

## APPENDIX 1

### ABBREVIATIONS

2015 Plan	2015 Electricity Supply Resource Procurement Plan
2016 Efficiency Assessment	2016 Updated Efficiency Potential Assessment provided by Nexant

#### **A**

AC	Alternating current
ACE	Area Control Error
AECO	Alberta Energy Company
AESO	Alberta Electric System Operator
AGC	Automated generation control
AMI	Advanced Metering Infrastructure
aMW	Average megawatts, a unit of energy
AOC	Administrative Order of Consent Regarding Impacts from Wastewater Facilities
ARM	Administrative Rules of Montana
Ascend	Ascend Analytics, LLC
ATC	Around-the-clock
ATC	Available Transfer Capability, a measure of remaining power transmission capability over and above already committed use (MW)
ATR	Acceleration Trend Relay

#### **B**

BA	Balancing Authority
BAAL	Balancing Authority ACE limit

BART	Best available retrofit technology
Basin Creek	Basin Creek Equity Partners, LLC
BBER	University of Montana – Bureau of Business and Economic Research
BEA	U.S. Bureau of Economic Analysis
BLM	U.S. Bureau of Land Management
BOR	U.S. Bureau of Reclamation
BPA	Bonneville Power Administration
Btu/kWh	British thermal unit per kilowatt-hour, typical unit for heat rate
<b>C</b>	
CAA	Clean Air Act
CAISO	California Independent System Operator
CBI	CB&I Stone & Webster, Inc.
CCCT	Combined cycle combustion turbine
CCR	Coal combustion residuals
CDD	Cooling Degree Days
CELP	Colstrip Energy Limited Partnership
CEMS	Continuous Emission Monitoring System
CFLs	Compact florescent lamps
CHEOPS	Computer Hydro Electric Operations and Planning Software
CIG	Colorado Interstate Gas
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
COD	Commercial operation date
CPP	Clean Air Act Section 111(d) or Clean Power Plan
CPR	Clean Power Research
CPS2	NERC Control Performance Standard 2
CREP	Community Renewable Energy Project

CSES	Colstrip Steam Electric Station
CSP	Concentrating solar power
CT	Combustion turbine
CU1	Colstrip Unit 1
CU2	Colstrip Unit 2
CU3	Colstrip Unit 3
CU4	Colstrip Unit 4

**D**

DAHS	Data acquisition and handling system
DC	Direct current
DER	Distributed energy resource
DGGS	Dave Gates Generating Station
DHI	Diffuse horizontal insolation
Dkt	Dekatherm, a unit of energy (1 dkt = 1 MMBtu)
DOE	U.S. Department of Energy
DR	Demand response
DSM	Demand-side management
DNV-GL	DNV KEMA Renewables, Inc.

**E**

E3	Energy and Environmental Economics, Inc.
EE	Energy efficiency
EFOR	Equivalent forced outage rate
EIA	U.S. Energy Information Administration
EIM	Energy Imbalance Market
ELCC	Effective load-carrying capacity
EOP	Economically Optimal Portfolio

EPA	U.S. Environmental Protection Agency
ESB	Energy Supply Board
ETAC	Electric Technical Advisory Committee
EUI	Energy use index

**F**

FERC	Federal Energy Regulatory Commission
FIP	Federal Implementation Plan
FOM	Fixed operating and maintenance costs
Forum	Pacific Northwest Adequacy Forum
FR	Federal Register
Frame CT	Frame Simple Cycle Combustion Turbine
FWS	U.S. Fish and Wildlife Service

**G**

GCR	Ground cover ratio
GDP	Gross domestic product
GHG	Greenhouse gases
GHI	Global horizontal insolation
GW	Gigawatt, a unit of power (1,000,000,000 Watts)
GWh	Gigawatt-hour, a unit of energy (1,000 MWh)

**H**

HAN	Home area networks
HAP	Hazardous air pollutant
HDD	Heating Degree Days
HDR	HDR Engineering, Inc.
HHV	Higher Heating Value

HL	Heavy Load (on peak hours per Mid-Columbia definition)
HP	Horsepower, a unit of power (1 HP is approximately 746 Watts)
HVAC	Heating, ventilating and air conditioning
Hydros	NorthWestern’s 2014 acquisition of hydroelectric generation plants and dams
Hz	Hertz, a unit of frequency
<b>I</b>	
ICE	Intercontinental Exchange
ICE	Internal combustion engine
IEEE	Institute of Electrical and Electronics Engineers
IGCC	Integrated gasification combined cycle
IOU	Investor-owned utility
ISO	Independent system operator
<b>K</b>	
kV	Kilovolt, a unit of voltage (1,000 Volts)
kVA	Kilovolt-ampere, a unit of apparent power (1,000 Volt-Amperes)
kW	Kilowatt, a unit of power (1,000 Watts)
kWh	Kilowatt-hour, a unit of energy
<b>L</b>	
Lands	Lands Energy Consulting
Lb.	Pound, a unit of weight
LEDs	Light-emitting diodes
LID	Light induced degradation
LIEAP	Low Income Energy Assistance Program
LL	Light Load (off peak hours per Mid-Columbia definition)

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LM	Lockheed Martin
LOL	Loss of load
LOLD	Loss of load days
LOLE	Loss of load expectation
LOLH	Loss of load hours
LOLP	Loss of load probability
<b>M</b>	
Maf	Million acre-feet, a unit of volume used for reservoirs
MATL	Montana Alberta Tie Line
MATS	Mercury and Air Toxic Rule
MCA	Montana Code Annotated
MCC	Montana Consumer Counsel
Mcfh	Thousand cubic feet per hour, a unit of volumetric flow rate
MDDQ	Maximum daily delivery quantity
MDEQ	Montana Department of Environmental Quality
MDNRC	Montana Department of Natural Resources and Conservation
MFWP	Montana Fish Wildlife and Parks
Mid-C	Mid-Columbia River electric trading hub
MMBtu	Million British thermal units, a unit of energy
MMcfd	Million cubic feet per day, a unit of volumetric flow rate
MPSC	Montana Public Service Commission
MPT	Mountain Prevailing Time
MW	Megawatt, a unit of power (1,000,000 Watts)
MW <sub>AC</sub>	Megawatt of power with alternating current, commonly used to describe solar PV power after DC-to-AC conversion
MW <sub>DC</sub>	Megawatt of power with direct current commonly used to describe battery or solar PV power before DC-to-AC conversion

MWh	Megawatt hour, a unit of energy (1,000 kWh)
MW <sub>P</sub>	Megawatts (peak), a measure of the rated DC power output of a solar PV system
<b>N</b>	
NAAQS	National Ambient Air Quality Standards
NAESB	North American Energy Standards Board
NCAT	National Center for Appropriate Technology
NEEA	Northwest Energy Efficiency Alliance
NERC	North American Electric Reliability Corporation
Nexant	Nexant Consulting Inc.
NGX	NGX, owned by TMX Group Limited
Non-Spin	Non-spinning contingency reserves
NO <sub>x</sub>	Nitrous oxide
NPV	Net present value
NREL	National Renewable Energy Laboratory
NRF	Northwest Regional Forecast
NSR	New Source Review
NW	Northwest
NWE	NorthWestern Energy
NWPCC	Northwest Power and Conservation Council
NWPP	Northwest Power Pool
NYMEX	New York Mercantile Exchange, Inc.
<b>O</b>	
O&M	Operation & maintenance
OASIS	Open Access Same-Time Information System
OOA	Colstrip Unit 3 & 4 Ownership and Operation Agreement

**P**

Plan	2015 Electricity Supply Resource Procurement Plan
PM	Particulate Matter
PM <sub>10</sub>	EPA air quality standard for particulate matter smaller than 10 microns in diameter
PM&E	Protection, mitigation, and enhancement
PNUCC	Pacific Northwest Utilities Conference Committee
PPA	Power purchase agreement
PPL	Pennsylvania Power & Light
PPT	Pacific Prevailing Time
PSC	Public Service Commission
PSD	Prevention of Significant Deterioration
PSIG	Pounds per square inch gauge, a unit of pressure relative to atmospheric pressure
PTC	Production Tax Credit
PTO	Participating Transmission Owner
PUC	Public utility commission
PUD	Public utility district
PURPA	Public Utility Regulatory Policies Act
PV	Photovoltaic

**Q**

QF	Qualifying Facility, as defined by PURPA
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**R**

RAAC	NWPCC Resource Adequacy Advisory Committee
RAS	Remedial action scheme
RBC	Reliability-Based Control



RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Credit
REMI	Regional Economic Models, Inc.
RFP	Request for Proposal
RICE	Reciprocating internal combustion engine
ROTR	Run-of-the-river
RPS	Renewable Portfolio Standard (as defined by § 69-3-2004, MCA)
RTO	Regional transmission organization

**S**

SCADA	Supervisory control and data acquisition
SCCT	Simple cycle combustion turbine
SCR	Selective catalytic reduction, an NO <sub>x</sub> emissions reduction process
SO <sub>2</sub>	Sulfur dioxide
SOGF	South of Great Falls Cut Plane
SO <sub>x</sub>	Sulfur oxide
Spin	Spinning contingency reserves
SPP	Southwest Power Pool
Synapse	Synapse Energy Economics, Inc.

**T**

TAC	Technical advisory committee
Talen	Talen Energy LLC
TIFID	Butte Tax Increment Financing Industrial District
TOU	Time of use
Ton	A unit of weight (1 ton = 2,000 lbs.)
Tonne	Metric ton, a unit of weight (1 tonne = 1,000 kg = 2,204.6 lbs.)
TPVRR	Total present value of revenue requirements

TRC	Total resource cost
TSP	Transmission service provider
TTC	Total transfer capability, a measure of power transmission (MW)

**U**

USB	Universal System Benefits
USFWS	U.S. Fish and Wildlife Services

**V**

VA	Volt-Ampere, a unit of apparent power
VAR	Volt-Ampere reactive, a unit of reactive power
VOC	Volatile organic compound
VOM	Variable operating and maintenance costs

**W**

WACC	Weighted average cost of capital
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council
Western EIM	CAISO/PacifiCorp EIM

**Y**

YELP	Yellowstone Energy Limited Partnership
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