Chromagen™
Solar Water Solutions

Hospitals case studies

commercial/industrial
case studies

Clínica Dávila

Location:	Santiago, Chile
Materialised:	2008
Demand:	100,000ℓ /day; 403 beds; 12 surgical wards, 14 specialty centres
Technology:	Solar-thermal field (primary), heat pump (backup)
Field:	400 CR-120 collectors; net aperture 1,200m²
Saved:	128 tonnes CO_2 & 85 tonnes LPG per year; 30% of total consumption
Noteworthy:	Largest clinic in Chile

In 2008, Chromagen designed and implemented a complete energy saving system for the largest medical centre in Chile – Clínica Dávila.

CLINICA DAVILA

At the heart of the renewable energy plant is a solar collector field, which comprises 400 high-efficiency flat plate collectors. The field supports the direct heating of approximately 100,000ℓ of potable and process water per day, of which 60% is heated by the field, and the rest by a heat pump backup.

The system eliminates the annual emission of 128 tonnes of CO_2 and 85 tonnes of LPG, and generates roughly 30% of the building's total demand. During summer the system is autonomous, and operates solely from energy captured by the solar field.

The project was commissioned with the cooperation Chilectra, the Chilean power utility. Chromagen systems were selected due to the great success of a 2007 municipal rollout of 10,000 Chromagen thermosyphon systems, all across Chile.

Chromagen (ACS) Ltd.
Sha'ar Ha'amakim 36588, Israel | Telephone: +972.4.953.8888 | Fax: +972.4.953.8872 | www.chromagen.com

Cornwall Regional Hospital

Location:	Montego Bay, Jamaica
Materialised:	2002
Demand:	400 beds, HVAC
Technology:	Thermosyphon solar geyser field
Field:	20 300L tanks; 40 CR-110 collectors, net aperture 86m²
Saved	Per annum: $38,770 and 219,000ℓ of fuel oil
Noteworthy:	Example of "low-tech" solution to energy problem

The Cornwall Regional Hospital is the premier public health facility in western Jamaica. It is a 10 storey, 400 bed multidisciplinary institution with various specialist centres.

The hospital has four 100 tonne chillers for its HVAC needs, and more than sixty stand-alone air-conditioning units in various rooms. Each chiller was connected to an air handling unit, and a maze of pumps, piping, valves, and ductwork. The central systems were 25 years old; two were decommissioned for lack of spare parts, and the other two were highly inefficient and expensive to maintain. The sixty air-conditioning units were originally installed to compensate for the declining performance of the central system, but were also inefficient and required replacement.

A "low-tech" solution to the hospital's problem was designed for. This included 20 thermosyphon-based solar geyser tanks, of net volume 6,000ℓ, which are also connectable to the existing 15,000ℓ boiler. The plant also includes 40 collectors, with a net aperture of 86m².

This renewable energy plant eliminates the need to operate and maintain poorly-performing systems, and has a design life of 20-25 years. Furthermore, it saves $38,770 and 219,000ℓ of fuel oil, per annum.

Chromagen (ACS) Ltd.
Sha'ar Ha'amakim 36588, Israel | Telephone: +972.4.953.8888 | Fax: +972.4.953.8872 | www.chromagen.com

Hospital de Molina

Location:	Murcia, Spain
Materialised:	2001
Demand:	120 beds, 4 operating theatres, HVAC
Technology:	Flat plate solar-thermal field
Field:	50 CR-12S collectors, net aperture 127m²
Saved:	40% for heating consumption; €9,273 per annum, 101.51 tonnes CO_2, 118.73kg SO_2, 178.09kg NO_x

Hospital de Molina is recognised as one of the "Top 20" local hospitals in Spain. It offers 120 beds, 4 operating theatres, various specialty wards, and it services 19,363 inpatient overnights per annum.

The hospital was built in 2000, and was intended to be environmentally friendly. As such, a renewable energy plant was implemented in 2001, which consists of a solar-thermal field of 50 CR-12S selective collectors, with a net aperture of 127m². The field connects to storage tank of 10,000ℓ total volume.

The plant services both the potable water loop, as well as the HVAC system. It *saves the hospital 40% on its gas oil bill*, which equates to €9,273 per annum. It also reduces annual emissions: 101.51 tonnes of CO_2, 118,73kg of SO_2, and 178.09kg of NO_x.

Chromagen (ACS) Ltd.
Sha'ar Ha'amakim 36588, Israel | Telephone: +972.4.953.8888 | Fax: +972.4.953.8872 | www.chromagen.com

Chromagen™
Solar Water Solutions

Hospital General de México

Location:	México DF, México
Materialised:	2005
Demand:	1,000 beds; 6,000 staff; 39 wards; per day: 3,000 outpatients; 112 inpatients; 164 surgeries
Technology:	Flat plate solar-thermal field
Field:	188 CR-120 collectors, net aperture 526.4m²
Saved:	5% of consumption per annum; 67,524ℓ of diesel; USD $400,417; 189 tonnes of CO_2
Noteworthy:	One of largest hospitals in Mexico

Hospital General de México

The hospital is one of the largest in Mexico, and in the region. It is over a century old, has over a 1,000 beds, employs 6,000 doctors, nurses, paramedics and administrators in 39 wards. Each day, it treats 3,000 outpatients, discharges 112 inpatients, and performs 164 surgeries. Annually, it receives 1,163 medical students, 47 residents, and 1,624 nursing and paramedical students. It has 89 research investigators.

Due to its size, the facility uses vast amounts of electricity, steam, diesel, and hot water, which were used or produced in old and distant parts of the complex; when hot water and steam arrived at a destination, mixing with cod water had occured, as well as heat loss due to poor insulation. Leaking valves and pipes also resulted in large losses of water.

After a rigorous study and design, a 188 collector field of 526.4m² net aperture was installed on various roofs in the complex. It was connected to a large storage network of 200ℓ, 400ℓ and 2,000ℓ tanks, and was tempered to deliver 36ºC according to the hospital's requirement.

Due to the public hospital's resource constraints, areas of greatest consumption were prioritised; the plant thus provides 5% of the complex's thermal requirements, which covers employees and patient hygiene, kitchen use, and the rehabilittion area's hydrotherapy pools. The remaining 95% is provided by existing diesel engines. The plant has a null operating cost, and maintenance is restricted to occasional cleaning.

Though designed to save a mere 5% of consumption, the plant yields great annual savings—67,524ℓ of diesel, USD $400,417, and 189 tonnes of CO_2. If water saving are included, the financial impact is even higher.

Due to the project's success, the hospital is phasing out the diesel plant and expanding the renewable plant, which will also cover a new building for oncology.

Chromagen (ACS) Ltd.
Sha'ar Ha'amakim 36588, Israel | Telephone: +972.4.953.8888 | Fax: +972.4.953.8872 | www.chromagen.com