



Modern Thermal Design (MTD) is Central Indiana-based design/build engineering firm, specializing in sustainable/renewable energy project development and providing the most extensive array of energy-producing and energy-saving products and services available in today's market. MTD's engineering team has over 150 years of combined experience in every aspect of engineering and project management including the largest solar thermal project of its kind in North America, receiving US Patents and Patent Pending designations on five (5) innovative and revolutionary energy technologies and securing project financing. As a result, we can coordinate all aspects of the design-build process with our in-house engineering services to work directly with installation contractors, resulting in improved performance, innovation and cost savings for the project owner.

WHAT DOES DESIGN-BUILD MEAN?

Design-build refers to a project delivery method in which a single entity is responsible for both the design and construction of a project. This contrasts with the traditional design-bid-build method, which requires a project owner to contract separately with an architect or engineer to design the project and a construction contractor to build it.

Design-build services offer several advantages, including:

1. **Single Point of Responsibility:** With design-build services, the owner only has to deal with a *single entity* for the project's design and construction, reducing possibilities for misunderstandings or disputes between the designer and contractor.
2. **Faster Project Delivery:** Because the design and construction teams are working together from the start, design-build projects can be completed faster than traditional design-bid-build methods.
3. **Cost Savings:** Design-built services can often result in cost savings by streamlining the process and reducing the number of change orders.
4. **Quality Control:** By utilizing the design-build method, the designer and the contractor work closely throughout the project, leading to better quality control.

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The CO² CAPTURE PROCESS

Utilizing engineering and equipment provided by MTD, CO² can be captured from the exhaust from power plant boilers or fuel-fired turbines. The captured CO² can then be prepared for transport to a Certified EPA CO² well, where it will be buried underground with the provider receiving \$80.00 per ton of delivered CO². Or it can be cleaned and purified to beverage-grade CO² for use in carbonated drinks or dry ice production. This purified CO² can receive up to \$350.00 per ton.

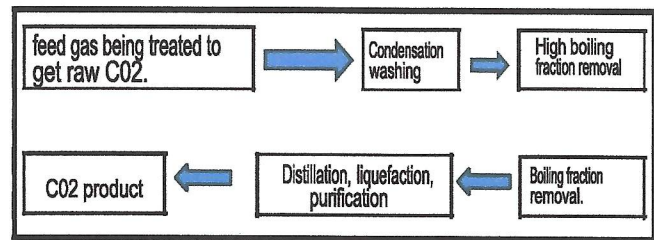
AN INTRODUCTION TO THE MTD FOOD GRADE CO² PLANT

MTD develops and installs Reclamation Equipment to convert exhaust gas into beverage-grade CO² or prepare it for transfer to a Certified EPA CO² Well Site.

Design Ideas

Most Raw gas contains substances such as water, nitrogen, oxygen, hydrogen, sulfides, benzene, hydrocarbons, alcohol, etc. According to the different types of raw gas to meet the final product's impurity requirements, this device's design concept is to purify the raw material to remove impurities and liquify it. After the product purity reaches the requirement of 99.996%, it is then liquefied for gas-liquid separation.

Food Grade CO² Plant Production Process Description and Flow Diagram



Main Equipment Composition

Our food-grade liquid carbon-dioxide plant mainly consists of the following parts: feed gas washing tower, carbon dioxide compressor, plate fin heat exchanger, distillation tower and refrigeration ice machine.

UNIQUE ADVANTAGES OF THE MTD CO² PLANT

1. Pioneering low temperature distillation washing process, which can remove alcohols, aldehydes, ethers and water above the boiling point of carbon dioxide. This technology's major highlight is the elimination of water washing, potassium washing, activated carbon absorption, molecular sieve drying and other equipment.
2. Unique heat and cooling capacity utilization measures, key heat exchange equipment adopts plate fin infiltration technology which accurately controls the temperature difference between cold and hot within 1° F, effectively reducing energy consumption.
3. The only cold box distillation equipment that utilizes heat pump distillation and graded refrigeration technology.
4. Adopting environmentally friendly and safe commonly used refrigerants, the production building is classified as Class E, greatly reducing investment in safety and environmental protection. The selection of motors, electrical appliances and instruments does not require explosion protection. Carbon dioxide compressors and refrigeration fluorine compressors can be arranged in the same factory building to save land.
5. The fragmented exhaust gas does not need to be washed with water. The alcohol and water in the exhaust gas are condensed and discharged through the front and rear stages of the compressor, and trace amounts of alcohol and water are then discharged through low-temperature distillation in the weight removal tower, allowing for complete recovery of alcohol without wasting carbon dioxide gas and saving water and steam.
6. Advanced running software that supports remote operation and convenient services.



**1,200-TON PER YEAR
RECLAMATION UNIT**

7. Advanced technology saves electricity and reduces energy consumption by 30% over traditional processes.
8. A reliable and stable CO² product is created with a purity of 99.996% to comply with the carbon dioxide standard for food additives (GB1886.228-2016).
9. MTD's food grade liquid level carbon dioxide device adopts a box-mounted skid with a small heat dissipation area, good insulation and low cold loss.
10. A high degree of automation eliminating drying, purification, catalysis and other processes in the equipment, system control points are greatly reduced and simplify the operation.
11. The plant can be remotely operated making the process more convenient.



**5,000,000-TON PER YEAR
RECLAMATION UNIT**



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<https://modernthermaldesign.com>

Line Card of Products & Services

Equipment

- **SunQuest 250™:** Best in class, US Patented high output evacuated tube solar thermal panels powered by UV rays that provide outstanding performance on cloudy days.
- **PV Solar Panels:** Highest quality 650W Canadian, German, Swiss or Israeli made.
- **LED Lighting:** Top quality indoor/outdoor commercial units.
- **Solar UV A/C-Heat Split Units:** .75-to-2.0-ton cooling with heat split.
- **Chiller Flow Valves:** Installed at each air handler; up to 60% electrical savings per chiller.
- **ORC Waste Heat Turbines:** Utilizing waste heat to create free electricity.
- **Micro-Turbines:** 75, 150, 200 and 250kW; steam, natural gas, propane, hydrogen or biogas.
- **MW Turbines:** 1-16 MW models; steam, natural gas, propane, hydrogen, kerosine or biogas.
- **Absorption Chillers:** Powered by waste heat or turbines listed above.
- **Thermal Ice Storage:** Makes ice in off-peak nighttime hours for daytime cooling.
- **Thermal Heat Storage:** Stores waste heat for process, DHW or space heating.
- **Linear Generators:** 250kW high efficiency natural gas units, ITC /IRA compliant.
- **Digesters:** Onsite biogas production from waste-to-power turbines or linear gensets.
- **High-Efficiency Boilers:** Steam or hot water; combine with solar thermal for a renewable tax credit.
- **Air-to-Water Technology:** Converts humidity to sterile water; great for humid locations.
- **Hydrogen Fuel Cells:** 150-500kW units; powered by hydrogen gas or methane/water mixture.
- **Hydrogen Electrolyzer:** Produces up to 270kg of Hydrogen per unit, per day.
- **EV-H2 Combination Refueling Stations:** US Patent Pending; 100% carbon free (individual EV or H2 units also available).

Services

- **Energy and Carbon Audits:** Complete carbon footprint analysis with recommended,
- **Feasibility Study:** Follows audits with recommended MTD in-house solutions including fully engineered and stamped drawings.
- **Commercial Loans and Leasing:** For renewable projects as well as other equipment needs.
- **C-PACE Financing:** Available in 39 states. Treated as an asset improvement with no debt on balance sheet. Lender is paid via tax assessment that remains with the property regardless of ownership changes.
- **PPA:** Power Purchase Agreement. Projects are completed and maintained at no cost to customers. Customer pays a substantially reduced rate for energy for the length of the contract.