Global proposals for
Energy Security and Environmental Sustainability

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INTRODUCTION

During the recent years, we have witnessed the appearance of complex and interrelated global issues such as environment, energy, economic development, peace, security, human rights and displaced persons that have posed problems whose solutions are difficult to find within the traditional frameworks of economics. It is worth noting that such historical trend towards the fusion of science and technology would require a new interdisciplinary approach beyond the traditional framework of academic disciplines.

The Fifth Summits of the Americas has included important aspects to be included in the agenda of the OAS. Democracy has historically proven that generates higher degrees of economic growth at global level when it is supported by Freedom (human rights) and based on the Capitalism economic system (economic growth and competitiveness). In addition, individual governments should invest in human development and create long terms programs to guarantee their energy security and sustainable development.

Galilei Consulting has used the methodologies developed by Dr. Lawrence Klein, Economic Nobel Prize, who has studied global economic problems and methods to measure market information and incorporate them into econometric models with the purpose of economic policy formulation and international cooperation. We have run a simulation in 250 countries based on the FUGI (Futures of Global Interdependence) modeling system that was developed as a policy modeling and simulation tool with the purpose to provide global information to the human society and finding out possibilities of policy coordination among countries in order to achieve sustainable development for the global economy under the constraints of a rapidly changing global environment.

Futures of Global Interdependence (FUGI) modeling system have been used since the year 2000 by financial institutions but also could be used to figure out alternative sustainable development of policies in a global and interdependent economy. The econometric methodology was developed by Dr. Akira Onishi, who was finalist of the Nobel Prize in Economics in 2006 for his research in global economic modeling.

Finally, I want to thank the comments and suggestions of Dr. Jerome C. Glenn, co-author of the annual State of the Future report of the Millennium Project of the World Federation of the United Nations Associations. Galilei Consulting has participated since the year 2005 in the expert panel of the 2020 Global Energy Scenarios.

GLOBAL MODEL SIMULATIONS
(GDP GROWTH RATES AND CO2 EMMISSIONS)

The president of the USA, George W. Bush, in his State of the Union in 2006 announced that the USA would reduce its dependence on oil from the Middle East by 75% by 2025. That program required an accelerating breakthrough in advanced energy technologies and announced a $10 billion economic package to develop cleaner, cheaper, and more reliable alternative energy sources. To improve cars, make cleaner coal-burning power plants, reduce carbon dioxide emissions and to diversify energy sources. Because the USA consumes nearly a quarter of all the energy produced in the world, those programs would have a profound impact on the future of energy around the world.

Table 1: Projections of Global Economy (2006-2020)

Annual average growth rates of real GDP (At 1995 prices) unit:%

	2001-2005 (Actual)	2006-2010	2001-2010	2011-2015	2016-2020	2011-2020
World	**2.6**	**3.5**	**3.0**	**2.8**	**3.9**	**3.3**
Developed Economies	**1.9**	**2.7**	**2.3**	**1.9**	**2.9**	**2.4**
Developed Asia-Pacific	**1.5**	**2.2**	**1.8**	**1.7**	**2.9**	**2.3**
North America	**2.4**	**3.2**	**2.8**	**2.0**	**3.3**	**2.8**
Western Europe	**1.6**	**2.4**	**2.0**	**1.6**	**2.4**	**2.0**
EU15	**1.5**	**2.4**	**2.0**	**1.6**	**2.4**	**2.0**
Developing Countries	**4.5**	**5.5**	**5.0**	**4.8**	**5.5**	**5.1**
Asia-Pacific	**6.1**	**7.0**	**6.5**	**5.6**	**6.4**	**6.0**
East Asia	**6.9**	**7.4**	**7.2**	**5.7**	**6.7**	**6.2**
China: Mainland	**9.6**	**9.2**	**9.4**	**7.2**	**8.0**	**7.6**
Southeast Asia	**4.3**	**5.7**	**5.0**	**4.5**	**4.8**	**4.7**
Middle East	**3.2**	**3.5**	**3.3**	**3.8**	**3.2**	**3.5**
Africa	**3.3**	**3.3**	**3.3**	**2.7**	**2.9**	**2.8**
North Africa	**3.2**	**2.4**	**2.8**	**3.1**	**2.4**	**2.7**
Latin America & Caribbean	**2.3**	**3.2**	**2.6**	**3.0**	**4.7**	**4.0**
Economies in Transition	**5.3**	**5.1**	**5.2**	**4.2**	**4.4**	**4.3**
South-Eastern Europe	**3.6**	**4.3**	**3.9**	**3.2**	**4.3**	**3.9**
CIS	**6.5**	**5.6**	**6.0**	**4.7**	**5.1**	**4.9**
Russian Federation	**6.1**	**5.4**	**5.8**	**4.4**	**5.2**	**4.8**

SOURCE: GALILEI CONSULTING

Notes: Projection periods are 2008-2020. This projection has been made at the end of 2007.

- Based on the simulations of the Global GDP growth rates presented in TABLE 1, we have constructed our own forecasting of Global CO2 emissions presented in TABLE 2. We have assumed that the C02 emissions are derived from fossil energy use.
- Fossil energy consists of oil, coal and gas. The contribution rates of each category to CO2 emissions are calculated by three main factors: 1) The highest CO2 emission energy is coal; 2) The lowest C02 emission energy is gas; and 3) Oil is situated in medium.
- The future levels of CO2 emissions have a large degree of “fluctuations” not only in accordance with various policy scenarios and technology innovations but also on alternative energy and fossil energy savings.

Table 2: Projections
Global CO_2 emissions from fossil energy use, 2000-2020

Unit MTCE

	2000	2005	2010 Projection	2015	2020
World	25811.54	30412.06	37188.49	42978.96	51809.93
Developed Economies	11745.08	12560.35	13766.47	14443.52	16399.47
United States	5690.92	6135.11	6625.20	6881.93	7804.61
Developed Asia-Pacific	1716.34	1825.48	2017.04	2098.5	2411.88
Western Europe	3794.09	3993.92	4440.85	4715.38	5308.00
EU15	3713.28	3909.55	4333.84	4619.95	5209.56
Developing Countries	11013.83	13901.85	18295.95	22225.18	27506.31
Asia-Pacific	7056.97	9580.49	13163.22	16070.44	20037.91
East Asia	4828.49	6828.21	9479.60	11185.81	13097.98
China	3876.76	5588.39	7937.13	9390.92	10951.84
Southeast Asia	1026.01	1250.35	1723.2	2223.51	3047.61
Middle East	1146.39	1380.51	1682.05	2126.8	2684.59
Saudi Arabia	372.17	380.54	393.63	458.35	491.58
Africa	868.78	920.13	1022.98	1132.14	1253.01
North Africa	295.53	332.19	369.4	407.47	451.68
Latin America and the Caribbean	1610.27	1619.88	1915.16	2264.66	2779.11
Economies in Transition	3052.63	3949.87	5126.08	6310.25	7904.14
South-Eastern Europe	262.47	328.69	404.93	492.80	593.21
CIS	2072.72	2891.13	3726.36	4556.76	6017.65
Russian Federation	1385.34	1847.02	2322.59	2769.32	3808.63

SOURCE: GALILEI CONSULTING

Notes: Projection periods are 2008-2020. This projection has been made at the end of 2007.

- Table 2, shows the projections of CO2 emissions from fossil energy use during 2000-2020. It's interesting to note that annual average increasing rates of global CO2 emissions for the period 2010-2020 will not so much decrease compared with the period 2000-2010.
- Another interesting predictable effect is that increasing rates of CO2 emissions from the developed economies tend to be stabilized. While developing countries as well as transition economies will experience much higher rates of CO2 emissions than developed economies during the period 2010-2020.
- As a result, global CO2 emissions from fossil energy use will be increasing steadily from 25,810 MTCE (metric ton canon equivalent) in 2000 to 51,810 MTCE in 2020.
- A relevant point is that CO2 emissions from China will surpass the ones from the USA (the world largest CO2 producing country) by the year 2010; although annual average increasing rates of CO2 emissions from China will decrease from 7.4% during 2000-2010 to 3.3% during 2010-2020.

GLOBAL ENERGY ALTERNATIVES

Energy alternatives consist of all sort of energy excluding fossil energy. For instance, it includes nuclear, biomass, solar, batteries, and other renewals and superconductor. Currently, nuclear energy plays a greater role in developed countries; nuclear energy could become one of the most important transition energy sources until new clean energy sources could appear. Developed countries have initiated research and development in new energy alternatives in technologies that would reduce the demand for fossil energy. Solar energy will play a much greater role in countries where new technology frontiers in HC (hybrid cars) and EV (electric vehicles) will be rapidly expanding. Super conductors use natural electric phenomena of super conductivity where electric resistance of materials becomes zero. Intensive research for super alloy to induce superconductivity in relatively moderate temperature, actually super express trains using super conductor have been tested in advanced countries.

Among the developing countries, Brazil like agricultural rich country will play a greater role in using biomass in place of fossil energy. Brazil is the world leader in ethanol production; 70% of its car purchases were flex-fuel vehicles in 2006; its ethanol exports could be $1.3 billion in 2010. Bolivia and Venezuela had continued to nationalize their oil and gas industries. Biomass could increasingly replace petroleum if environmental pollution and food prices are not raised too much. Cogeneration using waste heat can also make contributions to energy production. Environmental movements may try to close down fossil fuel industries, just as they stopped growth in nuclear energy 30 years ago. Other alternative technologies that show potential applications in the future are: 1) Nano-tubes; 2) Solar farms 3) Plastic nanotech photo-voltaic; 4) Wind energy; and 5) Space solar power satellites.

China has succeeded in creating high economic growth performance and enjoying extraordinary large amount of foreign exchange reserves. But China would become the world largest CO2 emission country by 2010 and we expect that China will confront serious environmental issues if proper policy measures for environment protection are not introduced urgently. In order to cut back global CO2 emissions, we should confront the dilemma of sustainable development of the global economy. A “Global Zero” growth rate may cutback CO2 emissions but could not solve trade-off between environment issues and desirable development of the global economy. The results from our global simulations complement the ones reported by the Nobel Peace Prize, Al Gore: **cutbacks of global CO2 emissions is a prerequisite against global warming.** In order to cutback global CO2 emissions, it should be needed international co-operation and co-ordination for a development strategy.

Global efforts to co-operate and co-ordinate the policies toward cut back of CO2 emissions by technology innovations for developing alternative energy and energy savings, will not achieve the global targets without the leading effort of the major CO2 emission nations (USA and China). It is important the cooperation of developing countries, but we expect that their efforts would focus on to develop their economies in order to overcome poverty and that they will assign a lower priority to environment protection. Advanced economies should offer higher levels of Official Development Assistance (ODA) and technical co-operation to developing countries. Technological transfers from advanced to developing countries are pre-requisites in order to achieve the target of cut back global CO2 emissions. Advanced economies should make utmost efforts to increase Research and Development (R&D) and dedicate financial resources for alternative energies and energy saving technologies. Our global simulation reports that not only an increased R&D with financial resources will increase the rates of development of the global economy but also decrease global CO2 emissions and then there is a hope that the global warming effects could be prevented and to reduce the risks of major climate changes.

RECOMMENDATIONS

We consider that the **Concept Paper** prepared for the Fifth Summit of the Americas has correctly identified and addressed the challenges that the region is currently affronting.

1) Country members of OAS should strengthen energy security and protect their environment; **OAS should develop a framework for energy efficiency standards**, sharing technical information, transfer knowledge about biofuels in the region, and enhance electricity networks, an promoting the used of hybrid vehicles. Individual government should explore opportunities to reduce barriers and to expand clean energy technologies and reduce carbon dioxide emissions.

2) We do believe that the agenda of the OAS should **not only focus on the efforts within its country members** but also promote an urgently global effort to affront global energy security challenges and global climate change risks. As has been presented by the Nobel Peace Prize, Al Gore, there are various global challenges in those areas that would require international and regional policy coordination.

To affront climate change and energy challenges the world really requires **a Global Energy Architecture (GEA) a global strategy led by the USA and China.**

- During the first phase of the creation of the GEA, the **USA and China** should focus their efforts and designate financial funds to promote Apollo-like projects and Research and Development (R&D) projects.
- A second phase of the creation of the GEA could include the creation of a World Energy Organization (WEO). WEO could be a required institution but by itself would not solve the urgent problems of global energy and global climate change without the previous real commitments of the **USA and China.**

We truly believe that the OAS should promote a **global strategy led by the USA and China** to create an Apollo-like project and R&D strategy to affront climate change and create technologies to affront energy security future requirements. The benefits for the OAS members are clear: they are going to receive financial funds and transfers of high energy technologies that could be shared within the OAS.

3) The OAS should promote that individual government will apply **quality of laws methodologies and rational economic principles** to improve the future efficiency of their government laws. Quality of laws includes the analysis of cost/benefits for laws and rational economics (derived from the work of Dr. Robert Aumann, Economic Nobel Prize 2005) involves the use of long-term economic models, environmental principles and rational agent's analysis; used by governments to formulate policies and create new laws. We have already registered practical efforts on that direction, led by a new generation of law makers and policy makers that will be committed to improve energy security, environmental conditions and long-term economic sustainability in their countries.

4) We consider that in a globalizing world, expansion of both trade and private foreign direct investment will play a greater role of increasing economic growth rates of the global economy. **Expansion of private foreign direct investment coupled with ODA from developed countries**; in particular, appropriate technical cooperation should increase real GDP growth rates of developing countries in coping with poverty at the global level. Poverty is one of the major causes of international instability for peace and security. We hope that in Latin America, the negative sentiments against private foreign direct investment could gradually swift into friendlier host country sentiments to take advantage of international financial markets and an interdependent global economy.