

REQUEST FOR PURCHASE IN EXCESS OF \$20,000/CHANGE ORDER



To: Mayor and Council

Agenda Item #: IV.L.

From: Susie Miller, Braemar Arena General Manager

The Recommended Bid is

Within Budget

Not Within Budget

Date: August 4, 2014

Subject: Request for Purchase - Reallce Ice Water Treatment, Braemar Arena, Cypress, Ltd.

Date Bid Opened or Quote Received:

Monday, July 21, 2014

Bid or Expiration Date:

Company:

Cypress, Ltd.

Amount of Quote or Bid:

\$27,500

Recommended Quote or Bid:

Cypress, Ltd.

General Information:

Reallce is a water treatment system for ice rinks that has been specifically designed and manufactured using 3 -D printing process. The system creates a controlled, intense and structured vortex as the water flows through it. The vortex creates hydrodynamic cavitation and increases the velocity of the water to promote the separation of dissolved air and impurities from the water. Impurities and dissolved air act like an insulator when the water changes to ice. This removes impurities and dissolved air from the water, allowing the water to freeze at a higher temperature and saving energy. It is also easier to achieve harder and clearer ice. Staff contacted multiple facilities throughout the US and Canada for references; all have shown significant energy reduction. We will see reductions in gas due to the hot water decrease. We will also see a reduction in electricity due to the compressors running significantly less as we will be able to maintain a warmer ice temp due to the strength and hardness of the ice treated by Reallce.

With the significant decrease in hot water required with this Reallce system, a much smaller hot water heater system will be needed. The cost of the Reallce is \$27,500. Expected energy rebates will be over \$13,000 and the system will provide a return on investment of less than a year. This will be paid for through the Ice Maintenance Contracted Repair Budget. This is a sole source purchase. This is a unique product with one manufacturer and Cypress, Ltd. is the only company selling the product.

Attachment:

Reallce Proforma



ADVANCED ICE RINK WATER TREATMENT

- **SUSTAINABLE UTILITY COST AVOIDANCE**
- **HIGH QUALITY ICE**

PRO-FORMA PROPOSAL FOR: BRAEMAR ARENA

JULY 2, 2014



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I. ABOUT CYPRESS, LTD.

Operating since 1990

Market Focus:	<ul style="list-style-type: none"> • Electric, Gas, and Water Utilities Efficiency and Demand Program Management and Implementation • Emerging Technologies Analysis • Rebate Administration Services and Processing • Energy Advisor Services for Commercial, Industrial, Education, Healthcare, Government, and Residential Markets. 		
Locations:	CA, WA, NV, MN 24/7/365 Bilingual Customer Service Center (CSC) in Hemet, California		
Main:	7 Rue Delacroix		
City:	Coto de Caza	State: CA	Zip Code: 92679
Phone CSC:	(877) 811-8700	Direct:	(949) 888-0255
Web & Email:	www.cyp-res.com	support@cyp-res.com	
Key Contact:	Tom Smolarek, President	tjs@cyp-res.com	
Example Clients	Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Southern California Gas Company, Xcel Energy, Boulder County CO, Chelan County PUD, Imperial Irrigation District, NVEnergy, Cal Poly SLO, AT&T, LACC and others		

Energy Advisor Service

Cypress, Ltd. helps clients stay at the forefront of energy efficiency and demand innovations through our research and engineering work with emerging technologies (ET) for major utilities (electric, water, and gas) and technology innovators. We assess the technology's potential savings and fit into a customer's specific requirements. Subsequently, through our Energy Advisor Service, we will suggest appropriate, proven, and cost effective products to our clients that we have vetted in the ET Program.

Our Energy Advisor Service examines the client's strategic and tactical goals, establishes realistic milestones, and creates a portfolio of utility cost saving measures in order to achieve their goals. We are committed to acting on behalf of our clients to recommend and help deliver their efficient and sustainable energy goals. The primary outcome of our Energy Advisor process is to provide business solutions that deliver results that are focused on sustainability, lower utility costs, operational improvements, and most importantly, the right technology.

As a trusted energy advisor, we have been delivering efficiency, demand management and sustainable programs, technical and business consulting, and customer support services for the past 25 years.

We support:

- Investor and municipal owned utilities, associations, and special utility districts
- The commercial, industrial, institution/government, education, and residential customer markets
- Energy value chain participants such as emerging technology manufacturers, distributors, contractors, and the building design community

Key Attributes:

- Cypress has been involved in the energy and related technology markets since 1990.
- Cypress maintains a California-based, bilingual, 24/7/365, and utility-centric Customer Service Center (CSC).
- We utilize a database technology platform called CyNET™ to handle all program administration, data reporting, customer services, communications and dispatch, program applications, and rebate processing.
- Cypress understands the best practices of administering utility programs and applying emerging energy technologies

II. REALICE™

Technology Overview

REALice is a water treatment system for ice rinks, shown in Figure 1, that has been specifically designed and manufactured using a 3-D printing process. The system creates a controlled, yet intense and structured, vortex as the water flows through it. The vortex creates hydrodynamic cavitation and increases the velocity of the water to promote the separation of dissolved air and impurities from the water. Impurities and dissolved air act like an insulator when the water changes to ice. Thus, removing impurities and dissolved air from the water allows the water to freeze at a higher temperature, saving energy¹.

Figure 1: The REALice System



Basis for Savings

The REALice system changes a few important characteristics of the water that is used for ice making and resurfacing, saving energy:

Removes micro-bubbles/degassing of air bubbles: Results in a decrease in viscosity of from 5-18%. A lower viscosity means that the water flows more easily over the ice and has better heat transfer. This changes the ice crystals, producing an ice that is more homogenous, hard and clear, and has a higher heat capacity leading to less energy usage in ice rinks¹. Temperate or un-heated water can therefore be used avoiding water heated to the typical 140 – 180 degree F range. Hot water is typically used to remove air bubbles.

This allows the chiller system to operate at a higher brine temperature, reducing the overall compressor run time. The REALice system allows other ice rink facilities² to raise the brine temperature from 4°F to 8°F. The potential temperature rise is dependent on variables such as ice rink design and size, climate zone, system age, and occupancy rates of the ice center. Using temperate water instead of hot water allows the chiller to be reset a few degrees higher, saving energy.

Reduces lime scale: In water treated using the REALice system, calcite is transformed into aragonite, which has a more rounded shape and consequently does not attach itself to other lime scale crystals, pipes, nozzles or other surfaces. Another advantage is that the treated water also acts upon old lime scale deposits, which are reduced and eventually vanish after a period of use.

¹ ASHRAE: 2010 Refrigeration Handbook: "Water quality affects energy consumption and ice quality. Water contaminants, such as minerals, organic matter, and dissolved air, can affect both the freezing temperature and the ice thickness necessary to provide satisfactory ice conditions. Proprietary treatment systems for arena floodwater are available. When these treatments are properly applied, they reduce or eliminate the effects of contaminants and improve ice conditions and reduce energy use." AND " Hot water generally gives harder ice, because air bubbles are removed..."

² REALice is used worldwide in more than 300 arenas and is part of a growing list of utility incentive programs such as FORTIS BC and Efficiency Vermont. It is endorsed by the International Ice Hockey Federation (IIHF) and was used by the NHL for the 2014 Winter Classic.

Benefits from use of the REALice system:

- Harder and clearer ice
- Softer water
- Reduced gas consumption (BTUs) for heating the water used for resurfacing
 - No heating is required for resurfacing water
- Reduced electric consumption (kWh) and peak energy usage (kW) due to raised brine temperature and subsequent less usage of compressors
 - Resetting brine from 16-17F to 20-24F reduces load on the chiller
- Reduction of usage of dehumidifier due to less evaporation
- Reduced CO₂ emissions due to less usage of electricity and gas

Additional benefits by not using hot water to resurface the ice:

- The device improves the ice to be denser, more even, and more durable under usage conditions
- Less humidity in the arena, therefore less draw on the humidifier
- Reduced load on the hot water boilers – increases capacity for other uses
- The device lowers the viscosity of the water thereby making the water outflow easy despite using ambient temperature of added water. Treated cold water has the same viscosity as non-treated heated water
- The device changes the lime scale crystals from calcite to aragonite, which changes the overall shape of the crystals in the water supply. This affect avoids the formation of lime scale deposits.
- Less ice cleans needed - less water used

III. EXPECTED COST AVOIDANCE SUMMARY

This summary report highlights facility electric and gas cost avoidance potential for the Braemar Arena based on the REALIce™ technology. Consideration of gas and electric rates and potential utility incentives are based on typical rates in the location. This is a conservative pro-forma summary based on average rates and standard savings from other similar ice rinks, incorporating specifics that we have learned about your site.

This overview assumes that there are two (2) REALIce systems or resurfacing filling stations supporting a total of 3 rinks, 2 rinks are year round and 1 rink is in operation typically for 5 months. Our cost avoidance assumptions are based on the typical refrigeration and water heating standards for ice rinks consistent with both typical operational practices and the ASHRAE 2010 Refrigeration Handbook. The Braemar Arena electric and gas rates are based on the average commercial customer rates schedules for your location. (Xcel and CenterPoint Energy)

Electric: Average Blended \$.08/kWh
Gas: Average \$0.57 / therm

The resultant avoided cost for installing REALIce will generate a very good return on investment through avoiding both gas and electric usage costs. We have also included estimated custom utility rebates of \$.08/kWh and \$.35/therm for reduced electric and gas usage. Should the project be authorized, Cypress, Ltd. will assist your facility with applying and acquiring the approved utility incentives³.

Figure 1: Avoided Costs and Simple Payback Summary for all Rinks

Equipment Cost (two REALICE)	\$55,000
Est. YR 1 Utility Incentives	\$16,342
Electric & Gas YR 1 Cost Avoidance	\$23,892
Total YR 1 Cost Avoidance	\$40,234
YR 1 Cash Flow	\$(14,766)
Simple Payback Years (total equipment cost/ total cost avoidance)	1.37

We have also included a break down of the avoided costs and simple payback for a single REALICE unit serving just the two year round rinks.

Figure 2 Avoided Costs and Simple Payback Summary for 2 Year Round Rinks

Equipment Cost	\$27,500
Est. YR 1 Utility Incentives	\$13,244
Electric & Gas YR 1 Cost Avoidance	\$19,390
Total YR 1 Cost Avoidance	\$32,634
YR 1 Cash Flow	\$5,134
Simple Payback Years (total equipment cost/ total cost avoidance)	0.84

³Cypress, Ltd. has more than 25 years assisting customers to obtain utility incentives for savings technologies.

Financial Analysis

Cypress Ltd. previously conducted a detailed measurement and verification study (M&V) commissioned by Southern California Edison (SCE) on the REALice system⁴. Based on that analysis and our technical understanding of REALice, we have estimated the cost avoidance of a system⁵ for the Braemar Arena. This includes utility savings post installation for the first year, potential utility incentives, and simple return on investment. We have taken a conservative approach in estimating both savings and potential utility incentives.

Utility Savings, Simple Payback, Cash Flow, ROI and Carbon Impact: Pro-Forma

Estimated Cost and Annual Usage

	units	Electricity kWh	Natural Gas therms	TOTAL
Physical units per MMBtu:		293	10	
VALUES				
Current delivered bundled price per unit		\$0.0800	\$0.5700	
Annual consumption cost avoidance in physical units YR 1		153,683	20,346	
Reduction Percentage YR 1		11.3%	100.0%	<-Resurfacing water only, not all domestic use
Dollar value of annual energy savings YR 1		\$12,295	\$11,597	\$23,892

Annual Recurring Non-Energy Operating Costs and Benefits

	Current	Proposed	Net benefit (+) or cost (-)
TOTAL ANNUAL POTENTIAL UTILITY BILL BENEFITS (NO TOU, DEMAND, AUOTDR savings estimated based on bundled average rates)			
Energy plus non-energy savings Year 1			\$23,892

Basic Construction/Installation Budget

	Value:
Construction and/or equipment costs	\$ 55,000
Tech Review, Engineering, Ongoing Support	\$ -
Ongoing Maintenance Costs	\$ -
Revenue lost during downtime/project installation	
Other capital cost offset subtracted from total	\$ -
Net salvage value of old equipment	\$ -
Estimated Value of incentives or rebates YR 1	\$ 16,342

TOTAL CONSTRUCTION BUDGET (Includes Rebate if available)..... \$38,658

Simple Payback

Defined The period of time required for an investment to "pay for itself" through the annual benefit

$$\text{Project Results SIMPLE PAYBACK} = \frac{\text{INVESTMENT (includes discount for potential utility rebates)}}{\text{FIRST-YEAR SAVINGS}} = \frac{\$38,658}{\$23,892} = 1.6 \text{ years}$$

Program Savings Summary	Estimated 5 Year Cash Flow					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Utility Avoided Costs: Gas & Electric		\$23,892	\$24,609	\$25,347	\$26,107	\$26,890
Supplies/Repairs/Maint (Ops Savings)	\$0	\$0	\$0	\$0	\$0	\$0
Total Cost Avoidance:	\$0	\$23,892	\$24,609	\$25,347	\$26,107	\$26,890
Cost for Technology (REALICE) - less Est Rebates	\$0	\$38,658	\$0	\$0	\$0	\$0
Ongoing Support Services	\$0	\$0	\$0	\$0	\$0	\$0
Total Program Cost	\$0	\$38,658	\$0	\$0	\$0	\$0
Net Annual Cash Flow	\$0	(\$14,766)	\$24,609	\$25,347	\$26,107	\$26,890
Cumulative Net Annual Savings	\$0	(\$14,766)	\$9,843	\$35,189	\$61,297	\$88,187
Avg. Energy Escalation Rate:		3.0%				
Principal: (Excludes sales tax)		\$55,000				
Less potential utility incentives		\$16,342				
Net Cost:		\$38,658				

⁴ ET09SCE0070 Ice Rink Water Treatment System_Final.pdf

⁵ Equipment cost only: Added costs include shipping, sales tax (if applicable), plus 1-2 hours installation by licensed plumber are required

Carbon Impact for Gas and Electric Cost Avoidance: Ten Year Useful Life⁶

Equivalency Results

The sum of the greenhouse gas emissions you entered above is **5,170 Metric Tons** of Carbon Dioxide Equivalent. This is equivalent to:

Annual greenhouse gas emissions from



CO₂ emissions from



Carbon sequestered by



⁶ Source: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results>