NEEDS v.4.10 User Guide

The National Electric Energy Data System (NEEDS) is the database of existing and planned-committed units which are modeled in the EPA Base Case v.4.10. Units that are currently operational in the electric industry are termed as “existing” units. Units that are not currently operating but are firmly anticipated to be operational in the future, and have either broken ground (initiated construction) or secured financing are termed “planned-committed”.

NEEDS is maintained in spreadsheet format. Below is a guide to the fields found in NEEDS.

Field Name	Column	Definition	Key to Recurring Column Values	
Plant Name	A	The plant's name.	———	
UniqueID_Final	B	The unique identifier assigned to a boiler or generator within a plant. It consists of the Plant ID (or ORIS Code), an indication of whether the unit is a boiler ("B"), generator ("G"), or committed unit ("C"), and the Unit ID. For example, for the Unique ID "113_B_1", "113" is the Plant ID, "B" indicates that this unit is a boiler, and "1" indicates that the ID of the boiler is 1.	———	
ORIS Plant Code	C	A unique identifier assigned to each power plant in NEEDS. While the ORIS code is unique for each plant, all generating units within a plant will typically have the same ORIS code. For committed units (i.e., those not currently operating, but firmly anticipated to be operational in the future), the entry in this field might be a dummy ORIS code assigned as a placeholder unique ID to the committed plant. (Note: ORIS originally referred to the Office of Regulatory Information Systems in the Department of Energy (DOE) Energy Information Administration (EIA) which was responsible for assigning unique identification codes to utility power plants.)	———	
Boiler/Generator/Committed Unit	D	An indicator of whether the unit is a boiler, generator, or committed unit. Committed units are those with a future expected in-service date (see “On Line Year”)	B	Boiler
			G	Generator
			C	Committed Unit
Unit ID	E	The identifier assigned to each unit/boiler in a given plant.	———	
CAMD Database UnitID	F	Unit-level identifier assigned by EPA's Clean Air Markets Division (CAMD) business system. Unlike other identification codes (e.g., ORIS codes), which are subject to change, once assigned to a unit, the CAMD Database Unit ID does not change. Used primarily for internal tracking purposes at EPA.	———	

Field Name	Column	Definition	Key to Recurring Column Values
PlantType	G	The type of electric generating unit, usually defined by the "prime mover" and/or fuels burned. "Prime mover" refers to the machine (e.g., engine, turbine, water wheel) that drives an electric generator or the device that converts energy to electricity directly (e.g., photovoltaic solar and fuel cell(s)).	Biomass Coal Steam Combined Cycle Combustion Turbine Fossil Waste Fuel Cell Geothermal Hydro IGCC Landfill Gas Municipal Solid Waste Non-Fossil Waste Nuclear O/G Steam Pumped Storage Solar Tires Wind
Combustion Turbine/IC Engine	H	Clarifies the engine type for units with “Combustion Turbine” plant type. An Internal Combustion (IC) Engine is a reciprocating engine which uses pistons to extract energy from a fluid to perform work. A Combustion Turbine is a stand-alone turbine combusting fuel to drive a generator (a combined cycle less the Heat Recovery Steam Generator (HRSG)).	Combustion Turbine IC Engine
Region Name	I	The region, used in the Integrated Planning Model (IPM), where the generating unit is located. IPM regions are defined to enable IPM to accurately represent the operation and structure of U.S. and Canada electric power system. IPM regions are generally subdivisions of the 10 North American Electric Reliability Council (NERC) regions and aggregations of the electricity grid's contiguous control areas. IPM also includes Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands.	See Appendix I and Appendix II
State Name	J	These four fields identify the geographic location of the unit. The State Code is the FIPS State Code, and the County Code is the FIPS County Code. New units have blanks in these columns, while committed units have zeros. Federal information processing standards (FIPS) codes are a standardized set of numeric or alphabetic codes issued by the National Institute of Standards and Technology (NIST) to ensure uniform identification of geographic entities through all federal government agencies.	———
State Code	K		———
County	L		———
County Code	M		———
FIPS5	N		———
Capacity (MW)	O	The net summer dependable capacity (in megawatts) of the unit available for generation for sale to the grid. Net summer dependable capacity is the maximum capacity that the unit can sustain over the summer peak demand period reduced by the capacity required for station services or auxiliary equipment.	———

Field Name	Column	Definition	Key to Recurring Column Values	
Heat Rate (Btu)	P	The net heat input (in Btu) required to generate 1 kilowatt hour of electricity. It is a measure of a generating unit's efficiency.	———	
On Line Year	Q	The year in which the unit is commissioned.	———	
Retirement Year	R	The year in which the unit is to be decommissioned. ("9999" indicates that the unit has not been retired.)	———	
Firing	S	This field, which applies only to boilers, indicates the burner type and configuration (e.g., cell, cyclone, FBC (fluidized bed combustion), stoker/SPR, tangential, or vertical). A blank appears in instances where the firing characteristics of a boiler are unknown or the unit is a not a boiler.	Cell: boilers that combine 2-3 standard burners into a compact, vertical assembly installed on the furnace wall; multiple cells utilized within a furnace.	
			Cyclone: A special type of burner for coals with low fusion point ashes. Combustion occurs within the horizontal burner generating high temps which turn the ash into molten slag. The term "wet bottom" furnace often accompanies the cyclone burner.	
			FBC: "fluidized bed combustion" where solid fuels are suspended on upward-blowing jets of air, resulting in a turbulent mixing of gas and solids and a tumbling action which provides especially effective chemical reactions and heat transfer during the combustion process.	
			Stoker/SPR: stoker boilers where lump coal is fed continuously onto a moving grate or chain which moves the coal into the combustion zone in which air is drawn through the grate and ignition takes place. The carbon gradually burns off, leaving ash which drops off at the end into a receptacle, from which it is removed for disposal.	
			Tangential (also referred to as "corner firing"): burners located along furnace corners in multiples of 4. Burner angle is off-set working in conjunction with the opposing corner burner to create a vertical, circular swirling combustion zone within the furnace.	
			Turbo (wall fired burner): Burner design for pet coke and low volatile bituminous coals (Riley trademark name: "Turbo Furnace"). Hour glass shaped furnace with rectangular shaped burners angled downwards.	
			Vertical: standard furnace (assume wall fired)	
			Wall: standard burner / furnace design used today. Circular burners located on the front and rear furnace walls at multiple elevations.	
Bottom	T	This field, which applies only to boilers, indicates whether the bottom of the combustion chamber is "wet" (i.e., ash is removed from the furnace in a molten state) or "dry" (i.e., the boiler has a furnace bottom temperature below the ash melting point and the bottom ash is removed as a solid). A blank appears in instances where the bottom characteristics of a boiler were not known or the unit was not a boiler.	Dry Wet	
Cogen?	U	This field indicates whether a unit is a cogenerator. A unit is considered a	Y	Yes

Field Name	Column	Definition	Key to Recurring Column Values	
		cogenerator if it produces electricity and another form of useful thermal energy (such as heat or steam), used for industrial, commercial, heating, or cooling purposes.	N	No
Modeled Fuels	V	Fuels that are reported to be combusted by the unit.	Biomass Bituminous Distillate Fuel Oil Fossil Waste Geothermal Hydro Landfill Gas Lignite MSW Natural Gas Non-Fossil Waste Nuclear Fuel Petroleum Coke Pumped Storage Residual Fuel Oil Solar Subbituminous Tires Waste Coal Wind	
Wet/DryScrubber	W	This field indicates if a unit has an SO_2 scrubber, and, if so, whether it is a wet or dry scrubber. Also known as flue gas desulfurization (FGD) systems, SO_2 scrubbers use chemical and physical absorption to remove SO_2 from the flue gas. Wet scrubbers use a liquid sorbent to remove SO_2 and the flue gas leaving the absorber is moisture saturated. With dry scrubbers the flue gas leaving the absorber is not saturated. For circulating fluidized bed units (as shown in the "Firing" field), this field indicates whether reagent injection is used for SO_2 control. Reagent injection involves adding finely crushed limestone to the fluidized bed. During combustion, the limestone is reduced to lime, the sulfur in the fuel is oxidized to form SO_2, and, in the presence of excess oxygen, the SO_2 reacts with the lime particles to form calcium sulfate, which can be removed with the bottom ash or collected with the fly ash by a downstream particulate matter (PM) control device.	Dry Scrubber Wet Scrubber Reagent Injection	
Scrubber_Online_Year	X	The first year of operation of an existing or committed SO_2 scrubber	———	
Scrubber Efficiency	Y	The removal efficiency of the SO_2 scrubber.	———	
NOx Comb Control	Z	This field indicates the NO_X combustion controls employed by a generating unit. Combustion controls reduce NO_X emissions during the combustion process generally by regulating flame characteristics such as temperature and fuel-air mixing.	AA	Advanced Overfire Air
			BF	Biased Firing (alternate burners)
			BOOS	Burners-Out-Of-Service
			CM	Combustion Modification/Fuel Reburning
			CO	Combustion Optimization

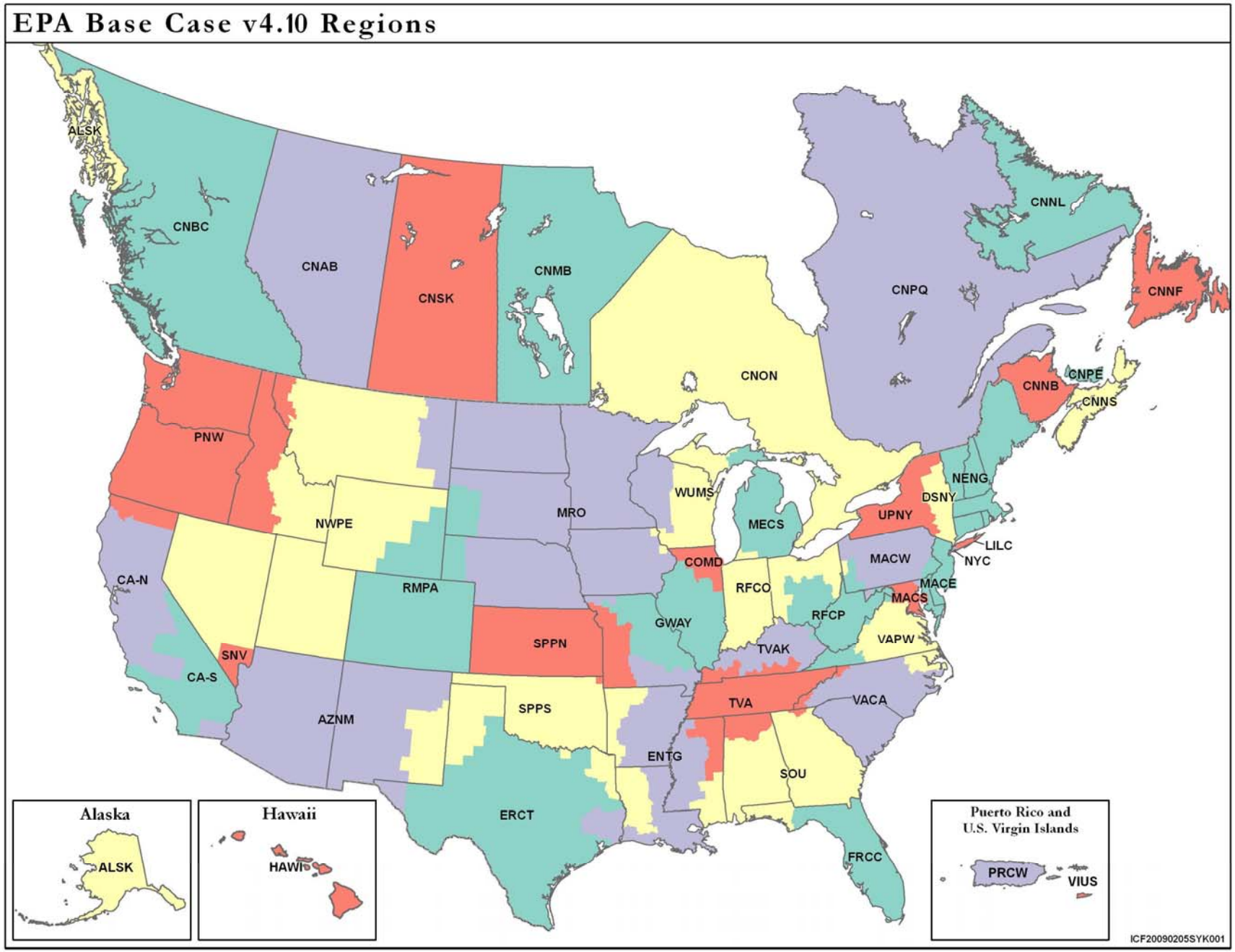
Field Name	Column	Definition	Key to Recurring Column Values	
			DLNB	Dry Low NOx Burners
			FR	Flue Gas Recirculation
			FU	Fuel Reburning
			H2O	Water Injection
			LA	Low Excess Air
			LN	Low NOx Burner
			LNB	Low NOx Burner Technology (Dry Bottom only)
			LNBO	Low NOx Burner Technology w/ Overfire Air
			LNC1	Low NOx Burner Technology w/ Closed-coupled OFA
			LNC2	Low NOx Burner Technology w/ Separated OFA
			LNC3	Low NOx Burner Technology w/ Closed-coupled/Separated OFA
			LNCB	Low NOx Cell Burner
			LNF	Low NOx Furnace
			MR	Methane Reburn
			N2	Nitrogen
			NDI	Nitrogen Diluent Injection
			NGR	Natural Gas Reburn
			NH3	Ammonia Injection
			OFA	Overfire Air
			other	Other
			ROFA	Rotating Overfire Air
			SC	Slagging
			SOFA	Stationary Overfire Air
			STC	Staged Combustion
			STM	Steam Injection
			WIR	Underfire Air
NOx Post-CombControl	AA	This column indicates the post-combustion NO_X emission controls at a generating unit. There are two NO_X post-combustion control options: Selective Catalytic Reduction (SCR) or Selective Non-Catalytic Reduction (SNCR). Post-combustion controls operate downstream of the combustion process and remove NOx emissions from the flue gas.	SCR	Selective Catalytic Reduction
			SNCR	Selective Noncatalytic Reduction
SCR_Online_Year	AB	The first year of operation of an existing or committed SCR	———	
SNCR_Online_Year	AC	The first year of operation of an existing or committed SNCR	———	
PM Control	AD	This field indicates the presence of particulate matter (PM) controls	B	Baghouse
			C	Cyclone
			ESP	Electrostatic Preciptator
			ESPH	Hot side electrostatic precipitator with flue gas conditioning
			ESPC	Cold side electrostatic precipitator with flue gas conditioning
			WS	Wet Scrubber

Field Name	Column	Definition	Key to Recurring Column Values
Mercury_Controls	AE	Dedicated Mercury emission controls in existence at a generating unit	ACI (Activated Carbon Injection)
ACI_Online_Year	AF	The first year of operation of an existing or committed ACI	———
Mercury_Controls Efficiency	AG	The removal efficiency of the mercury control device.	———
SO_2 Permit Rate	AH	The SO_2 emission rate (in lb/mmBtu) limit that applies to the unit due to federal, state or local emission regulations.	———
Uncontrolled NO_X Base Rate (or "Mode 1 NO_X Rate")	AI	The 4 NO_X rates in NEEDS allow modeling of any conceivable scenario involving NO_X controls. The Mode 1 rate applies to units not covered by a NO_X control policy. Specifically, this is the NO_X rate with post-combustion controls shut off. For units without post-combustion controls, it's their uncontrolled NO_X rate.	———
Controlled NO_X Base Rate (or "Mode 2 NO_X Rate")	AJ	The 4 NO_X rates in NEEDS allow modeling of any conceivable scenario involving NO_X controls. The Mode 2 rate applies to units covered by a mercury emission limit. A unit with post-combustion controls operates them, but a unit without post-combustion controls operates as usual. (Note: In the case of mercury limits, Mode 2 applies since it implies operation of an SCR or SNCR. This equipment, in combination with SO_2 and particulate controls, provides reduction and capture of mercury as a co-benefit.)	———
Uncontrolled NO_X Policy Rate (or "Mode 3 NO_X Rate")	AK	The 4 NO_X rates in NEEDS allow modeling of any conceivable scenario involving NO_X controls. The Mode 3 rate applies to units affected by a seasonal (typically summer) NO_X policy. The Mode 3 rate is the unit's NO_X rate in the off-season (winter). For units with post-combustion controls, this is the NO_X rate with post-combustion controls shut off. For units without post-combustion controls, it's the NO_X rate with state-of-the-art combustion controls operating. (Exception: In the SIP Call region current combustion controls are assumed to be retained.)	———
Controlled NO_X Policy Rate (or "Mode 4 NO_X Rate")	AL	The 4 NO_X rates in NEEDS allow modeling of any conceivable scenario involving NO_X controls. The Mode 4 NO_X rate applies to units covered by an annual NO_X policy. For units with SCR, it's the NO_X rate with the SCR operating. For units with SNCR, it's the NO_X rate with SNCR operating plus state-of-the-art combustion controls operating if required to attain rate limits. For units without post-combustion controls, it's the NO_X rate with state-of-the-art combustion controls operating. (Exception: In the SIP Call region current combustion controls are assumed to be retained.)	———

Field Name	Column	Definition	Key to Recurring Column Values
Hg EMF Inputs	AM	This field shows the combination of SO_2 scrubbers, NO_X post-combustion controls, and particulate matter controls that already exist at a unit. The entries in this column are compiled from the "NOx Post-CombControl," "Wet/DryScrubber" and "Particulate Matter Type" fields. Together with the entry in the "Firing" and "Modeled Fuels" fields, the entries in this field are used for the assignment of the Emission Modification Factors (EMFs) for mercury as shown in the six subsequent "Controlled Hg EMF" and "Uncontrolled Hg EMF" fields. The EMFs enable the model to capture mercury emission reductions that are a function of the rank of coal burned (bituminous, subbituminous and lignite), the specific burner type, and the configuration of SO_2, NO_X, and particulate matter control devices. Consolidating the controls that impact mercury reductions into this field helps to insure that the correct EMFs are assigned to each unit. Note that EMFs are metrics that quantify the extent of mercury emission reduction achieved by these non-mercury controls. The impact of mercury-specific controls (e.g., ACI) is not taken into account in the EMFs.	———
Controlled Hg EMF for BIT	AN	Mercury Emission Modification Factor (EMF) when the unit combusts bituminous coal and existing NOx post combustion controls (SCR or SNCR) are operating. "Mercury EMF" is defined as the percentage of fuel mercury left after accounting for the mercury removal obtained by the SO2, NOx, and particulate controls shown in the "EMF_Controls" field.	———
Controlled Hg EMF for SUB	AO	Mercury Emission Modification Factor (EMF) when the unit combusts subbituminous coal and existing NOx post combustion controls (SCR or SNCR) are operating.	———
Controlled Hg EMF for LIG	AP	Mercury Emission Modification Factor (EMF) when the unit combusts lignite coal and existing NOx post combustion controls (SCR or SNCR) are operating.	———
Uncontrolled Hg EMF for BIT	AQ	Mercury Emission Modification Factor (EMF) when the unit combusts bituminous coal and existing NOx post combustion controls (SCR or SNCR) are not operating.	———
Uncontrolled Hg EMF for SUB	AR	Mercury Emission Modification Factor (EMF) when the unit combusts subbituminous coal and existing NOx post combustion controls (SCR or SNCR) are not operating.	———
Uncontrolled Hg EMF for LIG	AS	Mercury Emission Modification Factor (EMF) when the unit combusts lignite\ coal and existing NOx post combustion controls (SCR or SNCR) are not operating.	———

Field Name	Column	Definition	Key to Recurring Column Values
Dispatchable Scrubber	AT	One-time option that allows certain generating units in the model to install a scrubber retrofit at zero capital cost. It applies to generating units known to have existing scrubbers that may not be operating because the original regulatory cause for their installation is no longer present. The model will use this retrofit if the control is economical to operate, but it will not use the retrofit if the control is not economical. This "dispatchable" construct allows modeling behavior in areas transitioning from a more stringent to less stringent regulatory regime (for example, a state affected by CAIR but potentially not affected by the proposed Transport Rule), where some operators may have economic incentive to bypass or reduce operation of a previously installed emission control, while other operators still need to operate the control in order to comply with settlements, state rules, or other past policies regardless of the status of the CAIR program.	Yes = unit has the dispatchable scrubber option <blank> = unit does not have the dispatchable scrubber option
Dispatchable SCR	AU	One-time option that allows certain generating units in the model to install an SCR retrofit at zero capital cost. It applies to generating units known to have existing SCR that may not be operating because the original regulatory cause for their installation is no longer present. The model will use this retrofit if the control is economical to operate, but it will not use the retrofit if the control is not economical. This "dispatchable" construct allows modeling behavior in areas transitioning from a more stringent to less stringent regulatory regime (for example, a state affected by CAIR but potentially not affected by the proposed Transport Rule), where some operators may have economic incentive to bypass or reduce operation of a previously installed emission control, while other operators still need to operate the control in order to comply with settlements, state rules, or other past policies regardless of the status of the CAIR program.	Yes = unit has the dispatchable SCR option <blank> = unit does not have the dispatchable SCR option
Dispatchable ACI	AV	One-time option that allows certain generating units in the model to install an ACI retrofit at zero capital cost. It applies to generating units known to have existing ACI installations that may not be operating because the original regulatory cause for their installation is no longer present. The model will use this retrofit if the control is economical to operate, but it will not use the retrofit if the control is not economical. This "dispatchable" construct allows modeling behavior in areas transitioning from a more stringent to less stringent regulatory regime, where some operators may have economic incentive to bypass or reduce operation of a previously installed emission control, while other operators still need to operate the control in order to comply with settlements, state rules, or other past policies regardless of the status of the original regulatory program.	Yes = unit has the dispatchable ACI option <blank> = unit does not have the dispatchable ACI option

Appendix I. IPM Model Regions Map



Appendix II. Mapping of NERC Regions and NEMS Regions with EPA Base Case v.4.10 Model Regions

NERC Region	NEMS Region	Model Region	Model Region Description
TRE	ERCOT	ERCT	Texas Regional Entity
FRCC	FL	FRCC	Florida Reliability Coordinating Council
MRO	MAPP	MRO	Midwest Regional Planning Organization
	MAIN	WUMS	Wisconsin-Upper Michigan
NPCC	NE	NENG	New England Power Pool
	NY	DSNY	Downstate New York
		LILC	Long Island Company
		NYC	New York City
		UPNY	Upstate New York
RFC	ECAR	RFCO	Reliability First Corporation - MISO
		MECS	Michigan Electric Coordination System
		RFCP	Reliability First Corporation - PJM
	MAAC	MACE	Legacy Mid-Atlantic Area Council - East
		MACS	Legacy Mid-Atlantic Area Council - South
		MACW	Legacy Mid-Atlantic Area Council - West
	MAIN	COMD	Commonwealth Edison
SERC	MAIN	GWAY	Gateway
	ECAR	TVAK	Tennessee Valley Authority - MISO-KY
	STV	SOU	Southern Company
		TVA	Tennessee Valley Authority
		ENTG	Entergy
		VACA	Virginia-Carolinas
		VAPW	Dominion Virginia Power
SPP	SPP	SPPN	Southwest Power Pool - North
		SPPS	Southwest Power Pool - South
WECC-AZ-NM-SNV	RA	AZNM	Western Electricity Coordinating Council - Arizona, New Mexico
		SNV	Western Electricity Coordinating Council - Southern Nevada
WECC-California ISO	CNV	CA-N	Western Electricity Coordinating Council - California North
		CA-S	Western Electricity Coordinating Council - California South
WECC-NWPP	NWP	PNW	Western Electricity Coordinating Council - Pacific Northwest
		NWPE	Western Electricity Coordinating Council - Northwest Power Pool East
WECC-RMPA	RA	RMPA	Western Electricity Coordinating Council - Rocky Mountain Power Area
Canada		CNAB	Alberta
		CNBC	British Columbia
		CNMB	Manitoba
		CNNB	New Brunswick
		CNNF	Newfoundland
		CNNL	Labrador
		CNNS	Nova Scotia
		CNON	Ontario
		CNPE	Prince Edward Island
		CNPQ	Quebec
		CNSK	Saskatchewan
Other		ALSK	Alaska
		HAWI	Hawaii
		VIUS	U.S. Virgin Islands
		PRCW	Puerto Rico