THERMO-SYSTEM®

The Specialist in Solar Drying

THERMO-SYSTEM® Active Solar Biosolids Dryer

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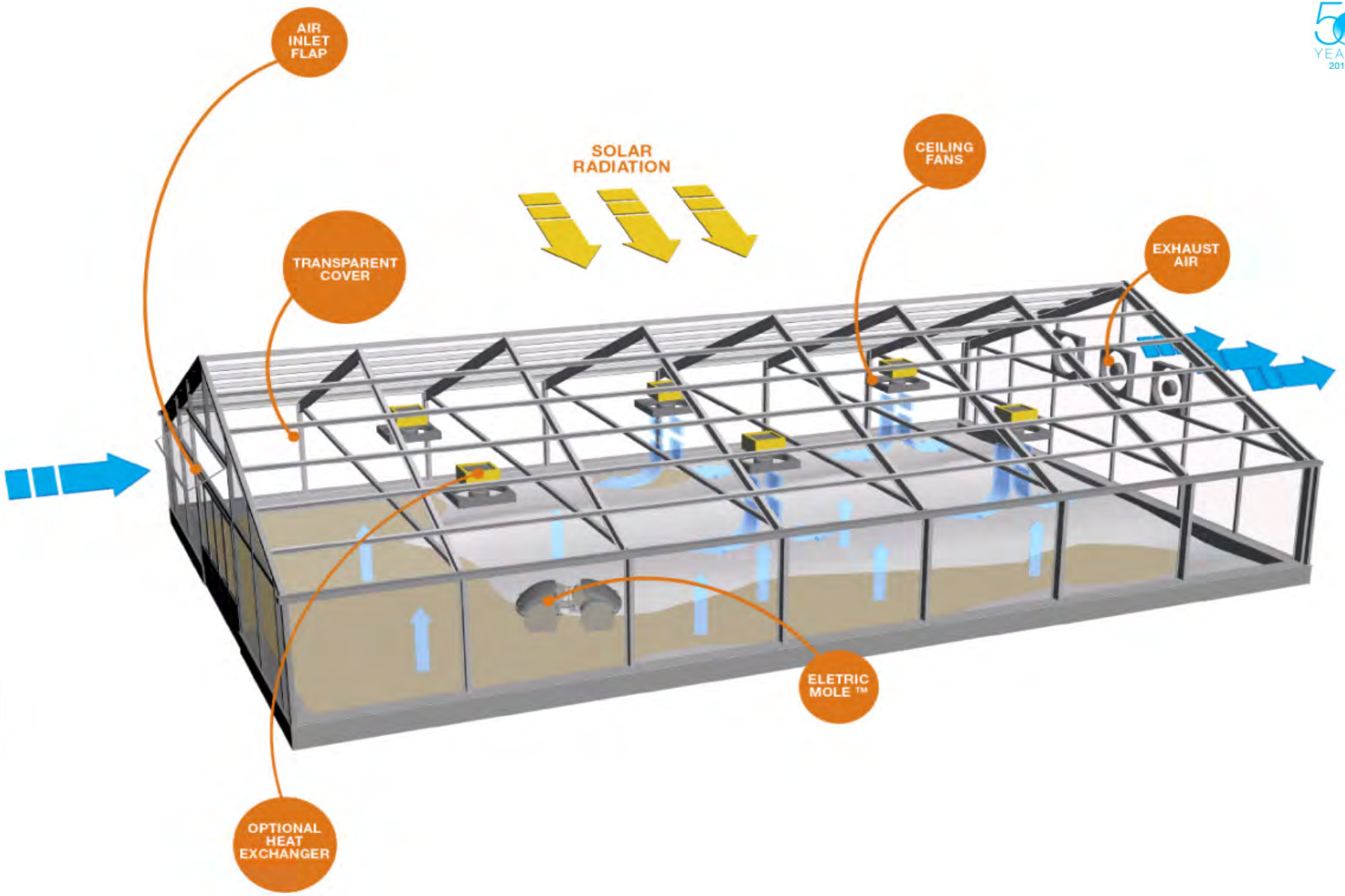
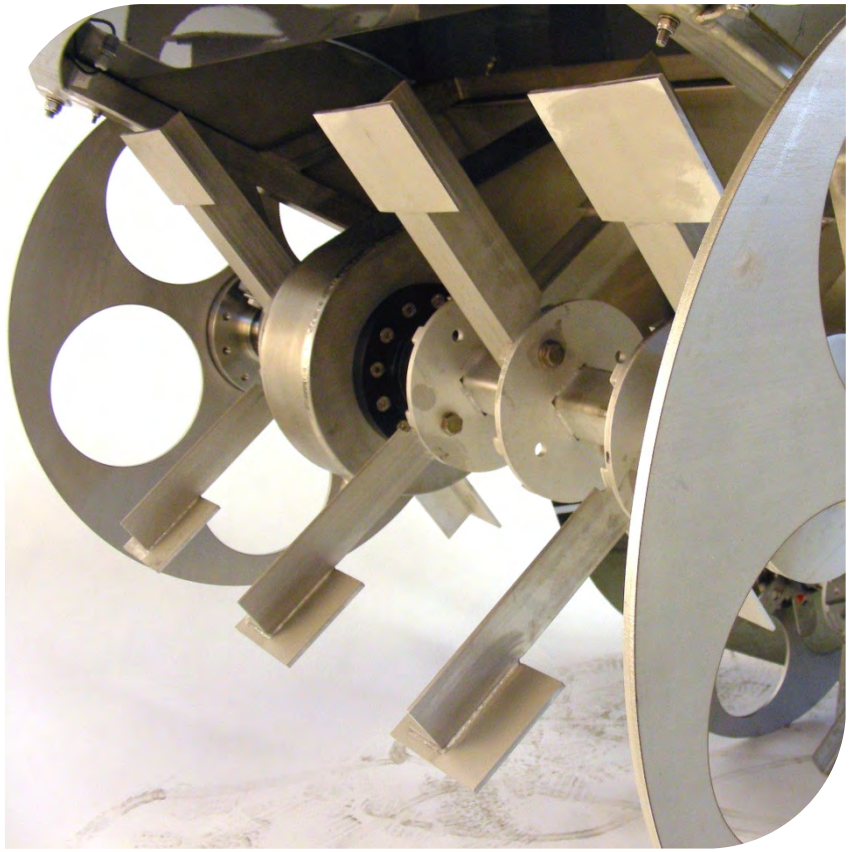


Concrete Basin & Enclosure

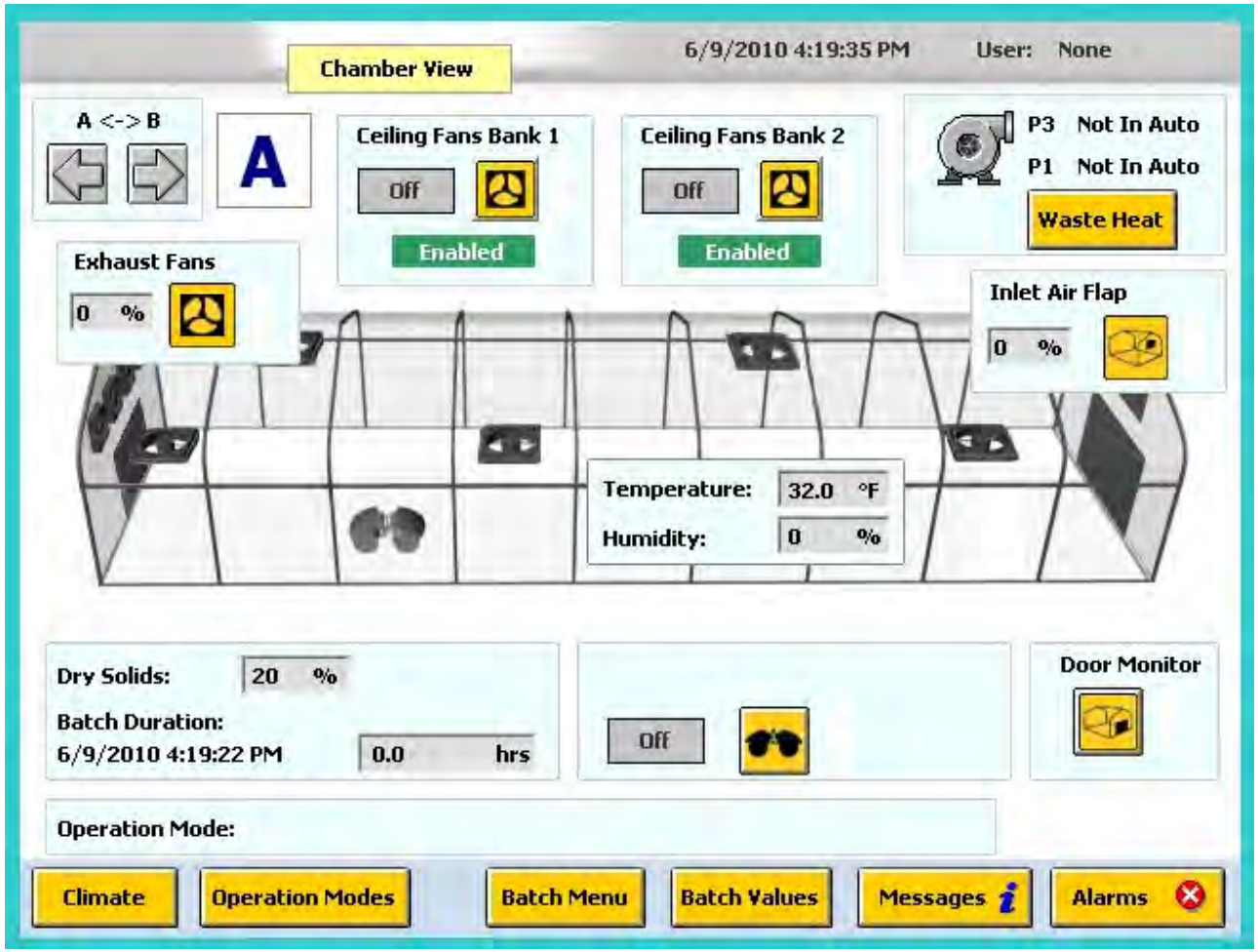
Plug & Play Tilling Device



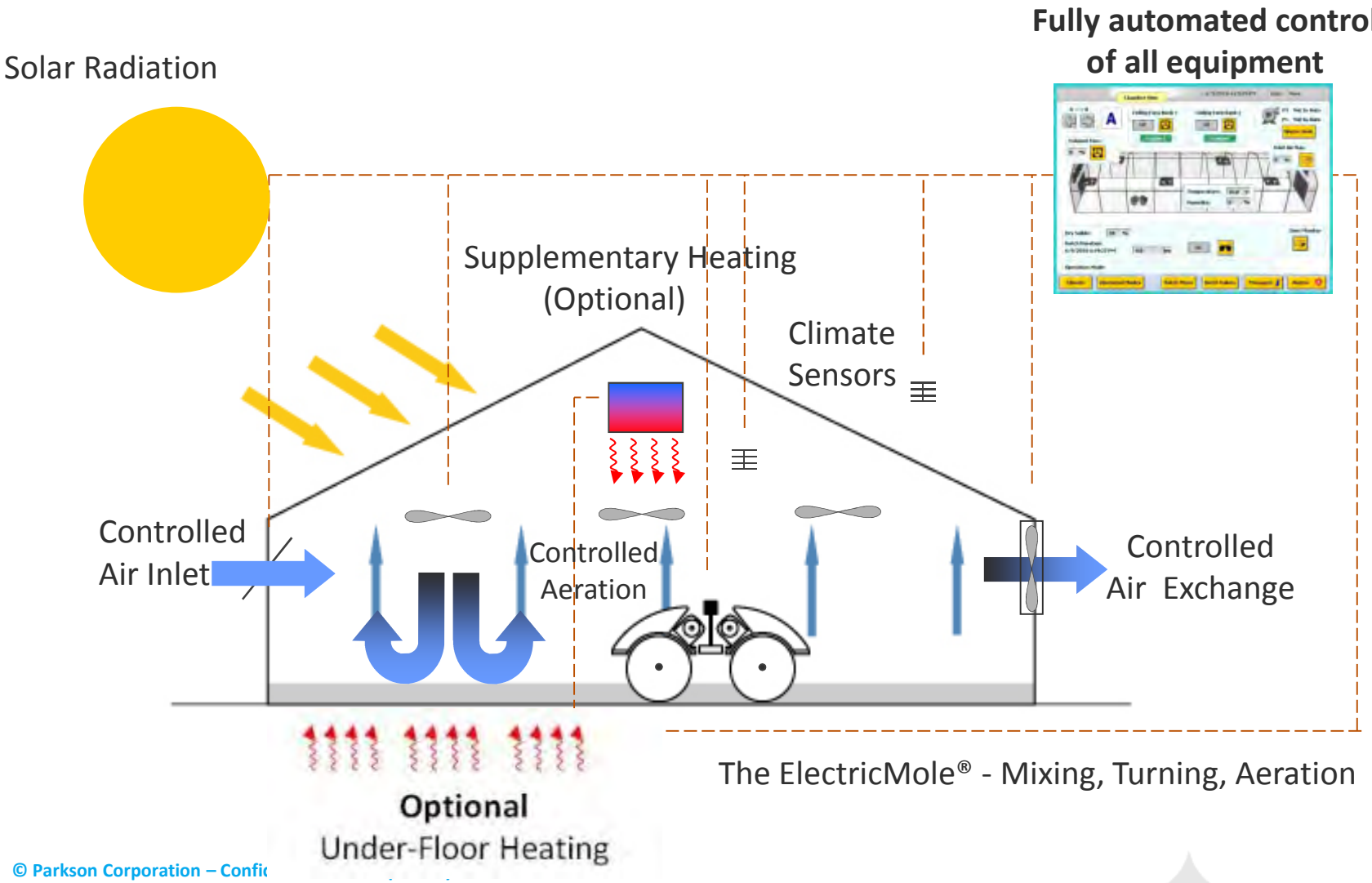
Auto. Controlled Aeration

Climatic Sensors

Programmable Logic Control

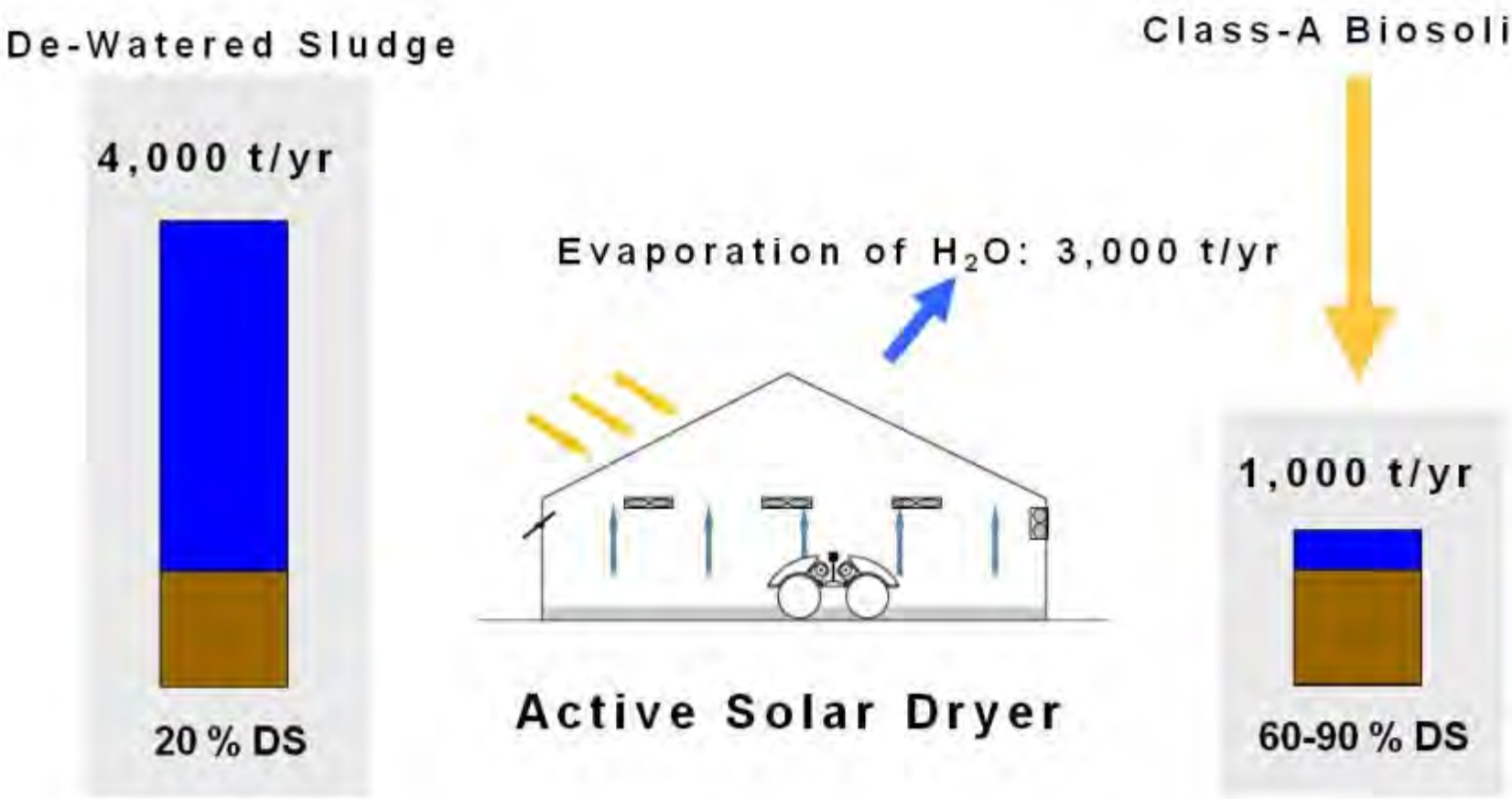


Symphony of all Components



THERMO-SYSTEM® Active Solar Biosolids Dryer

Automated Sludge Drying e.g.



➔ Mass reduction (60-75 %)

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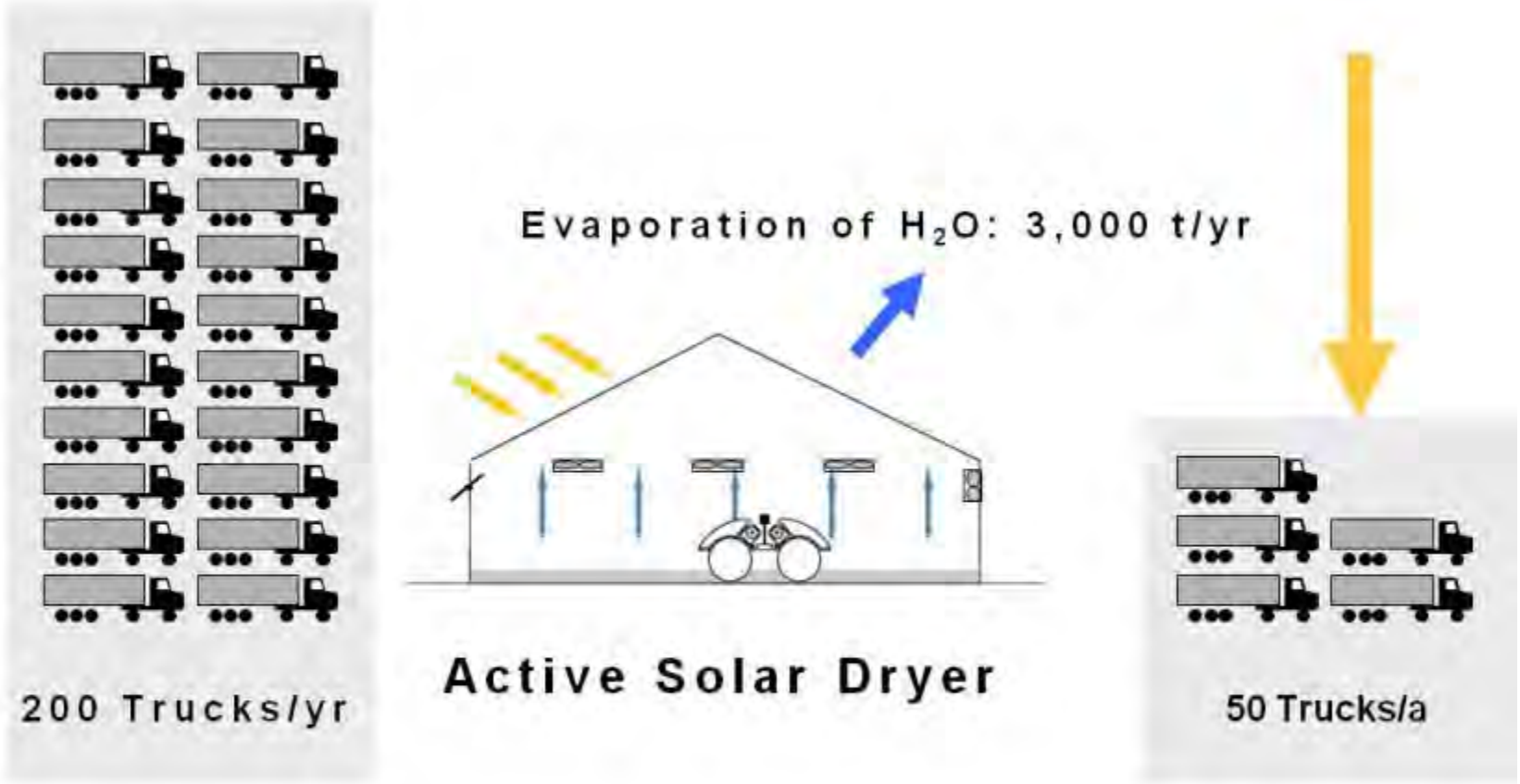

→ Reduced Hauling by up to 75 %

SolarBatch™

In a batch process, the de-watered sludge is either pumped or manually loaded into the drying chamber until full. Once the chamber has been filled, the tilling machine turns-over, mixes and distributes the sludge within the chamber. When the sludge has reached the desired final dried solids concentration, the sludge is manually removed from the chamber and is then ready for its end use. In this concept, the tilling machine has limited or no ability to transport the sludge over long distances.

Bird's eye view: 15MGD WWTP

THERMO-SYSTEM® Active Solar Dryer: Types

SolarBatch™

Biosolids @15%ds | Level Mode | Auto Drying | Biosolids @75%ds

SolarBatch™

- A batch system only requires a tilling device and a front end loader to load and unload the chamber.
- It is easy to operate.
- No time-critical errors in a batch process.
- Drying cycle is automatically adjusted to the existing climate conditions.
- The result is a consistent, homogenous product.
- Operational reliability.
- Low operating and maintenance cost.
- Redundancy of key-equipment (plug & play concept).

Installation: Kent County, DE

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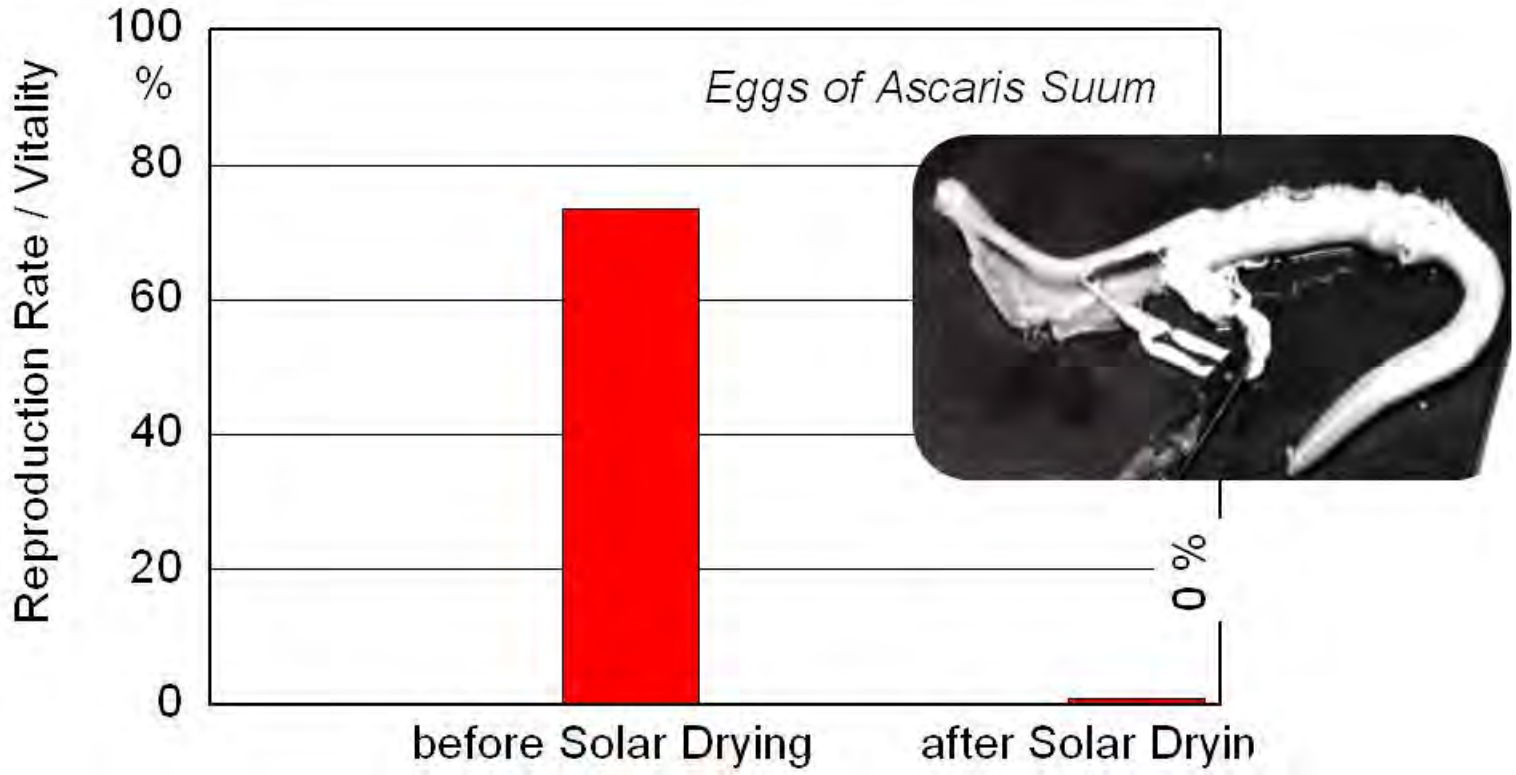
- Initial DS of Biosolids: 15-18%
- Final DS of Biosolids: >75%
- Biosolids used for Agriculture & daily cover for a local landfill
- 3 Chambers represent a pilot plant & expansion is expected in 2013
- Full 15 MGD design is expected by end of 2015

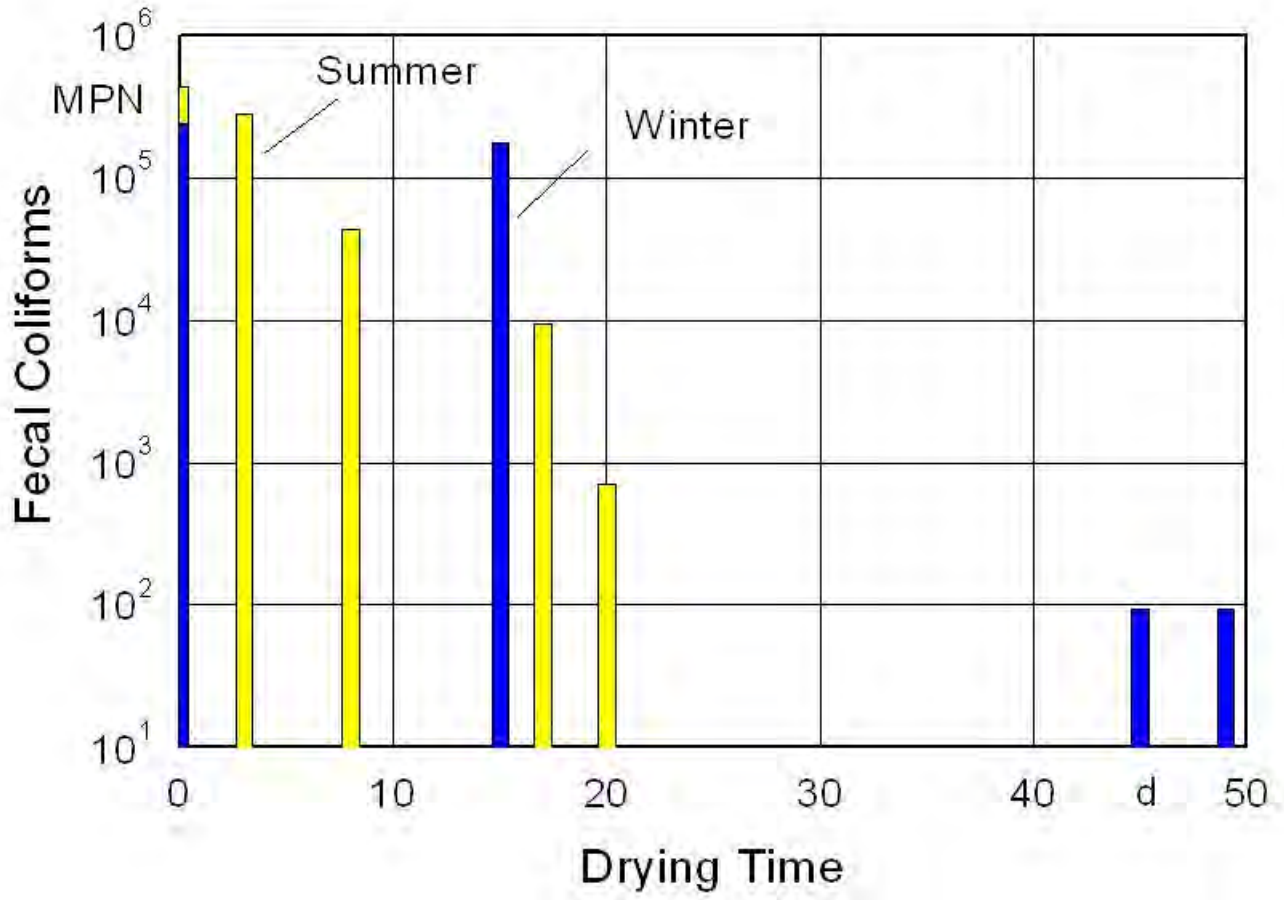
Installation: Kent County, DE

- Meets EPA 503 Class A Regs.



Installation: Kent County, DE

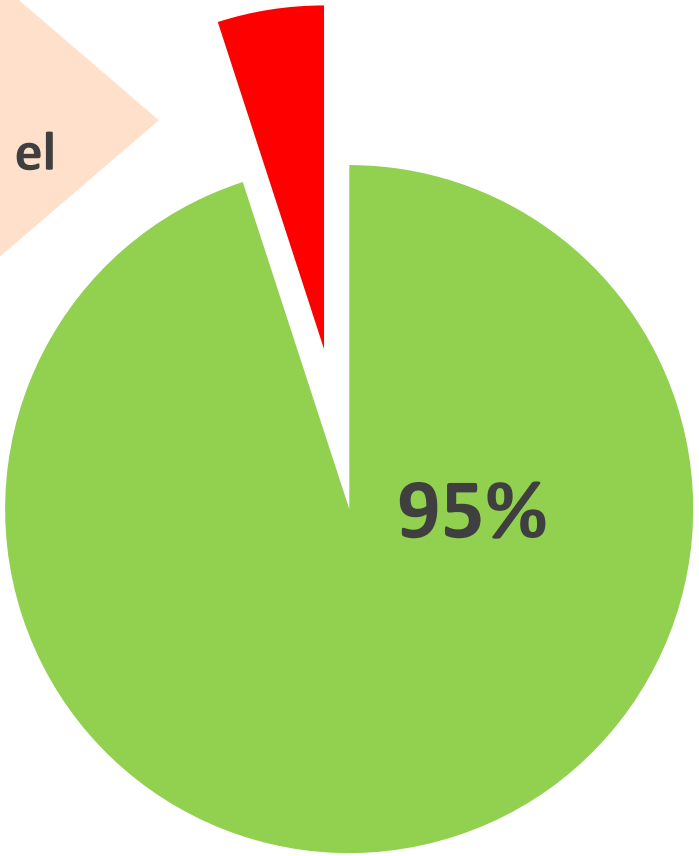
- Meets EPA 503 Class A Regs.



Energy – Thermal & Electrical

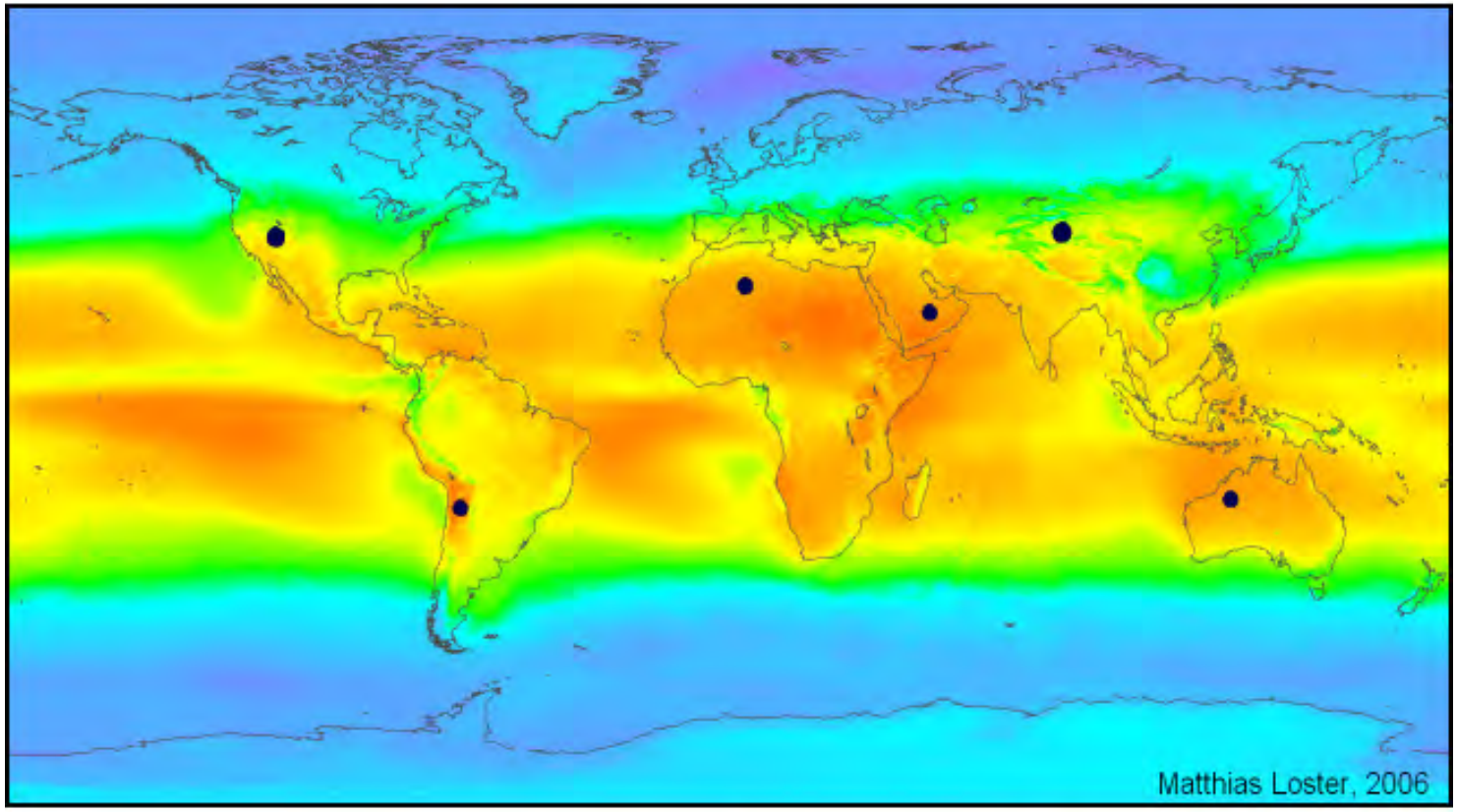
25 – 35 kWh $_{el}$

per ton of evaporated H_2O

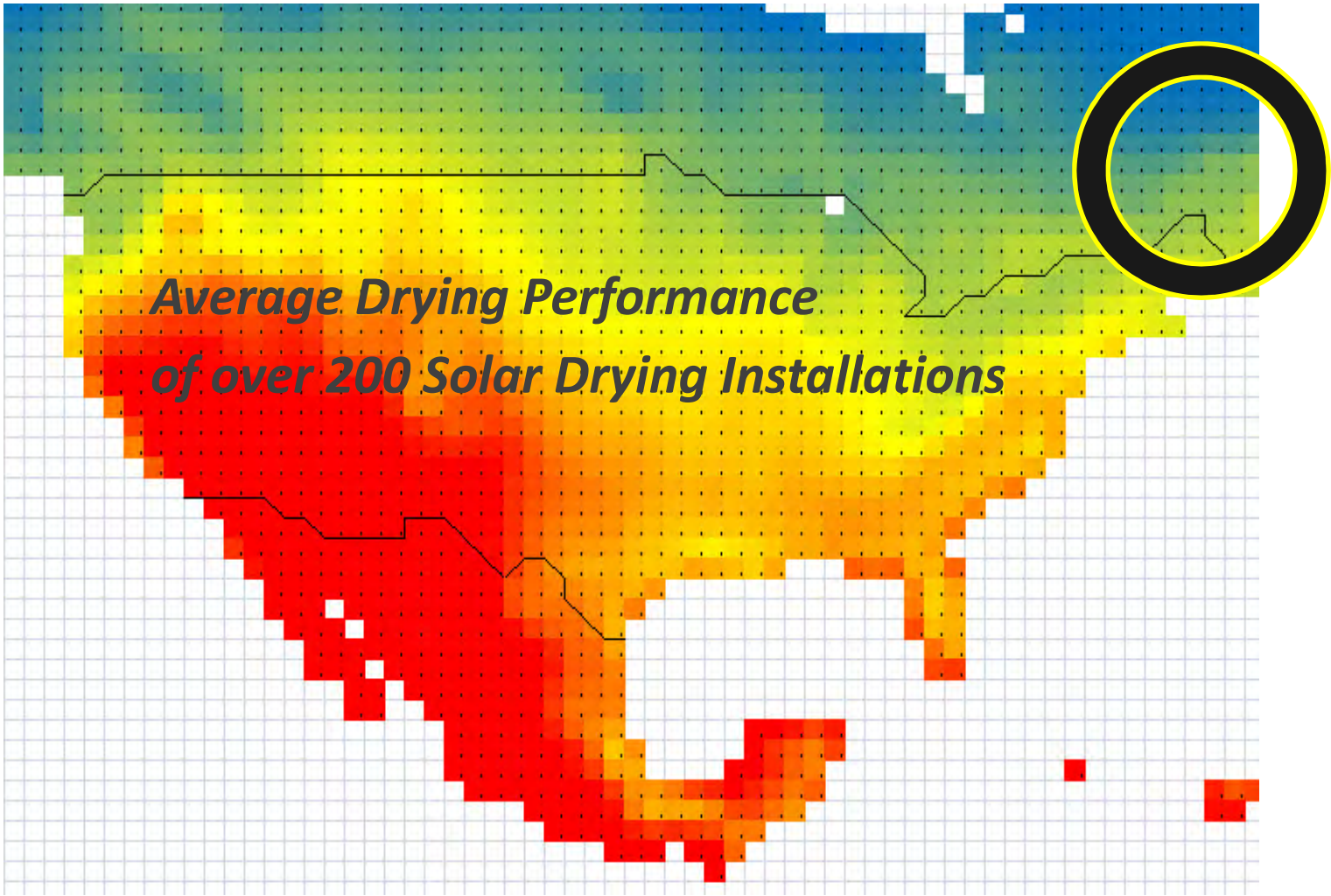


Source: LFU / LFW Report Fuessen

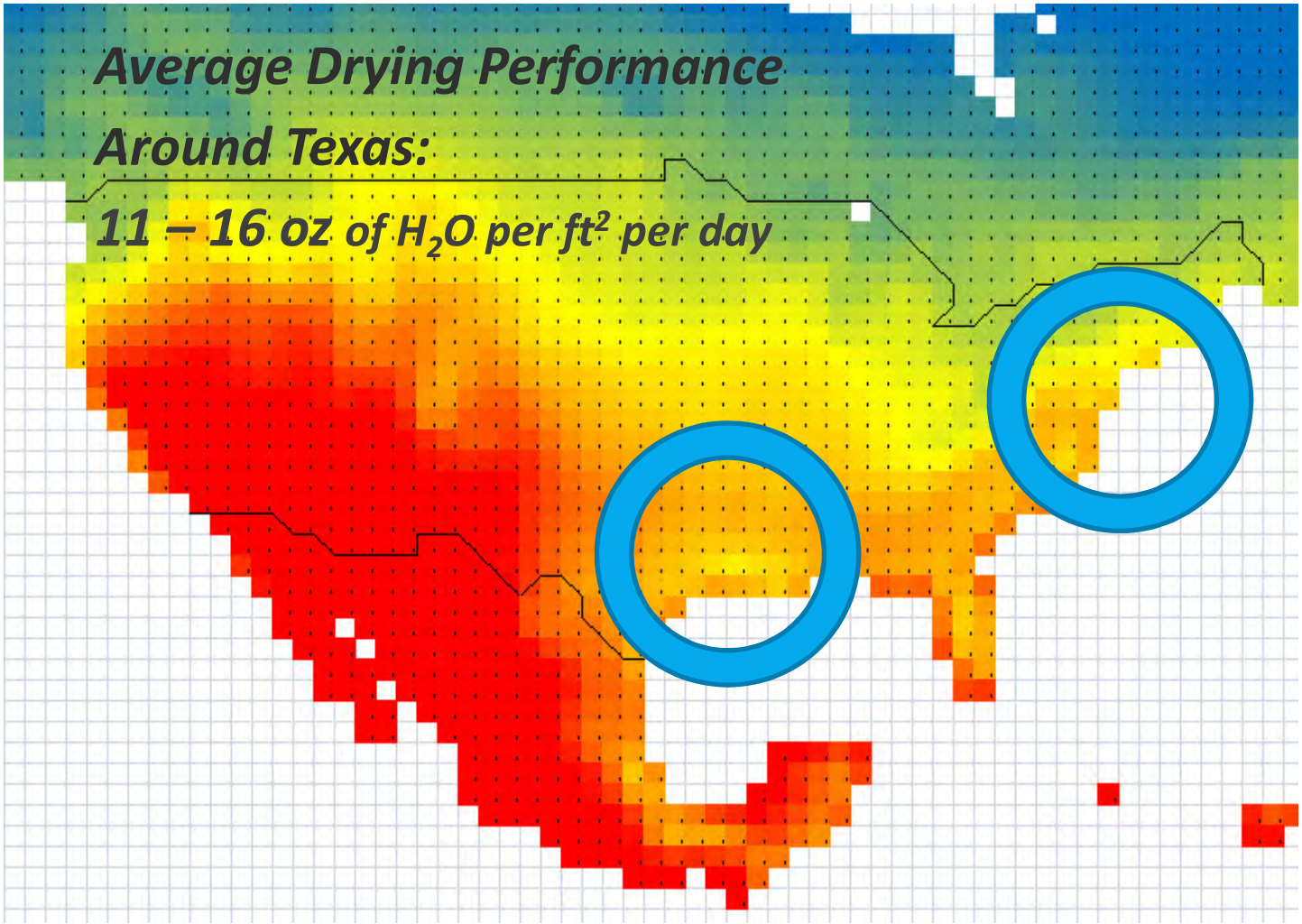
Energy – Thermal (World)



Energy – Thermal (N. America)



Energy – Thermal (USA)



THERMO-SYSTEM® Active Solar Dryer: Types

SolarPlus™

Energy Input:

- Air Heating
  - Direct/Indirect
- Floor Heating

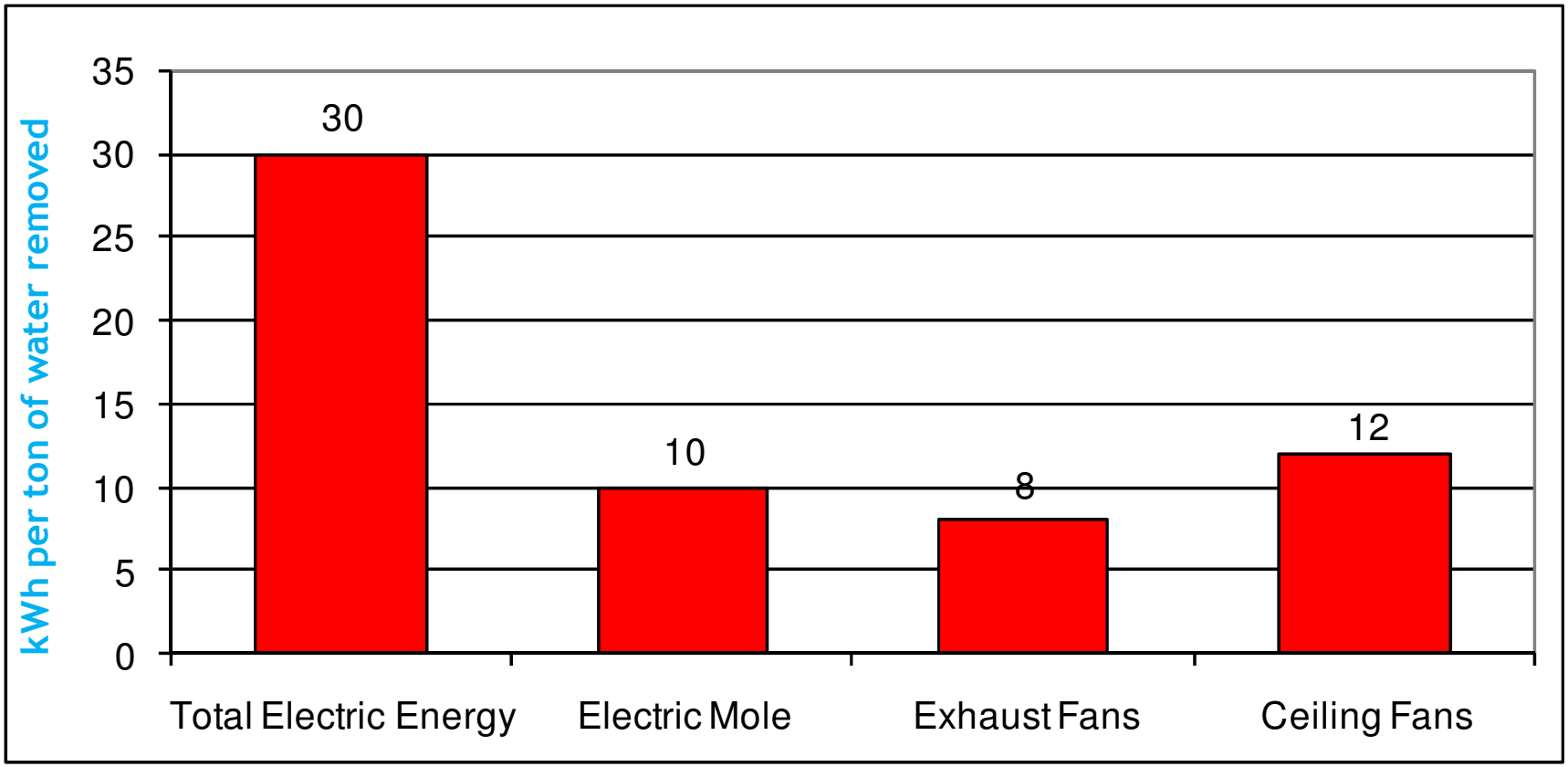
Heat Source:

- CHP-Station
- Process Heat
- Boiler / Furnace
- Heat Pump

THERMO-SYSTEM® Active Solar Dryer: Types

SolarPlus™

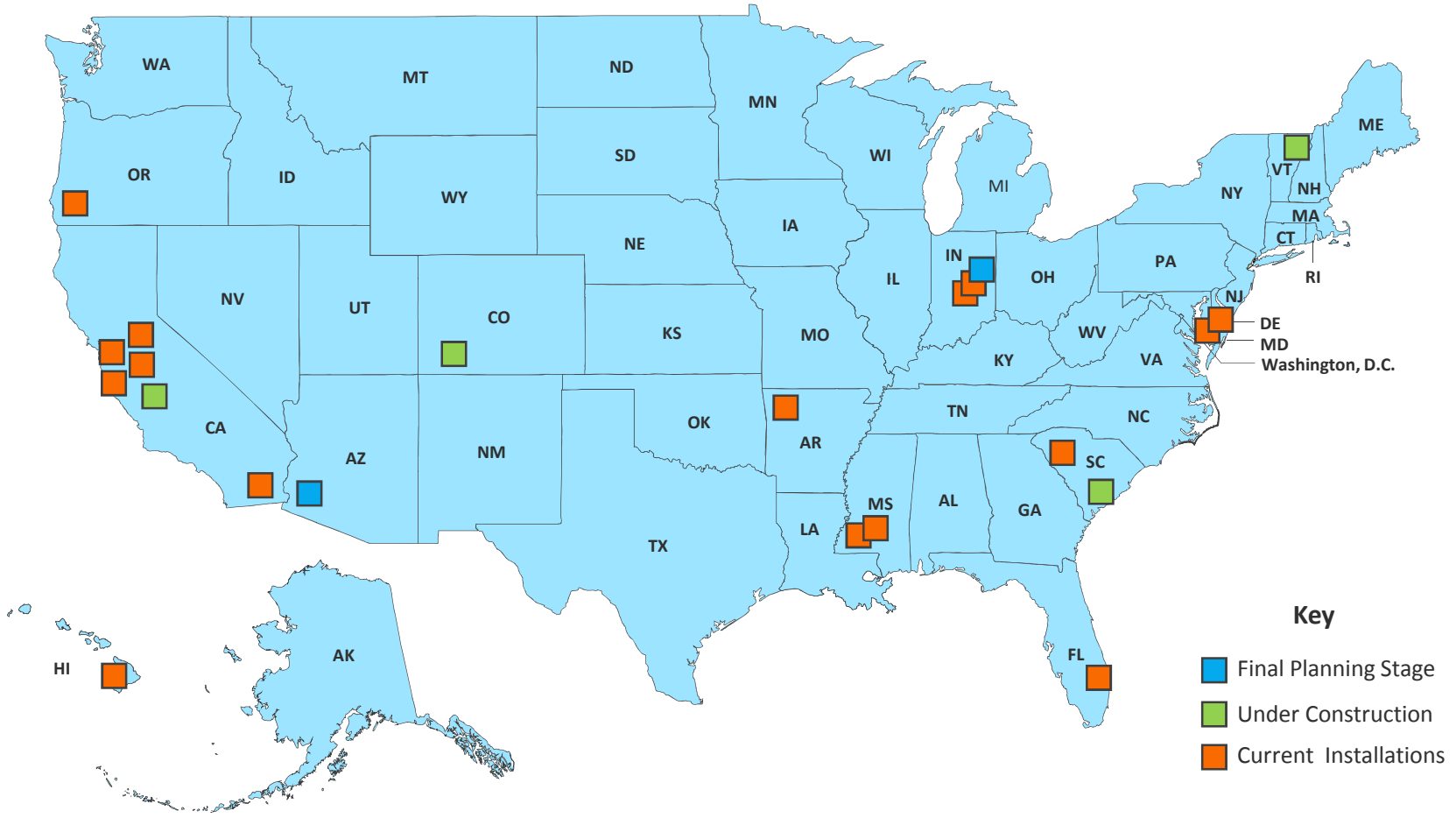
Energy – Electrical



Energy – Electrical

THERMO-SYSTEM® Active Solar Dryer: Types

Installations USA



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Installation: Waimea, HI

THERMO-SYSTEM® Active Solar Biosolids Dryer

Installation: Carmel, IN

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Installation: Natchez, MS

THERMO-SYSTEM® Active Solar Biosolids Dryer

Installation: Okeechobee, FL

Thank You

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Automated Sludge Drying e.g.

Basic Sludge Data & Assumptions		*Solar Dryer*	*Status Quo*
Beginning Wet Sludge	tons/yr	4,000	4,000
Initial Dry Solids	% DS	20%	20%
Final Dry Solids (Target)	% DS	75%	20%
Water to be Evaporated	tons/yr	2,933	0
Independant Drying Lines		4	0
Total Area Requirement (with Infrastructure)	ft^2	35,000	0
Machinery part of total Investment	%	20%	
Expected Livespan of Machinery	year	15	15
Obs. Period = Expected Livespan Other	year	30	30

Automated Sludge Drying e.g.

Calculation of Variable Costs		*Solar Dryer*	*Conventional Dryer*
Thermal Energy Consumption	Mbtu/ton H_2O	0	3.2
	Mbtu/yr	0	9,956
Thermal Energy Cost	$/Mbtu	8.00	8.00
	$/yr	0	79,644
El. Energy Consumption	kWh/ton H_2O	27	75
	kWh/yr	79,200	232,972
El Energy Cost	$/kWh	0.08	0.08
	$/yr	6,336	18,638
Total Energy Cost (today)	***$/yr***	***6,336***	***98,282***

Automated Sludge Drying e.g.

Calculation of Variable Costs
Disposal Costs of Remaining Biosolids

Status Quo		***Solar Dryer***
50	$/ton	50
200,000	***$/yr***	***53,333***

$ 146,667 PER YEAR

theoretical savings based on mass reduction only.

THERMO-SYSTEM® Active Solar Biosolids Dryer

Installations: >200 Worldwide

THERMO-SYSTEM® Active Solar Biosolids Dryer

Installation: Palma, Spain