



**TITLE**



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**KYOTO PROTOCOL OBJECTIVES BY  
PROMOTING THE TECHNOLOGY TRANSFER  
TO SMALL ISLAND DEVELOPING COUNTRIES:  
SANTO ANTÃO, CAPE VERDE**

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## Article 4.5 of the United Nations Framework Convention on Climate Change

**“The developed country Parties ... shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention.”**

**UNFCCC - 182 countries - mitigation of climate change**

**Kyoto Protocol to the Convention in 1997:**

- **Reduction in GHG emissions in 38 developed countries and economies in transition**
- **Flexible Mechanisms:**
  - Emission Trading**
  - Clean Development Mechanism**
  - Joint Implementation**

# OBJECTIVES

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- showing particular case of small island
- showing potentials of assumed rules of CDM on influencing future CO<sub>2</sub> emissions

- Small island special case: Santo Antão, Cape Verde
- 4 scenarios of electricity production: potential CDM influence
- Influence of declining prices of RET
- Conclusions



- High price of small scale fossil fuel technology (diesel)
- Possible competitiveness of renewable energy

## Cape Verde



- Wind as competitive energy source in electricity production (8% of total)
- High dependency on diesel in electricity production

## Electricity production - island of Santo Antão Case for CDM

2000-2030

Scenario 1: Business as usual\* – Diesel only

Scenario 2: 30% RE - 25% Wind + 5% PV

Scenario 3: 30% Wind energy

Scenario 4: as scenario 2 with declining prices of RET

\* based on studies by Jansénio Delgado et al.: Perspectivas de desenvolvimento, Plano director de electricidade de Santo Antão, 1997, Cape Verde, and Diagnóstico de situação local, Plano director de electricidade de Santo Antão, 1997, Cape Verde

# CASE: SANTO ANTÃO



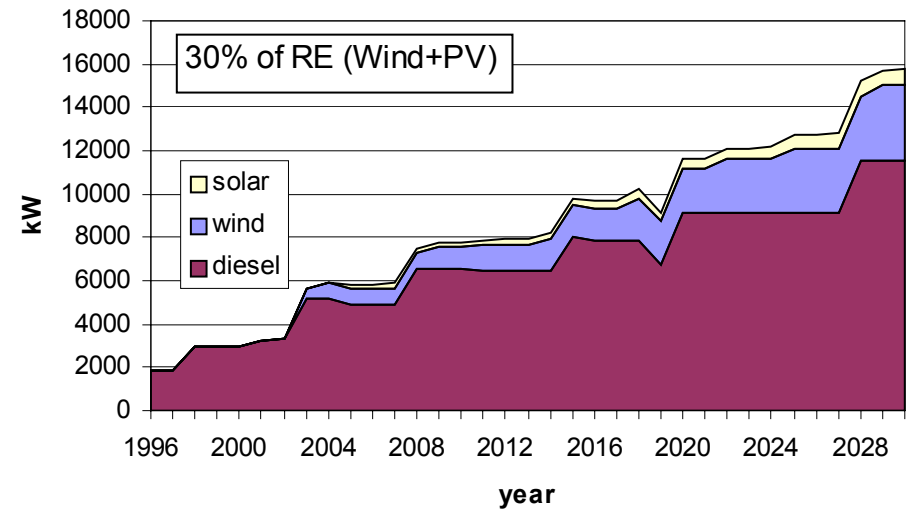
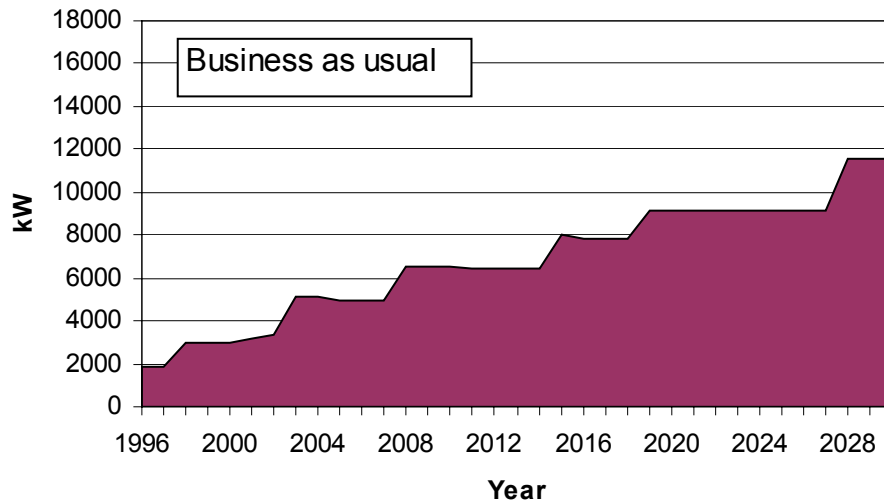
## The island of Santo Antão, Cape Verde



Santo Antão	scenario	1996	2010	2030
<b>Electricity penetration</b>		29%	70%	90%
<b>Production [GWh]</b>		2.6	14	50
<b>Load peak [MW]</b>		0.7	2.6	7.5
<b>Installed capacity [MW]</b>	BAU	1.9 D	6.5 D	11.5 D
	25% Wind + 5% PV		6.5 D +1 W +0.2 PV	6.5 D +3.5 W +0.8 PV
	30% Wind		6.5 D +1.3 W	11.5 D +4 W

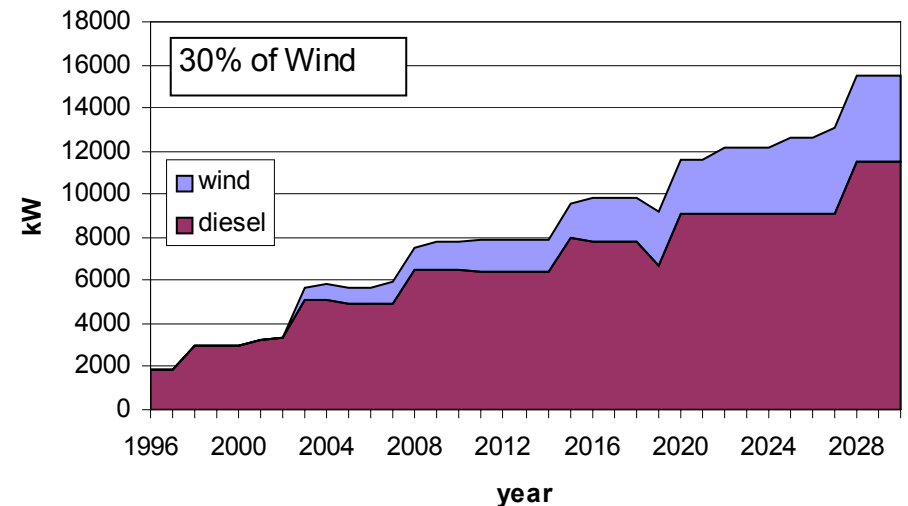


# CASE: SANTO ANTÃO

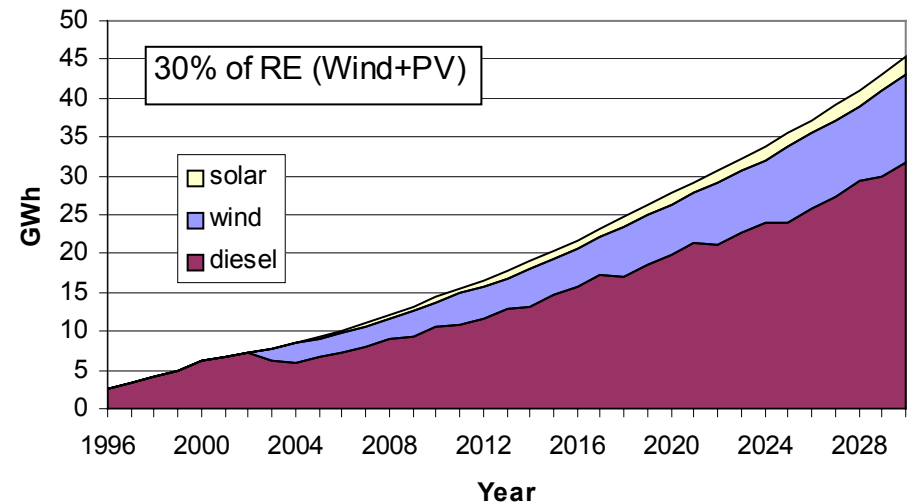
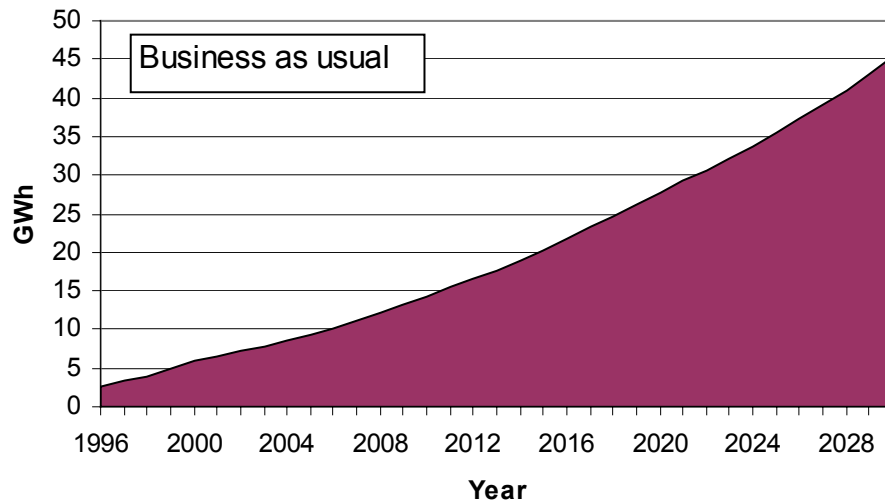


## Installed capacities

- Wind does not reduce significantly the installed diesel capacity needed

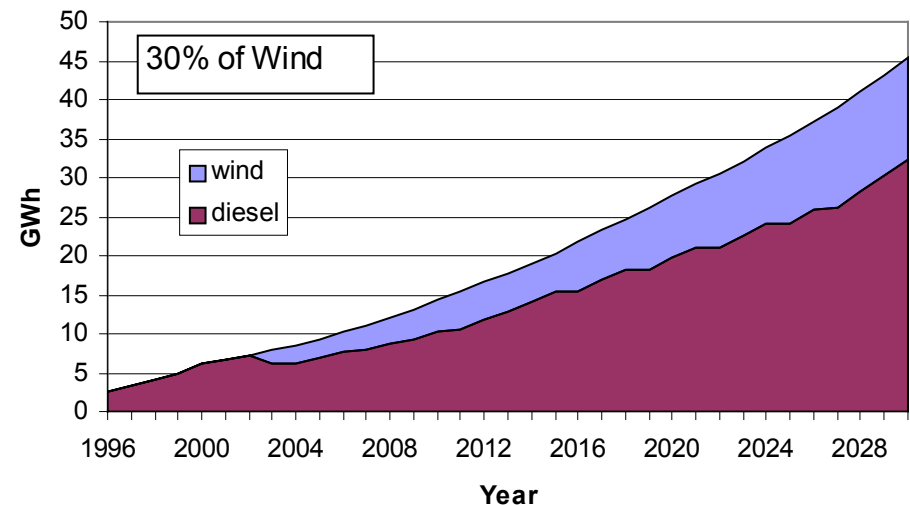


# CASE: SANTO ANTÃO

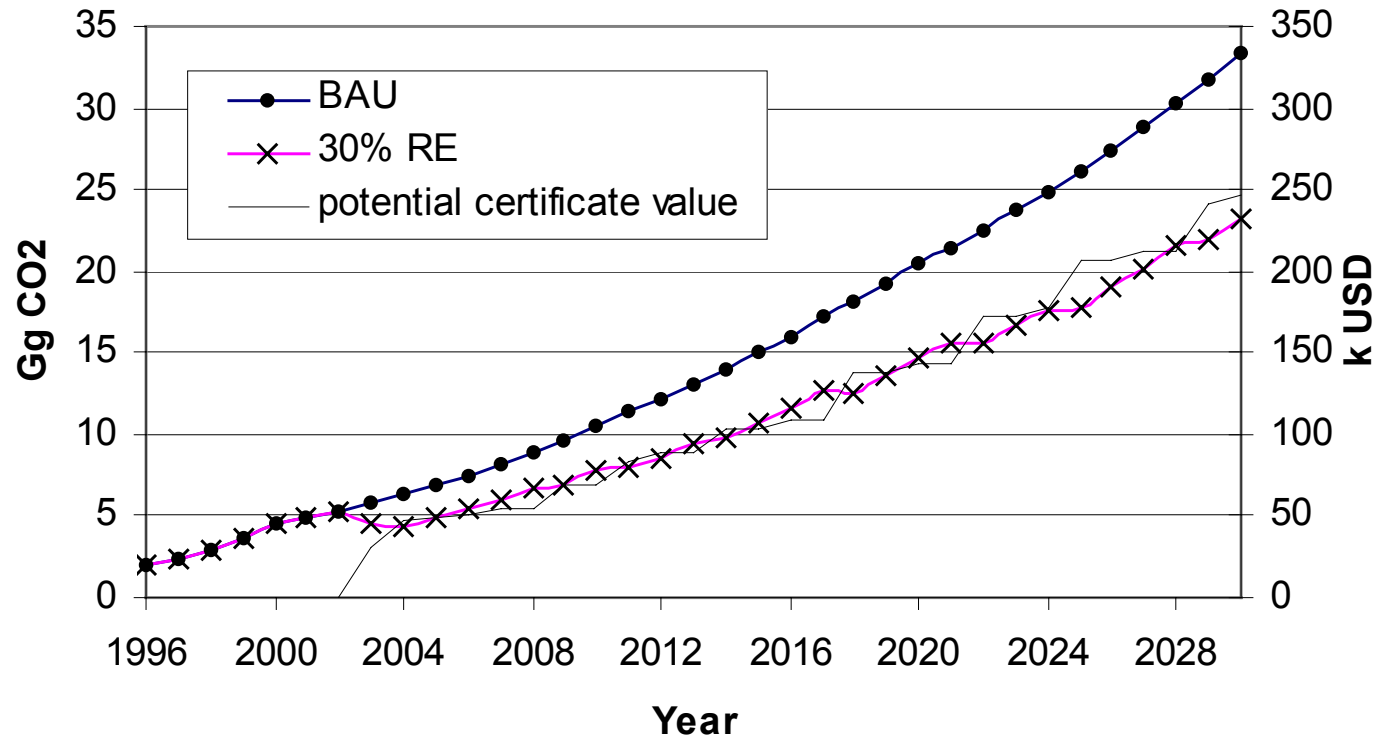


## Electricity production

- Wind & PV - intermittent sources
- Diesel - the rest



# CASE: SANTO ANTÃO



## CO<sub>2</sub> emissions comparison and potential CDM value

(based on OECD study that concluded that in case of emission trading the price of CO<sub>2</sub> reduction is 90 USD/Mg C)

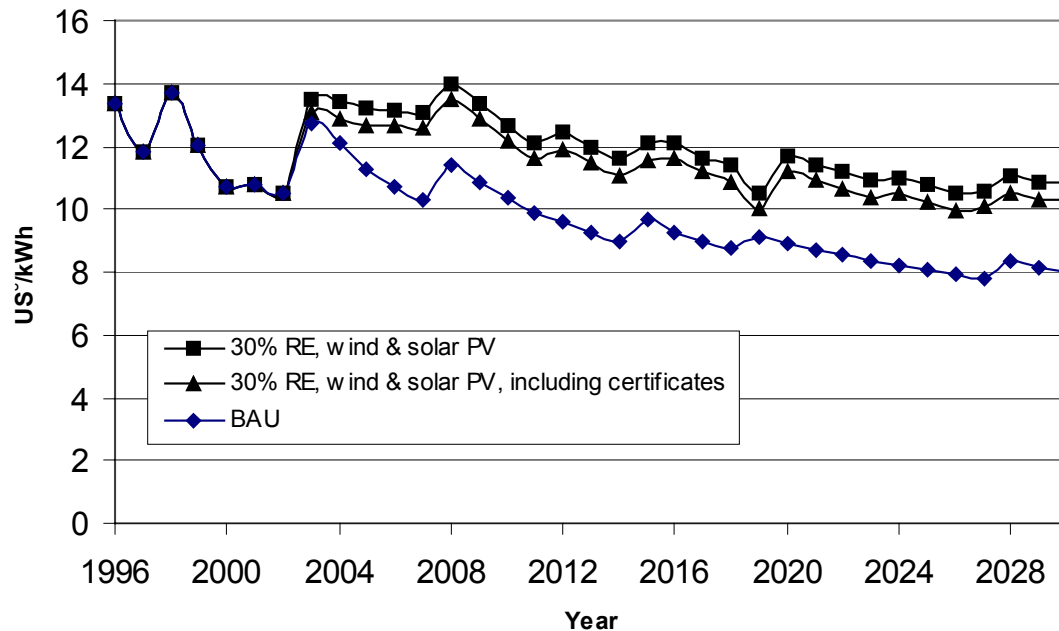
# CASE: SANTO ANTÃO



## Electricity cost

- Diesel (at 45% load) 8 USD¢/kWh
- Wind 7 USD¢/kWh
- Solar PV 50 USD¢/kWh

# CASE: SANTO ANTÃO

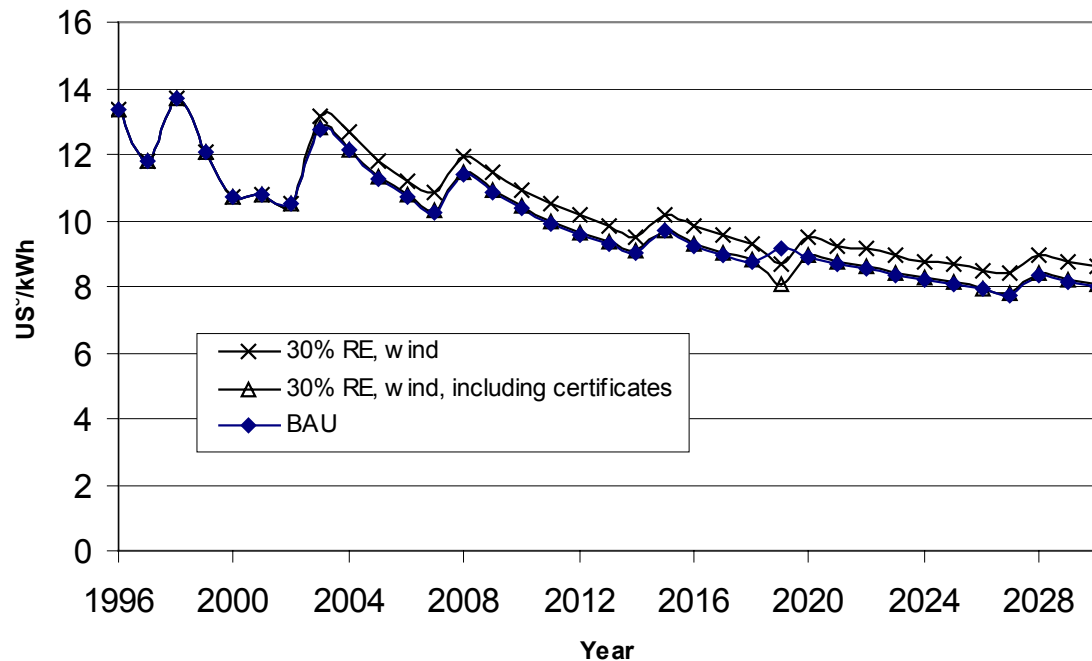


- Santo Antão - wind + PV scenario is not viable with current costs
- CDM does not help much this scenario
- constant prices of RET

Comparison of average electricity production price (1999 USD)

Scenarios 1-2: Business as usual and 30% RE, wind & solar PV

# CASE: SANTO ANTÃO

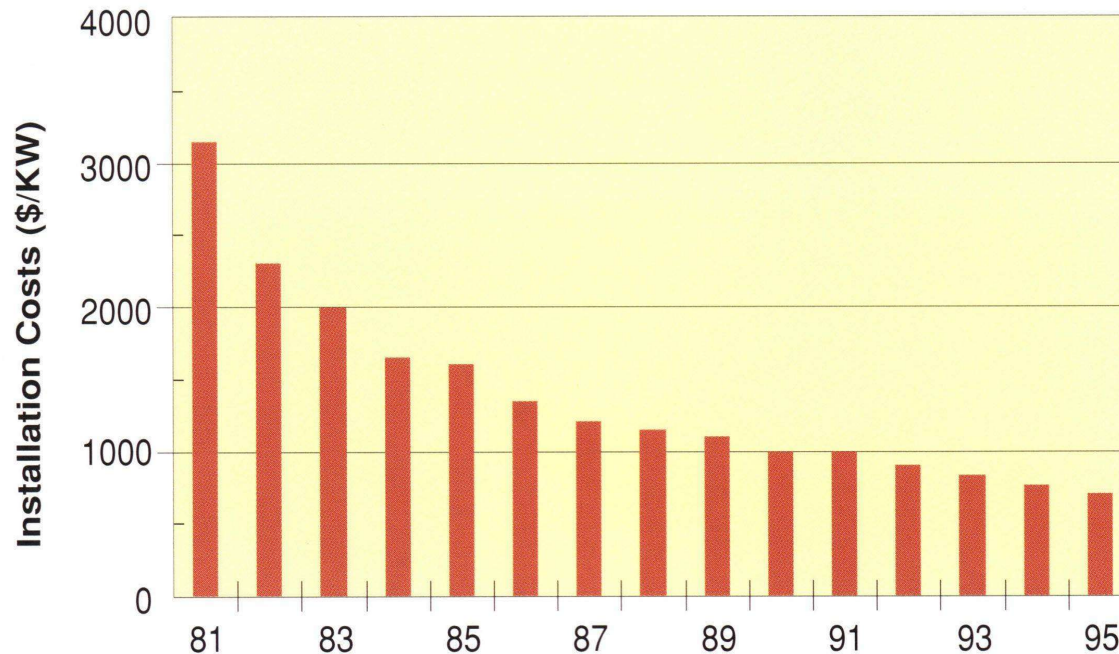


- Santo Antão - wind scenario is not viable with current costs
- CDM could help to make it viable
- constant prices of RET

Comparison of average electricity production price (1999 USD)

Scenarios 1 and 3: Business as usual and 30% wind

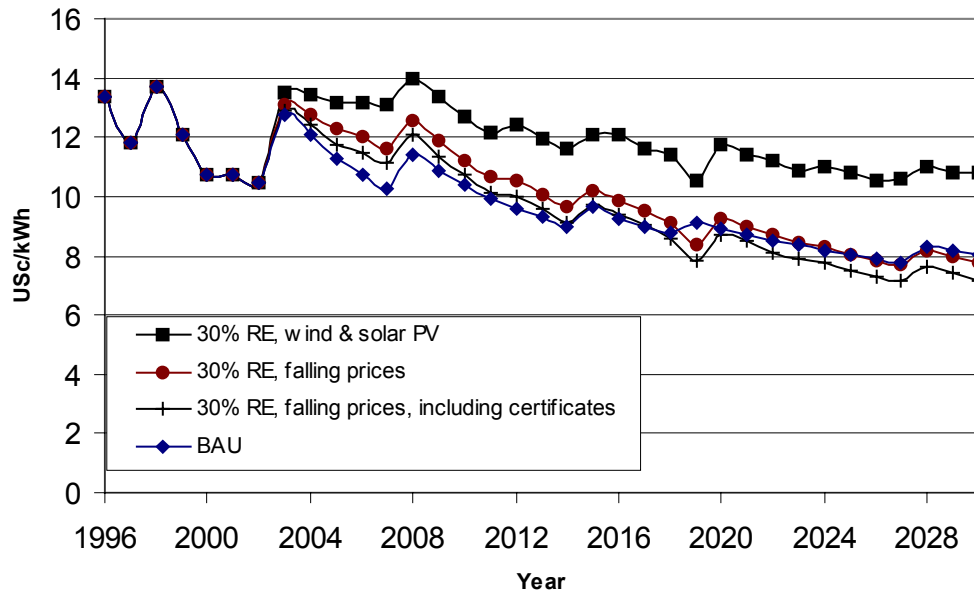
# CASE: SANTO ANTÃO



- Most calculations of RET viability assume static relations between different technologies implied costs
- RET are extremely dynamic technologies costwise

Innovation brings fall in cost of RET

# CASE: SANTO ANTÃO



- Scenarios 1, 2 and 4 - Influence of RET innovation
- Credibility of BAU as CDM baseline depends on declining prices

- Santo Antão - wind & PV scenario gets viable with falling prices
- CDM helps it to become viable sooner
- falling prices of RET - 2% yearly price decline for wind and 5% price decline for PV



# CONCLUSIONS



- GHG reduction potential from business as usual scenario baseline
- CDM could help reduce CO<sub>2</sub> emissions from electricity production by one third from baseline
- Financial and environmental additionality
- Contribution to the host country's sustainable development needs