

November 2010

Capital Expenditure Forecast (CEF10)

2010/11 - 2019/20



Corporate Controller Division
Finance & Administration



Foreword

The *Capital Expenditure Forecast* (CEF10) is a projection of Manitoba Hydro's capital expenditures for new and replacement facilities to meet the electricity and natural gas service requirements in the Province of Manitoba as well as expenditures required to meet firm sale commitments outside the province. Expenditures included in the Capital Expenditure Forecast will provide for an ongoing safe and reliable supply of energy in the most efficient and environmentally sensitive manner.

The *Capital Expenditure Forecast* is comprised of a number of specifically identified large projects or "major items" as well as numerous unspecified smaller projects referred to as "domestic items." Major items are normally over \$2 million in total cost and the construction period on each major item usually extends beyond one year. Domestic items typically represent the ongoing and recurring capital requirements to meet electricity and natural gas service replacements and expansions throughout the province. All major and domestic capital projects are subjected to a rigorous review and approval process before being included in the *Capital Expenditure Forecast*.

In constructing and maintaining its capital facilities, Manitoba Hydro adheres to the principles of sustainable development. For example, the Corporation is committed to reduce emissions from its own facilities and to contribute towards global emission reductions through the export of renewable electricity. In 2009, Manitoba Hydro exceeded its revised voluntary commitment to keep gross annual greenhouse gas (GHG) emissions to 6% below its 1990 baseline. Manitoba Hydro also has a separate contractual commitment under its participation in the Chicago Climate Exchange (CCX). Participation has entailed a commitment to progressively reduce its generation related emissions from Manitoba Hydro's historic baseline. Manitoba Hydro's emissions have been lower than its target in every year of participation.

Manitoba Hydro has one of the most aggressive Demand Side Management (DSM) programs in North America. The target to be achieved by 2025 is for electrical savings of 918 MW and 3,408 GWh, and natural gas savings of 149 million cubic meters. In total, Manitoba Hydro's DSM programs are expected to result in greenhouse gas emission reductions of nearly 2.6 million tonnes annually by 2025.

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Section 1

Overview

Capital Expenditure Forecast Summary
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1.0 Overview

Capital Expenditure Forecast Summary

This Consolidated Capital Expenditure Forecast (CEF10) totals \$16 931 million for the ten year period to 2019/20. Expenditures for Major New Generation & Transmission total \$12 354 million, with the balance of \$4 577 million comprised of expenditures for infrastructure renewal, system safety and security, new and increasing load requirements, and ongoing efficiency improvements.

Comparison to CEF09

The Capital Expenditure Forecast (CEF10) for the ten year period ending 2019/20 totals \$16 931 million compared to \$15 376 million for the same ten year period included in last year's Capital Expenditure Forecast (CEF09).

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10 Year Total
CEF09	1 085	1 036	1 024	1 486	1 765	2 156	2 165	1 716	1 651	1 291	15 376
Incr (Decr)	37	33	108	(17)	(166)	(216)	(321)	514	660	923	1 555
CEF10	1 122	1 069	1 133	1 469	1 599	1 940	1 845	2 231	2 311	2 214	16 931

The increase of \$1 555 million in capital expenditures over the ten year forecast period is comprised of the following:

	Total Projected Cost	Total Project Increase / (Decrease)	10 Year Increase (Decrease)
	(\$ Millions)		
Keeyask Generating Station	\$ 5 637	\$ 1 045	\$ 924
Conawapa Generating Station	7 771	1 446	(399)
Kelsey Improvements & Upgrades	302	112	111
Pointe du Bois Spillway Replacement	398	80	83
Kettle Improvements & Upgrades	166	90	70
Wuskwatim Generating Station	1 275	-	55
Pointe du Bois Safety Upgrades	50	50	50
System Refurbishment and Other Projects	NA	NA	328
Reduction to Target Adjustment	NA	NA	333
			\$ 1 555

Manitoba Hydro
Consolidated Capital Expenditure Forecast (CEF10)
For the Years 2010/11 – 2019/20

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CAPITAL EXPENDITURE FORECAST (CEF10)
(in millions of dollars)

	Total Project Cost	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10 Year Total
ELECTRIC												
Major New Generation & Transmission												
Wuskwatim - Generation	1 274.6	300.8	130.3	16.2	-	-	-	-	-	-	-	447.2
Wuskwatim - Transmission	291.2	35.7	21.2	-	-	-	-	-	-	-	-	56.9
Herblet Lake - The Pas 230 kV Transmission	74.9	22.2	6.0	-	-	-	-	-	-	-	-	28.3
Keevaak - Generation	5 036.9	71.2	152.5	179.2	312.3	379.5	683.0	749.1	1 080.5	816.6	640.1	5 064.0
Conawapa - Generation	7 770.8	42.4	104.4	105.2	83.3	166.4	288.6	333.4	325.1	623.4	1 038.0	3 110.1
Kelsey Improvements & Upgrades	301.7	42.7	34.7	28.5	12.5	-	-	-	-	-	-	118.6
Kettle Improvements & Upgrades	165.7	17.5	18.7	21.6	22.2	15.4	7.3	7.5	7.6	7.7	7.9	133.6
Pointe du Bois Spillway Replacement	398.2	18.6	24.4	92.7	103.6	89.2	31.5	0.5	-	-	-	360.5
Pointe du Bois - Transmission	86.0	20.5	15.6	25.0	13.1	3.1	-	-	-	-	-	77.3
Bipole III - Licensing & Properties	123.5	9.1	18.9	9.6	9.3	9.8	11.1	5.9	11.2	0.2	-	85.1
Bipole III - Transmission Line	958.4	2.8	5.4	38.2	87.9	181.9	313.1	133.0	192.2	-	-	954.6
Keewatinnow Converter Station	486.3	6.3	11.8	60.5	78.3	56.0	81.1	43.5	8.2	118.8	-	464.6
Keewatinnow AC Collector System	80.9	1.9	7.4	32.5	35.2	0.9	1.3	0.7	0.9	-	-	80.8
Riel Converter Station	618.7	36.7	31.7	58.7	135.1	128.1	14.4	5.0	1.7	196.2	-	607.7
Riel 230/500 kV Station	267.6	70.2	66.8	29.4	28.9	41.3	-	-	-	-	-	236.5
Ontario 100 MW Firm Import Upgrades	4.8	-	0.6	2.2	1.9	-	-	-	-	-	-	4.8
Dorsey - US Border New 500 kV Transmission Line	204.8	-	0.1	0.9	1.9	2.4	11.7	64.5	93.5	28.9	-	204.0
St. Joseph Wind Transmission	6.5	5.5	-	-	-	-	-	-	-	-	-	5.6
Demand Side Management	NA	36.9	38.0	39.1	38.6	36.2	29.5	25.0	23.0	21.9	20.4	308.6
Waterways Management Program	NA	5.5	-	-	-	-	-	-	-	-	-	5.5
	746.6	688.6	739.7	964.3	1 110.2	1 472.7	1 368.0	1 743.9	1 813.8	1 706.4	-	12 354.1

CAPITAL EXPENDITURE FORECAST (CEF10)
(in millions of dollars)

	Total Project Cost	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10 Year Total
Power Supply												
HVDC Converter Transformer Bushing Replacement	5.9	0.4	0.7	1.1	-	-	-	-	-	-	-	2.2
HVDC Auxiliary Power Supply Upgrades	5.3	0.9	0.2	-	-	-	-	-	-	-	-	1.2
Dorsey Synchronous Condenser Refurbishment	32.3	2.5	4.5	4.4	1.1	-	-	-	-	-	-	12.5
HVDC System Transformer & Reactor Fire Protection & Prevention	10.4	1.0	0.6	0.2	-	-	-	-	-	-	-	1.8
HVDC AC Filter PCB Capacitor Replacement	29.8	1.2	-	-	-	-	-	-	-	-	-	1.2
HVDC Transformer Replacement Program	105.7	0.3	1.1	4.9	8.1	-	-	-	-	-	-	14.5
Dorsey 230 kV Relay Building Upgrade	82.2	4.4	3.7	3.4	17.5	35.4	12.3	3.2	-	-	-	79.8
HVDC Stations Ground Grid Refurbishment	4.3	0.5	0.4	0.4	0.4	0.3	0.1	-	-	-	-	2.2
HVDC Circuit Breaker Operating Mechanism Replacement	15.9	1.9	2.7	1.1	0.4	0.1	0.1	0.1	0.1	0.1	-	6.6
HVDC Bipole 1 Pole Differential Protection	3.3	-	-	1.1	2.2	-	-	-	-	-	-	3.3
HVDC Bipole 1 By-Pass Vacuum Switch Removal	20.4	0.5	2.5	3.9	11.0	2.1	-	-	-	-	-	19.9
HVDC Bipole 2 Refrigerant Condenser Replacement	11.0	-	-	2.9	2.4	5.7	-	-	-	-	-	11.0
HVDC Bipole 1 & 2 Smoothing Reactor Replacement	39.3	14.3	12.8	1.9	9.2	-	-	-	-	-	-	38.2
HVDC Bipole 1 P1 & P2 Battery Bank Separation	3.2	-	0.9	2.2	-	-	-	-	-	-	-	3.2
HVDC Bipole 1 DCCT Transductor Replacement	11.7	-	0.5	1.6	1.1	3.0	3.1	2.3	-	-	-	11.7
HVDC Bipole 1 & 2 DC Converter Transformer Bushing Replacements	8.7	-	0.6	1.0	1.7	5.4	-	-	-	-	-	8.7
HVDC Bipole 2 Valve Hall Wall Bushing Replacements	19.2	0.5	0.1	0.2	3.4	4.4	4.1	4.8	1.4	-	-	18.9
HVDC Bipole 1 CQ Disconnect Replacement	5.2	-	0.3	0.9	1.5	1.1	1.1	0.3	-	-	-	5.2
HVDC Bipole 2 Refurbish Thyristor Module Cooling Components	4.7	1.4	1.3	-	-	-	-	-	-	-	-	2.7
HVDC Transformer Marshalling Kiosk Replacement	6.8	0.6	1.8	2.0	1.2	0.7	-	-	-	-	-	6.3
HVDC Gapped Arrestor Replacement	16.3	0.1	3.8	3.4	4.0	3.5	1.3	0.2	-	-	-	16.3
Pine Falls Rehabilitation	56.2	2.5	5.8	15.8	1.2	4.6	6.8	9.0	-	-	-	45.8
Jenpeg Unit Overhaul	128.1	-	-	-	-	-	2.3	2.5	18.5	24.3	24.9	72.5
Power Supply Dam Safety Upgrades	34.0	4.3	-	-	-	-	-	-	-	-	-	4.3
Winnipeg River Riverbank Protection Program	19.7	1.2	1.2	1.3	1.3	1.3	1.3	1.4	-	-	-	9.1
Power Supply Hydraulic Controls	20.5	3.7	1.5	0.5	1.3	-	-	-	2.1	2.6	0.9	12.6
Slave Falls Rehabilitation	223.0	19.8	7.3	1.7	3.7	32.4	40.8	45.6	38.8	9.2	-	199.4
Great Falls Unit 4 Overhaul	19.7	4.5	9.5	-	-	-	-	-	-	-	-	14.0
Great Falls Unit 5 Discharge Ring Replacement and Major Overhaul	24.8	-	-	-	-	2.3	17.5	5.0	-	-	-	24.8
Generation South Transformer Refurbish & Spares	29.8	0.4	4.8	11.3	12.1	0.5	0.3	0.3	-	-	-	29.7
Water Licenses & Renewals	40.8	5.3	6.0	6.2	6.8	6.6	0.7	-	-	-	-	31.5
Generation South PCB Regulation Compliance	4.7	0.6	0.5	0.4	0.4	0.2	2.4	-	-	-	-	4.5
Kettle Transformer Replacement Program	35.6	8.7	7.0	7.2	8.0	3.9	-	-	-	-	-	34.8
Generation South Breaker Replacement Program	11.1	2.5	3.0	1.4	3.4	-	-	-	-	-	-	10.3
Seven Sisters Upgrades	9.5	2.8	2.0	1.5	1.2	-	-	-	-	-	-	7.6
Generation South Excitation Program	18.3	0.1	0.3	2.1	2.4	0.6	1.5	2.9	1.7	6.8	-	18.3
Brandon Unit 5 License Review	18.7	0.2	0.1	1.6	2.7	9.2	-	-	-	-	-	13.8
Selkirk Enhancements	14.2	1.5	0.4	-	-	-	-	-	-	-	-	1.9
Laurie River/CRD Communications & Annunciation Upgrades	4.8	0.9	3.1	0.7	-	-	-	-	-	-	-	4.6
Notigi Marine Vessel Replacement & Infrastructure Improvements	4.6	0.9	3.0	0.6	-	-	-	-	-	-	-	4.5
Pointe du Bois Safety Upgrades	50.0	0.5	1.6	5.5	11.2	16.0	11.7	3.5	-	-	-	50.0
Fire Protection Projects - HVDC	5.2	0.6	0.4	0.3	1.2	1.0	-	-	-	-	-	3.5
Halon Replacement Project	36.4	4.6	5.5	6.8	2.7	-	-	-	-	-	-	19.7

CAPITAL EXPENDITURE FORECAST (CEF10)
(in millions of dollars)

	Total Project Cost	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10 Year Total
Power Supply - continued												
Oil Containment - Power Supply	19.1	0.5	0.6	0.5	0.7	0.4	0.5	0.5	-	-	-	3.8
Grand Rapids Townsite House Renovations	5.2	0.4	0.9	1.3	1.6	1.0	-	-	-	-	-	5.2
Grand Rapids Fish Hatchery	2.2	1.1	1.1	-	-	-	-	-	-	-	-	2.2
Generation Townsite Infrastructure	52.1	6.1	8.0	1.8	-	-	-	-	-	-	-	15.8
Site Remediation of Contaminated Corporate Facilities	34.7	1.0	1.7	1.0	1.6	-	-	-	-	-	-	5.3
High Voltage Test Facility	26.9	11.9	5.6	-	-	-	-	-	-	-	-	17.5
Security Installations / Upgrades	43.2	8.6	11.4	8.3	3.2	1.3	1.1	0.7	-	-	-	34.5
Sewer & Domestic Water System Install and Upgrade	26.9	7.1	4.9	3.2	(0.1)	-	-	-	-	-	-	15.0
Power Supply Domestic	NA	19.3	19.7	20.1	20.5	20.9	21.4	21.8	22.2	22.7	23.1	211.8
		152.1	155.6	137.6	152.2	163.9	130.5	104.1	84.8	65.6	48.9	1 195.3
Transmission												
Winnipeg - Brandon Transmission System Improvements	40.0	1.4	2.0	2.5	15.0	15.0	-	-	-	-	-	35.8
Transcona East 230 - 66 kV Station	33.1	10.4	17.7	3.6	-	-	-	-	-	-	-	31.7
Neepawa 230 - 66 kV Station	30.0	5.3	12.0	5.1	5.7	0.7	-	-	-	-	-	28.8
Pine Falls - Bloodvein 115 kV Transmission	33.1	0.3	0.9	4.4	20.7	6.8	-	-	-	-	-	33.1
Transmission Line Re-Rating	24.1	1.1	1.3	-	-	-	-	-	-	-	-	2.3
St Vital-Steinbach 230 kV Transmission	32.2	-	-	-	-	-	0.9	0.9	2.6	6.1	9.8	20.3
Rosser Station 230 - 115 kV Bank 3 Replacement	7.4	0.6	-	-	-	-	-	-	-	-	-	0.6
Rosser - Inkster 115 kV Transmission	5.1	2.6	-	-	-	-	-	-	-	-	-	2.6
Transcona Station 66 kV Breaker Replacement	6.0	-	0.4	2.9	1.5	1.1	-	-	-	-	-	6.0
Dorsey 500 kV R502 Breaker Replacement	2.6	0.3	-	-	-	-	-	-	-	-	-	0.3
13.2kV Shunt Reactor Replacements	33.0	-	4.0	4.1	4.2	4.3	4.4	4.5	4.6	2.9	-	33.0
Canexus Load Addition	(0.2)	(0.8)	2.0	-	-	-	-	-	-	-	-	1.3
Birtle South-Rosburn 66 kV Line	4.9	-	-	-	0.1	0.3	4.5	-	-	-	-	4.9
Stanley Station 230-66 kV Permanent Transformer Addition	21.1	-	-	1.7	8.1	7.5	3.8	-	-	-	-	21.1
Stanley Station 230-66 kV Hot Standby Installation	6.2	1.3	-	-	-	-	-	-	-	-	-	1.3
Enbridge Pipelines - Clipper Project Load Addition Phase 1	0.9	5.2	0.3	-	-	-	-	-	-	-	-	5.5
TCPL Keystone Project	8.0	2.3	1.9	1.6	-	-	-	-	-	-	-	5.8
Ashern Station Bank Addition	10.6	0.1	0.4	3.5	5.6	1.0	-	-	-	-	-	10.6
Ashern 230 kV Station Reactor Replacement	2.7	-	-	2.7	-	-	-	-	-	-	-	2.7
Tadoule Lake DGS Tank Farm Upgrade	1.1	5.1	(4.3)	-	-	-	-	-	-	-	-	0.7
Interlake Digital Microwave Replacement	19.7	0.7	-	-	-	-	-	-	-	-	-	0.7
PilotWire Replacement	8.3	0.5	-	-	-	-	-	-	-	-	-	0.5
Transmission Line Protection & Teleprotection Replacement	21.1	0.8	2.7	3.8	4.3	3.4	2.6	0.1	-	-	-	17.7
Winnipeg Central Protection Wireline Replacement	10.5	1.5	0.4	-	-	-	-	-	-	-	-	1.9
Mobile Radio System Modernization	30.7	0.4	2.5	6.1	2.9	11.7	7.1	-	-	-	-	30.6
Cyber Security Systems	10.1	1.3	-	-	-	-	-	-	-	-	-	1.3
Site Remediation of Diesel Generating Stations	13.3	3.8	1.9	0.3	-	-	-	-	-	-	-	6.0
Oil Containment - Transmission	7.4	0.8	0.2	-	-	-	-	-	-	-	-	1.1
Station Battery Bank Capacity & System Reliability Increase	46.5	5.0	5.7	4.8	5.8	4.5	4.4	-	-	-	-	30.2
Waverley Service Centre Oil Tank Farm Replacement	3.0	1.1	0.5	0.4	0.7	-	-	-	-	-	-	2.7
Transmission Domestic	NA	30.0	30.6	31.2	31.8	32.4	33.1	33.7	34.4	35.1	35.8	328.1
		81.0	83.1	78.7	106.5	88.6	60.7	39.3	41.6	44.1	45.6	669.1

CAPITAL EXPENDITURE FORECAST (CEF10)
(in millions of dollars)

	Total Project Cost	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10 Year Total
Customer Service & Distribution												
Winnipeg Distribution Infrastructure Requirements	24.5	2.2	2.3	2.3	2.3	-	-	-	-	-	-	9.1
Defective RINJ Cable Replacements	8.7	1.0	2.1	-	-	-	-	-	-	-	-	3.1
Rover 4 kV Station Salvage & Feeder Conversion	12.7	0.1	3.1	4.3	-	-	-	-	-	-	-	7.5
Martin New 66-4 kV Station	28.2	1.0	5.1	6.9	9.0	1.8	-	-	-	-	-	23.7
Frobisher Station Upgrade	14.4	1.6	-	-	-	-	-	-	-	-	-	1.6
Burrows New 66-12 kV Station	28.6	4.2	12.2	6.4	-	-	-	-	-	-	-	22.8
Winnipeg Central Oil Switch Project	7.1	0.2	-	-	-	-	-	-	-	-	-	0.2
Teulon East 66-12 kV Station	4.6	4.5	0.1	-	-	-	-	-	-	-	-	4.6
William New 66-12 kV Station	10.3	0.3	0.4	9.3	-	-	-	-	-	-	-	10.0
Waverley West Sub Division Supply	6.5	3.0	-	-	-	-	-	-	-	-	-	3.0
St. James New Station & 24 kV Conversion	65.9	0.1	2.6	5.9	6.8	10.4	21.2	18.8	-	-	-	65.8
Shoal Lake New DSC & Town Conversion	3.6	0.2	-	-	-	-	-	-	-	-	-	0.2
York Station Bank & Switchgear Addition	4.0	2.7	-	-	-	-	-	-	-	-	-	2.7
Cromer North Station & Reston RE12-4 25 kV Conversion	4.3	0.3	1.3	-	-	-	-	-	-	-	-	1.6
Brandon Crocus Plains 115 - 25 kV Bank Addition	6.3	-	-	6.2	-	-	-	-	-	-	-	6.2
Neepawa North Feeder NN12-2 & Line 57 Rebuild	1.9	1.9	-	-	-	-	-	-	-	-	-	1.9
Line 27 66 kV Extension and Arborg North DSC	6.0	0.4	5.4	-	-	-	-	-	-	-	-	5.7
Health Sciences Centre Service Consolidation & Distribution Upgrade	15.8	3.6	3.6	3.1	2.2	3.2	0.1	-	-	-	-	15.8
AECL Switchgear Replacement	2.4	1.1	1.1	-	-	-	-	-	-	-	-	2.1
Waverley South DSC Installation	3.9	3.8	-	-	-	-	-	-	-	-	-	3.8
Niverville Station 66-12 kV Bank Replacements	2.6	0.6	-	-	-	-	-	-	-	-	-	0.6
Customer Service & Distribution Domestic	NA	117.5	119.9	122.3	124.7	127.2	129.8	132.4	135.0	137.7	140.5	1 286.9
		150.2	159.0	166.8	145.1	142.5	151.1	151.2	135.0	137.7	140.5	1 479.0
Customer Care & Marketing												
Advanced Metering Infrastructure	30.9	-	4.0	5.3	5.4	5.6	4.3	4.2	-	-	-	28.8
Customer Care & Marketing Domestic	NA	2.6	2.6	2.7	2.7	2.8	2.8	2.9	2.9	3.0	3.1	28.1
		2.6	6.6	8.0	8.1	8.4	7.2	7.1	2.9	3.0	3.1	56.9

CAPITAL EXPENDITURE FORECAST (CEF10)
(in millions of dollars)

	Total Project Cost	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10 Year Total
Finance & Administration												
Corporate Buildings Program	NA	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	80.0
Workforce Management	11.3	0.8	-	-	-	-	-	-	-	-	-	0.8
Fleet Acquisitions	NA	13.5	13.8	14.1	14.3	14.6	14.9	15.2	15.5	15.8	16.2	148.0
Finance & Administration Domestic	NA	24.4	24.9	25.4	25.9	26.4	27.0	27.5	28.1	28.6	29.2	267.5
		46.7	46.7	47.5	48.3	49.1	49.9	50.7	51.6	52.5	53.3	496.2
Capital Increase Provision		-	-	-	-	-	31.1	87.9	133.7	155.4	177.2	585.2
ELECTRIC CAPITAL SUBTOTAL		1 179.3	1 139.6	1 178.2	1 424.5	1 562.7	1 903.0	1 808.2	2 193.5	2 272.1	2 174.9	16 836.0
GAS												
Customer Service & Distribution												
Ile Des Chenes NG Transmission Network Upgrade	1.2	0.8	0.4	-	-	-	-	-	-	-	-	1.2
Centerport NPS 16 Natural Gas Transmission Main	1.7	1.7	-	-	-	-	-	-	-	-	-	1.7
Gas SCADA Replacement	4.6	1.8	2.6	-	-	-	-	-	-	-	-	4.4
Customer Service & Distribution Domestic	NA	21.2	21.7	22.1	22.5	23.0	23.4	23.9	24.4	24.9	25.4	232.5
		25.6	24.6	22.1	22.5	23.0	23.4	23.9	24.4	24.9	25.4	239.8
Customer Care & Marketing												
Advanced Metering Infrastructure	15.0	-	1.0	5.4	8.4	-	-	-	-	-	-	14.7
Demand Side Management	NA	11.2	12.0	12.4	10.4	10.4	10.0	9.4	7.2	5.6	5.1	93.7
Customer Care & Marketing Domestic	NA	2.8	2.9	2.9	3.0	3.0	3.1	3.2	3.2	3.3	3.4	30.7
		14.0	15.9	20.7	21.8	13.4	13.1	12.5	10.5	8.9	8.5	139.2
Capital Increase Provision		-	-	-	-	-	-	-	2.3	4.9	5.0	12.1
GAS CAPITAL SUBTOTAL		39.6	40.5	42.8	44.3	36.4	36.6	36.4	37.1	38.7	38.8	391.1
CONSOLIDATED CAPITAL												
Target Adjustment		1 218.9	1 180.1	1 220.9	1 468.8	1 599.1	1 939.6	1 844.7	2 230.6	2 310.7	2 213.7	17 227.1
		(97.0)	(111.0)	(88.0)	-	-	-	-	-	-	-	(296.0)
CEF10 TOTAL		1 121.9	1 069.1	1 132.9	1 468.8	1 599.1	1 939.6	1 844.7	2 230.6	2 310.7	2 213.7	16 931.1



Section 2

Project Summaries

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ELECTRIC OPERATIONS:

MAJOR NEW GENERATION & TRANSMISSION:

Wuskwatim - Generation

Description:

Design and build the new Wuskwatim generating station with three generators and installed capacity of approximately 200 MW on the Burntwood River upstream of Thompson.

Justification:

This project increases generation for both export power purposes and domestic load requirements.

In-Service Date:

First power September 2011.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 1 274.6	\$ 275.3	\$ 105.1	\$ 12.1	\$ -	\$ -	\$ -
Increase (Decrease)	-	25.5	25.2	4.1	-	-	-
Revised Forecast	\$ 1 274.6	\$ 300.8	\$ 130.3	\$ 16.2	\$ -	\$ -	\$ -

Wuskwatim - Transmission

Description:

Perform environmental assessments and route selection, design and construct transmission and terminal facilities necessary to integrate the Wuskwatim generating station into the Manitoba Hydro 230 kV transmission network as follows: *Transmission*: 230 kV lines from Wuskwatim switching station to Thompson Birchtree station, from Wuskwatim switching station to Herblet Lake station, and from Wuskwatim generating station to Wuskwatim switching station. *Terminations*: New 230 kV stations at Thompson Birchtree and Wuskwatim, new 230 kV 150 MVA static var compensator at Thompson Birchtree station, terminate lines into Herblet Lake and replace protection at Kelsey and Thompson Mystery Lake Road stations. *Communications*: system additions for protection of the new transmission lines and stations, including optical power ground wire on the Wuskwatim to Birchtree transmission line.

Justification:

The existing 230 kV transmission system in northern Manitoba does not have sufficient capacity to accommodate the additional output of the Wuskwatim generating station. This project will increase the ability of the transmission system to carry the full output of Wuskwatim to load anywhere in Manitoba.

In-Service Date:

September 2011.

Revision:

Estimate decreased to reflect lower costs for the engineering & procurement contract resulting from fewer options and change orders being exercised, along with lower contingency costs for transmission line construction.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 316.3	\$ 30.5	\$ 18.9	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	(25.1)	5.2	2.3	-	-	-	-
Revised Forecast	\$ 291.2	\$ 35.7	\$ 21.2	\$ -	\$ -	\$ -	\$ -

Herblet Lake - The Pas 230 kV Transmission

Description:

Perform environmental assessments and route selection, design and construct transmission and terminal facilities to provide firm supply to Flin Flon Cliff Lake and The Pas Ralls Island as follows: *Transmission*: 230 kV line 160 km from Herblet Lake to The Pas Ralls Island. *Terminations*: Extend 230 kV facilities at Herblet Lake and The Pas Ralls Island stations. *Communications*: Upgrade and co-ordinate with existing Herblet Lake and The Pas facilities.

Justification:

The line is required to provide firm supply and voltage support for increasing Flin Flon and The Pas area loads. In addition, this line facilitates the transmission of power from the Wuskwatim generating station.

In-Service Date:

September 2011.

Revision:

Project budget decreased due to favourable contract bids for clearing the right-of-way and construction of transmission line H75P.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 93.2	\$ 30.4	\$ 7.2	\$ 1.9	\$ -	\$ -	\$ -
Increase (Decrease)	(18.3)	(8.2)	(1.2)	(1.9)	-	-	-
Revised Forecast	\$ 74.9	\$ 22.2	\$ 6.0	\$ -	\$ -	\$ -	\$ -

Keeyask - Generation

Description:

Design and build the Keeyask generating station with seven generators and nominal capacity of 695 MW on the Nelson River downstream of the Kelsey generating station. Project costs include activities necessary to obtain approval and community support to proceed with the construction of the future generating station. The estimate is comprised of costs associated with extensive First Nations and other community consultations, pre-project training, joint venture business developments, environmental studies, impact statement preparations, submissions, regulatory review processes, detailed pre-engineering requirements, acquiring all necessary licensing, the design and construction of associated transmission facilities, and improvements to access roadways.

Justification:

This project increases generation for export power purposes and ultimately domestic load requirements.

In-Service Date:

First power November 2019.

Revision:

Estimate updated to reflect current market conditions, and in-service date deferred 11 months from December 2018.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4 591.6	\$ 85.0	\$ 195.3	\$ 198.6	\$ 182.3	\$ 485.5	\$ 2 993.5
Increase (Decrease)	1 045.3	(13.8)	(42.8)	(19.4)	130.0	(106.0)	975.7
Revised Forecast	\$ 5 636.9	\$ 71.2	\$ 152.5	\$ 179.2	\$ 312.3	\$ 379.5	\$ 3 969.2

Conawapa - Generation

Description:

Design and build the Conawapa generating station with ten generators and nominal capacity of 1 485 MW on the Nelson River downstream of the Limestone generating station. Project costs include activities associated with extensive First Nations and other community consultations, pre-project training, environmental studies, impact statement preparations, submissions, regulatory review processes, acquiring all necessary licensing, improvements to access roadways, and detailed pre-engineering required to obtain a license and all necessary approvals to construct the Conawapa generating station.

Justification:

This project increases generation for both export power purposes and domestic load requirements.

In-Service Date:

First power May 2023.

Revision:

Estimate updated to reflect current market conditions, and first power in-service deferred one year from May 2022.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 6 324.8	\$ 60.4	\$ 75.0	\$ 111.8	\$ 190.1	\$ 231.5	\$ 2 839.9
Increase (Decrease)	1 446.0	(18.0)	29.4	(6.6)	(106.8)	(65.1)	(231.4)
Revised Forecast	\$ 7 770.8	\$ 42.4	\$ 104.4	\$ 105.2	\$ 83.3	\$ 166.4	\$ 2 608.5

Kelsey Improvements & Upgrades

Description:

Overhaul and uprate all seven Kelsey generating station units including the replacement of turbine runners, bottom rings, discharge rings or weld overlays, transformers, generator windings and exciters. Perform model testing to refine runner design, perform extensive intake gate rehabilitation, perform draft tube modifications, perform an 8 000 hour inspection, and upgrade rail spur and overhead crane. Upgrade transmission facilities necessary to integrate the additional Kelsey generation into the Manitoba Hydro system network.

Justification:

Rerunning presents the best economic solution for increasing efficiency at the Kelsey generating station and for adding system capacity without flooding or requiring a new water power license. Overhauling the units will improve the unit output by up to 11 MW per unit. The transmission upgrade of a portion of the Kelsey 138 and 230 kV buses and the revisions to the Northern AC Cross Trip scheme are required to accommodate the 77 MW of additional Kelsey output.

In-Service Date:

November 2013.

Revision:

Reflects scope changes which include extensive rehabilitation of all intake gates and modifications to all draft tubes, an 8 000 hour inspection and increased costs associated with construction camp expansion, sewer and water improvements and supply contracts. In-service date deferred 20 months from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 189.6	\$ 6.8	\$ 0.5	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	112.1	35.9	34.2	28.5	12.5	-	-
Revised Forecast	\$ 301.7	\$ 42.7	\$ 34.7	\$ 28.5	\$ 12.5	\$ -	\$ -

Kettle Improvements & Upgrades

Description:

Rewind stator for units 5-12 and install a new stator frame, core and winding for units 1-4. Perform rotor refurbishment, excitation upgrade replacements, control and protection system replacements, mechanical systems replacements, and intake gate and wicket gate work for units 1-4.

Justification:

The stator windings at Kettle are polyester bonded mica which is prone to internal degradation as a result of thermal and electrical stresses. There has been a much higher failure rate for stator coils at Kettle than in any of our other generators installed since 1960. Analysis of the internal conditions of the insulation system is ongoing. Re-wedging units at Kettle is an opportunity to repair isolated cases of severe slot discharge, necessary to avoid deterioration. Unit 4 requires repairs due to an incident that occurred in August 2006, where a top clamping finger on the unit broke off and fell into the air gap causing extensive damage to the windings and core.

In-Service Date:

October 2022.

Revision:

Project scope changed to include stator replacements for units 1-3, along with outage related opportunity work for units 1-4; including rotor refurbishment, excitation upgrade replacements, control and protection system replacements, mechanical systems replacements, and intake gate and wicket gate work.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 75.6	\$ 18.4	\$ 6.6	\$ 20.1	\$ 18.6	\$ -	\$ -
Increase (Decrease)	90.1	(0.9)	12.1	1.5	3.6	15.4	38.0
Revised Forecast	\$ 165.7	\$ 17.5	\$ 18.7	\$ 21.6	\$ 22.2	\$ 15.4	\$ 38.0

Pointe du Bois Spillway Replacement

Description:

Design and build a new spillway and new concrete and earth fill dams to replace the existing spillway structures. Includes engineering and environmental studies, community consultation, obtaining regulatory approval, and de-commissioning the existing spillway.

Justification:

Pointe du Bois does not currently meet dam safety guidelines with respect to spillway capacity. A new spillway is required to meet these guidelines.

In-Service Date:

November 2014.

Revision:

Project estimate increased to reflect updated design work and current market conditions. In-service date deferred one month from October 2014.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 318.0	\$ 14.8	\$ 15.5	\$ 53.0	\$ 83.1	\$ 110.7	\$ -
Increase (Decrease)	80.2	3.8	8.9	39.7	20.5	(21.5)	32.0
Revised Forecast	\$ 398.2	\$ 18.6	\$ 24.4	\$ 92.7	\$ 103.6	\$ 89.2	\$ 32.0

Pointe du Bois - Transmission

Description:

Redevelop Stafford Terminal station (formerly Scotland station), replace Bank 7 at Pointe du Bois switchyard station, salvage 66 kV P lines between Pointe du Bois and Rover station, install a 115 kV transmission line between Rover and GT1 just east of Winnipeg Floodway, a 115 kV transmission line between GT1 just south of Lac Du Bonnet and Pointe du Bois, and install equipment at Rover station.

Justification:

The 66 kV lines P1, P2, P3, and P4 between Pointe du Bois and Rover stations have exceeded their expected serviceable life and pose threats to public and employee safety. The reliability of the transmission system in the Winnipeg Central area has been degraded due to the poor physical condition of these lines. In order to successfully operate the power system and continuously deliver high quality power to our customers and protect the public, the P Lines should be removed. The rebuild of Stafford station is required to address due diligence concerns, including Manitoba Hydro grounding and switching standards and public safety, and to increase Winnipeg Central capacity. This work involves converting the 138 kV system to 115 kV, so work at Pointe du Bois is also required.

In-Service Date:

September 2014.

Revision:

Cost flow revision, and in-service date deferred four months from May 2014.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 85.9	\$ 26.3	\$ 10.4	\$ 20.6	\$ 13.9	\$ 3.1	\$ -
Increase (Decrease)	0.1	(5.8)	5.2	4.4	(0.8)	-	-
Revised Forecast	\$ 86.0	\$ 20.5	\$ 15.6	\$ 25.0	\$ 13.1	\$ 3.1	\$ -

Bipole III - Licensing & Properties

Description:

Conduct environmental impact assessment, acquire property, and obtain licensing necessary for a +/- 500 kV dc transmission line and converter stations at Riel and Keewatinow.

Justification:

Required for the construction of Bipole III and related facilities. This item covers the the cost of enviornmental licensing and monitoring, and acquisition of property.

In-Service Date:

October 2017.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 123.5	\$ 12.2	\$ 12.9	\$ 10.2	\$ 14.7	\$ 17.5	\$ 29.1
Increase (Decrease)	-	(3.1)	6.0	(0.5)	(5.3)	(7.7)	(0.7)
Revised Forecast	\$ 123.5	\$ 9.1	\$ 18.9	\$ 9.6	\$ 9.3	\$ 9.8	\$ 28.4

Bipole III - Transmission Line

Description:

Design and build a +/- 500 kV HVdc transmission line of approximately 1 341 km (west of Lakes Winnipegosis & Manitoba) from Riel converter station to Keewatinoow converter station.

Justification:

Provides increased reliability to the Manitoba Hydro system due to the critical risk to the Province and the Corporation of not mitigating an Interlake (Bipole 1 and 2) corridor outage or a Dorsey station common mode outage. In normal steady state operation, it will also provide an increase in southern power, due to decreased line losses (approximately 76 MW under full existing generation).

In-Service Date:

October 2017.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 958.4	\$ 3.1	\$ 9.9	\$ 80.7	\$ 99.1	\$ 170.1	\$ 593.6
Increase (Decrease)	-	(0.4)	(4.4)	(42.4)	(11.2)	11.8	44.7
Revised Forecast	\$ 958.4	\$ 2.8	\$ 5.4	\$ 38.2	\$ 87.9	\$ 181.9	\$ 638.4

Keewatinoow Converter Station

Description:

Design and build an HVdc converter station with a rating of 2 000 MW at the proposed Keewatinoow site, including the northern electrode station and line.

Justification:

Provides increased reliability to the Manitoba Hydro system due to the critical risk to the Province and the Corporation of not mitigating an Interlake (Bipole 1 and 2) corridor outage or a Dorsey station common mode outage.

In-Service Date:

October 2017.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 466.3	\$ 2.0	\$ 3.3	\$ 6.8	\$ 83.2	\$ 65.5	\$ 303.0
Increase (Decrease)	-	4.3	8.6	53.7	(4.9)	(9.5)	(51.3)
Revised Forecast	\$ 466.3	\$ 6.3	\$ 11.8	\$ 60.5	\$ 78.3	\$ 56.0	\$ 251.7

Keewatinoow AC Collector System

Description:

Design and build a 230 kV Northern Collector System, including three AC transmission lines and the Keewatinoow 230 kV AC switch yard.

Justification:

Provides increased reliability to the Manitoba Hydro system due to the critical risk to the Province and the Corporation of not mitigating an Interlake (Bipole 1 and 2) corridor outage or a Dorsey station common mode outage.

In-Service Date:

October 2017.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 80.9	\$ 1.0	\$ 2.0	\$ 5.9	\$ 9.5	\$ 18.2	\$ 44.3
Increase (Decrease)	-	0.9	5.4	26.6	25.7	(17.3)	(41.3)
Revised Forecast	\$ 80.9	\$ 1.9	\$ 7.4	\$ 32.5	\$ 35.2	\$ 0.9	\$ 2.9

Riel Converter Station

Description:

Design and build an HVdc converter station with 2 000 MW of converters at Riel, including three synchronous compensators and the southern electrode station and line.

Justification:

Provides increased reliability to the Manitoba Hydro system due to the critical risk to the Province and the Corporation of not mitigating an Interlake (Bipole 1 and 2) corridor outage or a Dorsey station common mode outage.

In-Service Date:

October 2017.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 618.7	\$ 3.2	\$ 8.6	\$ 9.8	\$ 60.0	\$ 148.9	\$ 375.5
Increase (Decrease)	-	33.6	23.1	48.9	75.2	(20.8)	(158.2)
Revised Forecast	\$ 618.7	\$ 36.7	\$ 31.7	\$ 58.7	\$ 135.1	\$ 128.1	\$ 217.3

Riel 230/500 kV Station

Description:

Conduct environmental impact assessment and obtain licensing necessary for the Riel 230/500 kV station. Design and construct a 230/500 kV station at the Riel site including the installation of a 230 kV bus with a maximum of five Bays, the installation of a 500 kV ring bus, the installation of a 230/500 kV 1200 MVA transformer bank using two 230 kV and one 500 kV breaker, and the installation of 500 kV line reactors with relocating of a reactor phase from Dorsey. Install a second reactor phase from Dorsey as a spare at Riel after the Riel reactors are in-service and salvage the third reactor phase at Dorsey. Sectionalize two 230 kV transmission lines R32V and R33V into Riel station using eight 230 kV breakers and associated equipment resulting in two Riel-Ridgeway and two Riel-St. Vital transmission lines. Sectionalize 500 kV transmission line D602F into Riel station using two 500 kV breakers and associated equipment resulting in Dorsey-Riel and Riel-Forbes 500 kV circuits.

Justification:

The sectionalization of the 500 kV line allows power to be imported during a catastrophic Dorsey outage, as well as an alternate path for power export during a Dorsey transformer outage.

In-Service Date:

May 2014.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 267.6	\$ 58.4	\$ 79.6	\$ 45.1	\$ 38.2	\$ 4.6	\$ -
Increase (Decrease)	-	11.8	(12.8)	(15.7)	(9.3)	36.7	-
Revised Forecast	\$ 267.6	\$ 70.2	\$ 66.8	\$ 29.4	\$ 28.9	\$ 41.3	\$ -

Ontario 100 MW Firm Import Upgrades

Description:

Reconductor and resag transmission lines R23R, WT34, HS5 and SM26, and replace risers and/or current transformers for stations at Rosser, Ridgeway, Great Falls, Transcona, Mercy St., and Parkdale.

Justification:

This project will increase to 100 MW Manitoba Hydro's firm import capability from Ontario. Increasing the transmission capability will permit greater volume of energy imports during periods when additional energy may be required.

In-Service Date:

March 2014.

Revision:

Cost flow revision, and in-service date deferred two years from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.8	\$ 2.1	\$ 2.1	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(2.1)	(1.5)	2.2	1.9	-	-
Revised Forecast	\$ 4.8	\$ -	\$ 0.6	\$ 2.2	\$ 1.9	\$ -	\$ -

Dorsey - US Border New 500 kV Transmission Line

Description:

Design and build a 68 km 500 kV transmission line between Riel station and Dorsey station, and a 123 km 500 kV transmission line between Dorsey station and the U.S. border. Design and install two 500 kV breakers, one 150 MVAR 500 kV shunt reactor, one double-wye ungrounded 46 kV 73.4 MVAR shunt capacitor bank and associated communications and protection at Dorsey. Design and install two 500 kV breakers, one 230 kV breaker, two double-wye ungrounded 46 kV 73.4 MVAR shunt capacitor banks, a 1 200 MVA 230/500 kV autotransformer and associated communications and protection at Riel. Acquire property for right-of-way, conduct environmental impact assessment, conduct community consultations, obtain licensing and perform environmental monitoring for all facilities.

Justification:

Power sale term sheets have been negotiated with Minnesota Power (250 MW) and Wisconsin Public Service (500 MW). The existing tie line capacity is insufficient to accommodate the additional sales and therefore a new export line is needed. The proposed transmission facilities will increase the Manitoba to U.S. transfer capability for both export and import purposes.

In-Service Date:

October 2019.

Revision:

Cost flow revision, and in-service date deferred 17 months from May 2018.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 204.8	\$ 0.5	\$ 1.9	\$ 8.2	\$ 17.6	\$ 32.4	\$ 144.1
Increase (Decrease)	-	(0.5)	(1.8)	(7.3)	(15.7)	(30.0)	54.5
Revised Forecast	\$ 204.8	\$ -	\$ 0.1	\$ 0.9	\$ 1.9	\$ 2.4	\$ 198.6

St. Joseph Wind Transmission

Description:

Establish a 230 kV generation interconnection from Manitoba Hydro's Letellier station to the St. Joseph Wind Farm Inc.'s 138MW wind farm near St. Joseph, Manitoba.

Justification:

Manitoba Hydro and St. Joseph Windfarm Inc. signed an Interconnection & Operating Agreement (IOA) on March 18, 2010, for connection of 138 MW of generation from the St. Joseph Wind Farm. The IOA requires that Manitoba Hydro install or upgrade facilities in order to provide 138 MW of interconnection service.

In-Service Date:

November 2010.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	6.5	5.5	-	-	-	-	-
Revised Forecast	\$ 6.5	\$ 5.5	\$ -	\$ -	\$ -	\$ -	\$ -

Demand Side Management

Description:

Design, implement and deliver incentive based PowerSmart conservation programs to reduce electricity consumption in Manitoba. When combined with savings realized to-date, total electricity savings of 918 MW and 3 408 GWh are expected to be achieved by 2025.

Justification:

The electric Demand Side Management plan is cost effective as a resource option and is included in Manitoba Hydro's Power Resource Plan (PRP). The DSM plan provides customers with exceptional value through the implementation of cost-effective energy conservation programs that are designed to minimize the total cost of energy services to customers, position the Corporation as a national leader in implementing cost-effective energy conservation and alternative energy programs, protect the environment and promote sustainable energy supply and service.

In-Service Date:

Ongoing.

Revision:

The change in expenditures is due to revisions to energy saving and expenditures for a number of programs based on current and updated market information.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 43.0	\$ 42.5	\$ 38.4	\$ 33.9	\$ 29.9	\$ 128.6
Increase (Decrease)		(6.1)	(4.5)	0.7	4.7	6.3	(8.8)
Revised Forecast		\$ 36.9	\$ 38.0	\$ 39.1	\$ 38.6	\$ 36.2	\$ 119.8

Waterways Management Program

Description:

Waterways management at Grand Rapids and Lake Winnipeg Regulation (LWR) / Churchill River Diversion (CRD).

Justification:

This program includes activities related to boat patrols, debris clearing, and supplementary works and is required to ensure ongoing safety and environmental management of waterways.

In-Service Date:

March 2011.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 5.4	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)		0.1	-	-	-	-	-
Revised Forecast		\$ 5.5	\$ -	\$ -	\$ -	\$ -	\$ -

POWER SUPPLY:

HVDC Converter Transformer Bushing Replacement

Description:

Replace converter transformer bushings with NGK bushings, and purchase spares as follows: at Dorsey replace six 230 kV AC, and six 25 kV tertiary bushings; and at Radisson / Henday replace five 138 kV, two 150 kV, four 230 kV, and three 15 kV tertiary bushings, and purchase two 300 kV and two 450 kV spares.

Justification:

The bushing replacement program was undertaken due to failure of a 230 kV bushing in Dorsey T21 A-phase converter transformer that resulted in costly repairs to the transformer, and loss of revenue due to the outage. Also during the repair of the Dorsey T31S converter transformer in Pauwel's Canada plant, two out of two 230 kV bushings that were tested failed at far below the full test voltage. The manufacturer's expected service life is 25 years. These bushings have all been in-service more than 20 years. Replacement cost is justified when compared to transformer damage due to an in-service failure.

In-Service Date:

October 2011.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 5.9	\$ 0.4	\$ 1.9	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	-	(1.2)	1.1	-	-	-
Revised Forecast	\$ 5.9	\$ 0.4	\$ 0.7	\$ 1.1	\$ -	\$ -	\$ -

HVDC Auxiliary Power Supply Upgrades

Description:

The review and upgrading of Bipole 1 and 2 auxiliary power supply at Dorsey, Radisson and Henday converter stations, including 12 battery banks and ten power centers. Scope increased to include the upgrade of Bipole 2 129 V dc battery systems for the converter buildings at Dorsey and Henday; and to build an addition to the Henday relay building to accommodate the battery system upgrade.

Justification:

Upgrading of the HVdc system auxiliary power supplies is necessary to obtain maintenance outages for them without additional system costs and to maintain reliability of the HVdc system. This will allow Manitoba Hydro to maintain/increase firm energy sales and keep spinning reserve requirements to a minimum.

In-Service Date:

April 2011.

Revision:

Expand project scope to include the upgrade of Bipole 2 129 V dc battery systems for the converter buildings at Dorsey and Henday, along with an addition to the Henday relay building to accommodate the battery system upgrade.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 3.7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	1.6	0.9	0.2	-	-	-	-
Revised Forecast	\$ 5.3	\$ 0.9	\$ 0.2	\$ -	\$ -	\$ -	\$ -

Dorsey Synchronous Condenser Refurbishment

Description:

Major inspection, re-wedging and overhaul of synchronous condensers SC7Y, SC8Y, SC9Y, SC21Y, and SC23Y. Replace coolers to restore original thermal performance on SC21Y, and SC23Y. Repair corrosion problems and replace GEM80 PLC on SC7Y, SC8Y and SC9Y. Modify the 600 V transfer scheme for SC8Y, SC7Y & SC9Y.

Justification:

Synchronous condensers are required for proper operation of the HVdc system, voltage regulation of the southern AC system and to provide reactive power for power export to the United States. A major inspection and overhaul of each machine is necessary to prevent catastrophic failure, involving the rotors and rotor bolts as indicated by the failures of SC12Y in 1987 and SC11Y in 1988. The cost of repairing a failure when combined with the inability to export power will well exceed the cost of major inspection and overhaul.

In-Service Date:

March 2018.

Revision:

Cost flow revision, and in-service date deferred three years from March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 32.3	\$ 2.5	\$ 3.6	\$ 2.5	\$ 2.6	\$ 2.8	\$ -
Increase (Decrease)	-	-	0.9	1.9	(1.5)	(2.8)	-
Revised Forecast	\$ 32.3	\$ 2.5	\$ 4.5	\$ 4.4	\$ 1.1	\$ -	\$ -

HVDC System Transformer & Reactor Fire Protection & Prevention

Description:

The supply and installation of fire protection upgrades on 33 converter transformers and eight smoothing reactors. The re-design and replacement of the deluge system on the Dorsey converter building south wall and the Henday converter building north east wall, and the construction of a fire response building in a safe location at Dorsey converter station.

Justification:

To minimize the high risk of fire spread and catastrophic damage throughout the AC and DC switchyards, and a potential transformer and revenue loss of an estimated \$30 to \$50 million. To provide adequate fire protection for personnel in accordance with National Fire Protection Association (NFPA) Life Safety Code 101.

In-Service Date:

October 2012.

Revision:

Cost flow revision, and in-service date deferred 10 months from December 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 10.4	\$ 1.3	\$ 0.3	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(0.3)	0.3	0.2	-	-	-
Revised Forecast	\$ 10.4	\$ 1.0	\$ 0.6	\$ 0.2	\$ -	\$ -	\$ -

HVDC AC Filter PCB Capacitor Replacement

Description:

Replace all Bipole 1 & 2 AC PCB filled high power capacitors at the Dorsey, Radisson, and Henday converter stations, with non-PCB replacement capacitors.

Justification:

Numerous PCB filled capacitor failures at HVdc converter stations have resulted in requests for outages via the System Control Centre to allow for repairs. The catastrophic failure of a capacitor in an AC filter bank of B2 would result in a pole outage. Manitoba Hydro is committed to being PCB free as outlined in corporate policy statement CP486B. The capacitors will be 28 years old and are approaching the end of their useful life.

In-Service Date:

March 2011.

Revision:

Project estimate reduced to reflect lower soil remediation requirements than originally anticipated. In-service date deferred four months from November 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 34.5	\$ 6.0	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	(4.6)	(4.8)	-	-	-	-	-
Revised Forecast	\$ 29.8	\$ 1.2	\$ -	\$ -	\$ -	\$ -	\$ -

HVDC Transformer Replacement Program

Description:

Maintain an inventory of eight spare converter transformers for use at Radisson, Henday and Dorsey converter stations.

Justification:

Maintenance of an inventory of spare converter transformers will limit outage durations and outage costs in the event of converter transformer failures.

In-Service Date:

October 2014.

Revision:

Cost flow revision, and in-service date deferred one year from October 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 105.7	\$ 1.1	\$ 7.3	\$ 5.3	\$ 1.1	\$ -	\$ -
Increase (Decrease)	-	(0.8)	(6.2)	(0.4)	7.0	-	-
Revised Forecast	\$ 105.7	\$ 0.3	\$ 1.1	\$ 4.9	\$ 8.1	\$ -	\$ -

Dorsey 230 kV Relay Building Upgrade

Description:

Upgrade the 230 kV relay building at Dorsey and provide mobile protection and control trailers.

Justification:

Upgrades to the building will reduce the risk of damage from weather related perils and limit the consequence of a Bipole failure due to fire related perils. Mobile protection and control trailers will facilitate the quick restoration of service in the case of a catastrophic event to this or other relay buildings.

In-Service Date:

August 2016.

Revision:

Increase project estimate to reflect current market conditions, and in-service date deferred five months from March 2016.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 73.8	\$ 1.9	\$ 4.0	\$ 16.4	\$ 32.1	\$ 12.0	\$ 4.9
Increase (Decrease)	8.4	2.5	(0.3)	(13.0)	(14.6)	23.4	10.6
Revised Forecast	\$ 82.2	\$ 4.4	\$ 3.7	\$ 3.4	\$ 17.5	\$ 35.4	\$ 15.5

HVDC Stations Ground Grid Refurbishment

Description:

Upgrade the existing ground grid systems at Dorsey, Radisson and Henday stations.

Justification:

These upgrades improve the safety of employees and contractors working in and around the HVdc converter stations, by ensuring that touch and step potential are within safe levels.

In-Service Date:

October 2015.

Revision:

Cost flow revision, and in-service date deferred two years from October 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.3	\$ 0.5	\$ 0.6	\$ 0.6	\$ -	\$ -	\$ -
Increase (Decrease)	-	-	(0.2)	(0.2)	0.4	0.3	0.1
Revised Forecast	\$ 4.3	\$ 0.5	\$ 0.4	\$ 0.4	\$ 0.4	\$ 0.3	\$ 0.1

HVDC Circuit Breaker Operating Mechanism Replacement

Description:

Replace all 34 HLR operating mechanisms with new operating mechanisms and replace 45-600V hydraulic breaker overloads with electronic overloads.

Justification:

System reliability will be improved. A breaker failure results in a bus outage and single contingency of the 230 kV bus. There is a Bipole outage risk, if bus B1 or B2 at Dorsey is out of service for any reason.

In-Service Date:

March 2019.

Revision:

Increase project scope to include the purchase and installation of an additional 19 HLR breakers, along with the replacement of 45-600V hydraulic breaker overloads with electronic overloads. In-service date deferred 63 months from December 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 9.4	\$ 0.4	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	6.5	1.5	2.7	1.1	0.4	0.1	0.3
Revised Forecast	\$ 15.9	\$ 1.9	\$ 2.7	\$ 1.1	\$ 0.4	\$ 0.1	\$ 0.3

HVDC Bipole 1 Pole Differential Protection

Description:

Prepare an engineering report to determine all possible options, scope of work, cost analysis, and detailed cost estimate. Implement the preferred option at both Dorsey and Radisson stations.

Justification:

Upgrading Bipole 1 pole differential protection is necessary in order to prevent the blocking of healthy poles, thus reducing outages and increasing availability.

In-Service Date:

March 2014.

Revision:

Cost flow revision, and in-service date deferred 27 months from December 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 3.3	\$ 1.0	\$ 2.3	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(1.0)	(2.3)	1.1	2.2	-	-
Revised Forecast	\$ 3.3	\$ -	\$ -	\$ 1.1	\$ 2.2	\$ -	\$ -

HVDC Bipole 1 By-Pass Vacuum Switch Removal

Description:

Remove the existing By-Pass Vacuum Switch (BPVS) and By-Pass Switch (BPS) and replace both with a single BPS at Dorsey and Radisson stations (Bipole 1 valve halls). In addition, Radisson will have its AC line switch (ACQ) removed.

Justification:

The equipment is nearing the end of its service life and requires substantial maintenance. By-pass vacuum switches were part of the replaced mercury arc valves switching scheme. The new thyristor valves may be more reliably served by other types of switches, thus reducing the forced outage rate.

In-Service Date:

March 2015.

Revision:

Cost flow revision, and in-service date deferred one year from March 2014.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 20.4	\$ 4.6	\$ 8.2	\$ 5.6	\$ 1.2	\$ -	\$ -
Increase (Decrease)	-	(4.1)	(5.7)	(1.7)	9.8	2.1	-
Revised Forecast	\$ 20.4	\$ 0.5	\$ 2.5	\$ 3.9	\$ 11.0	\$ 2.1	\$ -

HVDC Bipole 2 Refrigerant Condenser Replacement

Description:

Remove and replace existing air conditioning systems in the Bipole 2 valve halls, maintenance blocks and administration areas at both Dorsey and Henday converter stations.

Justification:

The present systems are nearing the end of their service life. Maintenance is increasing, along with the likelihood of costly valve outages. In addition, the present systems contain R-22 (an ozone depleting substance).

In-Service Date:

February 2015.

Revision:

Cost flow revision, and in-service date deferred 22 months from April 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 11.0	\$ -	\$ 2.8	\$ 7.2	\$ 1.0	\$ -	\$ -
Increase (Decrease)	-	-	(2.8)	(4.3)	1.4	5.7	-
Revised Forecast	\$ 11.0	\$ -	\$ -	\$ 2.9	\$ 2.4	\$ 5.7	\$ -

HVDC Bipole 1 & 2 Smoothing Reactor Replacement

Description:

Replace all Bipole 1 oil-filled smoothing reactors at Dorsey and Radisson, and replace with new air core reactors. Replace four Bipole 2 oil-filled smoothing reactors with air core smoothing reactors at Dorsey and Henday.

Justification:

Existing oil-filled smoothing reactors are approaching the end of their service life. Replacement will ensure continued availability and reliable operation of the HVdc system, and will reduce the risk of oil spills and fires within the work place and reduce maintenance and protection systems requirements.

In-Service Date:

March 2014.

Revision:

Reduce the project estimate to reflect lower costs for 16 smoothing reactors, and in-service date advanced 55 months from October 2018.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 48.9	\$ 3.6	\$ 3.3	\$ 5.8	\$ 7.8	\$ 18.0	\$ 9.7
Increase (Decrease)	(9.6)	10.7	9.5	(3.9)	1.4	(18.0)	(9.7)
Revised Forecast	\$ 39.3	\$ 14.3	\$ 12.8	\$ 1.9	\$ 9.2	\$ -	\$ -

HVDC Bipole 1 P1 & P2 Battery Bank Separation

Description:

Separate Pole 1 & Pole 2 battery banks at Dorsey and Radisson converter stations. Upgrade the battery banks and charger ratings to comply with current Manitoba Hydro design criteria.

Justification:

Pole 1 & Pole 2 battery banks have to be physically separated in order to provide a reliable first grade supply to the HVdc controls and protection and communication system.

In-Service Date:

March 2013.

Revision:

Cost flow revision, and in-service date deferred one month from February 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 3.2	\$ -	\$ 1.0	\$ 2.2	\$ -	\$ -	\$ -
Increase (Decrease)	-	-	(0.1)	-	-	-	-
Revised Forecast	\$ 3.2	\$ -	\$ 0.9	\$ 2.2	\$ -	\$ -	\$ -

HVDC Bipole 1 DCCT Transductor Replacement

Description:

Replace existing oil-filled DC transductors with optical transductors at Dorsey and Radisson stations.

Justification:

Existing BP1 DCCT transductors are reaching the end of service life and spares are no longer available. Failure of a transductor to transmit a required signal to protective and controls equipment at Dorsey and Radisson stations can cause a lengthy pole outage. A fire in the existing oil-filled transductors could result in irreparable damage to adjacent equipment and a lengthy pole outage. Replacement will contribute to reliable operation of the HVdc system. Removal of the oil-filled transductors will reduce the risk of oil spills and fires within the workplace.

In-Service Date:

October 2016.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 11.7	\$ 0.6	\$ 2.8	\$ 0.8	\$ 3.9	\$ 1.1	\$ 2.4
Increase (Decrease)	-	(0.6)	(2.3)	0.8	(2.8)	1.9	3.0
Revised Forecast	\$ 11.7	\$ -	\$ 0.5	\$ 1.6	\$ 1.1	\$ 3.0	\$ 5.4

HVDC Bipole 1 & 2 DC Converter Transformer Bushing Replacements

Description:

Remove and replace transformer bushings on all converter transformers over 25 years old.

Justification:

Bushings on converter transformers over 25 years old are reaching the end of their service life. A bushing failure while in-service would cause a costly valve group outage to repair or replace the bushing and could cause irreparable damage to a converter transformer.

In-Service Date:

October 2015.

Revision:

Cost flow revision, and in-service date deferred seven months from March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 8.7	\$ -	\$ 0.5	\$ 1.0	\$ 1.7	\$ 5.2	\$ 0.2
Increase (Decrease)	-	-	0.1	-	-	0.2	(0.2)
Revised Forecast	\$ 8.7	\$ -	\$ 0.6	\$ 1.0	\$ 1.7	\$ 5.4	\$ -

HVDC Bipole 2 Valve Hall Wall Bushing Replacements

Description:

Replace all oil-filled wall bushings in the Bipole 2 valve halls with new solid core bushings or SF6 filled bushings.

Justification:

Existing wall bushings in the Bipole 2 valve halls are over 21 years old and are reaching the end of their service life. The risk of bushing failure and fire in a valve hall increases as the bushings age. Replacing the bushings will ensure reliable operation of the valve group well into the future, and provide a safer working environment for employees at the converter stations.

In-Service Date:

June 2017.

Revision:

Cost flow revision, and in-service date deferred two years from June 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 19.2	\$ 0.1	\$ 3.3	\$ 4.5	\$ 4.6	\$ 4.7	\$ 2.0
Increase (Decrease)	-	0.4	(3.2)	(4.3)	(1.2)	(0.3)	8.3
Revised Forecast	\$ 19.2	\$ 0.5	\$ 0.1	\$ 0.2	\$ 3.4	\$ 4.4	\$ 10.3

HVDC Bipole 1 CQ Disconnect Replacement

Description:

Replace the existing Radisson and Dorsey DC disconnects, and Dorsey AC disconnects with new disconnects.

Justification:

Major failures of CQ disconnects cause costly pole outages, and these disconnects are reaching the end of their service life. They have been in-service for 37 years, their failure rate is increasing, and spare parts are no longer available.

In-Service Date:

March 2017.

Revision:

Cost flow revision, and in-service date deferred 35 months from April 2014.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 5.2	\$ -	\$ 1.1	\$ 1.5	\$ 0.9	\$ 1.0	\$ 0.6
Increase (Decrease)	-	-	(0.8)	(0.6)	0.6	0.1	0.8
Revised Forecast	\$ 5.2	\$ -	\$ 0.3	\$ 0.9	\$ 1.5	\$ 1.1	\$ 1.4

HVDC Bipole 2 Refurbish Thyristor Module Cooling Components

Description:

Refurbish 1,566 thyristor module cooling components in Bipole 2 by replacing the manifolds, connectors and cooling tubes.

Justification:

The cooling components are reaching the end of their life, and are starting to leak, resulting in forced outages. Refurbishing the module cooling components will improve the reliability of the cooling system and extend its life until the replacement of the Bipole 2 system equipment, which is in approximately 10 to 15 years.

In-Service Date:

March 2012.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.7	\$ 1.7	\$ 0.8	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(0.3)	0.5	-	-	-	-
Revised Forecast	\$ 4.7	\$ 1.4	\$ 1.3	\$ -	\$ -	\$ -	\$ -

HVDC Transformer Marshalling Kiosk Replacement

Description:

Replace nine Bipole 1 transformer marshalling kiosks with insulated Programmable Logic Controllers (PLC) monitoring marshalling kiosks, and upgrade 19 control boxes at the transformer with a quick disconnect system.

Justification:

The new control boxes will remove the 600V from the controls and monitoring section of the panel which will eliminate the present safety concerns that site workers face while performing maintenance or trouble shooting.

In-Service Date:

November 2014

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 6.8	\$ 1.0	\$ 1.6	\$ 1.6	\$ 1.1	\$ 0.5	\$ -
Increase (Decrease)	-	(0.4)	0.2	0.4	0.1	0.2	-
Revised Forecast	\$ 6.8	\$ 0.6	\$ 1.8	\$ 2.0	\$ 1.2	\$ 0.7	\$ -

HVDC Gapped Arrester Replacement

Description:

Replace the gapped surge arresters with polymer gapless Metal Oxide Varistor (MOV) arresters.

Justification:

The gapped surge arresters are over 31 years old and are experiencing frequent breakdowns. When a gapped surge arrester malfunctions there is potential for employee injury and / or equipment damage. The new MOV arresters will eliminate these issues.

In-Service Date:

November 2015.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	16.3	0.1	3.8	3.4	4.0	3.5	1.6
Revised Forecast	\$ 16.3	\$ 0.1	\$ 3.8	\$ 3.4	\$ 4.0	\$ 3.5	\$ 1.6

Pine Falls Rehabilitation

Description:

Rehabilitation, replacement of and addition to various electrical and mechanical equipment and systems such as spillway mechanical components, station service upgrade, station lighting, 11 kV cable replacement, spillway electrical distribution, water system, air system, transformer lightning arrestors, and station drawings. Replace unit 1 and 2 turbine runners with more efficient new design runners, rebuild existing servomotors for increased wicket gate opening allowing more discharge, and rewind the generator stators utilizing modern insulating materials. Conduct a model test and up-rate study. Replace potential transformers, synchronizers, annunciators, generator breakers, excitation and governor systems, step-up transformers and electrical back-up systems.

Justification:

Assessment of the electrical and mechanical systems has identified concerns in terms of obsolete equipment, safety, fire risk and adaptability to present day operating conditions and standards. Upgrading is necessary to ensure reliable safe and economical operation. Pine Falls consistently spills more water than the other Winnipeg River plants. Additional generation can be obtained (approximately 17%) with increased discharge capability. Tests have confirmed that the two stator windings are in danger of failure at any time.

In-Service Date:

October 2015.

Revision:

Cost flow revision, and in-service date deferred seven months from March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 56.2	\$ 4.2	\$ 17.4	\$ 12.2	\$ 2.1	\$ 2.9	\$ 8.0
Increase (Decrease)	-	(1.7)	(11.6)	3.6	(0.9)	1.7	7.8
Revised Forecast	\$ 56.2	\$ 2.5	\$ 5.8	\$ 15.8	\$ 1.2	\$ 4.6	\$ 15.8

Jenpeg Unit Overhauls

Description:

Major overhaul of all six generating units to inspect, repair, modify, and replace components of the turbine/generator. Areas of concern include journal bearings, thrust bearings, turbine seals, servo motors, wicket gate seals and bushings, waterhead and oil head, stator and rotor, and auxiliary systems.

Justification:

A complete overhaul is required to ensure reliable operation of the units when maximum power requirements on the system are essential.

In-Service Date:

December 2021.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 128.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 73.1
Increase (Decrease)	-	-	-	-	-	-	(0.7)
Revised Forecast	\$ 128.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 72.5

Power Supply Dam Safety Upgrades

Description:

Perform necessary engineering design and remedial construction to upgrade generating stations to present day dam safety standards: 1) Kettle generating station – upgrade main and saddle dams for freeboard; 2) Kelsey generating station – armour plating at spillway rollways, erection of heated hoist housing, insulating of spillway gates, upgrading of dikes, upgrading of spillway feeders and electrical systems at the spillway, and upgrading of the station service transformers due to increased loading; and 3) southern generating stations - capital works identified in the dam safety certification process or identified through observation and discussion with staff.

Justification:

Work is required to correct deficiencies to all the plants, in order to operate in a safe and reliable manner.

In-Service Date:

March 2016.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 34.0	\$ 1.7	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	2.6	-	-	-	-	-
Revised Forecast	\$ 34.0	\$ 4.3	\$ -	\$ -	\$ -	\$ -	\$ -

Winnipeg River Riverbank Protection Program

Description:

Placement of rock protection and construction of slope stabilization to reduce the erosion of riverbanks along the Winnipeg River. The work includes inspection, design, mapping, land acquisition, and remedial construction at priority locations along reaches of the Winnipeg River affected by Manitoba Hydro hydraulic operations.

Justification:

Provision of riverbank protection and stabilization work along the Winnipeg River between Seven Sisters forebay and Manitou rapids to protect private property from erosion partially due to hydraulic operations.

In-Service Date:

March 2017.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 19.7	\$ 1.2	\$ 1.2	\$ 1.3	\$ 1.3	\$ 1.3	\$ 2.8
Increase (Decrease)	-	-	-	-	-	-	(0.1)
Revised Forecast	\$ 19.7	\$ 1.2	\$ 1.2	\$ 1.3	\$ 1.3	\$ 1.3	\$ 2.7

Power Supply Hydraulic Controls

Description:

Install unit control and monitoring systems at Long Spruce, Seven Sisters, Jenpeg and McArthur Falls generating stations. This includes the installation of required automation, remote control, and protective devices for unmanned operation at Kettle.

Justification:

By increasing unit efficiency, the Corporation can reduce or delay the need for capital expenditures for new plant, increase export net revenues, improve financial strength, and protect the environment.

In-Service Date:

March 2020.

Revision:

Project estimate increased to install required automation equipment and remote control & protective devices to allow for reduction of work shifts.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 16.0	\$ 1.9	\$ 1.2	\$ -	\$ -	\$ -	\$ 5.6
Increase (Decrease)	4.5	1.8	0.3	0.5	1.3	-	-
Revised Forecast	\$ 20.5	\$ 3.7	\$ 1.5	\$ 0.5	\$ 1.3	\$ -	\$ 5.6

Slave Falls Rehabilitation

Description:

Perform major overhaul for all eight units at Slave Falls generating station, including spillway improvements/replacements, excitation upgrades, the addition of a Unit Control and Monitoring System (UCMS) Framework, access road upgrades, and a new walkway across the spillway.

Justification:

Many safety, reliability, environmental, efficiency, operational & dam safety issues have been identified relating to the Slave Falls infrastructure. Extensive repairs, modifications and/or replacements will be required to ensure the serviceability of the plant and spillway infrastructure. Economics of this work may suggest that a new spillway be constructed to replace existing spill infrastructure. Current operating procedures include ice load reduction activities at the spilling structures to ensure structural stability. A dam safety concern has been identified with respect to the minimal remote spilling capability at Slave Falls.

In-Service Date:

March 2019.

Revision:

Estimate revised to reflect additional access road construction costs resulting from realigning the road to accommodate continual access to the site during construction as the existing tramway rail bed is not of sufficient quality, deviations in the road alignment at Moose Creek wetland area in order to reduce environmental impacts, a new walkway across the spillway, and estimate revisions to reflect current market conditions. In-service date deferred 15 months from December 2017.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 198.3	\$ 4.0	\$ 1.1	\$ 16.3	\$ 11.8	\$ 15.6	\$ 125.5
Increase (Decrease)	24.7	15.8	6.2	(14.6)	(8.1)	16.8	8.9
Revised Forecast	\$ 223.0	\$ 19.8	\$ 7.3	\$ 1.7	\$ 3.7	\$ 32.4	\$ 134.4

Great Falls Unit 4 Overhaul

Description:

Major overhaul to generating Unit 4 including generator rewind, turbine re-runnering, new water passage embedded components, one 3-phase unit transformer, and modernization of components.

Justification:

The re-runnering and major overhaul will provide an opportunity to upgrade/modernize the unit while taking advantage of an already planned outage for the intake gates. The re-runnering will add both capacity and efficiency. The existing transformer is in poor condition and water passage components are starting to fail. The overhaul will increase reliability and extend the asset life by 40 to 50 years.

In-Service Date:

December 2011.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 19.7	\$ 7.0	\$ 7.8	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(2.5)	1.7	-	-	-	-
Revised Forecast	\$ 19.7	\$ 4.5	\$ 9.5	\$ -	\$ -	\$ -	\$ -

Great Falls Unit 5 Discharge Ring Replacement and Major Overhaul

Description:

Replacement of Unit 5 discharge ring along with performing a major overhaul including generator rewind, turbine re-running, replacement/upgrade of the runner, wicket gates, governors and associated electrical equipment.

Justification:

In January 2008, numerous cracks were found in the Unit 5 draft tube liner, which were significant and in close proximity to each other, oriented in such a manner that if the cracking continued, a piece of the draft tube liner could potentially break free and impact the runner resulting in catastrophic damage to the runner and liner. The discharge ring and liner were subsequently repaired; however, the discharge ring which was installed in 1988 is in very poor condition and is not expected to maintain a service life extending beyond 10 years.

In-Service Date:

March 2017.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	24.8	-	-	-	-	2.3	22.5
Revised Forecast	\$ 24.8	\$ -	\$ -	\$ -	\$ -	\$ 2.3	\$ 22.5

Generation South Transformer Refurbish & Spares

Description:

Purchase a spare generator step-up transformer and refurbish the existing generator step-up transformers at Jenpeg GS; purchase a spare three phase generator step-up transformer at Pine Falls GS; purchase 12 generator step-up transformers at Grand Rapids GS; and purchase two 3-phase generator step-up transformers and install one in Bank 6 at Great Falls GS.

Justification:

To minimize the occurrence and duration of transformer-related forced outages, it is imperative that spare transformers are available.

In-Service Date:

November 2016.

Revision:

Project scope changed from refurbishing 10 generator step-up transformers at Grand Rapids, to purchasing 12 new generator step-up transformers. In-service date advanced four months from March 2017.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 21.0	\$ 1.5	\$ 3.1	\$ 5.3	\$ 4.4	\$ 2.8	\$ 3.8
Increase (Decrease)	8.8	(1.1)	1.7	6.0	7.7	(2.3)	(3.2)
Revised Forecast	\$ 29.8	\$ 0.4	\$ 4.8	\$ 11.3	\$ 12.1	\$ 0.5	\$ 0.6

Water Licenses & Renewals

Description:

Conduct hydraulic studies, geotechnical assessments, property status and severance line determinations, mapping, license documentation, environmental reviews, and community informational sessions necessary to secure license finalization and/or renewals for the Corporation's hydraulic plants.

Justification:

All hydraulic generating facilities must be authorized under water power licenses and these licenses need to be clearly in force to significantly reduce risk exposure, maintain operating flexibility, maximize export revenues, and contribute to financial strength.

In-Service Date:

December 2017.

Revision:

Cost flow revision, and in-service date deferred 19 months from May 2016.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 40.8	\$ 6.0	\$ 6.0	\$ 5.7	\$ 5.9	\$ 4.9	\$ 3.2
Increase (Decrease)	-	(0.7)	-	0.5	0.9	1.7	(2.5)
Revised Forecast	\$ 40.8	\$ 5.3	\$ 6.0	\$ 6.2	\$ 6.8	\$ 6.6	\$ 0.7

Generation South PCB Regulation Compliance

Description:

Replace equipment identified as containing polychlorinated biphenyl (PCB) content > 50 ppm at generation south generating stations.

Justification:

Required to comply with Federal legislation regarding the replacement of equipment in non-sensitive areas with PCB content > 50 ppm.

In-Service Date:

March 2016.

Revision:

Cost flow revision, and in-service date deferred one year from March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.7	\$ 0.3	\$ 0.1	\$ 0.1	\$ 0.2	\$ 3.8	\$ -
Increase (Decrease)	-	0.3	0.4	0.3	0.2	(3.6)	2.4
Revised Forecast	\$ 4.7	\$ 0.6	\$ 0.5	\$ 0.4	\$ 0.4	\$ 0.2	\$ 2.4

Kettle Transformer Replacement Program

Description:

Refurbish one Kettle transformer to be used as a spare, purchase one universal spare transformer for the Long Spruce/Limestone generating stations and purchase 12 new generator step-up transformers for the Kettle generating station.

Justification:

Kettle step-up transformers have been in operation for 38 years, with a life expectancy of between 30 and 50 years. During this time frame there have been more transformer winding failures at the Kettle GS than anywhere else in Manitoba Hydro.

In-Service Date:

September 2014.

Revision:

Cost flow revision, and in-service date deferred five months from April 2014.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 35.6	\$ 6.6	\$ 6.5	\$ 6.6	\$ 6.8	\$ 7.4	\$ -
Increase (Decrease)	-	2.1	0.5	0.6	1.2	(3.5)	-
Revised Forecast	\$ 35.6	\$ 8.7	\$ 7.0	\$ 7.2	\$ 8.0	\$ 3.9	\$ -

Generation South Breaker Replacement Program

Description:

Remove the four existing 115 kV current transformers and breakers at McArthur Falls GS, and replace with new 115 kV breakers with internal current transformers, and replace the fourteen 115 kV breakers at the Pine Falls GS, including Breaker Failure Protection (BFP).

Justification:

The breakers at both stations require replacing as spare parts are no longer available. In addition, the breakers at both stations are PCB contaminated. Proposed federal PCB regulation currently states that all equipment with a concentration >50ppm must be removed from service by December 31, 2014.

In-Service Date:

September 2013.

Revision:

Increase project estimate to include BFP on the Pine Falls 115 kV breakers. In-service date advanced one month from October 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 9.4	\$ 3.1	\$ 2.2	\$ 2.0	\$ 0.4	\$ -	\$ -
Increase (Decrease)	1.7	(0.6)	0.8	(0.6)	3.0	-	-
Revised Forecast	\$ 11.1	\$ 2.5	\$ 3.0	\$ 1.4	\$ 3.4	\$ -	\$ -

Seven Sisters Upgrades

Description:

Rewind and rehabilitate Seven Sisters Unit 5 to maintain station MW output and prevent a high probability stator in-service failure through a planned generator rewind outage. Replace and upgrade generator and transformer protection on units 1, 2, 3, 4 and 6 to a redundant multifunction system with breaker fail protection, transient fault recording, and metering replacement.

Justification:

Seven Sisters Unit 5 stator winding has been identified as a candidate for potential failure through electrical condition assessment. The stator condition has deteriorated such that normal operation now contributes to accelerating the stator failure. In addition, transmission line events (115 kV faults) have been identified which would cause generator damage for the station. The existing protection system is incapable of detecting and interrupting these specific events, and is of a similar vintage to the replaced Kelsey electro-mechanical system, but with a longer operating history. Original electro-mechanical relay manufacturers no longer exist and replacement parts are currently salvaged from other recently upgraded generating stations.

In-Service Date:

September 2013.

Revision:

Cost flow revision, and in-service date deferred 13 months from August 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 9.5	\$ 5.3	\$ 1.2	\$ 1.0	\$ -	\$ -	\$ -
Increase (Decrease)	-	(2.5)	0.8	0.5	1.2	-	-
Revised Forecast	\$ 9.5	\$ 2.8	\$ 2.0	\$ 1.5	\$ 1.2	\$ -	\$ -

Generation South Excitation Program

Description:

Implement a generator excitation system replacement program to phase out unsupported and obsolete equipment at the Great Falls, Grand Rapids and McArthur Falls generating stations.

Justification:

Original excitation systems on the Winnipeg River have a frequent failure rate which has negative effects on export revenue. Spare parts for the excitation systems at these generating stations are no longer available, and the salvage inventory from Seven Sisters GS and Laurie River GS are exhausted. The current systems cannot be tuned due to physical wear and have failing rotating exciter insulation systems, which will render the generators inoperable in the event of an exciter failure.

In-Service Date:

March 2019.

Revision:

Cost flow revision, and in-service date deferred one month from February 2019.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 18.3	\$ 2.0	\$ 1.0	\$ 1.1	\$ 1.7	\$ 1.4	\$ 11.1
Increase (Decrease)	-	(1.9)	(0.7)	1.0	0.7	(0.8)	1.8
Revised Forecast	\$ 18.3	\$ 0.1	\$ 0.3	\$ 2.1	\$ 2.4	\$ 0.6	\$ 12.9

Brandon Unit 5 License Review

Description:

Renewal of Brandon generating station Unit 5 (Manitoba Environment Act license) is required for continuing operation. License renewal requires minor plant refurbishment. The timing and extent of additional future environmental regulatory changes is uncertain. The base case conservatively assumes that environmental controls must be installed. Should the need for additional controls be identified during the licensing process or subsequently thereafter, the economic viability of such controls will be assessed accordingly. Per the Manitoba Climate Change and Emissions Reductions Act (Bill 15), Manitoba Hydro must not use coal to generate power after December 31, 2009, except to support emergency operations.

Justification:

Unit 5 plays an important role in Manitoba Hydro's system, contributing economic generation and enhancing system reliability.

In-Service Date:

September 2014.

Revision:

Cost flow revision, and in-service date deferred 30 months from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 18.7	\$ 2.5	\$ 11.1	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(2.3)	(11.0)	1.6	2.7	9.2	-
Revised Forecast	\$ 18.7	\$ 0.2	\$ 0.1	\$ 1.6	\$ 2.7	\$ 9.2	\$ -

Selkirk Enhancements

Description:

Perform environmental enhancements in accordance with the revised license terms and conditions approved by the Province of Manitoba on April 30, 2008. The approval was based on continuing operation of the once-through cooling system with modifications to the cooling water intake fish screen, lube oil cooling system and condenser re-tubing.

Justification:

Provides assurance that the station will be able to operate as planned with the addition of the cooling tower, and provides long-term southern system reliability benefits.

In-Service Date:

June 2011.

Revision:

Cost flow revision, and in-service date deferred ten months from August 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 14.2	\$ 5.2	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(3.7)	0.4	-	-	-	-
Revised Forecast	\$ 14.2	\$ 1.5	\$ 0.4	\$ -	\$ -	\$ -	\$ -

Laurie River/CRD Communications & Annunciation Upgrades

Description:

Upgrade the communications infrastructure and replace the annunciation systems with Programmable Logic Controller (PLC) based Unit Control Monitoring Systems (UCMS) at Laurie River, Missi Falls and Notigi.

Justification:

Updated communications infrastructure and annunciation systems will provide more accurate water level information from the Churchill River Diversion allowing Manitoba Hydro to optimize water flows through the lower Nelson River generating stations. In addition, the maintenance costs will be reduced significantly with the implementation of the new system.

In-Service Date:

August 2012.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.8	\$ 3.5	\$ -	\$ 1.1	\$ -	\$ -	\$ -
Increase (Decrease)	-	(2.6)	3.1	(0.4)	-	-	-
Revised Forecast	\$ 4.8	\$ 0.9	\$ 3.1	\$ 0.7	\$ -	\$ -	\$ -

Notigi Marine Vessel Replacement & Infrastructure Improvements

Description:

Replace the existing Notigi marine vessels with one self-propelled unit, refurbish the Dallas-Faye self-propelled barge, and upgrade the vessel tramway to prevent damaging vessels when removing them from the water.

Justification:

The marine vessels are over 31 years old and in need of numerous repairs and upgrades, including hull repairs which are very difficult to weld repair. In addition, changes in Canadian Coast Guard regulations will require stability tests, and it is expected that at least one of the vessels will not pass this test, and will be deemed unsuitable for operation.

In-Service Date:

September 2012.

Revision:

Increase total project cost to reflect more accurate cost estimates for a replacement vessel and increase project scope to include the refurbishment of the Dallas-Faye self-propelled barge.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 2.6	\$ 1.3	\$ 1.3	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	2.0	(0.4)	1.7	0.6	-	-	-
Revised Forecast	\$ 4.6	\$ 0.9	\$ 3.0	\$ 0.6	\$ -	\$ -	\$ -

Pointe du Bois Safety Upgrades

Description:

Implement safety upgrades for the Pointe du Bois generating station including fire protection, mechanical hazards, electrical hazards, operational hazards, trips and fall hazards, and various other safety upgrades.

Justification:

To provide a high level of health and safety upgrades as well as improved reliability and control, along with a reduction in potential environmental impacts from catastrophic events such as fire or flooding.

In-Service Date:

March 2017.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	50.0	0.5	1.6	5.5	11.2	16.0	15.2
Revised Forecast	\$ 50.0	\$ 0.5	\$ 1.6	\$ 5.5	\$ 11.2	\$ 16.0	\$ 15.2

Fire Protection Projects - HVDC

Description:

The replacement of the existing Incipient Fire Detection (IFD) panels at all HVdc Stations with new Fenwal Fire Detection Systems, the replacement of the Radisson station building fire piping and fire pumps, and the installation of a fire water backup system at Henday Station.

Justification:

More than half of the existing IFD panels have failed. They are costly to maintain and parts are difficult to obtain. The backup fire protection does not meet the fire code. The Radisson fire piping and pumps are inadequate and have no water left to fight fire spread should a transformer fail and deluge be activated. The current Henday fire water backup system is inadequate and runs dry up to 30 minutes prior to the fire department's arrival at site. New tanks will ensure fire containment and prevent spreading until the fire department's arrival.

In-Service Date:

October 2014.

Revision:

Cost flow revision, and in-service date deferred two years from October 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 5.2	\$ 0.4	\$ 1.6	\$ 1.7	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.2	(1.2)	(1.4)	1.2	1.0	-
Revised Forecast	\$ 5.2	\$ 0.6	\$ 0.4	\$ 0.3	\$ 1.2	\$ 1.0	\$ -

Halon Replacement Project

Description:

Remove and replace the existing Halon fire protection systems with approved state-of-the-art alternative technologies such as water and gaseous based systems.

Justification:

Replacing the existing Halon fire protection systems with approved alternative technologies improves the HVdc, hydraulic, and diesel systems availability, minimizes the risk of extremely expensive outage and repair costs, and minimizes lost revenue. Halon replacement is becoming a mandatory requirement through Federal and Provincial environmental regulations and legislation. National Fire Protection Association (NFPA) Life Safety Code 101 requires the adequate provision of fire protection where, in addition to equipment, the human element is also involved.

In-Service Date:

April 2013.

Revision:

Project estimate decreased to reflect current market rates. In-service date deferred 25 months from March 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 42.5	\$ 13.1	\$ 9.1	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	(6.1)	(8.5)	(3.6)	6.8	2.7	-	-
Revised Forecast	\$ 36.4	\$ 4.6	\$ 5.5	\$ 6.8	\$ 2.7	\$ -	\$ -

Oil Containment – Power Supply

Description:

Modifications and/or additions are required to prevent and contain oil spills: 1) *southern and northern hydraulic generating stations*: install oil/ water separators, modify drainage systems, and upgrade sump, fuel storage facilities and dyking systems; 2) *converter stations*: install an oil containment system to collect and recover any oil spilled within the station and encapsulate oil filled transformers/smoothing reactors at the three HVdc stations to stop gasket leaks.

Justification:

Previous experience with oil spills requires the Corporation to demonstrate due diligence with respect to containing and minimizing the potential for any further occurrences.

In-Service Date:

October 2016.

Revision:

Cost flow revision, and in-service date advanced seven months from May 2017.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 19.1	\$ 0.4	\$ 1.0	\$ 0.5	\$ 0.3	\$ 0.3	\$ 1.0
Increase (Decrease)	-	0.1	(0.4)	-	0.4	0.1	0.1
Revised Forecast	\$ 19.1	\$ 0.5	\$ 0.6	\$ 0.5	\$ 0.7	\$ 0.4	\$ 1.1

Grand Rapids Townsite House Renovations

Description:

Renovate 26 homes within the Grand Rapids Hybord Townsite, over a five year construction period.

Justification:

Providing adequate and modern housing is critical to attracting employees to fill job vacancies at Grand Rapids.

In-Service Date:

March 2015.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 5.2	\$ 0.4	\$ 0.9	\$ 1.2	\$ 1.3	\$ 1.3	\$ -
Increase (Decrease)	-	-	-	0.1	0.3	(0.3)	-
Revised Forecast	\$ 5.2	\$ 0.4	\$ 0.9	\$ 1.3	\$ 1.6	\$ 1.0	\$ -

Grand Rapids Fish Hatchery

Description:

Rehabilitate the main hatchery building, the aeration building, the east and west pump houses, shops building, the exterior tanks and grounds, and replace the water meter.

Justification:

Provide for the benefits of environmental protection, employee safety and the modernization of obsolete and high maintenance assets.

In-Service Date:

March 2012.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 2.2	\$ 1.1	\$ 0.9	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	-	0.2	-	-	-	-
Revised Forecast	\$ 2.2	\$ 1.1	\$ 1.1	\$ -	\$ -	\$ -	\$ -

Generation Townsite Infrastructure

Description:

Gillam townsite: 1) interior and exterior retrofit of 66 corporate houses; 2) replace 40 doublewide trailers on basements with ready-to-move (RTM) homes and construct 32 new housing units over eight years; and 3) construct a new shopping centre (possibly in partnership).

Justification:

Gillam infrastructure evaluation lists the following as substandard: water quality, sewage treatment, water and sewer lines, asphalt repairs, recreation facility, trailer park improvements, and town office building renovations.

In-Service Date:

March 2013.

Revision:

Cost flow revision, and in-service date deferred one year from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 52.1	\$ 8.4	\$ 5.4	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(2.3)	2.6	1.8	-	-	-
Revised Forecast	\$ 52.1	\$ 6.1	\$ 8.0	\$ 1.8	\$ -	\$ -	\$ -

Site Remediation of Contaminated Corporate Facilities

Description:

Conduct geotechnical investigation of the various contaminated corporate facilities and remediate contaminated areas to environmentally acceptable limits.

Justification:

Environmental concerns and/or regulations require that corporate facilities be investigated and remediated to restore them to a level which permits unrestricted use of the site.

In-Service Date:

March 2014.

Revision:

Cost flow revision, and in-service date deferred one year from March 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 34.7	\$ 1.2	\$ 1.1	\$ 1.1	\$ 0.2	\$ -	\$ -
Increase (Decrease)	-	(0.2)	0.6	(0.1)	1.4	-	-
Revised Forecast	\$ 34.7	\$ 1.0	\$ 1.7	\$ 1.0	\$ 1.6	\$ -	\$ -

High Voltage Test Facility

Description:

Build a new high voltage test facility at 1840 Chevrier Boulevard, including a high voltage hall with rail access, supporting labs, shop, storage, and office and receiving space.

Justification:

This facility will enable Manitoba Hydro to adequately meet present industry standards (CAN/CSA C88.1-96, CAN3-C13-M83, CAN/CSA C225-00, and the recently adopted IEC 619361-1) for the testing of all bushings, instrument transformers and aerial lift devices, while improving the efficiency and safety of our insulation testing practices. Testing extra high voltage equipment to industry standards is the optimal way to avoid costly forced outages and life threatening and environmentally damaging failures, safeguard the reliability of our power supply, and enhance safety during live line work.

In-Service Date:

August 2011.

Revision:

Cost flow revision, and in-service date deferred two months from June 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 26.9	\$ 13.5	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(1.6)	5.6	-	-	-	-
Revised Forecast	\$ 26.9	\$ 11.9	\$ 5.6	\$ -	\$ -	\$ -	\$ -

Security Installations / Upgrades

Description:

Install, upgrade and enhance security systems, such as fencing, close circuit TV, and card access systems at Power Supply HVdc and generating stations. Implement of a comprehensive "Public Water Safety Around Dams" program, which is generally compliant with the draft Canadian Dam Association (CDA) 2007 technical bulletin for Public Safety and Security Around Dams.

Justification:

The scope of work is intended to raise the security standards of the stations to the levels outlined in the Security Readiness Report and to be compliant with NERC standards.

In-Service Date:

March 2015.

Revision:

Cost flow revision, and in-service date advanced one year to March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 43.2	\$ 16.0	\$ 8.7	\$ 2.1	\$ 1.5	\$ 1.0	\$ 1.5
Increase (Decrease)	-	(7.4)	2.7	6.2	1.7	0.3	0.3
Revised Forecast	\$ 43.2	\$ 8.6	\$ 11.4	\$ 8.3	\$ 3.2	\$ 1.3	\$ 1.7

Sewer & Domestic Water System Install and Upgrade

Description:

Upgrade or replace domestic water and waste water systems at northern and southern generation/HVDC facilities to ensure a continuing safe supply of drinking water and compliance with waste water regulations.

Justification:

Ensure safety and compliance with legislation. The lack of filtration systems result in organic and other matter reacting with chlorine treatment to create possible carcinogenic substances.

In-Service Date:

November 2013.

Revision:

Project scope expanded to include Grand Rapids, Pointe du Bois, Seven Sisters, McArthur Falls and Slave Falls facilities. Final in-service date deferred 20 months from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 15.1	\$ 3.4	\$ 0.7	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	11.8	3.7	4.2	3.2	(0.1)	-	-
Revised Forecast	\$ 26.9	\$ 7.1	\$ 4.9	\$ 3.2	\$ (0.1)	\$ -	\$ -

Power Supply Domestic

Description:

This program consists of projects whose individual costs are of a relatively small amount. These projects are required to provide safe, reliable, efficient power supply, and to replace plant facilities which are at the end of their useful life.

Justification:

Enhancements or rehabilitation to the power supply facilities will ensure a safe reliable and efficient source of energy.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 19.3	\$ 19.7	\$ 20.1	\$ 20.5	\$ 20.9	\$ 111.1
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 19.3	\$ 19.7	\$ 20.1	\$ 20.5	\$ 20.9	\$ 111.1

TRANSMISSION:

Winnipeg - Brandon Transmission System Improvements

Description:

Perform environmental assessments and route selection, design and construct transmission and terminal facilities to provide firm supply to Portage South as follows: *Transmission:* 230 kV line 70 km Dorsey - Portage South, 230 kV double circuit line with only one side strung. *Terminations:* Extend 230 kV facilities at Dorsey and Portage South. Install three 10 MVAR, 66 kV capacitor banks at Portage South. Extend the 66 kV facilities with the addition of one breaker, one selector switch, three circuit switchers, three disconnect switches, and associated equipment. Replace one existing 66 kV breaker. Install a fourth 54 MVAR 115 kV capacitor at Brandon GS to match the existing installation of capacitors, including the associated circuit switcher and disconnects. *Communications:* Integrate with existing facilities at Dorsey and Portage South stations.

Justification:

By 2015, studies indicate that without voltage support in the western Manitoba 230 kV system, compliance with the transmission planning criteria would not be achieved on the 230 kV system in the Brandon and Portage areas during winter peak conditions for outages to line D12P.

A system planning study related to the restricted operation of Brandon Unit 5 determined that the system improvements identified in this capital project are required to avoid operating the Brandon combustion turbines and save in excess of \$1 million per year.

In-Service Date:

October 2014.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 40.0	\$ 1.6	\$ 3.4	\$ 3.6	\$ 5.0	\$ 21.7	\$ -
Increase (Decrease)	-	(0.3)	(1.4)	(1.1)	10.0	(6.7)	-
Revised Forecast	\$ 40.0	\$ 1.4	\$ 2.0	\$ 2.5	\$ 15.0	\$ 15.0	\$ -

Transcona East 230-66 kV Station

Description:

Design and build a new 230-66 kV station adjacent to 230 kV circuits R32V and R33V at a proposed site directly east of the existing Transcona station on the east side of the floodway. Tap 230 kV lines R32V & R33V; make provision for two 230-66 kV transformers, an eight breaker 230 kV ring bus, a six breaker 66 kV ring bus and associated equipment; complete with protection, control, metering and communication systems.

Justification:

This station is required to supply increased load to east Winnipeg, and to the 66 kV networked transmission system (supplied by the Ridgeway and existing Transcona stations), as well as part of the downtown area through an interconnection at Amy St. station.

In-Service Date:

December 2012.

Revision:

Project estimate revised to include the design and installation of protection, control and metering. In-service date advanced three months from March 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 31.0	\$ 11.0	\$ 13.2	\$ 5.1	\$ -	\$ -	\$ -
Increase (Decrease)	2.1	(0.6)	4.5	(1.5)	-	-	-
Revised Forecast	\$ 33.1	\$ 10.4	\$ 17.7	\$ 3.6	\$ -	\$ -	\$ -

Neepawa 230-66 kV Station

Description:

Perform environmental assessments and route selection, design and construct terminal facilities to provide firm supply to Neepawa as follows: *Transmission:* Sectionalize 230 kV T/L D54C into Neepawa 230 kV station, creating Dorsey - Neepawa and Neepawa - Cornwallis 230 kV circuits. Build a 66 kV tie line between the new 66 kV terminal and the existing 115/66 kV station. *Terminations:* Establish Neepawa 230-66 kV station, including three 230 kV circuit breakers, a 50/66/83.3/93.3 MVA, a 230-66 kV LTC transformer, six 66 kV circuit breakers and associated equipment. Adjust line protection equipment at Dorsey and Cornwallis 230 kV stations. Terminate two 230 kV transmission lines to Dorsey and Cornwallis. *Communications:* Integrate with existing facilities at Neepawa, Dorsey, and Cornwallis 230 kV stations. *System Control:* automate control, protection, equipment communications and software programming.

Justification:

These facilities provide transmission improvements required to supply Neepawa and related western region future load growth.

In-Service Date:

December 2013.

Revision:

Cost flow revision, and in-service date deferred 13 months from November 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 30.0	\$ 14.1	\$ 9.5	\$ 5.1	\$ -	\$ -	\$ -
Increase (Decrease)	-	(8.8)	2.5	-	5.7	0.7	-
Revised Forecast	\$ 30.0	\$ 5.3	\$ 12.0	\$ 5.1	\$ 5.7	\$ 0.7	\$ -

Pine Falls – Bloodvein 115 kV Transmission Line

Description:

Perform environmental assessments and route selection, design and construct transmission and terminal facilities to provide 115 kV supply to Bloodvein station as follows: *Transmission:* Construct a 115 kV line 80 km from Pine Falls - L48 to L5 Tap near Manigotagan. Disconnect L48 from L5 at tap location and connect L48 to new line, converting L48 from 66 kV to 115 kV operation up to Bloodvein. *Terminations:* Extend 115 kV facilities at Pine Falls. Replace 66 kV transformers at Loon Straits with two 115-7.2 kV 500 kVA transformers, and modify station for 115 kV supply. Construct a 115-66 kV station at Bloodvein, including two 115-66 kV 28 MVA transformers.

Justification:

This project provides increased transmission capacity required to supply Lake Winnipeg east area load increases.

In-Service Date:

October 2014.

Revision:

Project estimate lowered to reflect market conditions.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 34.1	\$ 0.3	\$ 0.9	\$ 4.4	\$ 20.6	\$ 7.8	\$ -
Increase (Decrease)	(1.0)	-	-	-	0.1	(1.0)	-
Revised Forecast	\$ 33.1	\$ 0.3	\$ 0.9	\$ 4.4	\$ 20.7	\$ 6.8	\$ -

Transmission Line Re-Rating

Description:

Over the past ten years Manitoba Hydro has conducted aerial surveys on the majority of its overhead transmission line system, using LiDAR aerial survey technology. Engineering analysis of the survey data identifies spans that have overhead clearance levels and/or lines that have thermal ratings which fall below the recommended limits as established by the Canadian Standards Association (CSA). To date an inventory of 180 transmission lines have been flown and analyzed (69-230kV, 26-138kV, and 85-115kV), with 75 of these being partially or fully remediated.

Justification:

The refurbishment program will increase line to ground clearances to allow higher conductor temperatures under all potential heavy current line loads. When under-rated lines are operated to the design temperatures recorded in Manitoba Hydro's equipment rating database, the deficient spans could result in a safety hazard to the general public. In addition, there is a risk that any contact with vegetation could put Manitoba Hydro in violation of the NERC standard.

In-Service Date:

December 2012.

Revision:

Cost flow revision, and in-service date deferred two months from October 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 24.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	1.1	1.3	-	-	-	-
Revised Forecast	\$ 24.1	\$ 1.1	\$ 1.3	\$ -	\$ -	\$ -	\$ -

St Vital - Steinbach 230 kV Transmission

Description:

Perform environmental assessments and route selection, obtain licensing, acquire property, design and construct transmission and terminal facilities to provide 230 kV supply to Steinbach as follows: *Transmission:* Construct a 230 kV line 40 km between St. Vital and Steinbach stations. Salvage 23.5 km of 115 kV line between Ile Des Chenes and Randolph station. *Terminations:* Extend 230 kV facilities at St. Vital station. Construct a 230-66 kV station near Steinbach, including a 230-66 kV 95 MVA transformer. Install telecommunication facilities required for operation of the 230 kV line and Steinbach 230-66 kV station.

Justification:

Provides a 230 kV supply including transmission line, 230-66 kV station, and telecommunication facilities into the Steinbach area which will support load growth in south eastern Manitoba.

In-Service Date:

October 2020.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 32.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 20.0
Increase (Decrease)	-	-	-	-	-	-	0.3
Revised Forecast	\$ 32.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 20.3

Rosser Station 230-115 kV Bank 3 Replacement

Description:

Replace Rosser bank 3 with a 150/200/250 MVA transformer similar to bank 1. Replace the tertiary bus. Upgrade the existing 115 kV transmission lines, add breaker lock-out functionality for banks 1 to 4, and purchase and install DURA-BASE mats for transformer transportation through the station yard.

Justification:

With continued load growth on the North Winnipeg and Selkirk 115 kV systems due to summer peak loads, low water conditions on the Winnipeg River and exports to Ontario; additional capacity will be required. In addition, this replacement will prevent equipment overloads in the event of a failure to bank 1 at Rosser station, and maintain export power.

In-Service Date:

May 2010.

Revision:

Project scope increased to include upgrades to the existing 115 kV transmission lines, adding breaker lock-out functionality for banks 1 to 4, and the purchase and installation of DURA-BASE mats for transformer transportation through the station yard. In-service date for breaker lock-out functionality deferred two months from March 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 5.8	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	1.6	0.6	-	-	-	-	-
Revised Forecast	\$ 7.4	\$ 0.6	\$ -	\$ -	\$ -	\$ -	\$ -

Rosser - Inkster 115 kV Transmission

Description:

Build a second 8.2 km 115 kV line between Rosser and Inkster stations.

Justification:

A second line between Rosser and Inkster stations will alleviate contingency overload issues on the St. James to Tylehurst 115 kV underground cable, in the event of the failure of the existing Rosser – Inkster circuit.

In-Service Date:

October 2010.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 5.1	\$ 1.4	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	1.2	-	-	-	-	-
Revised Forecast	\$ 5.1	\$ 2.6	\$ -	\$ -	\$ -	\$ -	\$ -

Transcona Station 66 kV Breaker Replacement

Description:

Replace nine 66 kV breakers and one disconnect at 115/66 kV Transcona station.

Justification:

The breakers are being replaced based on 3-phase fault levels that exceed 95% of the breaker manufacturer's interrupting rating. These breakers are old (35-38 years), were made by a company that is no longer in business (Canadian General Electric) and cannot be certified for a higher interrupting rating. Failure of one of these lines or bank breakers will cause a transformer or line outage and lost supply power to customers between 7.3 MW and 42.8 MW, which would affect more than 10 000 customers.

In-Service Date:

July 2015.

Revision:

Cost flow revision, and in-service date deferred 17 months from February 2014.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 6.0	\$ 3.6	\$ 1.8	\$ 0.6	\$ -	\$ -	\$ -
Increase (Decrease)	-	(3.6)	(1.4)	2.3	1.5	1.1	-
Revised Forecast	\$ 6.0	\$ 0.0	\$ 0.4	\$ 2.9	\$ 1.5	\$ 1.1	\$ -

Dorsey 500 kV R502 Breaker Replacement

Description:

Replace the Dorsey 500 kV R502 breaker with a new 500 kV SF6 filled breaker complete with pre-insertion resistors, remove the GE ATB-80 air blast circuit breaker, remove the 3 000 PSI compressor system, and purchase one spare breaker pole.

Justification:

The R502 breaker is now operating beyond its expected useful life cycle, without an option to rebuild. Two 3 000 PSI compressors work simultaneously to supply the breaker with compressed air, and are now at the end of their useful lives and need to be replaced. Without replacement, breaker failure could result in cleanup, outage and damage costs that would exceed \$1.0 million. Additionally, should a second breaker fail at the same time that a breaker was being replaced; there would be a significant reduction in export power.

In-Service Date:

November 2009.

Revision:

Cost flow revision, and actual in-service achieved one month later than the previous date of October 2009.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 2.6	\$ 0.2	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.1	-	-	-	-	-
Revised Forecast	\$ 2.6	\$ 0.3	\$ -	\$ -	\$ -	\$ -	\$ -

13.2kV Shunt Reactor Replacements

Description:

Purchase and install fifteen 13.2 kV, 20MVA oil-type shunt reactors to replace all of the Ferranti Packard reactors currently in the system.

Justification:

Ferranti Packard reactors are installed at six stations throughout Manitoba (Cornwallis, Rosser, Raven Lake, Overflow River, Mystery Lake and LaVerendrye). These reactors were manufactured in 1964 and are well past their estimated useful life of 30 years. If a unit were to fail, system operations would be affected, with no replacement system immediately available.

In-Service Date:

October 2018.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 33.0	\$ -	\$ 4.1	\$ 4.2	\$ 4.3	\$ 4.4	\$ 16.1
Increase (Decrease)	-	-	(0.1)	(0.1)	(0.1)	(0.1)	0.3
Revised Forecast	\$ 33.0	\$ -	\$ 4.0	\$ 4.1	\$ 4.2	\$ 4.3	\$ 16.4

Canexus Load Addition

Description:

Build a 115 kV transmission line from the Brandon generating station to 65th Street East station with associated terminations, and reconductor 115kV Line BK41 to satisfy the Canexus Chemicals Canada LP load addition.

Justification:

A construction agreement between Canexus and Manitoba Hydro was signed in December 2009, which provides for upgrades to increase firm load from 174 MVA to 223 MVA, to accommodate consolidated operations and increased production in Brandon. The cost of the project is fully recoverable, with the payment schedule specifying contributions ahead of expenditures, resulting in a negative project cost.

In-Service Date:

February 2012.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	(0.2)	(0.8)	2.0	-	-	-	-
Revised Forecast	\$ (0.2)	\$ (0.8)	\$ 2.0	\$ -	\$ -	\$ -	\$ -

Birtle South - Rossburn 66 kV Line

Description:

Build a new 66 kV line from the 66 kV Birtle Queen station to Rossburn station. The new line will be terminated at Birtle South station with a new 66 kV breaker.

Justification:

This new transmission line will increase reliability for the Birtle South 230-66 kV station area by reducing the occurrence of line outages. In addition, voltage levels on the Birtle South 66 kV system will become adequate to maintain acceptable voltage levels at regulated distribution stations.

In-Service Date:

October 2015.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.9	\$ -	\$ -	\$ -	\$ 0.1	\$ 0.3	\$ 4.5
Increase (Decrease)	-	-	-	-	-	-	-
Revised Forecast	\$ 4.9	\$ -	\$ -	\$ -	\$ 0.1	\$ 0.3	\$ 4.5

Stanley Station 230-66 kV Permanent Transformer Addition

Description:

Permanently install the 230-66 kV transformer (previously positioned as a hot-standby) and associated equipment for the Stanley station. Relocate 230 kV towers for line S60L outside of the station to allow for the desired 230 kV bus ring configuration, and re-terminate three lines (S60L, Line 3 and Line 51). Install communications equipment for the new bank including SCADA/RTU.

Justification:

The absence of firm transformation capacity at Stanley station requires the station's load to be transferred to St. Leon, Portage South, and Morden Corner stations following a Stanley transformer outage. This load transfer creates unacceptably low sub-transmission and distribution voltages, which negatively impacts customer equipment and automated processes in Morden, Winkler and the surrounding areas.

In-Service Date:

October 2015.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 21.1	\$ -	\$ -	\$ 1.8	\$ 8.1	\$ 7.6	\$ 3.5
Increase (Decrease)	-	-	-	(0.1)	(0.0)	(0.1)	0.3
Revised Forecast	\$ 21.1	\$ -	\$ -	\$ 1.7	\$ 8.1	\$ 7.5	\$ 3.8

Stanley Station 230-66 kV Hot Standby Installation

Description:

Install an 84/112/140 MVA, 230-66 kV transformer and associated equipment at Stanley station as a hot standby, along with transformer protection equipment.

Justification:

The low sub-transmission and distribution voltages created by transferring Stanley station load will negatively impact customer equipment and their automated processes in the towns of Morden and Winkler and the surrounding areas, potentially affecting customer service to more than 15,000 customers. Deferral will place quality of supply to local customers at risk. Customer equipment and product will be damaged, and automated (voltage sensitive) processes will be halted. In addition, one of Manitoba Hydro's major customers will be adding significant new load in 2009, also necessitating this installation.

In-Service Date:

October 2010.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 6.2	\$ 1.2	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.1	-	-	-	-	-
Revised Forecast	\$ 6.2	\$ 1.3	\$ -	\$ -	\$ -	\$ -	\$ -

Enbridge Pipelines: Clipper Project Load Addition Phase 1

Description:

Build a new 32.7 km, 66 kV line using 336 ACSR conductor that will become Line 22 between Letellier station and the Enbridge Gretna pumping site. Terminate the new Line 22 with the installation of a 66 kV breaker and associated equipment at Letellier station. Reconnector 7.2 km of 66 kV Line 51 using 266.8 ACSR conductor from St. Leon station to the Enbridge Manitou pumping site, reconnector 500 metres of 66 kV using 336 ACSR conductor on Line 43 between Glenboro South station and the Enbridge Glenboro pumping site, and reconnector 120 metres of 66 kV using 336 ACSR conductor on the Line 94 tap to the Enbridge Cromer pumping site.

Justification:

To provide electrical supply to four pumping stations owned by Enbridge Pipelines Inc., as specified in the Construction Agreements signed between Manitoba Hydro and Enbridge Pipelines Inc. This project forms an integral component of Enbridge Pipelines Inc.'s business plan to ship oil from Alberta to the southern United States for processing. Failure to meet the customer's in-service date may result in financial loss to the customer. Approximately 83% of project costs are recoverable, with the payment schedule requiring contributions be paid in 2010.

In-Service Date:

October 2010.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	1.0	5.2	0.3	-	-	-	-
Revised Forecast	\$ 0.9	\$ 5.2	\$ 0.3	\$ -	\$ -	\$ -	\$ -

TCPL Keystone Project

Description:

Establish 66 kV primary supplies to six pumping stations (Rapid City, Portage, Carman, Haskett, Wellwood and Crandall) owned by TransCanada Pipelines (TCPL). Install a 66 kV capacitor bank near Manitoba Hydro's Elm Creek station.

Justification:

TCPL requires an electrical supply to six new crude oil pumping stations located in Manitoba for their Keystone project. Construction Agreements were signed with Manitoba Hydro in August 2008 (for the first four pumping stations) and in June 2009 (for the last two pumping stations) for this work. The agreements specify that TCPL will pay contributions totaling \$8.4 million for the provision of these supplies, most of which are due in 2010. The 66 kV capacitor bank near Elm Creek is required in order to maintain adequate voltage to the TCPL Carman pumping station and to existing Manitoba Hydro distribution stations in the area.

In-Service Date:

August 2012

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	8.0	2.3	1.9	1.6	-	-	-
Revised Forecast	\$ 8.0	\$ 2.3	\$ 1.9	\$ 1.6	\$ -	\$ -	\$ -

Ashern Station Bank Addition

Description:

Install a third 230-66 kV transformer bank rated 57/76/95 MVA with an On Load Tap Changer (OLTC) and create a 66 kV four-breaker ring bus at Ashern station, complete with equipment to facilitate protection of the new bank and ring bus. Relocate 66 kV lines L39 and L49 to terminate into the new ring bus.

Justification:

The existing annual load growth and the addition of future Lake Manitoba Narrows Cottage Development load necessitate a capacity increase. The recommended capacity increase will keep Ashern station below its winter firm limit for the next 20 years.

In-Service Date:

May 2014.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	10.6	0.1	0.4	3.5	5.6	1.0	-
Revised Forecast	\$ 10.6	\$ 0.1	\$ 0.4	\$ 3.5	\$ 5.6	\$ 1.0	\$ -

Ashern Station 230 kV Shunt Reactor Replacement

Description:

Purchase a 230 kV, 50MVAR shunt reactor to replace the existing Ashern station reactor.

Justification:

The Ashern reactor was installed in 1972 and has now reached the end of useful life, and is now considered a risk to the area's transmission and distribution system. When this reactor is down, one unit at Grand Rapids has to be switched from generator to synchronous condenser for the duration of the outage. Additionally, Manitoba Hydro currently does not have a system spare reactor that will support the 230 kV class.

In-Service Date:

December 2012.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 2.7	\$ -	\$ -	\$ 2.7	\$ -	\$ -	\$ -
Increase (Decrease)	-	-	-	-	-	-	-
Revised Forecast	\$ 2.7	\$ -	\$ -	\$ 2.7	\$ -	\$ -	\$ -

Tadoule Lake DGS Tank Farm Upgrade

Description:

Design and install four 500 000 litre single wall above ground vertical diesel fuel tanks and associated piping, spill containment dyke modifications to accommodate the new tanks, and a fuel tank level monitoring system. Project also includes salvaging the existing 30 above ground horizontal diesel fuel tanks.

Justification:

The current permit to operate a petroleum storage facility at Tadoule Lake will expire on December 31, 2011. Of the 30 tanks, 11 are not built to Underwriters Laboratories of Canada S601 standards, and must be withdrawn from service. Additionally, the remaining 19 tanks require replacement to be compliant with Canadian Council of Ministers of the Environment PN 1326. The cost reflects contributions from Indian and Northern Affairs Canada at a rate of 75% based on preliminary negotiations, to be paid upon in-service.

In-Service Date:

December 2011.

Revision:

Cost flow revision, and in-service date deferred one year from December 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 1.1	\$ 0.5	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	4.6	(4.3)	-	-	-	-
Revised Forecast	\$ 1.1	\$ 5.1	\$ (4.3)	\$ -	\$ -	\$ -	\$ -

Interlake Digital Microwave Replacement

Description:

Build a modern microwave communications system between the Dorsey transmission station and the Lower Nelson River. The existing Interlake microwave system is approximately 31 years old, is one of two communications systems used to operate the DC power system, and requires replacement by a modern, highly dependable communications system.

Justification:

A replacement communications system is required for dependable communications to operate the DC power systems, and to provide for the continued supply of reliable power to Manitoba Hydro's domestic and export customers.

In-Service Date:

November 2010.

Revision:

Cost flow revision, and in-service date deferred one month from October 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 19.7	\$ 0.4	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.3	-	-	-	-	-
Revised Forecast	\$ 19.7	\$ 0.7	\$ -	\$ -	\$ -	\$ -	\$ -

Pilot Wire Replacement

Description:

Replace existing Pilot Wire protection schemes to provide redundancy to major industrial and residential customers that are either running without protection or must be subject to an outage because of repairs on Pilot Wire schemes that generally have no alternative routes.

Justification:

The current equipment is no longer manufactured or supported by vendors.

In-Service Date:

December 2009.

Revision:

Project estimate decreased to reflect lower material and construction costs. Actual in-service was achieved two months later than the previous plan of October 2009.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 9.6	\$ 1.4	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	(1.3)	(0.9)	-	-	-	-	-
Revised Forecast	\$ 8.3	\$ 0.5	\$ -	\$ -	\$ -	\$ -	\$ -

Transmission Line Protection & Teleprotection Replacement

Description:

Replace obsolete protection and associated communications equipment for 30 transmission lines with phase comparison protection schemes. The new protection will provide "A" and "B" redundant relay schemes, and all communication signals will provide "A" and "B" teleprotection units with redundant channels.

Justification:

These protection systems must be replaced due to the history of false operations, degraded performance of the back-up protection, slower back-up fault clearing which can impact the Dorsey HVdc system, and unreliability of schemes using ATH-2 relays. Repairing and restoring failed equipment has proven very difficult. There is concern that the remaining spare parts, which are the same vintage as the failing in-service equipment, may not be functional, and cannot be repaired. Loss of the teleprotection equipment means the loss of the high-speed primary protection for these important lines. The backup protection for these lines has been identified as too slow by system performance. The availability of these lines has a direct impact on how much power Manitoba Hydro is able to import or export.

In-Service Date:

March 2016.

Revision:

Cost flow revision, and in-service date deferred 19 months from August 2014.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 21.1	\$ 6.1	\$ 6.1	\$ 2.3	\$ 1.1	\$ 0.9	\$ -
Increase (Decrease)	-	(5.3)	(3.4)	1.5	3.2	2.5	2.7
Revised Forecast	\$ 21.1	\$ 0.8	\$ 2.7	\$ 3.8	\$ 4.3	\$ 3.4	\$ 2.7

Winnipeg Central Protection Wireline Replacement

Description:

Migrate the former Winnipeg Hydro area communications from metallic wireline to optical fibre cables. Install a Remote Terminal Unit (RTU) at four stations (Keewatin, Strathcona, Cambridge, and Empress) along with the transfer of 69 kV points from the supervisory to the new RTU at these four stations, and a GPS satellite clock for 15 Winnipeg Central stations to ensure all protective relays have the same time base for fault analysis.

Justification:

Wireline communications cables are unsuitable for most modern power system control and protection equipment applications; and therefore, retention of such cables has little future value. This project also minimizes or eliminates the need for hazardous work adjacent to high voltage cables.

In-Service Date:

June 2013.

Revision:

Increase project scope to include the installation of a Remote Terminal Unit (RTU) at four stations along with the transfer of 69 kV points from the supervisory to the new RTU at these four stations, and a GPS satellite clock for 15 Winnipeg Central stations. In-service deferred 21 months from September 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 9.3	\$ 0.6	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	1.2	0.9	0.4	-	-	-	-
Revised Forecast	\$ 10.5	\$ 1.5	\$ 0.4	\$ -	\$ -	\$ -	\$ -

Mobile Radio System Modernization

Description:

Replace the VHF mobile radio system with a modern digital system of increased capability.

Justification:

This system is becoming obsolete due to regulatory changes taking place in both Canada and the United States. Manitoba Hydro requires a very dependable mobile radio communication system under its own control and independent of any public system, as public systems cannot guarantee service under adverse conditions and are affected by peak public traffic which can overload the public system.

In-Service Date:

December 2015.

Revision:

Cost flow revision, and in-service date deferred two years from December 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 30.7	\$ 2.5	\$ 9.2	\$ 10.6	\$ 8.0	\$ -	\$ -
Increase (Decrease)	-	(2.1)	(6.7)	(4.5)	(5.1)	11.7	7.1
Revised Forecast	\$ 30.7	\$ 0.4	\$ 2.5	\$ 6.1	\$ 2.9	\$ 11.7	\$ 7.1

Cyber Security Systems

Description:

Install or upgrade security and network systems for secure remote access, industrial data network installations, and compliance to NERC standards CIP-002 to CIP-009.

Justification:

The Cyber Security Standards CIP-002 to CIP-009 are part of NERC reliability standards, which Manitoba Hydro is legally bound to comply with, and subject to penalties and/or sanctions for non-compliance.

In-Service Date:

March 2012.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 10.1	\$ 0.4	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.9	-	-	-	-	-
Revised Forecast	\$ 10.1	\$ 1.3	\$ -	\$ -	\$ -	\$ -	\$ -

Site Remediation of Diesel Generating Stations

Description:

For each of the former diesel generating stations in Beren's River, Brochet, Churchill, Cormorant, Cranberry Portage, Little Grand Rapids, Manigotogan, Moose Lake, Norway House, Shamattawa, The Pas and Wanless, conduct geotechnical investigation, prepare a report with cleanup recommendations, remediate any contaminated areas identified, and issue a final report confirming the facility and surrounding area were remediated and all areas of the work were left in accordance with applicable environmental regulations.

Justification:

Due to environmental concerns and regulations applicable to unrestricted use of abandoned former diesel sites, these sites must be restored to the equivalency of the surrounding area. The estimate reflects cost-sharing arrangements with Indian and Northern Affairs Canada for work required at Beren's River (22.3%), Little Grand Rapids (22.3%), Moose Lake (44%), Norway House (22.3%) and Shamattawa (50%).

In-Service Date:

March 2013.

Revision:

Cost flow revision, and in-service date deferred one year from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 13.3	\$ 3.8	\$ 1.1	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	-	0.8	0.3	-	-	-
Revised Forecast	\$ 13.3	\$ 3.8	\$ 1.9	\$ 0.3	\$ -	\$ -	\$ -

Oil Containment - Transmission

Description:

Design and construct systems to contain oil spills from apparatus in switchyards.

Justification:

Minimize environmental impact of oil spills.

In-Service Date:

March 2013.

Revision:

Cost flow revision, and in-service date deferred two years from March 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 7.4	\$ 0.5	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.3	0.2	-	-	-	-
Revised Forecast	\$ 7.4	\$ 0.8	\$ 0.2	\$ -	\$ -	\$ -	\$ -

Station Battery Bank Capacity & System Reliability Increase

Description:

Conduct individual studies, and replace and/or upgrade battery bank capacity and chargers in 156 transmission and distribution stations and seven stand-alone communications sites, in order to meet the NERC requirements to have a workable system restoration plan. Includes AC service upgrades and building upgrades or extensions.

Justification:

Present battery banks were designed to an eight hour standard (normal DC loads), and there are concerns many may no longer meet the standard, due to additional DC loads and age related deterioration. Current corporate simulations indicate that, with the current battery sizing, system restoration will be inhibited if a black start situation should occur. Stations with a restoration plan will require 12 hours and dual battery systems with multiple chargers where practical. Stations without a restoration plan require capacity for a 16 hour duration.

In-Service Date:

March 2016.

Revision:

Cost flow revision, and in-service date deferred one year from March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 46.5	\$ 4.7	\$ 6.4	\$ 6.4	\$ 6.6	\$ 6.3	\$ -
Increase (Decrease)	-	0.3	(0.7)	(1.6)	(0.8)	(1.8)	4.4
Revised Forecast	\$ 46.5	\$ 5.0	\$ 5.7	\$ 4.8	\$ 5.8	\$ 4.5	\$ 4.4

Waverley Service Centre Oil Tank Farm Replacement

Description:

Replacement of all remaining single wall oil tanks at the Waverley Service Centre Oil Tank Farm.

Justification:

The tanks at this tank farm have reached their end of life and must be removed from service to ensure compliance with all environmental regulations. The tanks cannot be repaired due to the standard imposed by the Province of Manitoba. Failure to replace the tanks will significantly restrict the ability to provide clean processed oil for maintenance requirements.

In-Service Date:

December 2013.

Revision:

Cost flow revision, and in-service date deferred one month from November 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 3.0	\$ 1.0	\$ 0.6	\$ 0.4	\$ 0.5	\$ -	\$ -
Increase (Decrease)	-	0.1	(0.1)	-	0.2	-	-
Revised Forecast	\$ 3.0	\$ 1.1	\$ 0.5	\$ 0.4	\$ 0.7	\$ -	\$ -

Transmission Domestic

Description:

This program consists of projects whose individual costs are of a relatively small amount. The majority of projects consist of additions, improvements and maintenance of transmission lines; replacement, development and upgrades to communication systems; additions and replacement of field maintenance equipment; as well as station upgrades.

Justification:

This program ensures the reliability of transmission with respect to load, outages, and import/export requirements; as well as addresses safety issues and provides the necessary support for the operation and maintenance of the transmission system.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 30.0	\$ 30.6	\$ 31.2	\$ 31.8	\$ 32.4	\$ 172.2
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 30.0	\$ 30.6	\$ 31.2	\$ 31.8	\$ 32.4	\$ 172.2

CUSTOMER SERVICE & DISTRIBUTION:

Winnipeg Distribution Infrastructure Requirements

Description:

Complete assessment and emergency replacement as required of distribution underground equipment in the City of Winnipeg, including plant previously associated with Winnipeg Hydro.

Justification:

As the Underground Assessment (UGA) project progresses throughout Winnipeg, the number of failures caused by transformers has decreased. Other benefits of the UGA project include: decreased potential for employee accidents, decreased potential for public contact, extending transformer life, decreased outage duration, and increased customer satisfaction.

In-Service Date:

March 2014.

Revision:

Project estimate increased to reflect higher transformer failure rates and higher replacement costs. In-service date deferred four years from March 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 14.9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	9.6	2.2	2.3	2.3	2.3	-	-
Revised Forecast	\$ 24.5	\$ 2.2	\$ 2.3	\$ 2.3	\$ 2.3	\$ -	\$ -

Defective RINJ Cable Replacement

Description:

Replace approximately 62,500 metres of underground distribution 5 kV and 15 kV copper rubber insulated neoprene jacketed (RINJ) concentric neutral cable (also known as or "Red Jacket" cable) installed in the Winnipeg area between 1955 and 1965.

Justification:

RINJ underground cable installed between 1955 and 1965 failed at a rate of 9.6 failures per 100 kilometers, which was three times higher than the failure rate at which cable replacement is recommended by the CEA. Replacement of the cable reduces the number of underground cable failures and the negative impacts on customer reliability.

In-Service Date:

March 2012.

Revision:

Cost flow revision, and in-service date deferred one year from March 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 8.7	\$ 2.6	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(1.6)	2.1	-	-	-	-
Revised Forecast	\$ 8.7	\$ 1.0	\$ 2.1	\$ -	\$ -	\$ -	\$ -

Rover 4 kV Station Salvage & Feeder Conversion

Description:

Remove existing 4 kV switchgear and supervisory protection equipment and replace with new equipment capable of withstanding fault levels at this site. Install a current limiting reactor. Modify one feeder and relocate two others. Build a new substation building, replace three 66-4 kV transformer banks, extend the distribution ductline system and feeders to the new building, salvage the carpenter shop building, and the 4 kV building and its transformer banks.

Justification:

This equipment has been in-service since 1950 and its safe operation requires inefficient procedures and fault levels exceed its rating. Protective relaying, local control and metering functions are provided via electro-mechanical relays, manual switches, and analog meters located in a separate building, and provide decreasing reliability due to mechanical deterioration.

In-Service Date:

March 2013.

Revision:

Cost flow revision, and in-service date deferred 16 months from November 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 12.7	\$ 3.3	\$ 3.9	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(3.2)	(0.8)	4.3	-	-	-
Revised Forecast	\$ 12.7	\$ 0.1	\$ 3.1	\$ 4.3	\$ -	\$ -	\$ -

Martin New 66-4 kV Station

Description:

Install a new three bank outdoor station complete with 18 feeder positions and protection to replace the existing Martin station.

Justification:

Martin station is a 51 year old, two bank 12.47/4.16 kV station that has exceeded firm capacity. It is supplied from Rover station which is also being upgraded. Neither bank can be relied on as backup for the other, and there is no mobile backup available or external tie to neighbouring stations. Without improvements, 7 500 customers including residential, apartment blocks, heavy industry, and commercial businesses could be without power for an unacceptable period (48 hours minimum) in the event of an emergency, such as a transformer failure at Rover.

In-Service Date:

March 2015.

Revision:

Cost flow revision, and in-service date deferred three years from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 28.2	\$ 14.5	\$ 9.1	\$ 2.4	\$ -	\$ -	\$ -
Increase (Decrease)	-	(13.5)	(4.0)	4.5	9.0	1.8	-
Revised Forecast	\$ 28.2	\$ 1.0	\$ 5.1	\$ 6.9	\$ 9.0	\$ 1.8	\$ -

Frobisher Station Upgrade

Description:

Replace both 7.5/10 MVA transformer banks with 18/24/30 MVA banks complete with 66 kV and 12.47 kV breakers, including eight new 12 kV feeder positions and two 4.5 MVAR capacitor banks. Upgrade six existing feeder automatic circuit re-closers (ACRs). Salvage banks 1 and 2 - 7.5/10 MVA transformers. Construct a new building, install a Remote Terminal Unit (RTU), communications, security system and fire protection.

Justification:

Two fully utilized 12 kV stations serving the south St Vital area were loaded to a combined 8.1 MVA over firm capacity in the summer of 2003. Load has grown an average of 2.25 MVA per year for the last ten years, and is projected to grow another 46.3 MVA over the next 16 years. Land acquisition problems prevented building a new station north of the perimeter highway.

In-Service Date:

October 2010.

Revision:

Cost flow revision, and in-service date deferred seven months from March 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 14.4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	1.6	-	-	-	-	-
Revised Forecast	\$ 14.4	\$ 1.6	\$ -	\$ -	\$ -	\$ -	\$ -

Burrows New 66-12 kV Station

Description:

Build a new two bank 66 kV-12 kV indoor station, complete with 12 feeder positions and protection to replace the Alfred and Charles stations.

Justification:

Most of the equipment in this part of Winnipeg has been in service for 76 years. Alfred Station (which supplies Charles Station) lacks access to a satisfactory alternate supply in the event of a 12 kV interruption out of Rover Station. Remedial action was recommended for both stations in the Due Diligence Report. It indicated the 4 kV switchgear lineups at Alfred and Charles Stations lack arc-resistance and at Alfred Station are sometimes underrated for the available fault current during normal operating conditions. It also had concerns that neither station has an appropriate battery room, all station transformers have patched leaks, they contain asbestos materials, and that spare parts are in short supply.

In-Service Date:

March 2013.

Revision:

Cost flow revision, and in-service date deferred one year from March 2012.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 28.6	\$ 12.2	\$ 5.0	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(8.0)	7.2	6.4	-	-	-
Revised Forecast	\$ 28.6	\$ 4.2	\$ 12.2	\$ 6.4	\$ -	\$ -	\$ -

Winnipeg Central Oil Switch Project

Description:

Remove the remaining 26 oil switches located in various manhole sites throughout Winnipeg Central District. Install pad-mount switchgear and/or pad-mount transformers, and reroute existing primary feeder and customer service cables as required.

Justification:

The oil switches are corroding and are not rated for the maximum available fault current on the system. If a failure occurs or the oil must be replaced, a lengthy shutdown will be required. Replacement will alleviate the risks associated with switching primary feeders in confined spaces. Pad-mount equipment allows adequate clearances and efficiency for switching, maintaining, and upgrading for future customer load additions.

In-Service Date:

March 2011.

Revision:

Cost flow revision, and in-service date deferred 16 months from November 2009.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 7.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.2	-	-	-	-	-
Revised Forecast	\$ 7.1	\$ 0.2	\$ -	\$ -	\$ -	\$ -	\$ -

Teulon East 66-12 kV Station

Description:

Build a new 66-12.47/7.2 kV traditional wood pole station to replace the existing Teulon Station, and salvage the existing station.

Justification:

Project required as there have been several prolonged outages over the past two years caused by fuses dropping open and the misalignment of 66 kV switches due to the structure leaning from frost heave. Rebuilding the station at the existing location would address the drainage issue and resulting safety issues, however due to the small size of the site the operational difficulties would still exist in the station.

In-Service Date:

October 2010.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	4.6	4.5	0.1	-	-	-	-
Revised Forecast	\$ 4.6	\$ 4.5	\$ 0.1	\$ -	\$ -	\$ -	\$ -

William New 66-12 kV Station

Description:

Build a new two bank 66-12 kV indoor station, on Manitoba Hydro owned property, with protection and communication capability to the Central District Control Centre (CDCC) and the System Control Centre (SCC) for ten feeder positions.

Justification:

This project will allow for load transfers from King station, which will alleviate overloading as a result of operating limits imposed by cooling problems. Load transfers from Sherbrook station will allow for redundant feeds from different stations to supply critical services reducing the implication of a contingency equipment failure. Improvements in service reliability and accommodation for future distribution automation can be realized from new equipment. Manitoba Hydro already owns land at the south east corner of William Avenue and Tecumseh Street for a new station.

In-Service Date:

October 2012.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 10.3	\$ 3.6	\$ 3.1	\$ 2.9	\$ -	\$ -	\$ -
Increase (Decrease)	-	(3.3)	(2.7)	6.4	-	-	-
Revised Forecast	\$ 10.3	\$ 0.3	\$ 0.4	\$ 9.3	\$ -	\$ -	\$ -

Waverley West Sub Division Supply

Description:

Install 20MVA capacity complete with pad mounted voltage regulators, 24 kV-2400 kVAR capacitor banks, S&C automated switching cubicles and fibre optic communication link.

Justification:

Waverley West subdivision is a new development in an area predominantly supplied by 12 and 24 kV feeders. The 12 kV feeders cannot support more load. The nearest viable 24 kV feeder does not allow standard distribution equipment to be used due to high available fault currents. In addition, by using the 24 kV feeders, reliability to existing customers is reduced. This project is required to ensure the Waverley West subdivision customers have reliable service.

In-Service Date:

March 2011.

Revision:

Cost flow revision, and in-service date deferred 15 months from December 2009.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 6.5	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	3.0	-	-	-	-	-
Revised Forecast	\$ 6.5	\$ 3.0	\$ -	\$ -	\$ -	\$ -	\$ -

St. James New Station & 24 kV Conversion

Description:

Build a new 115-24 kV St. James Station, new and upgraded feeders, and conversion of St. James, Ness, Berry and King Edward station feeders from 4 kV to 24 kV.

Justification:

This project is required to ensure firm supply and a reliable system in the St. James area.

In-Service Date:

March 2017.

Revision:

Cost flow revision, and in-service date deferred four years from March 2013.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 65.9	\$ 14.1	\$ 31.6	\$ 18.9	\$ -	\$ -	\$ -
Increase (Decrease)	-	(14.0)	(29.0)	(13.0)	6.8	10.4	40.0
Revised Forecast	\$ 65.9	\$ 0.1	\$ 2.6	\$ 5.9	\$ 6.8	\$ 10.4	\$ 40.0

Shoal Lake New DSC & Town Conversion

Description:

Build a two bank Distribution Supply Centre (DSC) and rebuild and convert the town distribution system.

Justification:

The existing station is 49 years old and requires re-building. The distribution system has encountered problems with voltage drops. This project represents the least cost alternative for the restoration of reliable, quality service in the foreseeable future.

In-Service Date:

October 2010.

Revision:

Cost flow revision, and in-service date deferred 13 months from September 2009.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 3.6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.2	-	-	-	-	-
Revised Forecast	\$ 3.6	\$ 0.2	\$ -	\$ -	\$ -	\$ -	\$ -

York Station Bank & Switchgear Addition

Description:

Add a transformer bank and switchgear for nine feeder positions.

Justification:

Increasing capacity at York station alleviates loading problems at King station and interim relief at Sherbrook, and provides for future new loads that cannot be adequately supplied by existing King, Edmonton, and York capacity.

In-Service Date:

March 2011.

Revision:

Cost flow revision, and in-service date deferred six months to March 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.0	\$ 1.8	\$ 0.1	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	1.0	(0.1)	-	-	-	-
Revised Forecast	\$ 4.0	\$ 2.7	\$ -	\$ -	\$ -	\$ -	\$ -

Cromer North Station & Reston RE12-4 25 kV Conversion

Description:

Convert the westerly portion of Reston Feeder RE12-4 from 12 kV to 25 kV by November 30, 2009, and install one 66-25 kV transformer in Cromer North station by September 2011.

Justification:

A new five mile feeder and 25 kV feeder conversion is required at Reston to address the increased demand due to oilfield exploration.

In-Service Date:

September 2011.

Revision:

Cost flow revision only.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.3	\$ 0.1	\$ 1.2	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.2	0.1	-	-	-	-
Revised Forecast	\$ 4.3	\$ 0.3	\$ 1.3	\$ -	\$ -	\$ -	\$ -

Brandon Crocus Plains 115-25 kV Bank Addition

Description:

Install two 15/20/25 MVA OLTC 115-25 kV transformers. Install one 115 kV breaker to connect the transformers to line BF52. Install 3 x 25 kV breakers, four reclosers and associated equipment to connect the transformers, and provide four additional 25 kV feeders into the industrial park.

Justification:

To supply the load growth and the industrial loads in the south Brandon area.

In-Service Date:

October 2012.

Revision:

Cost flow revision, and in-service date deferred one year from October 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 6.3	\$ 3.1	\$ 1.9	\$ 0.6	\$ -	\$ -	\$ -
Increase (Decrease)	-	(3.1)	(1.9)	5.6	-	-	-
Revised Forecast	\$ 6.3	\$ -	\$ -	\$ 6.2	\$ -	\$ -	\$ -

Neepawa North Feeder NN12-2 & Line 57 Rebuild

Description:

Rebuild the main portion of feeder NN12-2 and a 16 km section of line 57.

Justification:

The poles have reached the end of their useful life and pole replacements must now be made or the entire line must be rebuilt. A section of line 57 that contains feeders NN12-4 and NN12-2 was built in 1953 and is over 57 years old. A field report indicates that 75% of the line is in poor condition. Larger under-build wire on feeder NN12-2 is required to improve voltage and losses, and a larger 66 kV wire is recommended to improve voltage fluctuations and losses.

In-Service Date:

August 2010.

Revision:

Cost flow revision, and in-service date deferred six months from February 2010.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 1.9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	1.9	-	-	-	-	-
Revised Forecast	\$ 1.9	\$ 1.9	\$ -	\$ -	\$ -	\$ -	\$ -

Line 27 66kV Extension and Arborg North DSC

Description:

Build 27.4 km of 66 kV line with 266A conductor from Riverton station to Arborg West station to improve supply reliability to Arborg West and Riverton stations and install a 10MVA 66-12.47/7.2kV Distribution Supply Centre (DSC) 11.3 km directly north of the town of Arborg to supply the northern reaches of Feeders AW12-4, AW12-6 and RN12-4.

Justification:

Manitoba Hydro and CSA standards for voltage have been exceeded due to load currents on Arborg West Feeders AW12-4 and AW12-6. In addition, the plant cannot be adequately protected as load currents have become significant compared to system strength in the area.

In-Service Date:

September 2011.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	6.0	0.4	5.4	-	-	-	-
Revised Forecast	\$ 6.0	\$ 0.4	\$ 5.4	\$ -	\$ -	\$ -	\$ -

Health Sciences Centre Service Consolidation and Distribution Upgrade

Description:

Salvage the existing distribution network at the Health Sciences Centre (HSC) complex, comprised of 32 service points, and re-build using a modular, dual radial-feed distribution system consisting of five service points.

Justification:

Much of the equipment within the existing HSC complex is over 75 years old and reaching its expected end of life. Due to the age of most of the existing vault transformers, replacement parts are not obtainable and a new method of servicing will be required in the event of equipment failure. Given the age of the existing underground cables, the likelihood of cable faults is now increased. Many of the vault transformers are sub-grade, difficult to access and do not meet limits of approach restrictions.

The design of the modular dual radial distribution system introduces levels of redundancy into the HSCs current distribution structure increasing service reliability and safety. It is expected that within the next thirty years, the HSC and the University of Manitoba (UM) will require additional services which will draw an anticipated 20MVA of new load. The existence of 32 metering points for these two customers causes a great many difficulties for business representatives. By consolidating their electrical services, they will both be eligible for the General Service Large rate, significantly decreasing their service costs.

In-Service Date:

December 2015.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	15.8	3.6	3.6	3.1	2.2	3.2	0.1
Revised Forecast	\$ 15.8	\$ 3.6	\$ 3.6	\$ 3.1	\$ 2.2	\$ 3.2	\$ 0.1

AECL Station Switchgear Replacement

Description:

Salvage the 4 kV switchgear and install four ACRs (Automatic Circuit Reclosers) to supply four feeders via cable to a new POD (Point of Delivery) at the Atomic Energy of Canada Limited (AECL) customer-owned switchgear located outside of the station fence.

Justification:

Manitoba Hydro was notified in 2009 by AECL that service will be required for another 30-40 years. The 4 kV switchgear at AECL is at end of life and must be replaced. There are no spare parts available and the arc chutes have asbestos. The building housing the switchgear is 47 years old and does not meet today's clearances and safety standards. The battery banks are 31 years old and are due for replacement.

In-Service Date:

July 2011.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	2.4	1.1	1.1	-	-	-	-
Revised Forecast	\$ 2.4	\$ 1.1	\$ 1.1	\$ -	\$ -	\$ -	\$ -

Waverley South DSC Installation

Description:

Install two 10 MVA, 66-12.47 kV Distribution Supply Centres (DSCs), two three phase 12 kV, 585A padmounted regulators, two 25 kV 600A Vista Gear four way switching cubicles complete with controllers, three 3 phase 600A reclosers, and one 50 kVA single-phase padmounted transformer.

Justification:

This station supplies both the south Fort Garry and La Salle communities (both fast growing) and provides a back-up supply to the St. Norbert single bank station. This option addresses the non-firm capacity issues at a significantly lower cost than the initial plan, provides superior system reliability and its automatic load transfer feature offers recovery in minutes versus hours when a transformer fails.

In-Service Date:

March 2011.

Revision:

Project scope increased to reflect the installation of two 66-12.47 kV, 10 MVA DSCs along with all associated equipment and landscaping on the Waverley South site.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 2.4	\$ 0.4	\$ 2.0	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	1.5	3.4	(2.0)	-	-	-	-
Revised Forecast	\$ 3.9	\$ 3.8	\$ -	\$ -	\$ -	\$ -	\$ -

Niverville Station 66-12 kV Bank Replacements

Description:

Replace two existing 66-12 kV, 3.75/5.0 MVA transformers at Niverville station with two new 66-12 kV, 7.5/10/12.5 MVA transformers.

Justification:

This project was initiated as last year's peak load readings indicated that the capacity of this station has been exceeded. In addition, the Town of Niverville is planning to develop a total of 600 residential subdivision lots over the next three years.

In-Service Date:

April 2010.

Revision:

Cost flow revision, and in-service date deferred six months from October 2009.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 2.6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	0.6	-	-	-	-	-
Revised Forecast	\$ 2.6	\$ 0.6	\$ -	\$ -	\$ -	\$ -	\$ -

Customer Service & Distribution Domestic

Description:

This program consists of projects whose individual costs are of a relatively small amount. These projects are required to extend sub-transmission, distribution, and transformation facilities to supply service to residential, farm, commercial and industrial customers, and to replace plant facilities whose useful life has been exceeded. Specific types of expenditures that make up electric domestic items include station and line additions, modifications and rebuilds, bank additions, breaker replacements, defective cable replacement, highway changes, field maintenance equipment, and ice melting requirements. These costs are spread over many facility locations throughout the Province.

Justification:

The residential, farm, commercial and industrial loads are expected to grow at an average rate in excess of 1.5% per annum and will require a program of additions to the system to accommodate these anticipated loads.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 117.5	\$ 119.9	\$ 122.3	\$ 124.7	\$ 127.2	\$ 675.3
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 117.5	\$ 119.9	\$ 122.3	\$ 124.7	\$ 127.2	\$ 675.3

CUSTOMER CARE & MARKETING:

Advanced Metering Infrastructure

Description:

Purchase and install an automated metering infrastructure (AMI) communication network to remotely read and electronically disseminate electric meter readings and other relevant customer information to appropriate departments and divisions.

Justification:

Satisfies the ongoing need for routine, periodic meter readings in customer billing as well as provides 'on demand' readings to respond to customer inquiries. Other benefits include: increased customer satisfaction due to greater billing accuracy; better detection of theft of service, meter tampering and defective meters; greater flexibility in the timing and consolidation of billings; and improved detection of customer and system power outages with shortened restoration times.

In-Service Date:

March 2016.

Revision:

Cost flow revision, and in-service date deferred one year from March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 30.9	\$ 4.0	\$ 5.3	\$ 5.4	\$ 5.6	\$ 4.3	\$ -
Increase (Decrease)	-	(4.0)	(1.4)	(0.1)	(0.2)	1.3	8.6
Revised Forecast	\$ 30.9	\$ -	\$ 4.0	\$ 5.3	\$ 5.4	\$ 5.6	\$ 8.6

Customer Care & Marketing Domestic

Description:

This program covers the additions and replacements of electric meters.

Justification:

As required for the connection of new customers to the system, as well as replacement of existing time expired or faulty meters.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 2.6	\$ 2.6	\$ 2.7	\$ 2.7	\$ 2.8	\$ 14.7
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 2.6	\$ 2.6	\$ 2.7	\$ 2.7	\$ 2.8	\$ 14.7

FINANCE & ADMINISTRATION:

Corporate Buildings Program

Description:

Cyclical acquisitions, refurbishments, and/or replacement of corporate administrative facilities throughout the Province.

Justification:

Enables a safe, efficient, and productive environment for staff and customers.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 8.0	\$ 8.0	\$ 8.0	\$ 8.0	\$ 8.0	\$ 40.0
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 8.0	\$ 8.0	\$ 8.0	\$ 8.0	\$ 8.0	\$ 40.0

Workforce Management

Description:

Implement a work force management solution to integrate and automate the Customer Care & Marketing planning and dispatch functions, as well as provide for in-truck computing.

Justification:

Facilitates the integration of field processes to improve customer service and field productivity; as well as, reducing clerical functions and employee travel time.

In-Service Date:

April 2011.

Revision:

Cost flow revision, and in-service date advanced two months from June 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 11.3	\$ 1.0	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	-	-	-	-	-	-
Revised Forecast	\$ 11.3	\$ 1.0	\$ -	\$ -	\$ -	\$ -	\$ -

Fleet Acquisitions

Description:

Cyclical procurement, refurbishment and/or replacement of corporate fleet vehicles and equipment.

Justification:

To provide a fleet of safe, reliable and efficient corporate vehicles and equipment.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 13.5	\$ 13.8	\$ 14.1	\$ 14.3	\$ 14.6	\$ 77.7
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 13.5	\$ 13.8	\$ 14.1	\$ 14.3	\$ 14.6	\$ 77.7

Finance & Administration Domestic

Description:

The programs consist primarily of information technology hardware, software, application development, and associated services to the corporation. In addition, there are programs to provide for property easements and to a lesser degree equipment for fleet, property and materials management.

Justification:

Computer system enhancements are required throughout the corporation to achieve ongoing improvements in resource productivity and reliability. Property easements and equipment purchases are required for supporting the appropriate areas of the corporation.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 24.4	\$ 24.9	\$ 25.4	\$ 25.9	\$ 26.4	\$ 140.4
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 24.4	\$ 24.9	\$ 25.4	\$ 25.9	\$ 26.4	\$ 140.4

GAS OPERATIONS:

CUSTOMER SERVICE & DISTRIBUTION:

Ile Des Chenes NG Transmission Network Upgrade

Description:

Upgrade the Ile Des Chenes natural gas transmission network by installing 220 meters of NPS 12 steel natural gas transmission pipeline, two 16" isolation valve assemblies, and abandoning approximately 10 meters of NPS 16 steel natural gas transmission pipeline and one NPS 12 plug valve.

Justification:

The upgrades will increase the reliability of gas supply to the city of Winnipeg and communities north and east of Winnipeg. The current configuration of the Ile Des Chenes transmission system at the Red River Floodway crossing does not allow for isolation of the NPS 16 pipeline in the event of damage, which could negatively impact approximately 203,000 natural gas customers.

In-Service Date:

October 2011.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	1.2	0.8	0.4	-	-	-	-
Revised Forecast	\$ 1.2	\$ 0.8	\$ 0.4	\$ -	\$ -	\$ -	\$ -

Centerport NPS 16 Natural Gas Transmission Main

Description:

Relocate 2.2 kms of existing NPS 16 natural gas transmission pipeline, which requires the installation of 3.1 kms of NPS 16 to permit the construction of an above grade highway interchange at PTH 101 and Saskatchewan Avenue.

Justification:

The existing location of the NPS 16 Oakbluff natural gas transmission pipeline is at risk of damage and poses a safety risk to the public if it is not relocated prior to the commencement of the interchange construction. In addition, the existing configuration of the Oakbluff Transmission Pressure Network could leave some natural gas regulation stations within the City of Winnipeg vulnerable in the event of damage to the NPS 16 natural gas transmission pipeline. The relocation of the main will assist in preventing damage during construction or the loss of service to Manitoba Hydro's natural gas customers. The costs for this project will be jointly shared by Manitoba Hydro and Manitoba Infrastructure and Transportation as per the Treasury Board Policy for Utility Relocations within highway right of ways. This will result in a 50/50 cost split for all capital costs related to the relocation.

In-Service Date:

December 2010.

Revision:

New item.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	1.7	1.7	-	-	-	-	-
Revised Forecast	\$ 1.7	\$ 1.7	\$ -	\$ -	\$ -	\$ -	\$ -

Gas SCADA Replacement

Description:

Replace the current Gas Supervisory Control and Data Acquisition (SCADA) system with a vendor-supported SCADA system.

Justification:

Replacement of the current gas SCADA system is required as product support is being discontinued by the vendor, and vendor alternative product does not meet the complete system requirements for Manitoba Hydro.

In-Service Date:

September 2011.

Revision:

Cost flow revision, and in-service date deferred three months from June 2011.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 4.6	\$ 3.0	\$ 0.6	\$ -	\$ -	\$ -	\$ -
Increase (Decrease)	-	(1.2)	2.0	-	-	-	-
Revised Forecast	\$ 4.6	\$ 1.8	\$ 2.6	\$ -	\$ -	\$ -	\$ -

Customer Service & Distribution Domestic

Description:

This program consists of projects whose individual costs are of a relatively small amount. These projects are required to extend, rebuild or upgrade: transmission pipelines, distribution pipelines, regulating stations, and customer service lines.

Justification:

Required to provide ongoing safe and reliable supply of natural gas to customers.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 21.2	\$ 21.7	\$ 22.1	\$ 22.5	\$ 23.0	\$ 122.0
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 21.2	\$ 21.7	\$ 22.1	\$ 22.5	\$ 23.0	\$ 122.0

CUSTOMER CARE & MARKETING:

Advanced Metering Infrastructure

Description:

Purchase and install an automated metering infrastructure (AMI) communication network to remotely read and electronically disseminate gas meter readings and other relevant customer information to appropriate departments and divisions.

Justification:

Satisfies the ongoing need for routine, periodic meter readings in customer billing as well as provides 'on demand' readings to respond to customer inquiries. Other benefits include: increased customer satisfaction due to greater billing accuracy; better detection of theft of service, meter tampering, defective meters and leaks; and greater flexibility in the timing and consolidation of billings.

In-Service Date:

March 2016.

Revision:

Cost flow revision, and in-service date deferred one year from March 2015.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	\$ 15.0	\$ 1.0	\$ 5.4	\$ 8.3	\$ -	\$ -	\$ -
Increase (Decrease)	-	(1.0)	(4.4)	(2.9)	8.4	-	-
Revised Forecast	\$ 15.0	\$ -	\$ 1.0	\$ 5.4	\$ 8.4	\$ -	\$ -

Demand Side Management

Description:

Design, implement and deliver incentive based PowerSmart conservation programs to reduce gas consumption and greenhouse gas emissions in Manitoba. When combined with savings realized to-date, total natural gas savings of 149 million cubic meters are expected to be achieved by 2025.

Justification:

The natural gas Demand Side Management plan provides customers with exceptional value through the implementation of cost-effective energy conservation programs that are designed to minimize the total cost of energy services to customers, position the Corporation as a national leader in implementing cost-effective energy conservation and alternative energy programs, protect the environment and promote sustainable energy supply and service.

In-Service Date:

Ongoing.

Revision:

The change in expenditures is due to revisions to energy saving and expenditures for a number of programs based on current and updated market information.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 13.1	\$ 11.6	\$ 11.7	\$ 11.1	\$ 10.2	\$ 39.2
Increase (Decrease)		(1.9)	0.5	0.7	(0.7)	0.2	(1.9)
Revised Forecast		\$ 11.2	\$ 12.0	\$ 12.4	\$ 10.4	\$ 10.4	\$ 37.3

Customer Care & Marketing Domestic

Description:

This program covers the additions and replacements of gas meters.

Justification:

As required for the connection of new customers to the system, as well as replacement of existing time expired or faulty meters.

In-Service Date:

Ongoing.

Revision:

No change.

	Total	2011	2012	2013	2014	2015	2016-20
Previously Approved	NA	\$ 2.8	\$ 2.9	\$ 2.9	\$ 3.0	\$ 3.0	\$ 16.1
Increase (Decrease)		-	-	-	-	-	-
Revised Forecast		\$ 2.8	\$ 2.9	\$ 2.9	\$ 3.0	\$ 3.0	\$ 16.1