

Table 3. Details on Six Certification Programs - Information on Certification Programs – CMVP, CEM, BPI GoldStar Contractor

N	Parameter	Certified Measurement and Verification Professional (CMVP)	Certified Energy Manager® (CEM)	BPI GoldStar™ Contractor Program
1	Administering Agency (Certifier)	Association of Energy Engineers (AEE) in cooperation with the Efficiency Valuation Organization (EVO)	Association of Energy Engineers (AEE) AEE is accredited by ANSI (ANSI/ISO/IEC 17024) for this certificate	Building Performance Institute, Inc.
2	URL	http://www.aeeprograms.com	http://www.aeeprograms.com	http://www.bpi.org/goldstar.aspx
3	Type	Certification	Certification	Quality Assurance Program for Contractors with 12 embedded Credentials possible
4	Year first available	2002	1981	2000 for first two certificates and ongoing since then
5	Count of current certificate holders	~770 in US ~3,500 worldwide	~10,970 in the US ~12,400 worldwide	457 GoldStar Contractors in US 12,925 Certified Individuals in US
6	Reason for certificate creation	To recognize the most qualified professionals and raise the overall professional standards within the measurement and verification field.	To raise the professional standards of those engaged in energy management To improve the practice of energy management by encouraging energy managers in a continuing program of professional development To identify persons with acceptable knowledge of the principles and practices of energy management related disciplines and laws governing and affecting energy managers through completing an examination and fulfilling prescribed standards of performance and conduct To award special recognition to those energy managers who have demonstrated a high level of competence and ethical fitness for energy management	GoldStar Contractor Program - To provide confidence to contractors that quality is profitable and to set their company apart in the marketplace. Certificates – to provide quality work with a good return on investment.
7	Time between considering certification and actual	Unknown	Approximately one year	Unknown

N	Parameter	Certified Measurement and Verification Professional (CMVP)	Certified Energy Manager® (CEM)	BPI GoldStar™ Contractor Program
	certificate process in place			
8	Who decides on attainment of competence	Not stated, but assume there is a CMVP Exam Development committee that is analogous to the CEM committee since both run by AEE.	There is a CEM Exam Development committee. The test is updated at least once a year.	Unknown
9	Modality to convey competency	In-person seminar with written exam (see qualifications, below)	In-person seminar with written exam (see qualifications, below) OR Online seminar with exam	Online test
10	Levels	Yes – two levels of certification Certified Measurement and Verification Professional (CMVP) CMVP – In Training (CMVP-IT)	Yes – two levels of certification Certified Energy Manger (CEM) Energy Manger in Training (EMIT™)	GoldStar program has three tiers with different opportunities and obligations in each tier Embedded in the GoldStar program are 12 certificates in two areas Eight Core Certificates Building Analyst Heating Professional Envelope Professional AC & Heat Pump Manufactured Housing Multifamily Air Leakage Control Installer Infiltration & Duct Leakage Four Home Energy Performance Certificates Energy Auditor QC Inspector Retrofit Installer Crew Leader
11	Qualification Requirements	CMVP Attend preparatory 2.5-day training seminar, AND Pass 4-hour proctored open book exam (minimum 70%), AND	CEM Attend preparatory training seminar by approved trainer, AND Pass 4-hour proctored open book exam (minimum 70%), AND	GoldStar Contractor Be a company or legal entity Have one (1) staff member BPI certified as a Building Analyst or Energy Auditor

N	Parameter	Certified Measurement and Verification Professional (CMVP)	Certified Energy Manager® (CEM)	BPI GoldStar™ Contractor Program
		<p>4-year degree from an accredited university or college in science, engineering, architecture, business, law, finance or related field AND 3 years of verified experience in energy or building or facility management, or M&V, OR</p> <p>Registered Professional Engineer or Registered Architect AND 3 years of verified experience in energy or building or facility management, or M&V, OR</p> <p>4-year non-technical degree from an accredited college or university in a field not specified above AND 5 years of verified experience in energy or building or facility management, or M&V OR</p> <p>2-year technical degree AND 5 years of verified experience in energy or building or facility management, or M&V OR</p> <p>No educational experience AND 10 years of verified experience in energy or building or facility management, or M&V OR</p> <p>Current status of Certified Energy Manager®</p> <p>CMVP-IT</p> <p>Attend preparatory 2.5-day training seminar, AND</p> <p>Pass 4-hour open book exam (minimum 70%),</p>	<p>4-year degree in engineering or architecture AND 3+ years of experience in energy engineering or energy management, OR</p> <p>Registered Professional Engineer or Registered Architect AND 3+ years of experience in energy engineering or energy management, OR</p> <p>4-year degree in technology, environmental science, physics, or earth science AND 4+ years of experience in energy engineering or energy management, OR</p> <p>4-year degree in business (or related field) AND 5+ years of experience in energy engineering or energy management, OR</p> <p>2-year energy management associate's degree AND 6+ years of experience in energy engineering or energy management OR</p> <p>2-year technical associates degree AND 8+ years of experience in energy engineering or energy management OR</p> <p>No educational experience AND 10+ years of experience in energy or building or facility management, or M&V</p> <p>EMIT</p> <p>Same qualifications as the CEM, but with less experience. Any 4-year degreed person or a person with a 2-year degree in energy management must simply have less than the requisite years described above.</p>	<p>Have general liability insurance in the amount of \$1 million</p> <p>Have workers compensation insurance (as state law requires)</p> <p>Licensing and bonding as required by governing jurisdiction</p> <p>Have a customer dispute resolution policy</p> <p>Maintain annual records of calibration of diagnostic equipment</p> <p>Maintain records on data collection</p> <p>Perform work according to BPI national standards</p> <p>Provide job specific information electronically to BPI upon request</p> <p>Has ability for a company representative to receive electronic notifications from BPI</p> <p>When required, agrees to pay a standardized fee for in-field Quality Assurance inspections on per inspection basis</p> <p>Certificates</p> <p>Vary, not included here</p>

N	Parameter	Certified Measurement and Verification Professional (CMVP)	Certified Energy Manager® (CEM)	BPI GoldStar™ Contractor Program
			<p>If person has a 2-year technical associate's degree, they must have at least 2 years of experience.</p> <p>If a person has no post-high school degree, they must have at least 4 years of experience</p>	
12	Renewal Required	Yes – every three years for CMVP CMVP-IT good for six years and is not renewable	Yes – every three years for CEM EMIT good for six years and is not renewable	Yes - annually
13	How to renew	10 renewal credits can be obtained through any of the following: 1) continuing education courses, 2) membership in a professional organization, 3) continued employment in energy management or energy engineering field, 4) attending specified energy conference, 5) presenting and publishing professional awards or papers, 6) holding office in professional organization	Same as CMVP (All AEE Certified Professionals have same renewal requirements)	Pay fee within 30 days of invoice Provide insurance proof with BPI as Certificate Holder
14	Certificate cost	<p>Seminar \$1450 - \$1550 (higher price if not AEE member)</p> <p>Initial Application and Exam Fee \$400 - \$500 (higher price for remote testing)</p> <p>Retesting Fee \$200 - \$300 (higher price for remote testing)</p> <p>Certification renewal \$300</p>	<p>Initial Application and Exam Fee \$400</p> <p>Certification renewal \$300</p> <p>Preparatory training costs vary depending on locale: <u>AEE Energy Seminars</u> (4 or 5 day in person for \$1,895 - \$1,995; 2 day in person for \$1,350 - \$1,450; 12 hours online for \$1,050 - \$1,150) <u>Salt Lake Community College</u> (~\$8,700 and 18-24 months); <u>UC Davis Extension</u> (unable to find online); <u>Unversidad del Turabo</u>, Puerto Rico (50 hour or a 100 hour training program, but unable to find costs online),</p>	<p>Annual Fee - \$1,200 plus payment for any required in-field quality assurance inspections</p> <p>Embedded in the three tier system are costs that the team cannot quantify. However, to move up a tier level, contractors must demonstrate training attendance and successfully complete a test specific for each tier. Additionally, company must add one more BPI certified person for something other than Building Analyst or Energy Auditor to get to Tier 2 (Advanced Level) and a BPI certified Quality Control Inspector to reach Tier 3 (Master level). While within a specific tier, contractor must complete companywide</p>

N	Parameter	Certified Measurement and Verification Professional (CMVP)	Certified Energy Manager® (CEM)	BPI GoldStar™ Contractor Program
			<u>Western New England College</u> (17.5 hours for \$379 - \$679, depending on alumnus status, 2011 costs which were the only items online)	self-assessment survey on specific topics, develop skills enhancement plan and actively engage in training specific to this plan.
15	How is the certification process maintained?	Not stated, but assume the same as CEM since both run by AEE.	Certification fees	Assume annual fees as BPI is a 501(c)3 non-profit
16	Exam included	Yes	Yes	Yes, for GoldStar Program to move up in Tier system
17	Examination Administrator	AEE Executive OR and educator OR a testing expert OR agency, OR whomever the certification body deems appropriate	One of five approved trainers listed above in the cost parameter	Unknown
18	Exam Format	Multiple Choice and True/False questions	130 Questions, multiple choice	Unknown
19	Exam Content	Reasons for M&V Current M&V Projects IPMVP Developing an M&V Plan Current Issues in M&V Emission Trading Baseline Adjustments Key Elements of Success: Theory & Examples of IPMVP Options Selecting Options: Which One Is Best Suited for My Project? Adherence with IPMVP	17 topic areas: 1. Codes and Standards 2. Energy Accounting and Economics 3. ENERGY AUDITS AND INSTRUMENTATION 4. ELECTRICAL SYSTEMS 5. HVAC SYSTEMS 6. MOTORS AND DRIVES 7. INDUSTRIAL SYSTEMS 8. BUILDING ENVELOPE 9. CHP SYSTEMS and RENEWABLE ENERGY 10. FUEL SUPPLY AND PRICING BUILDING AUTOMATION AND CONTROL SYSTEMS 11. HIGH PERFORMANCE BUILDINGS 12. THERMAL ENERGY STORAGE SYSTEMS 13. LIGHTING SYSTEMS 14. BOILER AND STEAM SYSTEMS 15. MAINTENANCE AND COMMISSIONING 16. ENERGY SAVINGS PERFORMANCE CONTRACTING 17. MEASUREMENT AND VERIFICATION	Unknown

N	Parameter	Certified Measurement and Verification Professional (CMVP)	Certified Energy Manager® (CEM)	BPI GoldStar™ Contractor Program
20	Available Continuing Education Units as pursue certification	Yes – for seminar 2.0 CEU 4.0 AEE Credits toward re-certification	Yes, for renewal only	No
21	Are there disciplinary or Quality Assurance processes once certified?	Yes. CMVP suspension or revocation may be due to violation of AEE’s ethical standards or CMVP Competence. CMVP may be suspended if the individual falls below the required professional credits.	Yes, CEM can be revoked or suspended by a 2/3’s vote of the certification board. Suspension or revocation may be due to violation of AEE’s ethical standards or CEM Competence.	Yes – GoldStar Agreement may be revoked if contractor fails to pay fees, commits a deliberate material breach of the Agreement, repeats breach on 3 occasions in a year, fails to make corrective actions for breach within 45 business days, or ceases to conduct business.

Table 1. Information on Certification Programs – Credentialed Evaluator, Certificate in Evaluation Practice, GHG Validation/Verification

N	Parameter	Credentialed Evaluator (CE)	Certificate in Evaluation Practice	Greenhouse Gas Validation / Verification
1	Administering Agency (Certifier)	Canadian Evaluation Society (CES)	The Evaluators Institute	ANSI (Under ISO 14065)
2	URL	http://evaluationcanada.ca/ce	http://tei.cgu.edu/	http://www.ansi.org/accreditation/environmental/greenhouse-gas-validation-verification/Default.aspx
3	Type	Credential	Certification	Accreditation for Third-party Validation / Verification services for the reduction and removal of greenhouse gasses (GHG)
4	Year first available	2010	2004	2011 (Public Policy GHG-PL-701)
5	Count of current certificate holders	312 in Canada	Unknown	24 Verifiers

N	Parameter	Credentialed Evaluator (CE)	Certificate in Evaluation Practice	Greenhouse Gas Validation / Verification
6	Reason for certificate creation	To define, recognize, and promote the practice of ethical, high-quality, and competent evaluation in Canada.	To enhance the role of, the practice of, and the impact of evaluation. To provide high quality learning experiences to professionals in an off-campus environment.	The program was determined necessary by the ANSI board.
7	Time between considering certification and actual certificate process in place	4 years	Uncertain, but appears less than a year	Unknown
8	Who decides on attainment of competence	Credentialing Board made up of experts in the field (e.g., recognized CES Fellows and National Award winners)	Academic professors and highly regarded experts in the field. These same individuals teach the courses required to obtain the certificate.	A group of two or more Greenhouse Gas Validation / Verification Body Accreditation Committee (GVAC) volunteers
9	Modality to convey competency	Bundling past experience to provide evidence of competence in specific broad topic areas (see qualifications, below)	In-person course work with classes ranging from one to five days on a topic (see qualifications, below)	Written application, desk review of provided documentation, and on site audit both for assurance of organizational structures and individual ability to perform the work
10	Levels	No	Yes – four certificates Master Evaluator Certificate™ Certificate in Evaluation Practice™ (CEP) Certificate in Advanced Evaluation Practices™ (CAEP) Certificate in Analytic Evaluation Methods™ (CAEM)	No
11	Qualification Requirements	Evidence of graduate level degree or certificate related to evaluation (e.g., a Prior Learning Assessment and Recognition, PLAR) AND Evidence of two years (full-time equivalent) evaluation-related work experience within the last 10 years AND	Master Evaluator Completion of two course-based certificates (CEP and CAEP) AND Portfolio of Experience developed with guidance of mentor AND Actively working in the field of evaluation or evaluation-related activity CEP	Two Stage Process: Preliminary Application Written description of compliance across these six areas: 1) Confirmation of third party status 2) Description of legal entity status 3) Proof of publically available documents describing the program

N	Parameter	Credentialed Evaluator (CE)	Certificate in Evaluation Practice	Greenhouse Gas Validation / Verification
		<p>Indicators of education and/or experience related to 70% of the 49 competencies in each of the five domains of Competencies^a</p>	<p>30 days of instruction as follows: 15 days of instruction in Evaluation Foundation courses AND 9 days of instruction in Design or Analysis courses AND 6 days of instruction in Evaluation Practice and Inquiry courses CAEP Completion of CEP AND 30 additional days of instruction within four topic areas (courses for CEP do not count) Topic areas are: 1) Evaluative Inquiry, 2) Design, 3) Analytic Approaches (Quantitative Analysis or Qualitative Analysis), 4) Outcome and Performance Assessment, 5) Evaluation Practice CAEM Additional 30-days of coursework, some courses may overlap with CEP or CEAP. Must include four hours of instruction in quantitative evaluation approaches and four hours of instruction in qualitative evaluation approaches Must include Basics of Program Evaluation (3 days) and Evaluation Research Methods (3 days)</p>	<p>4) Description of the management system for validation / verification activities 5) Identification of any GHG programs, registries, or emissions trading schemes that the entity currently participates in and intends to participate in Final Application has a written component, a ‘witness’ assessment, and an on-site assessment The written component has the following: 1) Listing of all office locations, personnel and activities conducted by site 2) Description of applicant main activities and experience conducting validation / verification (V/V) activities 3) Documentation of program procedures 4) Number of employees 5) Current recognitions / accreditations 6) Type of activity for which applicant is seeking accreditation 7) List which of 12 different GHG programs applicant seeks to provide services to 8) List which of six project level sector groups and 10 organization level sector groups application seeks to provide services to Within the witness assessment, ANSI staff observes the applicant as they perform tasks related to GHG V/V. For the on-site assessment, ANSI conducts a two- to three-day assessment at the main office to confirm operational capability.</p>
12	Renewal Required	Yes –every three years	No	Yes – every three years

N	Parameter	Credentialed Evaluator (CE)	Certificate in Evaluation Practice	Greenhouse Gas Validation / Verification
13	How to renew	Must accumulate at least 40 hours of Continuing Education Credits over	Not applicable	Similar to initial assessment except experience gained will be taken into account
14	Certificate cost	Application Fee \$485 PLAR application if required \$550 Maintenance Fee \$50 plus regular annual CES membership fees that range from \$71.25 to \$195 depending on student or professional status and membership in American Evaluation Association (AEA) or AES (Australasian Evaluation Society)	Master Evaluator Application Fee - \$225 Mentoring Fee - \$1,365 Courses for CEP, CAEM, and CAEP Varies based on the number days for a course. As of Feb 2016, regular fees are as follows: One-day course - \$570 Two-day course - \$980 Three-day course - \$1,365 Four-day course - \$1,722 Five-day course - \$1,950	Two stage process: Preliminary application has zero cost. The full application cost is \$5,000 plus a daily rate of \$1,250 plus expenses for onsite visits. Annual fee thereafter based on preceding calendar year revenue attributable to GHG V/V activities. Minimum is \$1,500 and maximum is \$55,000. After the minimum level, the cost is 0.4% of the GHG V/V revenue up to a max.
15	How is the certification process maintained?	Volunteer time from professionals in CES AND Application fees AND Annual maintenance fees	Unknown	Fees associated with the certification
16	Exam included	No	No	No
17	Examination Administrator	Not applicable	Not applicable	Not applicable
18	Exam Format	Not applicable	Not applicable	Not applicable
19	Exam Content	Not applicable	Not applicable	Not applicable
20	Available Continuing Education Units as pursue certification	Not applicable	Not applicable	Not applicable
21	Are there disciplinary or Quality Assurance processes once certified?	Unknown	No	Yes – accredited organizations undergo surveillance during the first and second year after receiving initial accreditation or reaccreditation. The team could not ascertain if there is a cost associated with the surveillance assessment.