Litherm-TEK

high efficient, low temperature waste heat air/gas conditioning system to

- ***Clean & dry & sterilize & cool &* deodorize** ***or***
- ***Clean & humidify & sterilize & heat up & deodorize***

Ecofriendly, sustainable Germany technology

FluCoS GmbH & Co. KG
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• Air conditioning / cleaning

for offices, warehousing / storing, production , dust-free rooms, computer centers, clean rooms in all kind of Industrie

- *automotive*
- *optics*
- *labor*
- *aerospace technology*
- *chemistry*
- *food industry*
- *medical*
- *building technology*
- *electronics*
- *pharmaceutic*
- *nanotech*

• air drying system / drying processes

- *process industry*
- *agriculture*
- *cellulose industry*

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Fresh air / recirculated air installation

Air conditioning all-season:

- cooling + drying + cleaning + sterilizing deodorizing in hot season
- heating + hydrating + cleaning + sterilizing deodorizing in cold season

Field of application	comply with
• air conditioning of offices	VDI 3804, VDI 6022
• air conditioning of non-residential buildings	DIN EN 13779 (Kl.THM-C5), VDI 6022
• constant climate production	ISO554 (e.g. corrosion free high precision manufacturing)
• standard climate production	ISO 554; DIN EN ISO 139 or DIN EN ISO 291
• grey room production	ISO 16232, VDA19 SaS2, ZVEI
• clean room production	ISO 14644–1, VDI 2083-1, VDA19 SaS3
• process industry	
• agriculture	
• cellulose industry	

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Operation principle

Litherm-TEK

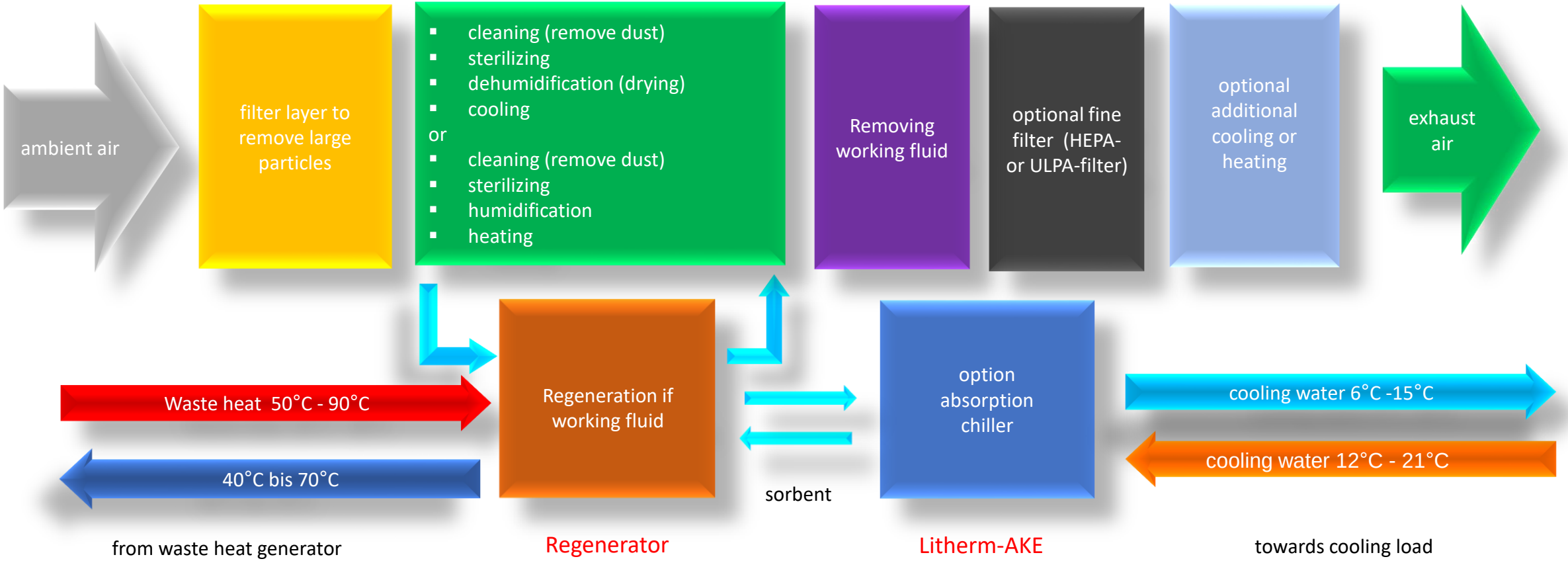
Pre-filter (option)

Reaction chamber
conditioning pre filtered fresh air to reach desired humidity and temperature

Droplet separator

Fine-filter (option)

Re-conditioner (option)



from waste heat generator

Regenerator

Litherm-AKE

towards cooling load

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Characteristics

Litherm-TEK

Litherm-TEK is based on the principle of a wet scrubber (VDI 3679) with a complete new absorption sprayer design developed by FluCoS.
It guaranties optimum drop size spectrum of the absorption fluid over a wide range of load conditions.

- ***Fine dust, viscous and bacteria will be removed***
  (Class U17 EN1822:2009 or ISO 75 U ISO 29463:2011)
- ***dehumidification (drying) down to 15 % relative humidity***
  (1 g/kg absolute water content)
- ***cooling down to +7 ^{0}C***
- ***heating up to +50 ^{0}C***
- ***humidification up to 98 % relative humidity***

Design of all absorption fluids are efficient, reliable, sustainable and save for human and environment.
Each fluid is designed regarding customer application and will be used in a circle process to be regenerated due to heat or waste heat.
This technology makes Litherm-TEK a highly energy efficient system.

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Litherm-TEK does only use electrical power to circulate (pump / spray) the absorption fluid between reaction chamber and regenerator.
The regeneration process used the low temperature waste heat and does not need any additional electrical power.

Sources for low temperature waste heat could be:

- ***process waste heat***
  (e.g. waste heat from a compressor, oven processes)
- ***machine waste heat***
  (e.g. plastic or metal injection molding machine, tooling machines)
- ***solar or geothermic heat***
  (e.g. solar collector)
- ***Waste heat from combined heat and power production***
  (e.g. block heat and power station)
- ***Heat from conventional heating systems***
  (e.g. thermal pump, combustion plant)

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System temperature range

Litherm-TEK

Based on needed dehumidification performance different absorption fluids will be used.

- ***Industrial dehumidification (drying)***
  high dehumidification performance based on organic absorption fluid at 75°C – 80°C regeneration temperature
  Waste heat system temperature of 90°C/70°C

- ***air conditioning systems***
  medium dehumidification performance based on inorganic absorption fluid at 50°C – 55°C regeneration temperature
  Waste heat system temperature of 60°C/40°C

Special droplet separator (demister) guaranties absorption fluid free exhaust air.
Absorption fluid will be used in a save circle process.

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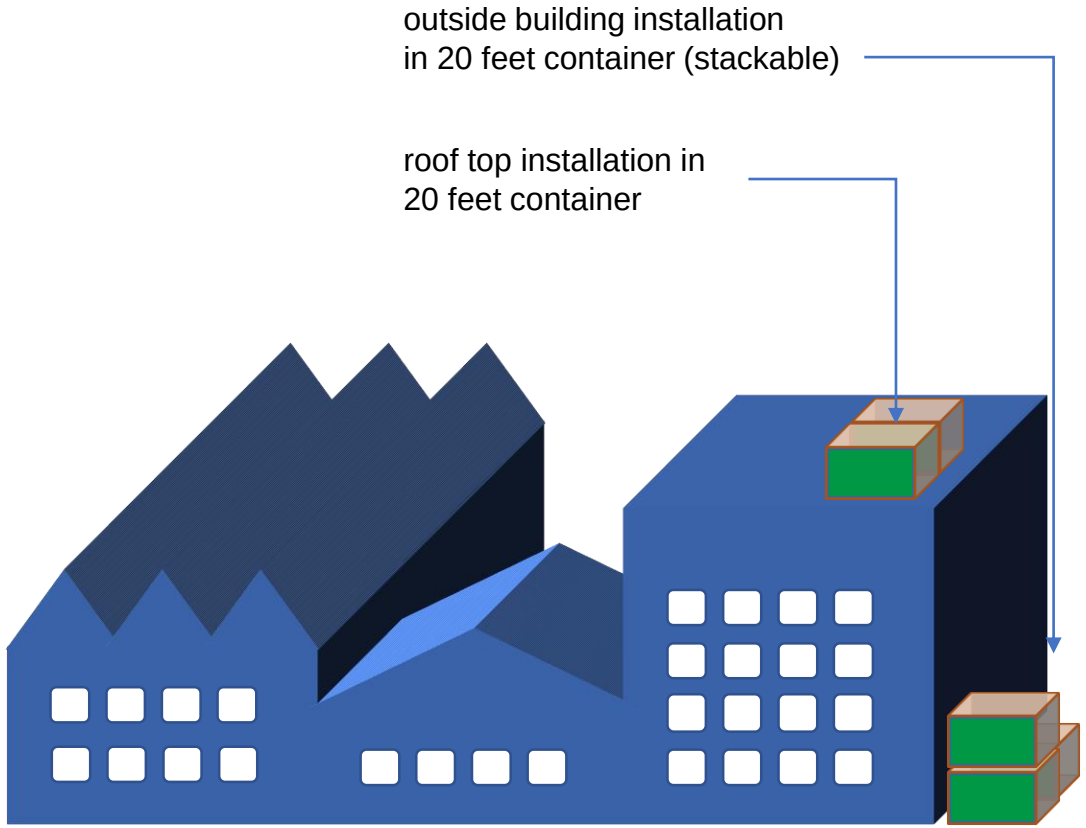
Litherm-TEK can be used in fresh air / recirculated air installation

- upgrade existing ventilation and air-conditioning installation
- Integrate in new ventilation and air-conditioning installation

System comes in a 20 feet container ready to use.
Easy to install on roof top or beside the existing building

- no need reconstruct
- no need to stop production during installation
- easy to extend by adding more container (stackable)
- easy to ship and transport by standard size
- maintenance outside building possible



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Systen size / standard delivery time

Litherm-TEK

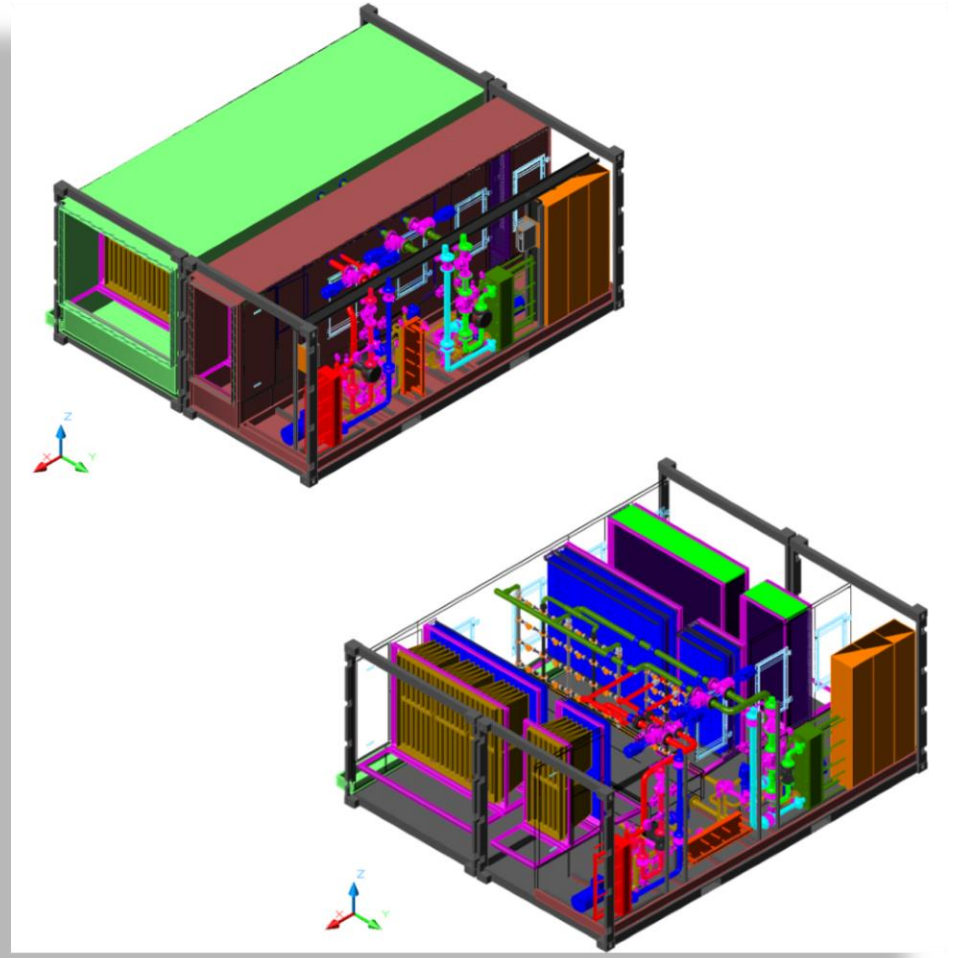
- **Standard size is 20 feet container**

- **Modular system design**

  from 10.000 m³/h up to 100.000m³/h
  (20 feet container modul standard perfromance 10.000 - 30.000 m³/h)

- **World wide standard delivery time**

  - 6 month after order intake acceptance test in germany
  - 3 month after acceptance test, shipment and installation at customer side



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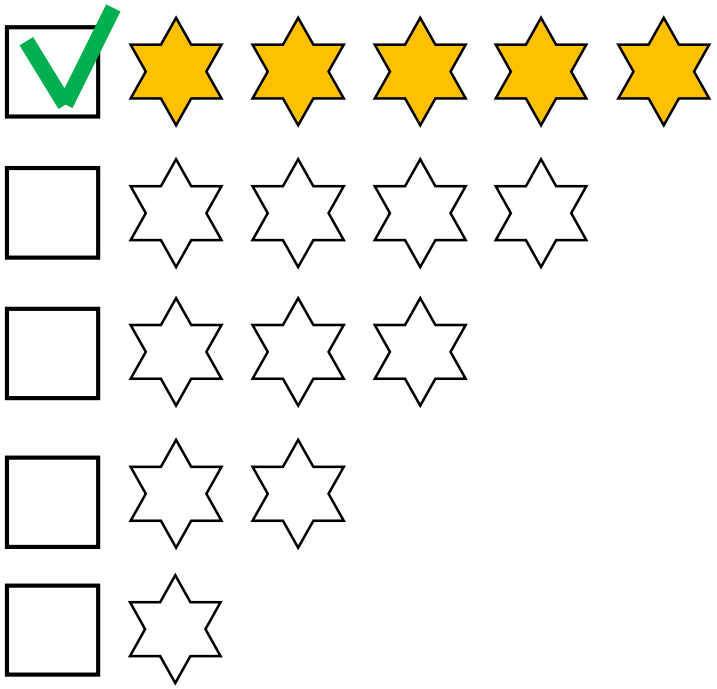
- ***High efficient dehumidification and cooling at the same time***
  90% less primary energy consumption compared with conventional dew point dehumidification / cooling
- ***Energy cost safeing of 50%-90% by usinge waste heat***
- ***No risk of germination compared with conventional dew point dehumidification / cooling***
  sterilized exhaust air in line with VDI 6022
- ***Low mainatance compared with conventional dew point dehumidification / cooling***
  sterilized exhaust air in line with VDI 6022
- ***Better usage of block heat and power station reduces energy mix cost.***
  Wast heate in hot season is used to provide cool air



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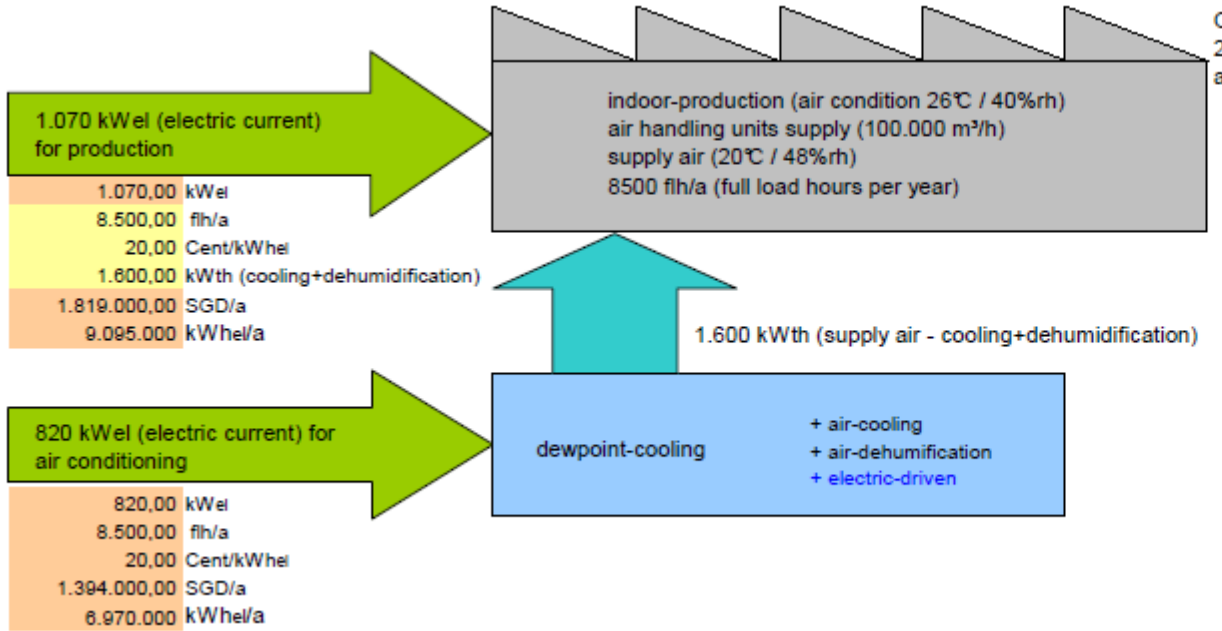
Energy consumption (thermal energy, electricity) with convectional dew point system (Existing system, only energy cost no investment calculated)



Keywords:
- supply air c
- supply air d
- electric driv

Total Energy Consumption Costs

1.819.000,00	SGD/a
1.394.000,00	SGD/a
3.213.000,00	**SGD/a**

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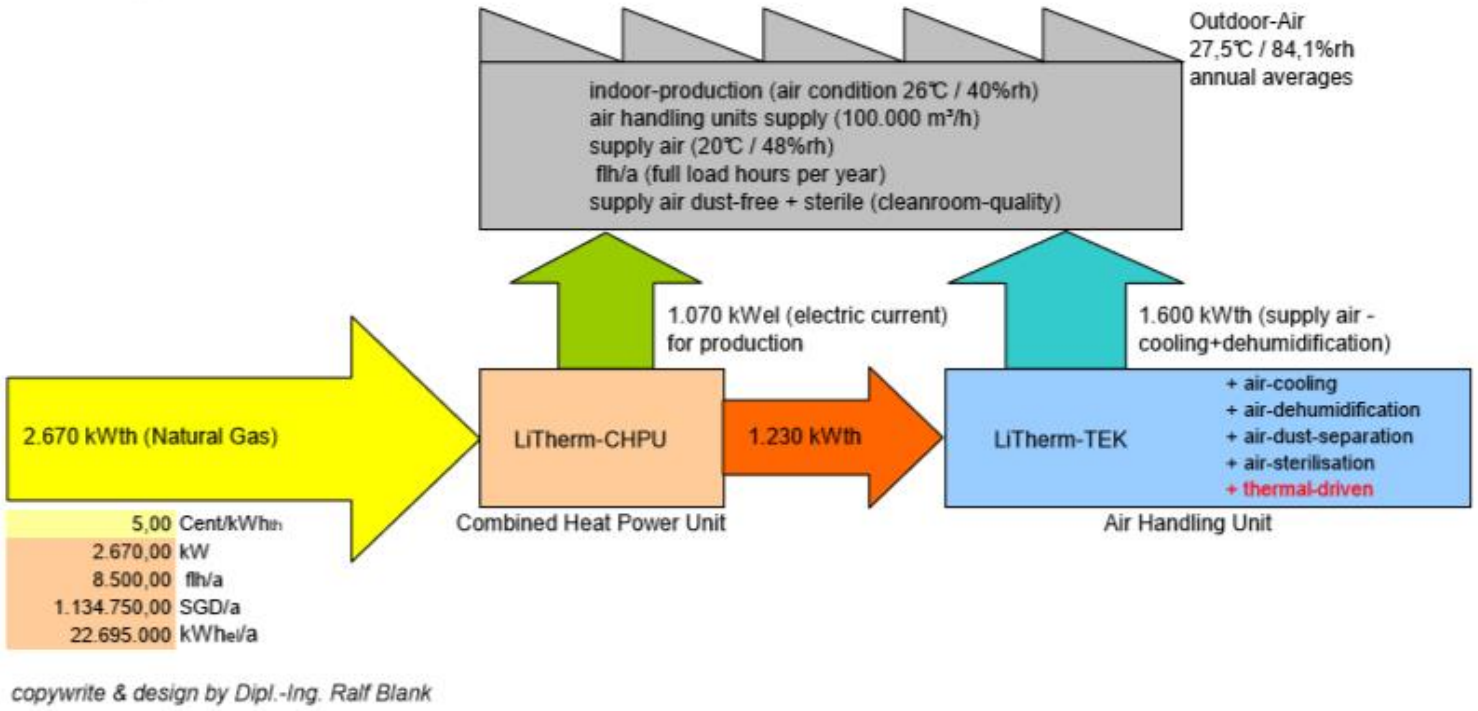
Energy consumption: thermal energy, electricity with Litherm-TEK



Keywords:
- highly efficient upgrade for existing airhandling units
- supply air cooling
- supply air dehumidification
- prevention of corrosion for supply air humidity < 50%
- supply air dust-separation
- supply air sterilisation
- waste heat utilisation via
- thermal driven cooling+dehumidification plants
- electricity generation for personal usage

LiTherm-TEK by kW+
Total Energy Consumption Costs

0,00	SGD/a
1.134.750,00	SGD/a
1.134.750,00	**SGD/a**

Air Conditioning Costs Savings

3.213.000,00	SGD/a	
-1.134.750,00	SGD/a	
2.078.250,00	**SGD/a =**	**65%**

If customer does already have waste heat the system reach up to 65% cost saving compared to conventional Systems

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Danke für Ihre Aufmerksamkeit

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