



YMCAs OF NORTHWEST NORTH CAROLINA

Project Overview

Vanir Energy, LLC entered an agreement to design, develop, build, finance, own and operate Solar Thermal Hot Water Generation Facilities for six Northwest North Carolina YMCA's. Through the use of Vanir's **Solar Thermal Power Purchase Agreements**, the YMCA's received new state of the art solar thermal hot water systems while hedging their energy cost at a fixed price from Vanir for 20 years, all without making any capital outlays.

The systems were engineered using the design principles of **Ritter XL Solar, Germany**, utilizing **CPC evacuated tube collectors**, and the **"Aqua Controller"**, which uses water as the heat transfer medium instead of glycol. By using water instead of glycol, the solar hot water systems are able to create and sustain hotter water temperature. This increases the amount of energy the YMCA can offset from conventional fossil fuel heating sources, dramatically reducing the YMCA's carbon footprint.

Five of the YMCAs each have fifty CPC 45 Star Azzurro evacuated tube collectors, or 2,646 sq. ft. of gross collector area, ballast mounted to their rooftops. These systems will annually produce 7,375 therms of energy. The sixth installation at William G. White, Jr. Family YMCA will feature 210 CPC 45 Star Azzurro evacuated tube collectors mounted to the rooftop using both penetrating steel and ballast mounted racking solutions. This system will produce 31,264 therms annually.

All six of the systems are monitored by Vanir using an **internet accessible monitoring** package provided by Draker Labs.



Solar System Facts:

- Peak power output: 1.9 MW
- Continuous power output: 1.2MW
- Installed gross area: 24,900 ft²

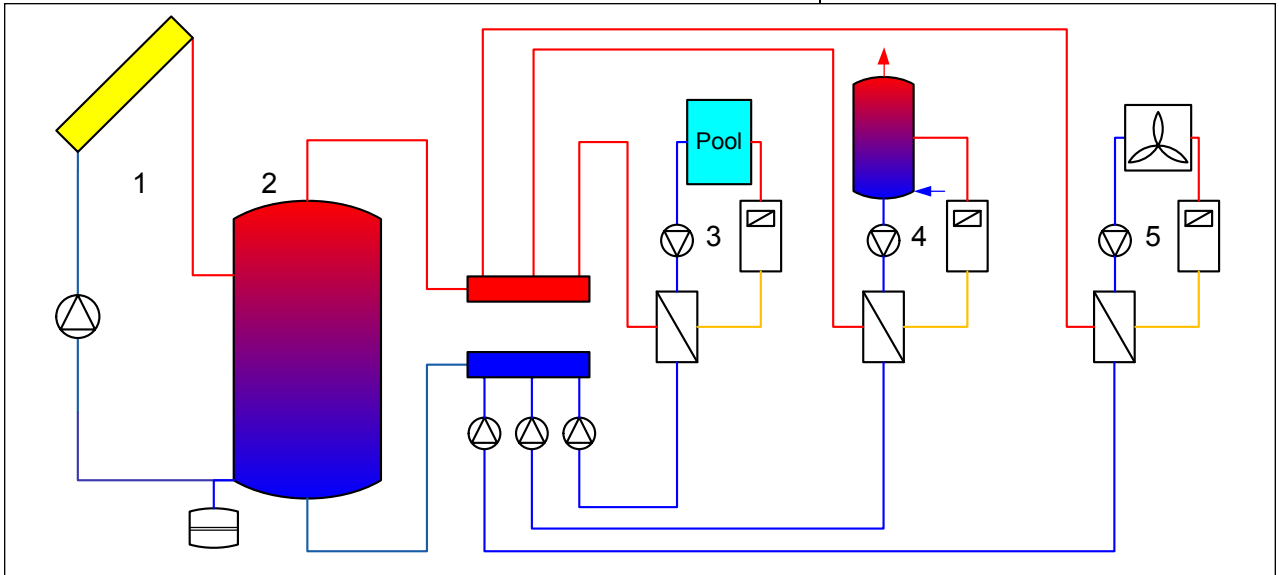


YMCA of NW North Carolina

- Davie Family YMCA
- Yadkin Family YMCA
- Stokes Family YMCA
- Fulton Family YMCA
- Wilkes Family YMCA
- W. G. White, Jr. YMCA



The YMCAs of Northwest North Carolina use the solar thermal generated energy to augment their need for hot water in such uses as showers, laundry, space heating, dehumidification, and pool & spa water heating. These buildings are registered with the North Carolina Utility Commission as “Renewable Energy Facilities”.



The evacuated tube collector field (1) heats up the solar storage tank (2). The solar energy is delivered to the pools (3), showers (4) and air heaters (5) via heat exchangers at temperatures ranging from 86°F to 180°F. The collectors are rated to generate temperatures to 248°F and operate most of the time in a temperature range of 180°F to 210°F. The maximum tank storage temperature is set at 220°F, which increases the heat storage capacity of the tank, permits high temperature space heating and extends the hours solar energy can be used after the sun sets.

A key design element is that the solar heated water increases the cold return water before it enters the backup boilers. Since the solar storage tank temperature is above the boiler low limit point, the boiler is not energized for extended periods.

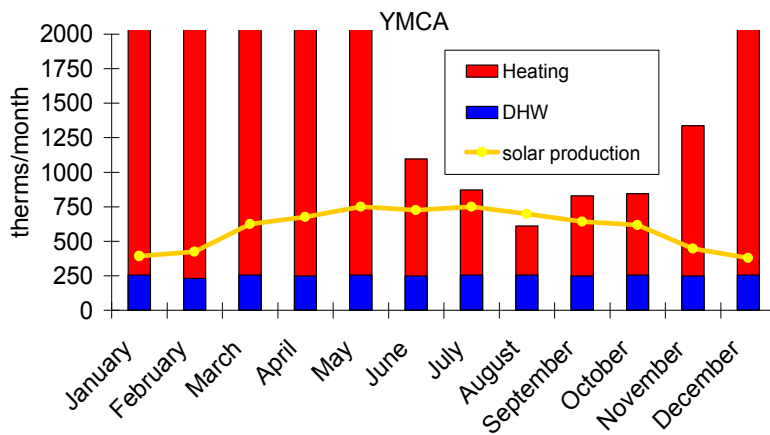
Solar System Facts:

- The installation of these solar thermal systems created approximately 30 jobs and generated more than 3 million dollars in revenue for the local economy.



Several of these boilers will be off-line for the entire five month non-heating season and boiler short cycling in the summer months is almost entirely eliminated. This dramatically improves boiler efficiency and increases the life of the equipment.

The graph below details energy demand for the small YMCAs.



Directing the system is Ritter's award winning "Aqua Controller", which is the only proven solution for eliminating glycol in pressurized systems. The Aqua control uses **set point logic**, which activates the pumps only when the desired temperature is reached. This ensures high temperature **stratification** in the storage tank and cuts in half the electricity used by the pumps. Since the heat transfer fluid is water, stagnation has no detrimental effect on the solar equipment or the fluid. **Frost protection** is achieved using an advanced logarithm, which continuously monitors collector temperature and time. If a temperature drop is detected below 45°F, short bursts of hot water are circulated to protect the system. Frost protection is achieved by using the minimum amount of energy necessary, which is typically 2% to 4% of the annual solar gain.



Solar System Facts:

- The renewable energy generated offsets 2.63 million lbs of CO₂, equivalent to reducing 2.6 million miles of driving, and saves 301,200 trees.





VANIR ENERGY, LLC is a Renewable Energy Company that designs, builds, owns, finances, and operates proprietary Solar Thermal Hot Water Generation Facilities and Solar Photovoltaic Energy Generation Facilities. Vanir Energy specializes in Solar Thermal Hot Water Generation Facilities that can be used for Domestic Hot water, Solar Thermal Space Heating and Solar Thermal Air-Conditioning for Commercial, Industrial and Government applications. Vanir Energy, LLC is a subsidiary of Vanir Group of Companies, Inc., a nationally recognized construction management, real estate development and alternative energy company headquartered in Sacramento, CA, with more than 30 years of experience. Vanir is a minority owned and women owned business enterprise (WMBE).

RITTER XL SOLAR, USA is the subsidiary of Ritter GmbH and was established to offer a wide range of solar thermal products in the USA, Canadian and Caribbean regions and services the OEM, residential and commercial markets. Ritter is an integrated manufacturer with an extensive engineering and R & D department and is the world's largest company in the evacuated tube solar market. In the commercial and industrial market, Ritter USA focuses solely on the Ritter XL Solar brand using the patented Aqua Controller, CPC evacuated tubes, and system design techniques developed in Germany.



Vanir Energy and Ritter XL Solar have executed an exclusive EPC contracting & distribution agreement for North America to offer the market a comprehensive solution to develop large scale solar thermal systems using the most advanced technology and professional development practices.



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