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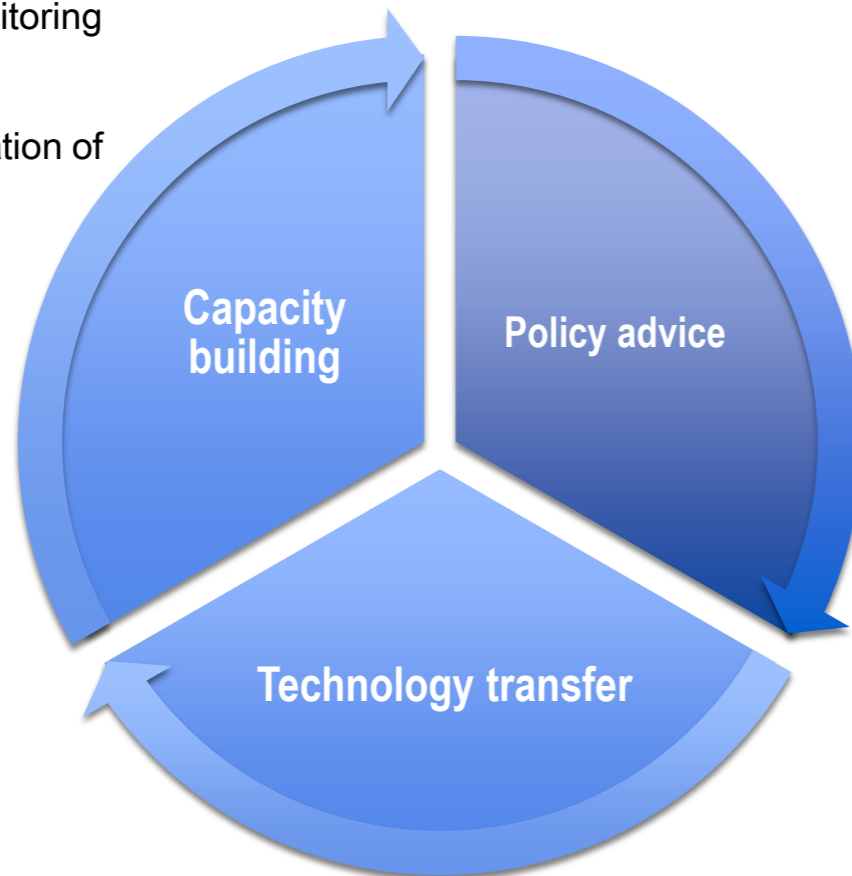
## **Successful strategies used to implement natural refrigerants in Southeast Asian markets**

Philipp Munzinger, GIZ Proklima

## GIZ Proklima

Promoting energy efficient cooling using natural refrigerants

- GHG emissions monitoring in the RAC sector
- Training and certification of technicians on safe handling of natRef



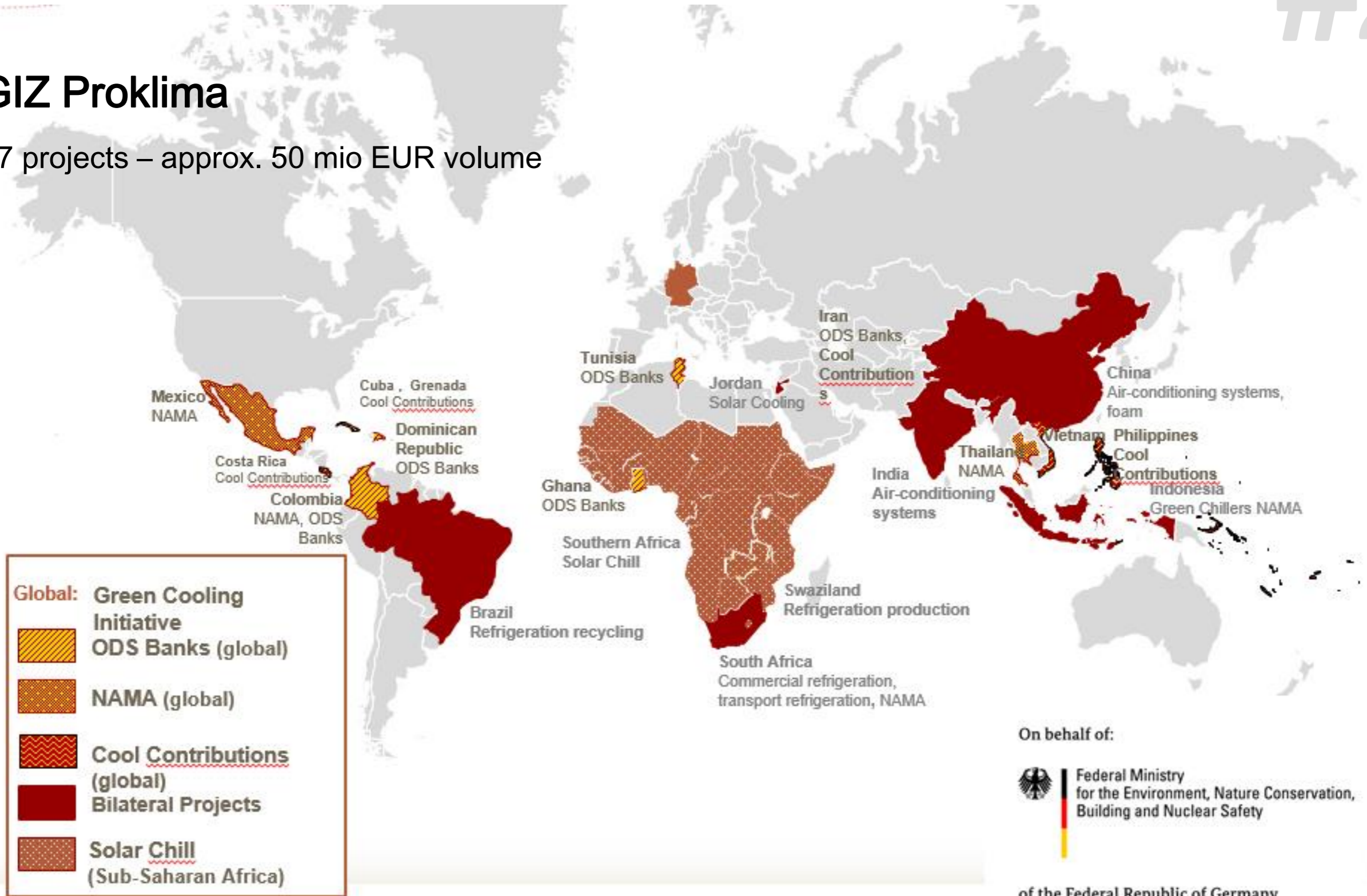
- GHG inventories
- Technology needs assessments
- Adoption of performance (MEPS) and safety standards



- Conversion of local production lines
- Technology demonstration

## GIZ Proklima

17 projects – approx. 50 mio EUR volume



## Barriers and solutions to hydrocarbons market uptake in Asia

Barriers	Solutions
Lack of certified and skilled technicians to produce, install and maintain hydrocarbon refrigeration and air conditioning systems	Development of a certification scheme Roll-out of training programs for RAC technicians on the safe handling of hydrocarbons in cooperation with vocational training schools
Current national standards stick to charge size thresholds that are too small for flammable refrigerants (underlying assumptions lack basis in evidence based research)	Adopt national standards within national standard committees by increasing charge size, referring to evidence research-based model addendums
Hydrocarbon RAC component often not available, oligopoly on HC split AC compressors	Promote local manufacturing and assembly
Hydrocarbon RAC equipment still more expensive than conventional HFC-based systems due to negligible market scales.	Grant or soft loan programs to ease market uptake
Little awareness about actual risk and risk mitigation measures related to use of hydrocarbons in RAC systems	Target-oriented awareness-raising campaigns that inform about safe use of HC RAC equipment, making use of evidence-based results

## Example: Green Chillers Project Indonesia

Promoting hydrocarbon chillers in Indonesia

- R290 refrigerant locally produced by state-owned oil and natural gas corporation PERTAMINA
- Aspart of the project, Local manufacturer AICOOL commissioned three HC chillers and demonstrates R290 split ACs, performance monitoring currently on-going
- National safety standards adoption in progress
- Certificaton programm conceptualized, training for RAC technicians on safe use of hydr carbons has been carried out



## Green Chillers Project Indonesia

Promoting hydrocarbon chillers in Indonesia

### University of Indonesia Jakarta, Indonesia

AC chiller for auditorium

Cooling capacity: 56,51 TR / 200 kW  
Refrigerant: R290  
Refrigerant charge: 2 x 14 kg  
COP: 4.0



### Politechnical School Bandung, Indonesia

Cold room for training of cooling technicians

Cooling Capacity: 0.475 TR / 1.66 kW  
Refrigerant type: R290  
Refrigerant Charge: 300 g  
COP: 4.25



### Politechnical School Bali, Indonesia

AC chiller for training of cooling technicians

Cooling Capacity: 12.39 TR/ 43.63 kW  
Refrigerant: R290  
Refrigerant charge: 6.5 kg  
COP: 4



## Green Cooling at Jetwing Hotels, Sri Lanka

- RAC make between 50 – 70 % of hotel's energy consumption and related emissions in tropical regions.
- High electricity tariffs in Sri Lanka, huge share of operating costs
- Jetwing Hotels group pursues rigid sustainability concept, including green cooling solutions
- Installation of three 300kW absorption chiller for AC of hotel rooms, fed by steam that is generated by burned cinnamon wood in boilers
- Currently the hotel chain plans to convert to other green cooling solutions such as HC-290 split ACs in selected premises
- Green RAC technology roadmap available at: <https://www.giz.de/expertise/downloads/giz2017-en-gci-green-cooling-hotel-roadmap.pdf>





## Example: RAC NAMA Thailand project

Promoting a transition to natural refrigerants in the Thai RAC sector

**Objective:** Supporting climate-friendly and energy-efficient cooling technologies in contribution to Thailand's energy saving and climate targets = addressing future technology trends today

Supply side	Demand side
Advice on safety standards and international best practices	Direct demand to more energy-efficient products by demonstrating best practices of energy performance standards, labels and other incentives
Product design and financial support for production line set-up for RAC manufacturers	Help increase demand of existing low GWP refrigerant RAC technologies (such as domestic refrigerators, bottle coolers etc.)
Training for manufacturing technicians	Training for technicians in relevant end-user sectors

## Contact details:

Philipp Munzinger  
Project Manager  
GIZ Proklima

[Philipp.Munzinger@giz.de](mailto:Philipp.Munzinger@giz.de)

Dr. Philipp Pischke  
Project Manager  
RAC NAMA Thailand Project  
[Philipp.Pischke@giz.de](mailto:Philipp.Pischke@giz.de)

## Find more information about projects and publications at:

GIZ Proklima:

<https://www.giz.de/expertise/html/3372.html>

Green Cooling Initiative:

[www.green-cooling-initiative.org](http://www.green-cooling-initiative.org)

Green Chillers Indonesia:

[www.greenchillers-indonesia.org](http://www.greenchillers-indonesia.org)

RAC NAMA Thailand:

<http://www.nama-facility.org/projects/refrigeration-and-air-conditioning-nama-rac-nama/>



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Thank you very much!

