



(RESEARCH ARTICLE)



## Promotion of CO<sub>2</sub> assimilation by sufficient supply of nitrogen and phosphorous is easiest method to fit Paris agreement and to protect global warming and to get national wealth

Shoichiro Ozaki \*

*Emeritus Professor Ehime University. Department of Resources Chemistry, Matsuyama. Japan.*

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### Abstract

Global warming is caused by retardation of CO<sub>2</sub> assimilation by scare of nitrogen and phosphorous. Developed countries are tried to purify air and water by NO<sub>x</sub> and NP elimination at around 1980. Then CO<sub>2</sub> assimilation is retarded. CO<sub>2</sub> fix is retarded. Agriculture and fish industry are retarded. DGP increase rates of these countries are low. On the contrary, developing countries like China, India and Indonesia, they do not eliminate NO<sub>x</sub> and NP and use as fertilizer. Then CO<sub>2</sub> assimilation is activated. CO<sub>2</sub> fix is activated. Agriculture and fish industries are activated. DGP increase rates of these countries are high. We must promote CO<sub>2</sub> assimilation by complete use of NO<sub>x</sub> and NP in waste water. And addition of fertilizer to the sea will increase CO<sub>2</sub> assimilation and fish production. Promotion of CO<sub>2</sub> assimilation by sufficient supply of nitrogen and phosphorous is easiest method to fit Paris agreement and to protect global warming and to increase DGP and national wealth.

**Keywords:** CO<sub>2</sub>; NO<sub>x</sub>; Protection of global warming; CO<sub>2</sub> assimilation; Fish production; Grain production

### 1. Introduction

The earth is warmed by the fossil fuel burning releasing CO<sub>2</sub> and heat. The plant is growing by CO<sub>2</sub> assimilation absorbing CO<sub>2</sub> producing carbohydrate and O<sub>2</sub>. If we can compensate the generation of CO<sub>2</sub> and heat with the absorption of CO<sub>2</sub> and heat by CO<sub>2</sub> assimilation, global warming can be protected.

About 51 billion tone CO<sub>2</sub> react with water by CO<sub>2</sub> assimilation to produce  $51 \times 30/44 = 34.7$  billion tone carbohydrate and  $51 \times 32/44 = 37.1$  billion tone oxygen per year. Carbohydrate turn to cellulose, tree, plant and plankton. Tree turn to coal, plankton turn into oil in many billion years.

Our human being are burning about 14 billion tone fossil fuel releasing 44 billion tone CO<sub>2</sub> and enjoying civilized life. Animal including fish can live by eating plant and plankton. Animal release about 10 billion tone CO<sub>2</sub> by respiration. Released CO<sub>2</sub> react with water to give carbohydrate. CO<sub>2</sub> is cycling in such way.

\* Corresponding author: Shoichiro Ozaki

Emeritus Professor Ehime University. Department of Resources Chemistry, Matsuyama. Japan.

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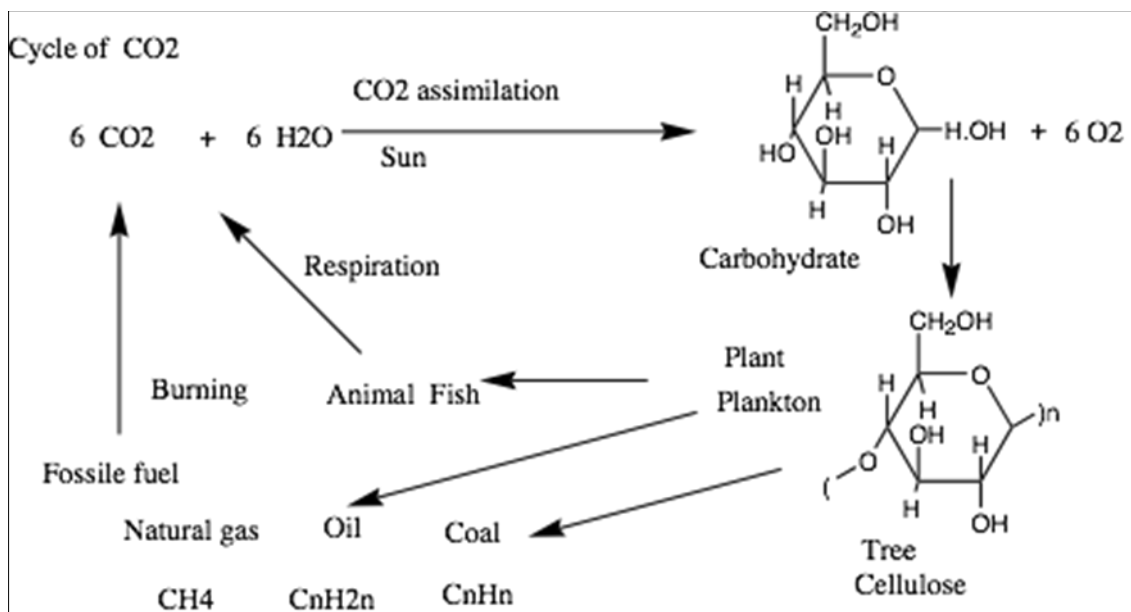


Figure 1 Cycle of CO2

I am insisting that global warming is caused by the lack of nitrogen and phosphorous. [1-50] The lack of nitrogen and phosphorous comes from the elimination of  $\text{NO}_x$  NP at 7 developed countries. The plant makes amino acid, chlorophyll and nucleic acid. It takes  $\text{CO}_2$ , nitrogen, and phosphorous with the same composition (C:N:P = 25:1:0.06) as plant itself. Plankton takes C, N, and P in the ratio of 6.6:1:0.06. Large amounts of N and P are necessary for maintaining plankton growth.  $1/25$  N of  $\text{CO}_2$  and  $1/416$  P of  $\text{CO}_2$  are necessary for plant growth.  $1/6$  N of  $\text{CO}_2$  and  $1/110$  P of  $\text{CO}_2$  are necessary for plankton growth. Nature sets up a system to provide nutrient N. When something is burned or sunder occurs,  $\text{NO}_x$  is produced by the oxidation of N in compounds and by the reaction of  $\text{N}_2$  and  $\text{O}_2$ .  $\text{NO}_x$  is a gift from nature.

Many researchers including Dr. W. Nordhaus (Nobel Economic Science Prize winner) say global warming comes from the increase of  $\text{CO}_2$ . [f 51]

For the first time in the world, the author pointed out the following tree important suggestions.

- Global warming is caused by lack of nitrogen and phosphorous by the elimination of  $\text{NO}_x$  and NP.
- Global warming is caused by the retardation of  $\text{CO}_2$  assimilation by elimination of  $\text{NO}_x$  NP which do assimilation reaction with  $\text{CO}_2$ .
- Global warming can be protected if enough nitrogen and phosphorous are supplied. Most easily available substances are  $\text{NO}_x$  and NP in waste water.

In addition, he proposes the following world-wide important idea to improve the global environment. If developed countries stop the elimination of  $\text{NO}_x$  NP,  $\text{CO}_2$  assimilation is activated, global warming will stop and grain and fish production increases and GDP will increase. Paris agreement,  $\text{CO}_2$  zero and growth can be accomplished sooner than 2050.

If  $\text{CO}_2$  fix by  $\text{CO}_2$  assimilation and  $\text{CO}_2$  emission by burning plus respiration are same, global warming will not happen. But after around 1970, 7 developed countries started  $\text{NO}_x$  elimination and NP emanation,  $\text{CO}_2$  concentration started increase. And global warming started.

Paris agreement asking us  $\text{CO}_2$  emission virtually zero by 2050. This mean

$\text{CO}_2$  emission-  $\text{CO}_2$  fix = 0

$\text{CO}_2$  emission =  $\text{CO}_2$  fix

Global warming protection ratio (GWPR) = CO<sub>2</sub> emission/ CO<sub>2</sub>fix = 1

We can do by reducing CO<sub>2</sub> emission or increasing CO<sub>2</sub> fix.

Majority including 7 developed countries are trying reduce CO<sub>2</sub> emission. But they are not trying to increase CO<sub>2</sub>fix.

I am insisting to protect global warming by increase CO<sub>2</sub> fix by increase of of CO<sub>2</sub> assimilation by stopping NO<sub>x</sub>, NP elimination (Ref 1-50)

William Nordhaus winner of Economic Science Nobel prize give theory that global warming is due to the increase of CO<sub>2</sub>. He proposing the method to decrease CO<sub>2</sub> by store CO<sub>2</sub>(Ref 51). Dr.Tadashi.Watanabe Professor emeritus Tokyo University, expert on CO<sub>2</sub> assimilation is insisting that CO<sub>2</sub> increase is better for protection of global warming(ref 52). Dr H.Ohtake Prof emeritus of Osaka University, expert on phosphorous insisting that P recycle is essential for protection of global warming.(ref 53). Many Nature papers report that CO<sub>2</sub> increase is better for climate control [ 54-74]

CO<sub>2</sub> assimilation is accelerated by fertilizer: nutrient nitrogen and phosphorous..Nature set up the system to change nitrogen gas to nutrient nitrogen , nitrogen oxide by the reaction of nitrogen with oxygen. The reaction need high temperature. High temperature is obtained by burning of something like , fossil fuel or by thunder. By burning ,CO<sub>2</sub> is produced and NO<sub>x</sub> is also produced. The ratio of CO<sub>2</sub>/NO<sub>x</sub> is around 25/1. When 1 tone fossil is burned, 1x 44/14

= 3.14 tone CO<sub>2</sub> is produced. 3.14x1/25 =0.125 tone NO<sub>x</sub> is produced.

When 14.0 billion tone fossil is burned. And 14x 44/ 14= 44.0 billion tone CO<sub>2</sub> is produced. And

44x1/25= 1.76 billion tone NO<sub>x</sub> is produced. By the increase of CO<sub>2</sub> and NO<sub>x</sub> production, CO<sub>2</sub> assimilation is promoted greatly. Some developed countries are eliminating NO<sub>x</sub>. Then CO<sub>2</sub> assimilation is retarded. I wish to describe the relation of NO<sub>x</sub> elimination, global warming, CO<sub>2</sub> assimilation, production of grain, fish and showed the best method to protect global warming(Ref 1-50)).

**1.1 CO<sub>2</sub> assimilation is promoted by Increase of CO<sub>2</sub> and NO<sub>x</sub>**

Since plant growth by CO<sub>2</sub> assimilation reaction . Velocity of CO<sub>2</sub> assimilation is carried out in proportion to the concentration of CO<sub>2</sub>, H<sub>2</sub>O, sunshine, nutrient N, nutrient P as shown by following equation

$$v = A (CO_2) (H_2O) (\text{sunshine}) (N) (P)$$

**Table 1** CO<sub>2</sub>em, CO<sub>2</sub>f, NO<sub>x</sub> em, GrainCO<sub>2</sub> em,co<sub>2</sub>f, CO<sub>2</sub>em, CO<sub>2</sub>f, NO<sub>x</sub>em, Grain, grained, Fish

Year	CO <sub>2</sub> em Hmt	CO <sub>2</sub> f hmt	NO <sub>x</sub> em hmt	Grain hmt	grainInd hmt	Fish mt	FishJ mt	Fish mt	China \$/kg	Fishp GDPgJ
1990	20	20	0.8	--	--	--	--	--	--	--
1920	30	30	1.2	--	--	--	--	--	--	--
1940	50	50	2	--	--	2	--	--	--	--
1960	100	100	4	8.5	0.7	3.5	3.5	1.5	0.2	6
1970	150	150	6	11	1	--	6.2	2	0.4	7
1975	170	170	6.8	12	--	--	9.5	2.5	0.7	6.5
1980	200	150	8	14	1,2	45	11	3	1	6
1985	210	140	8.4	15	--	--	12	4	1.5	1
1990	220	140	8.8	17	1.7	110	9	4	2	--

2000	250	150	10	22	2.2	140	8.5	16	3	1
2005	270	160	10.8	21.5	---	155	5	30	4	1
2010	300	170	12	23.5	2.5	163	4	50	5	1
2017	360	220	14.4	27	5	200	3.2	78	8	1

Since the industrial revolution, burning of fossil and production of CO<sub>2</sub> and NO<sub>x</sub> increased greatly

CO<sub>2</sub> emission, CO<sub>2</sub> fix, NO<sub>x</sub> emission, Grain production, GrainInd (grain production of India), Fish (fish production of the world), FishJa (fish production of Japan, Fish Chi(Fish production of China) Fishp (Fish price in Japan), GDPgJ (GDP growth rate in Japan) are shown in Table 1. (Ref 22-24).

Weight of vegetation of world increased about 2 times since the industrial revolution, Area of tropical rain wood area increased very much since these several 10 years.

Total weight of wood is said to be 80 billion tone.

Zaichun Zou reported the change of global change of leaf area from 1982-2009.Total area of increased green is 18 million km<sup>2</sup>, double of USA area(Ref 54). Many investigators reported that CO<sub>2</sub> increase is good for climate and plant growth (Ref 55-75).

The increase of CO<sub>2</sub> and NO<sub>x</sub> production increased the CO<sub>2</sub> assimilation. The increase of CO<sub>2</sub> will assimilation increased the production of grain and fish. The production of grain in 1960 0.85 billion tone in 2010 2.6 billion tone 3 times.

The production of grain in India increased 5 times from 1950 to 2010. In1950 0.5 billion tone, 1960 0.7 billion tone, 1970 1 billion tone, 1980 1.2 billion tone, 1990 1.7 billion tone, 2000 2.2 billion tone, 2010 2.5 billion tone, CO<sub>2</sub> emission is now 24 billion tone. NO<sub>x</sub> emission increased to 1 billion tone. The increase of NO<sub>x</sub> contributed for the production of 2.5 billion tone grain. Population of India increased 1951 3.8 billion to 2014 12.5 billion. 3, 3 times. grain production increased 5 times.

CO<sub>2</sub>em (CO<sub>2</sub> emission),NO<sub>x</sub>(NO<sub>x</sub> production),NO<sub>x</sub>c(NO<sub>x</sub> concentration at exit gas),GWPR( global warming protection ratio), GDP(GDP increase ratio) of 13 countries are shown in Table 2.

**Table 2** CO<sub>2</sub>em, NO<sub>x</sub>,NO<sub>x</sub>con, Area, FixableCO<sub>2</sub>, GWPR

Country		CO <sub>2</sub> em Hmt	NO <sub>x</sub> hmt	NO <sub>x</sub> con g/kWh	Area km <sup>2</sup>	FixableCO <sub>2</sub> hmt	GWPR inc	GDP ratio
World		360	14.4					
China		106.4	4.25	1.6	1.0x 10 <sup>7</sup>	100	1.0	6.9
USA		51.0	2	0.5	9.5x 10 <sup>6</sup>	95	0.53	1.48
India		24.6	1	1.6	3.2x 10 <sup>6</sup>	32	0.76	7.1
Japan	(2018)	12.5	0	0.1	3.8x 10 <sup>5</sup>	3.7	3.4	1.03
	(1980)	7	0.5	1.6	3.8x 10 <sup>5</sup>	3.7	1.5	7.0
Russia		19.6	0.63		3.2x 10 <sup>6</sup>	32	0.61	0.8

Germany	7.8	0.31	1.0	3.5x 10 <sup>5</sup>	3.5	2.2	1.83
Iran	6.3	0.25		1.6x 10 <sup>6</sup>	1.6	3.9	2.6
Canada	5.6	0.22	1.3	1.0x 10 <sup>8</sup>	100	0.06	1.44
Indonesia	5.0	0.2	1.6	1.9x 10 <sup>6</sup>	19	0.3	5.2
U. K	4.0	0.16	1.3	2.4 x 10 <sup>4</sup>	2.4	1.7	1.8
Turkey	4.0	0.16		7.8x 10 <sup>5</sup>	7.8	0.5	-2
Italy	3.5	0.14	0.5	2.0x 10 <sup>5</sup>	3.0	1.2	0.88
France	3.3	0.13		6.4x 10 <sup>5</sup>	8.4	0.4	1.2

! Km<sup>2</sup> green land can fix 1000 t CO<sub>2</sub>. Fixable CO<sub>2</sub> of the country can be estimated by 1000 x area of the country.

Amount of NO<sub>x</sub> produced at world is 16.8 billion tone. Developed countries are eliminating about 6 billion tone NO<sub>x</sub> producing 10 billion tone CO<sub>2</sub>. 6 billion tone NO<sub>x</sub> can fix 6x 25 = 150 billion CO<sub>2</sub>. Therefore if developed countries stop NO<sub>x</sub>.

fish production of the world will increase. In 1940 20 million tone, in 1960 35 million tone, in 1980 45 million tone, in 1990 80 million tone, in 2000 130 million tone, in 2010 130 million tone, in 2016 200 million tone. China increased fish production. 57 times from 1960 to 2017. In 1960 1.5 million tone, 1970 2 million tone, 1980 3 million tone, 1990 4 million tone, 1997 16.33 million tone 2002 16.33 million tone 2016 78.38 million tone, 2017 85.3 million tone. China produced 106 billion tone CO<sub>2</sub> and 4 billion tone NO<sub>x</sub>. 4 billion tone NO<sub>x</sub> contributed for the increase of nitrogen concentration of sea, and growth of plankton , increase of fish production.

East China sea in now top fishing sea. The three big fishing sea were north Pacific ocean, north Atlantic ocean, west of south America. These sea were rich in nutrient NP caused by countercurrent of deep sea water NP rich deep sea with NP poor surface sea water.

When CO<sub>2</sub> concentration increase, yield of grain increased about 30%. The concentration of CO<sub>2</sub> at green house is kept at 1000- 1500 ppm. Normal concentration of air is 400 ppm. Therefore the concentration at green house is 2.5-3.75 times higher than normal air CO<sub>2</sub>.

The tree at population dense big city growth much rapidly than normal district.(ref 29)

NO<sub>x</sub> is very effective promotor of CO<sub>2</sub> assimilation. Therefore the production of grain and fish increased proportionally to the increase of CO<sub>2</sub> and NO<sub>x</sub>. In 1900 20 billion tone CO<sub>2</sub> is emitted and 20 billion tone CO<sub>2</sub> is fixed. In 1920 30 billion tone CO<sub>2</sub> is emitted and 30 billion tone CO<sub>2</sub> is fixed. In 1940 50 billion tone CO<sub>2</sub> is emitted and 50 billion tone CO<sub>2</sub> is fixed. In 1960 100 billion tone CO<sub>2</sub> is emitted and 100 billion tone CO<sub>2</sub> is emitted and 100 billion tone CO<sub>2</sub> is fixed. After 1980, amount of CO<sub>2</sub> emission and fix become different. Fix amount become smaller than emission.

In 1980 20 billion tone CO<sub>2</sub> is emitted and 18 billion tone CO<sub>2</sub> is fixed. In 1990 22 billion tone CO<sub>2</sub> is emitted and 14 billion tone CO<sub>2</sub> is fixed. In 2000 25 billion tone CO<sub>2</sub> is emitted and 16 billion tone CO<sub>2</sub> is fixed. In 2010 300 billion tone CO<sub>2</sub> is emitted and 160 billion tone CO<sub>2</sub> is fixed. In 2016 360 billion tone CO<sub>2</sub> is emitted and 220 billion tone CO<sub>2</sub> is fixed. Amount of CO<sub>2</sub> fix is 140 billion tone less than emission. This is caused by the elimination of NO<sub>x</sub> and NP. CO<sub>2</sub> assimilation is retarded by NO<sub>x</sub>, NP elimination.

CO<sub>2</sub>em(CO<sub>2</sub>emission),NO<sub>x</sub>(NO<sub>x</sub> production),NO<sub>x</sub>c(NO<sub>x</sub> concentration at exit gas),W dump(Wastewater dumping), GWPR( global warming protection ratio), GDP(GDP increase ratio) of 13 countries are shown in Table 3

**Table 3** CO<sub>2</sub> em, CO<sub>2</sub> fix, NO<sub>x</sub>, NO<sub>x</sub> con, Dump Area Fixable CO<sub>2</sub> GWPR, DGP

Country	CO <sub>2</sub> em hm t	CO <sub>2</sub> fix hm t	NO <sub>x</sub> hm t	NO <sub>x</sub> con g/kWh	W Dump	Area Km <sup>2</sup>	FixableCO <sub>2</sub> hmt	GWPR inc	GDP ratio
World	510	370	16.5	--	--	--	--	--	--
China	106.4	100	4.25	1.6	do	1.0x 10 <sup>7</sup>	100	1.0	6.9
India	24.6	24.6	1	1.6	do	3.2x 10 <sup>6</sup>	32	0.76	7.1
Indonesia	5.0	6.0	0.2	1.6	do	1.9x 10 <sup>6</sup>	19	0.3	5.2
USA	51.0	51	2	0.5	no	3.8x 10 <sup>6</sup>	95	0.53	1.48
Japan (2018)	12.5	3	0	0.	no	3.8x 10 <sup>5</sup>	3.7	3.4	1.03
Japan (1980)	5.5	3.3	0.5	1.6	do	--	--	1.5	7.0
Russia	19.6	--	0.63	--	--	3.2x 10 <sup>6</sup>	32	0.61	0.8
Germany	7.8	3.5	0.31	1.0	no	3.5x 10 <sup>5</sup>	3.5	2.2	1.83
U.K	4.0	2.4	0.16	1.3	no	2.4 x 10 <sup>4</sup>	2.4	1.7	1.8
Italy	3.5	3.0	0.14	0.5	no	2.0x 10 <sup>5</sup>	3.0	1.2	0.88
France	3.3	8.4	0.13	--	no	6.4x 10 <sup>5</sup>	8.4	0.4	1.2
Canada	5.6	100	0.22	1.3	no	1.0x 10 <sup>8</sup>	100	0.06	1.44
Iran	6.3	1.6	0.25	--	--	1.6x 10 <sup>6</sup>	1.6	3.9	2.6
Turkey	4.0	7.8	0.16	--	--	7.8x 10 <sup>5</sup>	7.8	0.5	--

! Km<sup>2</sup> green land can fix 1000 t CO<sub>2</sub>. Fixable CO<sub>2</sub> of the country can be estimated by

1000 x area of the country.

When we look at the countries who GWPR ( global warming protection ratio) is higher than 1 are Japan 3.4, Germany 2.2, UK 2.4, Italy 1.2. These countries are narrow and they cannot fix CO<sub>2</sub> at their countries . They are eliminating NO<sub>x</sub> and NP. Then CO<sub>2</sub> assimilation is retarded. GWPR is over 1. GDP is less than 2., Japan GWPR 3.4, GDP 1.03, Germany GWPR 2.2, GDP 1.83. UK GWPR1.7, GDP 1.8, Italy GWPR 1.2, GDP 0.88,

Developing countries like China, India and Indonesia do no NO<sub>x</sub> elimination and do dumping. They can accelerate CO<sub>2</sub> assimilation. They can fix CO<sub>2</sub> produced at their countries. Therefore GWPR is less than 1. GDP is over 5 . China GWPR 1.0, GDP 6.9 India GWPR 0.76 GDP 7.1 Indonesia GWPR 0.3 GDP 5.2

The countries who has wide green area can fix much CO<sub>2</sub> than emission can have low GWPR than 1. Indonesia GWPR 0.3, USA 0.53, Russia 0.51, Canada 0.06

Amount of NOx produced at world is 16.8 hm tone. Developed countries are eliminating about 6 hm tone NOx producing 10 hm tone CO<sub>2</sub>. 6 hm tone NOx can fix 6x 25 = 150 hm CO<sub>2</sub>. Therefore if developed countries stop NOx elimination, 150+ 10= 160 hm tone CO<sub>2</sub> emission is reduced and global warming can be protected.

NOx elimination can be found by NOx concentration of exit gas. 1.6 g/kwh is no elimination. 0 g/kWh is complete elimination No NOx elimination countries like China, India, Indonesia show low GWPR and high GDP growth rate. On the contrary, high NOx eliminating country like Japan (3.4 1.03), Germany (2.2 1.83) UK (1.7,1.8), Italy(1.2 , 0.88) show high GRPR and low GDP growth rate.

Japan is eliminating NOx, NP most severely. NOx concentration at exit gas is 0 g/kWh. Then fish production decreased from 12 million tone in 1970 to 2 million tone In 1985 by NOx NP elimination policy. And DGP do not increase for 40 years from. 1980.

NOx elimination at exit gas of factory and garbage incinerator should be stopped.

The concentration of nitrogen at sea 100 m deep is 33µg/l p concentration is 13.4 µg/l , concentration of nitrogen at sea of Okhotsk is 20 µmole. At these N concentration plankton growth much.

We can increase N concentration by adding Urea 10<sup>6</sup> tone in 3.8x 10<sup>8</sup> Km<sup>2</sup> area 1/2 m deep, Concentration of urea become 20 µmole. By scattering 50000 tone tripolyphosphate to the sea, concentration of P increase to 0.5µmole. Then plankton growth is activated.

## 2. Method to decrease GWPR and to increase GDP of the world

GWPR, GDP of world at 1860,1980, 2018,2022,2030 and 2050 are shown in table 4 (Ref 33-50)

Table 4 CO<sub>2</sub>em(CO<sub>2</sub> emission),CO<sub>2</sub>fix, , NOxcon(NOx concentration at exit gas),Wd(Wastewater dumping), GWPR, GDP(GDP increase ratio)

CO<sub>2</sub> emission and CO<sub>2</sub> fix was same at before 1975. GWPR was 1. Elimination of NOx and NP started at 1985. CO<sub>2</sub> fix become smaller than CO<sub>2</sub> emission.

GDPR at 1985 was 1.33 and GWPR at 2018 was 1.63.

**Table 4** CO<sub>2</sub>em , CO<sub>2</sub>fix,NOxem,NOxcon, Wd, fertilizer, Fish, Population, GWPR, GDP

	CO <sub>2</sub> em hmt	CO <sub>2</sub> fix hmt	NOx em hmt	NOxcon g/kWh	Wd	fertilizer hmt	Fish mt	Population billion	GWPR	GDP inc.r %
1960	100	100	4	1.6	do	0	--	3.5	30	1
1975	170	170	6.8	1.6	do	0	--	--	40	1
1985	200	150	8	1.6	no	0	--	35	0.46	1.33
2018	360	220	14.4	1.0	no	0	150	73	1.63	1
2022	300	300	0.5	1.6	do	100	300	78	1	4
2030	300	330	0.51	1.6	do	300	500	85	0.9	5
2050	300	360	0.5	1.6	do	500	600	100	0.8	6

By addition of fertilizer 100 hm t and stopping of NO<sub>x</sub>,NP elimination GWPR of 2022 will be 1 If 300 hmt fertilizer is added in 2030 GWPR will be 0.9 and GDP will be 5 %. and if 500 hmt fertilizer is added GWPR of 2050 will be 0.8 and GDP will be 5 %.. These values are ideal value which we are expecting to reach.

### 3. Method to decrease GWPR and to Increase GDP of Japan

GWPR and GDP of Japan at 1980 (no Elimination of NO<sub>x</sub>,NP) and at 2018(Elimination of NO<sub>x</sub>,NP) and 2022,2030 are compared as shown in Table 5 (ref 32-50)

**Table 5** GWPR (global warming protection ratio),GDP of Japan at 1980, 2018,2022 and 2030

	CO <sub>2</sub> em hmt	CO <sub>2</sub> fix hmt	NO <sub>x</sub> em hmt	NO <sub>x</sub> con g/kWh	Wd	TPP hmt	Fertilizer HMT	Fish hmt	GWPR	GDP inc.r %
1980	8	5.5	0.5	1.6	do	0.05	5	11	1.45	7
2018	12.5	3.8	0.1	0	no	0	0	2	3.3	0
2022	10	10	0.5	1.6	do	0.05	10	10	1.0	3
2030	10	12.5	0.5	1.6	do	0.05	20	20	0.8	5
2050	10	15	0.5	1.6	do	0.05	50	50	0.6	7

CO<sub>2</sub>em(CO<sub>2</sub> emission),CO<sub>2</sub>fix, , NO<sub>x</sub>con(NO<sub>x</sub> concentration at exit gas),Wd(Wastewater dumping), TPP (Sodium tripolyphosphate) , GWPR, GDP(GDP increase ratio)

In 1980 CO<sub>2</sub> emission was 8 hm tone, and CO<sub>2</sub> fix was 5.5 hm tone. NO<sub>x</sub>emission was 0.5 hmt. GWPR was 8/5.5= 1.45 and GDP increase rate was 7. At 1980 severe NO<sub>x</sub> elimination and NP elimination were carried out and NO<sub>x</sub> emission was 0. Then CO<sub>2</sub> assimilation was retarded and fish production decreased from 11 hmt in 1980 to 2 hmt in 2018 and GDP increase rate decreased from 7% to 0% in 2018. If Japan government stop NO<sub>x</sub>,NP elimination and start use of fertilizer , fish production will increase to 10 hmt . . GWPR will decrease to 1 and GDP will increase. In 2030 and 2050 if much fertilizer is used, much plankton is produced and much CO<sub>2</sub> is fixed and GWPR will decrease to 0.8 in 2030 and 0.6 in 2050 and GDP increasing rate will increase to 5 and 7 % respectively.

When we look at Table 1 to 4 of Ref 50, decrease of phosphorous by NO<sub>x</sub>,NP elimination might be big reason why fish production decreased. One other reason is use of TPP(sodium tripolyphosphate). Fifty thousand tone TPP was used as detergent additive. In 1980 TN (Total nitrogen) was 12 t/day. TP(total phosphorous) was 60 t/day.and fish production was 11 million tone. And GWPR (CO<sub>2</sub> em/CO<sub>2</sub> fix) was 8/3.5= 1.45. and GDP was 7. In 2018 TN decreased to 3 t/day, TP decreased to 25 t/day fish production decreased to 3 million tone and GWPR was 12.5/3.8= 3.3. GDP was 1. We must decrease GWPR to 1.

This is not easy. We can increase CO. fix by using 0.5 hm tone NP.

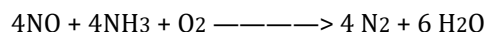
Japan must return to the state in 1980 by stopping NO<sub>x</sub> elimination and by stopping NP elimination and reuse TPP. Plankton grow infinitively if sufficient NP are supplied. Japan is spending about 39 billion \$ for the protection of global warming. If we scatter 30 billion \$ urea and ammonium phosphate to the sea, we can increase NP concentration. We must consider sea and lake as firm .to grow fish and to fix CO<sub>2</sub>. If we supply TPP or ammonium phosphate or Calcium superphosphate to sea and lake, we can activate CO<sub>2</sub> assimilation. We can increase fish production to 20 million tone. 20 million tone. Fish eat 20 times plankton of his weight. Plankton eat same weight CO<sub>2</sub> of his weight.

If we can produce 20 hm tone fish, We can fix 20x25= 500 hm tone CO<sub>2</sub> by the growth of plankton. We can decrease 1200 - 500 = 700 hm tone CO<sub>2</sub>.



#### 4. CO<sub>2</sub> assimilation must be promoted by stopping of NO<sub>x</sub> elimination and by stopping of waste water purification.

In 2015 fossil 14 billion tonne was burned and CO<sub>2</sub> 36 billion tonne and NO<sub>x</sub> 1.44 billion tonne are produced. If we use all NO<sub>x</sub> for the fixing of CO<sub>2</sub>, we can fix  $1.44 \times 25 = 36$  billion tonne CO<sub>2</sub>. But NO<sub>x</sub> is hated as pollution gas causing illness. Many governments of developed countries set up very strict law to eliminate NO<sub>x</sub> in burned gas and forced to eliminate NO<sub>x</sub> using ammonia. To eliminate NO<sub>x</sub>, huge amount of ammonia is necessary and huge amount of fossil is burned. (ref 21)



Elimination of NO<sub>x</sub> is promoting global warming three ways. One is retardation of CO<sub>2</sub> fix. Two is increase of CO<sub>2</sub> by using much butane. Three is consumption of precious fuel for the production of ammonia.

About 0.5 hm tone phosphorous and 10 hm tone nutrias nitrogen are contained in waste water. By using this phosphorous and nitrogen, 100 hm tone CO<sub>2</sub> can be fixed. and 37.5 hm tone plankton can be produced and fish 1.5 hm tone can be produced. Animal eat food containing P and exclude excreta containing P. When toilet disposal and drainage are sent to excreta disposal treatment plant. P in water was made to water insoluble mass, mixed with cement and made to concrete and buried in soil. Plant cannot use P any more(Ref 1,5). This process use huge electricity and consume much fossil fuel. Around 10 hm tone fossil and producing 30 hm tone CO<sub>2</sub>. For the elimination of one phosphorous, about 25 carbon fossil is used and about 25 CO<sub>2</sub> is produced. One phosphorous can fix 56 CO<sub>2</sub> (Ref 10) The phosphorous and nitrogen elimination process should be avoided. Excreta is best food for plant. Ocean dumping, field dumping and forest dumping of excreta are recommended to increase CO<sub>2</sub>( assimilation).

I wish to propose plan that NO<sub>x</sub> elimination should be stopped and waste water purification should be stopped. Then CO<sub>2</sub> assimilation is promoted and food production increase and global warming can be stopped.

#### 5. Heat Balance. Heat absorption by CO<sub>2</sub> assimilation is essential for protection of global warming [29]

On earth 14 billion tonne fossil fuel is burned and CO<sub>2</sub>  $3.6 \times 10^{15}$  t was produced . And  $7.4 \times 10^{15}$  kcal is produced. .

When we consider the heat produced by animal respiration,  $7.4 \times 10^{15}$  kcal x  $4.6/3.6 = 9.45 \times 10^{15}$  kcal is produced. (ref 24)

The earth is also warmed by the heat of atomic energy. Uranium produce  $2 \times 10^{15}$  kcal heat. Electricity generation capacity of the world is 16868 Tetra watt h . Electricity generation by atomic energy is 2086 Tetra watt h. Therefore  $7.4 \times 10^{15} \times 2986/10868 = 2.02 \times 10^{15}$  kcal evolved by atomic energy.

The earth is also warmed by the heat evolved by animal. Human being eat 1000 kcal food every day and release heat 1000 kcal every day. Population of the world is 7.6 billion. Therefore human being is releasing  $1000 \times 365 \times 7.6 \times 10^8 = 2.8 \times 10^{15}$  kcal in one year. Animal other than human being, caw, bird, whales, seal are producing heat. We can estimate as same as human being  $2.8 \times 10^{15}$  kcal .

Fossil burning produce  $7.4 \times 10^{15}$  kcal , atomic energy produce  $2.02 \times 10^{15}$  kcal . Human being produce  $2.8 \times 10^{15}$  kcal. Other animal produce  $2.8 \times 10^{15}$  kcal

15 15

Total heat emission is  $(7.4+2.02+2.8+2.8) \times 10^{15}$  kcal =  $15.02 \times 10^{15}$  kcal

CO<sub>2</sub> assimilation must be promoted by stopping of NO<sub>x</sub> elimination and by stopping waste water purification. By stopping NO<sub>x</sub> elimination. 1.44 billion tone NO<sub>x</sub> can fix  $1.44 \times 25 = 36$  billion tone CO<sub>2</sub>. Amount of N.P in drainage is around 1 billion tone. By using this 1 billion tone N.P, we can fix  $1.0 \times 25 = 25$  billion tone CO<sub>2</sub>. By adding  $36 + 25 = 61$  billion tone CO<sub>2</sub> can be fixed. And we can absorb  $15 \times 10^{15}$  kcal And earth can be cooled down.

### 6. We must protect burn out of fossil

Since industrial revolution, mankind has used a large amount of fossil fuel for manufacturing of food, iron, aluminum, plastic, and fertilizer. Global warming comes from over burning of fossil. Fossil fuel is a fossil of plants made by CO<sub>2</sub> assimilation from CO<sub>2</sub> and water in 5 billion years. Mankind has been using this fossil fuel in 500 years. Yearly use of fossil fuel is estimated to be reduced 25% by COVID-19. Thus, the term of years when oil, natural gas, and coal can be used is extended from 42 to 56 years, from 60 to 81 years, from 121 to 162 years, respectively.

**Table 6** Estimated amount of buried fossil

Fossil	buried amount billion ton	yearly use billion ton	Number of Years capable of use of fossil billion ton
Natural gas	276.9	4.6 → 3.4	60 → 81
Oil	173	4.1 → 3.1	42 → 56
Coal	909	7.5 → 5.6	121 → 162
Uranium			124

Until now, our human being has used 1360 billion tons of fossil which is corresponding to around a half of the total reserves of fossil buried in the earth. The remaining fossil is estimated as 1360 billion tons.

When fossil is burned out, we need not worry about global warming. We must worry how we can live civilized life. How can we drive car, airplane, and agriculture machine? How can we generate electricity? We must save the consumption of fossil. We should not spend precious fossil for the elimination of NO<sub>x</sub> and NP. We must protect burn out of fossil fuel as long as possible.

### 7. Prediction of fossil fuel and life at 2220 (200 years after now)

Human being is using now much fossil as exemplified in the use of 3.4 billion tons of natural gas, 3.1 billion tons of oil, and 5.6 billion tons of coal. About the same amount of remaining fossil as that used so far could be used in the future. However, the remaining fossil is limited. The amount of fossil used every year will become smaller than now. In 2200, a 1/4 amount of remaining fossil will be still available. We must limit the use of fossil to get food like agriculture machine and fishing boat. The number of sailing boats will increase. The number of cars and airplanes will become much fewer. Leisure trip must be limited. The use of fossil for air conditioning must be limited. We must depend on woods. There is 80 billion tons of wood in the world and increasing 1-2% annually. Tree grows quickly if sufficient N and P are provided. We must provide enough NP for the promotion of plant growth.

### 8. Ocean dumping of radioactive substance (ref 39)

The London protocol inhibits the dumping of wastes with more than de minimis levels of radioactivity. Japan was hit by a big earthquake 2011 and some atomic energy facilities released radioactive waste water. In the incident, a large

amount of radioactive substances are produced by decommissioning of nuclear reactor. Dumping of radioactive waste is not possible by London dumping convention. Japan keeping London dumping convention most honestly. Therefore, Japan is producing a large amount of CO<sub>2</sub> (presume 0.3 billion tons) for its treatment and storage to avoid troubles with other countries and yet Japan cannot eliminate such radioactive materials. Japan cannot export agriculture products to other countries, because Japan is keeping radioactive compounds in Japan. Electricity generation by atomic energy in Japan is almost stopping. Japan has no way to eliminate radioactive substances. The only way is dumping of radioactive waste to sea. Sea is wide and deep and infinite dilution is possible. Japan must find methods to dump radioactive substances giving no harm to other countries. Therefore we must find the method for dumping radioactive substances by safe methods. If we can dump radioactive substances without harm, this would be better than keeping radioactive substances that produces much CO<sub>2</sub> and activates global warming following London dumping convention.

By dumping of waste water, we can save the emission of 10 billion tons of CO<sub>2</sub>. We can obtain 1 billion tons of grain and fish. By dumping of radioactive substances, we can save 2 billion tons of CO<sub>2</sub> in emission. Dumping of these substances is better than keeping them in Japan that produces much CO<sub>2</sub> and promotes global warming.

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## 7. Global warming can be protected by promotion of CO<sub>2</sub> assimilation by stopping NO<sub>x</sub> and NP elimination

Paris agreement ask us CO<sub>2</sub> emission and CO<sub>2</sub> fix must be equal bei 2050. GWPR (CO<sub>2</sub> emission/CO<sub>2</sub> fix) must be 1. But global warming is caused by decrease of CO<sub>2</sub> assimilation by lack of nitrogen and phosphorous. Increase of CO<sub>2</sub>fix must be considered first. But 7 developed countries do not try to increase CO<sub>2</sub> fix by stopping NO<sub>x</sub> and NP elimination.

7 developed countries are trying to reduce CO<sub>2</sub> by CO<sub>2</sub> enclosure in depth of earth. Many attempt by Japan government to reduce CO<sub>2</sub> is planned. One is the Production of hydrogen from coal and H<sub>2</sub>O at Australia and carry to Japan by deep cooled tanker. Two is solar electricity generation by the sacrifice of wood. Three is decarbonylation. These attempts consumed much money 300 million \$ each year for 30 years total 80 billion \$, consuming much natural resources and producing much CO<sub>2</sub>, but no positive results were obtained.

If Japan government use this money for the production of fertilizer like urea, ammonium phosphate and spray at sea (ref 50) Then 300 hm plankton grow and 300 hm tone CO<sub>2</sub> is fixed and 20 million tone fish will be produced, Increase of CO<sub>2</sub> fix by promotion of CO<sub>2</sub> assimilation by supply of enough nitrogen and phosphor is easy and sure method to get GWPR 1 and to get national wealth.

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## 8. Conclusion

Promotion of CO<sub>2</sub> assimilation by sufficient supply of nitrogen and phosphors is easiest method to protect global warming.

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## Compliance with ethical standards

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