ECOWAS Solar Thermal Energy
Capacity Building and
Demonstration Programme

13 June 2014, Praia, Cabo Verde

New ECOWAS Solar thermal energy Program: Background, Components, Process

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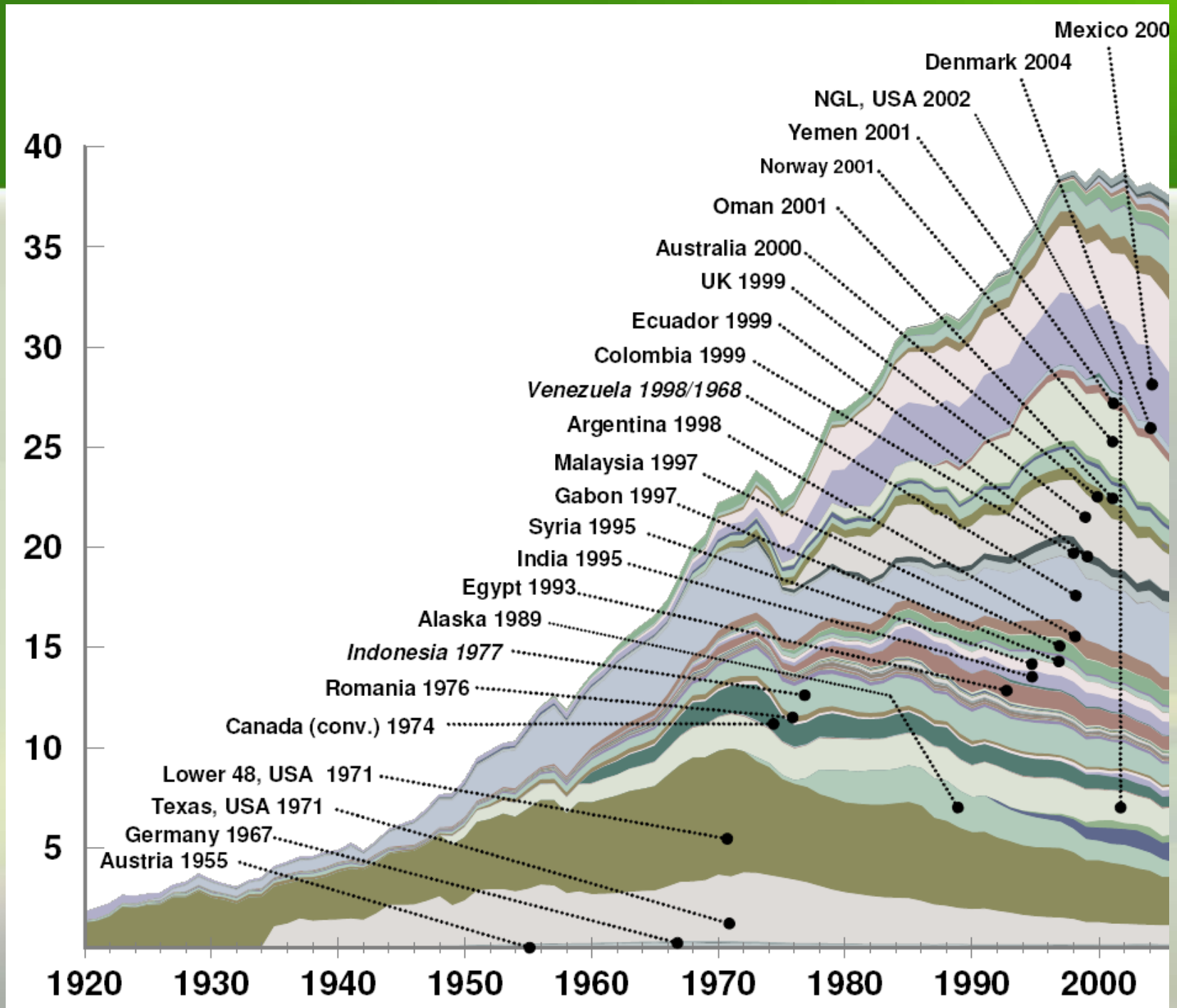
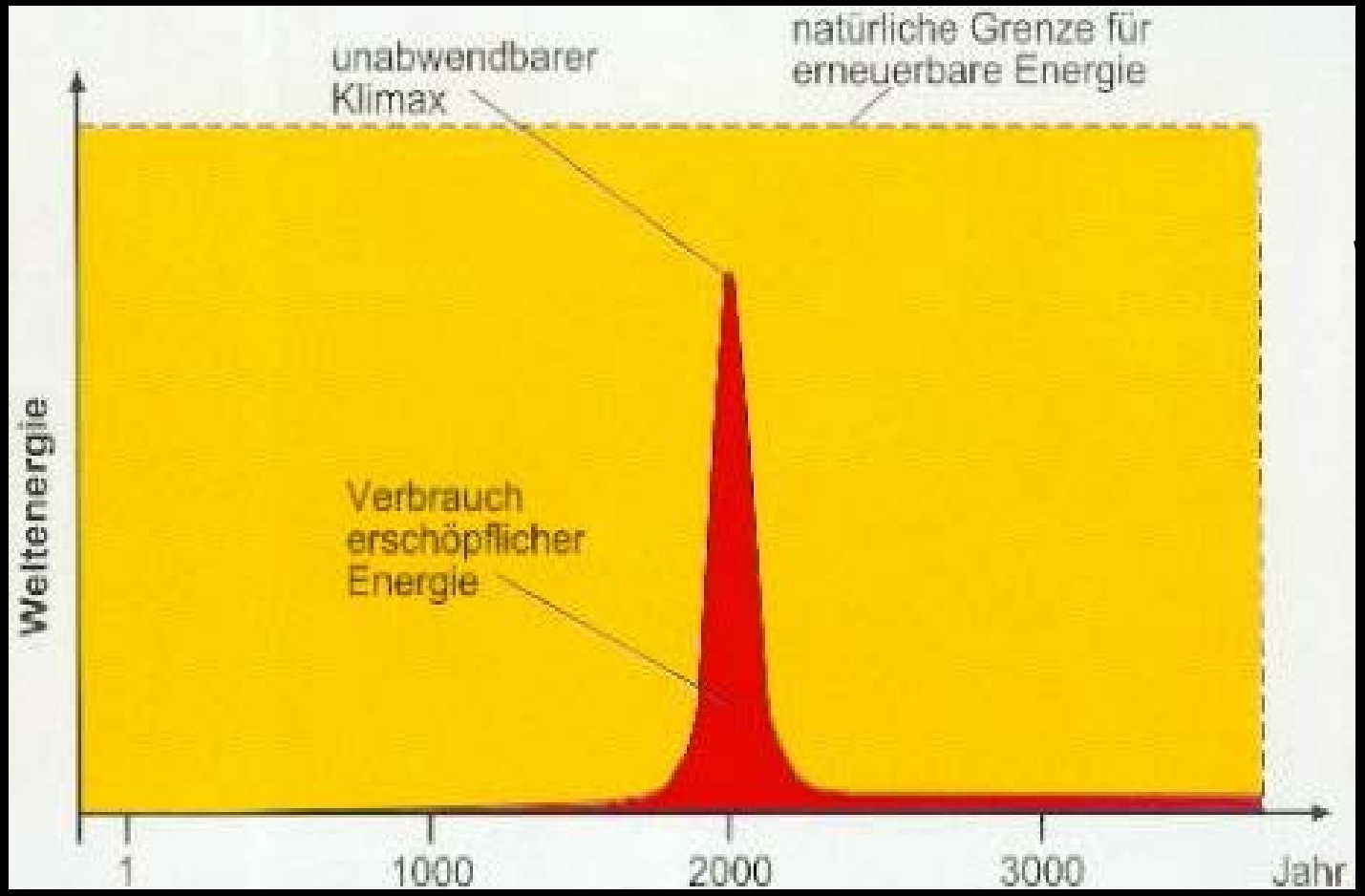
Countries with a PEAK OIL in the past



Episode of Fossile Energy Use in Mankind History

„…like a single match in the darkness of eternity…“

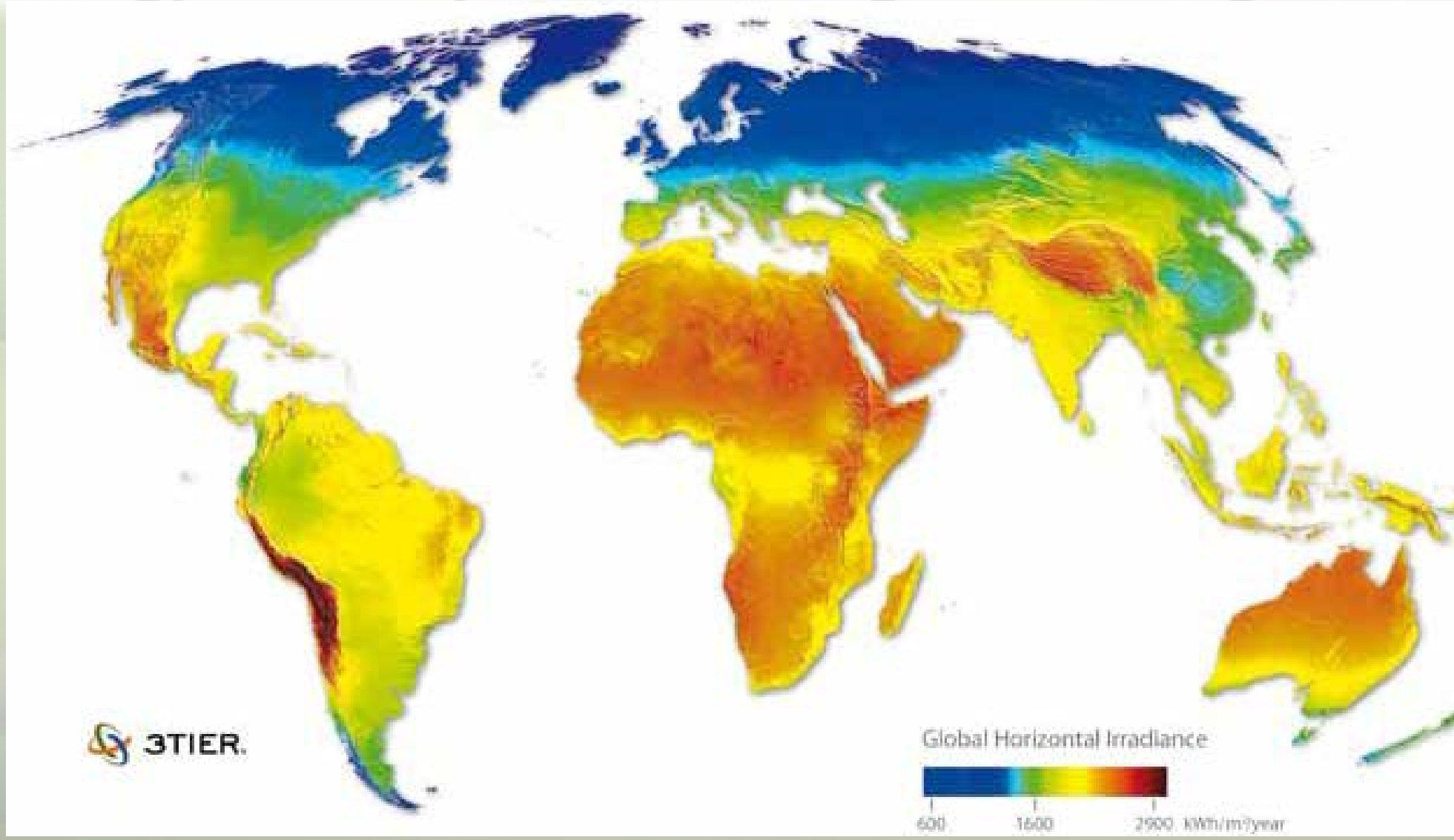


Solar resource map from IEA Technology Roadmap Solar heating and Cooling

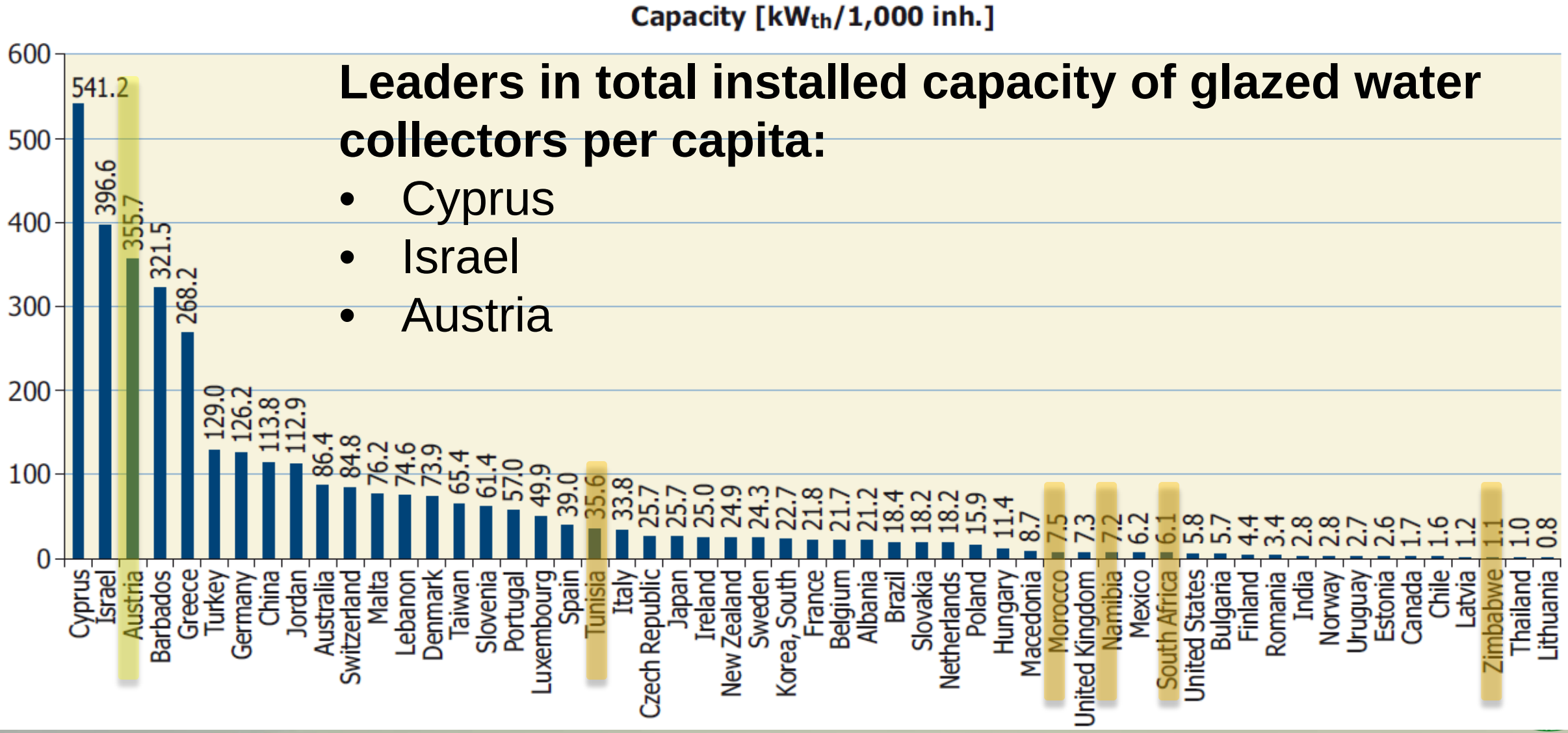
Solar radiation in West African countries:

Double as high in comparison to Middle European countries

but dissemination lagging behind



In terms of total installed capacity of glazed water collectors in operation per 1,000 inhabitants, there was a continued dominance by 5 countries: Cyprus ahead of Israel, Austria, Barbados and Greece. China is catching up within the Top 10; passing Jordan and Australia in 2011 (see **Figure 7**).



Leaders in total installed capacity of glazed water collectors per capita:

- Cyprus
- Israel
- Austria

Market growth of Solar thermal collectors

Market growth rates of average 20% per year

West Africa still Not participating

Between 2000 and 2010 the annual installed glazed water collector area worldwide increased 6-fold, and compared to the year 2009 the worldwide market grew by 13.8%. Regardless of this positive development, it should be noted that the growth 2009/2010 rate was the lowest since the period 2004/2005 (see **Figure 20**).

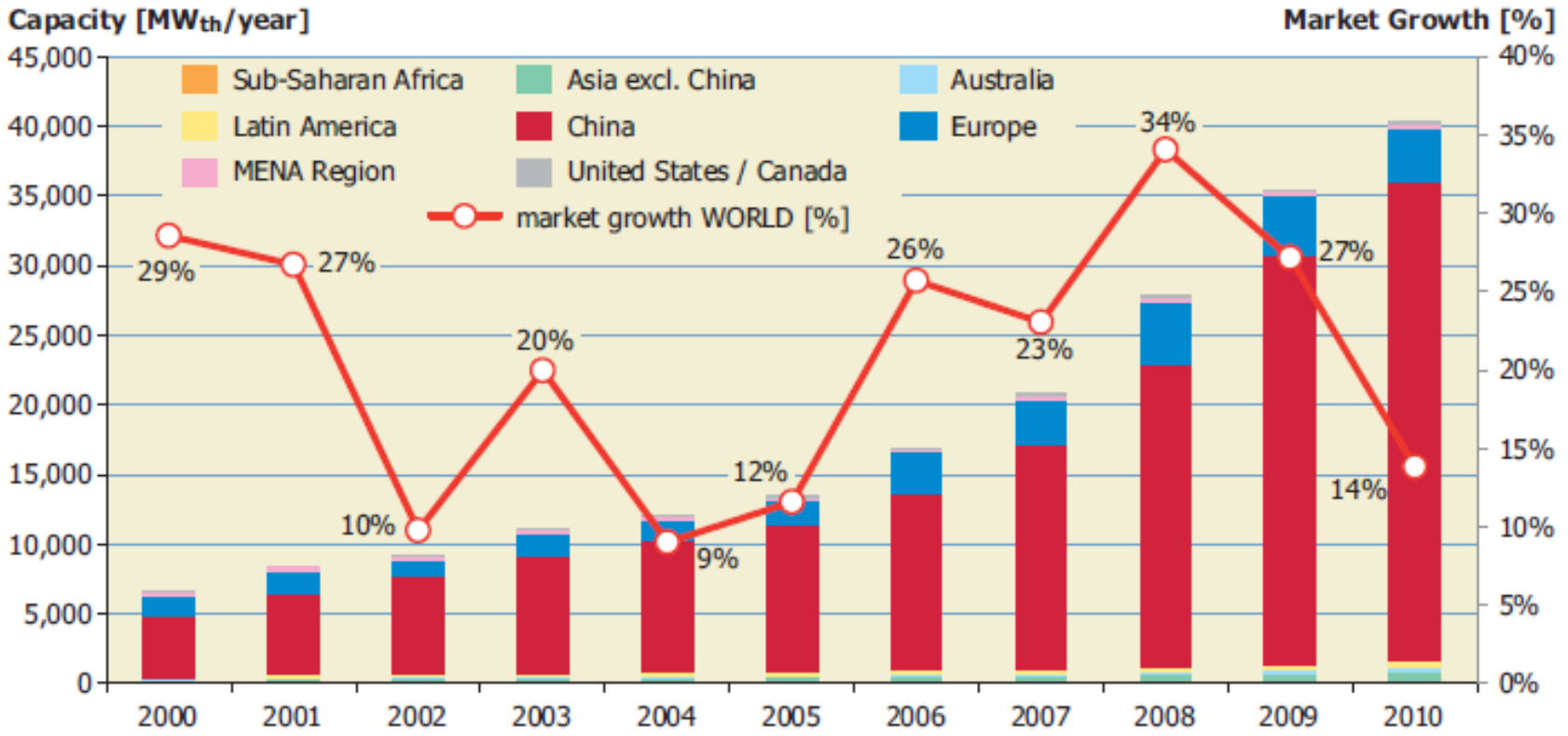


Figure 20: Annual installed capacity of flat plate and evacuated tube collectors from 2000 to 2010

IEA Solar Heating and Cooling Program (SHC) Global Report

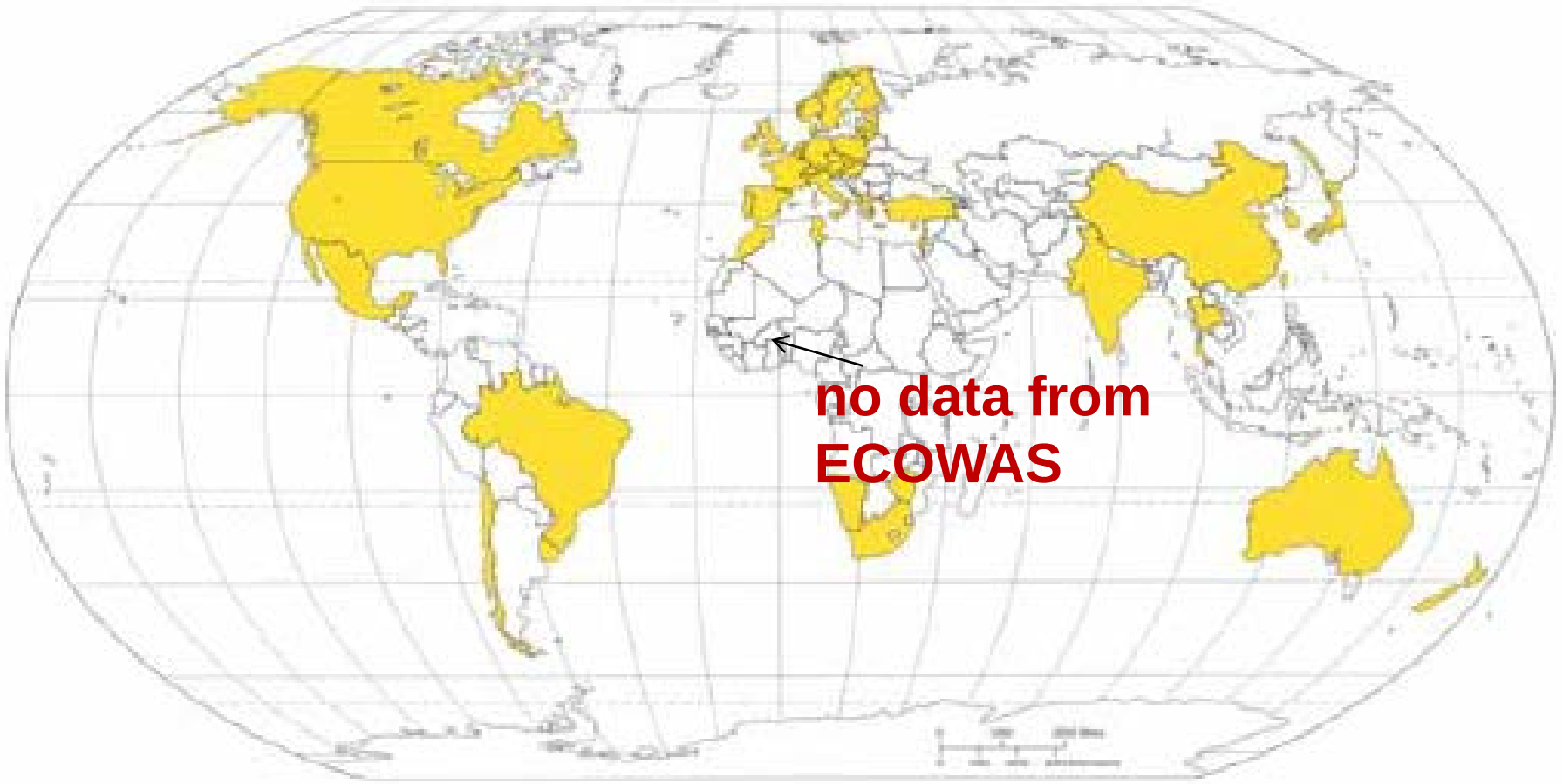
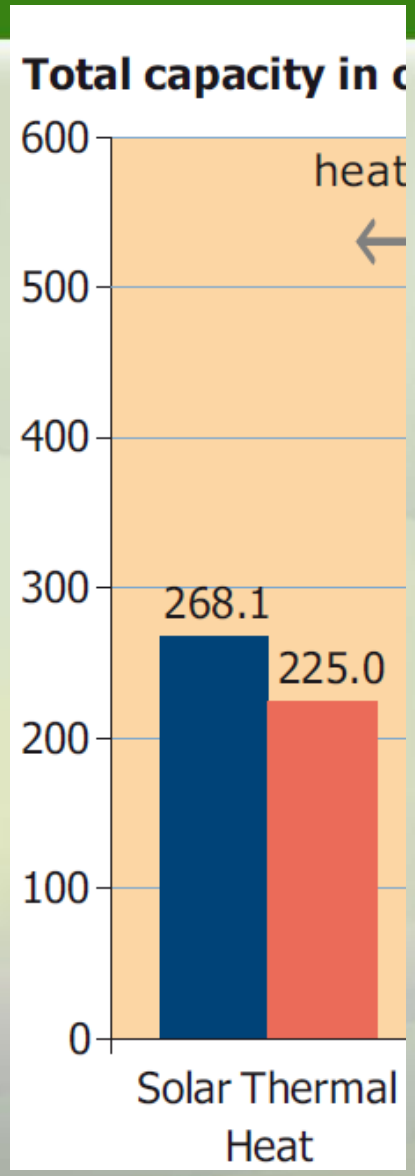


Figure 1: Countries represented in this report

Solar thermal Heat globally



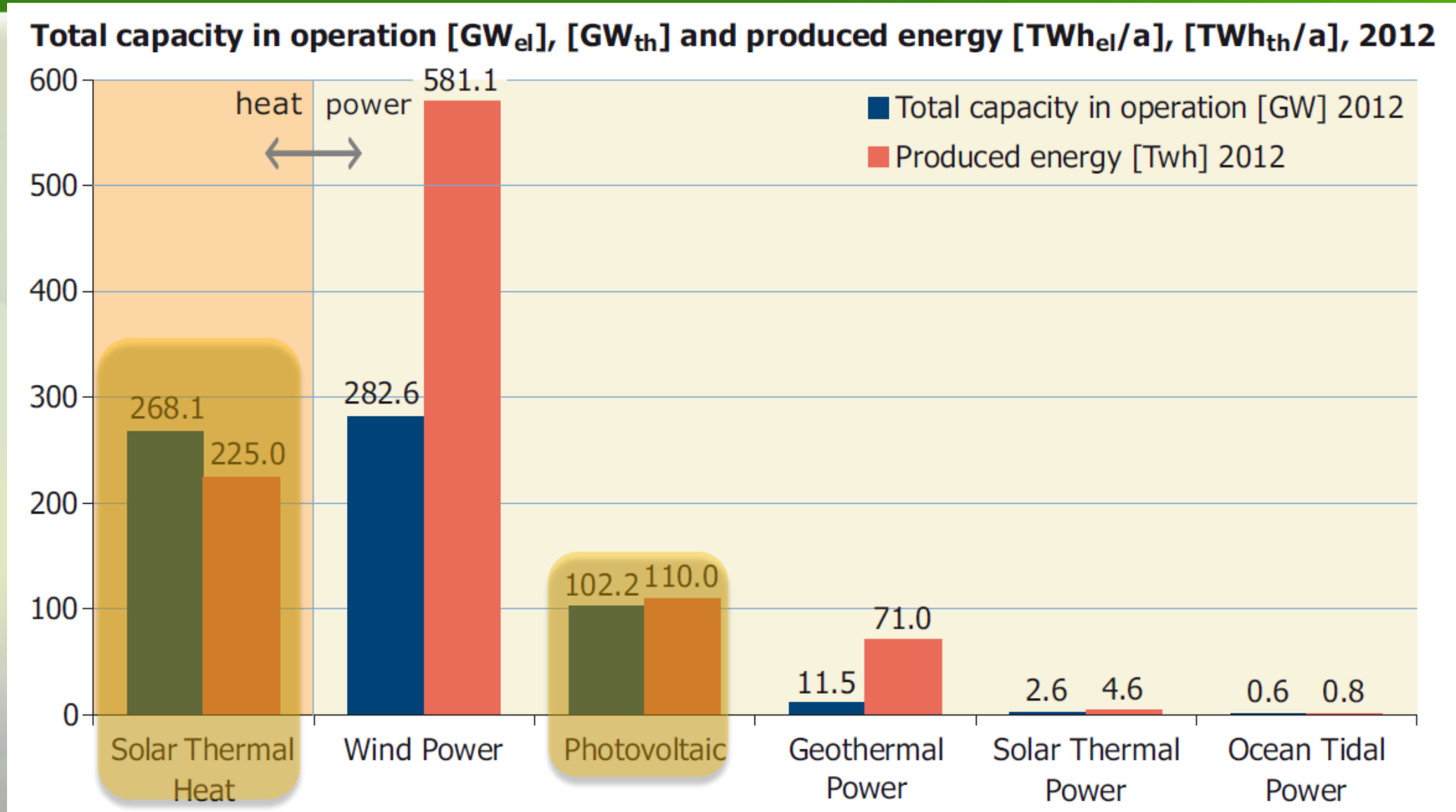
What means Solar?

"Solar" not only Solar PV

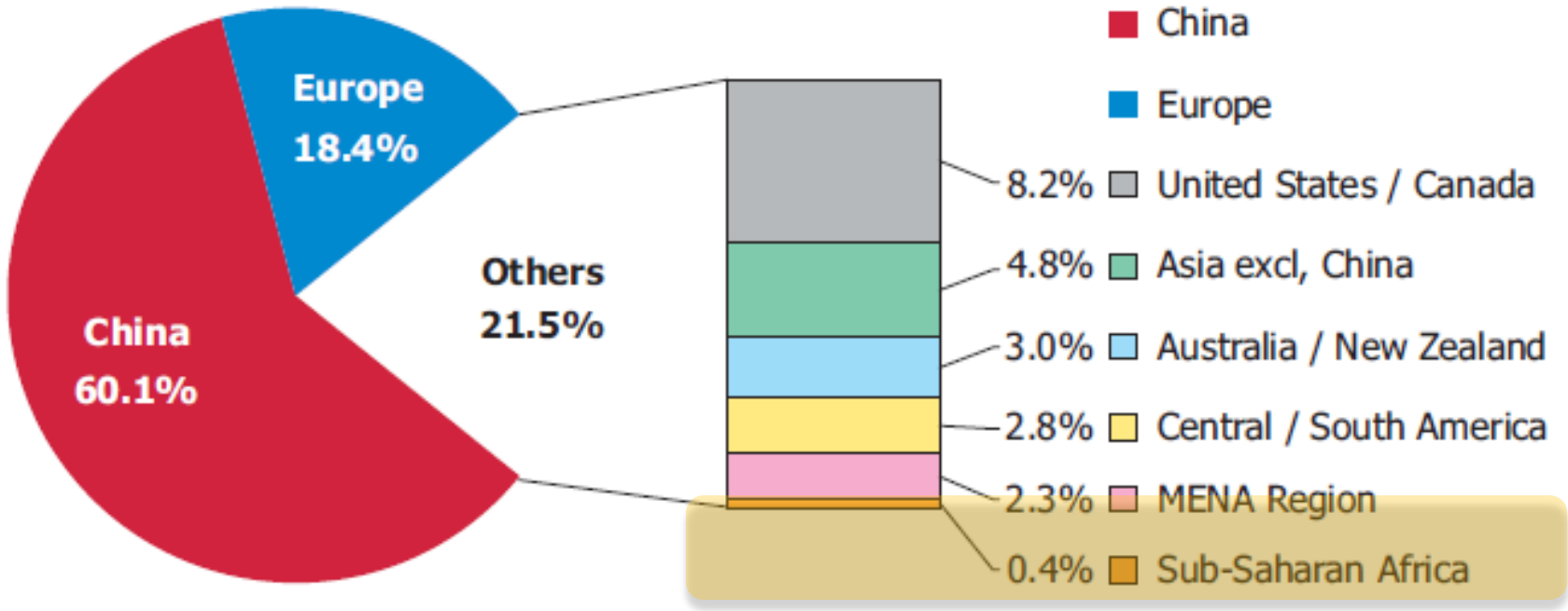
Comparison Solar PV / Solar Thermal Heat:

Which total capacity in operation is higher?

Solar thermal Heat globally



Share of total installed capacity in operation 2010



Asia excluding China:	India, Japan, Korea South, Taiwan, Thailand
Central / South America:	Barbados, Brazil, Chile, Mexico, Uruguay
Europe:	Albania, EU 27, Macedonia, Norway, Switzerland, Turkey
MENA Region:	Israel, Jordan, Lebanon, Morocco, Tunisia
Sub-Saharan Africa:	Namibia, South Africa, Zimbabwe

Figure 3: Share of the total installed capacity in operation (glazed and unglazed water and air collectors) by economic regions at the end of 2010

Justification for a Solar thermal energy program

ECOWAS RE Policy: adopted by energy ministers in 2012 and by head of states in 2013: *Important for electricity demand mitigation*

- *For domestic, commercial and industrial purposes*
- *Mature technology*
- *Promote as much as possible*

Table 11 : Target for Solar Water Heating

Least-cost option	2010	2020	2030
Solar water heater technologies for sanitary hot water and preheating of industrial process water:			
• Residential sector (new detached house price higher than €75,000		At least 1 system installed	At least 1 system installed
• District health centres, maternity clinics, school kitchens and boarding schools		25%	50%
• Agro-food industries (preheating of process water)		10%	25%
• Hotels for hot sanitary water		10%	25%

Background on Solar thermal energy

- **UK Announces Renewable Heat Tariffs in April 2014**
  - **first scheme anywhere of its kind in the world**
  - **Payments quarterly of a period of 7 years**
  - **For solar thermal panels: 23 EUR-Cents / kWh**
  -

Technology	Tariff
Air-source heat pumps	7.3p/kWh
Ground and water-source heat pumps	18.8p/kWh
Biomass-only boilers and biomass pellet stoves with integrated boilers	12.2p/kWh
Solar thermal panels (flat plate and evacuated tube for hot water only)	19.2 p/kWh

Range of use of solar thermal energy

Hot water in hospitals, households, schools, boarding schools, kitchens, laundries, orphanages, etc.

Systems on top of Roof in Egypt

Integrated Systems

Range of use of solar thermal energy

Residential Building in Austria 1999
410 m² Collector, 100 m³ storage,
hot water and heating

creee.org

Facade collector in Czech

Range of use of solar thermal energy

Solar process heat in beverage industries

Gatorade Pepsico: largest solar process heat system in US with Austrian engineering by SOLID:

2800 kW - 3800 m2 Collector

Solar Hot Water for process heat in soft drink industry

Range of use of solar thermal energy

- Solar process heat in industries, e.g. food industries in Austria

Solar process heat for Meat production in Austria by SOLID: Heat capacity: 590 kW
Reduction of Oil 63.000 Liters per year

Solar cooling for wine fermentation process In Austria by SOLID: Cooling capacity: 10 kW

Range of use of solar thermal energy

Solar thermal cooling of buildings (by SOLID)

Jamaica: 600 kW cooling

Lissabon: cooling, heating, warm water

Range of use of solar thermal energy

Solar thermal drying of fruits, wood, coffee, cereals, herbs, fish …

Advantages of solar heat in African countries

- More national and local budget sovereignty
  - Less use of fossil energy, electricity or biomass
  - Solar thermal energy used local and directly
- Low hanging fruit: Amortisation in a few years
- More electricity available, more grid stability
- Job creation and value creation in country – more than in PV
  - Production of most components in country possible
  - Use and enhancement of existing professions as installers, planners, welders, technicians, etc.
  - Cooperation and strengthening existing formation institutions
- Solar thermal strengthens scope of actions for communities

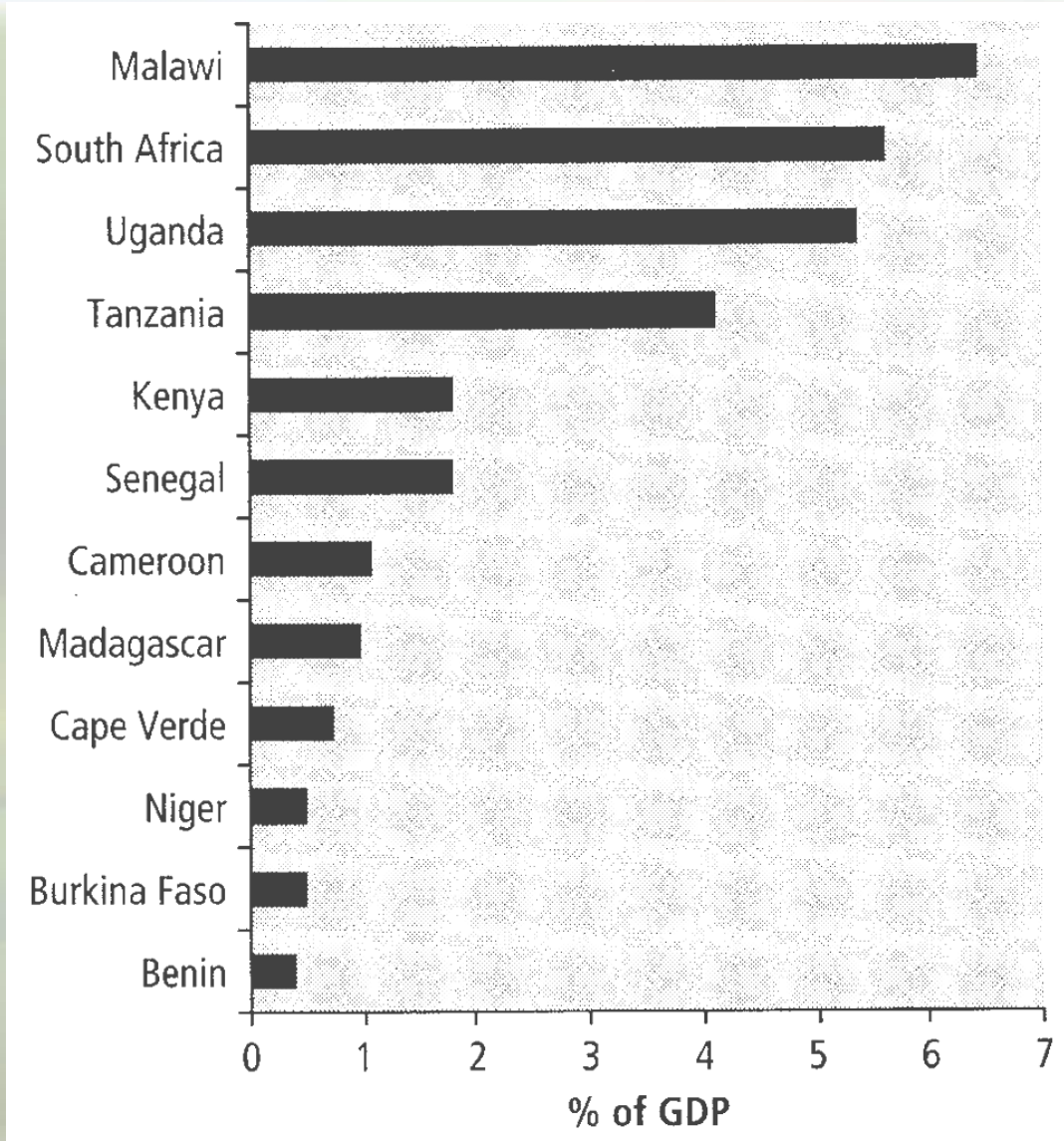
Economic costs of power black outs in Africa

Created by

- High costs of running back up generators
- Missing production during black out

Often 2-4 % of GDP

Source: Eberhard 2008, using WB data 2007



Members of IEA Solar Heating and Cooling Program

CONTRACTING PARTIES

Australia Austria Belgium Canada China Denmark
European Commission Finland
France Germany Italy Mexico
Netherlands Norway Portugal
Singapore South Africa
Spain Sweden Switzerland United States

SPONSORS

ECREEE (ECOWAS Centre for Renewable Energy and Energy Efficiency)

IEA Solar Heating and Cooling Program – Running Tasks

- **Task 53 - New Generation Solar Cooling and Heating (PV or Solar Thermally Driven Systems)**
- Task 52 - Solar Energy and Energy Economics in Urban Environments
- **Task 51 - Solar Energy in Urban Planning**
- Task 50 - Advanced Lighting Solutions for Retrofitting Buildings
- **Task 49 - Solar Heat Integration in Industrial Processes**
- Task 48 - Quality Assurance and Support Measures for Solar Cooling Systems
- Task 47 - Solar Renovation of Non-Residential Buildings
- Task 46 - Solar Resource Assessment and Forecasting
- Task 45 - Large Scale Solar Heating and Cooling Systems
- Task 44 - Solar and Heat Pump Systems
- **Task 43 - Solar Rating & Certification Procedures**
- Task 42 - Compact Thermal Energy Storage
- Task 40 - Net Zero Energy Solar Buildings
- Task 39 - Polymeric Materials for Solar Thermal Applications

Preparation of a new ECOWAS program

- Learning from experiences:
  - program SOLtrain South Africa, Namibia, Mosambique, Simbabwe, Lesotho
  - IEA-program Solar heating and cooling (SHC)
  - other countries Cyprus, Israel, Austria etc.
  - ECOWAS countries
- Activities in all ECOWAS countries
- Criteria for Advanced Activities in selected countries
  - Need of existing advanced solar thermal institutions
  - Cofunding to national activities
  - National commitment and ownership by country & ministries

Proposed Activities of an ECOWAS solar thermal energy program

- In Cooperation with existing solar thermal partner institutions
  - Analysing and improving existing systems
  - Projects demonstrating different solar thermal technologies
  - Continous Training and train the trainer activities for technicians, installers, banks, political stakeholders, etc
  - Strengthening the capacities
- Development of Policy incentives
- Awareness raising
- Quality through standards for solar water heaters and certification for installers and planners

Solar thermal institutions in West Africa

COUNTRY / CITY	NAME	INSTITUTION
Cape Verde / Mindelo	Antunio Barbosa	**UNICV Mindelo Engineering Department**
Cape Verde / Praia	Vargas Melo	**Energy training center (Instituto de Empregoe Formação Profissional)**
Nigeria / Sokoto	Dr M. Garba	**Solar Energy Research Centre Usman Dan Fodio University**
Nigeria / Nsukka	Okala Nwoke	**Nsukka / Enugu (ECN Centre)**
Sierra Leone / Freetown	Mohammed A R Kamara	**Renewable Energy Center, Government Technical Insititute**
Ghana / Accra	Divine Atsu	**Koforidua Polytechnic**
Mali / Bamako	Sékou Oumar TRAORE	**CNESOLER**
Senegal / Dakar	Prof Dorothe Azilinon, Ababacar THIAM	**Université Cheikh Anta DIOP**
Burkina Faso / Ouagadougou	Dr.-Ing. N'TSOUKPOE Kokouvi Edem	**Laboratory for Solar Energy and Energy Savings (LESEE) 2IE**
Niger / Niamey	Saleye Yahaya	**Centre National d'Energie Solaire (CNES)**

Time frame to launch the new ECOWAS program

- Stocktaking solar thermal activities and systems by 15 local consultants
- Identification of solar thermal institutions in West Africa
- 13 June 2014: program defining Workshop with stakeholders
- 14 June 2014: working group with solar thermal institutions
- Recommendations to hbauer@ecreee.org possible
- Elaboration of draft program document by ECREEE and AEE INTEC
- Sept. 2014: comments of stakeholders and partner institutions
- Oct. 2014: adoption by ECREEE Board
- Looking for donors: Austria (ADA) and Spain (AECID) on board
- 2015: Kick off Workshop with partner institutions

Agenda for today / 13 of June 2014

4 sessions, 4 goals:

- Awareness raising and Training
- Lessons learned from SOLtrain program in SADC countries
- Existing Solar thermal institutions in West African countries
  - Situation, Activities, Barriers, Needs, Expectations
- Your recommendations for a ECOWAS Solar Thermal energy program required today or in email to hbauer@ecreee.org

Hannes Bauer
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Thank you
Merci
Obrigado

Time for Change