



## AIR HEATERS

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[www.q-solar.com](http://www.q-solar.com)

### SUMMARY

- The most economical solar heating technology; does not need government subsidies
- Brings substantial environmental and financial benefits
- The difficult Optimised Design is made by the Q Solar engineers
- Simple and inexpensive to make and install with basic tools and workers
- Easy to retro-fit to buildings and to industrial and agriculture applications
- Q Solar offers licenses and technical assistance for manufacturing businesses
- Inexpensive and easy start-up; flexible operations
- The manufacturers can make more than 40% gross margin
- The users can pay less than half for clean solar heat than for fossil fuel heat

## THE TECHNOLOGY

- Most of our society's energy is produced by burning fossil fuel to obtain hot gases (hot air).
- The heat of that hot air may subsequently be transformed in other forms of energy.
- Since 2001, we developed solar air heaters which produce hot air like the fossil fuel burners.
- The solar heated air can be used in the same way as burner hot gasses, but it is cleaner
- Also, by pre-heating the air of combustion of burners, their fossil fuel use and expense are reduced, while also diminishing the greenhouse gas emissions and pollution.
- Before us, solar air heating was un-economical because air is thermal insulator, so difficult to heat.
- We conducted extended R&D to obtain more economical solar heaters than the fossil fuel burners
- The result were efficient solar radiation absorbers (SRA), which are the core of the air heaters.
- There are very many applications that need heat, but they have very different requirements.
- Therefore we designed more than 50 new models of solar air heaters adapted to different uses.
- Each model has a few versions for different places of installation and specific conditions.
- Our solar air heaters without concentration of radiation can deliver air of up to 100°C.
- The efficiency of our solar air heaters depends on the working regime; it may be of up to 87%.
- In 2005 we commissioned our first large scale solar air heater for an industrial client.
- The data acquired over a few years on all our heater models have given us statistical confidence.
- After years of R&D and commercial tests, the Q Solar results have been:
  - 1) Many new & different solar air heaters and their versions adapted for many different applications.
  - 2) Our solar air heaters are optimised to be more economical than fuel burners for that application.
  - 3) The reliability is very high (only the fans are moving parts); warranty is always more than 7 years.
  - 4) The payback time is between a few months and 3 years (usually about 2 years)
- Our experience has shown that there should be two kinds of solar air heaters:
  - A) Small Q Solar air heaters (up to 3m<sup>2</sup>) which are mass produced and directly or indirectly distributed
  - B) Larger size Q Solar air heaters which (for good results) must be purpose-designed and sized; most of their manufacturing is done at their place of installation because they are too large to transport.
- Q Solar has developed methods of manufacture that are economical and environmentally friendly
- The key to economical results is the optimisation of the large heaters through our unique know-how
- The complexity of the large size solar air heaters defies economical replication.
- Q Solar technology is protected through patents, restricted know-how, restricted use software and trade secrets (mainly referring to the method of treatment of our solar radiation absorbers)

## THE MARKET POTENTIAL

- The heat users need environmentally friendly heaters which also bring them heat cost savings.
- Q Solar has developed many new solutions which optimally adapt to different heat users.
- Applying to fuel burners, solar air heating now applies to most of the heat energy market.
- There are very many users of heat, requiring different types and sizes of heaters for their purposes:
  - a) industry: process heaters, air pre-heaters for burners, heating of factories, industry driers, etc.
  - b) agriculture: air pre-heaters for burners, driers, heating of barns, warehouses, greenhouses etc
  - c) community: heating of hospitals, schools, homes, sports centres and other public buildings
  - d) commercial: offices, commercial centres, airports, warehouses, other commercial buildings
- Q Solar has shown that the users of their solar air heaters can pay less than half for solar heat:

Past customers	Industrial	Homeowner	Agro-marine producer
Problem solved	Air preheating	Space heating	Drying algae
Classical heating	LPG	Natural gas	Solar / fuel heater
Issue of interest	Expense	Expense/environment	Time/contamination
Q Solar advantage	Financial	Financial/environment	V. efficient /cleaner
Price paid	\$ 70 / m <sup>2</sup>	\$ 150 / m <sup>2</sup>	\$ 5,000
Payback	months	2 years	months

- PH is the percentage of heat of certain temperature from the total national heat consumption.
- Solar contribution (SC) is the percentage from total heat that can be provided by Q Solar heaters
- For uses that require low temperature heat, PH=40, and SC=50 [Energy Information Agency, USA]
- For uses that require medium temperature heat, PH=20 and SC=10
- For uses that require high temperature heat, PH=40 and SC=2
- The potential of solar air heating results as about:  $(40 \times 50 + 20 \times 10 + 40 \times 2) / 100 = 23\%$  of total heat
- However, many potential users do not have a large enough sunny area nearby, therefore the practical limitations reduce the Q Solar potential to about 10% of total national heat
- The burners in a country generate more than  $10^8$ GJ per year [Energy Information Agency, USA]
- Therefore the Q Solar technology could in principle deliver about  $10^7$ GJ/year.
- The average price of fossil fuel heat is about \$20/GJ; the price of Q Solar heat is of about \$10/GJ
- Therefore, a national Q Solar air heating market potential may be of about \$100 million/year
- Until implementation is widened, the amount will be smaller, but it can nevertheless be substantial.

## THE TECHNOLOGY OFFER

- There is international and national demand and support for clean energy to replace fossil fuels.
- The Q Solar heaters are the single which can deliver half price heat compared to any other heater.
- Q Solar offers expertise on a potentially valuable product without having any real competition.
- The start-up is inexpensive, there is no need of a factory, special personnel, dedicated machinery
- Q Solar air heaters are difficult to optimise economically but easy to manufacture once known how.
- Q Solar does all Optimised Design for manufacturers, who do not need to employ solar engineers.
- The Q Solar air heaters smaller than 3m<sup>2</sup> (mostly space heaters for homes) have been optimised by Q Solar and can be mass produced and directly or indirectly distributed by their producers.
- For the larger heaters, the Q Solar software does a Preliminary Design (solar and economical estimation); if the customer is interested, the Q Solar engineers make the Optimised Design (OD).
- Only local manufacturers can economically produce and install the large size Q Solar air heaters.
- We provide to the manufacturers of large solar heaters: solar technology introduction, details of tools and materials, marketing instructions and software, Input Data collecting instructions and apparatus, the Optimised Design, manufacturing and installation instructions, technology updates.
- Q Solar has the best and most economical solar air heaters because:
  - a) We have about 50 models adapted to different uses, while all competition has less than 10 models
  - b) Q Solar air heaters have higher efficiency and are about 3 times less expensive than competition's
  - c) Our unique and ever-growing technical database and complex modelling allows by far the best OD.
  - d) The very low expenses results in economical process and overcomes the competition.
  - e) Only the Q Solar air heaters can make more than 40% gross margin for their manufacturer
    - Q Solar sells its advanced SRA (specially treated) only to its licensees; therefore the competition is not able to produce very efficient, long-lasting and economical solar air heaters.
    - The Optimised Design provides the most economical and best customization for an application
    - Q Solar does not charge a large license fee, but only a small start-up fee to cover the tuition of the licensee, and the costs of apparatus and software
    - Q Solar does not charge large royalty fees, but it actually works for its Optimised Design fee
    - Keeping the fees to a minimum, Q Solar eases the licensee's start-up, and assures that the manufacturer can make about 40% gross margin, while the user receives half price heat.
    - This financial structure results in un-subsidized solar heat becoming more economical than fuel heat, and allows the large scale implementation of solar thermal energy.

## PHOTOS AND DIAGRAMS



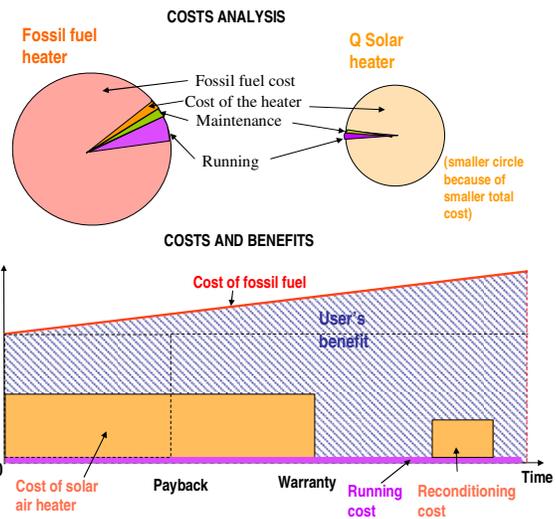
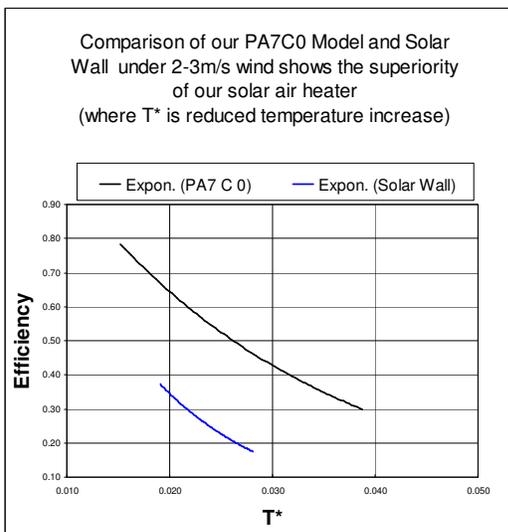
**Q Solar air pre-heaters for burners**

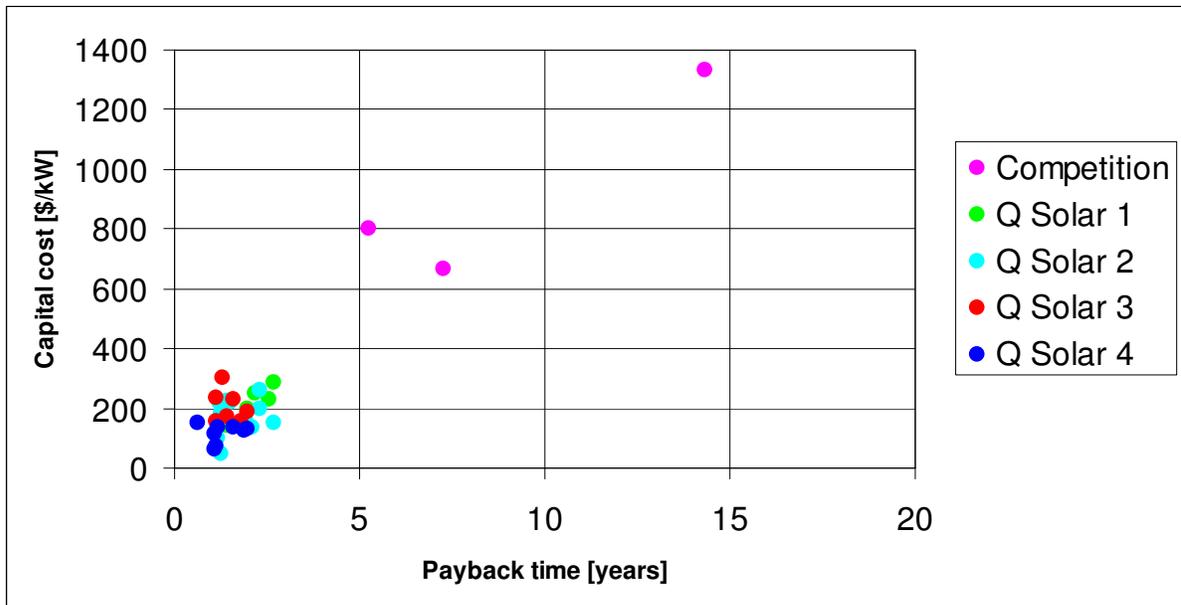
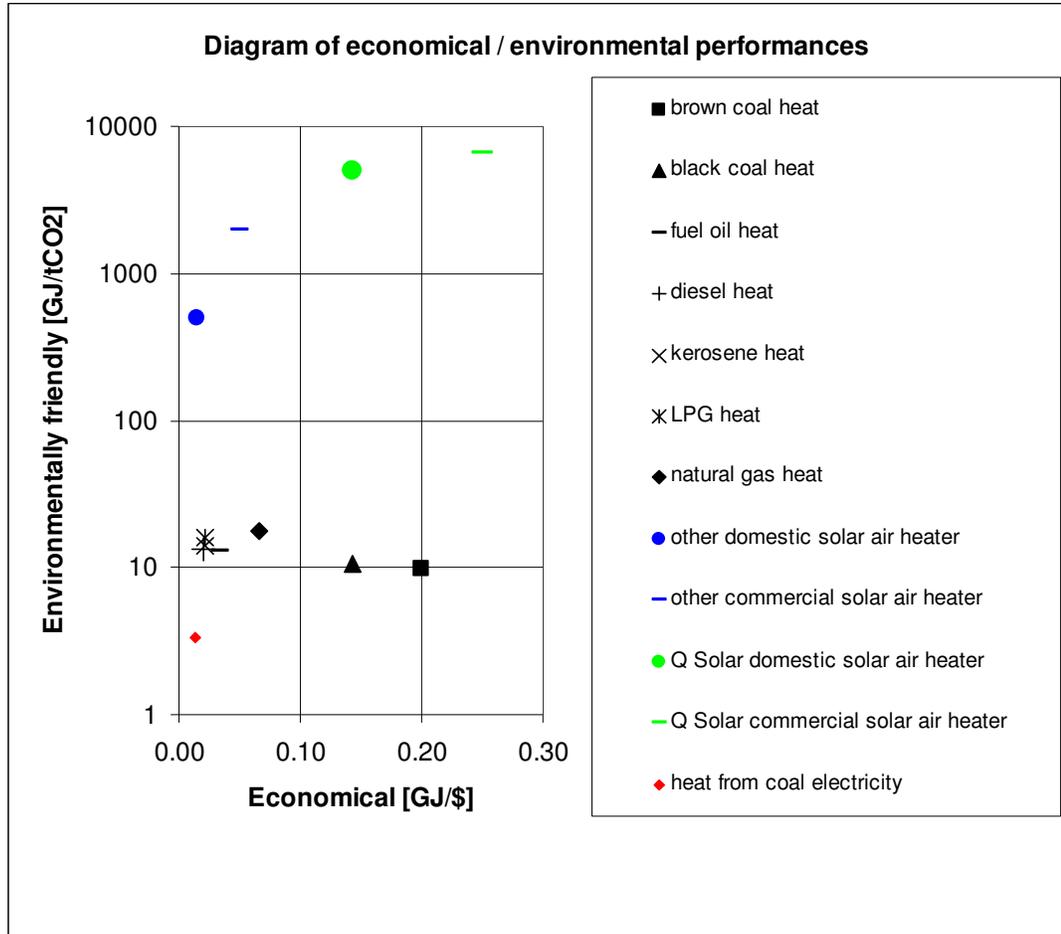


**Q Solar driers for industry / agriculture.**



**Q Solar air heaters for buildings.**





More details can be provided upon request.