

Illinois Statewide Advisory Committee

SAG Small Group Call: Upstream & Midstream Proposal Review
and Comments from Grundfos

12/11/2015

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Illinois Statewide Advisory Group**Attn: Subcommittee Midstream & Upstream Program Design**

This document has been prepared for the Illinois Statewide Advisory Committee (SAG) on behalf of Grundfos Pumps Corporation to provide technical information related to pump technology and the opportunity for a midstream/upstream state or utility program. The following information is confidential to the SAG group.

Executive Summary

There has been a revolution in the residential pumping market. It is a revolution that introduced products into the market that are able to save up to 90% of energy consumption compared to the market standards. These products do this by utilizing an electrically commutated motor (ECM) while having onboard, integrated controlling capabilities to learn the specific end users habits and run only when needed, offering substantial energy savings with no break in service for the end user. This presents a significant opportunity for Illinois to capture this savings through a well-structured incentive program in order to push the market towards energy efficiency.

Grundfos (and other pump manufacturers) have encountered resistance in converting the market to energy optimized products mainly due to price barriers. Almost unique to the pumping market is that the decision maker to go with a “like for like” product versus an efficient pumping solution is made by the contractor who has no stake in energy efficiency as the end user pays the electric bill and not the contractor. The contractors’ priorities lie in getting a reliable product as inexpensively as possible. So the endeavor to convert the market to efficient pumping solutions is an uphill battle. The only way to win this battle is to work with Illinois to build the most effective program possible and act as the boots on the ground to educate, train and maximize participation in the program. Simply put, Grundfos is excited to help Illinois “cast one net and catch all of the fish”.

The purpose of this document is to provide insights into the residential pumping market to help accomplish that goal. As you will read, we are sharing some inside information on the market size, trends, code changes that are applicable, and suggested program framework and deployment strategies in order to establish the most successful program possible. Furthermore, as a program would go live Grundfos would work with our local sales channels, wholesalers and contractors to raise awareness for the program and maximize participation in the program. We will help with marketing collateral and building short cut cheat sheets to help make every qualifying pump transaction run through the Illinois Energy program.

This document studies the Illinois residential markets where the primary application is hot water recirculation. The reader will note that recent code changes mean that there will be a growing number of installed population in these markets. As codes change, the industry must also change too to meet code requirements and continue to recognize energy savings. An incentive program could be the catalyst to get these pump systems up to code and optimize energy consumption in growing market conditions.

We will be suggesting that a program with qualifying product(s) to include the Grundfos Alpha, Magna and Comfort PM Auto would be the most beneficial. These products meets code requirements while consuming substantially less energy with minimal run time over the market standard.

The right qualifying products are just the first step in any successful program. Every bit as important as the technology itself is the program deployment framework. We will suggest a midstream incentive model that has been used with great success with other utilities (Efficiency Vermont, Connecticut Light & Power, MASS Save). Grundfos feels that attacking the choke point of any pump transaction, the wholesaler, will provide the greatest scalability for Illinois Energy. The wholesaler has the direct contact with the plumbing contractor who acts as the decision maker on which exact pump should be installed. Armed with past successes, Grundfos is a proponent that this is the best avenue for market transformation.

We very much appreciate the opportunity to supply these suggestions and hope they are taken to heart. Grundfos looks forward to the opportunity to work with Illinois Energy in this pursuit and together we can accomplish the goal of market transformation.

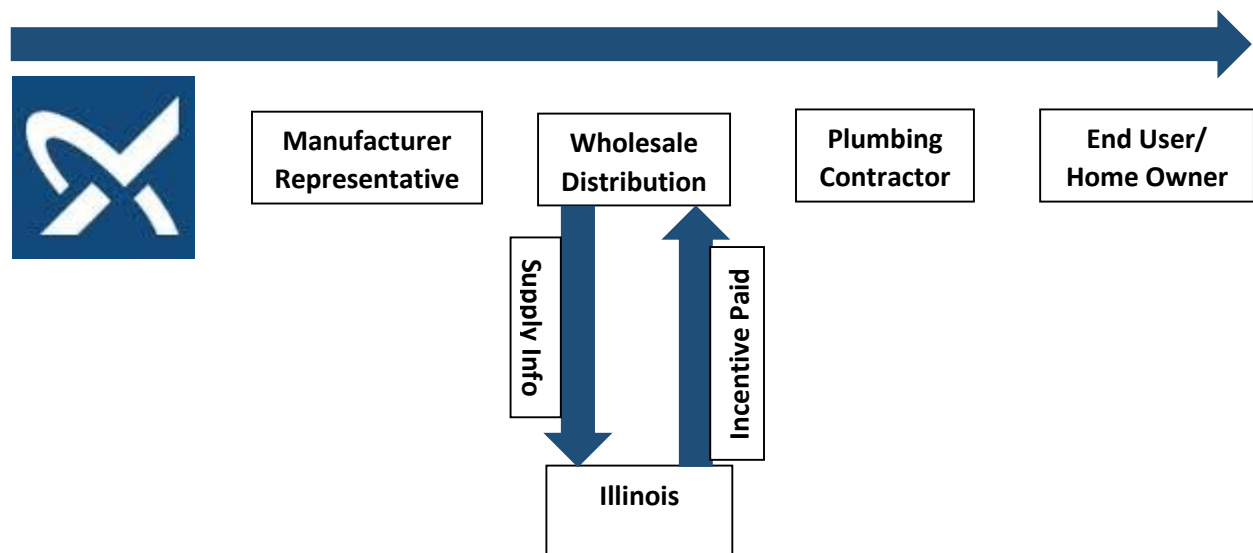
Why the Upstream Program Design

Grundfos proposes that, in order to better transform the market to highly efficient pumping systems, open an upstream contingent. This would allow for all pump transactions in the residential and/or commercial market to be run through Illinois state or utility programs. Roughly 80% of pump purchases are ultimately installed into retrofit applications, in order to transform the market we must capture those transactions.

Grundfos would propose that the installation information be captured at the point of sale for the contractor in order to verify that it would qualify for the program. Once the installation has been verified, an “instant rebate” can be assessed so the cost to the contractor for the qualifying products.

This model would incent the wholesale level to increase levels of stock of qualifying pump systems so these products are readily available. Also, these products have an inherent higher value and are higher margin for wholesalers, so they are incented to utilize the program as much as possible.

Grundfos proposes the following program structure...



Midstream/ Upstream Option – Success Story

Efficiency Vermont has gone live with a midstream program oriented for the residential market where Grundfos had qualifying smart pump solutions. The highly efficient pumping systems did not have significant market share, but in utilizing the true midstream program model we made significant strides towards transforming the Vermont market towards highly efficient pump solutions.

The midstream pump program was piloted in Q4 of 2013. The numbers break down as follows:

Smart Pumps Sold into Vermont

2010 (entire year): 65 Efficient Pumps

2011 (entire year): 49 Efficient Pumps

2012 (entire year): 73 Efficient Pumps

Average: 62 Efficient Pumps

Q4 2013 Pilot Duration: 2,870 Efficient Pumps (4,629% Growth). The Efficiency Vermont program is still active.

Technology Description

Electronically commutated motors (ECM) are high-efficiency brushless DC motors. They are typically fractional horsepower motors that enjoy several benefits over the more common permanent split capacitor (PSC) fractional horsepower motor. One of these advantages is higher overall efficiency. PSC motors are generally 20-60% efficient, depending on their loading, while ECM motor efficiencies range from 70-80%. Other advantages include the ability to provide constant flow with varying pressures, a wider range of rpm and the ability to be controlled by direct digital controls (DDC).

These fractional horsepower motors are frequently found in domestic hot water recirculating pumps, hydronic (boiler) recirculating pumps, geothermal and solar hot water systems. Recirculating pumps are commonly used in multifamily buildings to shorten the amount of time it would otherwise take for hot water to reach the tenants on the upper floors. These recirculation pumps can be operated continuously or can be controlled by an aqua-stat, which turns on the pump only when the temperature of the return line falls below a certain set point. Many of the ECM recirculating pumps currently on the market have integrated aqua-stat controls and the ability to be controlled and monitored wirelessly .

Pump Run Time Breakdown

Code currently dictates that sold into hot water recirculation applications should have some type of controller that would allow for the pump to shut off while not needed. The two most popular methodologies to accomplish this are through the installation of a timer or an aquastat.

TIMER: Timers can either be integrated in the pump or installed externally on the pump. They can be set to run in 15 minute increments, either full speed or off. The runtime is typically dictated by the end users habits. However, after speaking with many contractors across Illinois, the preference is to have the pump run 15 minutes on and 15 minutes off. This means that the pump will run 12 hours per day. The reason contractors like to do this is avoid any call backs while the end user is to maintain comfort and realize some savings. Of course, using this timer set up savings is not optimized. Nicor Gas also completed a study of using a time and how much gas is saved by implementing this technology on a system, while we agree that a time reduces run-time we know that having a smart control mode like the Grundfos Auto Adapt will save the optimal amount of energy.

AQUASTAT: Aquastats are externally installed through the pumps junction box and cannot be installed on pumps with direct wall plugs. The device is clipped on the pipe and measures the temperature of the pipe and in effect the water temperature. It acts as the governor to tell the pump to turn on when the product falls below a certain temperature (most commonly 105F) and shuts the pump off when it the temperature is above a certain temperature (most commonly 115F). Runtime for pumps with aquastats installed vary greatly depending on many different factors, heat source set point, ambient temperature, insulated pipes, pipes in slabs, etc. On average, we would estimate that a pump with aquastat employed would run roughly 6 hours per day (25% of the time).

SELF-OPTIMIZING: A recent evolution in the pumping market is for pumps to be able to learn the specific needs for the system into which they are installed, optimizing energy in the process. The Grundfos AutoAdapt has pioneered this technology and leads the market in energy optimization. It works by logging the data of the latest two weeks of performance data to learn the end users habits and only run the pump when there is a demand, mitigating runtime hours. The pump is estimated to run only 3 hours per day. If no demand is occurred for 8 hours, the system will automatically disinfect the system by running for 15 minutes. And if no demand occurs for a 24 hour period, the pump will automatically switch over to holiday mode.

Runtime Breakdown is estimated as follows...

Controller Type	Running Hours/ Year	% Runtime/ Year	Hours Saved/ Year
No Controller	8,760	100%	-
Timer	4,380	50%	4,380
Aquastat	2,190	25%	6,570
Self-Optimizing	1,095	12.5%	7,665

State Wide Market Landscape & Suggested Incentive Level

Illinois

Below is the methodology to, as accurately as possible, calculate the energy and power savings potential in Illinois. Keep in mind that approximately 80% of these pump/ accessory transactions are for replacement/ retrofit applications while 20% go into new construction.

How many pumps are sold into the Illinois market?

****Please note these are all estimates derived off of Grundfos sales data and assumptions of market share within both the HVAC and plumbing markets.***

Grundfos has pulled the quantity of pumps sold into the Illinois market, and with knowledge of the percentage of market share that Grundfos owns, we can estimate that the Illinois market share for the major competitors is broken down as follows.

	IL Mrkt Shr HVAC	IL Mrkt Shr Plumb
B&G:	35%	60%
Grundfos:	35%	20%
TACO:	20%	20%
Wilo:	10%	0%
	100%	100%

Dumb Pumps: Pump that has no integrated timer or other integrated control logic and utilizes an induction type motor/ driver.

Smart Pumps: Pumps that have integrated control logic and utilizes an EC motor.

HVAC Market Estimates

According to Grundfos' sales data for Illinois, only 2% of the products sold today are "smart" pumps.

HVAC Market - Closed Systems				
	Grundfos Market Share		IL Market	
	2013	2014	2013	2014
Pumps sold w/o Timers, non-ECM	5,527	6,195	15,791	17,700
Non-ECM pumps w/ integrated timers	0	0	0	0
Number of Timers	8	2	23	6
Number of Aquastats	22	18	63	51
Number of ECM, Smart Pumps	133	135	380	386
Total Pumps Sold	5,560	6,329	15,886	18,083

	No Controller	AutoAdapt	
Hours/ Yr:	4380	4380	
Biggest Market Mover:		Watts/pump	kWh/pump
UPS 15-58 FC	59896341	87	381
Alpha 15-55 F	59896877	25	110
Energy Saved Per Pump		62	272
Percentage Saved Per Pump		71%	71%

Item	2013	2014
Pumps sold w/o controller:	99%	98%
Pumps sold w/ integrated timer:	0%	0%
Smart pump Marketshare:	2%	2%
Pumps Sold w/ External Timer/Aquastat:	1%	0%

Market Opportunity in Illinois: HVAC			
Conversion from Dumb to Smart Pumps			
	Watts	kWh/Yr	
Energy Saved Per Pump	62	272	
Total IL Pump Market 2014	17,697	17,697	
Total Energy Saved	1,097,223	4,805,836	
	Incentive	# of Pumps	Totals
Average Incentive Amount = \$100	\$100	17,697	\$1,769,714

Plumbing Market Estimates

According to Grundfos' sales data for Illinois, only 3% of the products sold today are "smart" pumps.

Plumbing Market - Open Systems				
	Grundfos Market Share		IL Market	
	2013	2014	2013	2014
Pumps sold w/o Timers, non-ECM	551	529	918	882
Non-ECM pumps w/ integrated timers	19	6	32	10
Number of Timers	8	2	13	3
Number of Aquastats	22	18	37	30
Number of ECM, Smart Pumps	162	198	270	330
Total Pumps Sold	580	660	967	1,100

	No Controller	AutoAdapt	
Hours/ Yr:	8760	1095	
Biggest Market Mover:		Watts	kWh/ Yr
UPS 15-35 SFC	59896772	110	964
Comfort PM Auto	98420224	8.5	9
Energy Saved Per Pump		101.5	954
Percentage Saved Per Pump		92%	99%

Item	2013	2014
Pumps sold w/o controller:	95%	80%
Pumps sold w/ integrated timer:	3%	1%
Smart pump Marketshare:	28%	30%
Pumps Sold w/ External Timer/Aquastat:	5%	4%

Market Opportunity in Illinois: Plumbing			
Conversion from Dumb to Smart Pumps			
	Watts	kWh/Yr	
Energy Saved Per Pump	101.5	954	
Total IL Pump Market 2014	770	770	
Total Energy Saved	78,155	734,805	
	Incetnive	# of Pumps	Totals
Average Incentive Amount = \$250	\$250	770	\$192,500

Illinois Circulating Pump Market Data - SAG

HVAC Market

HVAC Systems are also called "closed systems", this is because no fresh water is introduced into the system. Circulating pumps installed in these systems should have cast iron construction. Cast iron pumps have a lower cost and due to no fresh water and oxygen being introduced into the system there is no risk of the pump rusting. Heating season is assumed to be 4,380 hours long.

	IL Market (Estimate)	
	2013	2014
Pumps Sold w/o Timers (non-ECM Motors)	15,791	17,700
Non-ECM Pumps w/ Timers	0	0
Number of Timers	23	6
Number of Aquastats	63	31
Number of ECM, Smart Pumps	380	386
Total Pumps Sold	15,886	18,083
Take Away: Market size is calculated based on sales, this is a VERY conservative estimate.		

	IL Market Stats	
	2013	2014
Pumps Sold w/o Controller:	99.4%	97.9%
Pumps Sold w/ Integrated Timer:	0%	0%
Smart Pump Market Share:	2.4%	2.1%
Pumps Sold w/ External Controller:	0.5%	0.3%
Take Away: The vast majority of pumps sold have either no controlling mechanism or use other (non-timer, non-aquastat) mechanism for operation.		

Most Popular Grundfos Pump Sold Into Market

Grundfos UPS 15-38 FC Max Watts: 87W
 P/N: 59896341 kWh/ Yr: 381 kWh
 Estimated Contractor Cost: \$73/ Pump
 No Control Integrated Controlling Mechanism
 Induction Type Motor

Efficient Pump Solution Crossover

Grundfos Alpha 15-33 FC Max Watts: 45W
 P/N: 59896877 kWh/ Yr: 109.5 kWh
 Estimated Contractor Cost: \$174.83/ Pump
 Self-Optimizing Ability
 Electrically Commutated Motor
 Due to self-optimizing ability, pump will typically run at 25W (0.025 kW x 4,380 hours/ year = 109.5 kWh/ year)



Plumbing Market

Plumbing Systems are called "open systems", this is due to fresh water being introduced in the system. Circulating pumps installed in these systems should have stainless steel or bronze constructions. These pumps have a higher cost but are necessary as due to the pump construction, the pump will not rust during operation. Running hours per year are assumed to be 8,760 due to no controller being applied.

	IL Market (Estimate)	
	2013	2014
Pumps Sold w/o Timers (non-ECM Motors)	918	882
Non-ECM Pumps w/ Timers	32	10
Number of Timers	13	3
Number of Aquastats	37	30
Number of ECM, Smart Pumps	270	330
Total Pumps Sold	967	1,100
Take Away: Market size is calculated based on sales, this is a VERY conservative estimate.		

	IL Market Stats	
	2013	2014
Pumps Sold w/o Controller:	93.0%	80.2%
Pumps Sold w/ Integrated Timer:	3.3%	0.9%
Smart Pump Market Share:	27.9%	30.0%
Pumps Sold w/ External Controller:	3.4%	3.8%
Take Away: Smart pumps have some market share, but the vast majority of pumps do not have any controlling mechanism and do not utilize electrically commutated motors.		

Most Popular Pump Sold Into Market

Grundfos UPS 15-33 SFC Max Watts: 110W
 P/N: 59896772 kWh/ Yr: 964 kWh
 Estimated Contractor Cost: \$298.13/ Pump
 No Control Mechanism
 Induction Type Motor

Efficient Pump Solution Crossover

Grundfos Comfort PM Auto Max Watts: 8.5W
 P/N: 98420224 kWh/ Yr: 9.3 kWh
 Estimated Contractor Cost: \$335.78/ Pump
 Self-Optimizing Ability
 Electrically Commutated Motor
 Due to self-optimizing ability, pump will typically run 1,095 hours per year (0.0085 kW x 1,095 hours/ year = 9.3 kWh/ year)



Efficient Pump Solution Crossover

Grundfos Alpha 15-38 SFC Max Watts: 45W
 P/N: 59896879 kWh/ Yr: 219 kWh
 Estimated Contractor Cost: \$327.25/ Pump
 Self-Optimizing Ability
 Electrically Commutated Motor
 Due to self-optimizing ability, pump will typically run at 25W (0.025 kW x 8,760 hours/ year = 219 kWh/ year)



SAG Meeting Discussion Items**1. What are the right measures to start with?**

1. **High Performance Circulator Pumps:** circulator pump that has integrated variable frequency drive (VFD), electrically commutated motor (ECM), and built-in control logic that has the ability to self-optimize to the best efficiency point on the pump curve.
 - a. **Plumbing and HVAC applications for:**
 - i. Residential
 - ii. Multifamily
 - iii. Commercial
 - b. Grundfos Products: Comfort PM Auto, Alpha, Magna1 & Magna3
2. Measure amount will range between \$80 - \$2,000 per pump depending on the application, size of the unit:
 - a. For example an open system will use a cast iron pump, which is less expensive a closed loop system will use a stainless steel pump that will have a higher price tag.
3. *How much information will the utility need to pay out the rebate?*

2. Who should offer this? (Statewide, including the Department if possible).

1. Gas and Electric utilities within the state of Illinois.
2. Illinois Department of Commerce or other State departments with EE dollars.

3. Outreach / marketing?

1. Using the Public Benefits Fund: ***Efficiency Vermont*** as an example we would propose the utility or statewide group partner directly with the manufacturer to market this program to the wholesale channels. In this case, Grundfos would assume the marketing and educational responsibility with the approval of the utility. An example of co-branding is provided below.
2. Grundfos has direct relationships with many wholesalers, distributors, and contractors in the Illinois market and by incentivizing at the manufacturing level.
3. Promotion through existing wholesaler channels located throughout IL. Grundfos will market, educate, engage and work with distributors, wholesalers and contractors to get them enrolled and participating in the program. In addition we will work with our internal and external sales channels to educate them on the program to increase participation - we will follow the ***Efficiency Vermont*** model which has had great success in transforming the market. We will also work with the local utility to educate and engage new trade allies. We have a dedicated utility team that can assist with making sure this program is a success.

Efficiency Vermont's High-Performance Circulator Pump program promotes the installation of efficient brushless permanent magnet motor circulator pumps with integrated variable speed controls in Vermont homes and businesses. This program will help drive energy savings for homeowners and business owners. This pilot program provides financial incentives at the wholesale level for qualifying energy efficient circulator pumps sold for installation in a commercial facility or residential home in Vermont.

SPECIAL PRICING
Wholesale to the trade

BENEFITS OF THE PROGRAM

For the distributor:
Vermont distributors can partner with contractors to deliver high-value, high-performance equipment to the marketplace at a reduced price resulting in lower energy costs and a better, quieter experience for customers.

For the contractor:
Contractors can offer homeowners premium products at a lower cost, thus increasing sales calls.

For the homeowner:
Vermonters can enjoy the lower energy costs and a better, quieter experience in their homes with high-performance circulator pumps.

For a list of participating distributors, go to www.efficiencyvermont.com/pumps.

CONTACT

For product information, contact:
Unroll, Inc.
615 Condit Avenue
Watertown, MA 02471-0031
tel: 617-921-9600
www.unroll.com

For program information, contact:
Efficiency Vermont
130 Lakeside Avenue, Suite 401
Burlington, VT 05401
tel: 802-421-5990
www.efficiencyvermont.com/pumps

THE UNIQUE FEATURES & BENEFITS OF THE GRUNDFOS ALPHA™

- Unique ALPHA Plug with line cord
- Terminal box for conduit connection applications
- Large display shows current energy consumption in Watts
- Large display shows estimated flow in gallons per minute
- A one button, easy-to-use interface
- Not capless
- Compact design
- Stainless steel and cast iron pump housing available
- Integrated check valve (optional)
- QR code. Scan with your smart device to learn more about ALPHA.

- Energy savings up to 85%
- Easy to install
- High reliability with less than 1% warranty claim
- Automatic dry-run protection

ETL FC

4. Program design questions: What should the incentive be? How to hold distributors / manufacturers accountable to offer incentive to customers; are parameters needed? How to keep Trade Allies engaged and happy? If this was statewide, how would the savings be split? Is customer data required?

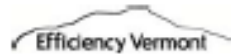
1. Distributors and Wholesalers will be held responsible through an auditing process. The utility will require addresses of the end-users home or business. The addresses will be submitted monthly by the distributor or wholesalers to the utility. Quarterly, we would propose that the utility audit the addresses to ensure the units were installed at those locations.
2. As outlined in the Upstream Connecticut example, the benefits of the program will be the following which promotes trade ally participation and engagement.
3. Example of incentive levels for the Efficiency Vermont program and listed below.

Benefits of Upstream Programs

Stakeholder	Benefits
Manufacturer	• Opportunity to balance product mix • Push latest technology to market
Distributor	• Increased profits and market share • Opportunity to transform end market
Contractor	• Lower first cost • No rebate completion required • Sales and marketing tool to sell jobs
End-users	• No rebate processing (time and money) • Lower first cost • Energy and lifetime cost savings
Utility	• Eliminate loss of savings associated with forms • Opportunity to reach larger customer base

ILLINOIS STATEWIDE ADVISORY COMMITTEE

High Performance Circulator Pumps Qualifying Products (Sorted by Manufacturer) Effective 7/1/2014; Updated 10/15/2015



Manufacturer	Model Number	Description	Max Input (watts)	Product Incentive
Armstrong	Compass	Compass Circulator	45	\$50
	0096-001.0	4300/4380/4312/4382 Design Envelope Pump	800	\$600
	0406-001.0	4300/4380 Design Envelope Pump	800	\$600
	0096-002.0	4300/4380/4312/4382 Design Envelope Pump	1518	\$600
	0406-002.0	4300/4380 Design Envelope Pump	1518	\$600
	0096-003.0	4300/4380/4312/4382 Design Envelope Pump	2136	\$600
	0406-003.0	4300/4380 Design Envelope Pump	2136	\$600
Bell & Gossett	605082000	Ecodirc Auto	60	\$50
	605082001	Ecodirc Vario	90	\$50
	104303	Ecodirc XL 15-75	200	\$200
	104304	Ecodirc XL 15-75	200	\$200
	104306	Ecodirc XL 20-140	500	\$200
	59896833	ALPHA 15-SS/LC	45	\$50
	59896833	ALPHA 15-SS/LC	45	\$50
Grundfos	59896834	ALPHA 15-SS/LC Stainless	45	\$50
	59896877	ALPHA 15-SSF	45	\$50
	59896878	ALPHA 15-SSFR	45	\$50
	59896879	ALPHA 15-SSSF Stainless	45	\$50
	90528423	ALPHA 15-SSFC - EVT	45	\$50
	90540508	ALPHA 15-SSFC - EVT	45	\$50
	98126822	MAGNA3 32-60 SS 115/230v	85	\$50
	98071395	MAGNA CLSC 32-60 CI 230v	85	\$50
	98126820	MAGNA3 32-60 CI 115/230v	85	\$50
	98126819	MAGNA1 32-60 CI 115/230v	107	\$50
	98126821	MAGNA1 32-60 SS 115/230v	107	\$50
	98126823	MAGNA1 32-100 CI 115/230v	178	\$200
	98126825	MAGNA1 32-100 SS 115/230v	178	\$200
	98126826	MAGNA3 32-100 SS 115/230v	180	\$200
	98071396	MAGNA CLSC 32-100 CI 230v	180	\$200
	98126824	MAGNA3 32-100 CI 115/230v	180	\$200
	98126828	MAGNA3 40-80 CI 230v	263	\$200
	98126830	MAGNA3 40-80 SS 230v	263	\$200
	98126800	MAGNA3 40-80 CI 115v	276	\$200
	98126803	MAGNA3 40-80 SS 115v	276	\$200
	98126812	MAGNA3 50-80 CI 115v	318	\$200
	98126814	MAGNA3 50-80 SS 115v	318	\$200
	98126840	MAGNA3 50-80 CI 230v	325	\$200
	98126842	MAGNA3 50-80 SS 230v	325	\$200
	98126832	MAGNA3 40-120 CI 230v	422	\$200
	98126834	MAGNA3 40-120 SS 230v	422	\$200
	98126804	MAGNA3 40-120 CI 115v	442	\$200
	98126806	MAGNA3 40-120 SS 115v	442	\$200
	98126836	MAGNA3 40-180 CI 230v	587	\$600
	98126838	MAGNA3 40-180 SS 230v	587	\$600
	98126808	MAGNA3 40-180 CI 115v	614	\$600
	98126810	MAGNA3 40-180 SS 115v	614	\$600
	98126816	MAGNA3 50-150 CI 115v	630	\$600
	98126818	MAGNA3 50-150 SS 115v	630	\$600
	98126844	MAGNA3 50-150 CI 230v	630	\$600
	98126846	MAGNA3 50-150 SS 230v	630	\$600
	98126848	MAGNA3 65-120 CI 230v	769	\$600
	98126850	MAGNA3 65-120 SS 230v	769	\$600
	98126896	MAGNA3 65-120 CI 115v	772	\$600
	98124702	MAGNA3 65-120 SS 115v	772	\$600
	98126856	MAGNA3 80-100 CI 230v	1041	\$600
	98126858	MAGNA3 80-100 SS 230v	1041	\$600
	98126858	MAGNA3 80-100 SS 230v	1041	\$600
	98126854	MAGNA3 D 80-100 CI 230v	1052	\$600
	98126864	MAGNA3 D 80-100 CI 230v	1052	\$600
	98126864	MAGNA3 D 80-100 CI 230v	1052	\$600
	98126862	MAGNA3 65-150 CI 230v	1301	\$600
	98126854	MAGNA3 65-150 SS 230v	1301	\$600
	98126863	MAGNA3 D 65-150 CI 230v	1301	\$600
	98126860	MAGNA3 100-120 CI 230v	1576	\$600
	98126862	MAGNA3 100-120 SS 230v	1576	\$600
	98126865	MAGNA3 D 100-120 CI 230v	1580	\$600

SEE NEXT PAGE

6. How does this work with existing custom and prescriptive programs?

1. The impact to the existing prescriptive program will depend on the structure of the state program and or utility program. Money can be transferred from the existing prescriptive program budget to help pay the midstream incentives. Or a new program budget may be created.
2. As far as the custom budget goes, we do not see the midstream impacting this budget because the incentives will be small dollar amounts. This is also the reason it is hard to get contractors to apply for incentives today because they do not feel it is worth their time.

7. Savings – how to ensure that savings are not double-counted.

1. End-user addresses will be required and audited to ensure savings are correct and not being double counted.

7. Are there examples of where the upstream approach has worked for public sector or low income customers?

1. Yes, Efficiency Vermont allows for the pumps to be installed at any consumer. They do not have a separate budget for these, but rather allow for installations in any customer group.

8. How does this impact NTG?

1. Through hot water recirculation there is natural gas savings, Nicor Gas is working on an emerging tech demonstration regarding this savings. In the meantime reference their earlier study that provides gas savings for just adding a timer to these pumps.

**Reference, “energySMART, Emerging Technology Program, 1003: Demand-based domestic hot water Recirculation. Public project report”*

9. Leakage - what are the boundaries? Where are the products going? What information is needed to work with the distributor or manufacturer effectively?

1. Midstream programs will require end-user address collected by installer, provided to the distributor/wholesaler on a monthly basis.
 - a. Must have Illinois address.
2. For upstream program no address is required, but sale must take place within the state of Illinois.

Midstream Program Discussion**1. Success in other jurisdictions (Efficiency Vermont, Massachusetts and Connecticut; Q-Sync Motors Report from Oak Ridge National Laboratory (Sept. 2015)).****HVAC/Plumbing Active Midstream Programs:**

1. Efficiency Vermont
2. Energize Connecticut
3. Pacific Gas & Electric
4. Boston Midstream program (currently in design)

Active High-Efficiency Circulator Prescriptive Programs

1. Focus on Energy, Wisconsin: Commercial and multifamily
2. Consumers Energy, Michigan (1/1/2016): Commercial
3. DTE Energy, Michigan (3/1/2016)

2. Delivery channel possibilities: (Distributor (midstream); Manufacturer rep, to sell to contractors (upstream))

1. Distributors
2. Manufacturer Representative
3. Wholesalers

*As stated earlier we believe the greatest distinction between a midstream and an upstream program to believe the information that is required by the utility or state program on the back-end. If the utility or state program is comfortable with partnering directly with a manufacturer the details will have to be worked out, but end-user information will be very hard to obtain.

3. Market share – what is the possibility in IL for this measure? (Jessica/Stephen to follow-up. What additional IL data do we need?)

1. See appendix for this information

4. What should the incentive be? (For Efficiency Vermont, incentives ranged from \$100 to \$600).

1. See appendix for this breakdown

5. Cost information? (Smart pumps are approximately 30% higher in cost. Cost may depend on the application). This is needed to run cost-effectiveness analysis. Information by pump would be helpful, for both cost and savings.

1. See appendix for this breakdown

6. Measure lifespan? (Approximately 15 years).**7. Energy savings? (Water savings; Gas savings – when will information be available? Jessica/Stephen to follow-up. They have engaged with Nicor Gas through the Emerging Technologies Program).**

1. Potential water and natural gas savings from these pumps
 - a. Nicor Gas is completing an Emerging Tech evaluation of the gas savings in 2015/2-16

Questions or Comments can be directed to Jessica Morrison at jmorrison@grundfos.com