### Index – MIPUG Book of Documents 2014/15 and 2015/16 Manitoba Hydro GRA As of June 8, 2015

Tab	Description	Reference
Manit	oba Hydro Load, DSM & Rates Panel	
1	A) Excerpts Power Smart Plan 2014 – 2017	A) Appendix 8.1, page 42, Appendix A.1, and Appendix B.1
2	<ul> <li>A) Calculative Example of DSM vs. New Supply</li> <li>B) DSM framework IR with Theoretical Example on assessing program fairness</li> </ul>	<ul> <li>A) MIPUG-20-3 (MIPUG Book of Documents Volume <ul> <li>3) from NFAT hearing re: PUB/MH I-216b</li> <li>example</li> </ul> </li> <li>B) PUB/MH I-216b from NFAT hearing</li> </ul>

# TAB 1

# Power Smart Plan 2014 to 2017

# SUPPLEMENTAL REPORT: 15yr (2014 to 2029)









## 2.3.2 Utility Perspective

#### **Metrics**

The following table outlines the cost effectiveness, from a utility perspective, of the program offerings provided in the 2014-2017 Power Smart Plan - 15 year supplemental report.

Utility DSM Metrics

Residential New Home Program Home Insulation Program Water and Energy Saver Program Affordable Energy Program - Insulation Affordable Energy Program - Insulation Affordable Energy Program - Insulation Affordable Energy Program - Total Refrigerator Retirement Program Residential LED Lighting Program Community Geothermal Program Commercial LED Lighting Conversion Program Commercial Building Envelope - Nindows Program Commercial Building Envelope - Vindows Program Commercial Building Envelope - Nindows Program Commercial HVAC Program - Chillers Commercial HVAC Program - Co2 Sensors Commercial HVAC Program - Co2 Sensors Commercial Building Optimization Program Commercial Building Program Commercial HVAC Program - Co2 Sensors Commercial HVAC Program - Co2 Sensors Commercial HVAC Program - Co2 Sensors Commercial HVAC Program Commercial Building Optimization Program Commercial Building Program Commercial Building Program Commercial Program Commercia	<b>RIM</b>	NUB		tric DSM			Natural G	as DSM
New Home Program Home Insulation Program Water and Energy Saver Program Affordable Energy Program - Insulation Affordable Energy Program - Insulation Affordable Energy Program - Total Refrigerator Retirement Program Residential LED Lighting Program Community Geothermal Program Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Vindows Program Commercial Building Envelope - Vindows Program Commercial Building Envelope - Insulation Program Commercial Building Envelope - Insulation Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Water Heaters Commercial HVAC Program - Water Heaters Commercial Building Program Commercial Refrigeration Program Commercial Refrigeration Program Commercial Richten Applance Program Commercial Richten Applance Program Commercial Richten Applance Program Commercial Refrigeration Program Power Smart Shops Commercial Rograms Total Mustrial Performance Optimization Program	1.1	NUB						us D3m
New Home Program Home Insulation Program Water and Energy Saver Program Affordable Energy Program - Insulation Affordable Energy Program - Insulation Affordable Energy Program - Total Refrigerators Retirement Program Community Geothermal Program Esidential LED Lighting Program Community Geothermal Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Vindows Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Water Heaters Commercial HVAC Program Commercial Custom Measures Program Commercial Refrigeration Program Commercial Refrigeration Program New Buildings Program Commercial Refrigeration Program New Suildings Program Program State New Suildings Program New Suildings Program Commercial Refrigeration Program New Suildings Program Power Snart Shops Commercial Programs Total Mustrial Performance Optimization Program			NPV	LUC (¢/kW.h)	RIM	NUB	NPV	LUC (¢/m³)
New Home Program Home Insulation Program Water and Energy Saver Program Affordable Energy Program - Insulation Affordable Energy Program - Insulation Affordable Energy Program - Total Refrigerator Retirement Program Residential LED Lighting Program Community Geothermal Program Esidential Program Stata Commercial Uighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Water Heaters Commercial HVAC Program New Buildings Program Commercial Refrigeration Program Commercial Refrigeration Program New Suildings Program Commercial Refrigeration Program New Suildings Program Power Snart Shops <b>onmercial Program Stata</b> Mustrial Performance Optimization Program								
Home Insulation Program Water and Energy Saver Program Affordable Energy Program - Insulation Affordable Energy Program - Furnace Affordable Energy Program - Total Refrigerator Retirement Program Community Geothermal Program Commercial LED Lighting Program Edidential Programs Total Commercial Lighting Program Edidential Programs Total Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial Building Optimization Program Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Network Energy Management Program Internal Refrofit Program Pover Smart Shops ommercial Programs Total vidustrial Performance Optimization Program								
Water and Energy Saver Program Affordable Energy Program - Insulation Affordable Energy Program - Insulation Affordable Energy Program - Total Refrigerator Retirement Program Community Geothermal Program deintial Programs Total commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Ninsulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - CO2 Sensors Commercial IdxC Program - Water Heaters Commercial Building Optimization Program Commercial Building Optimization Program Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total		5.1	\$7.3	0.3	0.8	(110.8)	(\$7.7)	0.1 c
Affordable Energy Program Affordable Energy Program - Insulation Affordable Energy Program - Furnace Affordable Energy Program - Total Refrigerator Retirement Program Community Geothermal Program esidential LED Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Vindows Program Commercial Building Envelope - Vindows Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Water Heaters Commercial Building Optimization Program Commercial Building Optimization Program Commercial Refrigeration Program Commercial Ritchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total vidustrial Performance Optimization Program	1.2	1.6	\$8.0	3.2	0.6	(0.6)	(\$18.4)	12.6
Affordable Energy Program - Insulation Affordable Energy Program - Furnace Affordable Energy Program - Total Refrigerator Retirement Program Community Geothermal Program Community Geothermal Program Esidential Programs Total Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Nindows Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial IdvC Program - Chillers Commercial Building Optimization Program Mew Buildings Program Commercial Retrigeration Program Network Energy Management Program Internal Retroit Program Internal Retroit Program Power Smart Shops Ommercial Programs Total	0.7	0.0	(\$4.2)	3.0	0.5	(0.6)	(\$4.9)	12.7
Affordable Energy Program - Furnace Affordable Energy Program - Total Refrigerator Retirement Program Residential LED Lighting Program esidential Programs Total ommercial Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - Water Heaters Commercial HVAC Program - Water Heaters Commercial Building Optimization Program Newe Buildings Program Commercial Refrigeration Program Network Energy Management Program Internal Retrofit Program Power Smart Shops pommercial Programs Total dustrial Performance Optimization Program								
Affordable Energy Program - Total Refrigerator, Retirement Program Residential LED Lighting Program Community Geothermal Program Esidential Programs Total commercial Lighting Program EDR Noadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial Building Envelope - Insulation Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial Building Optimization Program Commercial Building Optimization Program Commercial Building Optimization Program Commercial Building Optimization Program Commercial Building Optimization Program New Suildings Program Commercial Ritchen Appliance Program Network Energy Management Program Internal Retroit Program Power Smart Shops Dommercial Programs Total dustrial Performance Optimization Program	1.1	1.4	\$4.9	3.4	0.3	(0.2)	(\$31.7)	41.7 **
Refrigerator Retirement Program Residential LED Lighting Program sidential Programs Total memercial Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Nindows Program Commercial Building Envelope - Vindows Program Commercial Geothermal Program Commercial HVAC Program - Boilers Commercial HVAC Program - Collers Commercial HVAC Program - Collers Commercial HVAC Program - Collers Commercial UAC Program - Cole Sensors Commercial Building Optimization Program Mew Building Program Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Network Energy Management Program Internal Retrofit Program Power Smart Shops Dommercial Programs Total dustrial Performance Optimization Program	n/a	n/a	n/a	n/a	0.2	(0.1)	(\$17.3)	119.9 **
Residential LED Lighting Program Community Geothermal Program esidential Programs Total ommercial LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Water Heaters Commercial Building Optimization Program New Building Program Commercial Building Optimization Program New Building Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total dustrial	1.1	1.4	\$4.9	3.4	0.3	(0.1)	(\$48.9)	55.3 **
Community Geothermal Program esidential Programs Total ommercial Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial Geothermal Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial Loxtom Measures Program Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program New Buildings Program Commercial Refrigeration Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total	0.6	(0.7)	(\$10.8)	2.3	0.8	0.0	\$1.4	- i
esidential Programs Total ommercial Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial Building Envelope - Insulation Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Water Heaters Commercial HVAC Program - Water Heaters Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Commercial Refrigeration Program Network Energy Management Program Internal Retrofit Program Power Snart Shops ommercial Programs Total adustrial Performance Optimization Program	0.8 0.9	0.3	(\$1.2)	2.4	0.8	0.0 0.0	\$0.5 \$0.0	0.0 i
ommercial Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial Geothermal Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial Locatom Measures Program Commercial Custom Measures Program New Buildings Program Commercial Ritichen Appliance Program New Buildings Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retroit Program Power Smart Shops ommercial Programs Total wdustrial Performance Optimization Program	1.0	0.5	(\$7.7)	2.5	0.0	(0.4)	(\$78.1)	0.0 20.9
Commercial Lighting Program LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial Geothermal Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chilers Commercial HVAC Program - Co2 Sensors Commercial Custom Measures Program Commercial Gustom Measures Program Commercial Building Optimization Program New Buildings Program Commercial Kitchen Appliance Program New Buildings Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retroit Program Power Smart Shops <b>Demercial Programs Total</b> dustrial Performance Optimization Program	1.0	0.9	(\$3.8)	2.2	0.5	(0.4)	(\$/8.1)	20.9
LED Roadway Lighting Conversion Program Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial HVAC Program - Boilers Commercial HVAC Program - Collers Commercial HVAC Program - O2 Sensors Commercial HVAC Program - Water Heaters Commercial Building Optimization Program New Buildings Program Commercial Building Optimization Program Commercial Kitchen Applicatore Program Commercial Kitchen Applicatore Program Network Energy Management Program Internal Retrofit Program Power Smart Shops sommercial Programs Total dustrial Performance Optimization Program								
Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program Commercial Geothermal Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial LVAC Program - Water Heaters Commercial Building Optimization Program New Buildings Program Commercial Kitchen Appliance Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retroifit Program Power Smart Shops ommercial Program Stotal wdustrial Performance Optimization Program	0.9	0.7	(\$22.3)	2.4	0.8	0.0	\$1.2	0.0 i
Commercial Building Envelope - Insulation Program Commercial Geothermal Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - CO2 Sensors Commercial HVAC Program - CO2 Sensors Commercial Building Optimization Program Commercial Building Optimization Program New Buildings Program Commercial Richten Appliance Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops memercial Programs Total dustrial Performance Optimization Program	0.8	0.8	(\$6.9)	3.3	n/a	n/a	n/a	n/a
Commercial Geothermal Program Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - CO2 Sensors Commercial HVAC Program - Water Heaters Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Commercial Refrigeration Program Network Energy Management Program Internal Retrofit Program Power Smart Shops pomercial Programs Total dustrial Performance Optimization Program	1.2	1.7	\$6.0	2.5	0.6	(0.3)	(\$6.5)	12.4
Commercial HVAC Program - Boilers Commercial HVAC Program - Chillers Commercial HVAC Program - Chillers Commercial Custom Measures Program Commercial Custom Measures Program New Buildings Program Commercial Building Optimization Program Commercial Refrigeration Program Commercial Refrigeration Program Network Energy Management Program Internal Retrofit Program Power Smart Shops Dower Smart Shops Dommercial Programs Total dustrial Performance Optimization Program	1.2	1.6	\$5.0	2.8	0.6	(0.3)	(\$19.5)	12.3
Commercial HVAC Program - Chillers Commercial HVAC Program - CO2 Sensors Commercial HVAC Program - Water Heaters Commercial Building Optimization Program New Buildings Program Commercial Building Optimization Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops sommercial Programs Total dustrial Performance Optimization Program	1.0	0.9	(\$4.1)	3.2	n/a	n/a	n/a	n/a
Commercial HVAC Program - CO2 Sensors Commercial HVAC Program - Water Heaters Commercial Custom Measures Program New Buildings Program Commercial Refrigeration Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total dustrial Performance Optimization Program	-	-	-		0.8	(0.8)	(\$4.2)	4.5 c
Commercial HVAC Program - Water Heaters Commercial Custom Measures Program Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Commercial Kitchen Appliance Program Internal Retrofit Program Internal Retrofit Program Power Smart Shops ommercial Programs Total udustrial Performance Optimization Program	0.7	(0.7)	(\$2.9)	1.4	n/a	n/a	n/a	n/a
Commercial Custom Measures Program Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total adustrial Performance Optimization Program	1.7	3.5	\$0.9	2.6	0.7	(0.5)	(\$2.2)	7.3
Commercial Building Optimization Program New Buildings Program Commercial Refrigeration Program Commercial Refrigeration Program Internal Retrofit Program Internal Retrofit Program Power Smart Shops ommercial Programs Total udustrial Performance Optimization Program	n/a 1.1	n/a 1.2	n/a \$1.4	n/a 3.2	0.6 0.6	(0.4) (0.3)	(\$0.9) (\$2.8)	11.6 12.1
New Buildings Program Commercial Refrigeration Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total ndustrial Performance Optimization Program	0.9	0.6	\$1.4 (\$1.1)	3.2 2.8	0.6	(0.3)	(\$2.8)	12.1 13.0
Commercial Refrigeration Program Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total adustrial Performance Optimization Program	1.4	3.0	\$28.6	1.7	0.6	(0.3)	(\$3.9)	13.5
Commercial Kitchen Appliance Program Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total adustrial Performance Optimization Program	0.9	0.6	(\$2.5)	1.1	0.8	0.0	(\$0.6)	- i
Network Energy Management Program Internal Retrofit Program Power Smart Shops ommercial Programs Total ndustrial Performance Optimization Program	1.7	13.1	\$2.6	0.7	0.7	(1.5)	(\$1.1)	3.7
Internal Retrofit Program Power Smart Shops formercial Programs Total ndustrial Performance Optimization Program	1.1	2.3	\$0.8	0.9	0.9	0.0	\$0.0	- i
Power Smart Shops ommercial Programs Total adustrial Performance Optimization Program	1.2	1.2	\$0.4	5.4	1.9	1.9	(\$0.1)	13.0
ommercial Programs Total ndustrial Performance Optimization Program	0.9	0.6	(\$0.5)	2.7	0.6	(0.7)	(\$0.1)	10.5
Performance Optimization Program	1.0	1.0	\$5.3	2.4	0.6	(0.4)	(\$44.6)	10.8
Performance Optimization Program								
	0.9	0.8	(\$19.3)	2.6	n/a	n/a	n/a	n/a
Natural Gas Optimization Program	n/a	n/a	n/a	n/a	0.8	(0.5)	(\$3.2)	4.6
ndustrial Programs Total	0.9	0.8	(\$19.3)	2.6	0.8	(0.5)	(\$3.2)	4.6
nergy Efficiency Subtotal	1.0	0.9	(\$17.8)	2.4	0.6	(0.4)	(\$125.8)	14.8
			( )				()	
oad Management Curtailable Rate Program	1.4	1.4	\$32.2	n/a	n/a	n/a	n/a	n/a
oad Management Programs Total	1.4	1.4	\$32.2	n/a	n/a	n/a	n/a	n/a
0 0				,	,.	,	,	,
oad Displacement & Alternative Energy			** 0			(0, 1)	(*** **	
Bioenergy Optimization Program	1.0	1.1	\$1.2	1.4	0.8	(0.4)	(\$1.1)	4.2
Customer Sited Load Displacement	1.2	2.0	\$74.3 \$75.4	1.0	n/a 0.8	n/a	n/a	n/a
oad Displacement & Alt. Energy Programs Total	1.1	1.9	\$/5.4	1.0	0.8	(0.4)	(\$1.1)	4.2
onservation Rates								
Conservation Rates - Residential	0.8	(1.8)	(\$35.3)	0.8	n/a	n/a	n/a	n/a
Conservation Rates - Commercial	1.1	2.3	\$18.4	0.6	n/a	n/a	n/a	n/a
onservation Rates Total	0.9	0.4	(\$17.0)	0.7	n/a	n/a	n/a	n/a
ael Choice								
Fuel Choice	1.0	1.0	\$1.2	1.3	0.0	0.0	\$0.0	0.0
uel Choice Total	1.0	1.0	\$1.2	1.3	0.0	0.0	\$0.0	0.0
rogram Impacts Total	1.0	1.1	\$74.1	1.6	0.6	(0.4)	(\$126.9)	14.5
rogram Support and Contingency Costs			(\$59.9)				(\$25.4)	
	1.0	1.0			0.5	-		
rogram Impacts Total (Incl. Support and Contingency Costs)	1.0	1.0	\$14.3	1.8	0.5	(0.3)	(\$152.3)	18.5
ther Internal DSM Investments Afforedable Energy Fund	-	-	(\$0.9)	-	-		(\$0.7)	-
verall Portfolio Metric	1.0	1.0	\$13.3	1.8	0.5	(0.3)	(\$153.0)	18.6
	1.0	1.0	ψ10.0	1.0	0.0	(0.0)	(#100.0)	10.0

Notes:

\*\* Includes all Affordable Energy Fund Expenditures and Furnace Replacement Program

AEP Electric - Total: Excluding AEF costs, RIM is 1.4, NUB is 3.8, NPV is \$12.8M, and LUC is 1.3 ¢/kW.h

AEP Natural Gas - Total: Excluding AEF costs, without Furnance Replacement Program, RIM is 0.6, NUB is -1.1, NPV is -\$9.3M, and LUC is 6.8 ¢/m3

c Program assumption includes savings from Codes & Standards

i Program reflects natural gas interactive effects

1) Overall RIM, NUB, and NPV portfolio metrics include Curtailable Rate Program and do not include Customer Service Initiatives / Financial Loan Programs

2) Overall LUC porfolio metric does not inlcude Curtailable Rate Program
 3) Overall portfolio metrics include all support, contingency and Affordable Energy Fund Expenditures and Furance Replacement Program

4) Excluding the Affordable Energy Program, overall natural gas LUC is 13.5 ¢/m3

# LECTRICOSM MANITOBA HYDRO 2015/16 GRA BOOK OF DOCUMENTS (2014 - 2017 Power Smart Plan (Annual Capacity Savings (MW))

2015/16 & 2016/17 General Rate Application Tab 1

Appendix 8.1 January 23, 2015

RESIDENTIAL		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	Generation 2028/29
ncentive Based																	
New Home Program		0.0	0.0	0.0	0.3	1.0	2.2	4.3	5.4	6.4	7.3	8.3	9.2	10.2	11.1	12.0	13.7
Home Insulation Program		2.6	4.8	6.9	8.7	10.3	11.7	12.9	13.9	14.8	15.5	16.0	16.5	16.8	16.8	16.8	19.1
Water and Energy Saver Program		0.6	1.2	1.7	1.9	2.2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.8
Affordable Energy Program		1.8 1.2	3.6	5.3	7.0	8.6	10.2	11.8	13.1 3.5	14.3 3.5	15.4	16.3	16.5	16.6	16.1	15.6	17.8
Refrigerator Retirement Program		0.5	2.5 0.6	3.5	3.5 1.2	3.5 1.6	3.5 1.7	3.5 1.7	3.5	3.5	3.5 1.5	2.5 1.5	1.5 1.5	0.7	0.4	0.2	0.2
Residential LED Lighting Program Community Geothermal Program		0.5	2.6	0.9 4.4	7.0	9.1	1.7	1.7	1.5	1.5	1.5 15.7	1.5 15.7	1.5	1.5	1.5	1.4	1.6
community deother mar Program	Subtotal	7.8	15.3	22.7	29.6	36.2	42.6	48.7	53.0	57.3	61.3	62.7	63.3	63.8	64.0	64.1	73.1
Customer Service Initiatives / Financial Loan Programs Power Smart Residential Loan		0.3	0.5	0.8	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.7	3.9	4.5
Power Smart PAYS Financing		0.1	0.2	0.3	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.6
Residential Earth Power Loan		0.3	0.6	0.9	1.2	1.6	1.9	2.4	2.8	3.3	3.8	4.3	4.3	4.3	4.3	4.3	4.9
	Subtotal	0.6	1.3	2.0	2.7	3.4	4.2	4.9	5.7	6.5	7.4	8.3	8.6	9.0	9.3	9.7	11.0
COMMERCIAL																	
ncentive Based																	
Commercial Lighting Program		9.1	18.7	27.7	36.0	44.6	49.4	54.0	58.3	62.3	66.1	67.7	68.9	69.0	69.9	70.7	80.6
LED Roadway Lighting Conversion Program		0.7	1.5	2.1	2.9	3.8	4.6	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.9
Commercial Building Envelope - Windows Program Commercial Building Envelope - Insulation Program		1.0 1.0	1.9 1.9	2.7 2.7	3.5 3.4	4.3 4.2	5.1 4.9	5.9 5.7	6.7 6.4	7.6 7.2	8.4 8.0	9.2 8.7	10.1 9.5	10.9 10.2	11.7 11.0	12.6 11.8	14.3 13.4
Commercial Geothermal Program		0.4	1.3	2.7	3.4	4.2	6.3	7.8	9.6	11.4	13.3	15.3	17.4	19.6	21.9	24.3	27.7
Commercial HVAC Program - Chillers		0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial HVAC Program - CO2 Sensors		0.1	0.1	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.3	1.3	1.3	1.3	1.3	1.4
Commercial Custom Measures Program		0.2	0.5	0.8	1.1	1.4	1.8	2.1	2.5	2.9	3.3	3.7	4.1	4.6	5.1	5.7	6.5
Commercial Building Optimization Program		0.1	0.2	0.4	0.5	0.7	0.9	1.2	1.4	1.7	2.0	2.2	2.4	2.5	2.7	2.9	3.3
New Buildings Program		4.1	9.5	16.3	16.3	16.6	17.4	18.5	19.9	21.7	21.7	21.7	21.7	21.7	21.7	21.7	24.8
Commercial Refrigeration Program		1.2	1.8	2.1	2.5	2.8	3.2	3.6	4.0	4.4	4.9	5.4	5.8	6.2	6.6	7.0	8.0
Commercial Kitchen Appliance Program		0.6	1.5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.7	3.1
Network Energy Management Program		0.2	0.5	0.8	1.3	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
Internal Retrofit Program		0.2	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Power Smart Shops		0.0	0.0	0.2	0.4	0.6	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.3
	Subtotal	18.8	39.7	61.4	75.0	89.6	100.3	110.8	121.1	131.6	140.2	146.6	152.6	157.5	163.4	169.3	193.0
Customer Service Initiatives / Financial Loan Programs																	
Power Smart for Business PAYS Financing		0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6
	Subtotal	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6
NDUSTRIAL																	
Performance Optimization Program	Subtotal	2.4	5.3 5.3	8.6 8.6	12.2 12.2	16.3 16.3	20.4	24.4	28.5	32.6	36.7 36.7	40.7 40.7	44.8	48.9 48.9	53.0 53.0	57.0 57.0	62.7 62.7
		2.4	5.5	0.0	12.2	10.5	20.4			32.0	30.7		44.0	40.9	55.0	57.0	02.7
	ENERGY EFFICIENCY SUBTOTAL	29.7	61.6	94.8	119.8	145.7	167.7	189.1	208.7	228.4	246.0	258.7	269.8	279.7	290.1	300.6	340.4
LOAD MANAGEMENT																	
Curtailable Rate Program	LOAD MANAGEMENT SUBTOTAL	146.2 146.2	160.9 160.9														
LOAD DISPLACEMENT & ALTERNATIVE ENERGY Bioenergy Optimization Program		1.5	3.1	4.3	5.5	6.3	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.8
Customer Sited Load Displacement		21.9	34.1	50.9	61.9	77.9	81.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	94.5
LOAD DISPLACEMENT &	ALTERNATIVE ENERGY SUBTOTAL	23.4	37.2	55.1	67.3	84.2	89.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	102.3
CONSERVATION RATES																	
Conservation Rates - Residential		0.0	0.0	0.0	0.0	3.1	10.9	12.0	13.1	14.5	15.9	16.1	16.3	16.5	16.7	16.9	19.2
Conservation Rates - Commercial		0.0	0.0	0.0	0.0	0.0	5.2	11.4	15.4	16.6	17.8	19.0	20.3	21.6	23.0	24.3	27.8
	CONSERVATION RATES SUBTOTAL	0.0	0.0	0.0	0.0	3.1	16.1	23.3	28.5	31.0	33.7	35.1	36.6	38.1	39.7	41.2	47.0
FUEL CHOICE																	
Fuel Choice		0.0	0.0	0.0	13.3	26.7	40.0	53.4	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	76.1
	FUEL CHOICE SUBTOTAL	0.0	0.0	0.0	13.3	26.7	40.0	53.4	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	76.1
Impacts (at meter)		199	245	296	347	406	459	505	543	565	586	600	612	624	636	648	
Impacts (at generation)		220	272	329	386	453	513	565	609	634	657	673	687	700	713	727	
Codes Steadards & Doculations (structure)		19	42	71	101	129	154	179	203	226	249	271	294	316	337	359	
Codes, Standards & Regulations (at meter) Codes, Standards & Regulations (at generation)		22	42	81	101	129	154	204	203	226	249	309	335	316	337	409	-
POWER SMART 2014 to 2028 Impacts (at meter) POWER SMART 2014 to 2028 Impacts (at generation)		219 243	287 319	367 411	448 502	535 600	613 689	684 769	746 840	791 891	834 940	871 982	906 1,022	939 1,059	973 1,098	1,007 1,136	-
		210	517		502	000	007	707	010	071	710	702	1,022	1,007	1,050	1,100	
POWER SMART SAVINGS TO DATE																1	1
Incentive Based Program Impacts (at meter)		240	240	240	240	240	240	240	240	239	239	239	238	238	237	237	1
Incentive Based Program Impacts (at generation)		270	270	270	270	270	270	270	270	269	269	269	268	268	267	267	1
Customer Service Initiatives Program Impacts (at meter)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	1
	tion)	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	1
Customer Service Initiatives Program Impacts (at genera		46	46	42	38	50	50	50	50	50	50	50	50	50	50	50	1
Discontinued Programs (at meter)		52	52 145	48 145	43 145	56 145	1										
Discontinued Programs (at meter) Discontinued Programs (at generation)						145	145	145	145	145	145	145	145	145		145	1
Discontinued Programs (at meter) Discontinued Programs (at generation) Impacts of Codes & Standards (at meter)		145 166	145	166	166	166	166	166	166	166	166	166	166	166	166	166	
Discontinued Programs (at meter) Discontinued Programs (at generation)							166	166	166	166	166	166	166	166		166	

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#### MANITOBA HYDRO 2015/16 GRA BOOK OF DOCUMENTS

																									Interim		At
	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Estimate 2013/14	Benchmark 2028/29	Generation 2028/29
RESIDENTIAL Incentive Based																											i i
Home Insulation Program Lower Income Energy Efficiency Program	0.00	0.00	0.00	0.00	0.00	0.00 0.00	0.00	0.00	0.00 0.00	0.00	0.00 0.00	0.00	0.00 0.00	0.00	0.00	0.83	2.03 0.00	5.16 0.00	7.96 0.12	10.69 0.36	13.77 0.70	16.38 1.54	18.81 3.03	21.69 4.55	23.96 5.95	23.96 5.95	27.31 6.78
New Home Program Refrigerator Retirement Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.19	0.44	0.73	0.97	1.18	1.46	1.63	1.63	1.63 3.04	1.63	1.86
Community Geothermal Program Water and Energy Saver Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.37	0.42 2.37
Subtota		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	2.22	5.60	8.81	12.01	15.65	20.08	25.50	31.40	37.02	33.98	38.74
Customer Service Initiatives																											1
Power Smart Residential Loan Residential Earth Power Loan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47 0.00	0.80	1.10 0.25	1.39 0.63	1.64 1.06	2.00 1.42	2.73 2.07	3.04 2.47	3.93 2.99	4.22 3.28	4.39 3.77	4.69 3.83	4.94 3.86	4.94 3.86	5.63 4.40
ecoEnergy Residential PAYS Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Smart for Business PAYS Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.63	0.71
Solar Hot Water Heating Subtota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.02	0.00 2.70	0.00 3.42	0.00 4.80	0.00	0.00 6.92	0.00 7.50	0.00 8.16	0.00 8.52	0.00 9.52	0.00 9.52	0.00 10.85
DISCONTINUED/COMPLETED																											i i
Appliances Seasonal LED Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49 0.12	1.01 0.17	1.59 0.20	1.71 0.21	1.71 0.21	1.71 0.21	1.71 0.21	1.71 0.21	1.71 0.21	1.94 0.24
Outdoor Timer	0.29	0.52	0.90	1.23	1.51	1.86	1.99	2.28	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.72
Res Hot Water Water Heater Rental	0.00 0.00	0.00	0.06 0.00	0.06 0.00	0.06	0.06 0.00	0.06 0.00	0.07 0.00	0.07 0.02	0.09 0.04	0.09 0.04	0.10 0.05															
Thermostat Retrofit/Demonstration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.04 0.00	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 0.00	0.00 0.00	0.00 0.00
RBB High Efficiency Furnace & Boiler	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Light Fixtures	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.21	0.33	0.43	0.59	0.74	0.74	0.74	0.74	0.85
Compact Fluorescent Lighting PSEM	0.00	0.00	0.00 0.00	0.00 0.00	0.00	0.00 0.00	0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00	0.00 0.05	0.00	0.00 0.10	1.64 0.14	3.11 0.14	4.15 0.14	5.69 0.14	10.18 0.14	17.72 0.14	21.33 0.14	21.33 0.14	21.33 0.14	21.33 0.14	20.96 0.14	23.90 0.16
R2000 House Subtota	0.00	0.00	0.00	0.00 1.30	0.00 1.57	0.00 1.92	0.00 2.06	0.00 2.36	0.00 2.51	0.00 2.55	0.00 2.56	0.00 2.56	0.03 2.64	0.04 2.70	0.05 2.67	0.05 4.35	0.05 5.87	0.05 7.52	0.05 9.79	0.05 15.00	0.05 23.21	0.05 26.98	0.05 27.13	0.05 27.13	0.05 27.13	0.05 26.76	0.06 30.51
RESIDENTIAL TOTAL	0.29	0.52	0.96	1.30	1.57	1.92	2.06	2.36	2.51	2.55	2.56	2.56	3.11	3.58	4.02	7.22	10.79	16.54	23.40	32.52	45.78	54.55	60.79	67.04	73.66	70.25	80.09
COMMERCIAL	0.2.7	0.32	0.70	1.30	x.J/	1.72	<i>a.00</i>	a.30	10.01	w.33	2.30	2.30	9.11	5.50		1.66	10.17	10.37	23.70	04.JL	10.70	01.00	00.13	07.UT	75.00	10.25	00.09
Incentive Based																											1
Commercial Lighting Program Commercial Earth Power Program	0.00	0.00	0.00	0.50	2.59 0.00	5.72 0.00	9.17 0.00	10.78 0.15	11.57 0.80	15.14 1.11	16.37 1.48	17.35 1.66	18.54 1.97	19.65 2.42	21.68 3.77	24.22 4.21	27.65 5.36	31.14 7.42	34.05 8.67	38.51 9.28	42.30 10.31	45.75 11.25	48.78 11.94	55.96 12.61	62.46 12.94	62.46 12.94	71.20 14.75
Commercial Insulation Program Commercial Windows Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.75 1.76	1.84 2.09	3.17 2.97	4.85 3.99	6.22 4.79	8.13 5.62	11.00 6.06	11.00 6.06	12.54 6.91
Internal Retrofit Program	0.00	0.00	0.00	0.04	0.33	0.56	0.65	0.74	0.87	1.03 0.11	1.10	1.22	1.26	1.36	1.69	2.16	2.41	2.83	3.00	3.24	3.54 1.22	4.04	6.76	8.10	9.21 1.66	9.21	10.50 1.89
Commercial Custom Measures Program Commercial Refrigeration Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.84	1.22 1.34	1.63	1.92	1.66 2.13	1.66 3.50	4.22	4.22	4.81
Commercial HVAC Program - Chiller City of Winnipeg Power Smart Agreement	0.00	0.00	0.00	0.00 0.00	0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00	0.00	0.00 0.00	0.00 0.01	0.00 0.13	0.00 0.27	0.00 1.61	0.00 2.00	0.00 2.14	0.00 2.20	0.00 2.38	0.00 2.48	0.00 2.58	0.00 2.62	0.00 2.62	0.00 2.62	0.00 2.98
Commercial Clothes Washers Program Commercial Kitchen Appliance Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.24 0.11	0.28	0.36 0.16	0.47 0.17	0.47 0.18	0.47 0.18	0.54 0.20
Power Smart Shops Commercial Building Optimization Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.14 0.03	0.14 0.03	0.14 0.04	0.14 0.04	0.14 0.01	0.16 0.01
Network Energy Management Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.08
New Buildings Program CO2 Sensors	0.00	0.00	0.00 0.00	0.00 0.00	0.00	0.00	0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00	0.00	0.00	0.00	0.00 0.00	0.00 0.00	0.00	0.00	0.00 0.00	0.00	0.00 0.00	0.43 0.00	1.01 0.00	1.27 0.00	1.27 0.00	1.45 0.00
Power Smart Energy Manager Program Subtota	0.00	0.00	0.00	0.00	0.00	0.00	0.00 9.82	0.00 11.78	0.00 13.45	0.00 17.64	0.00 19.70	0.00 21.14	0.00 22.74	0.00 24.60	0.00 28.97	0.00 32.79	0.00 39.43	0.00	0.00	0.00	0.00	0.00 76.25	0.00 85.98	0.00 100.03	0.00 112.33	0.00 112.30	0.00 128.02
DISCONTINUED/COMPLETED	0.00	0.00				0.21			0.21				0.21							0.21							
Commercial Showerhead Infrared Heat Lamp	0.00	0.00	0.21 0.61	0.21 0.61	0.21 0.61	0.61	0.21 0.61	0.21 0.61	0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.21 0.61	0.23 0.69
Livestock Waterer Roadway Lighting	0.00	0.00	0.00 0.91	0.00 3.13	0.00 5.37	0.05 6.97	0.08 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.10 6.97	0.00 6.97	0.00 7.94
Sentinel Lighting Commercial Air Barrier	0.00	0.00	0.51	1.11 0.00	1.78	1.78	1.78 0.00	1.78	1.78 0.07	1.78	1.78 0.11	1.78	1.78 0.20	1.78 0.23	1.78 0.26	1.78	1.78	1.78	1.78 0.29	1.78 0.29	1.78	1.78 0.29	1.78	1.78 0.29	1.78 0.29	1.78 0.29	2.03 0.33
Agricultural Demand Controller	0.00	0.00	0.00	0.68	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14
Commercial Air Conditioning Aboriginal Commercial	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00
Parking Lot Controllers Spray Valves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 0.27	0.00 0.27	0.00	0.00	0.00 0.00	0.00 0.00	0.00 0.00
Agricultural Heat Pads Subtota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66 11.43	1.00	1.19 12.05	1.59	1.99 12.91	2.20	2.61	2.71 13.69	2.77	3.24 14.23	3.49 14.66	3.59 14.81	3.87 15.09	4.05	4.05 15.01	4.05 15.01	4.05 14.91	4.62 16.99
COMMERCIAL TOTAL	0.00	0.00	2.22	6.20	11.92	16.92	20.40	22.54	24.21	29.08	31.50	33.18	35.23	27.54	42.12	46.37	53.12	60.09	66.59	74.45	02.75	91.34	100.99	115.03	127.34	127.21	145.02
INDUSTRIAL	0.00	0.00	2.23	0.20	11.92	10.92	20.49	22.54	24.21	29.00	51.50	55.10	33.23	57.51	42.12	40.57	55.12	00.00	00.39	74.45	02.75	71.54	100.99	115.05	127.34	127.21	145.02
Performance Optimization Program	0.00	0.00	0.00	0.00	0.00	0.29	1.08	4.60	5.78	37.36	39.13	39.45	48.40	52.93	54.07	57.64	61.68	63.18	66.25	68.71	72.03	75.49	78.95	87.50	90.81	90.81	99.89
Emergency Preparedness Program Subtota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 4.60	0.00	0.00	0.00 39.13	0.00 39.45	0.00 48.40	0.00	0.00 54.07	0.00 57.64	0.00 61.68	0.00 63.18	0.00	0.00 68.71	0.00 72.03	0.00 75.49	0.00 78.95	0.00 87.50	0.00 90.81	0.00 90.81	0.00 99.89
DISCONTINUED/COMPLETED Industrial (Basic)	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
Retrofit/Demonstration GSL	0.00	0.00	0.00	0.31	0.38	1.59	4.30 2.30	4.30	4.30	4.34	4.34	4.34	4.34	4.34	4.34 3.79	4.34	4.34	4.34	4.34	4.34 3.79	4.34	4.34	4.34	4.34 3.79	4.34 3.79	4.34	4.77
High Efficiency Motors Efficient Motors (QMR)	0.00	0.00	0.00	0.00	1.33 0.00	1.81 0.00	0.00	3.03 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.79 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.17 0.00
Subtota		0.00	0.07	1.04	1.74	3.43	6.63	7.36	8.12	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.98
INDUSTRIAL TOTAL	0.00	0.00	0.07	1.04	1.74	3.72	7.71	11.96	13.90	45.52	47.29	47.61	56.56	61.09	62.23	65.80	69.84	71.34	74.41	76.87	80.19	83.65	87.11	95.66	98.97	98.97	108.86
EFFICIENCY PROGRAMS SUBTOTAL	0.29	0.52	3.27	8.62	15.24	22.56	30.26	36.85	40.63	77.14	81.35	83.36	94.90	102.19	108.38	119.39	133.75	147.96	164.39	183.85	208.72	229.55	248.89	277.74	299.97	296.43	333.97
CUSTOMER SELF-GENERATION PROGRAMS		-		_	_																						
BioEnergy Optimization Program	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.30	14.30	14.30	14.30	14.30	14.30	14.35	25.28	27.78	0.05	0.05
RATE/LOAD MANAGEMENT PROGRAMS	0.00	0.00	0.00	0.00	40.70	46.40	24.70	32.70	80.00	48.20	58.00	57.10	68.00	110.28	148.54	153.76	189.07	183.29	180.62	172.76	149.15	154.52	147.25	146.60	145.86	0.00	0.00
PROGRAM IMPACTS	0.29	0.52	2 77	8.67	55.94	68.96	54.96	69.55	120.63	125.34	139.35	140.46	162.90	212.47	256.91	272.15	227 1 2	345 55	359.31	270.00	272.17	398.36	410.48	449.61	473.61	296.48	334.03
		0.52	3.27	0.02	33.94	00.70	51.70	07.55	120.05	120.01	137.35		102.70	212.47	250.71	273.15	337.12	343.55	557.51	370.90	3/2.1/	370.30	410.48		175.01		
CODES, STANDARDS & REGULATIONS	0.00	0.00	0.00	0.48	1.60	3.33	5.43	8.41	13.60	20.40	28.00	35.18	42.93	52.01	56.15	61.78	66.95	72.42	78.60	85.12	91.99	99.46	114.57	131.56	145.33	145.33	165.57
Total Impact @ Meter Total Impact @ Generation	0.29	0.52	3.27 3.72	9.10 10.33	57.54 63.90	72.29 80.40	60.38 67.54	77.97 87.09	134.22 149.25	145.74 162.37	167.35 186.53	175.64 195.99	205.83 229.61	264.48 294.58	313.06 348.38	334.93 372.95	404.07 449.61	417.97 465.62	437.91 488.33	456.03 509.21	464.15 519.28	497.83 557.31	525.06 588.51	581.17 651.72	618.94 694.58	441.81 499.60	499.60
Note: May not add un due to rounding			-																								

2014 - 2017 Power Smart Plan Annual Capacity Savings (MW) (Savings to Date) (1989/90 - 2013/14)

 1 otal impact @ ueneration
 0.3.3
 0.59
 3.7

 Note: May not add up due to rounding.
 \* Includes savings for Downtown Office project based on planning assumptions

# TAB 2

100/11			343 110 W 34P				
Part 1 - P	UB/MH I-216b example	Example #1	Example #2	Exan	nple #3	Exa	mple #4
Utility		Existing	Add Supply	Add	DSM	Add	DSM
-		-	100 GW.h at \$0.10/kW.l	h 100 GW.h at	\$0.10/kW.h	100 GW.h a	it \$0.027/kW.h
row			new gen or lost exports				
1	Net Revenue Req (\$M)	\$70	\$70		\$70		\$70
2	added: gener. or lost exp.	0	\$10		0		0
3	added: DSM cost	0	0		\$10		\$2.7
4(1+2+3)	Total	\$70	\$80		\$80		\$72.7
5	Sales(GW.h)	1,000	1,000	1,0	000		1,000
6	added: growth	0	100		100		100
7	less: DSM	0	-		100	-	100
8(4+5+6)	Total	1,000	1,100		000		1,000
9 (4/8)	Average Rate (\$/kW.h)	\$0.0700	\$0.0727	\$0.0	800	\$C	0.0727
Customer	r			participating	non participating		non participating
				customer	customer	customer	customer
10	Usage (kW.h/yr)	10,000	10,000	9,000	10,000	9,000	10,000
12 (9*10)	Bill (\$/yr)	\$700.00	\$727.00	\$720.00	\$800.00	\$654.30	\$727.00

# PUB/MH I-216(b) example - DSM versus new supply (e.g. showerhead)

# PUB/MH I-216(b) example - DSM versus new supply (e.g. showerhead)

PUR/IM	H I-216(b) example -		new supply (	le.g. snower	nead)		
	IB/MH I-216b example	Example #1	Example #2		mple #3	Example	#4
Utility	•	Existing	Add Supply		DSM	Add DSM	
5		0	100 GW.h at \$0.10/kW.l	h 100 0	GW.h at \$0.10/kW.h	100 GW.h	at \$0.027/kW.h
row			new gen or lost exports				
1	Net Revenue Reg (\$M)	\$70	\$70		\$70		\$70
י ר	added: gener. or lost e		\$10		0		0
2	added: DSM cost				-	d	
3			0		\$10		<u>52.7</u>
4(1+2+3)	Total	\$70	\$80		\$80	\$7	2.7
5	Sales(GW.h)	1,000	1,000	1	1,000	1,0	000
6	added: growth	-	100		100	1	00
7	less: DSM	-	-	-	100	- 1	00
8(4+5+6)	Total	1,000	1,100	1	1,000		000
0(1+0+0)		1,000	1,100		1000	.,.	
9 (4/8)	Average Rate (\$/kW.h)	\$0.0700	\$0.0727	\$0	.0800	\$0.0	727
Customer				participating	non participating	participating	non participating
				customer	customer	customer	customer
10	Usage (kW.h/yr)	10,000	10,000	9,000	10,000	9,000	10,000
10		10,000	10,000	7,000	10,000	,,000	10,000
12 (9*10)	Bill (\$/yr)	\$700.00	\$727.00	\$720.00	\$800.00	\$654.30	\$727.00
Part 2 - DS	M Patios						
Fait 2 - DS	SWI Ratios						
13	Marginal Benefits	\$0.10/kW h cost of	new generation or lo	ost exports			
14	ASSUMED Non-Energy Benefits	\$0.03/kW.h water	0				
15	ASSUMED Program Costs	\$0.02/kW.h adverti	-				
16	ASSUMED Product Costs	\$0.09/kW.h purcha	0	Evar	mple #3	Example	#1
10	ASSUMED FIDUALL COStS	\$0.09/KW.11 putcha		LAdi	Tiple #5	Liample	<i>π</i> 4
17			Utility Admin Cost		\$0.02	\$0	).02
18			Incentives		\$0.08		007
19			Total Utility Cost (fr		\$0.10		027
19			Total Othing Cost (II		φ0.10	φ <b>0</b> .	027
20	Integratec TRC Varginal Benefits	+ Non Energy Benefi	t:	\$0.10+0.03	= 1.18	\$0.10+0.03	= 1.18
21	° <u> </u>	s + Product Costs	_	\$0.02+0.09		\$0.02+0.09	
22	Utility RIM Margin	nal Benefits		\$0.10	= 0.58	\$0.10	= 1.0
23	3	Admin Costs + Incen	tive Cost	\$0.0727+\$0.02+\$		\$0.0727+\$0.02+\$0.0	
	Metric			· · ·			
24	Customer Incentives Received +	Bill Savings + Non Er	nergy Benefits	\$0.08+\$0.0727+\$	<u>50.03</u> = <b>2.03</b>	\$0.007+\$0.0727+\$0.	03 <b>= 1.22</b>
25	Metric Proc	luct Costs		\$0.09		\$0.09	

	UB/MH I-216b example	Example #1	Example #2	Exam	ple #3	E>	kam
Utility		Existing	Add Supply	Add D	SM	Ac	dd D
			100 GW.h at \$0.10/kW.h	100 GV	V.h at \$0.10/kW.h	10	0 GV
row			new gen or lost exports				
1	Net Revenue Req (\$M)	\$70	\$70		\$70		
2	added: gener. or lost exp.	0	\$10		0		
3	added: DSM cost	0	0		\$10		
4(1+2+3)	Total	\$70	\$80		\$80		\$
5	Sales(GW.h)	1,000	1,000	1,0	000		1,
6	added: growth	-	100	·	100		
7	less: DSM	-	-		100	-	
8(4+5+6)	Total	1,000	1,100	1,0	000		1
9 (4/8)	Average Rate (\$/kW.h)	\$0.0700	\$0.0727	\$0.0	0800		\$0.
Customer	-			participating customer	non participating customer	participating customer	
10	Usage (kW.h/yr)	10,000	10,000	9,000	10,000	9,000	
12 (9*10)	Bill (\$/yr)	\$700.00	\$727.00	\$720.00	\$800.00	\$654.30	

# PUB/MH I-216(b) example - DSM versus new supply (e.g. showerhead)

## Part 2 - DSM Ratios

TRC = Tot	al Resource	Cost RIN	= Rate Impact Measure	LRC = Levelized Reso	urce Cost LU	C = Levelized Ut	lity Cost
30 31	Utility Ratepayer Metric	LUC <u>Adr</u>	nin Costs + Incentives Energy	\$0.02+\$0.08	= \$0.10/kW.h	\$0.02+\$0.007	= \$0.027
28 29				with Non Utility (\$0.03 offset)	Benefits included = \$0.08/kW.h	with Non Utility (\$0.03 offset)	Benefits incl = <b>\$0.08</b>
26 27	Integrated Metric		<u>ct Costs + Admin Costs</u> Energy	\$0.09+\$0.02	= \$0.11/kW.h	\$0.09+\$0.02	= \$0.11
Part 3 - DS	SM Unit Cost	S					
24 25	Customer Metric		l Savings + Non Energy Benefits duct Costs	\$0.08+\$0.0727- \$0.09	+\$0.03 = 2.03	<u>\$0.007+\$0.0727</u> \$0.09	(+\$0.03) = 1
23	Ratepayer Metric	Revenue Loss + /	Admin Costs + Incentive Cost	\$0.0727+\$0.02-	+\$0.08	\$0.0727+\$0.02+	-\$0.007
22	5		nal Benefits	\$0.10	= 0.58	\$0.10	= 1
20	Metric	Q	s + Product Costs	\$0.02+0.09	- 1.10	\$0.02+0.09	_
20	Integrated	TRC Marginal Benefits	+ Non Energy Benefits	\$0.10+0.03	= 1.18	\$0.10+0.03	= 1
19				ility Cost (from above)	\$0.10		\$0.027
17 18			Utility Ad Incentiv	dmin Cost es	\$0.02 \$0.08		\$0.02 \$0.007
	Assumed					Enc	•
15 16		Program Costs Product Costs	\$0.02/kW.h advertising \$0.09/kW.h purchase and in:	stallation Ex	ample #3	Fxa	mple #4
14		Non-Energy Benefits	\$0.03/kW.h water saving				
13		Marginal Benefits	\$0.10/kW.h cost of new gen	eration or lost exports			

mple #4 . DSM GW.h at \$0.027/kW.h

\$70 0 \$2.7 \$72.7 1,000 100

100

\$0.0727

non participating customer 10,000

\$727.00

= 1.18

= 1.0 \$0.007

-\$0.03 = **1.22** 

= \$0.11/kW.h

enefits included = \$0.08/kW.h

= \$0.027/kW.h



3

PREAMBLE: In evaluating Demand-Side Management programs, the Rate Impact
Measure test should not be a barrier to higher levels of Demand-Side Management
savings and should be applied only at the portfolio level, not the individual program
level. Order 43/13 Page 44

8

### 9 **QUESTION:**

10 Please more fully describe the framework used to assess DSM opportunities, including

11 economics, barriers and fairness of all ratepayers.

12

#### 13 **RESPONSE:**

- 14 The framework used by Manitoba Hydro to assess DSM opportunities is based on the following
- 15 underlying and key principles:
- All economic DSM opportunities should be pursued; and
- The optimal strategy in pursuing those economic DSM opportunities should consider :
- Each DSM opportunity individually to determine the appropriate strategy for
   implementation;
- 20 2) The benefits and synergies of taking a broader, long term and holistic
   21 perspective towards pursuing DSM opportunities;
- 3) The overall benefits and costs associated with DSM opportunities, irrespective of
  who benefits and pays;
- 24 4) The value proposition of pursuing DSM opportunities from a customer, utility25 and societal perspective;
- 26 5) The fairness of who pays for DSM initiatives given the benefits are not shared27 equally among all customers.

28



# Needs For and Alternatives To PUB/MH I-216b

The economics of a DSM opportunity are assessed as described in Section 4.2.2.2. of Manitoba Hydro's submission, including the metrics used by the Corporation. All metrics provide useful information in the DSM decision making process which considers whether a DSM opportunity should be pursued, and if so, the best strategy for pursuing the DSM opportunity.

5

Manitoba Hydro uses the Marginal Resource Cost (MRC) to assess the incremental benefits of 6 7 implementing a DSM measure relative to the incremental costs. If the benefits are greater than 8 the costs (i.e. MRC > 1), then the DSM opportunity should be pursued. The MRC metric 9 provides a simplistic perspective which only compares the incremental cost of implementing a 10 DSM measure to the marginal value associated with implementing the DSM measure. No 11 consideration is given to program administration costs or free ridership (ie. natural 12 conservation whereby some customers would implement the DSM opportunity without any 13 market intervention). Manitoba Hydro will consider all DSM opportunities having a MRC > 1. In addition, Manitoba Hydro generally supports DSM opportunities with MRC < 1 through 14 15 educational/awareness initiatives and supports emerging technologies, recognizing the costs of 16 these technologies may change over time.

17

In assessing alternative strategies for pursuing a DSM opportunity, Manitoba Hydro considers the economics from all perspectives, the barriers to participation and the fairness to all ratepayers. Manitoba Hydro designs programs by taking a balanced approach to achieving the objectives outlined above.

22

In assessing the merits of various approaches to supporting and promoting a DSM opportunity,
 Manitoba Hydro uses the various metrics discussed in s. 4.2.2.2 of the submission as guidelines
 in choosing a strategy which is most appropriate for each specific DSM opportunity. The
 analysis involves:

#### MANITOBA HYDRO 2015/16 GRA BOOK OF DOCUMENTS

- Understanding what barriers exist for each DSM opportunity, including product
   availability, upstream delivery constraints, customer awareness, customer benefits
   versus costs, customer financial constraints, and customer priorities;
- Assessing alternative utility strategies, including awareness efforts, customer incentives
   including varying levels, upstream incentives including varying levels, financing tools,
   program delivery options, duration of programming efforts, and varying programming
   efforts over time (e.g. potentially ramping up incentives over time to capture deeper
   energy savings within a targeted market or opportunity);
- 9 Assessing alternative utility strategies against the value proposition associated with
   DSM opportunities;
- Assessing the fairness of a utility's investment on behalf of non-participating customers;
   and
- Assessing the reasonableness of a utility's investment on behalf of all ratepayers.
- 14

Manitoba Hydro uses the DSM metrics as guidelines rather than rigid requirements due to the
varying dynamics associated with each DSM opportunity and with Manitoba Hydro's business
environment. Examples of varying dynamics which may influence Manitoba Hydro's DSM
decision making include:

Government incentives such as those offered through the Federal ecoENERGY Retrofit
 program. Manitoba Hydro temporarily modified its programs to take advantage of the
 window of opportunity to increase customer participation and capture additional
 energy savings;

Market acceptance factors which may accelerate expected adoption rates. In such
 cases, an optimized strategy to pursue the opportunity may be a deferred, a non incentive based program or potentially a non cost effective initiative (e.g. even without
 having an incentive-based program promoting residential LED lighting, Manitoba Hydro
 has observed the shelf space for LED lighting in Manitoba retail stores is comparable to
 other regions);

A Manitoba Hydro
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# Needs For and Alternatives To PUB/MH I-216b

Timing of incentives. An optimized strategy for pursuing some DSM retrofit
 opportunities may involve offering lower incentives initially and subsequently offering
 higher incentives and greater outreach to capture deeper energy savings within the
 particular DSM opportunity, recognizing that in the latter stages of the overall strategy,
 the DSM initiative may no longer be cost effective.

6 Electricity export market conditions. By way of example, this occurred during the post 7 2008 timeframe, when Manitoba Hydro's short-term electricity market was less 8 favourable, which impacted the aggressiveness and timing of pursuing certain DSM 9 opportunities. For example, customer self-generation based on short term economic 10 value was no longer economic. Further, for retrofit opportunities, alternative timing 11 options are available for capturing energy savings which may offer a more optimal DSM 12 approach, with the energy savings still captured by a targeted date even with a delayed launch date. The value of capturing targeted energy savings in the mid and longer term 13 14 is still important.

15

16 With respect to assessing the fairness of a utility's investment in DSM on behalf of non-17 participating customers and assessing the reasonableness of a utility's investment on behalf of 18 all ratepayers, Manitoba Hydro uses the various DSM metrics as guidelines in an overall effort 19 to balance its objective of pursuing all economic opportunities against the objectives of being 20 fiscally responsible and being mindful of the net impact on all customers. For example: 21 although the impact of a particular DSM strategy and overall investment might result in 22 Manitoba Hydro's aggregate customer bills being lower, the impact on specific customer 23 segments may be different with participating customers potentially having lower bills at the 24 expense of non-participating customers having higher bills. This is best illustrated by 25 considering a simple example associated with a generic utility confronted with a decision on to meet additional load, as follows: 26

27

<u>Theoretical Example</u>: A Utility has 1000 GWh of existing load, has 1000 GWh of existing
 generation and has an embedded cost of service equal to 7 cents/kWh. In the current
 situation:

- 4 the utility's aggregate customers' bills are <u>\$70 million</u>
- 5 A typical customer using 10,000 kWh per year has an annual bill of <u>\$700</u>.
- 6

Next year, the utility's load is expected to increase by 100 GWh. which is associated with
additional customers using the same average load as the existing customers (e.g. 10,000
kWh/year). The utility can either meet the new load requirements through adding additional
generation or through DSM initiatives. Under the alternative options available to the utility, the
impact to customer bills are as follows:

12

<u>Case A</u>: Utility adds 100 GWh of new generation at a levelized cost of 10 cents/kWh. which
 increases its embedded cost such that rates need to be increased to 7.27 cents/kWh. ((\$70
 million + (\$0.1/kWh x 100 GWh)) / 1,100 GWh). With this option:

• Total aggregate customer bills are <u>\$80 million</u>.

A typical customer using 10,000 kWh per year now has an annual bill of \$727 which
 reflects the higher cost associated with the new generation added to the utility's
 system.

20

<u>Case B</u>: Utility invests in DSM and reduces its load by 100 GWh or the equivalent amount expected coming from additional load growth. The investment by the utility in DSM is equivalent to the cost of new generation (10 cents/kWh) and the utility's rates are now increased to 8 cents/kWh (\$80 million revenue requirement divided by 1000 GWh of load). This reflects the difference between generation options and DSM options as there is no additional revenue associated with DSM while there is with adding new generation. As a result, rates have to increase by a greater amount under the DSM option when an equivalent dollar amount 1

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is invested in the DSM option. In this case, it is assumed the utility pays the entire cost of the DSM initiatives and participating customers do not contribute. For this example, it is assumed the participating customers in DSM experience a 10% reduction in load which in aggregate achieves the targeted 100 GWh. With this option: Total aggregate customer bills are \$80 million (i.e. the same as if the utility invested the equivalent amount in additional generation). Participating customers in DSM have typical annual bills associated with 9,000 kWh of \$720 (subject to rounding, equivalent to Case A where the utility used new generation to meet the additional load requirements). Non participating customers have typical annual bills associated with 10,000 kWh of <u>\$800</u> which is higher than what these customers would have experienced under Case A. Case C: Utility invests in DSM and reduces its load by 100 GWh; however in this case, the utility shares the cost of achieving the DSM energy savings with participating customers, with the utility investing a levelized 0.27 cents/kWh and the participating customers contributing the balance. Under this scenario, the utility needs to raise rates to 7.27 cents/kWh. In this case: Total aggregated customer bills are \$72.7 million. Participating customers in DSM have annual energy bills associated with their reduced load (9,000/kWh) of \$654 however these customers also were required to contribute to the investment in DSM. Non participating customers now have annual bills of \$727, which is the same as if the utility had invested in new generation. As demonstrated in the theoretical example, Case C attempts to balance the fairness issue by ensuring non participating customers in DSM are as well off under the option where a utility invests in DSM opportunities as opposed to new generation options. The example is provided

to illustrate the importance of considering the fairness issue and providing an understanding



- how benefits realized by participating customers can be at the expense of non participating
   customers.

3

- 4 Caution must be exercised in extrapolating the results associated with this theoretical example
- 5 into Manitoba Hydro's situation. As described in the response to CAC GAC/MH 1-018(b), costs
- 6 and potential rate impacts for Manitoba Hydro and its customers are more complicated than
- 7 presented in the theoretical example.