

Energy Project Finance, Analysis & Structuring Training (Optional - EPFA Energy Project Finance Analyst Certification)

Course Length: 20 Professional Development Hours (PDHs)
2.0 Continuing Education Units (CEU's)

Delivery: OnDemand | Self-Paced at Learner's Schedule

Level: Basic to Intermediate. Attendees should have exposure to basic energy terms, be able to make fundamental calculations, and be interested in the financial aspect to help make energy efficiency projects a reality.

Required: Students must have access to an HP12C calculator, purchase one on their own, purchase the HP12C app from the appropriate app store (e.g., apple store / google play etc.) depending on their smart device or computer.

Note: Students may take the course for knowledge and professional development learning without taking the certification exam which is optional.

ABOUT THE COURSE

Attendees to the Energy Project Finance, Analysis & Structuring training course will learn about the business strategy to help make successful energy projects happen. Having a basic understanding of a project's financial implications, can make the difference of a project moving forward or remaining in the proposed stage. Leveraging the power of one of the industry's most popular tools, the HP12C calculator or app, the instructor will guide students through a series of practical, real-world problem-solving calculations, go over basic terminology and concepts, as well as explain different financial considerations for a given energy project. By gaining a better understanding of the basic energy project financial principles, attendees can make their business case to all stakeholders and offer a transparent plan of action to make projects happen, meet project expectations and goals.

Benefits of Attending

Anyone who wants to learn how to understand the finance side of energy projects and what makes them so attractive in the energy sector. This includes the core concepts of the time value of money, analyzing both even and uneven cash flow yields, roles of depreciation and amortizations, tax implications to the yield curves in energy projects, and how to take all that information and put it into energy project proposals and requests for quotes. Students will utilize the HP12C calculator or HP12C app to make computations and to answer questions throughout this training.

Who Should Attend:

This course is designed to provide practical skills to help a wide array of professionals involved in the energy project decision making process. The course does not go into "engineering and

heavy technical” energy project details. Instead, the training modules provide a base foundation needed for team members to work with others in their company whether that be a supporting position, leadership position, or advisory position. Attendees may already have a background in energy efficiency, building or facility operations, sustainability, renewables, fintech and cleantech projects or they may be more interested in sharpening their skills in the financial aspects and other considerations to help evaluate a proposed energy project. Professionals and new entrants to the energy field should consider attending such as:

Building Owners, Property Managers, Building & Facility Operators, Business Development, Project Managers & Coordinators, Energy Professionals, Renewable Energy Professionals, Facility Managers, Finance Coordinators, Contracting & Procurement Professionals, Sustainability & ESG Managers, and others team members involved with helping to make energy projects happen and a success.

CERTIFICATE OF COMPLETION

Professional Development Hours (PDHs) | Continuing Education Units (CEUs)

Attendees who complete the course, view all course modules, complete the knowledge checks will be awarded 20 PDHs / 2.0 CEUs.

EPFA CERTIFICATION

In addition, those attendees who take and pass each module exam and the Final course examination with a 75% grade or higher will be awarded the Energy Project Finance Analyst (EPFA) Certification by the non-profit organization [GreenNRG Institute](#).

CERTIFICATION REQUIREMENTS:

There are **not** any prerequisites to take the training and become EPFA Certified

- You must take the training: Energy Project Finance, Analysis & Structuring Course
- You must pass all the knowledge check quizzes, module exams and the final exam
- Once you are certified, you are certified. There are no requirements to re-certify.

COURSE SYLLABUS OUTLINE

MODULE 1 - Introduction

- Anatomy of an Energy Project
- Energy Project Considerations and Parameters
- Economics of an Energy Project
- Risk & Due Diligence
- Introduction to Interest Rates
- Introduction to the HP12C Energy Calculator Learning Modules
- Using Memories to Solve Problems
- Basic Arithmetic

- Additional Study Example Problems With Answers
- Additional Study Example Problems Without Answers
- Time Value of Money (TVM) Basics
- Financial Calculations

MODULE 2 - Module 2: NPV, IRR and Lease Functions

- Introduction to Module 2
- Present Value of Future Cash Flows
- Discounted Cash Flow Analysis-NPV (Net Present Value)
- Discounted Cash Flow Analysis-IRR (Internal Rate of Return)
- Lease & PPA (Power Purchase Agreement) Functions
- Review of Projects, Analysis & Components
- Additional NPV & IRR Study Guide Sample Calculations with Answers
- Additional NPV & IRR Study Guide Sample Calculations Without Answers

MODULE 3 - Amortization, Depreciation & Tax Components

- Introduction to Module 3
- Financial Statements 101
- Balance Sheet Treatment of Energy Assets
- Amortization
- Depreciation
- Value of ITC (Investment Tax Credit) and RECs (Renewable Energy Certificate)

MODULE 4 - Dates, Fees, Markups, Proposals, Legal Structures, Software and MM&R

- Introduction to Module 4
- Dates Functions on the HP12C calculator or HP12C App
- Points & Loan Fees on the HP12C
- Percentages
- Determining Equipment Cost
- Energy Project Proposals
- Project Proposal Overview
- Project Economics & Pre-construction
- ECM (Energy Conservation Measures) Evaluations
- Project Plan Documentation & Structures
- Appendices & Internal Project Requirements
- Monitoring, Measurement & Reporting
- Electric Utility Rates & Billing
- Energy Project Software--Quantifying the Economics of Solar Plus Storage Projects in California

- Measure & Optimize the Performance of a Solar + Storage Project

ABOUT THE INSTRUCTOR

Gene Beck, CEM, CLP is the team leader for the energy project finance series of courses and is the Executive Director of the Green NRG Institute in Orange, California. Green NRG is a non profit 501(c)3 organization with a focus of education on the business aspects of the U.S. energy sector and corporate leadership training.

Mr. Beck has served on five environmental advisory boards and 12 compliance task forces at the South Coast Air Quality Management District in Southern California, two small business environmental and small business financing task forces in Sacramento for the State of California, and several environmental task forces with the EPA in Washington, D.C. Additionally, he is a past member of the Southern California Association of Governments Energy Advisory Board, past President and executive board member of the Southern California chapter of the Association of Energy Engineers (AEE), and past board member of the Orange County Engineering Council. He was the AEE annual conference chairman in 2008 on AB32 Legislation and Implementation, and the Co-chairman of the 2009 AEE annual conference on Energy Solutions: CleanTech and Renewable Energy.

Course Website:

<https://pbjtechhub.com/products/energy-project-finance-analysis-structuring>

Energy Savings Measurement & Verification (M&V) Fundamentals and IPMVP Training

(PMVA - Performance Measurement Verification Certification Preparatory Program)

Course Length: 20 Professional Development Hours (PDHs)
2.0 Continuing Education Units (CEU's)

Delivery: Live interactive online webinars with instructor and attendees.

Level: Intermediate to Advanced. Attendees should have experience in the energy efficiency industry and be familiar with Measurement & Verification of energy efficiency both retrofits and new construction. See Certification below for more details.

Course Overview:

Attendees to the Energy Savings M&V Fundamentals and IPMVP course will utilize EVO's International Performance Measurement and Verification Protocol (IPMVP) to implement "best practices" for measurement & verification for energy efficiency projects and to enhance continuous energy systems performance. The course also helps attendees prepare for taking the Performance Measurement & Verification Analyst (PMVA) Certification exam to earn their PMVA industry recognition. The live webinar format enables attendees to interact with the instructor.

PMVA Certification builds on the M&V Fundamentals and IPMVP training curriculum owned and deployed by EVO since 2009. Over 15,000 individuals have taken this course with alumni in more than 60 countries.

The course has eleven subject matter modules (see below) that mirror the body of knowledge covered on the PMVA exam. Students will also be provided prior to the course the online Introduction to Statistics for M&V (Short self-taught online course) which further helps them prepare for the PMVA exam and M&V Fundamentals and IPMVP course.

LEARNING OBJECTIVES

- Understand the fundamental principles of M&V for individual energy efficiency projects.
- Understand relevant statistical concepts and how they apply to Measurement & Verification of Energy Savings
- Understand the IPMVP four Options (including partial retrofits, full retrofits, new construction) and the essential elements and content of an IPMVP compliant M&V Plan
- Be able to provide professional advice to energy efficiency program developers, energy managers, end users, utilities, governments, financial institutions, and other parties interested in M&V, transparency and increased energy savings and facility optimization.

SYLLABUS TRAINING CONTENT (11 MODULES)

The course has eleven subject matter modules (see below) that mirror the body of knowledge covered on the PMVA exam.

1. Introduction to M&V
2. Key Concepts
3. Short Examples
4. M&V Planning & Implementation
5. Critical Issues
6. Statistics for M&V
7. Retrofit Isolation Details (Option A + B)
8. Option C Details
9. Option D Details
10. Other M&V Applications
11. Summary and Review of an M&V Plan

M&V Overview:

Measurement and Verification (M&V) is the process of planning, measuring, collecting, implementing, enhancing, and analyzing data for the purpose of verifying and reporting energy savings within an individual facility resulting from the implementation of energy efficiency measures and to foster additional energy efficiency measures. Energy savings are sometimes hard to quantify since they represent the absence of energy usage. Instead, savings are determined by comparing measured use before, during and after implementation of an energy efficiency project, making appropriate adjustments for changes in conditions.

M&V activities may consist of some or all of the following:

- Meter installation calibration, building optimization and maintenance,
- Data gathering and screening,
- Development of a computation method and acceptable estimates for new construction,
- Computations with measured data, and
- Reporting, quality assurance, generating M&V plans, and third-party verification of reports.

M&V techniques can be used to:

- Increase energy savings
- Enhance energy efficiency techniques, services and technologies
- Document financial transactions
- Enhance financing for efficiency projects
- Improve engineering design & facility operations and maintenance
- Manage energy budgets, utility incentives and rebates
- Enhance the value of emission reduction credits
- Support evaluation of regional energy efficiency & DSM programs

PMVA – A (Associate option)

For those professionals that have not met their two year work experience requirement but have passed the PMVA exam, they will be awarded the PMVA-A (Associate) designation, and can submit additional work experience to be upgraded to full PMVA status.

TARGET AUDIENCE

Facility managers and building operators properly accounting for energy budgets.

End users / building owners / property managers implementing energy efficiency measures and looking to account for, measure and verify savings and bolster future energy efficiency savings.

New building designers wishing to account for the sustainability, reduced energy usage, and emissions of their project.

Demand side management (DSM) program managers, evaluators, or others working at utilities, State energy offices, Government, or public administrations.

Building owners, operators & property managers seeking recognition or certification for the energy efficiency of their building.

Water efficiency project professionals.

Designers for emission reduction & trading.

Energy end users seeking ISO 50001 designation.

PMVA Certification

The Performance Measurement and Verification Analyst (PMVA) professional certification establishes the primary standard for individuals applying performance, measurement, and verification concepts to energy efficiency projects. PMVAs typically work in an analyst role for ESCOs, public administration, utilities, and financial institutions and are involved in designing and implementing energy efficiency programs and financing energy efficiency projects. They have demonstrated M&V capabilities, including a good understanding of applying the IPMVP to determine savings. PMVAs could be building technologists, HVAC specialists, engineers, architects, economists, financial analysts, etc.

CERTIFICATION EXAM

The certification exam test reflects the following competencies:

Knowledge and basic understanding/comprehension of the fundamental principles of M&V for individual energy efficiency projects and specifically the key concepts of the IPMVP.

Understanding relevant statistical concepts and how they apply to M&V

Understanding the IPMVP four Options and the essential elements/content of an M&V Plan

Capacity to provide professional advice to energy efficiency program developers, utilities, governments, financial institutions, energy users, and other parties interested in M&V. The exam consists of multiple-choice questions. Before taking the exam, candidates have access to a series of knowledge-based sample questions on various M&V topics to test their acquired knowledge and to help them identify subjects/themes requiring further study and revision.

PMVA PRE-REQUIST CRITERIA

- 1) Take the M&V Fundamentals and IPMVP training course and take & pass the PMVA exam with a mark of 70 % or higher. More than 15,000 individuals have already taken this course in the past decade. (Candidates must take the exam and file their PMVA application with EVO within three years of training; however, it is recommended to upload your documentation before taking the course and to take the exam immediately after taking the course)
- 2) Have successfully graduated college/university in engineering, architecture, economics, sustainability, finance, building technology, HVAC, or related (requires a copy of your diploma or other relevant credentials)
- 3) Work in the field for at least two years – M&V, energy, energy efficiency, government, ESCO, utility, financial institution or related – should be advising/developing/implementing energy efficiency programs, energy efficiency projects, financing of energy projects, energy management, energy audits (provide contact details for reference and also a short description of duties)
- 4) Complete the PMVA electronic application form on EVO's website, upload information as required.

The PMVA certification is valid for 36 months from the date of being awarded. PMVA-A Associate level awardees have four years to upload their additional work and/or educational experience to apply for full PMVA designation.

Course Website:

<https://pbjtechhub.com/products/m-v-fundamentals-and-ipmvp%C2%AE-pmva-certification>

Fundamentals of Heat Pump Systems: Efficiency, Electrification & Sustainability

Course Length: 4 Professional Development Hours (PDHs)
.4 Continuing Education Units (CEU's)

Delivery: Live interactive online webinars with instructor and attendees. Course offered multiple dates or may be held on a private online bases.

Level: Intermediate. Attendees should have experience with Commercial HVAC Systems, their components, HVAC terminology, and Building Operations.

This course is for existing industry professionals, building operators, facility managers, energy managers, or anyone new to heat pumps (HP) and interested in knowing how heat pump systems operate, save energy, and reduce fossil fuel carbon dioxide (CO₂) emissions. Heat pumps now play a significant role in our federal, state, and local government's plans as part of a world-wide strategy for decarbonization. The instructor will provide information on factors to consider selecting the best heat pump system for your application needs, including the costs, energy savings, environmental impact, and incentives.

Course objectives:

About traditional constant volume and variable volume HVAC systems.

The types and operation of commercial and residential heat pump systems.

What factors should be considered to determine the best heat pump systems for your building.

The upfront cost and operating cost for HVAC systems and HP systems.

Positives and negatives of HP and HVAC systems.

Course Syllabus Topics:

- Definitions, abbreviations, and acronyms
- HVAC - variable air, water, and refrigerant systems
- Energy efficiency opportunities to enhance HP and HVAC heating and cooling systems
- Heating only heat pumps and reversible heating and cooling heat pumps
- Air source heat pump systems
- Ground source heat pump systems
- Water source heat pump systems
- Waste heat or wastewater from industrial or commercial processes
- Government and other incentives to install HP systems
- HP and HVAC math and calculations

Who should attend:

Building operators & owners, facility managers, O&M professionals, energy managers, energy services professionals, HVAC professionals and technical team members considering upgrades.

ABOUT THE INSTRUCTOR:

SAMUEL C. SUGARMAN, C.T.A.B., C.E.M., C.D.S.M., C.I.A.Q.M., is an internationally recognized HVAC and TAB consultant, instructor, and author. He has consulted on projects for testing and balancing, performance evaluation, design, retrofit and commissioning of HVAC systems for cleanroom facilities, corporate headquarters, government facilities, office complexes, hotels, hospitals, fume hood labs, major retail establishments, military installations, nuclear power plants, private and public schools, colleges, and universities. Mr. Sugarman was an adjunct professor at San Diego City College, and has also instructed over 250 HVAC, TAB and energy management training programs and seminars for various organizations, including AEE, ASHRAE, and the National Energy Management Institute. He has authored several books and training manuals on topics in the areas of his expertise and has received numerous awards and special recognition for his accomplishments. He currently serves as Board Chairman of the International Registry of CTAB Professionals.

Course Website:

<https://pbjtechhub.com/products/fundamentals-of-heat-pump-systems-efficiency-electrification-sustainability>

HVAC Clean Air Test and Balance Training

Course Length: 6 Professional Development Hours (PDHs)
.6 Continuing Education Units (CEU's)

Delivery: Live interactive online webinars with instructor and attendees. Course offered multiple dates or may be held on a private online basis.

Level: Intermediate. Attendees should have experience with Commercial HVAC Systems, their components, HVAC terminology, and Building Operations.

About the Course:

Providing Required Airflow to Conditioned Spaces for Efficiency, Comfort and Health

This course explains and shows how to test and adjust the airflow in commercial heating, ventilating, and air conditioning (HVAC) systems. For the health and comfort of the building's occupants HVAC systems must provide the correct amount of airflow into and out of conditioned spaces to ensure acceptable temperature, humidity and volume of cooling, heating, and ventilation air.

Recently there have been discussion about changes to percent of outside air (OA) aka fresh air, air changes per hour, and room pressurization in buildings. The amount of ventilation air (outside air) was at one time approximately 10%. This means that the mixed air going into and through the HVAC filters, cooling coils, heating coils, and into the conditioned space as supply air was 90% return air volume and 10% OA volume. As energy costs increase, there is a push-pull between energy costs and indoor air quality. An increase in energy cost means the cost to heat and cool the OA goes up. On the energy management side, when energy cost increased the percent of OA was lowered in some buildings to 5% and buildings were built tighter, with non-operable windows and we had sick building syndrome in the 1980's and 90's. Then the OA percentage went back to 10-15%, and sometimes higher, 20% OA. Whatever the amount of ventilation air is required for a particular system and time it is the test and balance people that test and set that requirement.

Office buildings are typically designed for 5 to 10 air changes per hour (ACH). With less than 5 ACH occupants may complain that the air is stuffy or that they detect body or equipment odors. More than 10 ACH may cause drafts and occupants, especially workers seated at a desk, may feel cold air movement across their bodies. Many HVAC engineers and professionals design for 7.5 ACH. Medical authorities have called for more air changes per hour in office buildings, schools, etc. In some buildings room pressurization may be a critical factor. An example is a hospital where the operating rooms must have a positive room pressure and intensive care units (ICUs) may require a negative pressure. Other buildings with special conditioned spaces that require either a negative or a positive pressure are labs and clean rooms facilities. The typical office has a slight positive pressure and room pressure is not tested.

In this course you will learn about testing and balancing (TAB) the ventilation air, the return air, and the heated and cooled supply air for each conditioned space's air volume in cubic feet per minute (cfm), air changes per hour (ACH) and room pressurization and how to make changes when required. Whether it is conditioned space air volume, air changes per hour, or pressurization it is test and balance professionals that do the testing and make changes. This training helps attendees navigate the proper balances based on their unique needs, energy efficiency goals, sustainability considerations and occupancy comfort.

Course Syllabus & Objectives

Learn:

The major air side components in an HVAC system.

General HVAC and test and balance terminology.

The four centrifugal fans used in HVAC systems.

The instruments used in test and balance.

The report forms used in test and balance.

Basic test and balance calculations.

Understand:

How to do a field inspection.

How to test fan and duct pressures.

How to change airflow at fans and in the air distribution system.

How to Test and Balance Constant Air Volume Systems.

How to Test and Balance Variable Air Volume Systems.

How to recognize when a test and balance report may have inconsistencies.

Course Topics:

Introduction to Test and Balance of HVAC Air Systems and Terminology

Heating, Ventilating, and Air Conditioning Systems

Test and Balance Procedure

Test Instruments and Test Report Forms

Field Inspection

Testing Fan Speed

Testing Fan Pressures

Testing Duct Pressures

Balance Report Forms

Setting Volume Dampers

Setting Temperature Controls

Terminal Velocity Instruments

Terminal Volume Instruments

Balancing Constant Air Volume (CAV) Systems

Balancing Variable Air Volume (VAV) Systems

Finalize Test and Balance

Test and Balance Math

This course is for HVAC and facility or maintenance engineers, building operators and managers, and technicians, energy managers and indoor air quality (IAQ) managers or professionals, and any related professionals interested in knowing how to: Make or call for changes to increase or decrease airflow for room supply and return air volume, air changes per hour, pressurization, and ventilation.

ABOUT THE INSTRUCTOR:

SAMUEL C. SUGARMAN, C.T.A.B., C.E.M., C.D.S.M., C.I.A.Q.M., is an internationally recognized HVAC and TAB consultant, instructor, and author. He has consulted on projects for testing and balancing, performance evaluation, design, retrofit and commissioning of HVAC systems for cleanroom facilities, corporate headquarters, government facilities, office complexes, hotels, hospitals, fume hood labs, major retail establishments, military installations, nuclear power plants, private and public schools, colleges, and universities. Mr. Sugarman was an adjunct professor at San Diego City College, and has also instructed over 250 HVAC, TAB and energy management training programs and seminars for various organizations, including AEE, ASHRAE, and the National Energy Management Institute. He has authored several books and training manuals on topics in the areas of his expertise and has received numerous awards and special recognition for his accomplishments. He currently serves as Board Chairman of the International Registry of CTAB Professionals.

Course Website:

<https://pbjtechhub.com/products/hvac-clean-air-test-and-balance>

Introduction to Energy Benchmarking: Energy Data, Metrics, and Analytics Training

Course Length: 2 Professional Development Hours (PDHs)
.2 Continuing Education Units (CEU's)

Delivery: OnDemand | Self-Paced at Learner's Schedule

Level: Basic. Attendees should have exposure to basic energy terms.

ABOUT THE COURSE

Benchmarking is the energy manager, building operator, facility manager, end-user consultant, energy service professional, utility, energy officials, and any other key stakeholder's ruler to measure building performance quickly and accurately. In this course, the fundamentals around energy data, metrics, and energy benchmarking will be discussed. In addition, common pitfalls will be revealed, along with some ideas on how to avoid them. Options to facilitate benchmarking requirements and reporting, such as software, are also provided. Whether you are looking for training on benchmarking due to the value it provides the energy & operations team, or because you have a pending or existing mandate, this training course will help start you on your benchmarking journey.

Why attend this course?

Benchmarking, and other forms of data analysis have shown to have proven results in identifying ways to save energy.

They are a low effort and low/no cost way to start your energy management journey.

Verify energy savings and prevent entropy (decline in savings year over year).

They are an integral part of your overall Strategic Energy Plan (SEP).

Learning Objectives:

When the student completes this course, they will be able to:

Be able to explain why energy benchmarking is vital for identifying areas of energy efficiency improvement, cost savings, and the impact buildings have on emissions & sustainability.

Understand the value of energy data.

Know how to analyze and benchmark energy data for insights.

Understand different types of metrics and how to utilize them.

Course Syllabus:

Overview

Why?

Terminology

The Basics

Spreadsheet and Profiles
Metrics and Benchmarking
Significant Energy Users
EPA Portfolio Manager & Energy / Utility Software
Reporting
Additional Thoughts
Conclusions

About the Instructor:

Walter “Wally” Bright is President of the Institute of Energy Professionals (IEP), where his goal is to provide practical and impactful energy management training backed by expertise in energy efficiency. Walter Bright is the lead instructor for all IEP training, instructing topics such as HVAC and Building Automation Systems (BAS), as well as other building-system and energy-related subjects. Prior to IEP, Wally spent five years in the building automation field as a contractor, designing open-protocol, multi-vendor, Tridium-based control systems for a variety of facilities, including schools, data centers, water treatment plants, and others. He helped produce shop drawings and created standards/best practices for the company to ensure quality installations. Wally has experience in the A&E industry as well, performing MEP design for the healthcare and research/lab sectors. In addition to traditional design work, he helped create standardized BAS specifications, sequence of operations, and provided controls-related oversight on a variety of projects. He also led equipment startups and several investigations to identify mechanical/controls-related issues with new and existing construction. Working both as a contractor and an engineer has enabled Wally to gain a unique insight into the BAS/controls marketplace.

Course Website:

<https://pbjtechhub.com/products/2536591>

Understanding and Optimizing HVAC Systems in Commercial and Institutional Buildings

Course Length: 6 Professional Development Hours (PDHs)
.6 Continuing Education Units (CEU's)

Delivery: Live interactive online webinars with instructor and attendees. Course offered multiple dates or may be held on a private online basis.

Level: Intermediate. Attendees should have experience with Commercial HVAC Systems, their components, HVAC terminology, and Building Operations.

About The Course

This easy-to-understand course is for facility managers, building operators, maintenance, energy managers, HVAC and indoor air quality professionals, and any anyone interested in knowing how heating, ventilating and air conditioning systems (HVAC) work, strategies to save energy and how to optimize them.

Course Learning Objectives:

Attendees will be instructed on and should learn about the various types of HVAC systems - single zone and multi-zone constant air volume systems, water to water, water to air, air to water, air to air, variable air volume systems, package systems, split systems, electric heat pumps, variable refrigerant flow systems, and variable water volume systems.

Attendees will learn about additional HVAC equipment & systems including fossil fuel and electric boilers, furnaces, chillers, refrigerant coils, heating and cooling water coils, electric duct coils, air filter, volume control dampers, fans, and pumps.

Learning Objectives:

- How to optimize HVAC equipment and systems to provide an acceptable level of occupancy comfort or process function while maintaining good indoor air quality and holding overall cost and energy requirements to a minimum.
- Conduct basic math calculations - heat power (Btuh), air changes per hour, volume of air flow, brake horsepower for constant and variable volume systems, and energy savings for optimized equipment.

Course Syllabus & Topics:

- The Goal of HVAC Systems
- The 5 Ts of HVAC Optimization
- Heat and Humidity Fundamentals

- HVAC Equipment
- Central HVAC System
- Air Distribution
- Air Movement
- Air Volume Control
- Sensible and Total Heat Transfer
- Air Volume and Air Changes per Hour
- Single Zone and Multi-zone Constant Air Volume Systems and Air Economizers
- Pressure Dependent and Independent Variable Air Volume Systems
- Package Systems and Split Systems
- Heat Pumps and Variable Refrigerant Flow Systems
- Variable Water Volume Systems and Water Economizers

ABOUT THE INSTRUCTOR:

SAMUEL C. SUGARMAN, C.T.A.B., C.E.M., C.D.S.M., C.I.A.Q.M., is an internationally recognized HVAC and TAB consultant, instructor, and author. He has consulted on projects for testing and balancing, performance evaluation, design, retrofit and commissioning of HVAC systems for cleanroom facilities, corporate headquarters, government facilities, office complexes, hotels, hospitals, fume hood labs, major retail establishments, military installations, nuclear power plants, private and public schools, colleges, and universities. Mr. Sugarman was an adjunct professor at San Diego City College, and has also instructed over 250 HVAC, TAB and energy management training programs and seminars for various organizations, including AEE, ASHRAE, and the National Energy Management Institute. He has authored several books and training manuals on topics in the areas of his expertise and has received numerous awards and special recognition for his accomplishments. He currently serves as Board Chairman of the International Registry of CTAB Professionals.

Course Website:

<https://pbjtechhub.com/products/understanding-and-optimizing-hvac-systems-in-commercial-and-institutional-buildings>

ABOUT THE COURSE

With the world paying ever more and more attention to energy efficiency, sustainability, and the environment, energy auditing is rapidly moving to the forefront of the facility, energy, and asset management marketplace. Have you ever wondered what it takes to do a professional energy audit?

This training course will answer your questions about all the pieces and parts that go into producing energy audits for the modern marketplace. This course covers standards, best practices, and also provides some top tips gleaned from the instructor's two decades of real-world experience. Energy is an essential part of any business, but it can be expensive. By conducting an effective energy audit, it can help decision makers & team members set a plan towards a more efficient enterprise, maximize capital improvement plans, implement whole or partial energy efficiency retrofits, and leverage available utility & governmental rebates and incentives. This course is the perfect place to begin taking your first steps of a journey into the ever changing & rewarding world of energy auditing.

Who Should Attend:

This course is designed to introduce entry level energy professionals to the process of performing and presenting energy audits.

Examples:

- Existing energy professionals who seek a deeper understanding of the different types of energy audits, their value, data collection and reporting techniques.
- Lighting auditors/energy efficiency product sales team members looking to expand their skill set into more complicated auditing to bolster their knowledge to better interact with potential customers.
- Recent college graduates, Veterans, and other professionals looking for employment in the energy efficiency sector.
- Business development professionals in adjacent markets who find themselves in a position to provide or purvey energy audits.
- Facility managers, maintenance team members & building operators who want to learn how to do energy audits to optimize efficiency and cost savings.
- Building owners, property managers and VPs of operations who seek ways to reduce energy costs, enhance overall operations, and comply with energy reporting requirements or organizational sustainability goals.
- Utility and Energy Service (ESCO) account managers who seek to help their customers identify areas for energy savings and sustainability enhancements.
- Field technicians looking to graduate from basic field tasks to energy audits.
- Any person with a good grasp of building science who wants to learn how to present energy efficiency measures to key stakeholders to make energy conservation projects happen.

Learning Objectives:

This course has five main objectives. Upon completion, participants will have a strong understanding of:

1. The basic types of energy audit as defined by the ASHRAE standard.
 - The course will also discuss when the ASHRAE standard is and is not applicable.
2. The fundamental pieces that make up any energy audit.
 - Regardless of type or standard, certain things are necessary.
3. Walkthrough best practices.
 - Topics include safety, professionalism, and process.
4. How to evaluate quality of Energy Conservation Measures (ECM)
 - Course will discuss the basic parameters that make a given ECM attractive, but will not go into specific ECMs.
5. Presenting an audit.
 - Basic principles for constructing a professional report that meets the needs of the client or internal energy, facilities, and utilities management team.
 - Best practices and tips included.

The Basics: This educational course is designed to be a surface level overview of these topics. Each of the discussed areas is a course of study unto itself, so it should be understood that a 2 hour presentation does not a professional energy auditor make. However, this course will leave the participant with a clear understanding of what is expected when conducting an energy audit at any level, offer a pathway for further studies in energy auditing and the best ways to get there.