Energy wedges - lab report example

Science, Chemistry

ENERGY WEDGES

Insert of (Insert of Department) (Insert of unit) A LAB REPORT ON ENERGY WEDGES (insert (Insertgroup member’s full names)

TITLE: A LAB REPORT ON ENERGY WEDGES

Objectives

1. To be able to identify the technologies that are currently available in the market and can substantially cut carbon emissions over the next fifty years

INTRODUCTION

Evidence continues to accumulate that carbon dioxide, or CO2, from fossil fuel burning is causing dangerous interference in the climate. The main aim of this experiment is to point outthe technologies currently available that can substantially cut carbon emissions over the next fifty years. The Stabilization wedge Game aims at reducing the projected carbon output by roughly 8 billion tonnes per year by the year 2055. This will entail using energy wedges to accomplish the stabilization triangle. Each wedge will represent a reduction of one billion tonnes of carbon emitted per year.(Carbon Mitigation Initiative)

EXPERIMENTAL METHODS

The methodology followed for the Stabilization Wedge Game is;

I. Chose 8 wedges that our team gave preference to bethe best global solutions bearing in mind the costs and impacts of each,

II. From the Wedge Game-board that was supplied we cut apart the red, green, yellow, and blue wedge pieces,

III. We then read the information on each of the 15 strategies in the Wedge Table that was provided and on which costs were indicated on a relative

basis,

IV. From the 15 strategies in the Wedge Table we chose one wedge strategy at a time to fill the 8 spots on the wedge game-board,

V. Four colors of the wedge pieces represented major categories:(fossil fuel-based (blue), efficiency and conservation (yellow), nuclear (red), and renewables and bio-storage (green).

VI. Each wedge was to be considered basing on both technical and political viability.

VII. All the 8 strategies we chose werefilled out in the Wedge Worksheet and we totaled the cuts from each energy sector (Electricity, Transport, and Heat) and costs. A scoring table was used to predict how different interest groups ratedour wedges. (Hotinski)

DATA AND OBSERVATIONS

1. Wedge Worksheet

1. Record your strategies to reduce total fossil fuel emissions by 8 wedges by 2055.

(1 “ wedge” = 1 billion tons carbon per year)

• You may use a strategy more than once

• Use only whole numbers of wedges

• You may use a maximum of

- 6 electricity wedges (E)

- 5 transportation wedges (T)

- 5 heat or direct fuel use wedges (H)

Strategy

Sector

(E, T, H or B)

Cost

Challenges

1

Conservation Transport

T

$

Increased public transport, urban design

2

Efficiency Electricity

E

$

Increased plant cost

3

CCS Hydrogen

T H

$$$

New infrastructure needed, hydrogen safety issues

4

Wind Electricity

E

$$

Not in my backyard

5

Soil Storage

B

$

Reversed if land is deep-plowed later

6

Biofuels

T H

$$

Bio-diversity, competing land use

7

Efficiency Building

E H

$

House size, consumer demand for appliances

8

Nuclear Electricity

E

$ $

Weapon proliferation, nuclear waste, local opposition

TOTALS

E= 4

T= 3

H= 3

B= 1

13

2. Guess the score each stakeholder group would give your team’s triangle

on a scale of 1 to 5 (5 = best).

Judge

Taxpayers/ Consumers

Energy companies

Environmental Groups

Manufacturers

Industrialized country governments

Developing country governments

Score

2

1

4

5

3

4

Stabilization Wedge Game-board (Hotinski)

RESULTS AND DISCUSSION

Our group discussed and the contributing really substantially. All the members came to a consensus on the choice of wedges that we made. The wedges were selected with a basis of the ease of achieving them and the effectiveness of each wedge. However we agreed that none of the wedges could create the stabilization triangle on its own and also none of the wedges was 100% effective. (Hotinski)

Strategy

Source of Wedge

1

Conservation Transport

Cutting miles travelled by all passenger vehicles in half

2

Efficiency Electricity

Raising plant efficiency from 40% to 60%

3

CCS Hydrogen

Producing hydrogen at 10 times the current rate

4

Wind Electricity

Using area equal to ~3% of U. S. area for wind farms

5

Soil Storage

Practicing carbon management on all world’s agricultural soils

6

Biofuels

Scaling up world ethanol production by a factor of 30

7

Efficiency Building

Using best available technology in all new and existing buildings

8

Nuclear Electricity

~3 times the effort France put into expanding nuclear power in the 1980’s, sustained for 50 years

Each of the 8 strategies above has the potential to reduce global carbon emissions by at least 1 billion tons per year by 2054, or 1 wedge. Using a combination of strategies will be needed to build the 7 wedges of the stabilization triangle.

CONCLUSION

In summary, a single strategy cannot build the entire stabilization triangle. To keep pace with global energy needs at the same time, the world must find energy technologies that emit little to no carbon, plus develop the capacity for carbon storage. Many strategies available today can be scaled up to reduce emissions by at least 1 billion tons of carbon per year by 2054. We call this reduction a “ wedge” of the triangle. By embarking on several of these wedge strategies now, the world can take a big bite out of the carbon problem instead of passing the whole job on to future generations (Masters).

Bibliography

Carbon Mitigation Initiative. " Building the Stabilization Triangle." CMI IN BRIEF (2006): 1.

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Masters, John Randolph and Gilbert M. Energy For Sustainability: Technology, Planning, Policy. Washington D. C: Island Press, 2008.