE SOLUTIONS

If alternative solutions are offered, the information should be submitted in the same format as a standard proposed response but should be clearly marked as an “Alternative Proposal”. If a proponent submits more than one proposal each must be separately and uniquely identified.

5.0 CHANGES TO PROPOSALS

By written notice submitted prior to closing a proponent may amend or withdraw its proposal. Upon closing all proposals become irrevocable and may not be amended or withdrawn prior to the deadline for acceptance except where the proponent and the Regional District have mutually agreed to a change for the purpose of entering into a contract.

6.0 PROPONENTS’ EXPENSES

Proponents are solely responsible for their own expenses in preparing and submitting their proposals. The Regional District will not be liable for any claims for costs or damages incurred by a proponent in preparing a proposal, loss of anticipated profit in connection with a final Contract or any other matter whatsoever.

7.0 CURRENCY AND TAXES

Prices must be quoted in Canadian dollars and exclusive of taxes which shall be shown separately on the Proposal Form.

8.0 SUB-CONTRACTORS AND PARTNERSHIPS

If sub-contractors are to be used they must be clearly identified in the proposal. Joint submissions in the form of a partnership or consortium is acceptable including a joint submission by proponents having no formal corporate links. However, each proposal must identify the legal entity which is to be responsible for the overall performance of the work which constitutes the project.

9.0 CONFLICT OF INTEREST

Contracting or sub-contracting with any firm or individual whose corporate or other interests could, in the Regional District’s opinion, give rise to a conflict of interest in connection with the services will not be permitted. This includes, but is not limited to, any firm or individual involved in the preparation of this RFP.

10.0 ACCEPTANCE OF PROPOSALS

This RFP should not be construed as an agreement to purchase goods or services nor as an invitation to perform any service for the Regional District except as specifically outlined herein. Proposals shall remain open for acceptance by the Regional District at least until Oct 18, 2021 Proposals must state the latest date for acceptance at the time of submission.

The Regional District is not bound to accept the lowest price or any proposal. Proposals will be evaluated on the basis of stated criteria and the Regional District is under no obligation to request clarification or further information, whether written or oral, from any proponent prior to completion of the evaluation process.

The Regional District reserves the right to reject any and all proposals for any reason or to accept any proposal in whole or in part which the Regional District, in its sole unrestricted discretion, deems to represent the best value for the Regional District. Proponents acknowledge the Regional District’s rights under this clause and absolutely waive any right of action against the Regional District for failure to accept their proposals whether such right of action arises as a result of negligence, bad faith or for any other reason.

The Regional District reserves the right to enter into negotiations with one or more proponents with respect to the services to be provided, and expressly reserves the right through such negotiations to request changes, alterations, additions or deletions from the terms of any proposals received.

Formal acceptance of any proposal and the subsequent confirmation of project award should not be construed as authority for the proponent to proceed with the project as this will be dependent on the execution of a contract and the fulfillment of any conditions precedent imposed by any authority having jurisdiction over the work or service to be performed.

11.0 CANCELLATION OF RFP

The Regional District reserves the right to cancel this Request for Proposals at any time and for any reason and will not be responsible for any direct or indirect loss, damage, cost or expense incurred or suffered by any proponent as a result of such cancellation. The acceptance of any Proposal and the subsequent execution of a contract will be subject to funding and approval by the Board of the Strathcona Regional District.

12.0 EXECUTION OF CONTRACT

After acceptance by the Regional District, the successful Proponent will be provided with written confirmation. A contract will be executed when all preconditions have been met. No proponent will acquire any legal or equitable rights or privileges with respect to this project until a contract has been entered into with the Regional District.

13.0 LIABILITY FOR ERRORS

The information contained within this RFP is not guaranteed or warranted to be accurate by the Regional District, nor is it necessarily comprehensive or exhaustive. Nothing in this RFP is intended to relieve proponents from conducting their own research and forming their own opinions and conclusions with respect to the matters addressed in this RFP.

14.0 MODIFICATION OF TERMS

The Regional District reserves the right, at its sole discretion, to modify the terms of this RFP at any time prior to the closing time. Such modifications will be communicated to all proponents through a formal addenda process.

15.0 FREEDOM OF INFORMATION

Proposals are subject to the provisions of the *Freedom of Information and Protection of Privacy Act* which provides that all information contained therein, with some exceptions, is subject to access by the public. Information that is considered to be confidential or proprietary in nature should be clearly noted as such. The Regional District cannot guarantee that any information contained within a proposal will remain confidential if a request for access is made.

16.0 USE OF DOCUMENT

This document, nor any portion thereof, may not be used for any purpose other than the submission of proposals.

17.0 CONFIDENTIALITY OF INFORMATION

Information pertaining to the Regional District obtained by the Proponent as a result of participation in this RFP process, other than information that is generally available as part of the public record, is to be treated as confidential and must not be disclosed without prior written authorization from the Regional District.

C. SUBMISSION REQUIREMENTS

18.0 PROPOSAL SUBMISSION

Proposals shall be submitted in duplicate complete with one copy of the signed and dated Proposal Form provided herein. The deadline for receipt of proposals is 3:00pm Pacific time on October 1, 2021 at the following location:

Strathcona Regional District
990 Cedar Street
Campbell River, BC V9W 7Z8

Proposals must be submitted in a sealed package with the name and address of the proponent and the RFP title clearly marked on the outside.

ROD BRIND'AMOUR ARENA LIGHTING EFFICIENCY UPGRADES STRATHCONA GARDENS

SAMPLE LABEL

Name of Proponent Address of Proponent
CONFIDENTIAL – DO NOT OPEN
RFP-08-21 Rod Brind’Amour Arena Lighting Efficiency Upgrades Strathcona Gardens
STRATHCONA REGIONAL DISTRICT 990 Cedar Street Campbell River, BC V9W 7Z8

Facsimile and electronic submissions will be disqualified.

Late proposals will be disqualified.

Proposals that are unsealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations or irregularities of any kind may, at the discretion of the Regional District, be disqualified.

The person(s) authorized to sign on behalf of the proponent and to bind the proponent to statements made in response to this RFP **must execute** the Proposal Form. Unsigned proposals will be disqualified.

Proponents shall be solely responsible for the delivery of their proposals in the manner and time prescribed. All submissions must be delivered according to the instructions provided herein and the Regional District will accept no responsibility for documents delivered to any other location.

19.0 SITE INSPECTION

Proponents are required to inspect the facilities at 225 South Dogwood Street, Campbell River, BC. The group facility site inspection will be September 15, 2021 10 am to 12 noon. Site inspections should be used to assess:

- I. Light counts

- II. Voltage verification
- III. Phase balancing
- IV. Load balancing
- V. Cabling size
- VI. Access
- VII. Project Material Storage

Photographs will be permitted during facility inspections. Follow up inspections can be facilitated to ensure and accurate RFP can be drafted.

20.0 ENQUIRIES

All enquiries related to this RFP are to be directed, in writing or by email, to:

Robin Kentrop
Operations Manager
Phone: 250-830-6744
Cell: 250-201-3336
Email: procurement@srd.ca

Information obtained from any other source is not official and should not be relied upon.

21.0 ADDENDA

Addenda to this RFP may be issued prior to closing in response to queries received or at the initiative of the Regional District. Addenda will be in written form and sent to all proponents who have received RFP packages. Information contained within RFP addenda is considered an integral part of the RFP and should be considered by proponents when responding to this RFP.

Verbal communications will not be binding unless confirmed by written addenda.

22.0 DISCLAIMER

Each proponent is responsible to review and understand the terms and conditions of this RFP, and the scope of the work being requested. The Regional District makes no representation or warranty as to the accuracy or completeness of the information contained in this RFP and proponents are solely responsible to ensure that they have obtained and considered all information necessary to understand the requirements of the RFP, and to prepare and submit their proposals. The Regional District will not be responsible for any loss, damage or expense incurred by a proponent as a result of any inaccuracy or lack of completeness associated with this RFP, or as a result of any misunderstanding or misinterpretation of the terms of this RFP on the part of any proponent.

23.0 EVALUATION CRITERIA

Proposals will be evaluated against the following criteria:

Pricing	20 points
Qualifications, expertise, and past experience of project team	25 points
Functional Requirements (maintenance, warranty, lifespan)	20 points
References	20 points
Schedule	15 points
Total	100 points

If required, a short list of proponents may be established to be contacted by the Regional District. The purpose for contacting a proponent at this stage would be to gain a greater understanding of the proponent’s proposal as submitted. Depending on the nature of the

questions to be answered an interview may also be arranged to facilitate a more in-depth understanding of the proposal.

D. SPECIFICATIONS AND SCOPE OF WORK

24.0 SERVICES

The proponent will provide all labour, tools, equipment, (depending on access requirements, a boom lift and scissor lift can be provided if the proponent’s crew has the appropriate training) supervision, vehicles, materials, supplies, permits, and services necessary to supply and install the approved Lighting.

25.0 WARRANTIES

The Contractor will be required to warrant all materials furnished and work performed under the contract for a minimum period of two years from the date of project completion. This includes the replacement of faulty materials, and rectification of any defects discovered and failures occurring during the warranty period. All deficiencies will be rectified to the satisfaction of the Regional District.

26.0 PRODUCTS AND MATERIALS

Proposals must include a detailed specification sheet regarding the products and materials proposed to be used or installed for this project. The Regional District will downgrade any proposal where the products or materials to be used do not conform to the minimum specifications set out herein.

27.0 PROJECT SCHEDULE

The work of the contract should commence not later than 30 days after award and must be satisfactorily completed not later than 90 days after start date or by the end of 2021. See section **32.0** for facility scheduling requirements.

28.0 KNOWLEDGE OF THE WORK

By submitting a response, the Proponent agrees that they have attended the required site visit, examined the facilities, have carefully read the scope of work and have satisfied themselves as to their ability to fulfill the requirements of this RFP and the Work before submitting a proposal and agree that they will make no claim against the Regional District based on any misunderstanding of the RFP requirements and the Work to be provided. See attached marked up site plan for key card entry locations and quantities.

No extra payment will be made by the Regional District for conditions which should have been determined by a proponent through inspection or research, prior to entering into a contract for the Work.

29.0 WHMIS

All products provided by the successful proponent in performing the work are considered to be required for use in the workplace. Therefore, full compliance for all labeling and information requirements for the Workplace Hazardous Materials Information System (WHMIS) Legislation for controlled products is required.

30.0 PROJECT SPECIFICATIONS AND CLARIFICATIONS

Installation follows applicable codes and manufacturers specification of the approved system. Other clarifications requested below:

1. The system must be installed and comply with the Canadian Electrical Code - CSA C22.1:21 and local building and fire codes.

2. Current lighting in the Rod Brind’Amour arena is See below “Rod Brind’Amour Arena High Bay Lighting” Pictures. Current Arena 2 high bay LED lighting is EELighting – Circular LED High Bay (0-10V Dimmable) Model: CHB-150LED50K-347-D Rated: AC200-480V, 50/60HZ, 150W, 5000K, 0.75A (max), [0.43A@347V](#) SUITABLE FOR WET LOCATIONS – Made in China ESD52.
3. All replacement lighting must be LED and meet or exceed BC Hydro’s efficiency requirements.
4. All equipment & fixtures in arena, dressing rooms, mechanical room, custodial room, arena hallway, building exterior must be rate – SUITABLE FOR WET LOCATIONS. (Lobby, offices, office hallway would not require wet location fixtures).
5. All equipment & fixtures must be rated for commercial use (not residential lighting).
6. All exposed wiring to be run in conduit.
7. Electrical drawing package to include Arena lighting layout, one line diagrams, legend and electrical lighting schedules by space/room, emergency lighting and exterior lighting.
8. Proposed lighting schedule draft must be submitted with proposal.
9. All equipment must have spares/replacements available at local suppliers.
10. Exposed arena equipment & fixtures must be protected from stray pucks with durable housings or cages.
11. All equipment & fixtures must be approved for arena ice in and ice out conditions (cold, warm, humid and excessive cycling).
12. Equipment & fixtures in hallways and dressing room will be exposed to hockey stick contact and should have durable housings or be caged.
13. All permits, inspection fees, electrical equipment, cable tray, conduit, fasteners, cable, wiring, supports, penetrations, fireproofing and labor must be included in submitted proposal.
14. All equipment & fixture manuals, service requirements, asset information (cost and life span), lighting schedules must be included in a detailed turnover binder at project completion for final payment processing.
15. Proposals should include training requirements and cost for control equipment
16. Main arena lighting control (options for light control for events, including remote spotlights). Option for Fully Integrated Lighting Control System (Dimmable).
17. Submissions must include detailed information regarding the design of the arena lighting to demonstrate the system is applicable to ice hockey (recreational and competitive, including broadcasted Junior Hockey games), figure skating (recreational and competitive), recreational skating, lacrosse, roller derby and events such as trade shows and concerts.
18. Equipment and fixture installation must be compatible with existing electrical system infrastructure.
19. Office lighting should be rated for personnel comfort
20. Proposal must include removal and disposal of old equipment, fixtures, cabling, wiring, conduit, and construction debris.
21. Proposals need to detail all product information with graphs covering the following points:

I. Lighting Level

- i. Horizontal Illuminance
- ii. Vertical Illuminance
- iii. Uniformity
- iv. Correlated Color Temperature
- v. Color Rendering
- vi. Flicker
- vii. Energy Savings from current fixtures
- viii. Light Depreciation Graph
- ix. Life cycle (graphed)

- 22. Details regarding available rebates and grants would be an asset.
- 23. Proponents fixed price for the system
- 24. Hourly rates for work outside of the project scope
- 25. Proposals should identify ant BC Hydro incentives
- 26. Proposals must include a detailed installation schedule (dates, hours of work, manpower per day)
- 27. All work fronts will need to be cleaned up each day
- 28. All areas must be remediated to original condition for the scope to be considered complete

31.0 DELIVERABLES

The successful proponent shall be responsible for providing the following:

- 1. Supply and delivery and installation of the proposed system;
- 2. Application to BC Hydro BESt program on behalf of the SRD for associated rebates;
- 3. Schematics of all system components both electronic and hard copies;
- 4. Operation manual in both electronic and hard copies;
- 5. A warranty of at least one year from date of delivery;
- 6. Any training related to the operation and installation of the supplied goods;

32.0 TIMELINE AND PROJECT OBJECTIVES

Installation of the lighting system will need to be completed while the Rod Brind’Amour ice surface is in operation. The Contractor will be expected to work around facility operations and programs, ice surfaces will need to be back in operation and fully lit at the end of each work shift. Work days and times will be established at the onset of the project and may require work to be scheduled on evenings, early mornings and weekends. Any concerns or limitations due to these project requirements must be included in the proponent’s response to the RFP

<i>Projected date of award</i>	<i>October 15, 2021</i>
<i>Project completed by date</i>	<i>December 31, 2021</i>

33.0 CHANGE IN SCOPE

The Regional District reserves the right to amend the scope for work during the term of the proposed Contract. In such cases, the Regional District would request a quotation from the Contractor for the change in scope. Scope change could be used to ensure there are no cost overruns with the set budget.

E. CONTRACT CONDITIONS

By submission of a proposal, the Proponent agrees that should its proposal be successful, the Proponent will enter into a Contract with the Regional District that subject to negotiation, may include the following selected contract clauses:

32.0 COMPLIANCE WITH LAWS

The Contractor will give all the notices and obtain all the licenses and permits required to perform the work and provide written confirmation that the Contractor (and Sub-contractor’s) personnel are fully certified to perform the work. The Contractor will comply with all laws, regulations and requirements of authorities having jurisdiction applicable to the work or performance of the contract.

33.0 LAWS OF BRITISH COLUMBIA

Any Contract resulting from this RFP will be governed by and will be construed and interpreted in accordance with all laws in affect in the province of British Columbia.

34.0 INDEMNITY

Notwithstanding the provision of insurance coverage by the Contractor, the Contractor hereby agrees to indemnify and save harmless the Regional District, its officers, agents and employees from and against all claims, demands, losses, costs, damages, actions, suits or proceedings by whomever made, brought or prosecuted and in any manner based upon, arising out, related to, occasioned by or attributable to the activities of the Contractor, its servants, agents, sub-contractors and sub-operators, in providing the services and performing the work of the Contract, excepting always liability arising solely out of the negligent act or omission of the Regional District.

35.0 INSURANCE

Any Contract resulting from this RFP will require that the Contractor, without limiting its obligations or liabilities and at its own expense, provide copies and maintain throughout the Contract term:

- a. Comprehensive commercial general liability insurance in an amount not less than \$2,000,000 inclusive per occurrence, insuring against bodily injury and property damage and including liability assumed under the Contract;
- b. Professional liability in an amount not less than \$2,000,000 insuring the Contractors’ liability resulting from errors and omissions in the performance of professional services under the Contract.
- c. Automobile liability on all vehicles owned, operated or licensed in the name of the Contractor in an amount not less than \$2,000,000.

The Regional District is to be added as an additional insured and the policy shall contain a cross liability clause. All required insurance will be endorsed to provide the Regional District with 30 days advance written notice of cancellation or material change.

The Contractor will provide the Regional District with evidence of the required insurance in the form of a certificate(s) of insurance, immediately upon execution and delivery of the Contract.

36.0 REGISTRATION WITH WORKSAFEBC

The Contractor shall abide by all provisions of the *Workers Compensation Act* and its regulations and must sign a WorkSafeBC Safety Covenant in the form provided by the Regional District. The Contractor will be the designated prime contractor as defined by the Workers Compensation Act and regulations. The contractor and any approved sub-contractors must be registrants in good standing at all times with the WorkSafeBC, for the duration of the Contract. Prior to receiving any payment, the Contractor may be required to submit a WorkSafeBC Clearance Letter confirming all assessments have been paid and the Contractor is in good standing.

F. PROPOSAL FORM

**REQUEST FOR PROPOSAL
RFP-08-21
ROD BRIND'AMOUR ARENA LIGHTING EFFICIENCY UPGRADES STRATHCONA GARDENS**

CLOSING DATE AND TIME: 3:00PM PACIFIC TIME ON OCTOBER 1, 2021

This form must be completed, signed and included with the submission.

The undersigned confirms that its submission is in response to the above noted RFP.

The proponent acknowledges receipt of Addenda # _____ through Addenda # _____.

Name of Proponent: _____
Address: _____

Contact Name: _____
Phone: _____ **Fax:** _____
Email: _____

Completed Price	\$
Taxes	\$
Total Completed Price	\$

Proponents should ensure that all requirements of the RFP are dealt with in their proposal submission and that all materials and products proposed comply with the specifications therein.

Authorized Signature

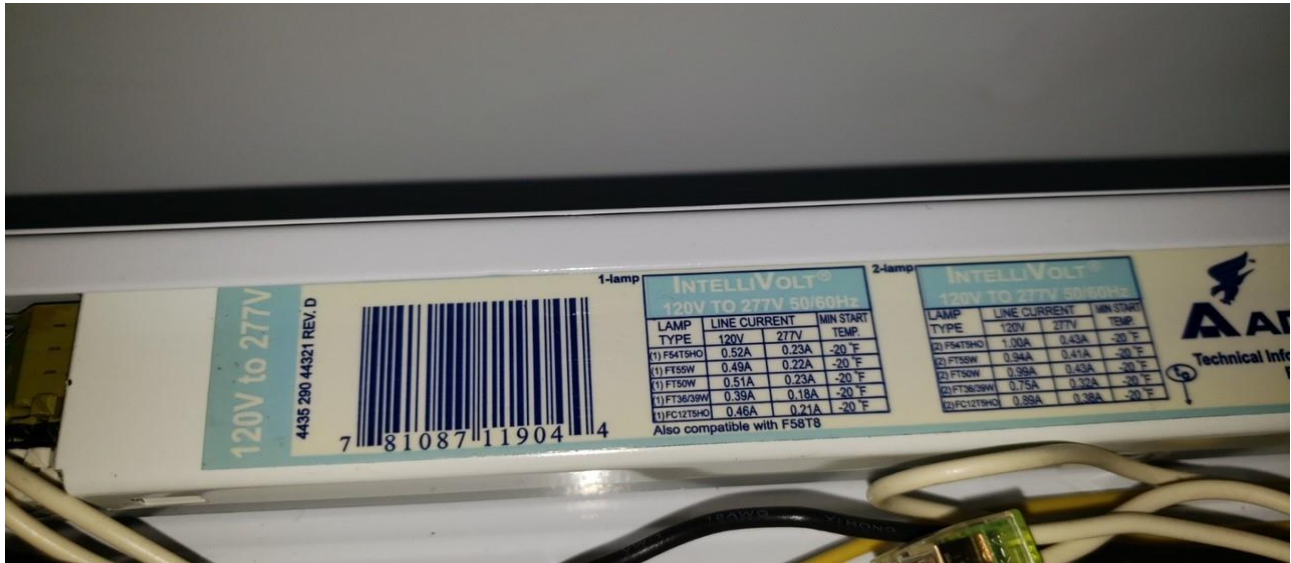
Name and Title

Date

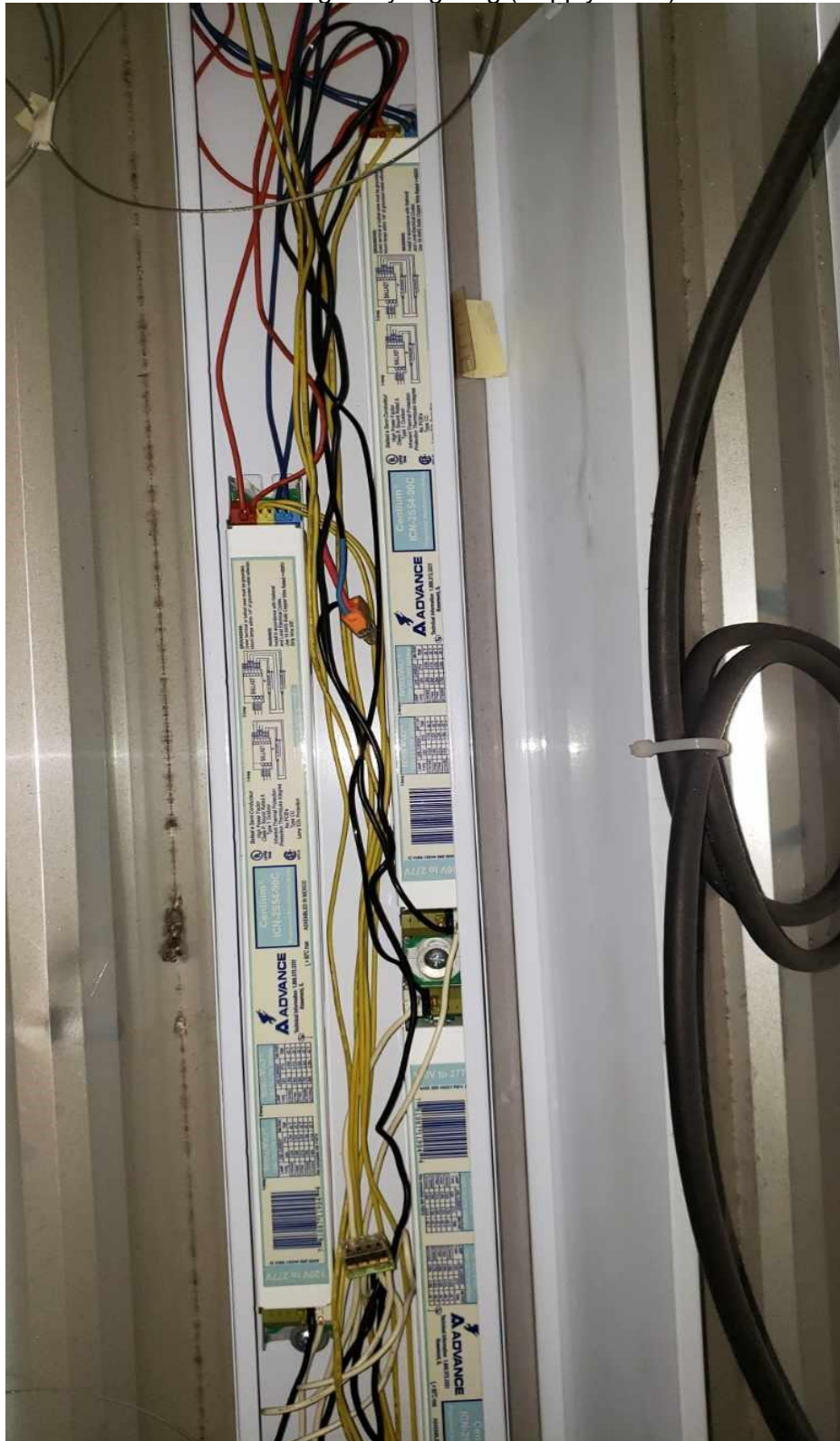
Arena 2 High Bay LED Lighting



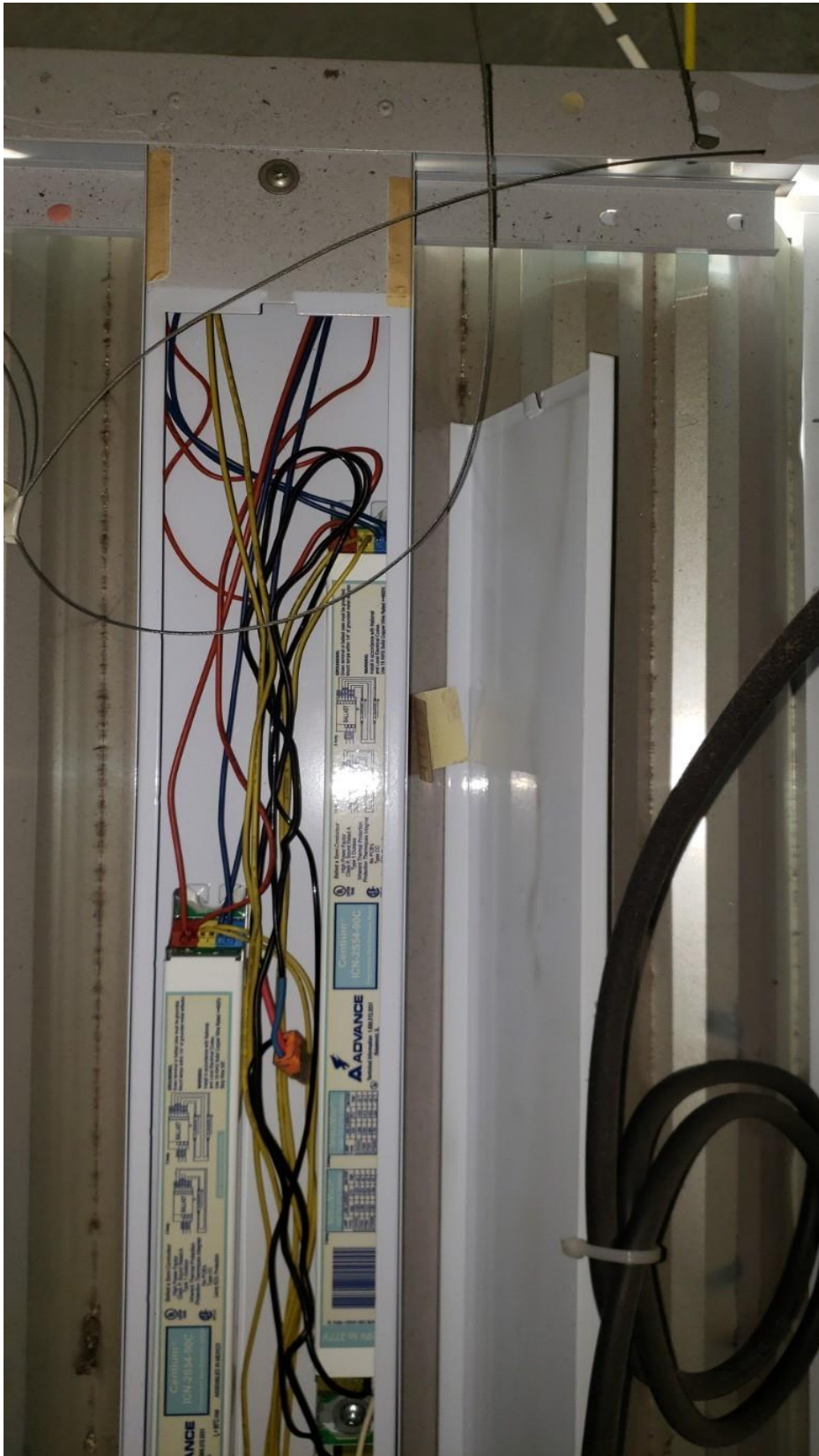
Rod Brind'Amour Arena High Bay Lighting (Supply 277V)



Rod Brind'Amour Arena High Bay Lighting (Supply 277V)



Rod Brind'Amour Arena High Bay Lighting (277V)



Reference Material – For Information Only



- WHO WE ARE...
- SOLUTIONS
- ARTICLES
- CONTACT

Share



Ice Hockey/Skating Arena Lighting – The Here and Now

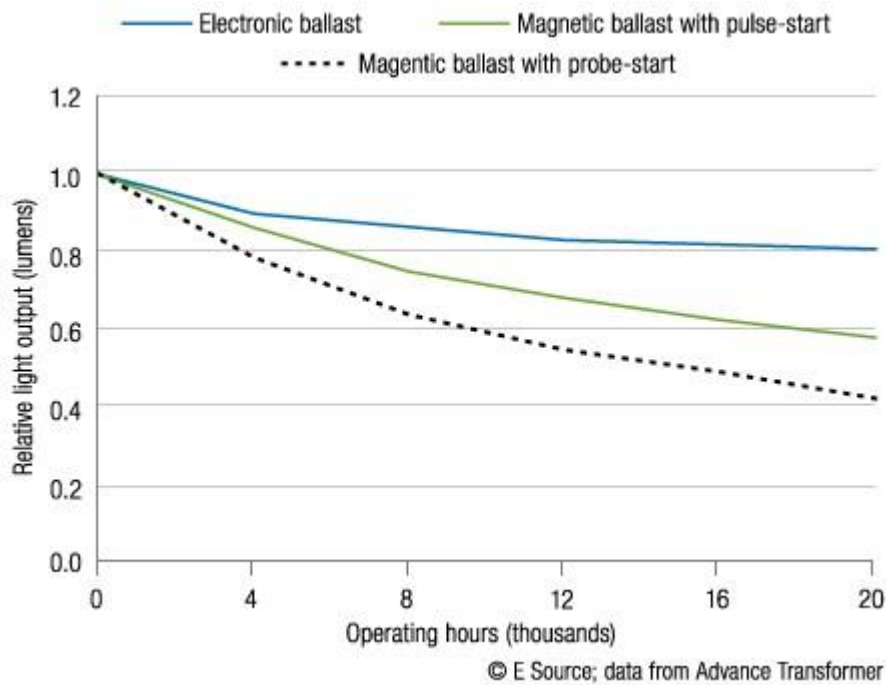
[OCTOBER 19, 2015](#) [CHRISTIE MARTIN](#)

Traditionally our arenas have been illuminated by high intensity discharge (HID) fixtures. Metal halide technology is the most common of the HIDs utilized in arenas because of the clean white light it produces along with fairly good colour rendering ability (CRI of 65-70) and efficacy (65-100 lumens/watt). While metal halide technology ensures the goal of meeting horizontal illuminance levels to provide safe activity on the ice surface it does have many drawbacks.

We are all familiar with some of the limitations and constraints of metal halide technology.

- Significant Light Depreciation
 - Average of 35% light depreciation occurs by 40% of rated life
 - This significant light depreciation means we must design the lighting such that even when lamps reach their full light depreciation they still provide

enough light to meet or exceed the lighting level recommendations whether it be IES (Illuminating Engineering Society) or ORFA recommendations



http://ouc.bizenergyadvisor.com/BEA1/PA/PA_Lighting/PA-55

- Colour shift often occurs with time



How to Tell if Metal Halide Light Bulb or Ballast Need Replaced 06/27/10 Copyright Synergy Lighting USA

When metal vapours within the lamp expire from heat and burning, the mixture of gases within the arc tube tend to result in a pinkish hue. This usually starts to become evident as early as 40% loss of original light output.

- Long warm up time
 -
 - Probe Start lamps take approximately 4-6 minutes to warm up on first start up
 - Pulse Start lamps take approximately 2 minutes to warm up on first start up

In an effort to avoid the long warm up times lights are often left on for extended periods of time when area is vacant

- Long restrike time
 - Probe Start lamps take approximately 10-12 minutes to restrike
 - Pulse Start lamps take approximately 4 minutes to restrike

To ensure the safety of athletes and patrons, back up lighting in the form of linear fluorescent or halogen lighting are installed to provide safety lighting in case of power failure.
- Most systems don't dim
 - All or nothing lighting levels for all levels of play, activities and utilization
- Dimming ballasts are expensive
 - Few facilities have invested in this technology due to cost
- Lamp life is relatively short
 - Typically 15,000- 20,000 hours rated life (Rated lamp life is the time it takes for one half of the test lamps to burnt out)



Lack of light Uniformity

- ‘Hotspots’ or ‘Banding’ created by the point source nature of metal halide lamps on an ice surface.

Moving Forward – Choices

So what technologies are available and what is the best choice for your facility?

With the many options and the large upfront costs associated with both retrofit and new construction this decision can be a little daunting. Sales people representing all different technologies and products will all claim “we have the best technology for you”.

So where do we start.....

A good place to start is to consider the following questions:

1. How is your facility currently utilized and what is the highest level of play/competition?

Activity/Sport	<input checked="" type="checkbox"/>
Recreational Skating	
Competitive Figure Skating	
Professional Figure Skating Competition/Performances	
Recreational Hockey/Ringette	
Competitive Hockey/Ringette	
Professional Hockey	
Curling	

Activity/Sport	<input checked="" type="checkbox"/>
Off Ice Sports (Basketball/Lacrosse/Roller Derby etc.)	
Concerts/Entertainment	
Trade Shows	
Broadcasting Site	
High Definition (HD) Broadcasting Site	

2. How may your facility be utilized in the future?
3. Consider how important the following are to your goals of operating your facility:

(Scale 0 to 5, 0 being not important, 5 extremely important)	
Athlete Safety and Experience	0 1 2 3 4 5
Fan/Patron Comfort & Experience	0 1 2 3 4 5
Meeting Broadcasting/HD Broadcasting Criteria	0 1 2 3 4 5
Energy Savings/Reducing Energy Costs	0 1 2 3 4 5
Reducing Maintenance Costs	0 1 2 3 4 5
Reducing Life Cycle Costs	0 1 2 3 4 5
Being Environmentally Friendly/ Reducing Hazardous Waste	0 1 2 3 4 5

The answers to these simple questions help identify the lighting requirements for your facility and help guide us towards which technologies can best meet these requirements.

Utilization of Facility – Present and Future

Once you have determined how your facility is utilized both now and in the near future you can then start to look at the specifications that the chosen lighting technology will have to meet in order to achieve the right outcome.

Lighting Levels (Illuminance)

When determining the lighting level requirements for the purpose of safety and enjoyment you must consider which activity has the most stringent requirements and ensure these are met.

In North America we use The Illuminating Engineering Society (IES) **Best Practices for Sports and Recreational Area Lighting RP-6 -15** as best practices for recommended minimum illuminance levels. Recommended average maintained illuminance levels for sports activities take into account:

1. Type of Sport – Aerial or Ground Level
2. Class of play and facility – level of play, size of facility and # of spectators
3. Horizontal Illuminance requirements
4. Vertical Illuminance Requirements
5. Uniformity Requirements

In 2013 ORFA published Public Skating: Guidelines & Best Practices. Below is the recommendations made by OFRA based on IES recommendations.

Building Area/Activity	Foot Candles	Lux
Recreational Hockey (IES)	30	300
Recreational Skating (IES)	15	150
ORFA Recommendations		
Recreational Skating	30	300
Recreational Hockey	30	300
Dressing Rooms	30	300
Common Areas	30	300

Source: ORFA Public Skating: Guidelines & Best Practices Oct 2013

**The ORFA recognizes these as minimum lighting levels for recreational ice-skating. A well-lit ice surface will help to ensure that public safety is maintained thereby mitigating the risk for skater injury. ORFA recommends that facility management raise lighting*

levels for public skating to 30- footcandles/300 lux in keeping with the levels for recreational ice hockey.

Broadcasting Needs

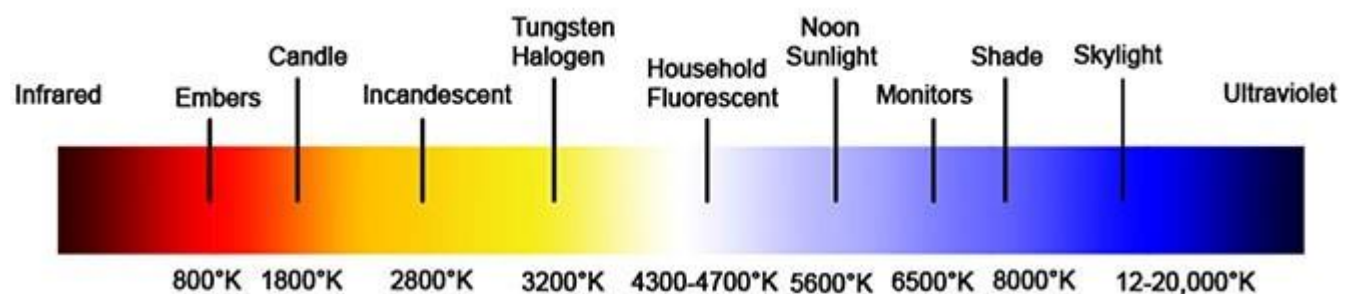
We must consider Broadcasting/HD Broadcasting requirements if applicable. More and more sports events are being broadcast in high definition (HD). Recording in high definition requires specific illuminance levels, illuminance uniformity, colour temperatures (CCT), CCT uniformity, Colour Rendering (CRI) and the absence of flicker.

Illuminance and Uniformity

The National Collegiate Athletic Association together with ESPN have set out best practices for lighting requirements for broadcasting purposes.

Correlated Colour Temperature (CCT)

Correlated Colour temperature (CCT) of a light source is the temperature of an ideal black body radiator that when heated to a given temperature radiates a comparable hue to that of a light source¹. Colour temperature is typically expressed in Kelvin (K), with the light produced by incandescent sources in the lower temperature range of 2,700-3,000K and day light ranging from 5,600 – 10,000K. Many newer lighting technologies are available in a variety of colour temperatures to suit any application.



While the broadcasting industry typically colour corrects for light colour, it is advantageous to approach what is typically considered by the photographic industry as daytime outdoor lighting (5,600K)². It also proves advantageous for broadcasting to have colour temperature uniformity throughout the space. This allows televised colour presentation to appear as accurate as it does in person whether it's at the goal line or at centre ice.

Colour Rendering

The Color Rendering Index (CRI) is a scale from 0 to 100 percent indicating how accurate a “given” light source is at rendering color when compared to a reference source³. The higher the CRI, the better the color rendering ability. In the past, only incandescent and halogen

technologies could achieve the broad spectrum and colour accuracy similar to that of natural daylight (CRI 100). Today many fluorescent and LED lighting approaches or exceed CRIs of 90. Again, when it comes to broadcasting, the higher the CRI the more accurately colour is transferred to the television viewer.

Flicker

While the average naked is not capable of detecting flicker > than 1500Hz, the HD camera is potentially much more demanding. Regular television broadcasting is typically shot at 25 frames per second (fps) while high definition is typically at 50-60 fps⁴. As camera technology evolves to allow for recording greater number of frames per second flicker free lighting becomes more important. While every lighting technology has products that have the potential to create obnoxious flicker, several LED companies have produced luminaires that remain flicker free even at frames rates greater than 2,500 fps. One Finnish company has even released an LED product that can achieve recordings of 100,000 fps flicker free⁵. That said, it is extremely rare to see recordings of greater than 1,000 fps in sport as the action speed itself does not require these rates to create compelling video coverage⁶.

Operational Goals

Question 3 of our questionnaire addresses operational goals.

Safety

At the top of our list, the safety of athletes and patrons must always be a priority. We must ensure that light levels are such that whatever activity takes place in the facility it is done under safe conditions no matter which lighting technology is selected. When considering a lighting retrofit one should always carry out photometric design to help predict the new light levels and the uniformity of the light throughout the space. All lighting technologies have the ability achieve recommended light levels, however some may do it in a more efficient manner, by using less fixtures, less wattage and/or reduced life cycle cost.

Experience

When it comes to “experience” whether for the athlete or patron, lighting can make all the difference.



Colour Rendering Index (CRI)

As an athlete or fan we all want to view the activity in “true colour” as if the activity were taking place outside in daylight. When the sport involves speed, colour rendering become more important. Many athletes will contest that even in daylight conditions it is sometimes challenging when opposing jersey are close in colour. While we don’t require a CRI of 100 to observe and distinguish different shades of colour in sport we typically utilize a light source with a CRI of >70.

Glare & Spotting

Glare is a visual sensation caused by excessive and uncontrolled brightness. Glare within a sports venue can be both uncomfortable and potentially impeding to the activity. To reduce glare experienced by athletes and patrons, light source distribution and location needs to be addressed during the photometric design stage. It is not just the lighting technology type but it’s placement within a luminaire (fixture) and the optics such as reflectors, lens etc. which determine how light is distributed within a space. Every lighting technology has the potential to create uncomfortable glare. It is up to the lighting designer to ensure that luminaire location and the selected distribution pattern works within the space to minimize glare.

Spotting is created when there is contrast of light levels in adjacent space. Like glare, it is the goal of the lighting designer to minimize spotting (hot spots) by improving uniformity of light levels throughout the space.

Dimming

Dimming can have a role in the experience of the space. Our arenas can often have more than 1 use. It is quite typical for facilities to utilize the ice pad areas in off season for concerts, trade shows, galas, parties etc. The ability to dim the lights for such events allows the lights to be adjusted for different events and applications. Not all technologies allow for dimming and some technologies such as LED may come standard with this ability.

Energy Saving/Reducing Energy Costs

Whether in the private or public sector, reducing energy use and costs is typically a goal of every facility. When it comes to arenas there are many ways to achieve energy savings.

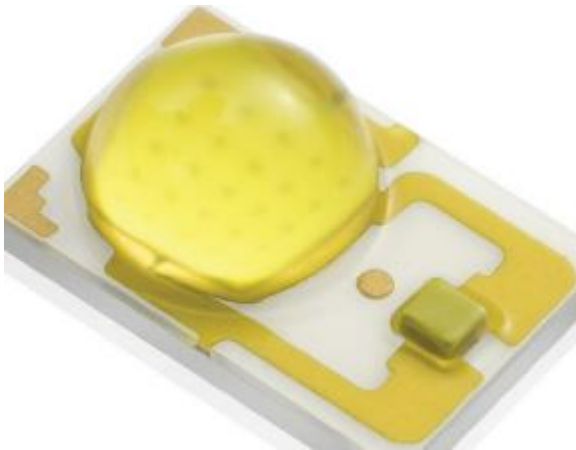


Image credit: Philips Lumileds

Improve Efficacy

Luminous efficacy is a measure of how well a light source produces visible light. It is the ratio of luminous flux to power and is expressed in lumens/watt. We can look at the efficacy of the lamp or in the case of LED the LED package, or we can look at the luminaire efficacy. In most cases these are two very different things.



When selecting a technology we must keep in mind that it is not just the efficacy of the light source but the efficiency at which the luminaire (housing) can direct the light to where it is required. For instance, a typical 100 W metal halide lamp (ED17 Shape) may produce 7,700 mean lumens but the visible light that escapes the source is in an omni-directional pattern. It is the role of the luminaire and the optic system to direct the light to the target.

One of the reasons LED technology has the ability to have greater luminaire efficacy is the uni-directional nature of the LED package. If the luminaire (housing) is designed to enable

visible light to be emitted directly at the target then less watts are required to illuminate the same space. This is known as the light power density and is typically expressed in watts per square ft.

Control Light Source

Lighting controls allow lights to be turned off or dimmed when not required. Lighting controls may include occupancy sensors, timeclocks, photocells, dimmers and/or a fully integrated lighting control system. Each “control” option has its role in reducing energy use.

Occupancy Sensors

Occupancy sensors turn lights “OFF” when space is vacant and “ON” when movement is detected. Occupancy sensors can only be used with lighting sources that have instantaneous start.

Timeclocks

Timeclocks or timers are pre-set to turn lights “ON” and “OFF” at a specified times of day.

Photocells

Photocells turn lights “OFF” or dim light source when daylighting from windows or skylights is adequate for the space. Photocell thresholds can be specified or adjusted to ensure light levels meet recommended requirements.

Dimmers

Dimmers allows light fixtures to be dimmed to pre-set or manually adjusted levels specific to task. Example – A light source can be adjusted to full output (50fc) for Rep. Hockey games and decreases to 30 fc for public skating and house league practice times. A savings of 40% can be achieved for a large portion of the day. Please note not all light sources have the ability to dim effectively.

Fully Integrated Lighting Control System

A fully integrated lighting control system is a networked system which makes use of all or many of the above stand-alone controls together. These system can have varying levels of control from the ability to control each individual fixture, banks of fixtures, zones or a full building. They can be wall mounted within the space or reside remotely on a networked system that can be accessed by networked computer or web enabled devices.

Example: In an arena application a lighting control system could have the ability to set a time schedule for a week or month and set the light levels for each task within that schedule. If connected to occupancy sensors it could also turn lights “OFF” when ice pads are vacant.

Day	Time	Scheduled Activity	Light Levels
Monday	6:50 – 8:00	Figure Skating Practice	30 fc
Monday	8:01 – 9:00	Atom Practice	30 fc
Monday	9:01 – 10:00	Empty Ice	5 fc
Monday	10:01 – 11:00	Empty Ice	5 fc
Monday	20:01 – 22:00	Rep Hockey	50 fc
Monday	22:01 – 23:00	Maintenance	30 fc
Monday	23:30		Lights Off

Reducing Maintenance Costs

Each facility has its own costs associated with maintenance. One should always consider all the costs associated with servicing a luminaire (fixture), including all the parts, equipment and the labour required. In the case of ice pads, labour and lift equipment rentals greatly outweigh the material cost of the lamps and ballasts. If the lamps and ballasts have fairly short rated life spans then costs can add up quickly. One should also look at how actual maintenance is completed. Do lamps get changed out on regular scheduled group replacement schedule or do you replace on a one for one system when the lamps burns out. Whatever the maintenance pattern the actual true cost must be considered.

If maintenance costs are high, it is may make more sense to go to a technology that has a longer rated life.

Reducing Life Cycle Costs

Once you have determined the lighting needs for your facility then life cycle costing analysis is one of the best ways to differentiate which technology is best for you. Life cycle cost analysis is a tool to determine the most cost effective option among different alternatives to purchase, own, operate, maintain and dispose of an object or process⁷. This is always a very worthwhile process because often upfront costs can play very little role in the whole life cost of a product. Sometimes a steep upfront cost can lead to greatly reduced energy cost, maintenance costs and disposal costs.

Environmentally Friendly/ Reducing Hazardous Waste

Many lighting technologies utilize mercury (Hg) in vapour form to produce light. While mercury is not dangerous while contained within the lamp, the disposal/recycling of these products does require care. The US EPA classifies mercury as a hazardous waste and as such in Canada we must dispose/recycle these products as provincial and territorial legislation requires. In many cases this come with a cost attached.

Lighting Technologies

Thus far we have summarized some of the things to consider when selecting a lighting technology for the arena application. As you may appreciate from this quick summary, there is great benefit to hiring a lighting professional.

A lighting professional can:

- Perform photometric design to ensure all lighting needs are met (illuminance, uniformity, glare reduction etc.)
- Utilize photometric design to maximize energy savings/reduce upfront costs
- Recommend energy saving controls
- Analyze Life Cycle Costs to compare products and technologies
- Help recommend quality products which meet what manufacturers claim on their specification sheets from install to end of life.

Figure 1 is a simple comparison of lighting technologies as they stand today. **Caution** should be taken in painting all products within a lighting technology with the same brush. Quality of each components within a luminaire (fixture), the luminaire design and manufacturing, as well as all the costs associated can vary greatly. This is especially true for the exploding LED market.

Lighting Comparison for Comparable Light Sources (400W MH equivalent)	Metal Halide	HPS	Fluorescent T8	Fluorescent T5	Induction	LED
Life Span(hrs)	12,000 - 20,000	15,000 - 25,000	20,000 - 40,000	20,000 - 40,000	60,000 - 100,000	50,000 - 200,000*
Instant-on	No	No	Yes	Yes	Yes	Yes
Instant Hot-restrike	No	No	Yes	Yes	Yes	Yes
Lumen Depreciation	35-45%	40-50%	10-15%	5-10%	25-30%	5-30% at 100,000 hours
Efficacy	65-125 lm/W	60- 150 lm/W	80-100 lm/W	85-105 lm/W	70-90 lm/W	80-120 lm/W
CRI	65	20	>80	>80	>80	70-90
Dimmable	No	No	Yes	Yes	No	Yes
Mercury Content	Yes	Yes	Yes	Yes	Yes	No
Upfront Cost	N/A	N/A	Low	Low	Medium	Medium - High
Maintenance Costs	High	High	Medium	Medium	Low	Low
Energy Costs	High	High	Medium	Medium	Medium	Low

* LED typically fade out, not burn out. L70 is often used as the designated "end of useful life". L70 is the calculated time (hrs) at which an LED reaches 70% of the initial lumen output.

Figure 1

WARNING – Not all LEDs are created equal. An unbiased lighting professionals can help you select a quality product that will meet all your needs and keep performing as predicted.

Footnotes

¹ NLPIP Lighting Answers Volume 8 Issue 1 Oct 2004 <http://www.lrc.rpi.edu/programs/nlpip/lightinganswers/lightsources/whatisCCT.asp> (2015 ,Aug)

² Ben Vollmer, “Sports Broadcasting Under LED Lighting”, Espesus White Paper 12/31/2014

³ NLPIP Lighting Answers Volume 8 Issue 1 Oct 2004 <http://www.lrc.rpi.edu/programs/nlpip/lightinganswers/lightsources/whatisColorRenderingIndex.asp> (2015,Aug)

⁴ Cory Janseen, “Frames Per Second (FPS)” <http://www.techopedia.com/definition/7297/frames-per-second-fps> (2015 August)

⁵ Easy LED Finland <http://easyled.fi/en/> (2015, August)

⁶ Ben Vollmer, “Sports Broadcasting Under LED Lighting”, Espheus White Paper 12/31/2014

⁷ Life-Cycle Cost Analysis, 14 July 2015 https://en.wikipedia.org/wiki/Life-cycle_cost_analysis (2015, August)