

WebEx Call-In Details: Call-in Phone #: +1-855-797-9485 Meeting #: 649 836 680

TAGWebTM

Software Demonstration and Training

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ın www.epri.co



TAGWebTM Training Agenda

- 1. TAGWebTM Overview
- 2. Logging In and Getting Help
- 3. Structure and Basic Functions
- 4. Quick Search
- 5. Customization
- 6. Reporting





TAGWebTMOverview







EPRI's TAGWeb™ Software

 TAGWEB[™] is a web-based software package used to create customized technology cost & performance estimates for power generation and storage technologies (e.g., fossil-fired and renewables).



- TAGWeb ™ provides the necessary information in a concise and credible format to conduct preliminary evaluations of power generation and storage technology options.
- TAGWeb provides a sound basis to understand and compare technology cost and performance estimates, and to validate results of more detailed, engineering studies.
- The database that underlies TAGWeb is derived from EPRI's renowned Technology Assessment Guide (TAG) – an industry standard reference for technology cost and performance data and information.
- TAGWEB[™] is a key component of PSET 178A and is available to PSET 178A members at no extra charge. It is also available as a supplemental project for \$US 85,000 per year (SDF eligible).



Benefits of TAGWeb™ Software

- Single, comprehensive data and information source and analytic tool for capital investment planning in the electric power industry.
- TAGWeb uses a consistent analytic approach, and contains a comprehensive database and technology trends
- Facilitates analysis and customization
- TAGWeb has established credibility. Many electric companies have used TAGWeb to support their IRPs and similar regulatory filings.
- State PUCs and other regulators are familiar with TAGWeb and have accepted it to support company IRPs and related regulatory decisions
- TAGWeb [™] is a planning tool that can be used for many purposes:
 - Marketing
 - Financial Evaluation
 - Investment Analysis
 - Integrated Resource Planning (IRP)



- Energy Evaluation
- Business Planning
- Technology Forecasting



How Members Use TAGWebTM Results

- TAGWeb often is used to support company IRPs, technology strategy, and capital investment planning
- Larger electric companies often use TAGWeb results to validate internal data and information obtained from 3rd party contractors. The *granularity* and *transparency* of the data facilitates validation.



- Smaller companies often use information and data included in TAGWeb as their primary source for technology cost and performance data.
- It is common practice to companies to share TAGWeb results among planning, engineering, marketing, and other key staff.
- Employee education and staff development
- Be aware of the status of commercial technologies and near -term advancements



Power Generation and Storage Technologies Included in TAGWebTM

Central Stations

- Pulverized coal
- Fluidized bed combustion
- IGCC
- Nuclear
- Combustion turbine

Small Scale Generation

- Fuel cell
- Internal combustion engine
- Small combustion turbine
- Micro turbine

Renewables

- Wind
- Solar photovoltaic (PV)
- Solar thermal
- Geothermal
- Renewables combustible

Storage

- Compressed Air Energy Storage (CAES)
- Pumped hydro
- Flywheel
- Batteries (Li-Ion; Flow)
- Superconducting Magnetic Energy Storage (SMES)





TAGWeb[™]Log-on and Help





Part 1: Log on to Member Center on EPRI.com

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Logging on to TAGWeb[™] – Part 1

- Step 1 Open a webpage
- Step 2 Input "tag.epri.com" into the address bar and hit "enter".
 You will be redirected to EPRI's Member center.
- Step 3 Log on to Member Center with your EPRI Member UserID and Password (Note: Do <u>not</u> use your TAGWeb UserID and Password.)
 You will automatically be redirected to the TAGWeb Log-on screen.





Part 2: Log on to TAGWebTM Software

Welcome to TAGWeb! × +		- 0
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Parameterse Param	TAGWeb™ Log In Version 3.52 Please enter User ID and Password User ID: Password: Log In Release Notes	New User Request An Account

<u>Logging on to TAGWeb[™] – Part 2</u>

- Step 4 Enter your TAGWebTM UserID and Password on the TAGWebTM screen
- Step 5 Read and Accept the TAGWebTM software licensing agreement.
- Step 6 You should now be logged on to TAGWeb[™]







Click on the Help link to see FAQs, user manual, and technology update schedule



TAGWeb[™] Help

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TAGWEB Help					
TAGWEB Frequently Asked Questions The link above provides access to an FAQ on TAGWEB with detailed answers. The answers come with detailed descriptions on navigating the TAGWEB applications. In case you do not find what you need here please contact TAGWEB support at askepri.com.	User Manual User Manual for the TAGWB Application Technology Update Schedule Lists the Schedule of Technology Update Release Notes Release Notes for the TAGWB Applicatio	≥5 n			
Careers Contact EPRI Copyright Policy Privacy Statement Terms of Use 800.313.3774 or 650.855.2121 EPRI 3420 Hillview Avenue. Palo Alto. California 94304					

- The FAQs link will open a list of questions. The user can click on a question to open a PDF file containing the answer / explanation
- The User Manual is a complete guide on how to use TAGWeb^M and its capabilities.



TAGWeb[™] Frequently Asked Questions

- 1. How is the TAGWeb[™] database structured?
- 2. How do I make changes to Technology Design Basis (unit capacity, site, configuration, design parameters)?
- 3. How do I make changes to Capital Costs data?
- 4. How do I make changes to O&M data?
- 5. How do I make changes to Performance data (capacity factor, heat rate, emissions data)?
- 6. How do I make changes to Economics Financial data (financing structure, inflation, timing)?
- 7. How do I make changes to Economics O&M unit cost data?
- 8. How do I make changes to Fuel (cost and physical properties)?
- 9. How do I do Adjust Design?
- 10. How do I save the changes made to a technology record?
- 11. How do I generate a Technology Summary report?
- 12. How do I generate a Comparison report?
- 13. How do I copy a record from another account?
- 14. How do I copy a study from another account?
- 15. What is the Reference Year?
- 16. What is the Technology Input Year?
- 17. What is the Year Dollars for Input Data



Loading a TAGWeb Technology "Case"

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- Select Study 15.0 from the Study dropped down menu
- Select **Combustion Turbine** from the Technology Type dropped down menu
- Click Select



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TAGWebTM Structure and Basic Functions

Note: Some screenshots in this presentation may display older dates. These screenshots are only meant to be illustrative.





TAGWebTM – The Basics (1 of 2)

 TAGWeb ™ is a planning tool to facilitate preliminary screening for electricity generation and storage technologies



- Incorporates the widely known and used conventions in EPRs Technical Assessment Guide (TAG)
- Provides a standard economic methodology, uniform coststimating premises, and financial assumptions
- Includes technical and economic characteristics of the technologies, economic parameters for preliminary screening, and fuel price forecasts
- With TAGWeb ™, users are able to:
 - Revise the technical data
 - Customize the core technical data for their specific region (US only)
 - Conduct sensitivity studies of costs for electric generation and storage technologies
 - Generate reports comparing technologies, fuels, and economic scenarios
 - Export data, plots, tables, text files, and graphics
- TAGWeb [™] has been well-tested and validated. Cost and performance findings are based on recent, high-quality, and unbiased data





TAGWebTM – The Basics (2 of 2)



- The database underlying TAGWeb[™] uses a Microsoft SQL server housed at EPRI's HQ in Palo Alto, CA
 - Contains multiple tables containing data records for technologies, fuels, and economic parameters.
 - Global data records in each database define the basic parameters used in all analyses
- TAGWeb[™] software includes the following technology types:
 - Central station > 50MW for fossil and nuclear
 - Small-scale generation <50MW
 - Renewable energy and storage technologies
 - Project participants receive the updated information for generic plant locations in six regions of the country

18



Baseline Data for 19 Different Technologies

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Home >		
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CENTRAL STATION	Technology Type: ALL	
Pulverized Coal	Minimum Size: 0 MW	
Fluidized Bed Combustion	Maximum Size: 2000 MW	
IGCC		
Nuclear	No data available.	
Combustion Turbine		
SMALL SCALE GENERATION		
Fuel Cell Internal Combustion Engine	EPRI provides a baseline data for sev	veral cases for
Small Combustion Turbine		1 II 6
Micro Turbine	each of 19 different technologies. In	cluding.for
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Technology, Economic and Fuel Parameters

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TAGWeb[™] Structure for Coal and GT Generation

■ TAGWeb TM navigation for coal technologies



■ TAGWeb TM navigation for combustion turbine technologies





TAGWebTM Structure for Wind and Solar PV

■ TAGWebTM navigation for wind technologies



■ TAGWeb TM navigation for solar PV technologies





TAGWebTM Structure for Concentrating Solar

■ TAGWebTM navigation for concentrating solar technologies





TAGWeb™ Database Structure

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Production Costs and Emissions

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Heat Rates and Load Factors

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Operations & Maintenance Costs

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	Economics 1031.3	2010 Econ EWC N	latural Gas	times of plant operation. For example					
				timos of plant operation. For example,					
				the Inspection Service Costs for CTs					
	TECH INFO			can be entered at various service					
	Save Save As Restore			hours of operation from plant start-up.					
	Expand All Collapse All	Other			-				
	TECHNOLOGY	Other Incremental Maint	enance,mils/kWh	30					
	GENERAL								
	DESIGN BASIS	Other Variable O&M,mils	/kWh 0.00	10					
		Inspection List	Append Insert Auto Populate						
	⊟ 0&M								
	Fixed	No	Aroa	Cost (\$)	Do	priod (hrs)			
	Variable			COSE (\$)	Pe				
	Consumables	1	Major Maintenance	0	0				
	PERFORMANCE	2	SCR Catalyst Replace	518800 7446					
	ENVIRONMENTAL								
	FCONOMICS	Selected Item							
	FINANCING	<u>1</u>	ajor Maintenance	0 Update Delete					
	OWNER'S COST								
		Note: Changing global CC	A will NOT affect technology records already imp	ported with the old data.					
	FUEL	Go to individual technolog	y record to re-import.						



Financial Analysis

www.epri.com

	VER STITUTE	TAGWEB™ Database & Software TAGWeb Account: t2010resul	
Home Admin		Log Off	
Home > Economics > Financin	g-Financing	Help	
Study 10.0 Technology 1016.3 Fuel 1012.0 Economics 1031.3 TECH INFO Save Save As Restore Expand All Collapse All TECHNOLOGY	CURRENT SELECTION 2010 Tech Cases for 2011 2010 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas Security % of total Curred Debt 46.00 7.50 Preferred 8.00 8.40	SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan	
GENEKAL GENEKAL DESIGN BASIS ADJUST DESIGN CAPEX OSM PERFORMANCE	Common 46.00 11.50	0	
 ■ ENVIRONMENTAL ECONOMICS General Financing Inflation Taxes Timing AFUDC @ 0&M UNIT COST @ OWNER'S COST 	The economics i enough level of o of financial analy	nput data provide detail for various types /ses for projects.	





Fuel Prices

E	PCI ELECTRIC POWE RESEARCH INST	R TUTE						TAGWEB [™] Database & So TAGWeb Account: t2	ftware 010resul
Hor	ne Admin 🕨								Log Off
Hor	ne > Fuel/Resource > Fuel/R	esource-Cost							Help
CURRENT SELECTION Study 10.0 2010 Tech Cases for 2011 Technology 1016.3C Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas Fuel 1012.6 2010 Natural Gas EWC Economics 1031.3 2010 Econ EWC Natural Gas						SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan			
	Save Save As Restore Expand All Collapse All TECHNOLOGY I GENERAL DESIGN BASIS ADJUST DESIGN	ve Save As Restore Year \$ for Input Data 2010 and All Collapse All HNOLOGY © Use Price Escalation GENERAL © Use Year-by-Year DESIGN BASIS ADJUST DESIGN							
	CAPEX O&M PERFORMANCE ENVIRONMENTAL ECONOMICS FINANCING O&M UNIT COST OWNER'S COST FUEL GENERAL General	Year 2010 2011 2012 2013 2014 ◀	Fuel Price, \$/ MBtu 5.77 4.58 4.58 4.58 4.58 4.58	App Insert Insert Insert Insert	Delete Delete Delete Delete Delete	opulate	F a h	Fuel prices can be set on n annual basis with alf-yearly inflation, and	
	Physical Properties						W	nin escalation.	





Code of Account Escalation

E	EPEI ELECTRIC POWER RESEARCH INSTITUTE						TAGWEB™ Database & Softwar TAGWeb Account: t2010res
н	ome Admin						Log Of
н	ome > Global > COA Escalate						Help
«	STUDY	Code of Account - Es	scalate				
	TECHNOLOGY Expand ALL GROUPS CENTRAL STATION SMALL SCALE GENERATION RENEWABLES STORAGE TRANSMISSION / DISTRIBUTION		Set ID: 1.5 Description: PC Environm	nental			
		Enter amount (%) to escalate below. Select one of more technology records from the right to apply the escalation. *Note that only technology records using the current Code of Account set are shown.					
	DISTR GENERATION ECONOMICS	# A	Account (%)	rial Labor (%)	Indirects (%)	Subcontr (%)	1001.2C1 - Pulverized Coal, 800 MW, EWC, IL6 Bit, Supercritical, LSFO w 90% CO2 1001.2F1 - Pulverized Coal, 800 MW, EWC, PRB, Supercritical, LSFO w/o CO2 1001.2F1 - Pulverized Coal, 800 MW, EWC, PRB, Supercritical, LSFO w/o CO2
	GLOBAL DATA Code of Accounts Inflation Data Depreciation Schedules Season Definitions Regionalization	2 CO Contro 3 SO2 Contr 4 NOx Contro 5 Particulate 6 Thermal ((7 Solid Wast 8 Hg Control 9 VOC Contr 10 Other	on 0 on 0 on 0 on 0 cooling Water) 0 te 0 rol 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	1001.2FA - Pulverized Coal, 800 MW, SC, PRB, Supercritical, LSFO w/o CO2 1001.2FB - Pulverized Coal, 800 MW, SC, PRB, Supercritical, LSFO w 90% CO2 1001.2K - Pulverized Coal, 800 MW, NE, WV Bit, Supercritical, LSFO w/o CO2 1001.2K1 - Pulverized Coal, 800 MW, NE, WV Bit, Supercritical, LSFO w 90% CO2 1001.2L - Pulverized Coal, 800 MW, SE, WV Bit, Supercritical, LSFO w/o CO2 1001.2L1 - Pulverized Coal, 800 MW, SE, WV Bit, Supercritical, LSFO w/o CO2
		Selected Item	Control	0	0 0 U	pdate	
						Escalate	Cancel





TAGWebTM Quick Search





Technology Search Capability

EPER ELECTRIC POWER RESEARCH INSTITUTE		TAGWEB [™] Database & Software TAGWeb Account: t2010resul
Home Admin		Log Off
Home >		Help
Home > Image: Study TECHNOLOGY Image: Study I	TAGWeb Quick Search Image: Study: Technology Type: Combustion Turbine Minimum Size: 100 Mw Maximum Size: 500 MW Maximum Size: Study For Illustration Only Image: Study Image: Study Image: Study Maximum Size: Soo Mw Maximum Size: Soo Study Image: Study Image: Study Image: Study Image: Soo Minimum Size: Soo Study Image: Soo Image: So	Fuel/Resource Type: Natural Gas Region: E/W Central State: Representative Search Search Cost eters and click on the Search button.

Technology Search helps choose and run an analysis for a technology very quickly.





TAGWeb™ Quick Search

- Exercise 1: Complete a search within TAGWebTM
 - Select a technology that meets the following criteria
 - Combustion technology
 - Natural gas fuel
 - 50 100MW capacity
 - East/West Central location



Finding a current technology record in the TAGWeb[™] database is the start of a beautiful relationship!



TAGWeb[™] Includes Technical Information About Each Power Generation and Storage Technology

EPEI ELECTRIC POWER RESEARCH INSTITUTE	TAGWEB™ Database & Software TAGWeb Account: t2010resul
Technical Information - Combustion Turbine	
Combustion Turbine Update - 2010	
Combustion Turbine Update - 2009	
Combustion Turbine Update - 2008	
Combustion Turbine Update - 2007	
Fixed and Variable O&M Inputs for CTCC	
Introduction - 2010	
Cost and Performance Basis - 2010	
Technology Risks and CTCC Market Impact - 2010	
Generation/Transmission Capacity Impacts - 2010	
Table of Contents/Product Description - 2010	
Carbon Dioxide Capture Technologies - 2008	
Hybrid and Dry Cooling Systems - 2008	
Technology Improvements for 2020+	
Environmental Controls - 2007	
Bulk Percentages and Quantities - 2008	
Method of Escalation - 2008	
MACRS Depreciation Schedule	
Availability - 1993	


A

?

Technical Description for Each Technology





Done

Block Diagram for Each Technology and Plant Configuration



Figure 6-10 SPRINT[™] Process Flow Diagram

Intercooling improves turbine output in three ways. First, it reduces the work of compression since the cooler HP compressor inlet temperature reduces the work required for HP compression. Second, it reduces the temperature of air entering the combustor, allowing more fuel to be burned before reaching combustor or turbine temperature limits. Third, a significant quantity of compressor discharge air, in the area of 20%, is used as turbine coolant and must bypass the combustor. An intercooled compressor has a lower air discharge temperature; consequently, less cooling air is required, allowing more fuel to be burned in the larger quantity of combustion air. Demineralized water is required for SPRINT operation to minimize solids deposition on the compressor blades.

SPRINT is available as an option on the water/steam injected LM6000PC and may be employed with natural gas firing or fuel oil firing. SPRINT also is offered on the dry low- NO_x LM6000PD but at this time it must be switched off when firing fuel oil Also at this time



Qualitative Assessment of Technical Aspects for Each Technology

		Leading Dev	elopers of the S	Science or			
			Technology				
Technologies	R&D	Government	Nonprofit	Leading	Major Trends	Changes To Watch For	Unresolved Issues
	Intensity	Organizations	Organizations	Vendors			
Conventional	Low		EPRI	Various CFBC	Addition of polishing	Increasing price of	CO2 emission control
subcritical				boiler and	scrubbers to new units.	natural gas, improving	systems and
CFBC				steam turbine	Existing units: co-firing	economics of coal-fired	associated costs.
					"opportunity" fuels like	plants over CT plants.	Impact of CO2 tax.
				vendors	biomass	Stricter regulations	
Conventional	Low			Various CFBC	First supercritical unit being	Increasing price of	Construction of more
supercritical				boiler and	built	natural gas, favoring coal-	supercritical units
CFBC				steam turbine		fired plants. If first and	dependent on
				vendors		subsequent supercritical	experience of first
Advanced	Limited	DOE/ORNL		Primarily one	New alloys - higher	Advanced supercritical	Depends on the
				CFBC vendor	temperature and pressure.	possible in the future, but	experience at
supercritical		(much of		steam and	Research at ORNL will be	is a number of years	Lagisza, Poland.
		research in high		turbine	applicable to CFBC	away.	
		pressure/		vendors			
		temperature					
		alloys will					
		applicable to					
		CFBC pressure					
		parts)					
CFBC							



Qualitative Assessment of Business Aspects for Each Technology

3,			2 1110	
	First Generation	Second Generation	Third Generation	Fourth Generation
Process	Conventional non-reheat and	Conventional subcritical	Subcritical CFBC	Supercritical CFBC;
Identification	subcritical CFBC 50-150 MW	CFBC	300-500 MW	500 MW
Usual capacity	1200 psig/950°F & 2400 psig	150-300 MW	2400 psig	3500 psig
Steam Conditions	1000°F/1000°F	2400 psig	1000°F/1000°F	1000°F/1000°F
		1000°F/1000°F		
NO _x control	None	SNCR	SNCR	SNCR
Sulfur control	In-bed	In-bed	In-bed	In-bed
	70-80% control	85-95% control	95-98% control. Efficiency	95-98% control. Efficiency
			greater than 95% may	greater than 95% may
			require polishing scrubber	require polishing scrubber
Mercury control	None	None	Activated carbon	Enhanced activated carbon
Fly ash control	ESP	Fabric filter	Fabric filter	Fabric filter
Other Characteristics	Initial commercial experience	Maturing operating	Commercial operating	Needs to be proven
		experience	experience	
Heat Rate, HHV	10,000-12,000 Btu/kWh	9500-10,000 Btu/kWh	9500-9800 Btu/kWh	Needs to be shown
Major Disadvantages	Solid waste disposal Fine	Solid waste disposal	Solid waste disposal in	No supercritical experience
Environmental	particulate emission	Fine particulate emission	most cases	yet. Same disadvantages as
	CO, emissions	CO, emissions	CO, emissions	third generation.
	NO _v emissions	NO _x emissions	Trace compound	_
	Mercury emissions	Mercury (Hg) emissions	emissions (other than Hg)	
Others	Limited efficiency. High	Improving efficiency. High	Move toward more waste	
	capital cost compared to	capital cost compared to	coal and fuel firing.	
	NGCC.	NGCC.		
Key technology	Reducing O&M costs and	Reducing O&M costs and	Proving commercial	Proving commercial viability
needs	minimizing tube erosion	increasing plant size	viability of 500-MW single	of 500-MW supercritical
			boilers	boilers
Development Timing				
Research	1960s	1970s	1990s	2001-2003
Development	1970s	1990s	Late 1990s	In progress
Demonstration	1980s	1990s	Early 2000s	2006
Commercialization	1000-1005	1995-2000	2002-2007	Euture
Date for Large Units	1990-1995	1995-2000	2002-2007	Future
Key Issues	Improving performance	Reducing capital cost	Improving performance.	Competing with PC & IGCC
		Improving performance,	Competing with PC &	
		availability	IGCC	





TAGWebTM Customization







- Exercise 2: Creating a new record/Making changes technology design basis
 - Save As function
 - Copy function

Save Save As Restore	
Expand All Collapse All TECHNOLOGY	NOTE: To make changes to unit or fuel/economic link, please go to Adjust Design -> General
GENERAL	CT UNIT Size, Gross MW 50.700
DESIGN BASIS	HRSG ST Unit Size, MW 0.000
General	Auxiliaries, MW 0.650
Site	CT/CC Unit Size, Net MW 50.050
Configuration	Number of Units 2.000
Parameters	Fuel Type Natural Gas
ADJUST DESIGN	Fuel Link 1112.4 2011 Natural Gas W
	Economics Link 1231.5A 2012 Econ W Natural Gas
⊕ 0&M ⊕	
PERFORMANCE ENVIRONMENTAL	
I LIVINOITILITAL	

You can obtain new technologies from another user's account!

Select a current technology record, make changes, and save the results to a new technology ID.





TAGWeb[™] - Moving Records Between Studies and Copying Records from Other User Accounts

■ Exercise 3: Moving/Copying files from other TAGWebTM user accounts



Building from other user accounts can save time!



TAGWeb[™] - Moving Records Between Studies and Copying Records from Other User Accounts

E	Eſ	PCI ELECTRIC POWER TAGWEB™ Database & Software RESEARCH INSTITUTE TAGWeb Account: t2010res	are sul
Н	ome	a Admin ▶ Log 0	Off
н	ome	e > Technology > Tech-Copy Help	p
≫	Т	TECHNOLOGY NEW/COPY	
	[Current Study ID: 10.0	ח 🛙
		Select TAGWeb account to copy technology data from:	
		Current Account Another User Account (need login info below)	
		TAGWeb User ID:	
		Password:	
		Select study to copy from t2010resul Update Studies StudyID Description	
		20.0 Combustion Turbine Study 1000.X TEST study 10.2 CT ISO Conditions	
		10.1 2010 Revisions 10.0 2010 Tech Cases for 2011	
		Select technology records to copy from account t2010resul study (10.0) Update Tech Records TechID Description Region State	
		1016.48 Combustion Turbine Combined Cycle, 2x1 7FA.05, SE, Nat Gas Southeast North Carolina 1015.4A Combustion Turbine, 3x209 MW, SE, Nat Gas, 7FA.05 with DLN Southeast North Carolina 1015.2 Combustion Turbine, 4x84 MW, SE, Nat Gas, 7FA.05 with DLN Southeast North Carolina 1015.2 Combustion Turbine Combined Cycle, 2x1 G-Class, SE, Nat Gas Southeast North Carolina 1015.1A Combustion Turbine, 3x97 MW, SE, Natural Gas, LMS 100PB Southeast North Carolina 1015.0A Combustion Turbine (AtS0 MW, SE, Nat Gas, LMS 100PB Southeast North Carolina 1016.3D Combustion Turbine (AtS0 MW, SE, Nat Gas, SE, Nat Gas Southeast North Carolina 1016.3D Combustion Turbine Combined Cycle, 2x1 7FA.03, SE, Nat Gas Southeast North Carolina 1011.2FA Pulverized Coal, 800 MW, SC, PRB, Supercritical, LSFO w/o CO2 South Central Texas 1001.2FB Pulverized Coal, 800 MW, SC, PRB, Supercritical, LSFO w/o CO2 South Central Texas 1001.2FB Turbine RW coal, ANM FWIN Extender Coal, SUM South Central Texas	



- Exercise 4: Modifying base assumptions
 - Reference Year
 - Technology Input Year
 - Economic Year Dollars

Home							Log Off
Home > Economics	Economics-Sel	ect					Help
Home > LCONOMICS 2 STUDY TECHNOLOGY AL GROUPS AL GROUPS AL GROUPS AL GROUPS B STRALE GEN B STRALES B STRALES A STRALES B STRALES	Economics-Set	ect ECONOMICS MANAGEN Note: Use technology des Econ ID 27.1A 26.4A 26.4A 26.4A	ENT ign adjust to change technology oceno ECON EC 1998 Caal ECON West 1998 Wind ECON West 1998	nics link Dis 12 Description	pleying page 1 of 14 8456 789 10 East Central West West West Wast	State Representative Utah Utah Utah	Help
FUELRESOURCES FUELRESOURCES GIOBAL DATA Code d Accomb Inflation Data Depreciation 5ch Socion Definition Regionalization	s adulas is	263 261 254 253 251 244 243C 243C 243C 243C 251 223 223 221 163 163 143 1135DPL 1131DPL	ECON West 1998 ECON West 1998 Biomass ECON EVC 1998 Coal ECON EVC 1998 Coal ECON EVC 1998 Coal ECON EC 1998 Natural Cas ECON EC 1998 Coal ECON ECON ECON ECON		West West E/W Central E/W Central E/W Central Nerttheast Nerttheast South-ast South-ast South-ast West Nertheast Nertheast Nertheast E/W Central E/W Central	Utah Utah Viisconsin Wiisconsin Pennsyivana Pennsyivana Pennsyivana Georgia Georgia California Pennsyivania Ohio Ohio Ohio	
		(2010 ECUILOFE CUAL	12	Delete Edi Report	CHIV	, .

Edit key economic parameters that drive the financial calculations in TAGWeb[™]









Exercise 5: Modifying capital costs at the code level

Save Save As Restore	Cost & Performance Basis								
Expand All Collapse All	A// Cost Category 1 - Steam Generator System Delete C								
TECHNOLOGY	C0A: 1.0	Material	Dir Labor	Indirects	SubContr	Total			
E DESIGN BASIS	StmGenSys	148.5	165.4	0	35.8	349.7			
■ ADJUST DESIGN	CombAirPht	1	1.1	0	0.2	2.3			
CAPEX	AirFlueGas	14.2	15.9	0	3.4	33.5			
Capital Costs	FuelOII	1.3	1.4	0	0.3	3			
Cost Categories	Total (\$/kW)	167.1	185.2	0	40.2	393.5			
Replacement Costs	Selected Item StmGenSys	165.4	D.	35.8	349.7				
PERFORMANCE					Update				
ENVIRONMENTAL	Close								

Decompose capital costs to code of accounts level that can be escalated at different values – think "REGIONALIZATION"





- Exercise 6: Modifying O&M data
 - Fixed & Variable O&M: Includes data to calculate fixed and variable O&M costs (Quantities go here think "how much?")
 - O&M unit costs: Includes labor rates, consumables and disposal costs (think "how much does it cost/unit?")



Input key O&M parameters to calculate both fixed and variable O&M costs.



Exercise 7: Modifying performance data



Change key performance parameters to better meet customized plant operational expectations





- Exercise 8: Adjusting design features...
 - *temperature and elevation parameters* to evaluate the impact on plant output and heat rate for a CTCC plant
 - plant location and evaluate impact on capital cost
 - number of units

Customize plant conditions and compare impacts of various parameters





Exercise 9: Setting economic assumptions

	Calculation Method
Expand All Collapse All	C Constant Dollars
	 Current Dollars
ECONOMICS Save	Econ ID 0641.13
FINANCING	Region Northeast
Financing	State Pennsylvania
Inflation	Busbar Cost Units mils/kWh 💌
Taxes	Emission Units tons/yr
Timing	Last Updated 11/28/2006 12:00:00 AM
■ 08M UNIT COST	By epribase
OWNER'S COST	Description ECON NE 2006 Coal
\checkmark	Notes:
SENSITIVITY B GENERAL	1. 2006 changes: a. Financing, Debt = 7.5% and Common = 11.5% b. PreProduction = 4% of TPL, and Spare Parts = 2% of TPC. Consumables 08M were escalated from 2003 to 2006 using 5% per year.

Set important economic assumptions to best meet the needs of the financial analysis





Exercise 10: Adjusting fuel cost data input



Adjust fuel cost data to match the company's forecast





TAGWeb™ Reporting





TAGWeb™ Report Generation

Hon	e Admin 🕨				Log Off
Hon	ne > Technology > Tech Repo	orts-Technology			Help
»	Study 10.0 Technology 1016.3C Fuel 1012.6 Economics 1031.3	CURRENT SELECTION 2010 Tech Cases for 2011 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas		SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan	
	Save Save As Restore Expand All Collapse All TECHNOLOGY If GENERAL If DESIGN BASIS If ADJUST DESIGN If CAPEX If ORM If PERFORMANCE If NURONMENTAL	Technology Technology Summary Results of current calculations Estimating Worksheet Calculation details and intermediate results Technology Input Data Current technology input data Economics Input Data Current economics input data Fuel/Resource Input Data Current fuel/resource input data	Carryin Carryin Revenu Revenu Discour	Financial ig Charge Summary ig Charge Summary ie Requirements ie Requirements inted Cash Flow ited Cash Flow Report	
	ECONOMICS	Emissions Emissions Outputs Physical emissions output Emissions Costs Cost of emissions treatment and disposal	Techno Techno Fuel Se Fuel se Econom	Sensitivity Study logy sensitivity report institivity Report institivity report incs Sensitivity Report nics sensitivity report	



TAGWeb™ Report Generation – Technology

Ho	ne Admin 🕨		Log Off
Но	me > Technology > Tech Rep	orts-Technology	Help
>>	Study 10.0 Technology 1016.3C Fuel 1012.6 Economics 1031.3	CURRENT SELECTION 2010 Tech Cases for 2011 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas	SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan
	Save Save As Restore Expand All Collapse All	Technology Technology Summary Results of current calculations	Financial Carrying Charge Summary Carrying Charge Summary
	GENERAL DESIGN BASIS ADJUST DESIGN CAPEX O8M PEPEORMANCE	Estimating Worksheet Calculation details and intermediate results Technology Input Data Current technology input data Economics Input Data Current economics input data	Revenue Requirements Revenue Requirements Discounted Cash Flow Discounted Cash Flow Report
	ENVIRONMENTAL	Fuel/Resource Input Data Current fuel/resource input data Emissions	Sensitivity Study
	EINANCLING O&M UNIT COST OWNER'S COST FUEL GENERAL	Emissions Outputs Physical emissions output Emissions Costs Cost of emissions treatment and disposal	Technology Sensitivity Report Technology sensitivity report Fuel Sensitivity Report Fuel sensitivity report Economics Sensitivity Report
	REPORTS ■ REPORTS Technology Reports Comparison Reports Phase Construction	<u></u>	Economics sensitivity report





TAGWeb™ Report Generation – **Technology**

- Technology Summary: Displays key data about the currently selected technology, including *capital*, *O*&*M*, and *busbar costs*
- Estimating Worksheet: Displays data about the currently selected technology, including intermediate calculations made during the simulation that are *not* included in other TAGWebTM outputs
- Input Data: Displays the inputs for the currently selected technology
 - Technology
 - Emissions
 - Fuel/Resource



Study	10.0	2010 Tech Cases for 2011
Technology	1001.2C	Pulverized Coal, 800 MW, EWC, IL6 Bit, Supercritical, LSFO w/o CO2
Economics	1030.3A	2010 Econ EWC Coal
Fuel	1033.0	2010 Illinois No. 6
Region	E/W Central	
State	Wisconsin	
Unit Size (Net MW)	800	
Number of Units	1	
Capacity Factor (%)		85.00
Pre-construction Time (Yrs)		1
Plant construction Time (Yrs)		4
Unit Life (Yrs)		30
Technology Development Rating		Mature
Design, Cost Estimate Rating		Preliminary
Commercial Service Year		2011
Tech Input Year \$		Dec, 2010
Econ Input Year \$		Dec, 2010
Reference Year \$		Dec, 2010
Time-dependent Input Type		Annual
Capital Costs (\$/kW) - R = Refrence	Year, M = Mixed Ye	ear
Steam Generator System		407.5
Turbine Island System		439.2
Coal Handling System		126.0
Balance of Plant		53.5
Misc Indirects		191.0
Environment		522.4
Total Process Capital (R)		1739.6
General Facilities & Site Specific (R)		60.7
Engineering Fee & Constr. Man. (R)		223.0
Project Contingency (R)		196.0
Process Confingency (R)		0.0
Total Plant Cost(R)		2219.3
AFUDC (M)		618.9
Total Cash Expended (M)		2066.4
Total Plant Investment (M)		2685.3
Total Owner Costs (R)		193.1
Total Capital Required (M)		2878.4
Operating, Maintenance, and Consu	mables (Reference	: Year)

Current \$ Busbar Costs (mils/kWh)

	2011	2012	2013	2014	2015	2020	2030	2040	Leve
Capital	66.94	64.91	62.81	60.80	58.86	50.04	33.04	22.24	50.50
O&M	12.72	13.04	13.37	13.70	14.05	15.89	20.34	26.04	16.24
Fuel	19.55	20.04	20.54	21.05	21.58	24.41	31.25	40.00	24.95
CO2 Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Byproduct Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Production Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emission Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROC Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.21	97.99	96.72	95.55	94.48	90.34	84.63	88.29	91.69

Levelized from 2011 To 2040 Using After Tax Discount Rate of 8.10 %



TAGWebTM users can print this report directly from TAGWeb[™]!

Fixed O&M (\$/kW-yr)	47.16
Variable O&M (mils/kWh)	6.39
Consumables (mils/kWh)	4.95
Land Required (acre)	935.1
Water Makeup @ 100% capacity (1000 gal/yr)	5193338



Economic Parameters

		Curr	ent \$	Constant \$	
Security Type	% of Total	Cost (%)	Return (%)	Cost (%)	Return (%)
Debt	46.0	7.5	3.5	4.9	2.2
Preferred Stock	8.0	8.4	0.7	5.8	0.5
Common Stock	46.0	11.5	5.3	8.8	4.0
Total Annual Return			9.4		6.7
Inflation Rate (%)	2.5				
Income Tax Rate (%)	38.0				
Discount Rate (%)	38.0				
After Tax			8.1		5.9
Before Tax			9.4		6.7
50% Load 75% Load Full Load Average		967 918 902 905	D D D D		
Unit Availability:					
Equivalent Planned Outage Ra	te (%)	4.8			
Equivalent Planned Outage Ra Equivalent Un-planned Outage	te (%) Rate (%)	4.8 3.7			
Equivalent Planned Outage Ra Equivalent Un-planned Outage Equivalent Availability (%)	te (%) Rate (%)	4.8 3.7 92.1	D		
Equivalent Planned Outage Ra Equivalent Un-planned Outage Equivalent Availability (%) Capability Ratio	te (%) Rate (%)	4.8 3.7 92.1	D		
Equivalent Planned Outage Ra Equivalent Un-planned Outage Equivalent Availability (%) Capability Ratio Capacity Factor (%)	te (%) Rate (%)	4.8 3.7 92. 1.1 85.	0		

Cost and performance data updated in 2010 based on data from PCCost.

Gen Options: lengthened construction profile to 4 years.

1. Activated Carbon Injection for Mercury removal is included in capital cost.

- 2. Substation was added to General Facilities (category 1)
- 3. Raw Water Make up costs was added to General Facilities (category 2).
- 4. Rail Spur added to General Facilities (category 3).
- Engineering & Construction Managment Fee is 10% of Process Facilities Capital.

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- Project Contingencies calculated at 10% of Total Plant Cost.
- Availability numbers are for reference only and do not affect total costs.

_ Key assumption data supplied to model to perform key TAGWeb[™] analysis

Helpful notes to provide insight on plant cost and performance results





- 800 MW PC Plant with hybrid cooling (30% wet / 70% dry) installed upfront
- PC plant is retrofitted with 90% CO₂ capture after 10 years of operation

Deferred Capital, such as CO2 removal, fuel cell stack removal, etc. can be analyzed for different scenarios!





- 800 MW PC Plant with hybrid cooling (30% wet / 70% dry) installed upfront
- PC plant is retrofitted with 90% CO₂ capture after 20 years of operation

Deferred Capital, such as CO2 removal, fuel cell stack removal, etc. can be analyzed for different scenarios!



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>	Study 10.0 Technology 1016.3C Fuel 1012.6 Economics 1031.3	CURRENT SELECTION 2010 Tech Cases for 2011 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas		SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan
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- Carrying Charge Summary (CC): Annual capital costs contributing to the carrying charge requirements for the plant
- Revenue Requirements (RR): Annual costs for all items contributing to revenue requirements for the plant, such as capital carrying charges, O&M expenses, and fuel costs (intended for investor owned utilities - IOUs)
- Discounted Cash Flow (DCF): Annual cash flow requirements for major plant cost categories such as taxes, capital recovery costs, O&M expenses, and fuel costs (intended for Non-Utility Generation – NUGs)

Discounted Cash Flow	Analysis Parameters		_
Secur [rity % Of Total	Current \$ (%/yr) 7.50	Users can modify key
Comr	Levelize with after tax debt of Cevelize with cost of Co Cevelize with user input dis	ost? 🔽 mmon count rate	economic input parameter used in DCF analysis



Discounted Cash Flow Analysis for Unregulated Power Projects

	DISCOUNTED CASH FLOW REPORT									
Study	tudy 10.0 2010 Tech Cases for 2011									
Techno	ology		1016.3C	Combus	Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas					
Econor	nics		1031.3	2010 Ec	2010 Econ EWC Natural Gas					
Fuel			1012.6	2010 Na	atural Gas EWO	2				
Region			E/W Centr	al						
State			Michigan							
Unit Si	ze (Ne	t MW)	235.85							
Numbe	r of U	nits	2							
Capaci	ty Fac	tor (%)	85.00							
Dec 20	10 \$									
					For an Invo (Tho Curre	estor-Own Jusands of Ent \$ Analy	ed Utility \$) ysis			
Study Year	Year	Return on Common Equity	Interest on Debt	Income Taxes	Other Taxes and Insurance	Capital Recovery	Fuel Cost	Charging Cost	O&M Cost(%)	
1	2011	45903.1	25501.7	20267.7	11903.5	29235.5	115204.4	NA	17054.8	
2	2012	44054.0	24380.3	18049.5	11903.5	30320.4	118084.5	NA	17481.2	
3	2013	42137.6	23221.4	18155.3	11903.5	29040.0	121036.6	NA	17918.2	
4	2014	40300.7	22106.7	18213.8	11903.5	27855.7	124062.5	NA	18366.2	
5	2015	38537.3	21032.8	18228.6	11903.5	26760.1	127164.1	NA	18825.3	
6	2016	36842.0	19996.8	18202.8	11903.5	25746.8	130343.1	NA	19295.9	
7	2017	35209.6	18995.7	18139.7	11903.5	24809.4	133601.7	NA	19778.3	
8	2018	33635.4	18026.9	17872.2	11903.5	24112.1	136941.8	NA	20272.8	
9	2019	32104.5	17082.3	16933.9	11903.5	24112.1	140365.3	NA	20779.6	
10	2020	30573.6	16137.6	15995.6	11903.5	24112.1	143874.4	NA	21299.1	

Busbar Costs based on DCF Analysis

	Year-by-Year Revenue Requirements Schedule For a Non-Utility Company									
	(Thousands of \$)									
	(See Note Below) Current \$ Analysis									
Study	Content & Analysis Content & Analysis Content & Analysis Content & Analysis Content & Analysis Content & Analysis									
Year	Year	Sub-total	Тах	Credit	Credit	Credit	Credit	Required	Current \$ Analysis	Constant \$
1	2011	265070.7	0.0	0.0	0.0	0.0	0.0	265070.7	75.470	73.629
2	2012	264273.3	0.0	0.0	0.0	0.0	0.0	264273.3	75.243	71.617
3	2013	263412.6	0.0	0.0	0.0	0.0	0.0	263412.6	74.998	69.643
4	2014	262809.0	0.0	0.0	0.0	0.0	0.0	262809.0	74.826	67.788
5	2015	262451.7	0.0	0.0	0.0	0.0	0.0	262451.7	74.724	66.045
6	2016	262331.0	0.0	0.0	0.0	0.0	0.0	262331.0	74.690	64.405
7	2017	262438.0	0.0	0.0	0.0	0.0	0.0	262438.0	74.720	62.859
8	2018	262764.7	0.0	0.0	0.0	0.0	0.0	262764.7	74.813	61.403
9	2019	263281.2	0.0	0.0	0.0	0.0	0.0	263281.2	74.960	60.023
10	2020	263895.9	0.0	0.0	0.0	0.0	0.0	263895.9	75.135	58.696
11	2021	264611.4	0.0	0.0	0.0	0.0	0.0	264611.4	75.339	57.419
12	2022	265430.1	0.0	0.0	0.0	0.0	0.0	265430.1	75.572	56.192
13	2023	266354.6	0.0	0.0	0.0	0.0	0.0	266354.6	75.835	55.012
14	2024	267387.5	0.0	0.0	0.0	0.0	0.0	267387.5	76.129	53.879
15	2025	268531.7	0.0	0.0	0.0	0.0	0.0	268531.7	76.455	52.790
16	2026	269789.8	0.0	0.0	0.0	0.0	0.0	269789.8	76.813	51.743
17	2027	271164.6	0.0	0.0	0.0	0.0	0.0	271164.6	77.205	50.739
18	2028	272659.2	0.0	0.0	0.0	0.0	0.0	272659.2	77.630	49.774
19	2029	274276.5	0.0	0.0	0.0	0.0	0.0	274276.5	78.091	48.848
20	2030	276019.7	0.0	0.0	0.0	0.0	0.0	276019.7	78.587	47.959
21	2031	277891.7	0.0	0.0	0.0	0.0	0.0	277891.7	79.120	47.107



TAGWeb™ Report Generation – Emissions

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>>>	Study 10.0 Technology 1016.3C Fuel 1012.6 Economics 1031.3	CURRENT SELECTION 2010 Tech Cases for 2011 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas	SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan				
	TECH INFO	Taskaslam	Financial				
	Expand All Collapse All TECHNOLOGY GENERAL DESIGN BASIS ADJUST DESIGN CAPEX OSM PERFORMANCE ENVIRONMENTAL	Technology Summary Results of current calculations Estimating Worksheet Calculation details and intermediate results Technology Input Data Current technology input data Economics Input Data Current economics input data Fuel/Resource Input Data Current fuel/resource input data	Carrying Charge Summary Carrying Charge Summary Revenue Requirements Discounted Cash Flow Discounted Cash Flow Report				
	ECONOMICS	Emissions Emissions Outputs Physical emissions output Emissions Costs Cost of emissions treatment and disposal	Sensitivity Study Technology Sensitivity Report Technology sensitivity report Fuel Sensitivity Report Fuel sensitivity report Economics Sensitivity Report Economics sensitivity report				
	REPORTS REPORTS Technology Reports Comparison Reports Phase Construction	·					





TAGWeb™ Report Generation – Emissions

 Emissions Output: Displays the physical air, liquid, and solid emissions from the plant. It does not include the calculated or inputs costs of emissions controls.



 Emissions Cost: Displays the capital and O&M costs associated with emissions controls for the selected technology. It does not include the physical emissions quantities.



TAGWeb™ Report Generation – Sensitivities

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*	Study 10.0 Technology 1016.3C Fuel 1012.6 Economics 1031.3	CURRENT SELECTION 2010 Tech Cases for 2011 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas		SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan				
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	ECONOMICS	Emissions Outputs Physical emissions output Emissions Costs Cost of emissions treatment and disposal	Techno Techno Fuel Se Econon Econon	Sensitivity Study plogy Sensitivity Report ensitivity Report ensitivity report mics Sensitivity report mics sensitivity report				



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TAGWeb[™] Report Generation – Sensitivities

 Sensitivity Analysis: Allows users to examine sensitivities on key TAGWebTM input variables



- Economics
- Fuel
- "0" for midpoint, TAGWeb[™] will run the simulation twice once at the minimum and maximum values
- "1" for midpoint, TAGWeb[™] will run the simulation 3 times once at the minimum, the maximum, and at a value halfway between the maximum and minimum





TAGWeb™ Report Generation – Sensitivities (Example)

Study	10.0	2010 Tech Cases for 2011
Technology	1001.2C	Pulverized Coal, 800 MW, EWC, IL6 Bit, Supercritical, LSFO w/o CO2
Economics	1030.3A	2010 Econ EWC Coal
Fuel	1033.0	2010 Illinois No. 6
Commercial Service Year	2011	

Process Capital, Category 1			
TCR (\$/kW)	2617.708	3399.705	
FOM (\$/kW-yr)	44.799	51.889	
VOM (mils/kWh)	6.390	6.390	
Consumables (mils/kWh)	4.951	4.951	
Levelized Busbar Cost (mils/kWh)			
Capital	45.932	59.627	
O&M	15.838	17.054	
Fuel	24.954	24.954	
CO2 Tax	0.000	0.000	
Byproduct Credit	0.000	0.000	
Production Credit	0.000	0.000	
Emission Credit	0.000	0.000	
ROC Credit	0.000	0.000	
Total	86.725	101.635	



TAGWeb™ Report Generation – Comparison Reports

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>>>	Study 10.0 Technology 1016.3C Fuel 1012.6 Economics 1031.3	CURRENT SELECTION 2010 Tech Cases for 2011 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas	SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan					
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	ECONOMICS ■ FINANCING ■ 0&M UNIT COST ■ 0WNER'S COST FUEL ■ GENERAL REPORTS ■ REPORTS Comparison Reports Phase Construction	Emissions Termissions outputs Physical emissions output Termissions costs Emissions Costs Eux Cost of emissions treatment and disposal Function Economic Economic Economic Economic	Sensitivity Study chnology Sensitivity Report chnology sensitivity report el Sensitivity Report el sensitivity report onomics Sensitivity Report onomics sensitivity report					



TAGWeb™ Report Generation – Comparison Reports

- This feature allows TAGWeb [™] users to compare data for various technology records side-by-side
- Comparison Reports
 - Summary Technologies ComparisonKey data comparing selected Technologies, including capital, O&M, and busbar costs.
 - Detailed Technologies ComparisonDetailed data about the selected Technologies, including capital and O&M costs, performance, emissions, and busbar costs.
 - Busbar Chart: A chart comparing busbar costs over the life of the plant for the Technologies that have been selected
- Screening Curves: A graph showing the totallevelized plant cost versus capacity factor for selected technologies.



Busbar Comparison Chart Compares Cost of Electricity for Different Technologies





TAGWeb™ Report Generation – Comparison Reports

 This feature allows TAGWeb [™] users to compare data for various technology records side-by-side




TAGWeb™ Report Generation – Phase Construction

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	Study 10.0 Technology 1016.3C Fuel 1012.6 Economics 1031.3	CURRENT SELECTION 2010 Tech Cases for 2011 Combustion Turbine Combined Cycle, 2x1 7FA.03, EWC, Nat Gas 2010 Natural Gas EWC 2010 Econ EWC Natural Gas		SIZE & LOCATION CT Plant Size (Gross MW) 483.30 HRSG Size (MW) 86.40 Auxilaries (MW) 5.80 Unit Size (Net MW) 235.85 Unit 2.00 Total Plant Capacity (NET MW) 471.70 Region, State E/W Central, Michigan	
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		Emissions Outputs Physical emissions output Emissions Costs Cost of emissions treatment and disposal	Techno Techno Fuel Se Fuel se Econor	Sensitivity Study Ology Sensitivity Report ology sensitivity report ensitivity Report mics Sensitivity Report mics sensitivity report	



TAGWeb™ Report Generation – Phase Construction

 This feature allows TAGWeb [™] users to create expenditure and revenue requirements for multiple unit projects with sequential unit construction





TAGWeb™ Report Generation – Phase Construction

 This feature allows TAGWeb [™] users to create expenditure and revenue requirements for multiple unit projects with sequential unit construction



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Summary – TAGWeb's Value

- Cost effective approach to having access to data and information on the <u>detailed</u> costs of a broad range of power generation and storage technologies
- The data and information in TAGWeb can be used to support resource planning activities and regulatory decisionmaking.
- Unit performance and costs can be<u>customized</u> by location, instead of a national average or "typical" unit
- Sensitivity analysis to support initial planning scenarios and risk mitigation



Together...Shaping the Future of Electricity

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