TITLE

Facilitating the Kyoto Protocol Objectives by Clean Development Mechanism in Small Island Developing States – CDMSIDS Project

The potential for Clean Development Mechanism in electricity production

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OBJECTIVES

- To show the potential for CDM in electricity generation sector in Cape Verde
- To show the potential for clean technologies transfer to Cape Verde due to CDM

CONTENT

- Introduction
- Population scenarium description
- Economic scenaria – 3 scenaria
- Electricity demand scenarium
- Electrification scenaria
- Electricity supply scenaria – 3 scenaria
- Clean Development Mechanism scenaria – 3 scenaria
- Conclusions

INTRODUCTION

INTRODUCTION

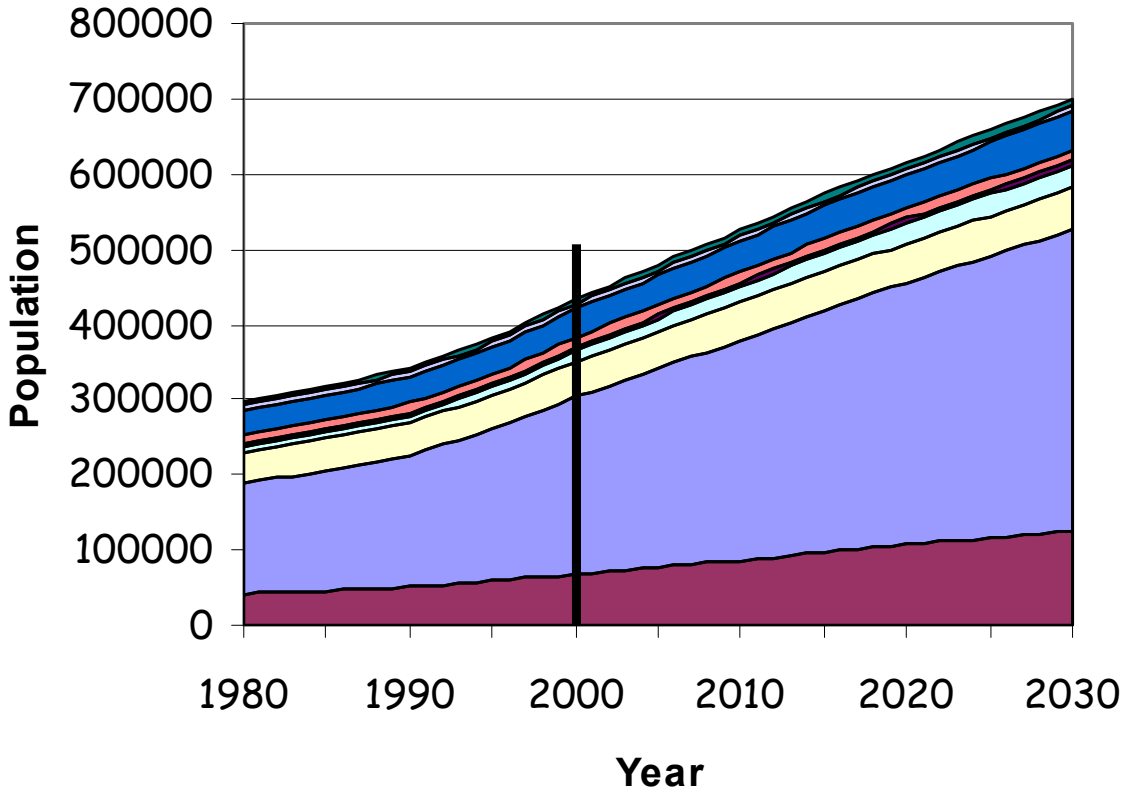
- Each islands naturally a separate power system
- The need to model each island separately
- The problems with connecting islands by power cables – not envisaged by this study
- Electrification
- Connection of independent grids on each island

INTRODUCTION

For each island 27 scenaria:

- Demographic scenarium 2000-2030
- 3 Economic scenaria 2000-2030
  - Business as usual
  - Cape Verde as tourist paradise
  - Cape Verde still as frontier
- Electricity demand scenaria 2000-2030 (one for each economic scenarium)
- 3 Electricity supply scenaria 2000-2030 for each demand scenarium
- 3 CDM scenaria 2000-2030 for each supply scenarium

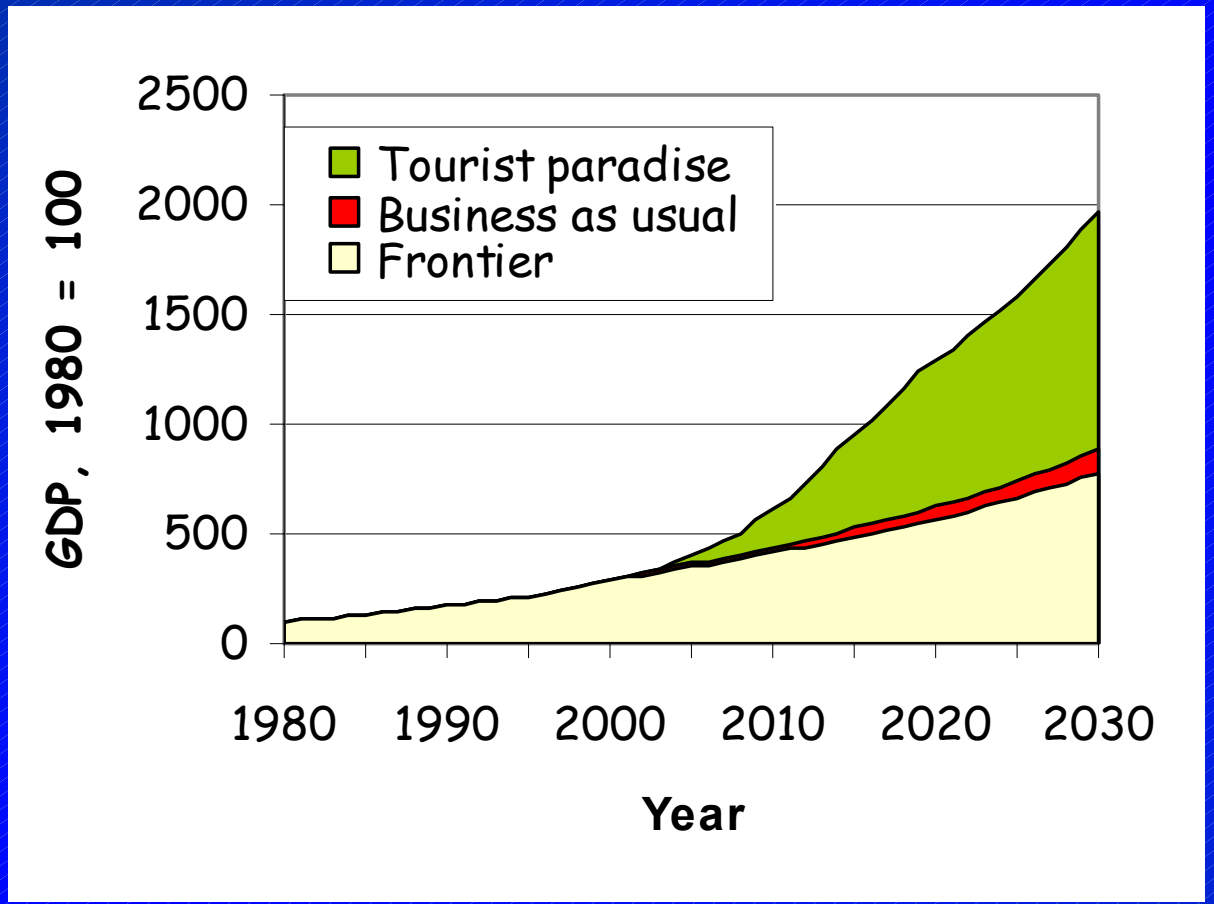
POPULATION



Growth centers:

- **Santiago**
- **Sal**
- **Boavista**
- **São Vicente**

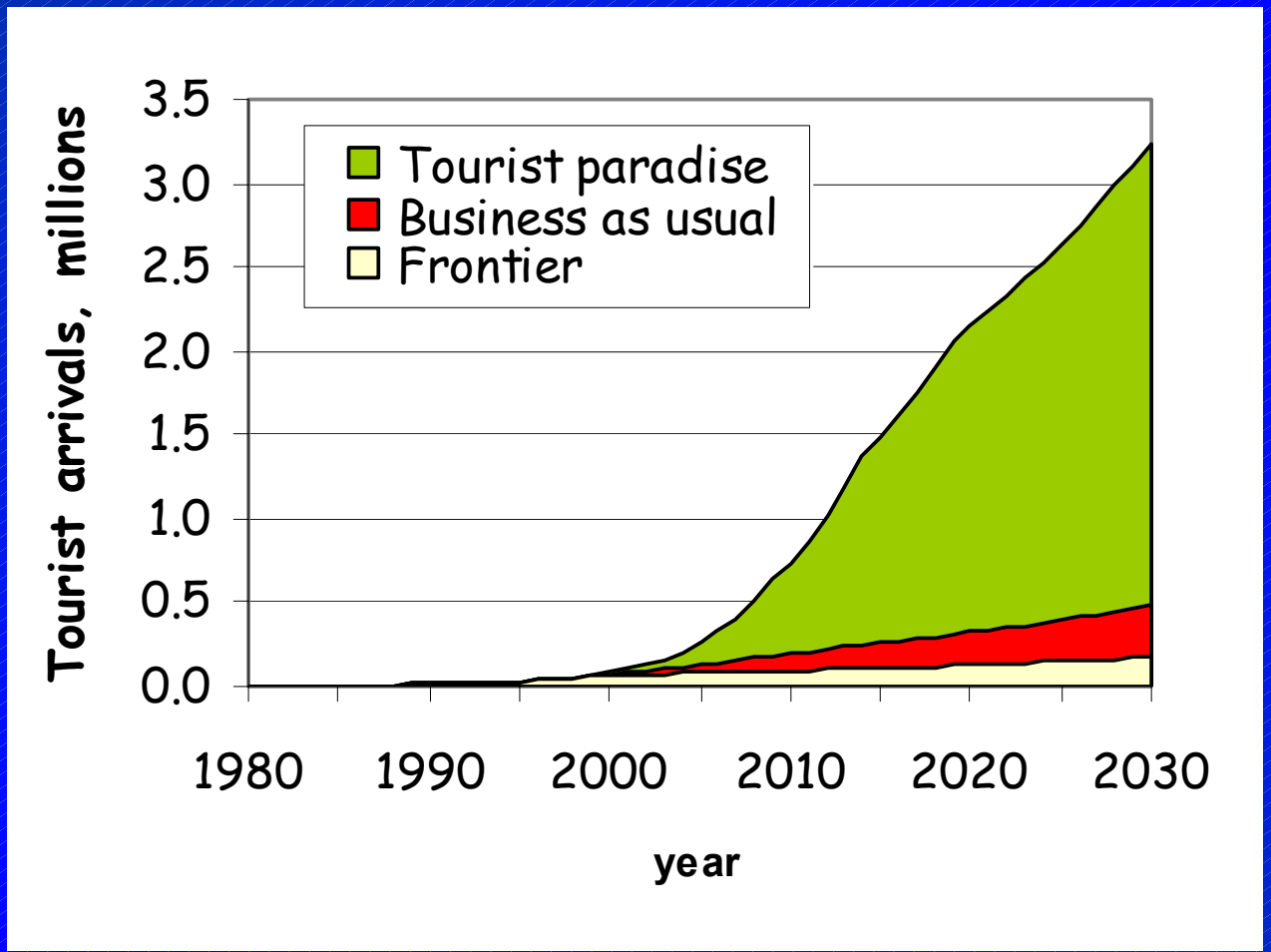
ECONOMY



Three scenarios:

- Business as usual
- Tourist paradise scenario
- Frontier scenario (no Praia airport, slow electrification, little infrastructure)

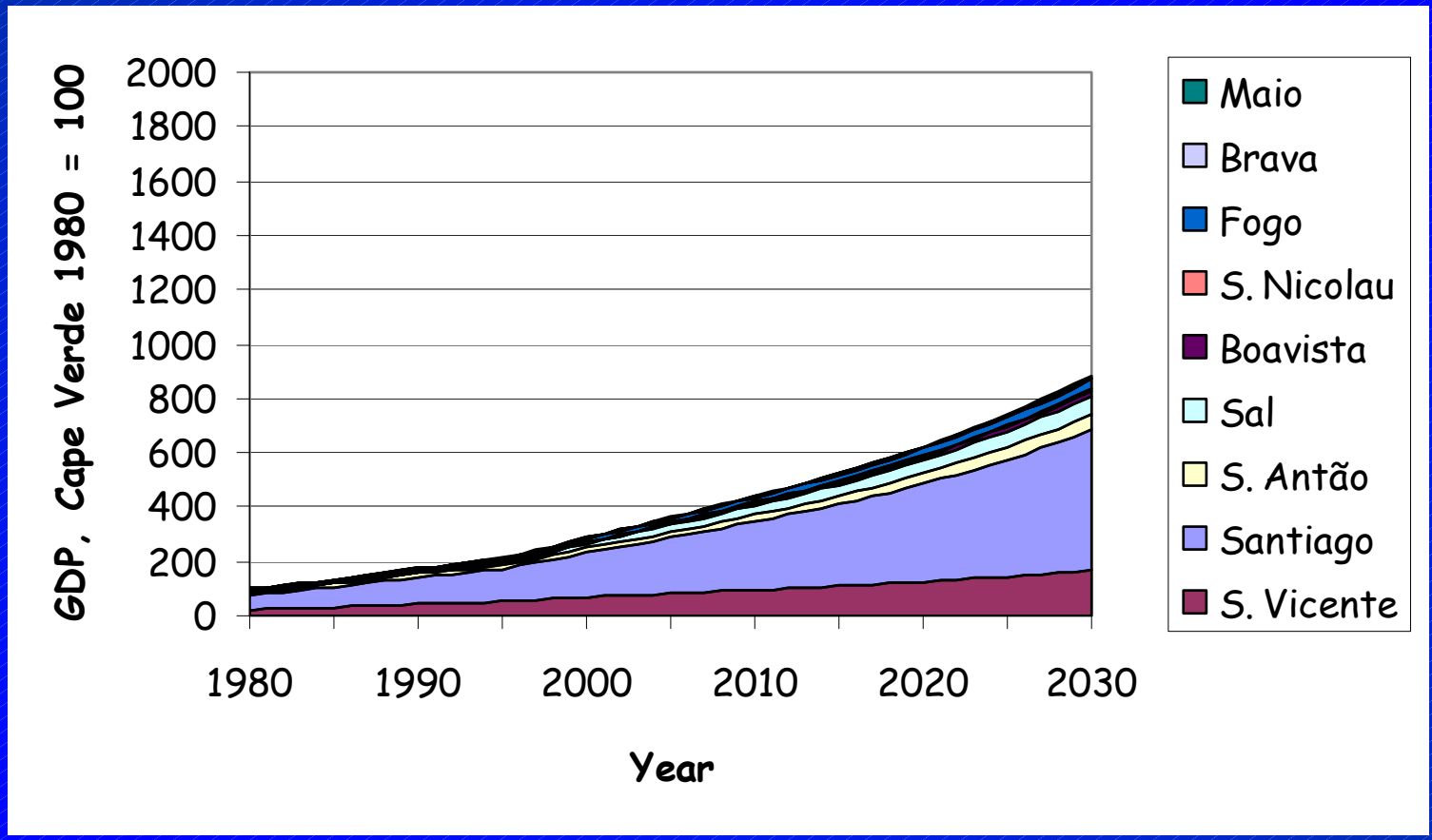
TOURISM



Tourist paradise

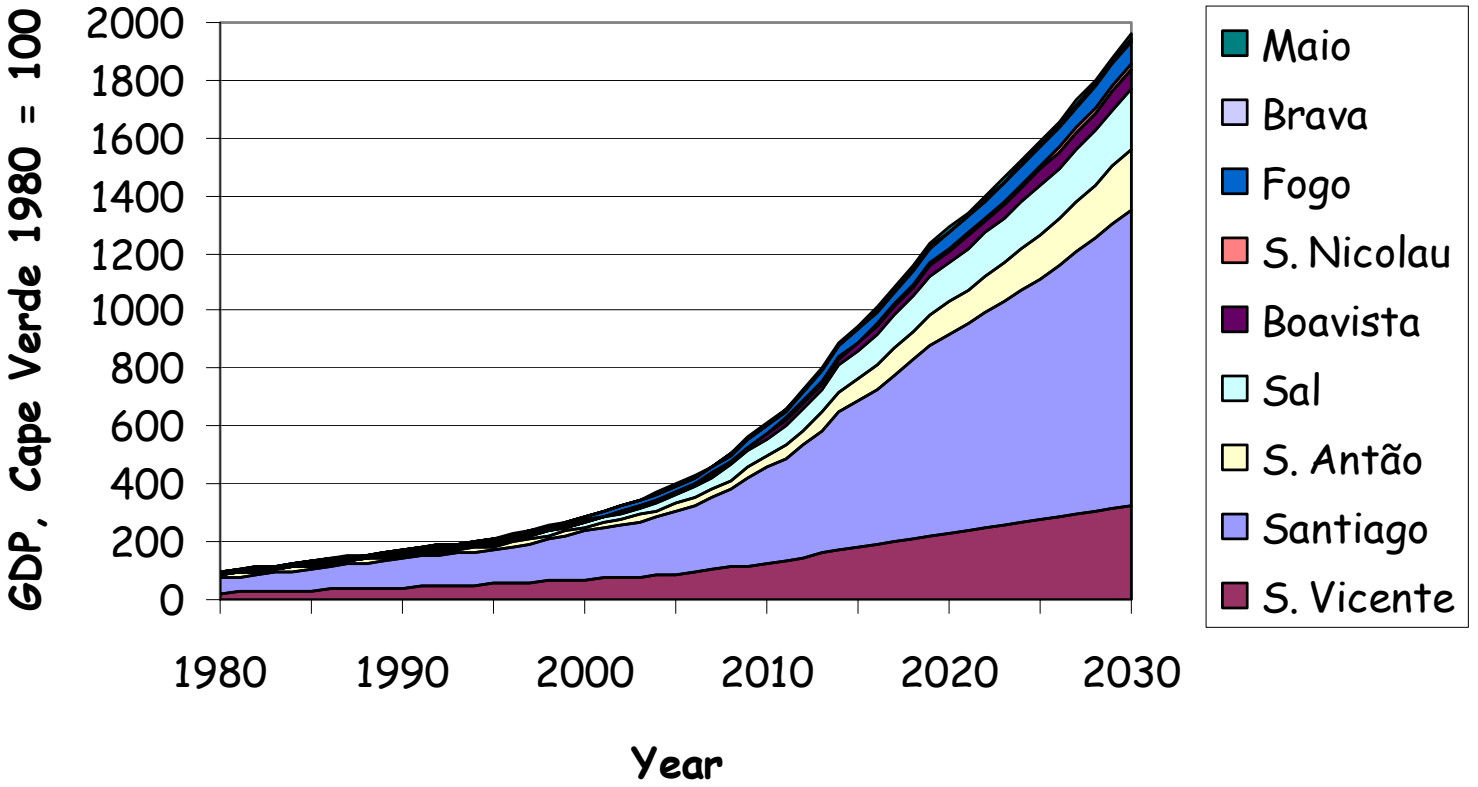
- Sal & Boavista intensive tourism
- Santo Antão, Santiago, São Vincente, Maio, importance of tourism
- Spill over effect in other sectors

ECONOMY - BAU



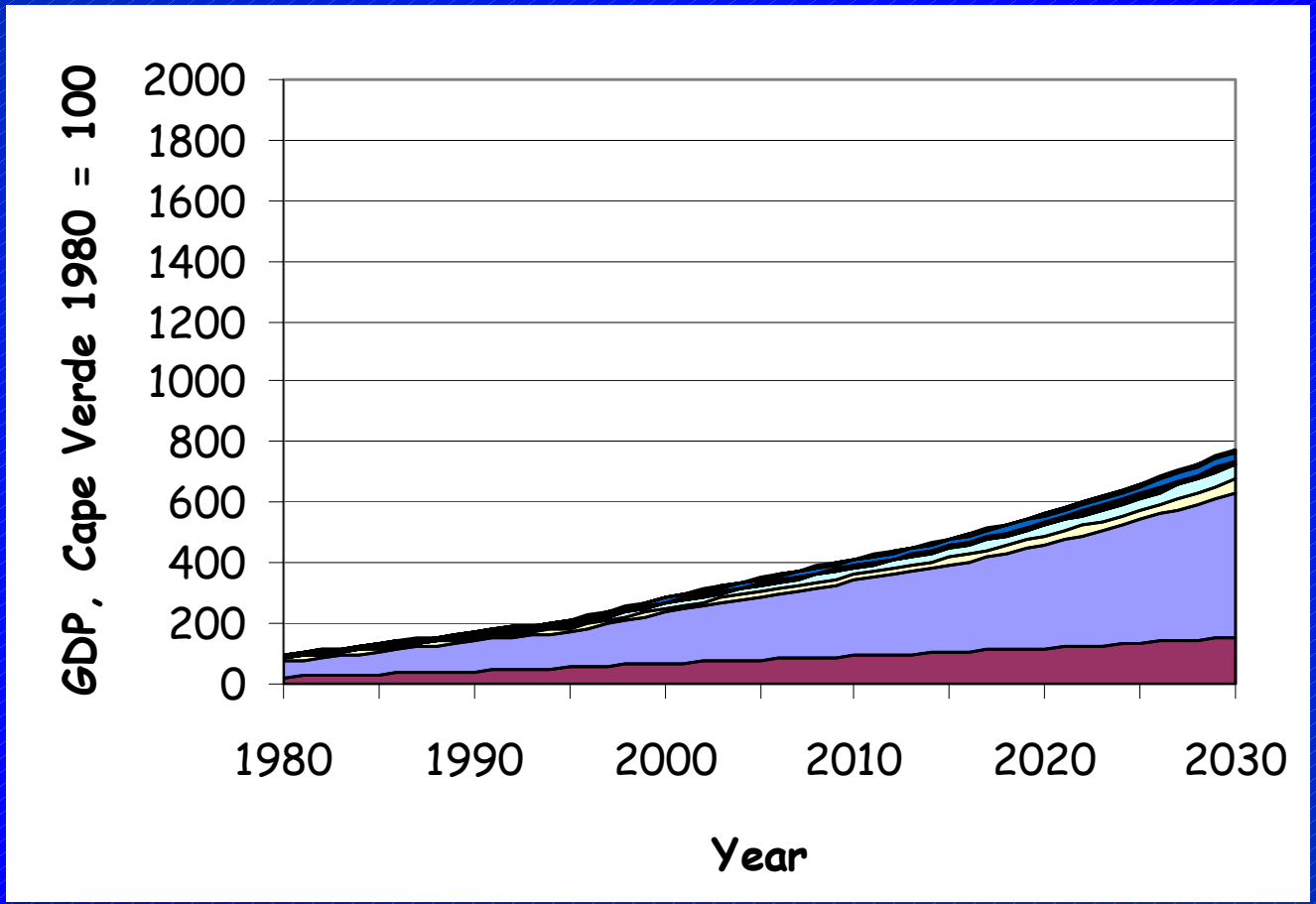
Business as usual scenarium, regional distribution of GDP

ECONOMY - PARADISE



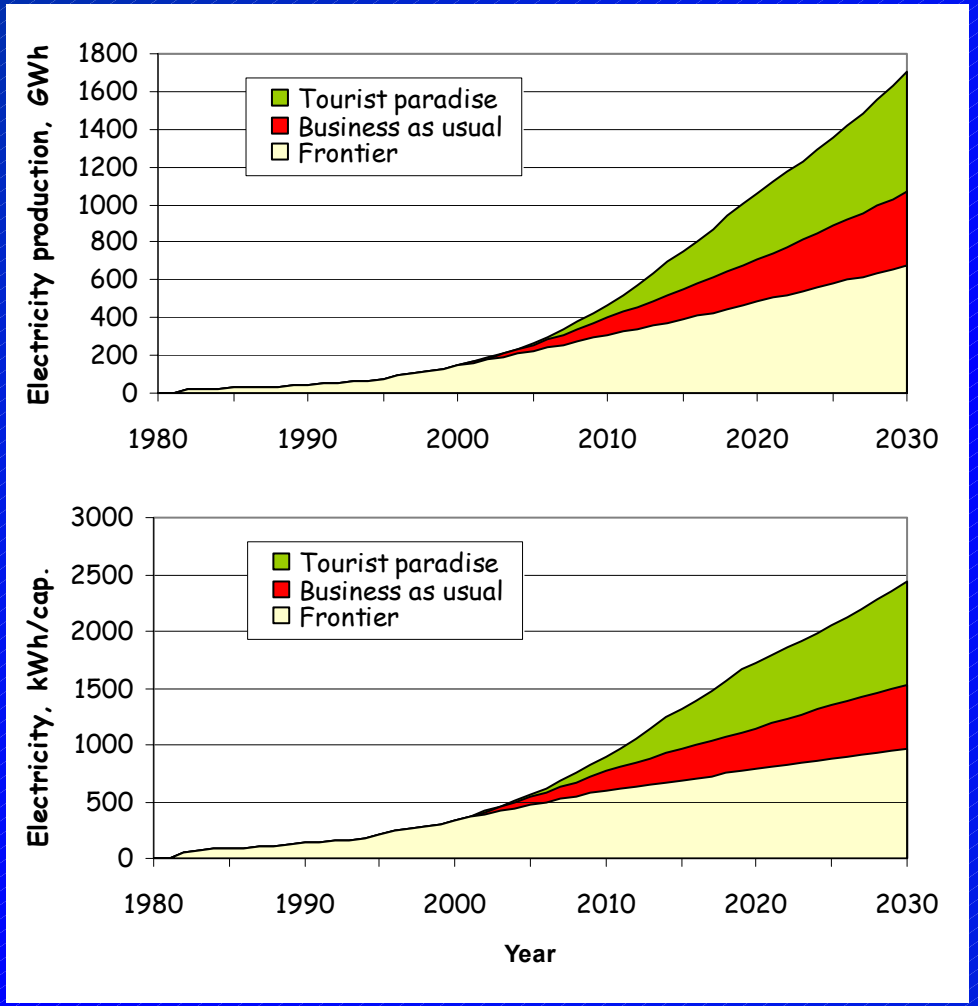
Tourist paradise scenarium, regional distribution of GDP

ECONOMY - FRONTIER



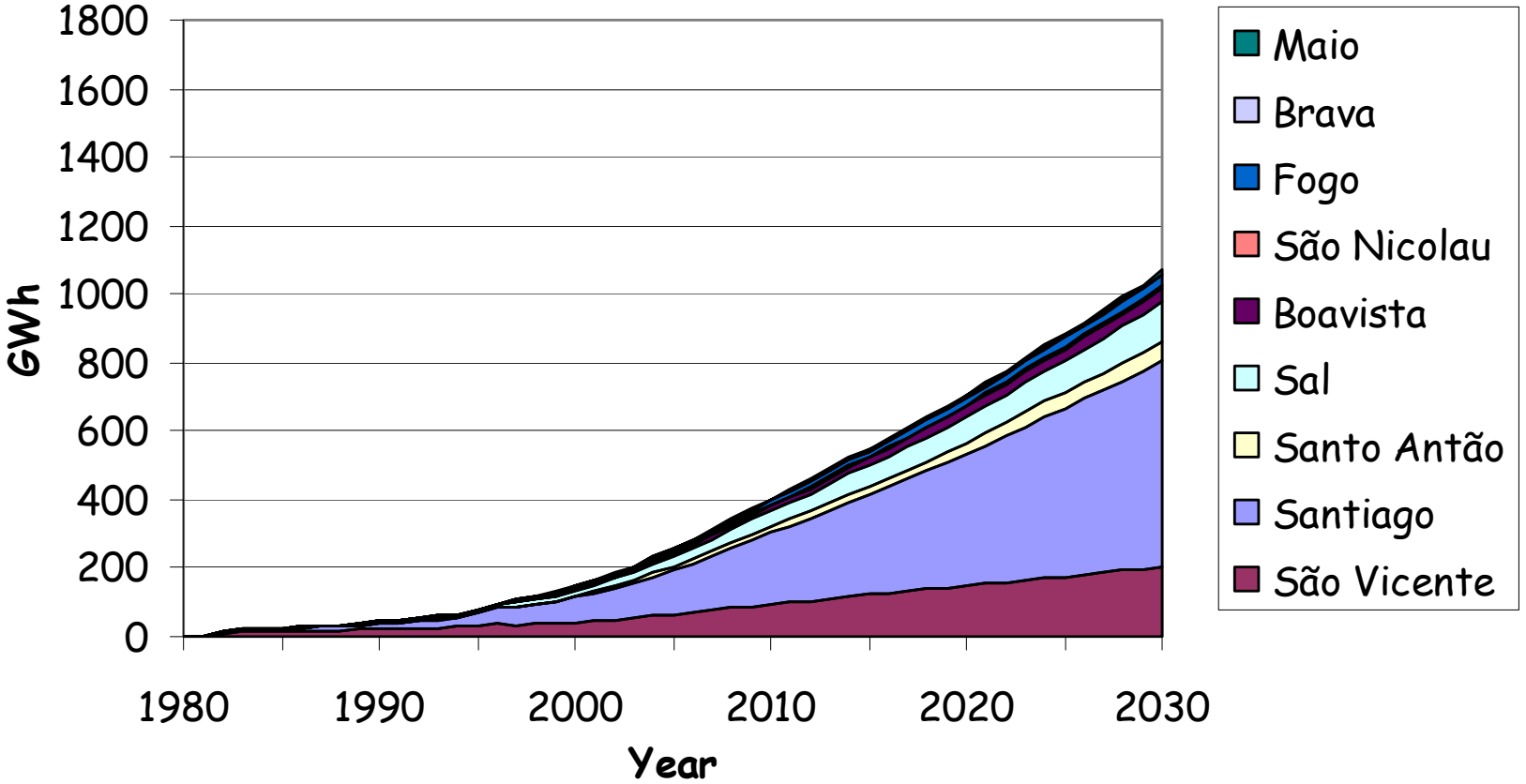
Frontier scenarium, regional distribution of GDP

ELECTRICITY DEMAND



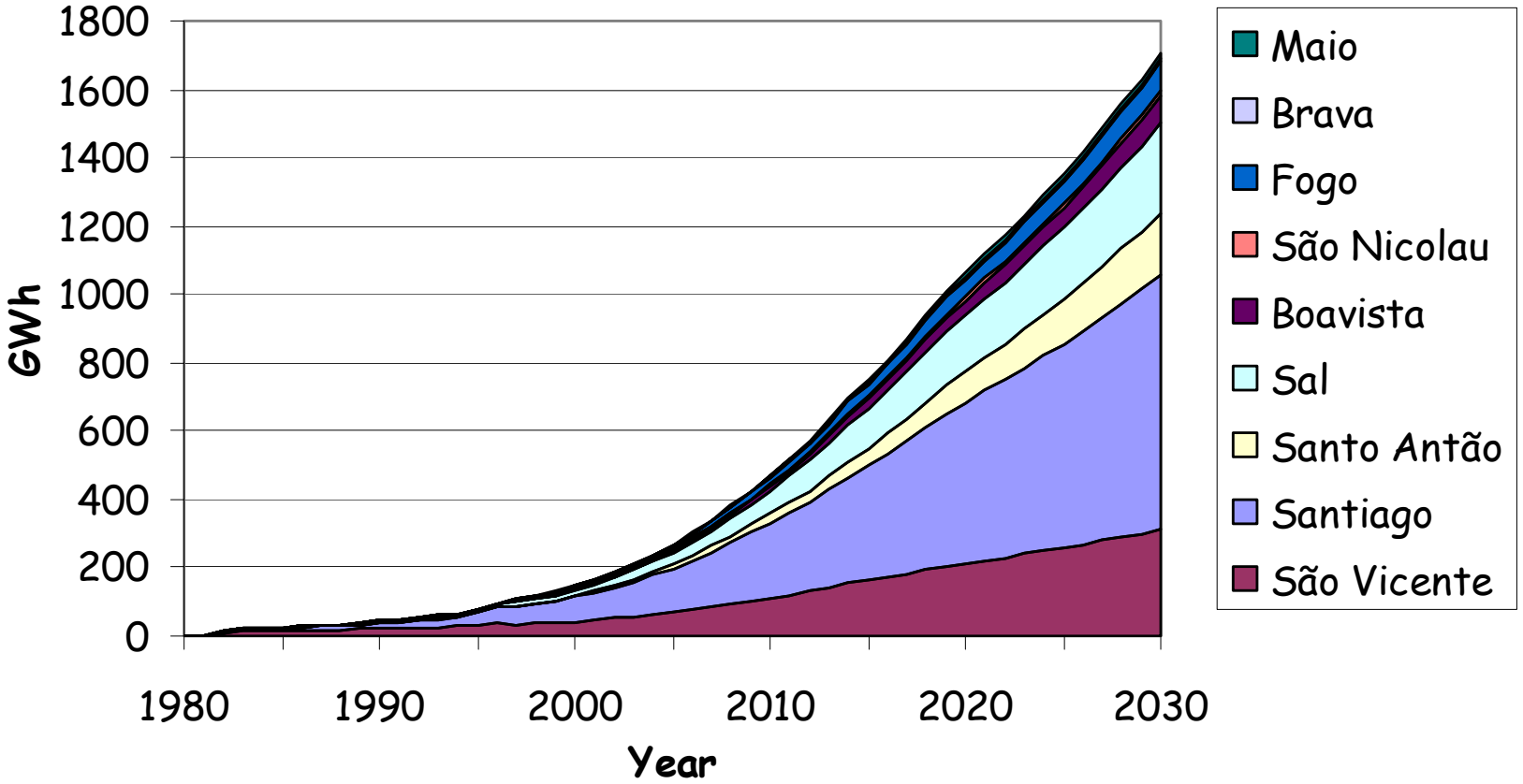
- Tourist sector
- Electrification rate
- Security of supply

ELECTRICITY DEMAND - BAU



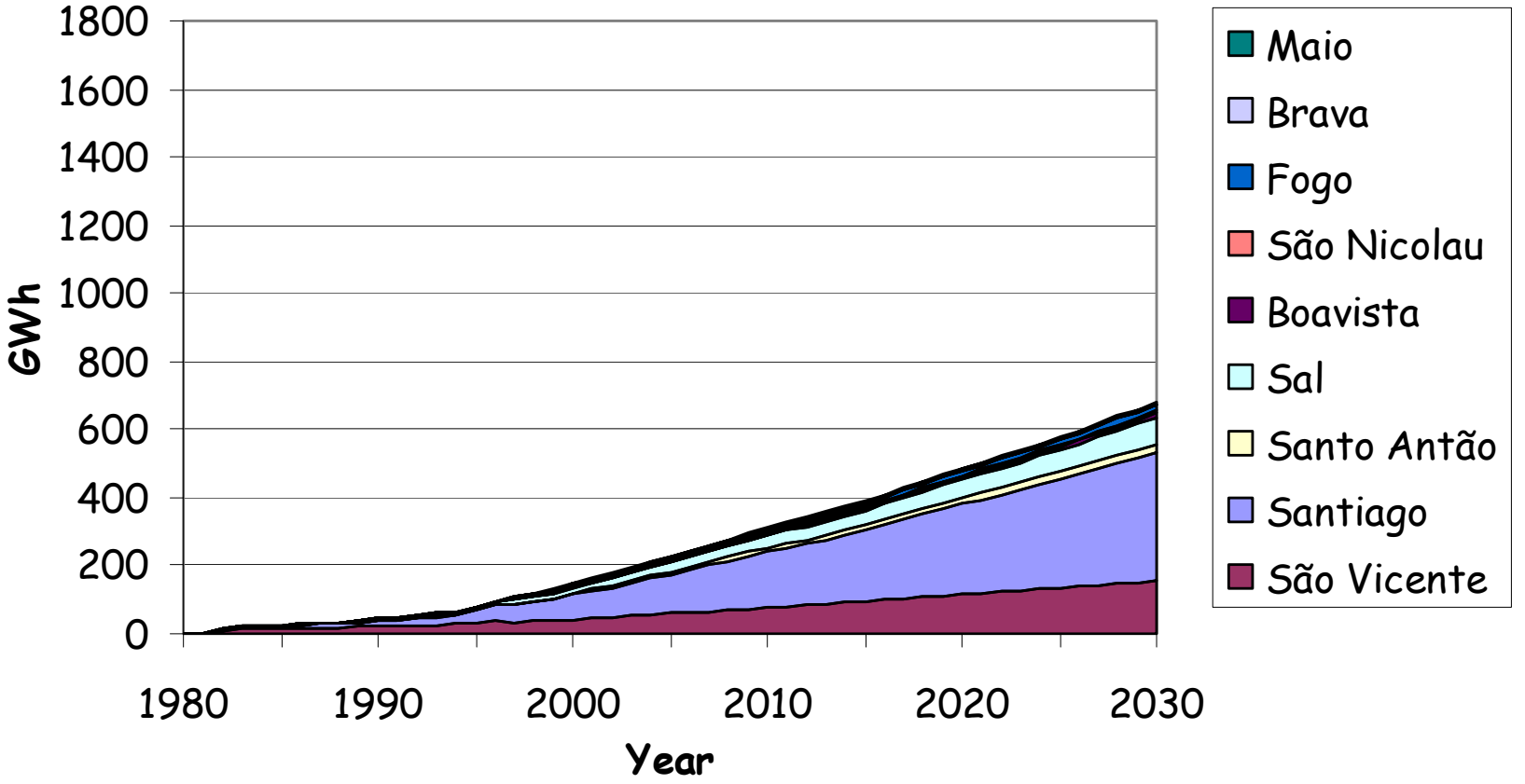
Business as usual scenarium, regional distribution of electricity demand

ELECTRICITY DEMAND - PARADISE



Tourist paradise scenarium, regional distribution of electricity demand

ELECTRICITY DEMAND - FRONTIER



Frontier scenarium, regional distribution of electricity demand

ELECTRICITY SUPPLY

For each island and for each economic/electricity demand scenaria

Electricity supply scenaria:

1. **Baseline** – Diesel + wind installed and to be installed in 2002
2. **30% wind** electricity for all islands
3. **Combined cycle + 30% wind** – scenario 2 + 10 MW CC base power units for systems where peak is > 35 MW

ELECTRIFICATION 2000-2030

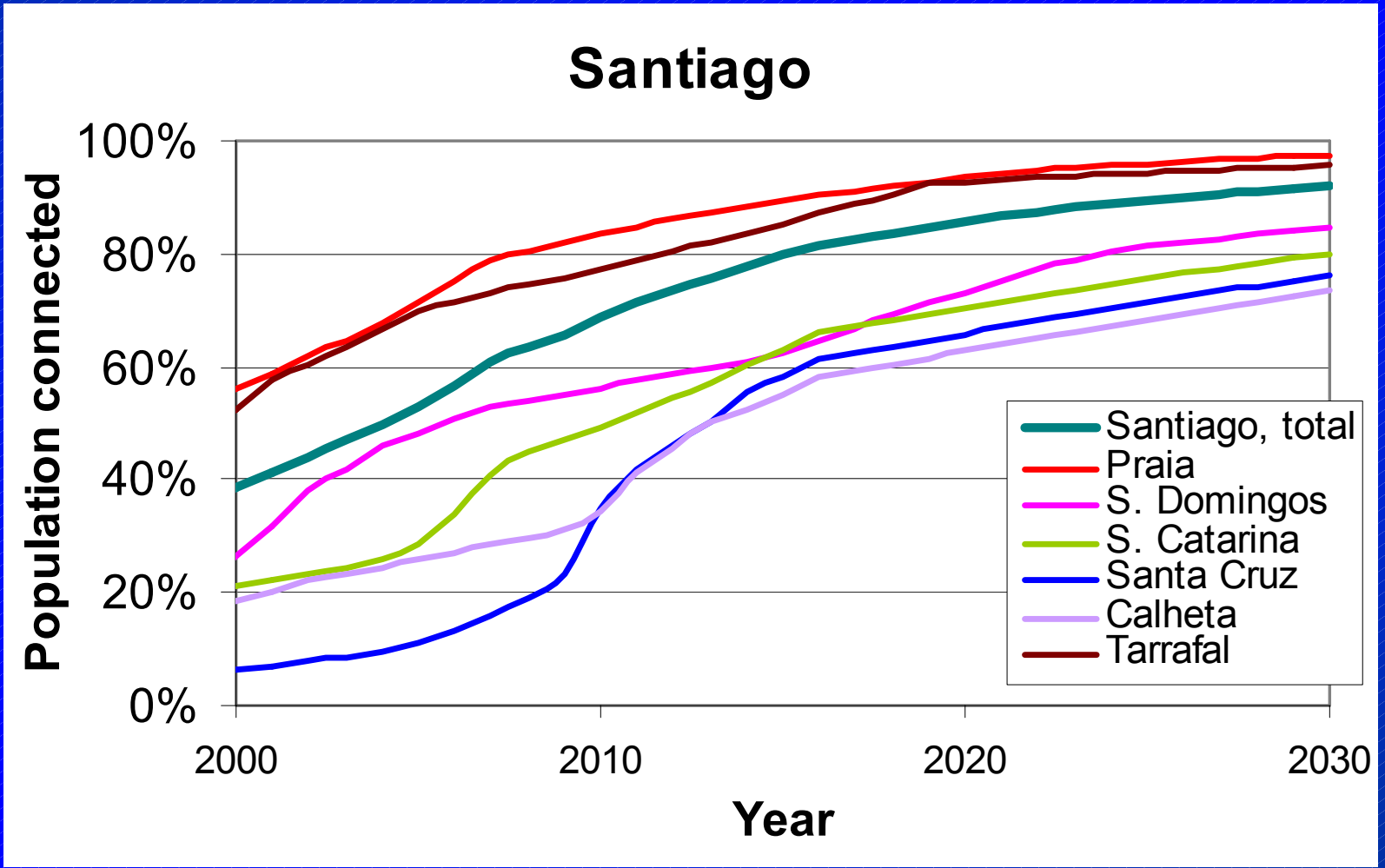
2001-2005

- Santiago – Santa Catarina and Santa Cruz linked to main network (Praia)
- Santo Antão – Porto Novo linked to main network (Ribeira Grande)
- São Nicolau – Tarrafal linked to main network (R. Brava)

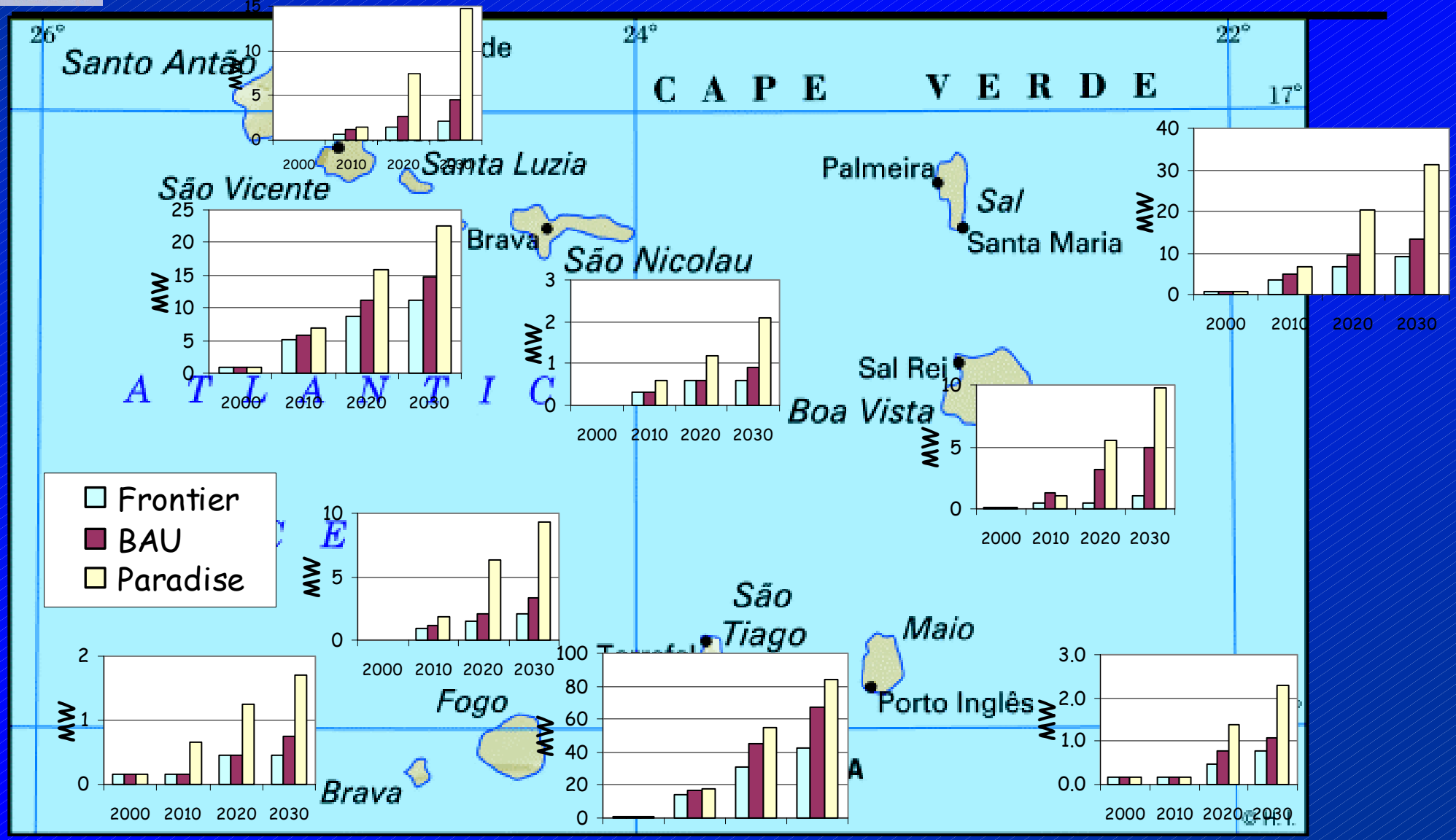
2006-2010

- Santiago – Calheta and Tarrafal linked to main network (Praia)
- Fogo – São Felipe linked to main network (Mosteiros)

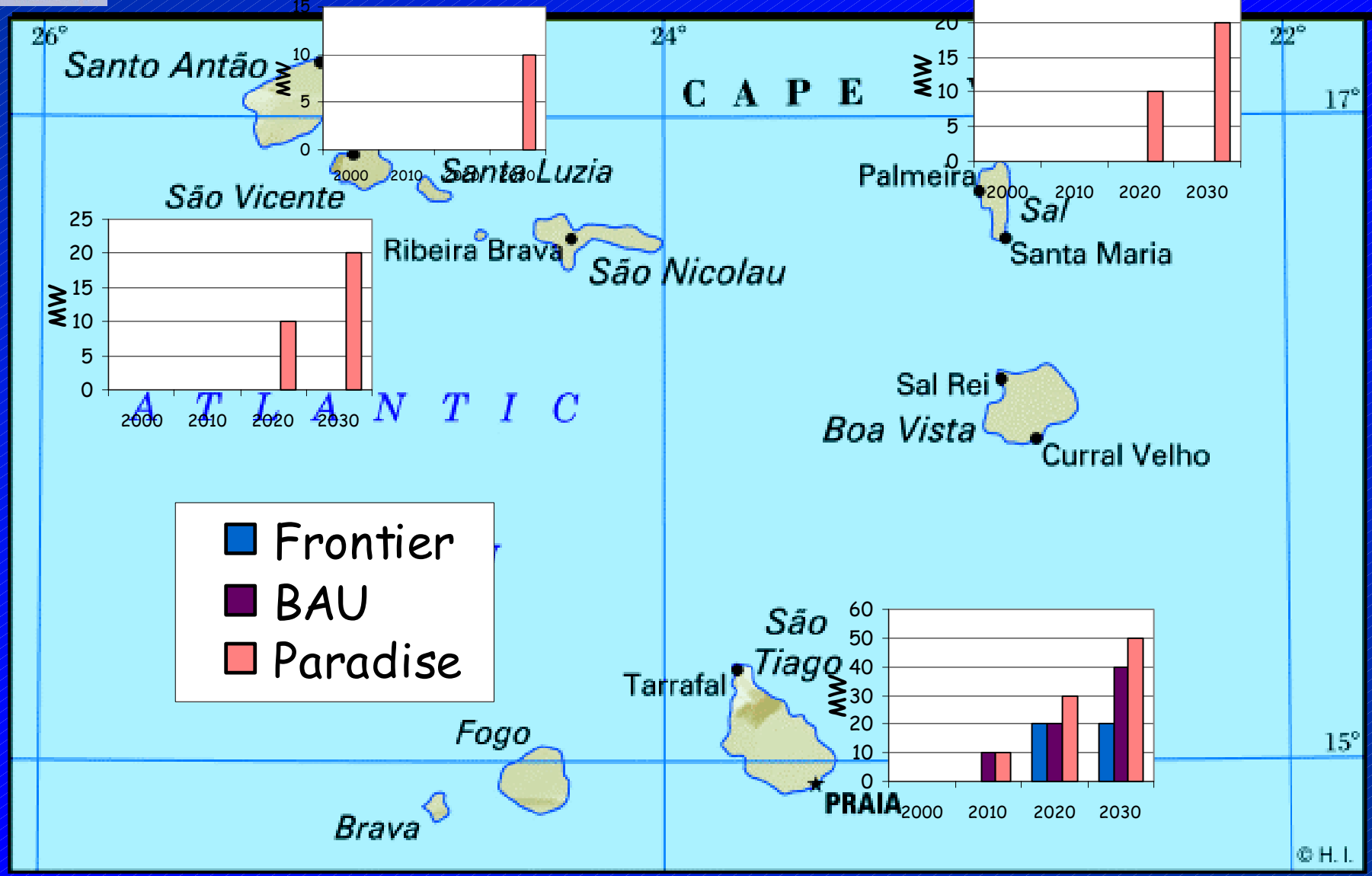
ELECTRIFICATION 2000-2030



WIND TURBINES INSTALLED



COMBINED CYCLE INSTALLED



CDM PROJECTS 2005-2012

Business as usual scenarium

2005 – 13500 kW wind turbines

- Santiago 12x600 kW + São Vicente 3x600 kW + Santo Antão 3x300 kW + Sal 3x600 kW + Boavista 2x300 kW + São Nicolau 300 kW + Fogo 3x300 kW

2008 – 10800 kW wind turbines

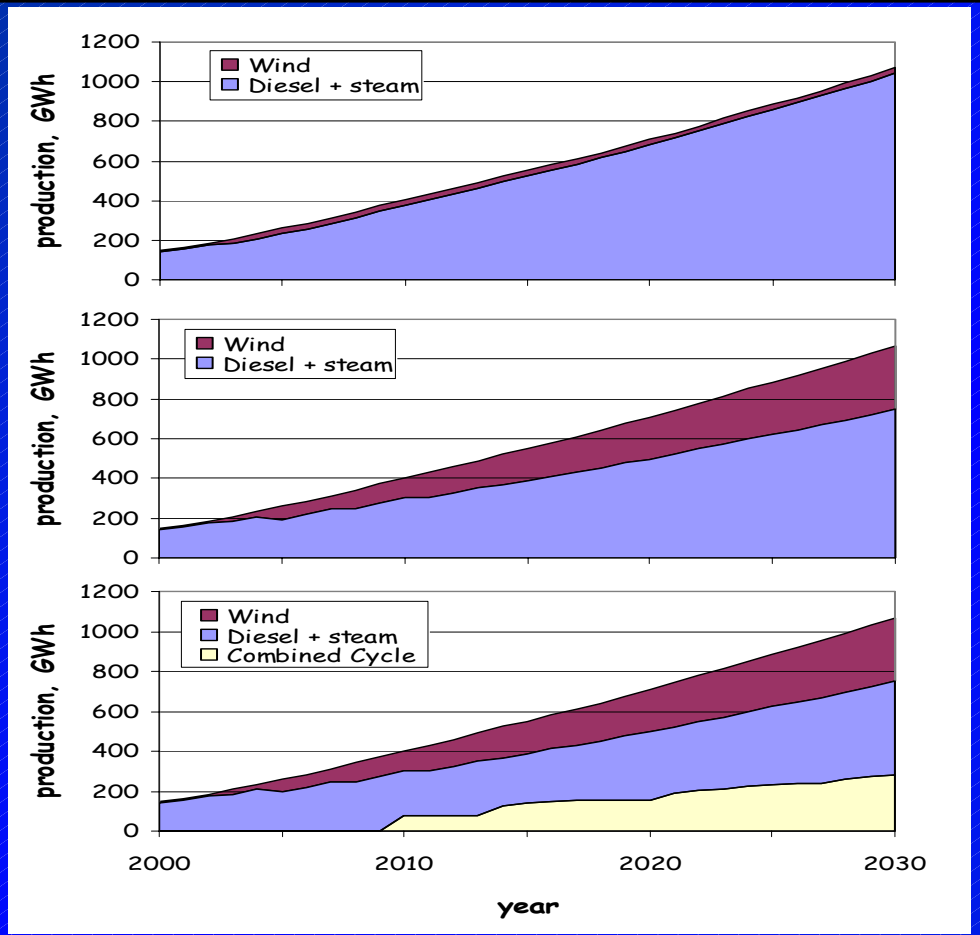
- Santiago 12x600 kW + São Vicente 2x600 kW + Santo Antão 300 kW + Sal 2x600 kW + Boavista 2x300 kW + Fogo 300 kW

2010 – 10000 kW Combined cycle, Santiago

2011 – 13800 kW wind turbines

- Santiago 15x600 kW + São Vicente 3x600 kW + Santo Antão 300 kW + Sal 2x600 kW + Boavista 2x300 kW + Fogo 300 kW + Brava 300 kW + Maio 300 kW

ELECTRICITY SUPPLY - BAU



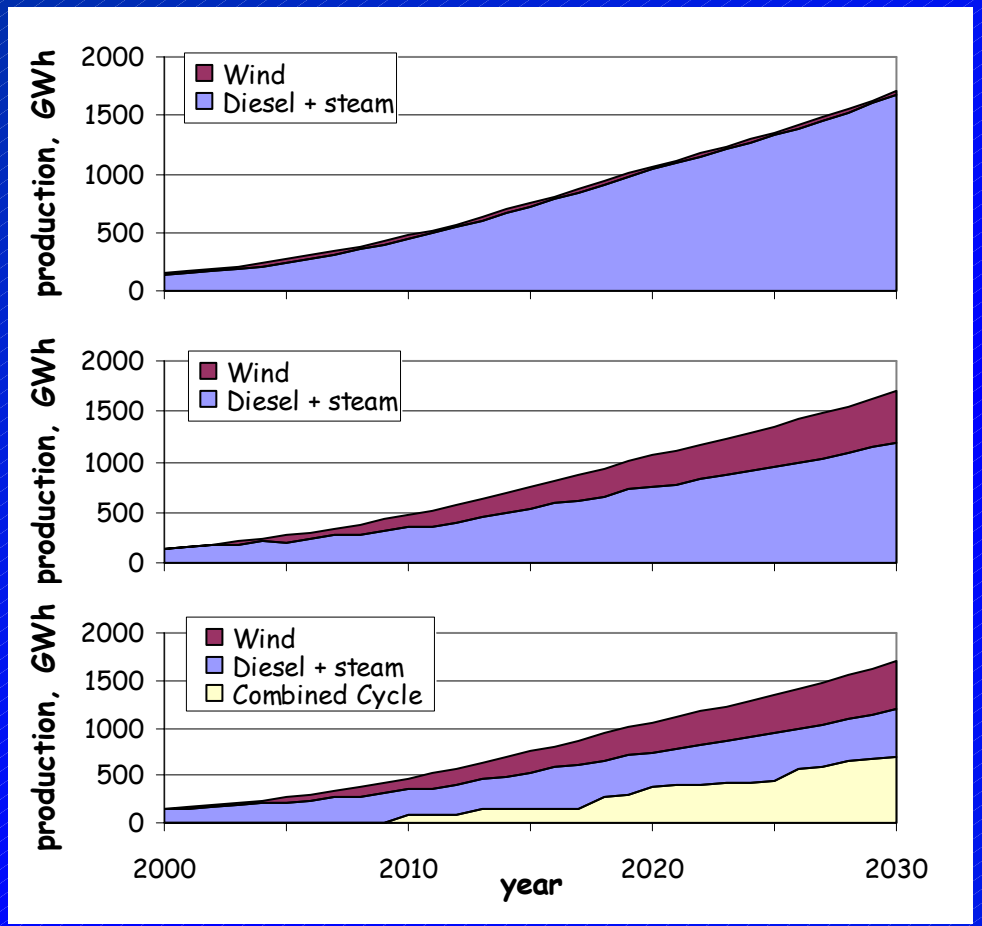
Baseline

30% wind

Combined cycle
30% wind

Business as usual economic scenarium

ELECTRICITY SUPPLY - PARADISE



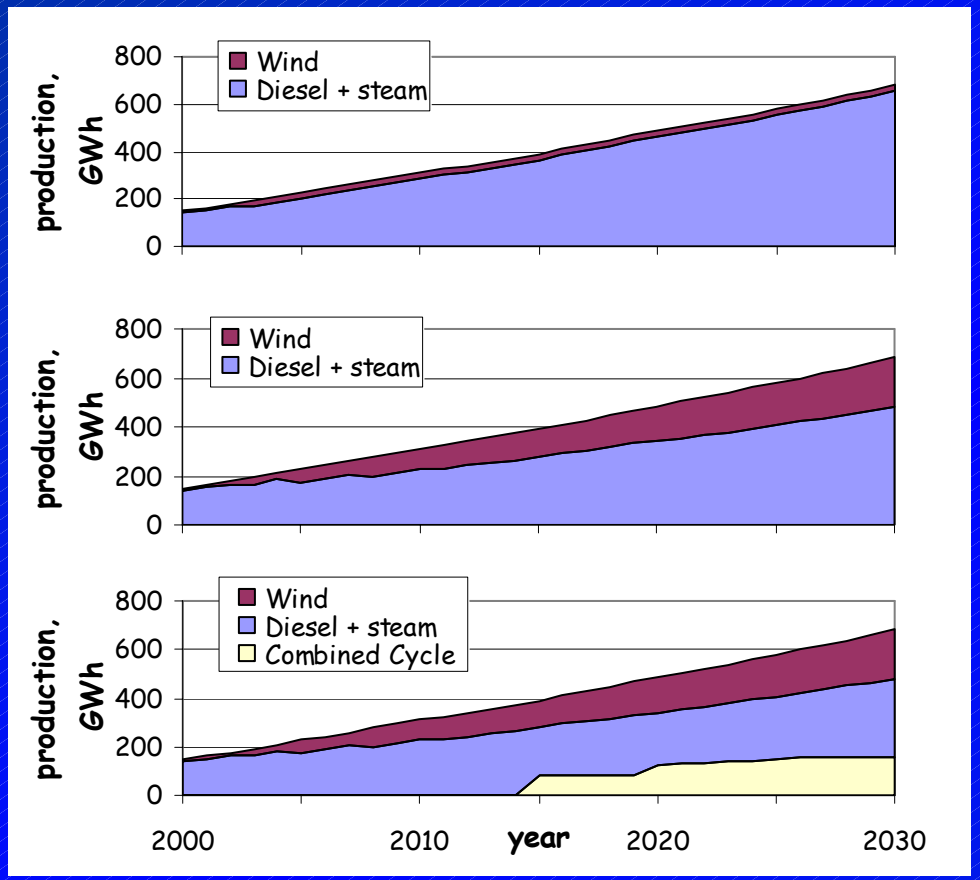
Baseline

30% wind

Combined cycle
30% wind

Tourist paradise economic scenarium

ELECTRICITY SUPPLY - FRONTIER



Baseline

30% wind

Combined cycle
30% wind

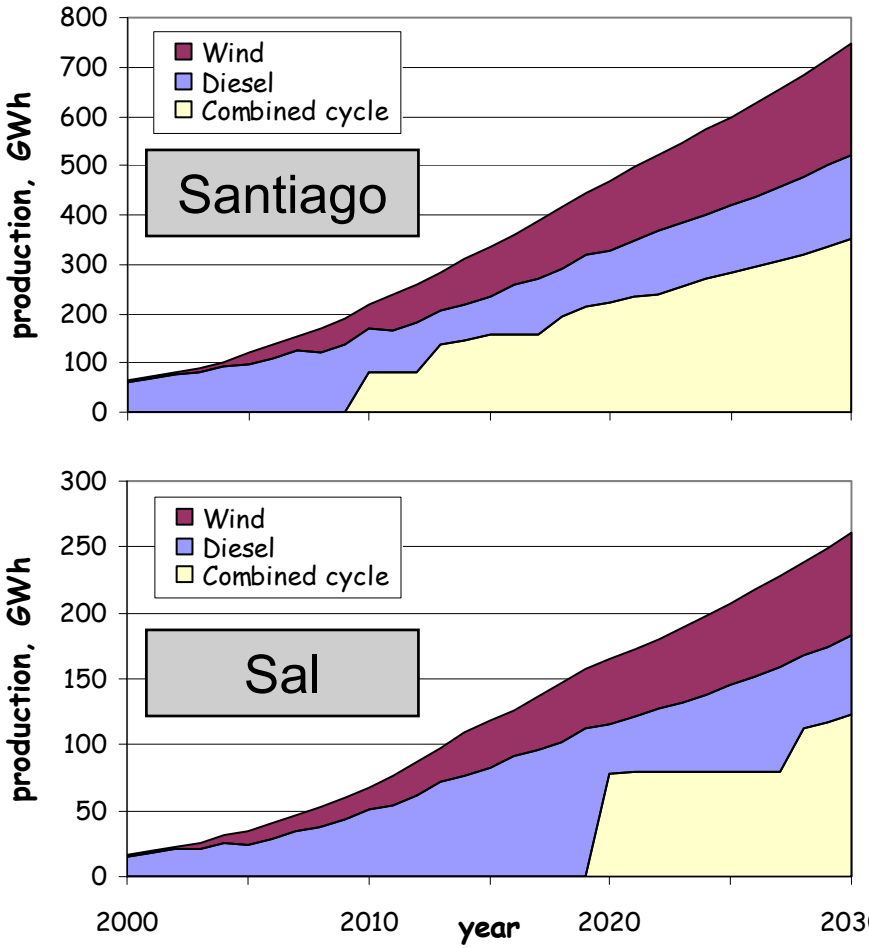
Frontier economic scenarium

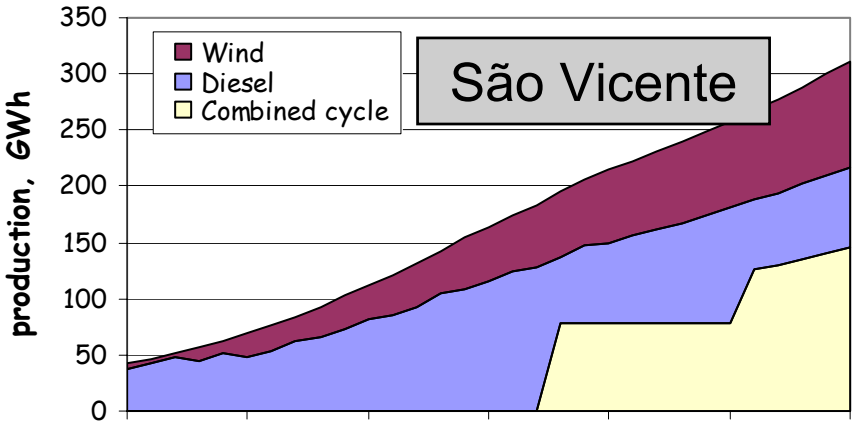
ELECTRICITY SUPPLY – REGIONAL

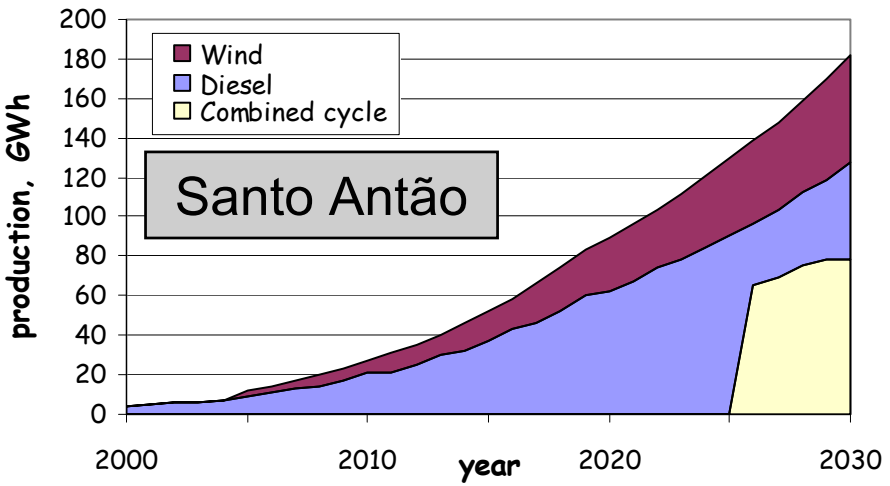
Economic scenaria	Electricity supply sceanria	SV	ST	SO	SA	BV	SN	FO	BR	MA
BAU	Baseline	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	30% wind	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CC+30% wind	No	2010	No	No	No	No	No	No	No
Tourist paradise	Baseline	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	30% wind	Yes	Yes	Yes	Yes	Yes *	Yes *	Yes *	Yes *	Yes *
	CC+30% wind	2018*	2010*	2026*	2020*	No	No	No	No	No
Frontier	Baseline	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	30% wind	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CC+30% wind	No	2015	No	No	No	No	No	No	No

*shown

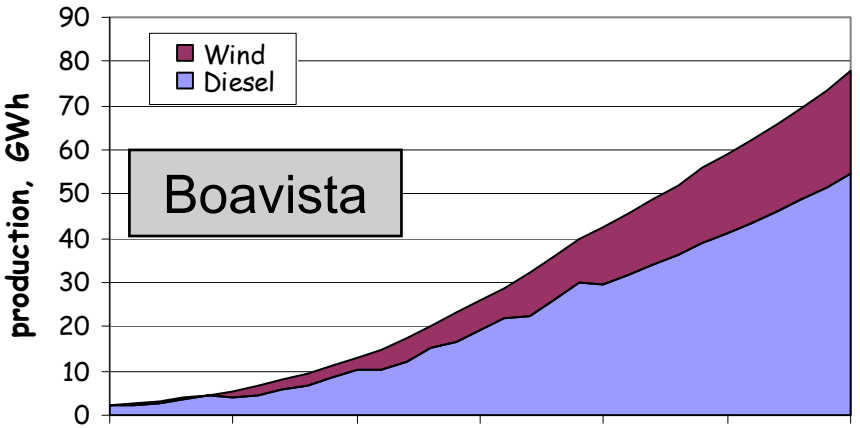
ELECTRICITY SUPPLY – REGIONAL

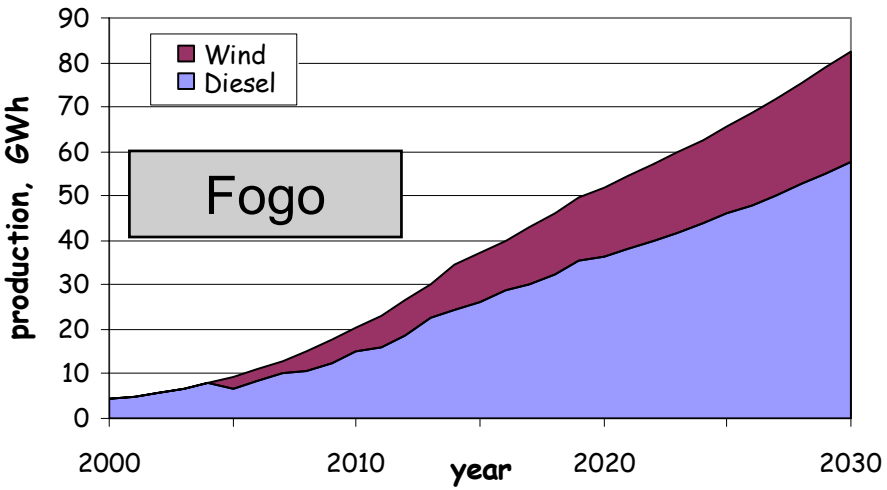


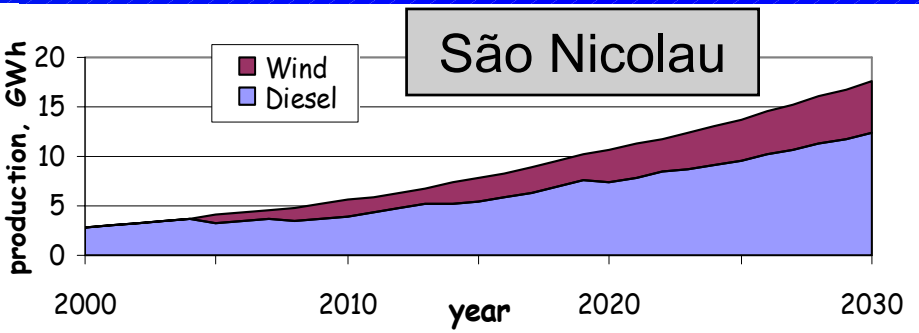


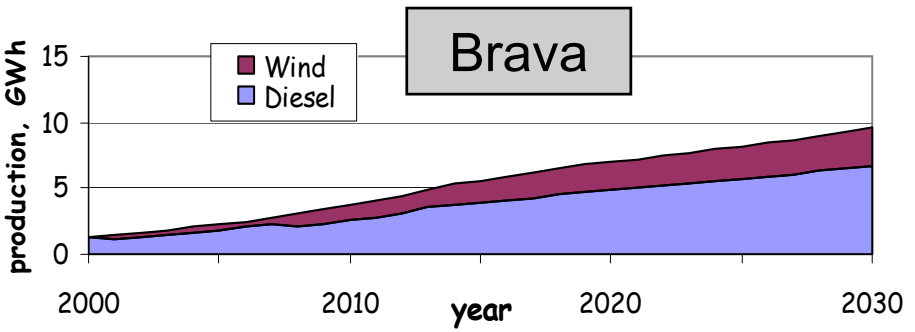


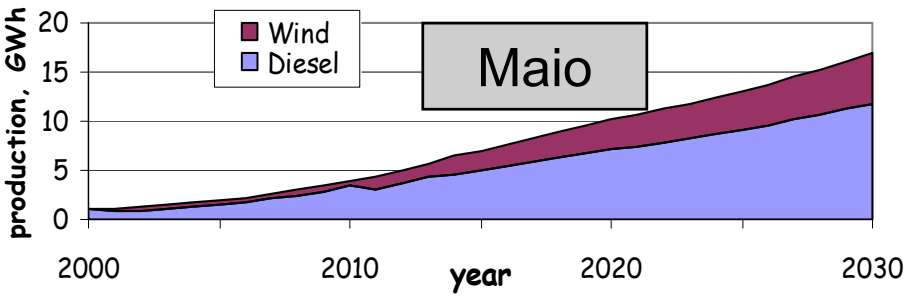
ELECTRICITY SUPPLY – REGIONAL



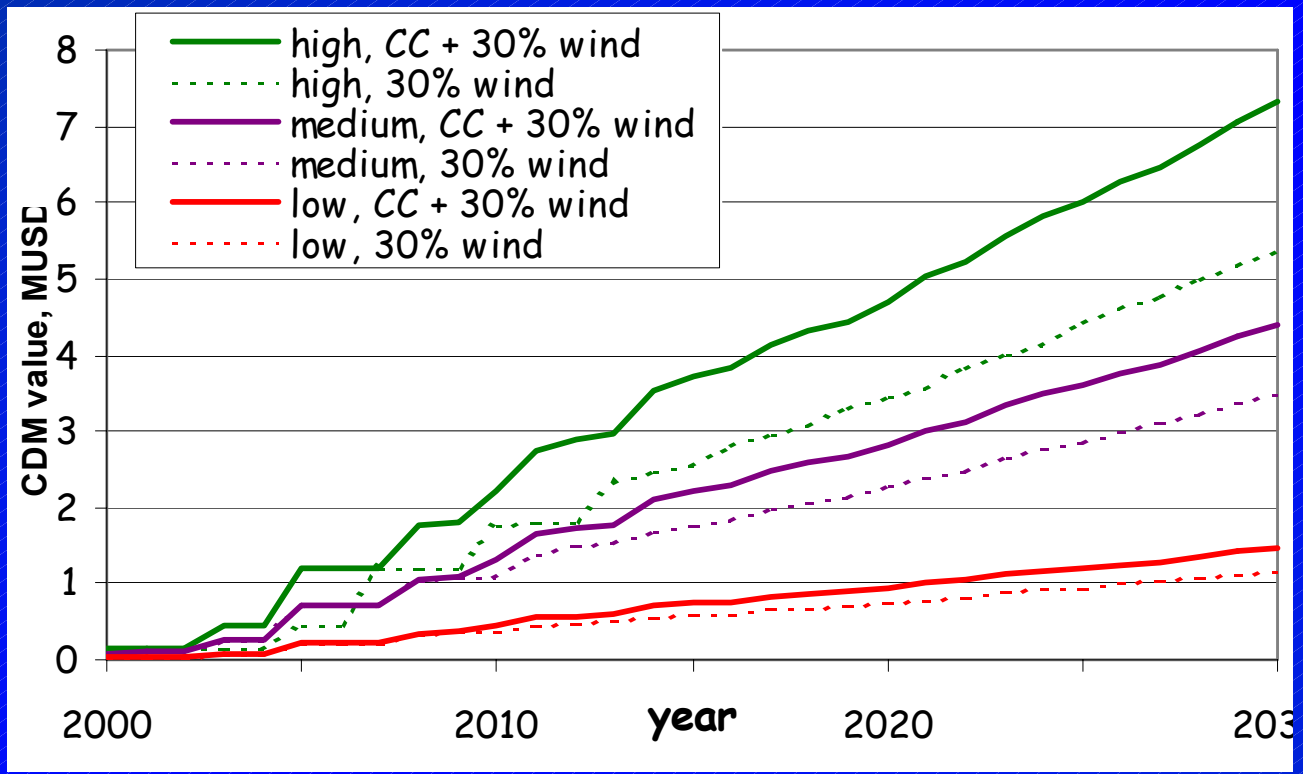








CDM SCENARIA

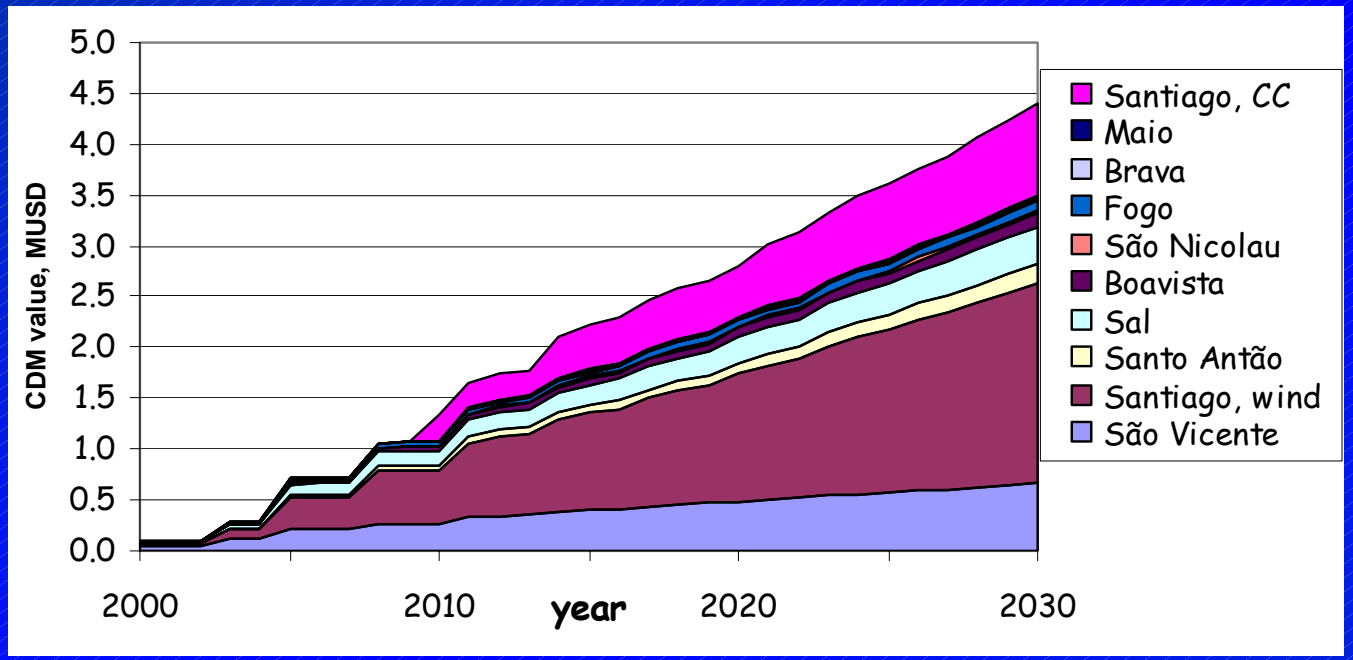


CDM potential for 2 electricity supply scenaria and 3 CDM certificate prices:

- **High – 25$/tCO2**
- **Medium – 15$/tCO2**
- **Low – 5$/tCO2**

Business as usual economic scenarium

CDM VALUE

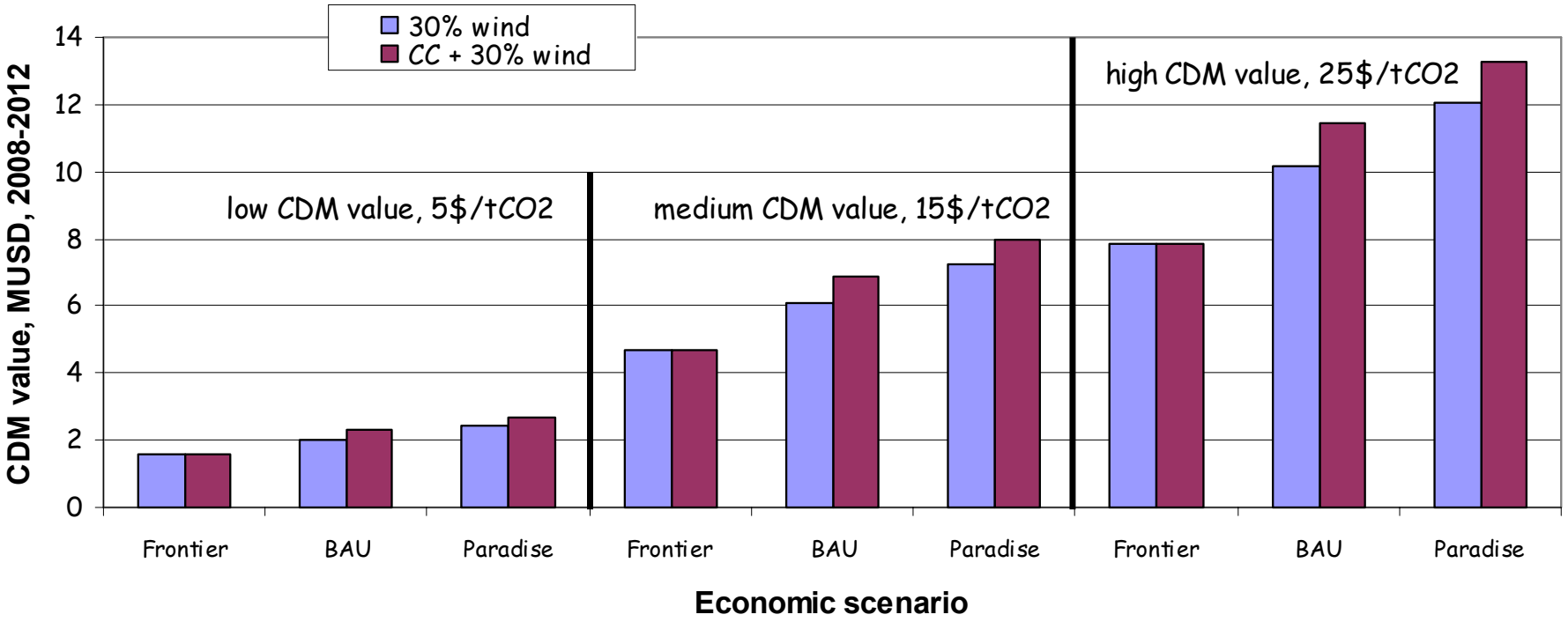


- Wind in all islands
- Combined cycle only in Santiago

Business as usual economic scenarium

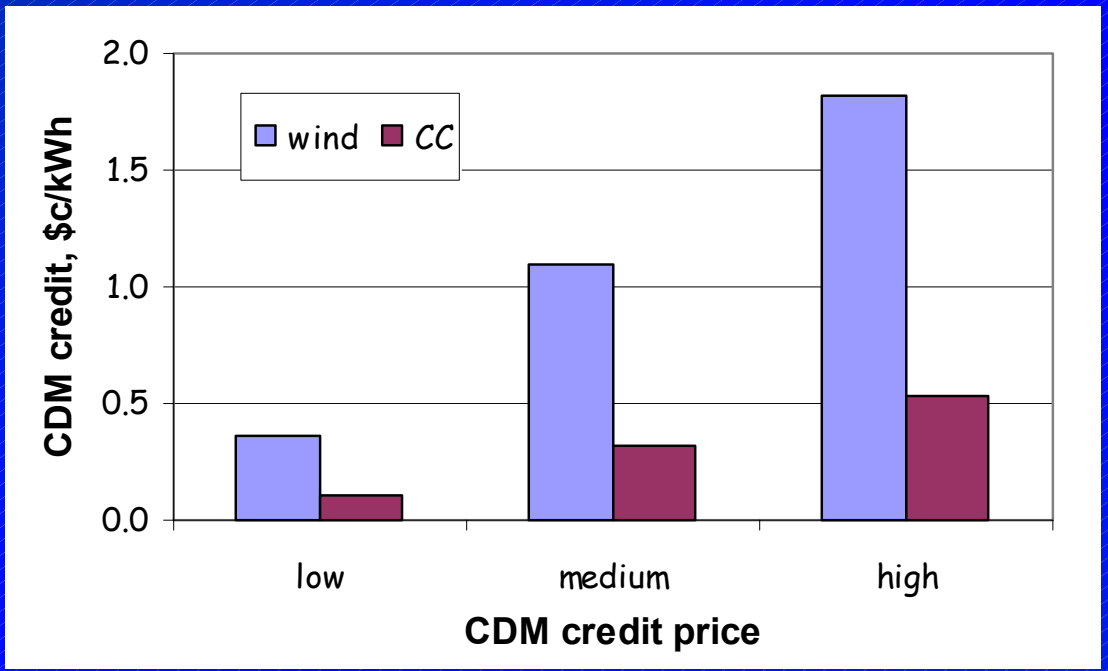
Medium CDM price scenarium – 15$/tCO2

CDM VALUE



2008-2012 – The First budget period of the Kyoto Protocol

CDM VALUE



- CDM – significant influence on electricity cost
- CDM for wind, up to 25% of the total price of kWh

CONCLUSIONS

- Wind is good for islands
  - Security of supply
  - Competitive with Diesel
- CDM for islands
  - Big financial potential
  - Helps clean energy technology transfer