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Following the OECD Plan to Climate Stabilization

INOGATE New ITS Project

BUILDING PARTNERSHIPS FOR ENERGY SECURITY

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INOGATE New ITS Project

Following the OECD Plan to Climate Stabilization

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Overview

Section I. Two Problems

1. Climate Change
2. Energy Security

Section II. OECD Plan

Section III. Local Solutions

Section I

Two Problems

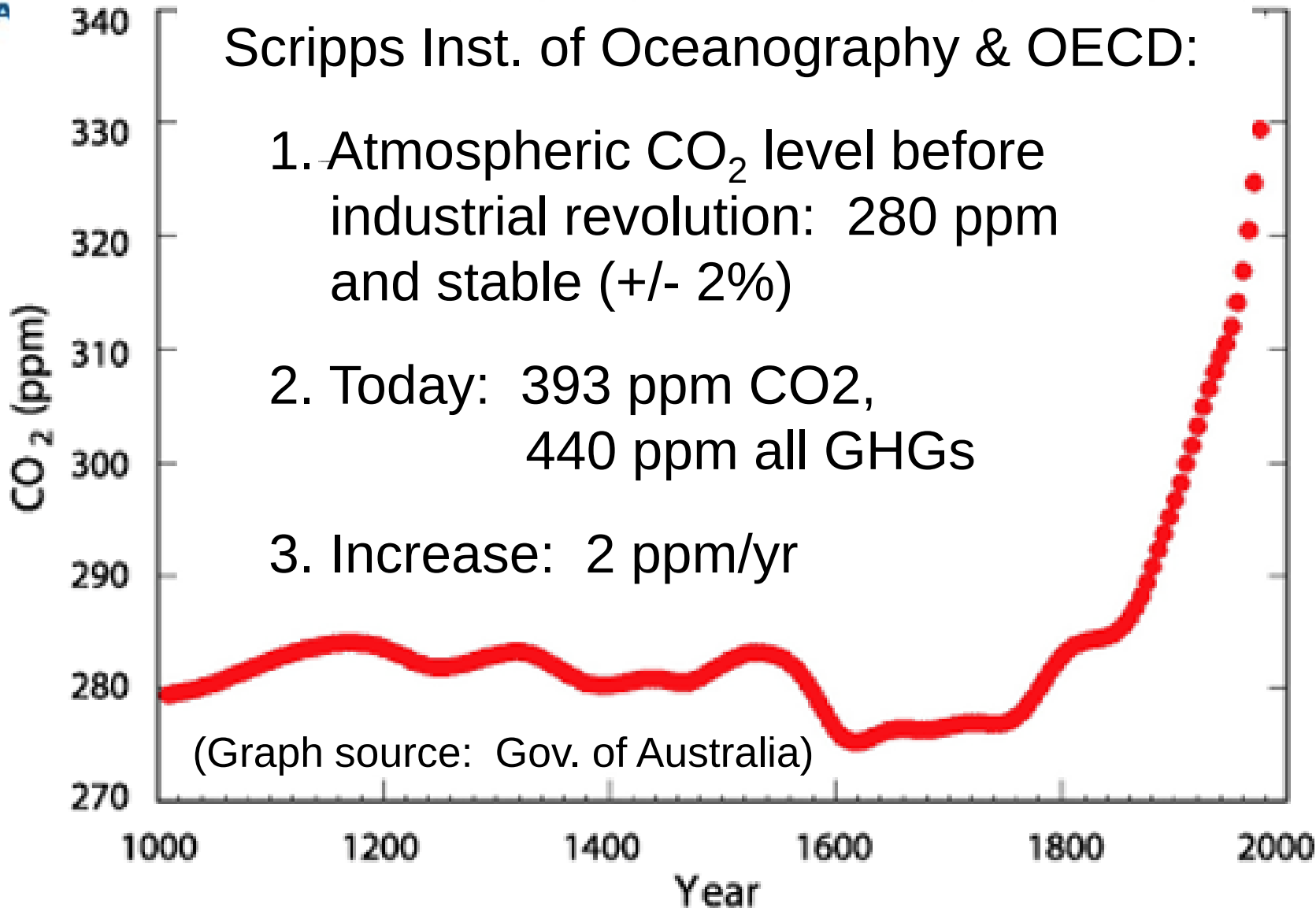
Problem #1: Climate Change

Problem #2: Energy Security

Problem #1: Climate change

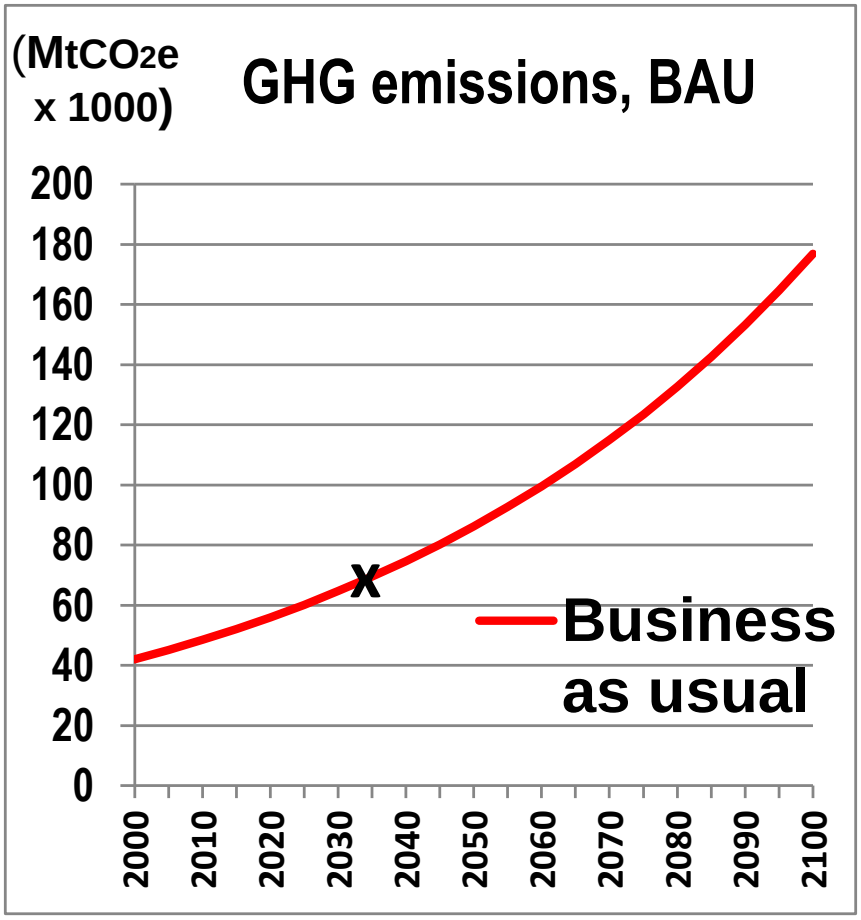
Scripps Inst. of Oceanography & OECD:

1. Atmospheric CO_2 level before industrial revolution: 280 ppm and stable (+/- 2%)
2. Today: 393 ppm CO2,
   440 ppm all GHGs
3. Increase: 2 ppm/yr



(Graph source: Gov. of Australia)

Climate change, 21ST century



From OECD:

- Beyond 450 ppm (all GHG)s: Tipping points
- Without intervention, will cross 450 ppm by 2030 (OECD).

Consequences

Beyond 450 ppm, > 50% probability:

- Average global atmospheric temperature will increase > 2^{o}C (safe limit – Copenhagen Accord).
- Oceans begin releasing more CO_2 and absorbing less… beyond human ability to stop.
- Temperature will continue rising out of control.

The Cause

From IEA data

- Whole world burns about 10 billion tons of oil equivalent (toe) of fossil fuel/yr.
- This produces about 48,500 $Mtco_2e$/yr.
- Annual increase: 700 $Mtco_2e$ (1.45%).
- 3 biggest emitting sectors:
  - Electricity generation
  - Industry
  - Transport

Fossil Fuel Consumption & Carbon Emissions

Annual numbers, calculated from IEA data:

	Fossil fuel (Mtoe)	Carbon Emissions (MtCO2e)
World	10,000	48,500
EU	1,300	6,100
SK	12.5	59

(Assumes emissions directly proportional to fossil fuel consumption)

Problem #2: Energy security

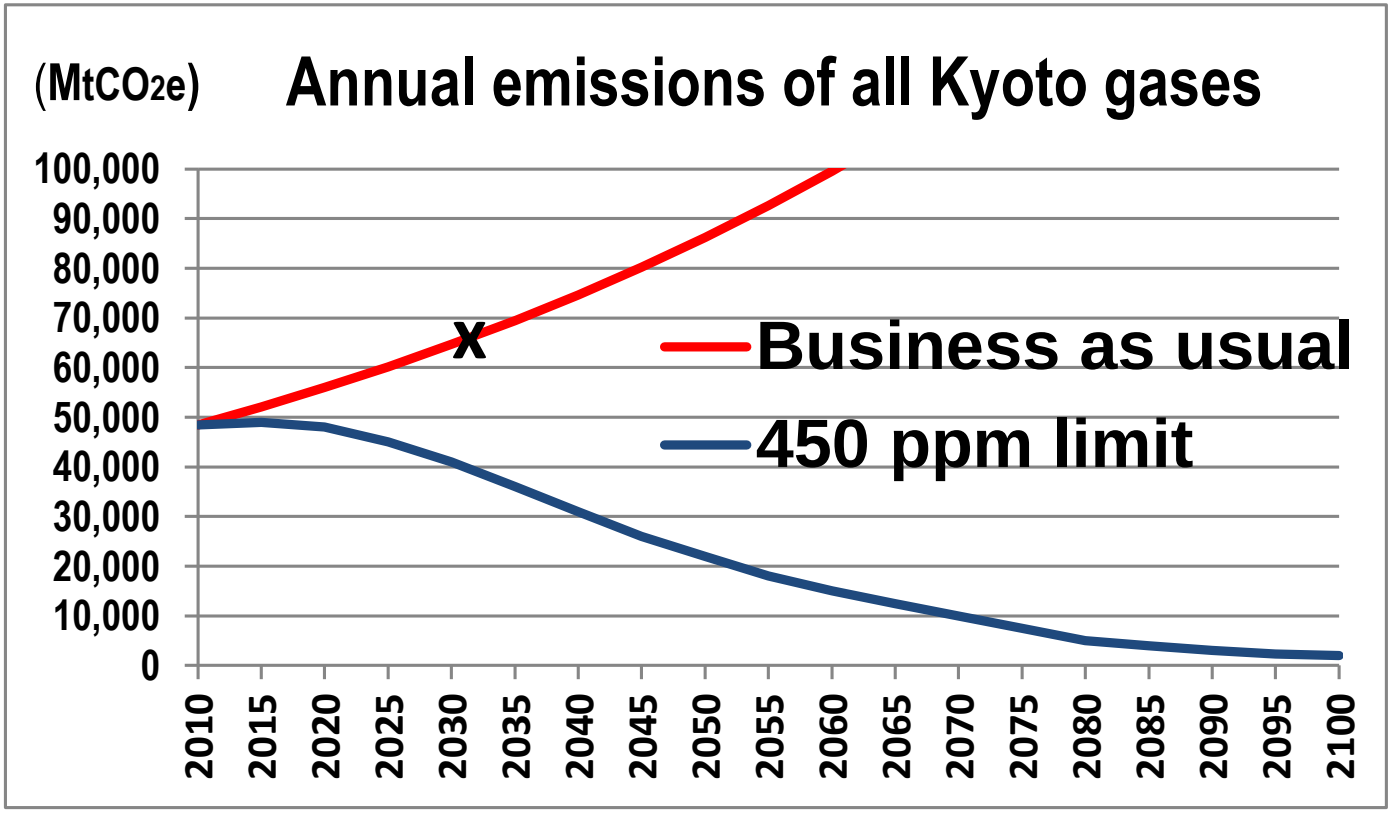
- No country wants to be at the mercy of another for energy supply.
- However, most countries are energy-dependent.
- Creates problems with national security, economy, sovereignty.

Section II

OECD Plan

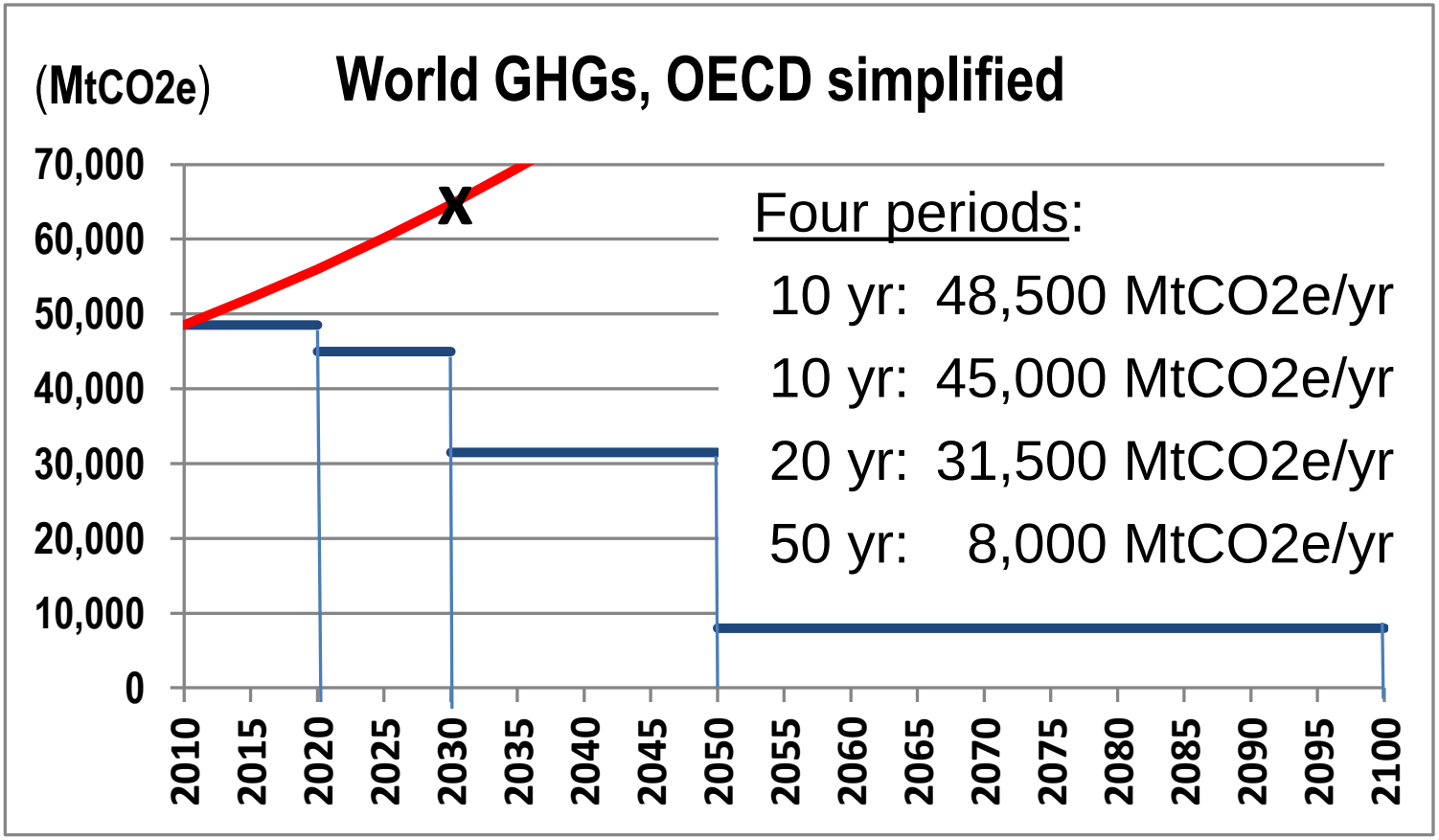
OECD Plan, 2010-2100

Avoid tipping point (x) with 450 ppm limit.



Gradual reduction almost to carbon neutrality

OECD Plan, Step by Step



Simplified, shown by average in period

What to do?

To stop global warming:

Replace increases in fossil fuel with sustainable energy.

- Energy efficiency stops unnecessary fossil fuel consumption.
- Renewable energy sources replace fossil fuel with carbon-neutral energy sources.

Following OECD

To accomplish OECD plan,

1. Change ***behavior***.
2. Invest in ***technology***.

The following slides present

1. A methodology to determine the right level of investment in sustainable energy technology.
2. A discussion about energy behavior.

What does technology cost?

- Prices vary widely.
- To demonstrate methodology, use median prices.
- To calculate for own country, use local prices.

Typical unit costs	€/kWh	€/toe	€/MtCO2e
Energy efficiency	0.025	300	60
Renewable energy	0.085	1000	200

- Technologies cover all sectors
  - Energy
  - Buildings
  - Industry
  - Transportation

Calculate avoided emissions

Illustrative example:

- World needs to avoid increase of **700 $MtCO_2e/yr$**.
- Try method with 1/3 EE, 2/3 RES.

MtCO2e/yr	
233	Energy efficiency
467	RES technologies
700	Total

Calculate world cost

Avoided emissions (MtCO2e/yr)		Unit cost (€/tCO2e)		Annual investment (billion €/yr)	
233	x	60	=	14	EE
467	x	200	=	93	RES
700				**107**	**World Cost**

(Repeat every year as economy grows.)

Cost of Business as Usual?

- Usual annual world cost of energy infrastructure investment: **13 400 billion €** (unofficial ITS estimate)
- Cost of annual SE upgrades: **107 billion €**
- Most of SE upgrades will repay their investments with profit.

Section III

Local solutions

About GHG growth rates

- OECD model predicts steady, 1.45% GHG growth rate… no irregularities.
- But 2008 crisis disrupted local development.
- To demonstrate methodology we need *post-crisis* GHG growth.
- Assume local GHG growth = GDP growth.
- Not enough IEA data, so use World Bank post-crisis GDP data.

EU investment example

- Baseline emissions: 6,100 $MtCO_2e/yr$
- GDP increase: 3.7%
- 3.7% GHG increase = 230 $MtCO_2e/yr$
- Illustrative investment mix to avoid increase:

$MtCO_2e/yr$			$€/tCO_2e$		billion €/yr
77	EE	x	60	=	5
153	RES	x	200	=	30
230	Total				**35**

Cost of Business as Usual?

- Usual annual EU cost of energy infrastructure investment: **2 600 billion €** (unofficial ITS estimate)
- Cost of SE annual upgrades: **35 billion €**
- Most of SE upgrades will repay their investments with profit.

SK investment example

- Baseline emissions: 59 $MtCO_2e/yr$
- GDP increase: 7.5%
- 7.5% GHG increase = 4.5 $MtCO_2e/yr$
- Illustrative investment mix to avoid increase:

$MtCO_2e/yr$			$€/tCO_2e$		billion €/yr
1.5	EE	x	60	=	0.1
3.0	RES	x	200	=	0.6
4.5	Total				**0.7**

Cost of Business as Usual?

- Usual annual EU cost of energy infrastructure investment: **17 bllion €** (unofficial ITS estimate)
- Cost of SE annual upgrades: **0.7 billion €**
- Most of SE upgrades will repay their investments with profit.

Common in all countries

- Repeat investment ***every year*** to offset growth.
- Not all investments must come from national budget.
- Investments may also come from
  - Municipal/regional budget
  - Domestic private industry
  - International private investors
  - International finance institutions

Unique features

- Each country has its own unique
  - energy features
  - energy problems
  - energy advantages
- Determine correct national investment:
  - investment potential by technology
  - unit cost by technology
  - energy consumption growth rate
- Highly industrialized countries deal with high energy intensity.

Energy security

- Return on investment is not the only criterion.
- Military budgets do not measure return.
- Governments spend whatever is necessary for their security.
- Energy security is the same.

Changing behavior

- With motivation, people will
  - Close doors in winter.
  - Turn off lights by day.
  - Drive further on less petrol.

- *Changing behavior costs LESS MONEY than the cheapest EE technology!*

How to change behavior?

- Building codes, vehicle codes (policy)
- Energy audit requirements (policy)
- Public awareness campaigns
- Driver training to save fuel (and lives)
- Efficient appliance demonstration centers
- Public school curricula (children influence parents)

The challenge

- Behaviorial benefits need strong leadership.
- If leaders fall asleep, benefits stop.
- Policies need constant enforcement.
- Awareness raising must be continuous.

Summary

- Investments
  - Reduce GDP energy intensity
  - Increase productivity
  - Improve energy security
  - Reduce global warming
  - Create jobs
- Most SE investments return more than their cost… choose them first!
- Changing citizen behavior
  - Reduces investment cost
  - Requires long term commitment

Thank you for your attention!

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