Nippon Poly-Glu Co.,Ltd.

To Clean Water
to All The World's People

Retrospect and Prospect of Nippon Poly-Glu's BOP Business in Bangladesh

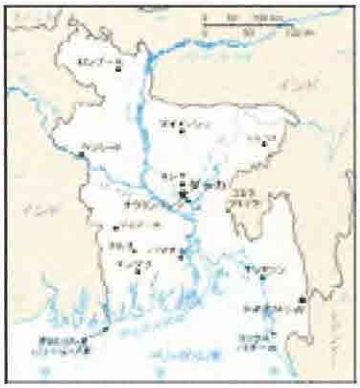
September 2011

Always Awaiting Smiley Faces (Barguna District, Bangladesh in 2011)

Introduction

It has been 4 years since the start of our business in the rural town Barguna, a day away from Dhaka by any means of travel.
We repeatedly failed to implement our business plans worked out in Japan for the first two and half years. But, we started getting good result only when we ran our business while considering the ideas given by the local staffs.
In the first two and half years, these local staffs seldom worked according to our instruction. They used to promise to work according to our instruction in our presence but seldom kept their promise in our absence.
We had to tolerate their frequent failure to keeping promises very patiently. Thinking back now, we wonder 'What a nightmare it really was!'
Why this present spirit came into being among them?! A brief reply of this question is presented here in this retrospect for the people dealing with BOP Business.

Bangladesh at a Glance



Population	152,221,000 (World's 7th Largest)
Official Language	Bengali
Capital	Dhaka
Area	144,000 km^2
	(Equivalent to the cumulated area of Hokkaido, Shikoku and Kyushu)
Administrative Units	6 Divisions, 64 Districts
GDP	US$ 81.9 Billions
Chief Industries	More than 62% of the whole population work in the agricultural Industries and 70% of the population are living in the rural areas.
Population of BOP Level	Above 80%
Water Environment	Unhygienic Tube-Well Water, Pond Water, Canal/River Water
	30,000,000 People reported to be arsenic exposed

Our Business Area: Barguna District under Barisal Division,
Population-500,000 Average Monthly Income of every rural household-¥2,000～¥5,000

Main Town of Barguna District

Typical Village of Bangladesh

Woman boiling rice with pond water

Woman getting water from a tube-well

From the Beginning to the Present Day

(1) Visit to the the Cyclone 'Sidr' Affected Area in 2007 ~ 2008

During this Great Disaster approximately 3,256 lives died, 880 were missing, and 39,756 were wounded. Our company sent our staffs to the affected area Barguna to facilitate safe drinkable water purified with our technology. During this time, our staffs set up simple water plant for the local people.

Mass Grave of the People died of the Cyclone

Bothie (Small Shelter House)

Local people and the children were so happy to see such clean water for the first time.
And, many of them were telling how they could buy our product for clean water. That was the beginning of our challenge to BOP Business.

Simple Water Treatment Plant

Children happy to see clean water

We visited the households unable to get water from the water treatment plant due to far distance from their houses to the plant and supplied them with small & simple water treatment devices free of cost after demonstrating the usage of our water treatment agent.

Children Purifying Water with our Water Treatment Agent

Children and Simple Water Treatment Device

(2) Local Water Sellers in 2008

In the beginning, we entrusted the responsible people of mosque and the local water sellers with selling of our water treatment powder at the rate of 100 BD Taka per 100gm. 1000 liter of water can be purified with this 100gm.
There are also some people who carry water with Van Rickshaw from pond to different households, shops etc for money. They sell each 18 liter Tin for 4 BD Taka. Around 50 people were found to be doing this business. We arranged for selling the same quantity of water but purified with our water treatment devices set up by the pond for 7 Taka through these people.

Though we were getting good responses in the beginning, after 1 ～ 2 months our treatment devices were stolen away. Same thing also happened to the plant installed by the mosque. Our water treatment was sold away otherwise and parts of the plants were taken away.

Our Water Treatment Plant by the Mosque

Scenario of Water Intake from Pond

Water Carrying and Selling People

Even Taps of the Plant were stolen away

(3) Birth of the 'Poly-Glu Ladies' in 2009

After 2 years since the Sidr, we received a letter from the family of Fatema who had been using our water treatment agent, saying 'our diarrhea has improved, skin disease also has got cured, and when we go to school while taking clean water, our other friends want to get the same water even if they need to purchase it'.

▲ Fatema Using our Water Treatment Agent

'Poly-Glu Ladies' were first born out of this letter of appeal from Fatema. In the beginning, number of Poly-Glu Ladies was 8 including Fatema's elder sister. Also, an office was opened in the town of Barguna and a male manager was appointed accordingly. But, sales still remained minimum.

First 8 Poly-Glu Ladies

Management of Poly-Glu Ladies

Person in Charge in Japan

MD. MONIR UDDIN

Obtaining BA and MA from the University of Dhaka in 1995 and 1997 respectively, attended a one-year training program in Japan in 1998～1999. Served to the Institute of Modern Languages, University of Dhaka from 1999 to 2002. Obtained MA in 2004 from the Osaka University of Foreign Studies and PhD in 2008 from the University of Osaka.

I started realizing the inferiorities of my own country and the superiorities of Japan only when I came to Japan as a foreign student. Since then, I had always been thinking of development of my country. In the meantime, in March 2008 I as an interpreter accompanied the chairman of Nippon Poly-Glu during his visit to Bangladesh and ultimately got appointed in this company with the aim that even though a little contribution could be made to the improvement of water environment of my country. I would like to devote myself to the cause of my home country.

Person in Charge in Barguna, Bangladesh

Mohammad Mashiur Rahman Miraj

Obtaining BA and MA from Chittagong University in 2005 and 2006 respectively worked at the Dhaka Paramount International School from 2007 to 2008. Then, after a short service at the NGO SAP Bangladesh working as Manager of Nippon Poly-Glu since January 2010.

I came to know about the activities of Nippon Poly-Glu during my job hunting at my home district after graduating from my university. Eventually I contacted with the responsible person of Poly-Glu with the hope that if I was given opportunity to expand this technology in my home district. Now I am proud that I am engaging in such works which contribute to the improvement of local water environment, economic independence of the rural ladies through their employment.

Training Program for Poly-Glu Ladies

Newly appointed Poly-Glu ladies are trained by their senior Poly-Glu Ladies and the manager. They are mostly trained on usage of our water treatment agent, hygienic matters, quality of raw water, report writing, communication skills etc.

Scenario of Training to New Poly-Glu Ladies by a senior Poly-Glu Lady

Activities of Poly-Glu Ladies

Poly-Glu Ladies sell our product door to door while demonstrating its usage and explaining the importance of safe water. During their door to door sales, they also record the customers information such as their profession, income etc.

During their home visit sales activities, they also open such an umbrella in which there is written **'Safe Water is indispensable for life and Poly-Glu is a must for your safe water'** Opening of an umbrella while door to door sell by Ladies, is a very popular phenomenon in Bangladesh.

Poly-Glu Ladies are very proud of their work.

Voices from the Poly-Glu Ladies and the Consumers

'80% of the people we visit purchase our product'
'Diarrhea of my children has improved'
'Skin disease has been cured for using the purified water for shower'
'Rice boiled with the purified water is delicious'.
'Poly-Glu Ladies who have got chances of getting out of their homes for becoming Poly-Glu Ladies are now looking better'.
Some are also saying 'We have got to be confident of ourselves through our works as Poly-Glu Ladies'.

<Local Changes>

Local children greet us with the Osaka dialect like the words **'Maido(Hello)'** **'Ookini (thanks)'.**
They also even remember the names of our Japanese staffs.

Also, whenever we go, many children gather there. Oda is there behind.

(4) Investment Facilitation Program (Pilot Project) under the Minsitry of Economy, Trade and Industry (METI) in the year 2010.

While struggling with our business in Bangladesh our proposal of pilot project under the support program of Investment Facilitation by the METI was luckily accepted. By that time we were running our business with the support of local agent. But when it was known that we were also going to be supported by the Japanese Government, we were now getting more trusted by the local people which eventually accelerate our business. Our pilot project was executed by the name of 'Primary School Based Community Water Treatment Plant'.

[Specificaitons]

- Efficiency: 1,000 Liter/Hour
- Intake System of Source Water: To intake water by the pump driven with electric generator.
- Flocculation Treatment System: Manually adding the water treatment powder PG α 21Ca in the source water and then stirring manually.
- Outlets (taps) of Treated Pure Water: 4
- Ultraviolet Device for sterilization

We want the children understand the importance of water by supplying them with safe water.
This Plant is run under the supervision of the 'School Managing Committee'. And, a business model for selling the water even outside the catchment area of the school is also under consideration.

The data obtained from this Pilot Project under the METI may also be helpful references for launching BOP business in the other countries of the world. Supply of safe drinkable water is possible only on the expenses of the consumers while requiring no financial liabilities of the government. Even profit can be made after deducting the plant cost, water treatment agent cost, running cost and staff salaries if this WHO standard water is sold at the rate of ¥4/10L.

The results of the Support Program of the METI that must be noted are:

① It was very difficult for a medium size company like us to get the recognition etc of the local government but now it has become easy to get the support of the local government through this project of the METI.

② Our company gained high credibility through the seminars held at Barguna, Chittagong and Dhaka. These seminars arranged by AOTS were mainly attended by the local influential people, concerned government officials and Water Business concerned people.

AOTS Seminar (Chittagong)

AOTS Seminar (Chittagong)

300 head masters of local primary, junior high and high schools attended the seminar held at Barguna. Most of the head masters who attended the seminar sent us request letters for installing water plants at their respective schools while appreciating our technology and the concept.

Scenario of the Seminar attended by the local Head Masters.

Head Masters visiting the Water Plant

Business Profit Specification of a 20MT/Day Water Plant (WHO Standard Water Quality)

Income ◎ ¥7,700.00/Day in case of delivering water to 1,500 households (once in every 3 days)

Expenses ● Daily Expenes Total ¥7,056.00

Every Day Depreciation of Plant
(Depreciation in 5 years at the rate of 15% annual interest) ¥ 536.00
Water Treatment Agent ¥2,400.00
Staff Salaries (Operators, Poly-Glu Ladies and Delivery Boys) Total ¥3,520
Fuel and Maintenance Cost ¥600.00

1,500 households/6,000 people can be provided with safe drinkable water by each water treatment plant. Employment of at least 16 people including 6 ladies may be created in every plant.

※ Installation of water treatment plants at 181 schools in the district of Barguna is under plan. If this plan is implemented, a lot of employment will be created together. And, that will be true Win-Win-Win Business.

※ Worlds BOP Business Content

Seminar in Japan attended by the water specialist from Bangladesh

A 10 Days Training Program was conducted in Japan for water related specialists from Bangladesh. Trainees were telling that they will optimally apply their knowledge gained from the Advanced Technology in Japan.

Japan Visit of the Poly-Glu Ladies

Poly-Glu Ladies and the manger also visited Japan to attend a training program.
During their Japan visit, they also made courtesy visit to the Chairman of Osaka Chamber of Commerce, attended international exchange program with the local Japanese students, reported on their daily lives and business activities at the seminars held in Tokyo and Osaka and did model demonstration as Poly-Glu Lady.

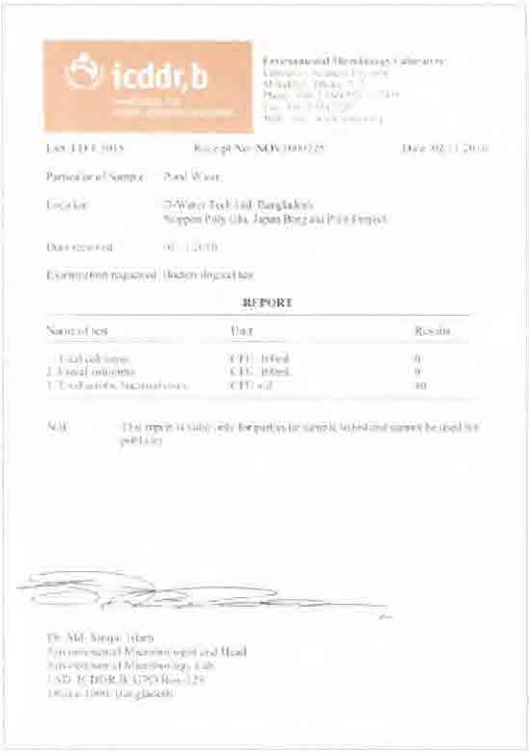
Courtesy Visit to the Osaka Chamber of Commerce

Comments of the Poly-Glu Lady 'Nilufar' in the Magazine 'AERA'

Until now, we could not even dream. But, after my visit to Japan, I have got the dream that 'If I could make my country Bangladesh as beautiful as Japan. And, for implementing of this dream, I want to apply and tell others my knowledge obtained in Japan.'

Model Sales Demonstration by the Poly-Glu Ladies at the Seminar

③ Test results of our purified water at different recognized institutions in Bangladesh



icddr,b

REPORT

Test Result from International Center for Diarrhea Disease Research, Bangladesh (ICDDR, B)

BANGLADESH STANDARDS AND TESTING INSTITUTION

Test Result from Bangladesh Standard and Testing Institute

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
DEPARTMENT OF CIVIL ENGINEERING
ENVIRONMENTAL ENGINEERING LABORATORY

Test Result from Bangladesh University of Engineering and Technology

We distributed water to the students to drink at school as well as at their homes. But, as it was difficult for the students to carry water to their home along with their texts etc, we arranged for delivering water to their home by our staff. In fact, this delivery system was introduced according to the proposal made by the local people for the first time.

Delivery of Purified Water

Water Delivery Staff

Local staffs themselves thought about the uniforms of the delivery staffs.

(5) Selling Water Outside School Community from 2011

The proposal of selling water to the people outside of school catchment area was also approved instantly. For the school community the price is ¥4/10Liter while it ¥5/10Liter for the people outside of school community. Through this system, an Water Plant of 15MT/Day can even bring profit to the school after paying back the installment expenses at the rate of 15% interest in a 3 years plan and maintaining running cost of the plant including staff salaries. Our present plant of 10MT/Day is soon going to be on a profit track. By the way, selling of our water to local restaurants, hotel, small shops and drug stores has also started. These all have been done as per the proposal from the local staffs.

Our water on sale at a small store

Our water on sale at a drug store

It might be thought that Poly-Glu Ladies may loose their job of selling our water treatment agent door to door. But, they are now doing marketing activities and collecting money from the customers. We think that Poly-Glu Lady can help market research of some other products from Japan.

※ So, entrepreneurs interested to make market research through our Ploy-Glu ladies are requested to contact to "info@poly-glu.com".

Commemorative Photo of Poly-Glu Ladies during their training in September 2010

Japanese media men visited Bangladesh and covered our activities.

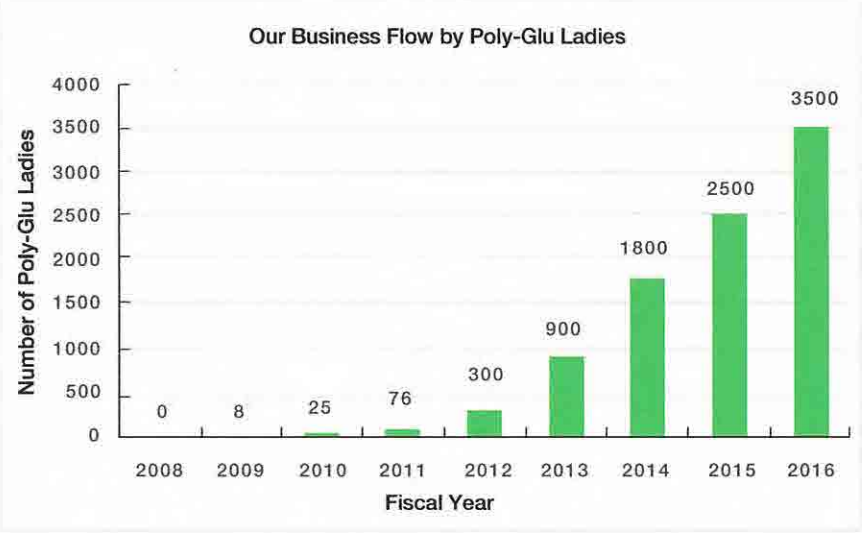
June	2008	Documentary Film 'GAIA NO YOAKE' by TV Tokyo
December	2008	Year End Special Documentary 'GAIA NO YOAKE' by TV Tokyo
December	2009	Year End Special Documentary 'GAIA NO YOAKE' by TV Tokyo
February	2010	Business Report 'World Business Satellite' by TV Tokyo
March	2010	Business Report 'Morning Satellite' by TV Tokyo
June	2010	'Sekai Wa Ima (Current World) by JETRO Global Eye
December	2010	Close Up Gendai by NHW World
August	2011	Wake UP Plus by Nihon TV
September	2011	GREEN STYLE JAPAN by NHK WORLD

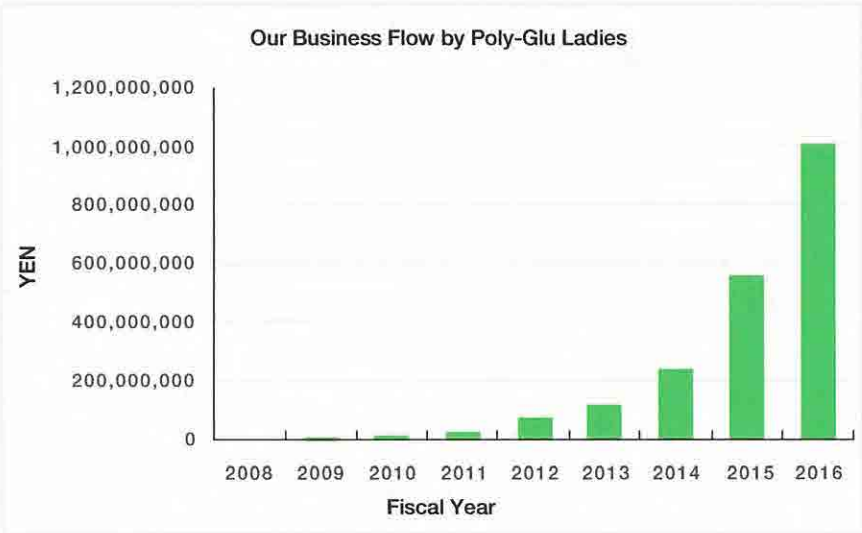
Our Future Plan

In Bangladesh, except our business in Barguna through a local agent, we have already formed a local company to expand our business throughout the country.

We have also started extensive research on the basis of the data already obtained at Barguna for expanding our business throughout the country.

【 Our Achievements and our Expectations 】





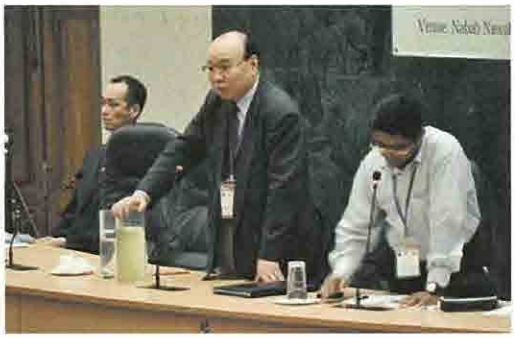
Conclusion

Our business in Bangladesh is growing out of our imagination.
Local company has already been established keeping the head office in the capital city of Dhaka.
So, it is a beginning of the challenge of the business turn over of 1 billion Yen per year after 5 years. Our company has been able to reach at today's position only because of the support of the METI. Particularly, Investment Facilitation Program in cooperation with AOTS helped a lot for our success.
This one year program has accelerated our business to such degree that could not be achieved even in 3 years. Our company in the foreign country is being popular with the support of JICA, JETRO, AOTS etc. So, we can say it is the result of ALL JAPAN EFFORTS. Though failed repeatedly in the previous years, a very bright possibility of success is about to come as the local people and the local government are now sincerely cooperating with us. For success of BOP business, ALL Japan Efforts and Local Understanding & Supports are must.
With this view, we get 100 Students of the International Volunteer University Association to join a Program namely 'Mission Clean Dhaka' along with the other 100 students from the University of Dhaka. In this program, students from both the countries worked together while sweating them and making mutual understanding. Local media also covered their activities quite enthusiastically.
The result of this program was out of imagination. Students of both countries are still contacting with each other for betterment of their respective countries.

We received cooperation from the Chief Representative of JICA Bangladesh, Ambassador of Japan to Bangladesh and the Vice Chancellor of Dhaka University.

Big success comes only when the investing company gets support from government and society of the target country.

Scenario of cleaning activities by the students of both the countries at a local park in Dhaka



Lecture at a Symposium

Students of Japan and Bangladesh reluctant to leave each other

Scenario of Pond Purifying Operation by Nippon Poly-Glu

Like 'teaching how to fish rather than giving a fish', we prefer the WIN-WIN-WIN Business rathr than giving temporary aid for eradicating poverty from this world. Believing in 'Quick start though in a small scale', we have already dispatched our young staffs to India in April, to Kenya in August and to Uganda in September for Feasibility Study of our BOP business. Dispatching of Staffs also to Philippines, Pakistan and Peru in this year is under consideration. We do not think that the same process that brought our success in Bangladesh will be applicable in the other countries. But, one thing can be confidently mentioned that BOP business must succeed at last despite repeated failure in the beginning. We could learn 'Success is as near as quick start'.

I want the Japanese other business enterprises jump into this market of 4 billion consumers as soon as possible. I believe that the future of Japan lies in gaining of the BOP Market.

Safe Drinkable Water for All the World's People

Dr. Kanetoshi Oda
Chairman and CEO
Nippon Poly-Glu Co., Ltd.

アフリカ諸国の外交団へのメッセージ
私達の水事業を支持してください。
A Request to the Diplomats of the African Countries for Support for Our Water Program

Oct 14　2011

Dr. Kanetoshi Oda
Chairman & CEO,
Nippon Poly-Glu Co., Ltd

“Safe Drinkable Water for All” それが、私達の夢です。
2011 年バングラデシュでの「経済産業省（METI）」との実証事業で、この夢が実現出来ることが公に証明されました。WHO の飲料水基準をクリアした安全でおいしい水を供給できる装置が完成しました。無料ではありませんが誰にでも払える低価格で供給が可能です。

Our dream is “Safe Drinkable Water for All”. It has been proved through the Pilot Program of the Ministry of Economy, Trade & Industry (METI) that the implementation of this DREAM is possible. The water provided during this pilot project was of WHO standard. Though not free of cost, a nominal price has been fixed to be easily purchased by any one.

装置から供給される安全な水を 1 日 10L 配達し、一軒あたり 1ヶ月の負担は US$1.5 になります。この価格は、浄水装置、発電機、予備品、浄化剤などの減価償却費、浄水、燃料、配達販売等に従事する職員の給料、税金など全ての経費を含んでいます。標準型で 1500 世帯約 6000 人に安全な水を供給することが出来ます。

Monthly expense for water is only US$1.5 at the rate of 10L/Day. All the expenses like maintenance cost, labor cost, gasoline cost etc are included in this price. A standard plant can supply safe water to 1,500 households/6,000 people.

装置の製造は貴方の国の企業と提携するか、私達が工場を建設します。この価格で現地の管理者には “30%の利益” が得られます。この利益を “買えない貧困層” に無料で与えることも私達の次の夢です。他にも良いことがあります。標準の 1 装置で雇用を 20 名～30 名創出することが出来ます。貴方の国で 1000 の装置が普及すれば 30000 人の雇用が生まれます。

Plant can be built up either by the local company or by our company directly. Local management can earn 30% profit from this price. Our dream is to use this profit for the people who have no ability to purchase. There also many other good things. For example, employment of 20~30 people will become possible in every plant. If 1,000 plants are set up in your country, employment of 30,000 people would be possible.

METI　の実証実験の装置
Plant of METI Pilot Project

量産タイプ (High Volume Production)
90% cost reduction possible by local production

世界の水問題の解決は急がねばなりません。
私達の技術があれば、貴方の国の政府負担は不要です。
“水は高くつくのだ、誰かの援助が必要だ” との考えは
今日から捨ててください。
貴方の国が独自に解決できる問題です。
World water problem requires an urgent solution. Your government will not have to bear any financial burden if our technology and concept is adopted. Let us give up the attitude that water is expensive or support is necessary for water. It is a problem that can easily be solved by your country alone.

私達の会社は小さくて、すぐに多くの国に進出する事は出来ません。
しかし、急ぎたい気持ちから “Small But Quick Start をモットーにケニアとウガンダには半年前から準備のために優秀な若者を駐在させています。 私も、12月にはアフリカに行きます。 私達の技術を信頼して、夢の実現に協力して下さる国には優先的に駆け付けます。 貴方の国の専門家をご紹介下さい。
Our company is too small to solve the whole world’ s problem immediately.But, as I want to do it as soon as possible, I have started with the motto of “Small But Quick Start” and have already dispatched young staffs to Uganda and Kenya. I will also visit Africa in December. I believe that people of those countries will trust my technology and help me implement my DREAM.

配達人の様子
Water Boys delivering water

ポリグルレデイの販売風景
Poly-Glu Ladies are selling

※１装置、１日あたり５トン～500トンまで
水の販売価格はほとんど変わりません。
There will be very little change of selling price of water according
to the efficiency of the plants ranging from 5MT to 500MT.

きれいな水で喜ぶ人たち
People happy with clean water

Policy Dialogue on Climate Change in Africa 2011

Toward the Green Growth in Africa
by inclusive cooperation between multiple stakeholders

Food for Thought on Rural Electrification
（For Building Better Adaptation Capacity）

October 31, 2011

Takeshi Sagawa
Emerging Countries Group
Global Business Planning Dept
Toyota Tsusho Corp.

Contents

1. Introduction of TTC, Toyota Tsusho Corp. - A Toyota Motors group company
Activities in Africa
(1) Vehicle Distribution (more than 2,000 people employed)
Angola, Kenya, Malawi, Mauritius, Uganda, Zambia, Zimbabwe
<in charge of export, working with respective national distributors>
Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Liberia, Madagascar, Mauritania, Mozambique, Rwanda, Seychelles, Sierra Leone, Somalia, Sudan, Tanzania, Tunisia
(2) Vehicle Production Support
South Africa
(3) General Trading & Investment
Infrastructure: Power Generation, Port Projects
Equipment: Construction Machinery, Agricultural Machinery
(4) ODA related
Rural Electrification (+Medical), Rural Water Supply, REDD+

(*) Toyota Motors group working for improvement of fuel efficiency in transport sector
e.g. PRIUS: Hybrid Vehicle (+ Plug-in HV); Hybrid SUVs, buses, trucks

PRIUS Fuel Efficiency: 38km/litre
(according to a method designated by MILT)

3

2. Rural Electrification
(1) Discussions in International Arena and Lessons Learned

UN declared 2012 the International Year of Sustainable Energy for All
targeting universal modern energy access by 2030

Various international organisations issuing reports on experiences and ideas

Lessons Learned
- Monthly kerosene purchase: typically USD3-10/family
- Connection Cost: requires financing
- Community based development sometimes necessary
- Capacity Building for all chains of project, possibly including areas for utilisation of power for economic activities
- Basin habitation areas not suitable for wind power generation
- Hydro power least cost option where available
- Example of failure exists for non-payment or non-performance of maintenance

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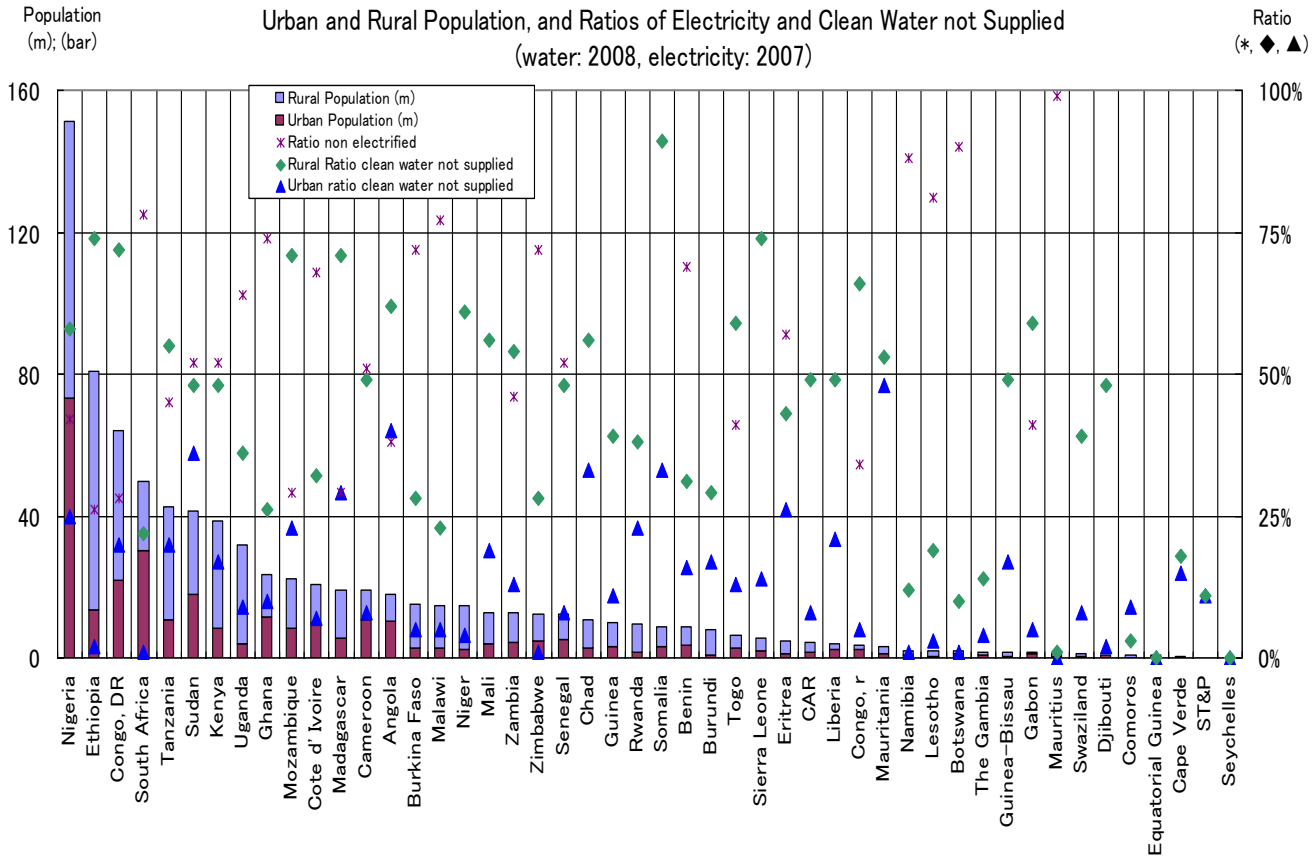

http://www.wssinfo.org/data-estimates/table/
http://www.africapedia.com/AFRICA:-POPULATION-WITHOUT-ELECTRICITY--(2007)

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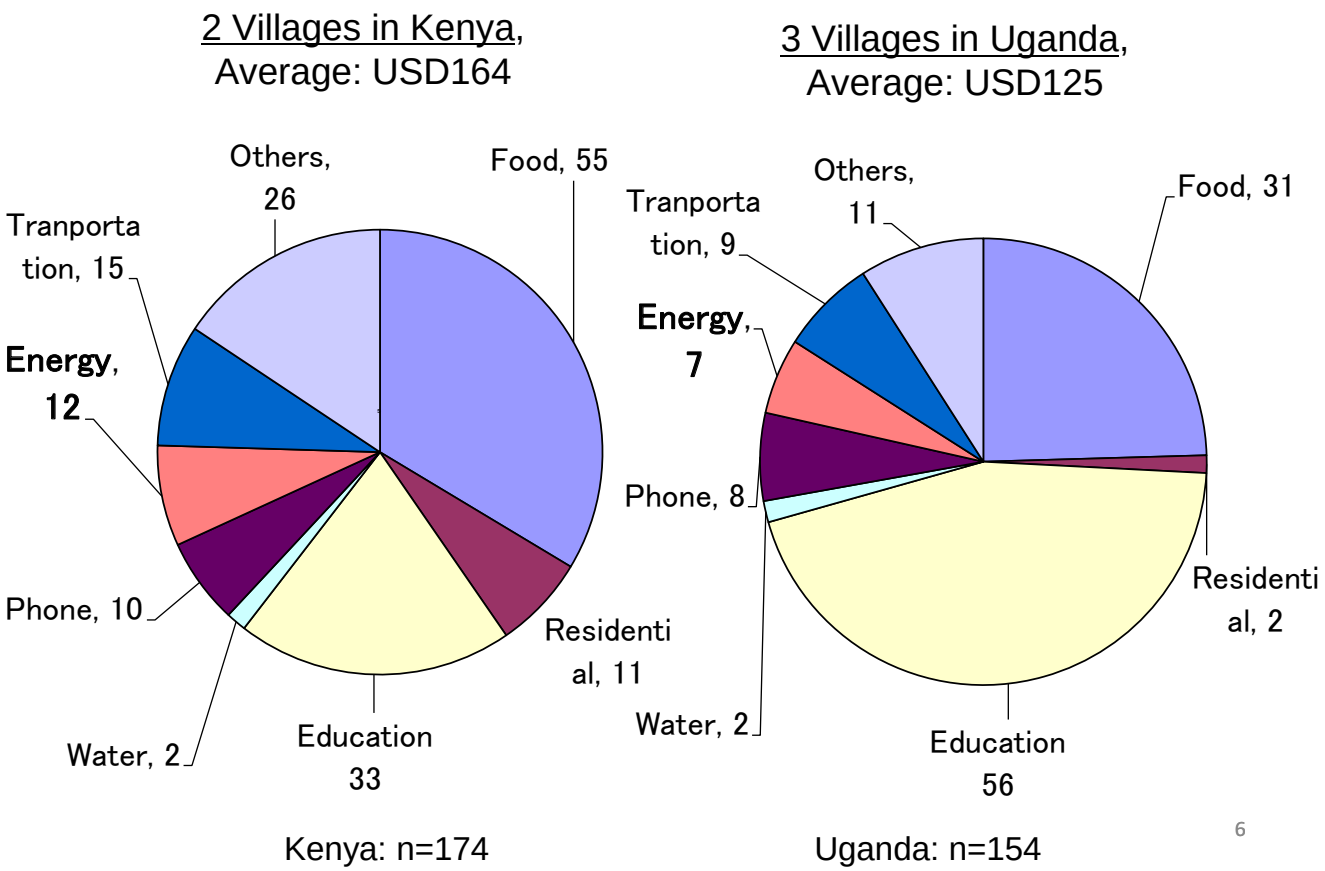
(2) 2009 field study results

Monthly Household Expenditure (USD)



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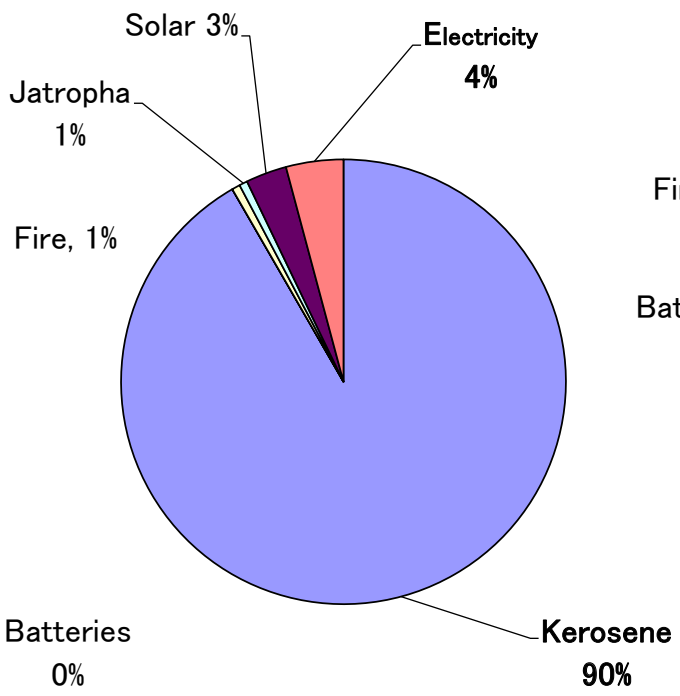
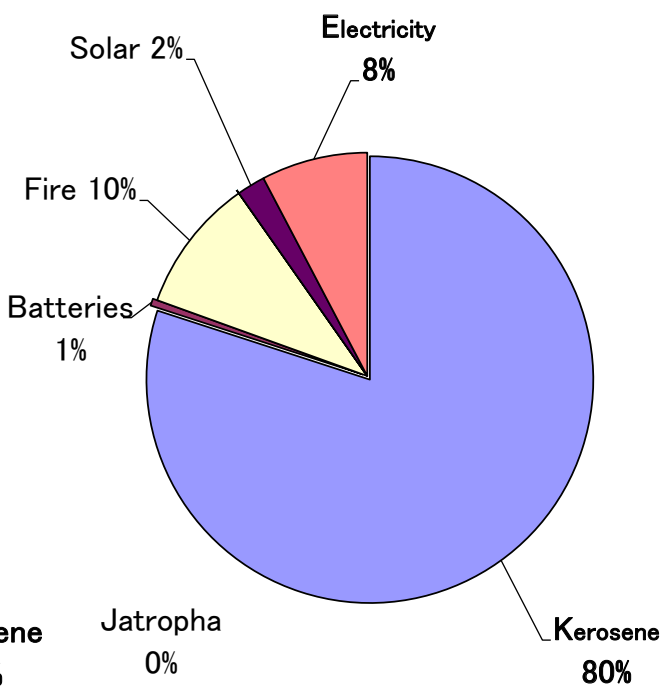
Energy Sources for Lighting

2 Villages in Kenya



Kenya: n=171

3 Villages in Uganda



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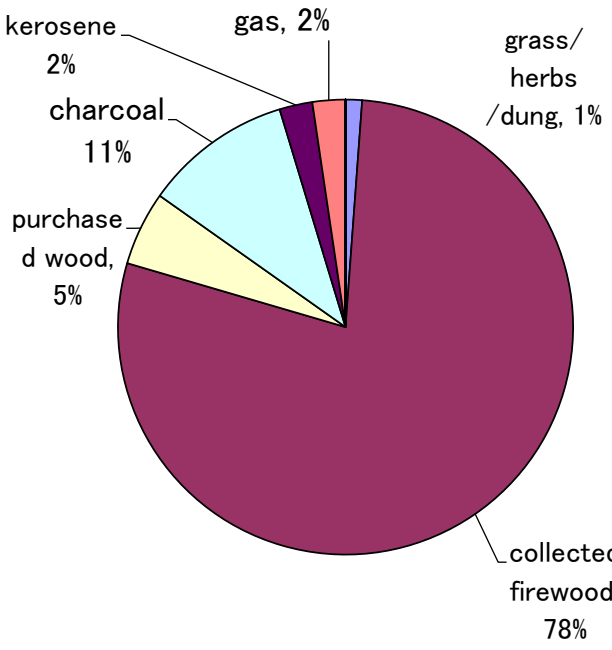
Energy Sources for Cooking

2 Villages in Kenya



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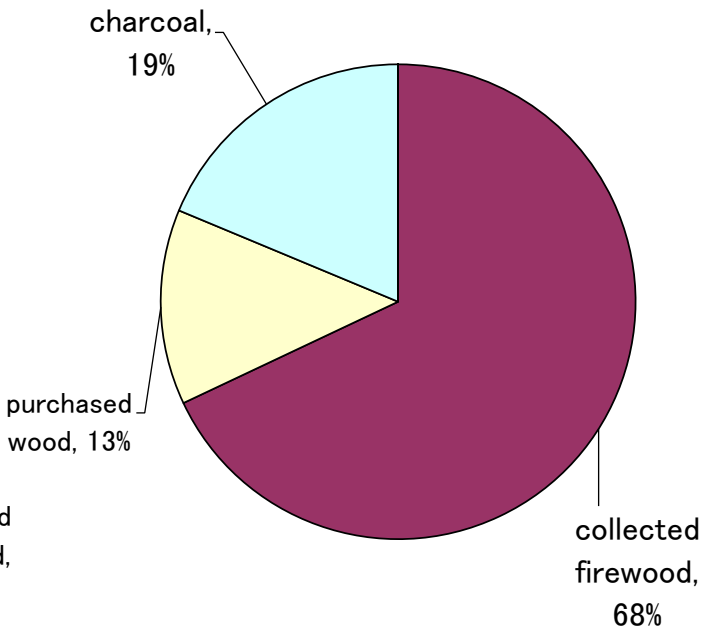
3 Villages in Uganda



Uganda: n=203

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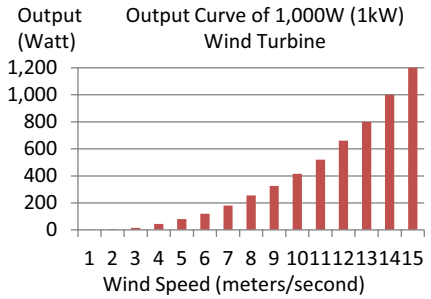
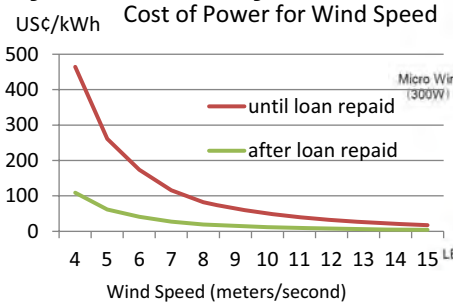
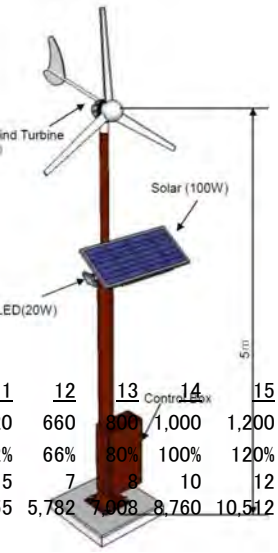
(2) Micro Wind – a 1kW capacity case study







Wind Speed	m/s	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Output	Watt	1	5	15	45	80	120	180	255	325	415	520	660	800	1,000	1,200
Plant Load Factor	%	0%	1%	2%	5%	8%	12%	18%	26%	33%	42%	52%	66%	80%	100%	120%
# h'holds @ 100W	#	1	1	1	1	1	1	2	**3**	3	4	5	7	8	10	12
Generation	kWh/y	9	44	131	394	701	1,051	1,577	2,234	2,847	3,635	4,555	5,782	7,008	8,760	10,512
Cost of Power																
(until loan repaid)	US¢/kWh	18,700	3,740	1,247	416	234	156	104	**73**	58	45	36	28	23	19	16
(after loan repaid)	US¢/kWh	4,395	879	293	98	55	37	24	**17**	14	11	8	7	5	4	4
Monthly Payment		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
By 1 family	USD	137	137	137	137	137	137	137	137	137	137	32	32	32	32	32
Divided by 3	USD	**46**	**46**	**46**	**46**	**46**	**46**	**46**	**46**	**46**	**46**	**11**	**11**	**11**	**11**	**11**
Up front cost	USD	7,700	FOB Asia													
Loan term	10Yrs															
Interest Rate	10%															
Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Initial Balance		7,700	7,217	6,685	6,101	5,458	4,750	3,972	3,116	2,175	1,139	0	0	0	0	0
Repayment		483	531	585	643	707	778	856	942	1,036	1,139	0	0	0	0	0
Ending Balance		7,217	6,685	6,101	5,458	4,750	3,972	3,116	2,175	1,139	0	0	0	0	0	0
Interest		770	722	669	610	546	475	397	312	217	114	0	0	0	0	0
Debt Service		1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	0	0	0	0	0
O&M	5%	385	385	385	385	385	385	385	385	385	385	385	385	385	385	385
Cash Out		1,638	1,638	1,638	1,638	1,638	1,638	1,638	1,638	1,638	1,638	385	385	385	385	385

-Power generated during off-peak hours can be stored in batteries and used by other families for a cost.
- For economic activities, several turbines can create a wind farm.

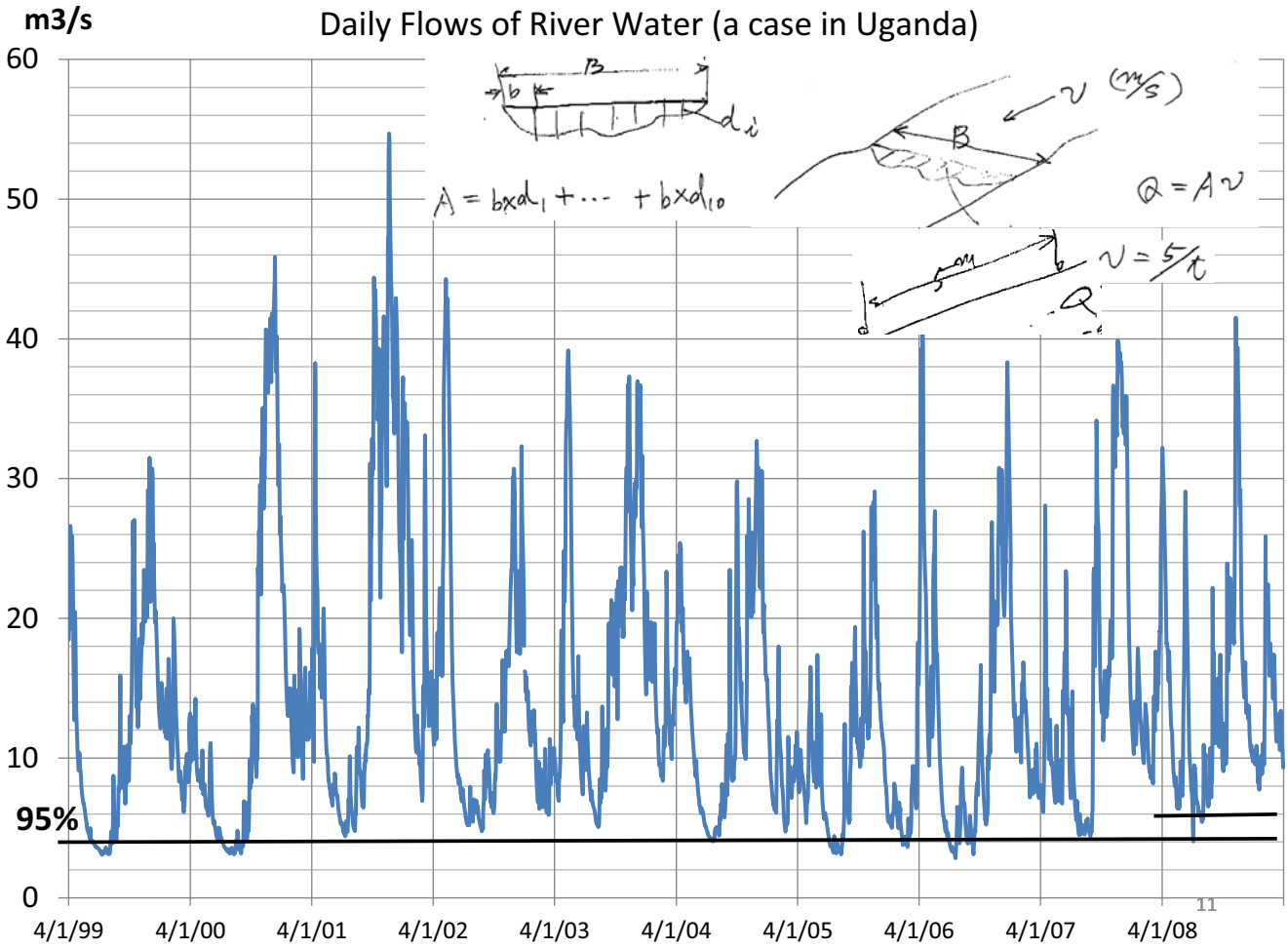
(3) Micro Hydro

Formula: kW = 9.8 x 0.8 x 0.9 x Q (m3/s) x H (m) ≒ 7 x Q x H

where:
0.8: turbine efficiency (an assumption)
0.9: generator efficiency (an assumption)
Q (m3/s): water flows in cubic meters per second
H (m): effective height (intake – turbine) in meters

Cons: *Initial capital expenditure, big
(per kW, micro can cost far more than mega scale)
*Instability of Water Flows: seasonal, cyclical, CC

Pros: *can provide energy for economic development,
e.g. businesses, value addition, income earning
⇐ economic resilience could improve adaptability to CC
*can serve remote areas not connectable with grid long time
*can remove instability by designing capacity with min. flows
*can reduce cost (initial capex, opex)
by standardisation and non-conventional ideas
e.g. focusing on specific sizes like 10/20/30kW;
PVC pipes, not steel;
not turbines/generators but pumps/motors;
use of rocks not concrete for easy maintenance



Cost Estimation of Micro Hydro Electric Power

Capacity	kW	10																			
Plant Load Factor	%	95%																			
Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Generation	MWh/y	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83
Cost of Power	US¢/kWh	13	13	13	13	13	13	13	13	13	13	3	3	3	3	3	3	3	3	3	3
Monthly Payment																					
Total	USD	886	886	886	886	886	886	886	886	886	886	208	208	208	208	208	208	208	208	208	208
Divided by 100W	USD	9	9	9	9	9	9	9	9	9	9	2	2	2	2	2	2	2	2	2	2
Up front cost	USDk	50																			
Loan term	10Yrs																				
Interest Rate	10%																				
Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Initial Balance	USDk	50	47	43	40	35	31	26	20	14	7	0	0	0	0	0	0	0	0	0	0
Repayment	USDk	3	3	4	4	5	5	6	6	7	7	0	0	0	0	0	0	0	0	0	0
Ending Balance	USDk	47	43	40	35	31	26	20	14	7	0	0	0	0	0	0	0	0	0	0	0
Interest	USDk	5	5	4	4	4	3	3	2	1	1	0	0	0	0	0	0	0	0	0	0
Debt Service	USDk	8	8	8	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0
O&M	5%	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Cash Out		11	11	11	11	11	11	11	11	11	11	3	3	3	3	3	3	3	3	3	3

Assuming sufficient demand:	<u>while loan is repaid</u>	<u>after repayment</u>
- monthly payment for the capacity of 100W	USD9	USD2.1
- kWh cost of power	US¢13	US¢3

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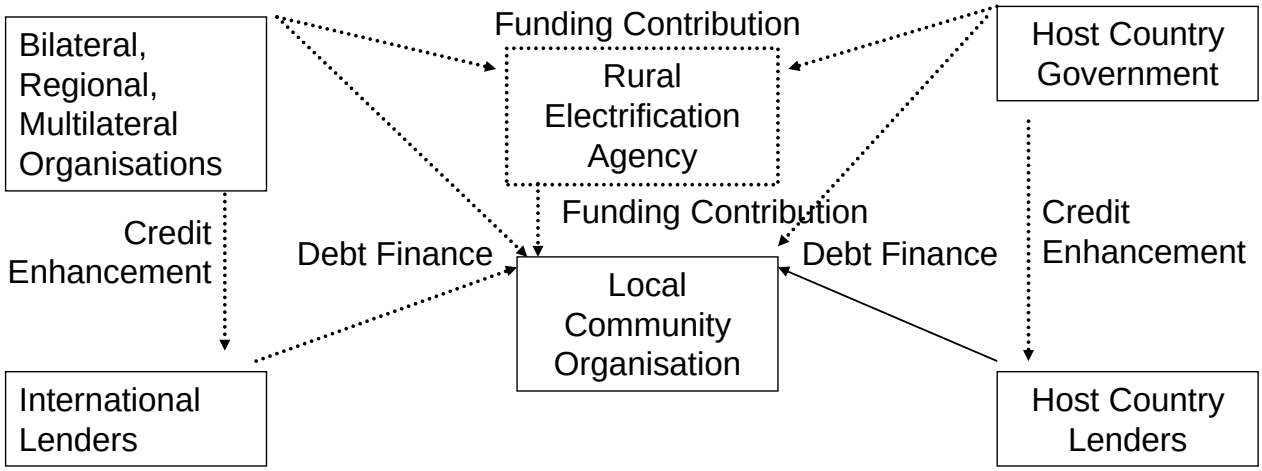
(4) Financial & Development Conceptual Framework

(a) Funding Choices

Grant, Equity, Soft Loans, Commercial Loans, Adaptation Funds

* With limited resources for acceleration of electrification:
  - debt finance should play a role with longer-term, low interest rate loan;
  - monetary contributions and credit enhancement from public sectors may be combined to alleviate the burden of payment;



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(b) Implementation Body

Public, Local Community, Consortium, Pure Private

Support by public sector (possibly via contractors):

e.g. site identification, distribution line, inspection/maintenance

* Local community may have to be an implementation body, if private and government can not be involved as such a party;
* Capacity development seems absolutely necessary in every aspect of project development and also ulitisation part;
* Inspection/maintenance cost can decline with proliferation of standardised micro hydro stations (economies of scale; as in Asia and Latin America)
* Public facilities may be first priority, and charging station can also be set up as well as productive/value addition centre like UNIDO's Energy Kiosk

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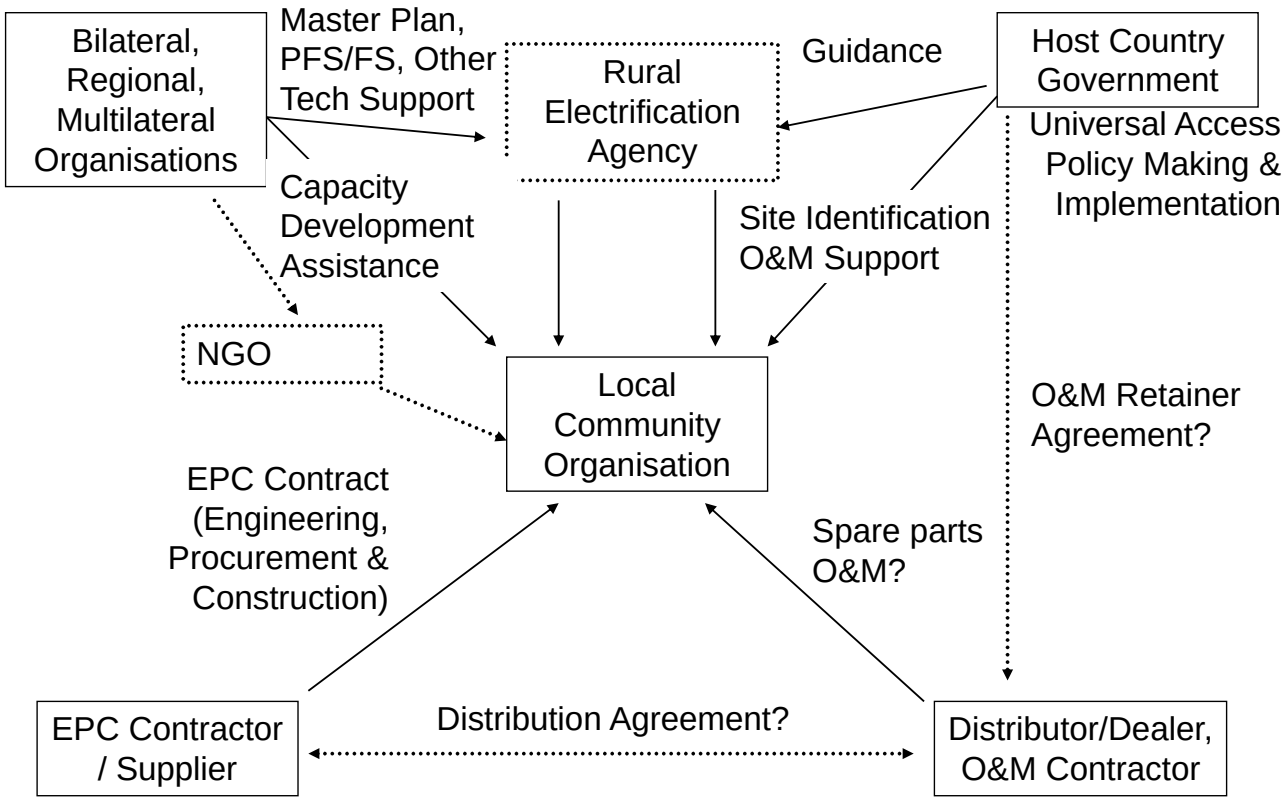
An Example of Development Framework



(Credits and References)

(1) Credits

Mr. R. Sudo, ex-Chairman, Tanaka Suiryoku (a god of small hydro)
Mr. K. OTAKI, MD, Proact International (ex-METI engineering consultant)
Mr. G. KANO, International Consulting Group, Tokyo Electric Power Co.
Ms. K. Nasu, A-Wing International (Micro wind turbine manufacture)

(2) References

(a) IEA, Energy for All, Financing Access for the Poor, October, 2011
(b) ARE, Rural Electrification with Renewable Technologies, Quality Standards and Business Models, June 2011
(c) ARE, Hybrid Mini - Grid for Rural Electrification: Lessons Learned, March 2011
(d) UNDP, Bringing Small - Scale Finance to the Poor for Modern Energy Services: What is the Role of Government?, August 2009

(*) ARE: Alliance for Rural Electrification
IEA: International Energy Agency

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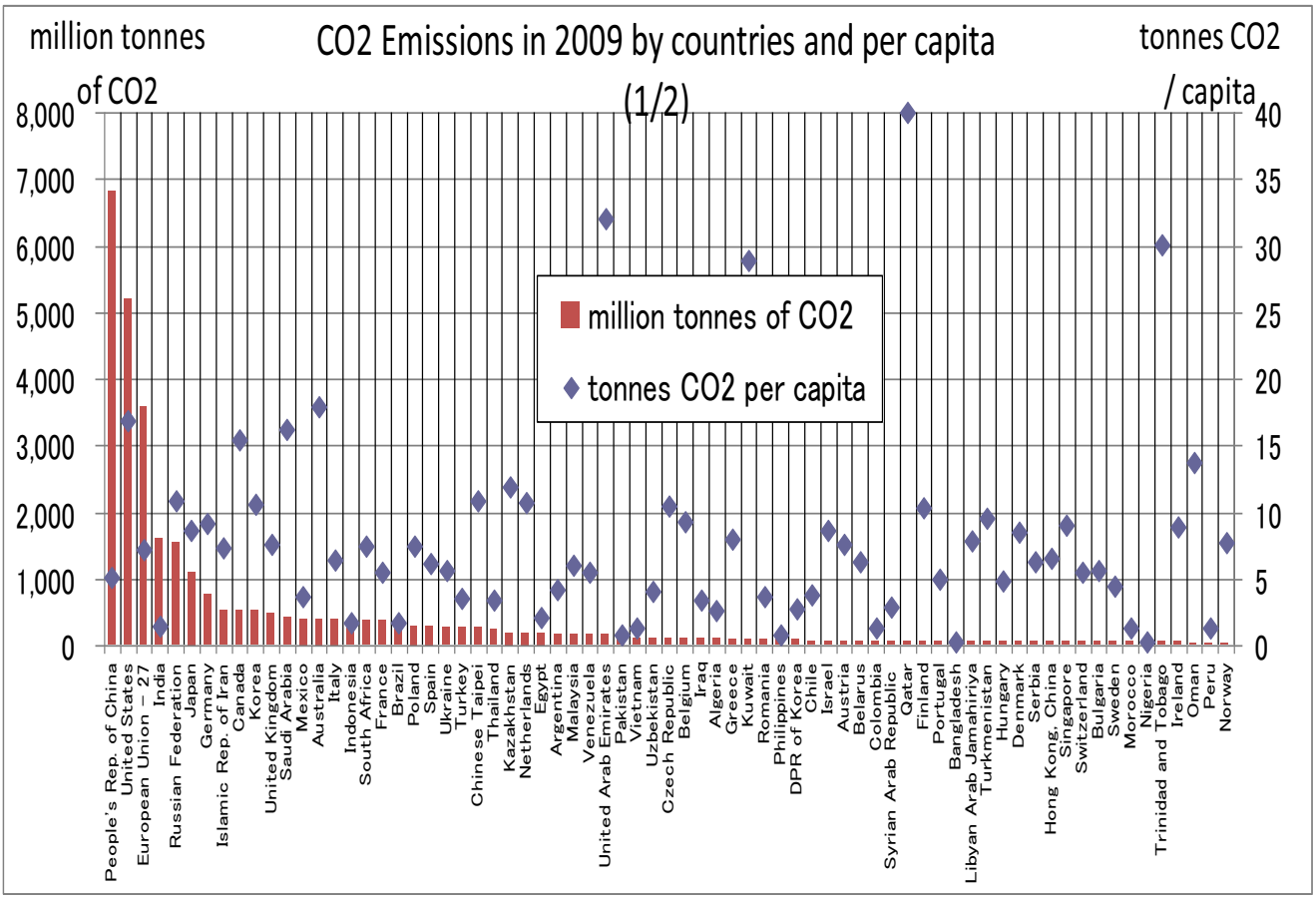
Phone: 81 3 4306 3508



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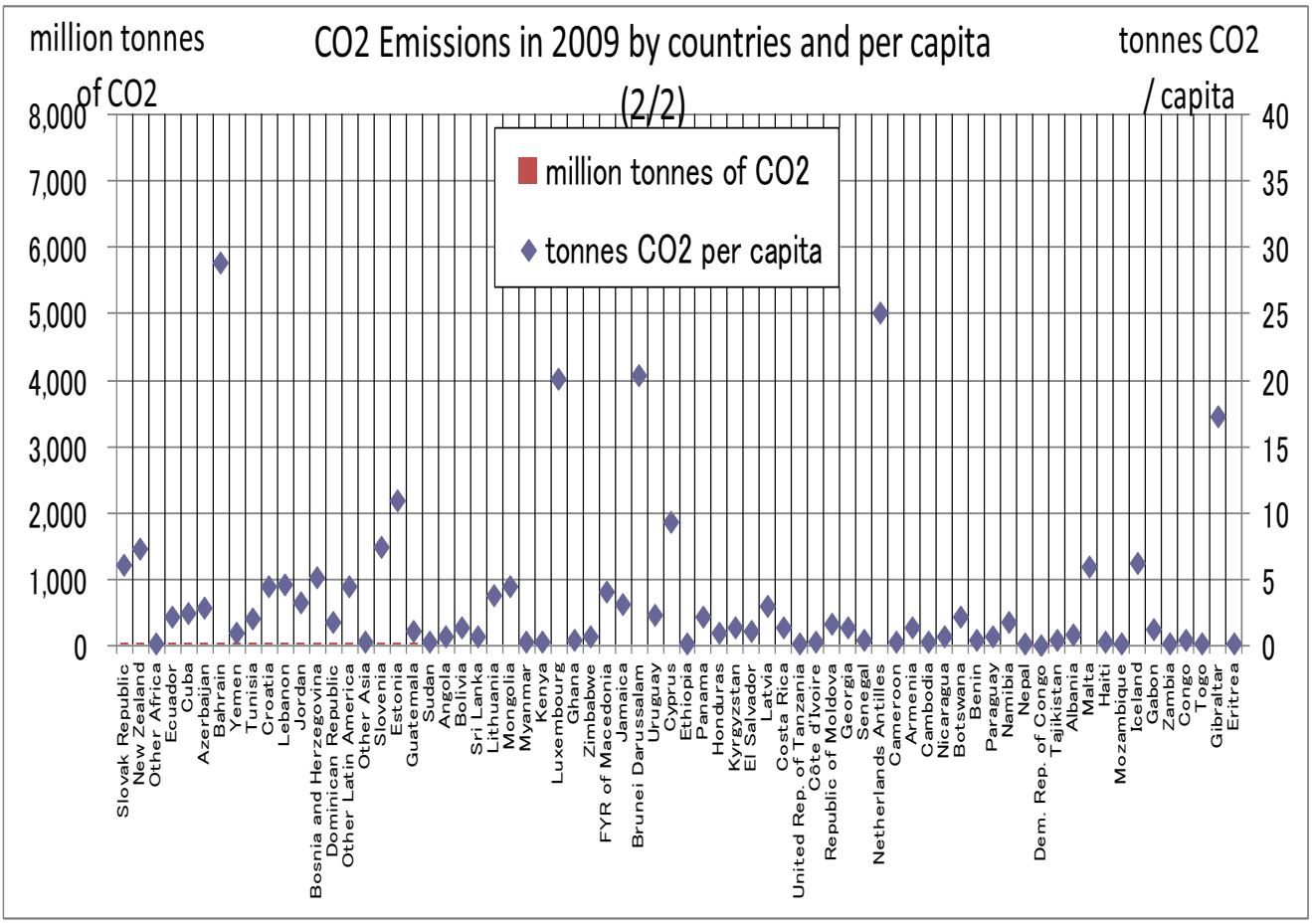
http://www.iea.org/co2highlights/



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Policy Dialogue on Climate Change in Africa
October 31 – November 2, 2011
Session 1: Toward the Green Growth in Africa by Inclusive Cooperation between Multiple Stakeholders

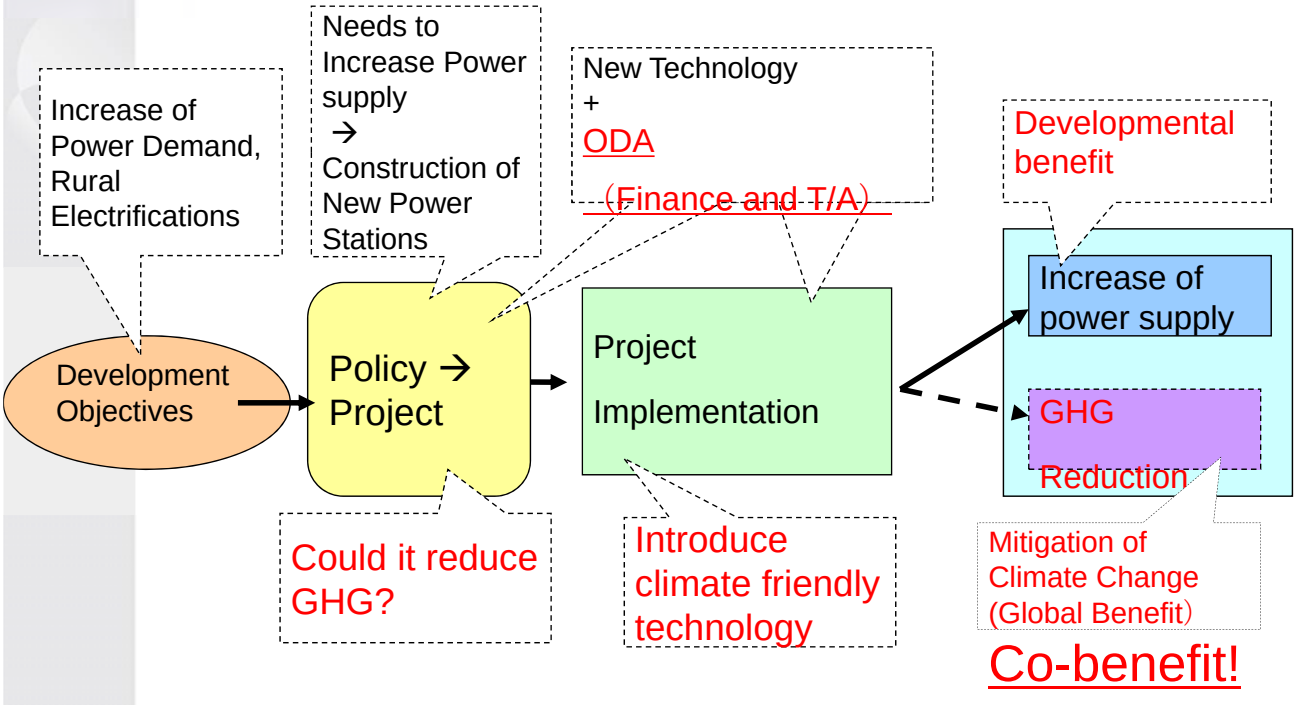
JICA's operation responding to Climate Change

Approach and Priority against Climate Change

October 31, 2011

Masayuki KARASAWA (Mr.)
Director, Office for Climate Change
JICA Global Environment Department

To generate "co-benefit" Case of Power Sector



Toward Resilient Development Strategy

Reducing Vulnerabilities

- Measures to mitigate vulnerabilities: present-day environmental and social stresses

Close relationship with existent development programmes

- Water supply and management
- Agricultural diversification
- Livelihood diversification
- Other basic development needs such as MDGs

Enhancing Disaster Preparedness

- Need to adapt to multiple climate risks such as flood, drought, storm, etc.

Climate change will likely increase the trends of extreme weather events

- Structural measures

-Infrastructure and 'hard' engineering options

- Non-structural measures

-Early warning systems and other 'soft' adjustments such as land use planning

-Promotion of preventive measures by 'risk communication'

Challenges for Resilient Development in Africa

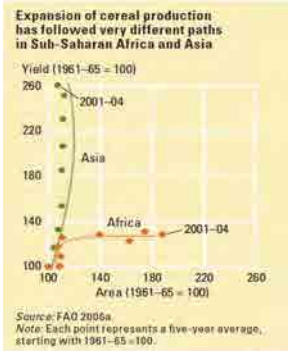
Toward Resilient Agriculture

-In many African countries, economy and livelihood structures are highly dependent on rain-fed agriculture.

-Potentially very vulnerable to climate change and variability, food security could be threatened
ex: drought

'Sub-Saharan Africa has a large untapped potential for irrigation' (WDR, 2008)

Only 4 percent of the total cultivated area is under irrigation, with a mere 4 million hectares added in the last 40 years, far less than in any other region



Challenges

- Expansion of irrigated fields
- Realization of higher agricultural productivity
- Development of value chain and marketing
- Agricultural diversification for minimizing risks

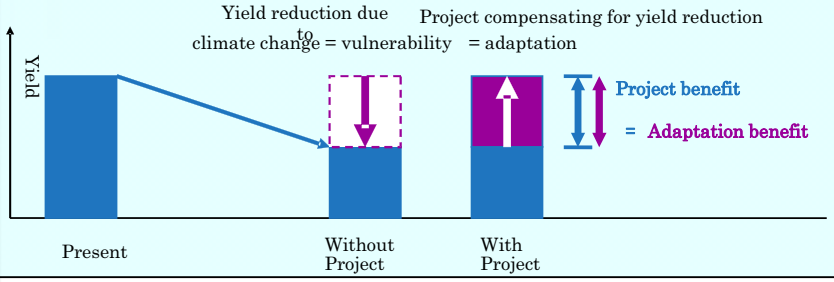
Asian Green Revolution is also called 'Seed-Fertilizer Revolution'.

Development and diffusion of a series of fertilizer-responsive, short maturing, non-photoperiod sensitive, high-yielding modern varieties (MVs)

Different Types of Adaptation Projects

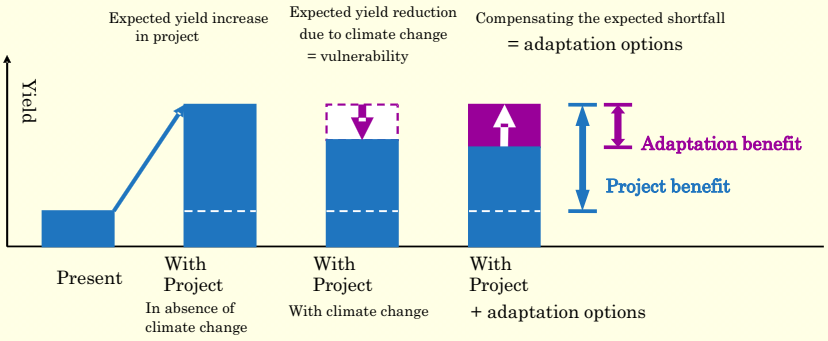
Adaptation Project

Projects formed to reduce the climate change vulnerability in the existing system such as projects to improve existing facility to cope with the increased vulnerability caused by the change of external forcing due to climate change.



Business-as-Usual Development with Adaptation Options

Projects which are not mainly aimed to reduce the vulnerability, but is designed to adapt to the impacts of the climate change in achieving its main objective, such as development and rehabilitation of infrastructure projects that are planned or designed with consideration to increasing external forcing stemming from climate change.



Adaptation Finance

Opportunities and challenges to promote investment that **minimize risks** and **maximize benefits** in the context of development and climate change

Full Use of Local Resources
Renewable Energy towards a Low-carbon Community

Solar

Basic Training for Introduction of Solar Power

- Introducing new technologies to administrative officials and engineers from developing countries through training in Japan

Geothermal

Kenya: Olkaria 1 Unit 4 and 5 Geothermal Power Project

- Expanding the existing Olkaria 1 geothermal power plant by installation of power generator units 4 and 5, 140MW in total in Rift Valley province of Kenya

Wind

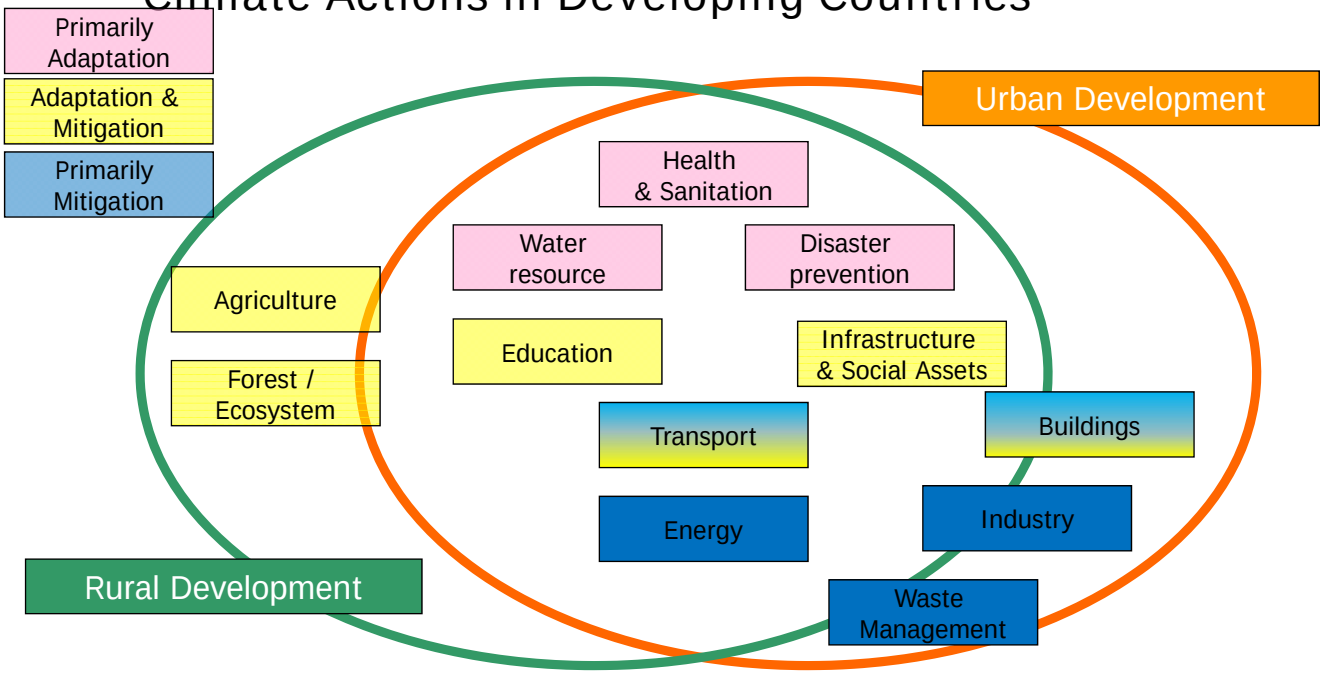
Egypt: Gulf of El Zayt Wind Power Plant Project

- Constructing 220MW wind power plant contributing to achieve the Egyptian target to derive 12% of its total electricity generation from wind power by 2020

Integrating various modes of assistance for effective introduction of renewable energy

- Preparation of roadmap and action plan to promote renewable energy at national level
- Establishing standards, institutions and policies related to renewable energy
- Capacity building
- Financing tangible renewable energy projects

Sustainable Development and Climate Actions in Developing Countries



Sectors in need of adaptation and with potential of mitigation are critical components of sustainable development

- climate actions in developing countries *must* be implemented in the context of sustainable development

7

Thank you for your attention.

Contact:

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8

国際協力機構

Readiness support for Africa

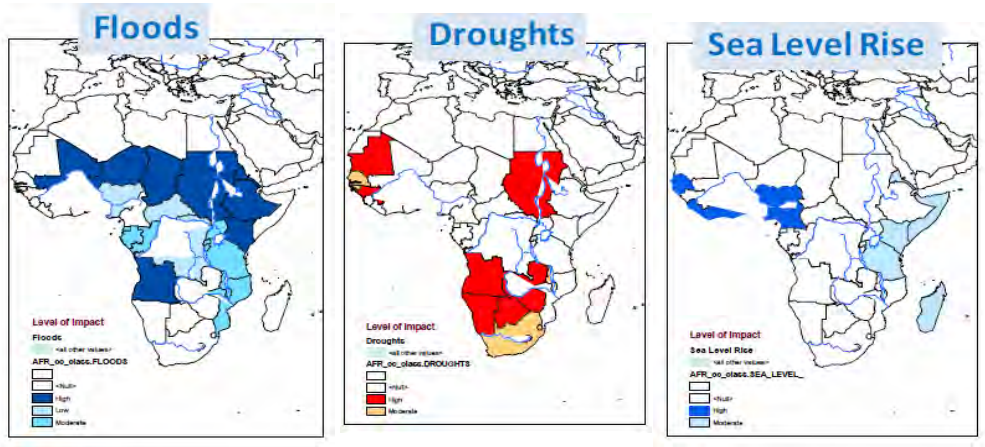
Policy Dialogue on measures and assistances to address climate change in Africa

31st October 2011

Contents

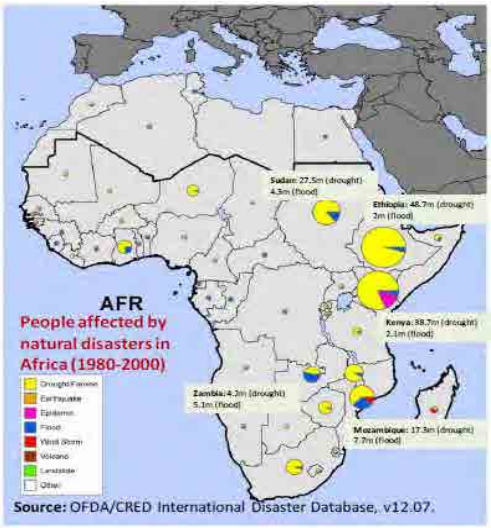
1. African Development and Impact of Climate Change

- Africa faces the Climate Risk (Floods, droughts, Sea Level Rise, Storms…)



1. African Development and Impact of Climate Change

- Africa's growth and livelihoods are undermined by climate risks



1. African Development and Impact of Climate Change

- Moreover, future climate change is expected to pose further challenges to the region's development…
- Need to promote an approach that contribute to both the efforts to adapt to climate change and to ensure sustainable development ('Green Development')
- Readiness supports are crucial to help countries build appropriate capacity for Green Development

2. Readiness support for Africa

Readiness support through 2-1. WB

- Japan supports「Africa Climate Risk Management for Green Growth Program」through Japan Trust Fund in the WB
- There is a need to:
  - Improve the readiness of African countries
  - Capacity building on climate risk management
  - Undertake immediate enabling investment

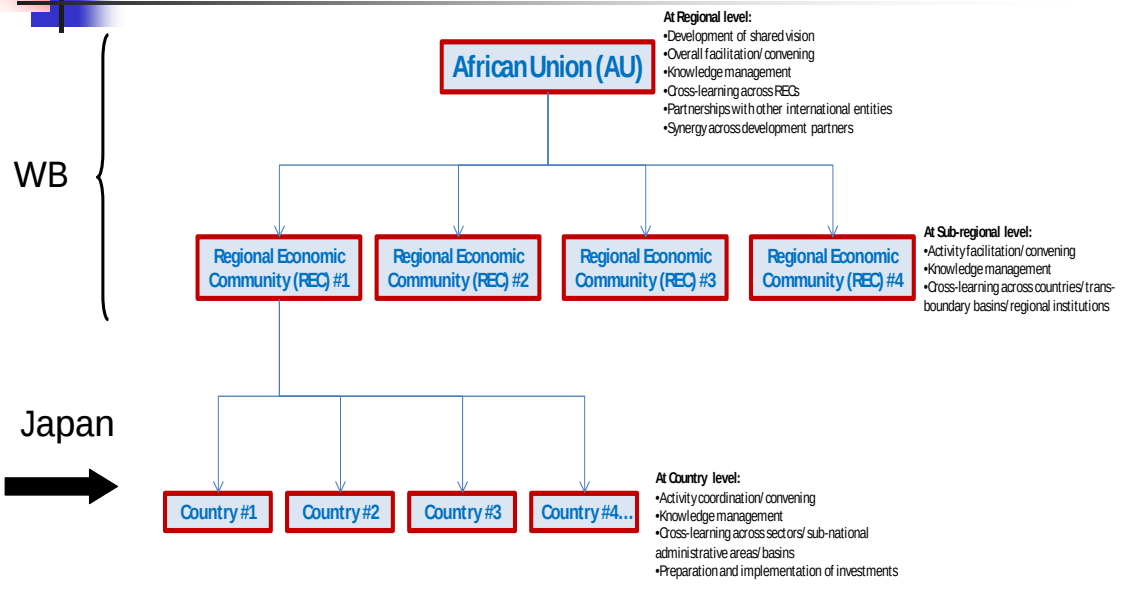
Readiness support through 2-1. WB

- A regional perspective is essential to effectively address many of existing and emerging challenges
  - Shared hydro-meteorological systems in combination with satellite technologies
  - Storage, hydropower or irrigation in river systems

Readiness support through 2-1. WB

- The key components of the project
  - Capacity building at regional level
  - Capacity building at country-level
  - Preparation of potential investments for climate financing at regional and country level
  - Financing investments on the ground at country-level

Readiness support through 2-1. WB



Readiness support through 2-1. WB

- Country selection criteria under discussion
  - Needs
    - Climate risk vulnerability and mitigation opportunities
  - Demand
  - Readiness
    - Presence of NAPAs / NAMAs

Readiness support through 2-2. GEF

1. Japan and GEF
- Japan is a leading contributor to the GEF (contributed $2 billion since 1991)
- Japan has taken the lead to establish Nagoya Protocol Implementation Fund in the GEF(2011) to support capacity building associated with generic resources in developing countries

2. My visit on Biodiversity project
- Visited a project, 'Sustainability building for an agrarian reform Settlement' in Brazil on 30th Sep, 2011

(Photo Credit: GEF)

Readiness support through 2-2. GEF

3. Case Example:
Readiness support by Japan Trust Fund and GEF in Africa

- Country: Kenya
- Project title: Western Kenya Integrated Ecosystem Management
- Sector: Forestry, Agriculture, Fishing
- Outline: To improve the productivity and sustainability of land use systems in Kenya, support on- and off- farm conservation strategies and improve the capacity of local communities and institutions to identify, formulate and implement integrated ecosystem management activities

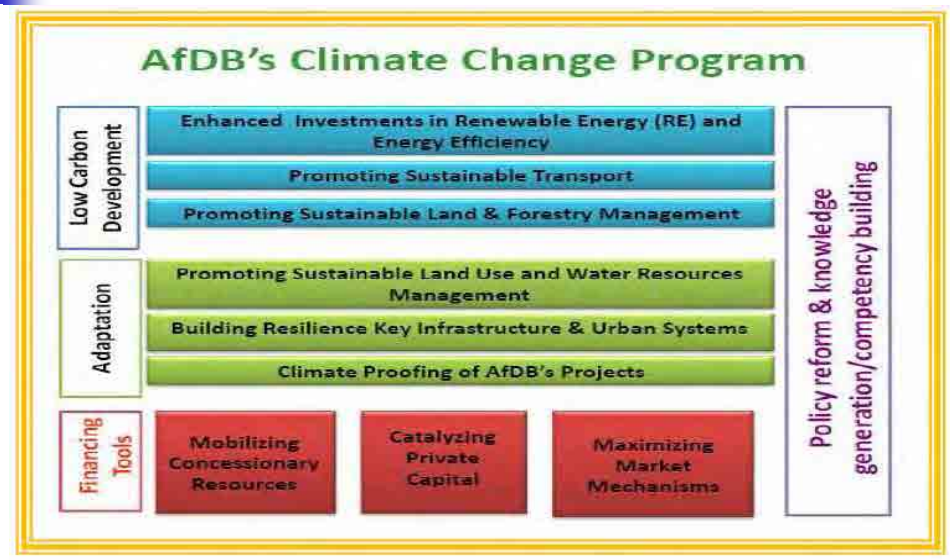
(Photo Credit: Gene Hettel, IRRI)

Readiness support through 2-3. AfDB and Climate Change

1. To mainstream climate change in the development strategy, AfDB established「Energy, Environment and Climate Change Department」in April, 2010

2. Adapted Climate Change Action Plan in September 2010, which focus on three areas
   - Low Carbon Development
   - Climate Change Adaptation
   - Climate Change Financing Platform

Readiness support through 2-3. AfDB



Readiness support through 2-3. AfDB

3. Japan Trust Funds in the AfDB

- Fund for African Private Sector Assistance (FAPA)
  Established in 2005 to promote private sector development by supporting the implementation of the Bank's strategy in building capacity for private sector development in Africa.
- Policy and Human Resources Development Grant (PHRDG)
  Established in 1994 to support ADF countries, with a focus on HIPC eligible countries in the areas of human resource development and technical assistance to the Bank Group's operations.

How these Funds can be utilized to support the Climate Change?

Readiness support through 2-4. GCF

- Transitional Committee's work for Durban in 2011
  - TC1 @ Mexico City in April
    - Operationalize TC
  - TC2 @ Tokyo in July
    - Start design process of GCF
  - TC3 @ Geneva in September
    - Detailed discussion of key issues
  - TC4 @ Cape Town in October
    - Finalize a draft for Durban

Readiness support through 2-4. GCF

- Key Results for African contents
  - Adaptation
  - Mitigation
  - Resource Allocation
  - Private Sector Facility
  - Capacity Building
  - Transfer of Green Technology

Thank you for your attention!

Naoko Ishii
Deputy Vice Minister of Finance

Asia Pacific Adaptation Network (APAN) and its implications to Africa

Institute for Global Environmental Strategies (IGES)
Shinano Hayashi
31st October, 2011
Tokyo, Japan

1

Brief History of APAN

UNFCCC SBSTA at its 28th Session (2008):

"recognized that **regional centres and networks undertaking work relevant to climate change play an important role in enhancing adaptation**"
and
"agreed to promote existing networks for impacts, vulnerability and adaptation and encouraged the establishment of new networks."

Responding to SBSTA-28 decision, United Nations Environment Programme (UNEP), in partnership with key UN and other international and bilateral agencies, has been facilitating the development of **Global Climate Change Adaptation Network (GAN).**

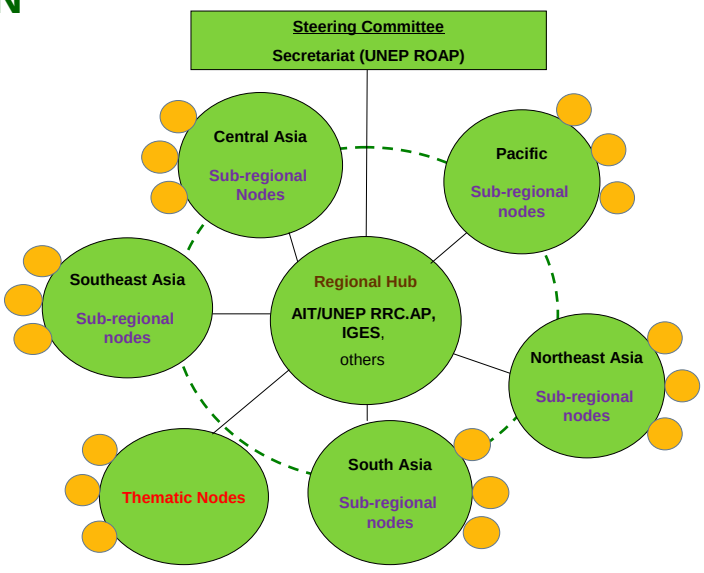
2

Brief History of APAN

-**Asia-Pacific Adaptation Network (APAN)**
and
- **Regional Climate Change Adaptation Knowledge Platform (AKP)**
was launched in October 2009 in Bangkok by the Prime Minister of Thailand

3

Organizational Structure of APAN



4

APAN – Sub regional Nodes

Organisation	Sub Region
Keio University	NEA
Climate Action Network South Asia @ Bangladesh Centre for Advanced Studies	SA
ICLEI-Local Governments for Sustainability, Southeast Asia	SEA
Central Asia Regional Economic Cooperation (CAREC)	Central Asia
SPREP	Pacific

5

APAN – Thematic Nodes

Organisation	Thematic Area
Global Water Partnership (GWP), South Asia	Water
International Centre for Integrated Mountain Development (ICIMOD)	Mountains
Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)	Agriculture

6

Overall goal of APAN

Help build climate resilience of vulnerable human systems, ecosystems and economies through the mobilization of knowledge and technologies to support adaptation capacity building, policy-setting, planning and practices.

7

Specific Objectives of APAN

- Generate & share knowledge & information on adaptation in the region;
- Improve access & timely availability to relevant adaptation knowledge & information;
- Facilitate access to international adaptation finance mechanisms by developing countries in the region;
- Strengthen institutional capacity for adaptation in the region;
- Inform development planning & investment decisions to support adaptation; and
- Develop the capacity of national & local planners, development partners & communities in adaptation.

8

Activities of APAN

ASIA PACIFIC ADAPTATION NETWORK

1. Improve availability and accessibility of knowledge for adaptation, i.e. knowledge management, along with the Regional Climate Change Adaptation Knowledge Platform (AKP)

•Compile currently available information for assessment frameworks, methods and tools for climate impacts, decision support tools, good adaptation practices

•Organize annual forum, learning seminar, workshop

•Maintain on-line portal

2. Strengthen knowledge support to governments, communities and development partners

•Identify sub-regional partners (sub-regional nodes)

•Identify country-specific needs for adaptation (by sub-regional nodes)

•Facilitate the provision of targeted knowledge services and products

•Provide match making opportunities to promote, i) project formulation, ii) capacity building and iii) enhancing necessary researches

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Activities of APAN (cont.)

ASIA PACIFIC ADAPTATION NETWORK

3. Improve access to adaptation finance mechanisms

•Provide advisory services to developing countries in the region to improve their access to adaptation finance mechanisms

4. Increase capacity of national and regional institutions to support adaptation actions

•Develop capacity of adaptation planning in targeted countries.

E.g.: a project funded by APN and KEI
-Training needs assessment workshop
-Training module development workshop
-Piloting training course

10

Necessary Factors for Network

ASIA PACIFIC ADAPTATION NETWORK

1. Utilizing Adaptation Network as a platform

•Sharing technologies, knowledge, and experiences as practical information

2. Adaptation Network to minimize gaps amongst countries in the region

•Dissemination of practical information of adaptation in the region

•Capacity Building and Institutional Development

3 . Maintaining sustainable long-term network

•Challenging , but worth to try

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APAN website: http://www.apan-gan.net/

ASIA PACIFIC ADAPTATION NETWORK

12


ADAPTATION
KNOWLEDGE
PLATFORM
ASIA PACIFIC
ADAPTATION
NETWORK
Thank you for your attention
ADB
APN
IGES
環境省
Sida
UNEP
13

Greenhouse gas Inventory Office of Japan

Inventory Development Status in Asia

Junko Akagi
Greenhouse Gas Inventory Office of JAPAN (GIO)
Center for Global Environmental Research
National Institute for Environmental Studies
2011.10.31 (Mon) 16:15-17:45

Overview

- GHG Inventory
- Japan's capacity building of inventory in Asia (Workshop on GHG Inventory in Asia)

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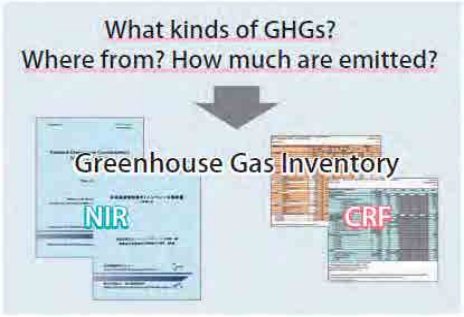
GHG INVENTORY

Greenhouse gas Inventory Office of Japan

GHG inventory

- The UNFCCC's ultimate objective is "stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".
- Knowing current status of GHG emissions/removals is important
- GHG inventory shows GHG emissions/removals from each source/sink category within a certain time frame
- National GHG Inventory forms the basis of rational policy development, as it …
  - ✓ identifies major emission sources where abatement will have a real impact,
  - ✓ reveals the effectiveness of applied mitigation measures,
  - ✓ helps us choose cost-effective mitigation options.



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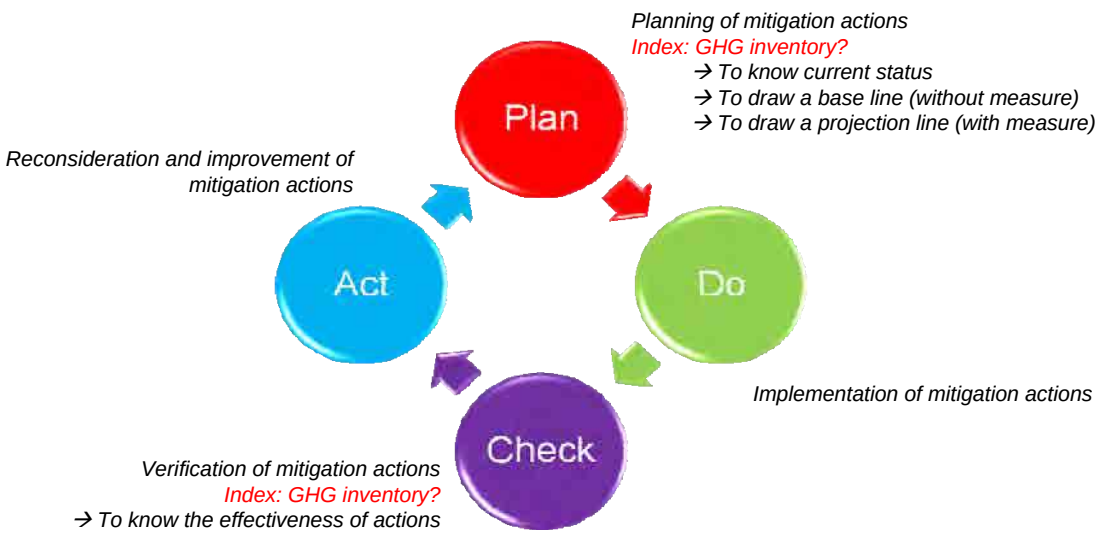
Mitigation actions in a sustainable manner



Inventory is a basis for mitigation actions and could help enhance these actions in a sustainable manner.

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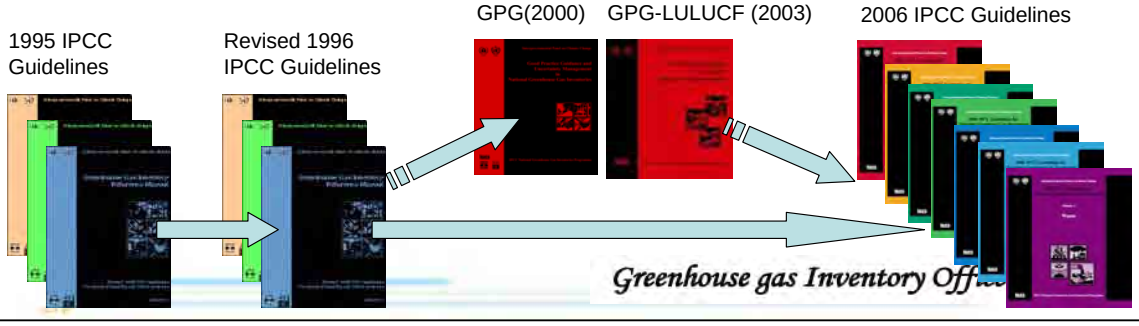
How do we prepare a GHG Inventory?

- All Parties to the UNFCCC are required to compile national GHG inventories as part of their National Communications to be periodically submitted to the COP. (UNFCCC Article 4 and 12)
- GHG emissions are not directly measured or monitored, but estimated based on national statistics etc.
- Estimation methodologies are provided in the IPCC guidelines
- National GHG inventory is prepared in line with guidelines adopted by COP

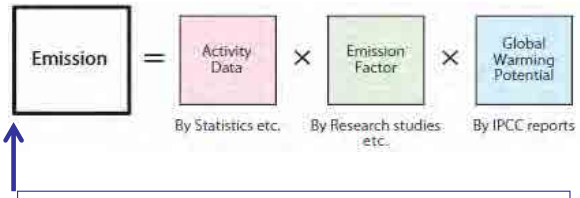


How do we prepare a GHG Inventory?

GHGs and emission sectors

Sector \ GHGs	CO_2	CH_4	N_2O	HFCs PFCs SF_6
Energy	Fuel Combustion	Fugitive Emission from Fuels / Fuel Combustion	Fuel Combustion	
Industrial Processes	Cement Products / etc.	Chemical Industry	Chemical Industry	Semiconductors / Refrigeration / Solvents
Agriculture		Enteric Fermentation / Rice Cultivation / Manure Management	Agricultural Soil / Manure Management / etc.	
Waste	Waste Incineration	Solid waste Disposal on land / Waste Water Handling / Waste Incineration	Solid waste Disposal on land / Waste Water Handling / Waste Incineration	

General estimation method



Inventory data can be more accurate, when local activity data and emission factors are used.

→ *Data collection is important*

- With the principle of common but differentiated responsibilities, reporting requirements are different for Annex I (AI) Parties and Non-Annex I (NAI) Parties

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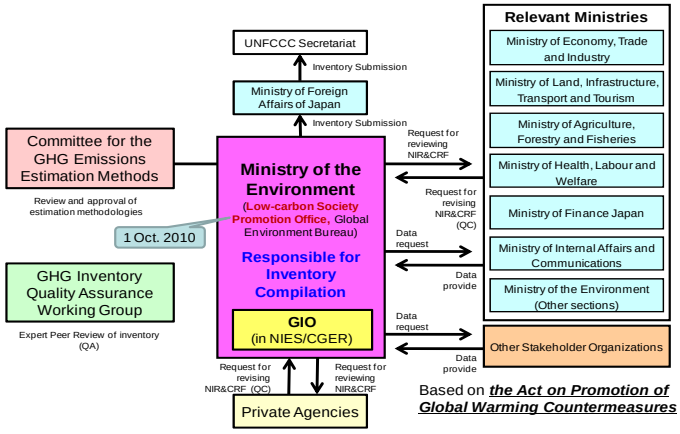
AI & NAI Inventories

	Annex I Parties to the Convention	Non-Annex I Parties to the Convention
Submission	Annual: Due date 15 April • National Inventory Report (NIR) • Common Reporting Format (CRF) Periodical: As part of NC	Periodical: As part of National Communications (NC)
Reporting year	Time-series from base year (1990, in principle) until latest year	NC1: 1994 (or 1990) NC2: 2000
Coverage	Anthropogenic GHG emissions and removals taking place within national (including administered) territories and offshore areas over which the country has jurisdiction	
Sectors	(1) Energy, (2) Industrial Processes, (3) Solvent and Other Product Use, (4) Agriculture, (5) Land Use, Land Use Change and Forestry (LULUCF), (6) Waste, (7) Other	
GHGs	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 NOx, CO, NMVOC, SO_2	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 NOx, CO, NMVOC, SO_2
	CO_2 equivalent (Global Warming Potential (GWP) with a time horizon of 100 years in the 2nd Assessment Report)	CO_2 equivalent (GWP with a time horizon of 100 years in the 2nd Assessment Report)
Estimation methodologies	• 1996 Revised IPCC Guidelines • Good Practice Guidance (GPG) • GPG-LULUCF	• 1996 Revised IPCC Guidelines • Good Practice Guidance (GPG) • GPG-LULUCF
Review	Yes	No

Note: Letters in gray mean "not obligated" but encouraged to estimate and/or apply.

Institutional arrangements

- Establishment of an appropriate institutional arrangement for compiling GHG inventory is important to sustain the process of data collection and archiving
  - ✓ For data collection, cooperation among ministries, agencies, companies, etc. is essential
  - ✓ Archiving is important to keep institutional memory



Based on ***the Act on Promotion of Global Warming Countermeasures***

Japan's institutional arrangement

JAPAN'S CAPACITY BUILDING OF INVENTORY IN ASIA
(WORKSHOP ON GHG INVENTORY IN ASIA)

Greenhouse gas Inventory Office of Japan

Workshop on GHG Inventories in Asia (WGIA)

Workshop title:	Workshop on Greenhouse Gas Inventories in Asia (WGIA)
Objective:	To support countries in Asia to improve the quality of inventories via regional information exchange
Organizers:	Ministry of the Environment of Japan National Institute for Environmental Studies
Participating countries:	Cambodia, China, India, Indonesia, Japan, Republic of Korea, Lao P.D.R., Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand, Vietnam (14 countries)
Participants:	One researcher and one government official from each participating country, UNFCCC Secretariat, IPCC, etc.
Style:	Annual workshop since 2003
Funds:	Ministry of the Environment of Japan

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Advantages of WGIA

- Holding an annual workshop helps strengthen the relationship among regional experts
  - → Can enhance inter-sessional information exchange, research collaboration, etc.
- Holding the workshop at the capital city of each member country
  - → Can invite many local participants (e.g., government officials, researchers), who are directly involved in the inventory compilation process (promotion of awareness raising of inventory)
- Keep updating information on inventory development status of member countries, international negotiations, IPCC's activities, etc.
  - → Can keep on track what is going on from the international point of view
- Sharing good practices and challenges in inventory development of member countries
  - → May be able to apply those good practices in other member countries

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New Activity in WGIA – Mutual Learning

- Objectives:
  - ✓ To help inventory compilers in Asian countries improve their national GHG inventories by providing them with an opportunity to mutually learn details of methods and data actually used by other countries.
  - ✓ To foster and strengthen cooperative relationship among experts who are actually doing technical work for inventory compilation.
- Modalities:
  - ✓ Active and voluntary participation of experts actually produced the inventories
  - ✓ Two-way communication of questions and answers, not one-way communication like examiner vs. examinee
  - ✓ Not to criticize or audit each other's inventory.
  - ✓ Not like the UNFCCC review of Annex I Parties' GHG inventories

→ *Improvements of inventory quality*

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NC* Submission Status

Based on information provided in FCCC/SBI/2011/INF.4, etc.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cambodia					NC1					Expected submission date: December 2011				NC2		
China							NC1			Expected submission date: June 2012					NC2	
India							NC1			Expected submission date: June 2011				NC2		
Indonesia		NC1												NC2		
Lao P.D.R.			NC1							Expected submission date: September 2012					NC2	
Malaysia			NC1											NC2		
Mongolia				NC1									NC2			
Myanmar										Expected submission date: June 2011				NC1		
Philippines			NC1							Expected submission date: 2011				NC2		
Republic of Korea	NC1					NC2				No information				NC3		
Singapore			NC1										NC2			
Thailand			NC1											NC2		
Vietnam						NC1							NC2			

*NC: National Communication

WGIA

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Improvements of inventory

	Improvements SNCs compared to INCs
Transparency	✓Documentation (clear indication of data sources in reports) ✓Voluntary preparation of inventory report and/or source-by-source documentation (e.g., India, Korea, Laos, Viet Nam)
Accuracy	✓Application of higher tier methodologies ✓Collection of local activity data and emission factors ✓Implementation of uncertainty assessment ✓Application of recent guidelines (i.e., GPGs and 2006 GLs)
Completeness	✓More coverage of GHGs and category ✓Development of time-series data
Consistency	✓Recalculation of old data, where data were available (i.e., consistent methodologies were used for time-series data)
Comparability	-
Other	✓Improvements of institutional arrangements (most countries) ✓Development of database ✓Archiving ✓Implementation of key category analysis

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Challenges & Constraints

- Efforts should be made for maintaining institutional memory
  - ✓ Person in charge of inventory preparation often changes, because inventory is prepared on a project basis (outsourced consultants).
  - ✓ Accumulated knowledge can be lost and newly hired person has to start inventory compilation from the beginning all over again (→ waste of time and resources)
  - ✓ Old data can not be recalculated, if data are not properly archived.

  → Documentation and archiving are important.

  → Improvement of institutional arrangements is preferred, if possible.
- Collection of local activity data and emission factors needs to be enhanced.

  → Matter of resource availability (e.g., financial support, manpower)

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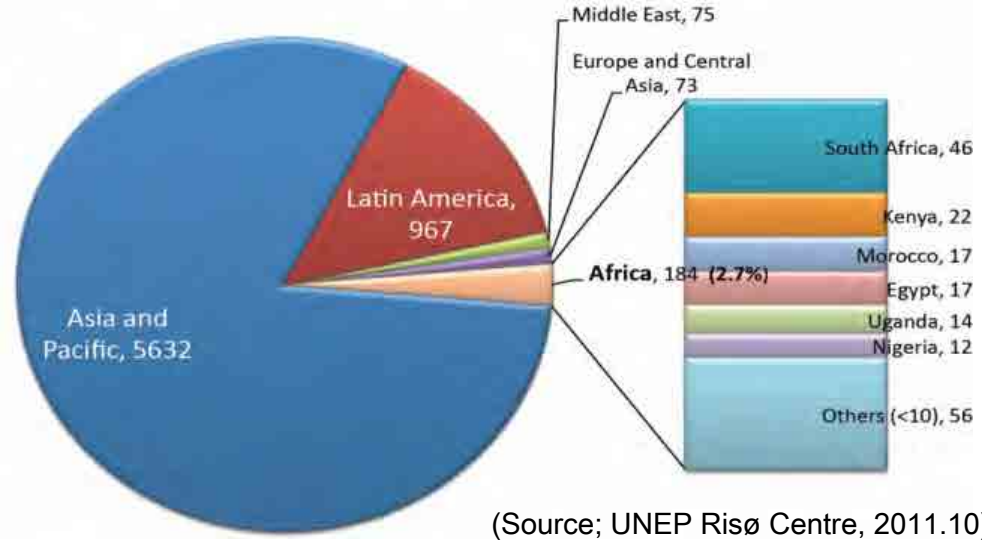
Capacity Building Project for Measurement, Reporting and Verification (MRV) of Greenhouse Gas (GHG) Emission Reduction in Africa

October 31th, 2011

Yuji MIZUNO, Ph.D.
Office of Market Mechanisms
Climate Change Policy Division
Ministry of the Environment, Japan (MOEJ)

Project Background

➢Limited benefits from the existing market mechanisms in spite of strong need for sustainable development of African countries.



(Source; UNEP Risø Centre, 2011.10)

Project Period

June 2011 - March 2012

Target Countries

Group1 Ghana, Morocco, Senegal

Group2 Kenya, Tanzania, Uganda

Group3 Mozambique, South Africa, Zambia

Group4 Democratic Republic of the Congo (DRC), Egypt, Ethiopia, Nigeria

Project Implementing Entities

INGEROSEC Corporation
Climate Experts Ltd.
UNICO International Corporation
OSUMI Co., Ltd.

Project Objectives

➢Conduct capacity development program on MRV of potential projects for future crediting under new market mechanisms such as the BOCM (Bilateral Offset Credit Mechanism).

➢Find out potential GHG emission reduction projects / programmes for future crediting under market mechanisms including the BOCM.

➢Find out potential verification entities to implement MRV for GHG emission reductions.

Relevant Events (co-hosted by project team)

➢COP17 Side Event

➢International Workshop in Tokyo (February, 2012)

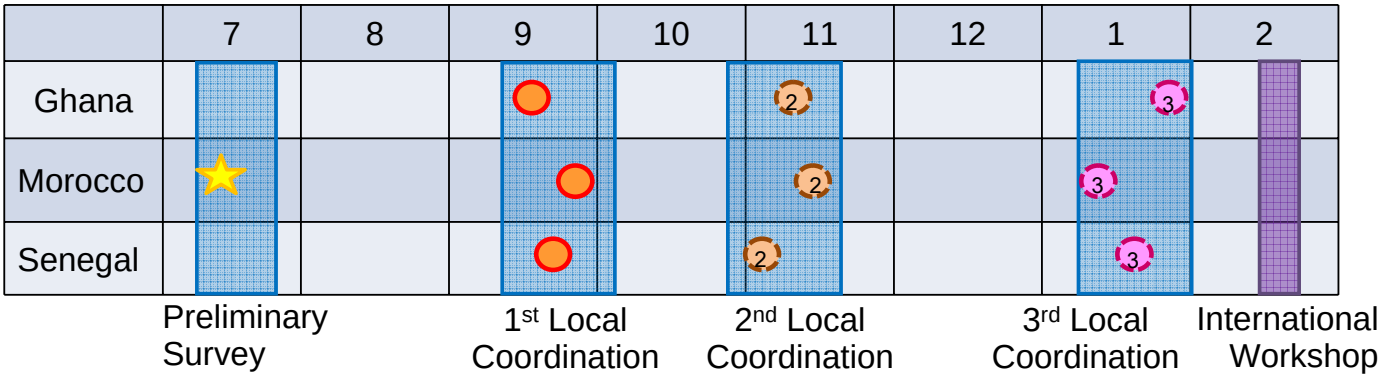
Project Activities

➢Preliminary Survey
- Find out a counterpart (C/P) in each target country. (mostly CDM DNA: Designated National Authority)
- Interview with relevant governmental agencies and private companies. (for Data collection and analysis)

➢1st Local Coordination
- Reach agreement with C/P in terms of cooperation for this project.
- Hold a workshop with C/P.
- Consultation with relevant governmental agencies and private companies.
- Find out the potential GHG emission reduction projects.

➢2nd and 3rd Local Coordination
- Hold a workshop with C/P.
- Discussions with relevant governmental agencies and private companies.
- Find out potential verification entities and support them to conduct model MRV.

Project Status and Schedule – Group1 (Ghana, Morocco, Senegal)



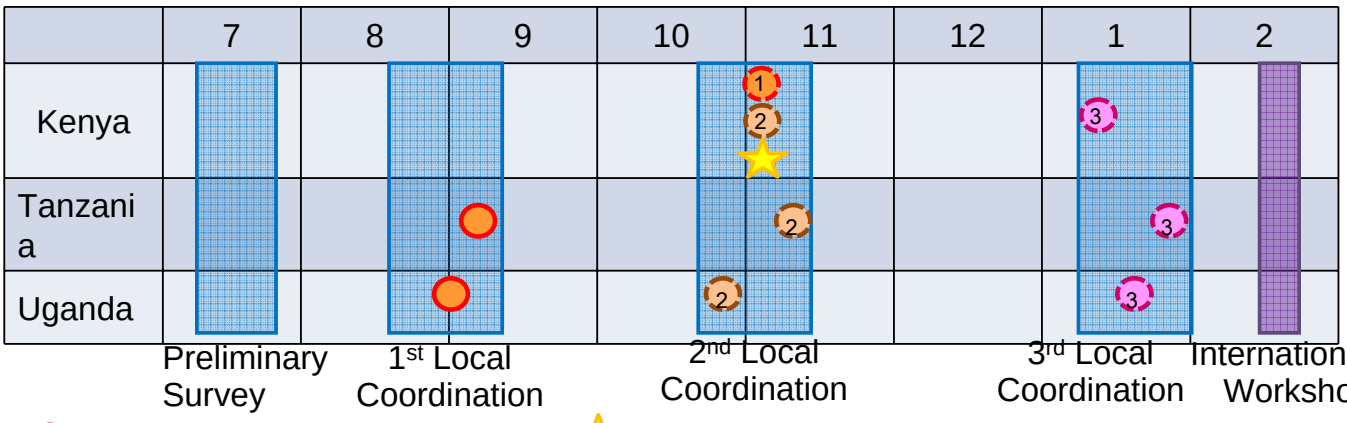
★Africa Carbon Forum (7/4-6)　●1st Workshop (2-days)　②③ 2nd & 3rd Workshop (tentative; 2-days)

Palais des Congres, Morocco (7/4-6)

Novotel Accra City Center, Ghana (9/14-15)

Direction de l'environnement et des établissements Classés (DEEC), Senegal (9/21-22)

Project Status and Schedule – Group2 (Kenya, Tanzania, Uganda)



1st Workshop (2-days)

UNFCCC NAMA Workshop (11/3-4)

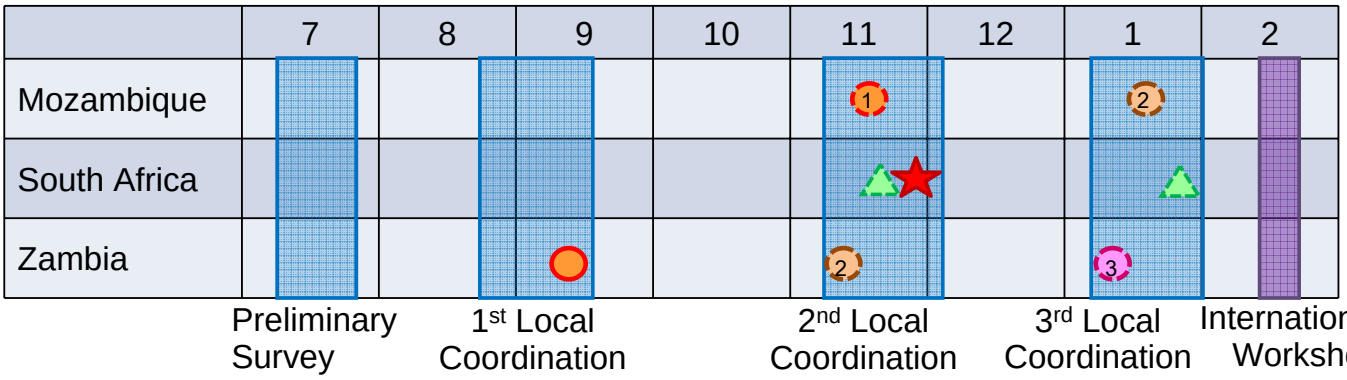
1st, 2nd & 3rd Workshop (tentative; 2days)

Protea Hotel, Tanzania (8/31)

Hotel Silver Springs, Uganda (9/7)

Protea Hotel, Tanzania (9/1)

Project Status and Schedule – Group3 (Mozambique, South Africa, Zambia)



1st Workshop (2-days)

COP 17 Side Event (11/29)

1st, 2nd & 3rd Workshop (tentative; 1-2days)

Presentation (tentative; 1 day)

Department of Energy, Zambia (9/15)

Hotel Cardoso, Mozambique (9/1)

World Bank, Zambia (9/13)

Project Status and Schedule – Group4 (DRC, Egypt, Ethiopia, Nigeria)

	8	9	10	11	12	1	2
DRC				①		②	
Egypt				①		②	
Ethiopia				①		②	
Nigeria						①	

Preliminary Survey — 1st Local Coordination — 2nd Local Coordination — International Workshop

① ② 1st & 2nd Workshop (tentative; 2days)

Ministry of State for Environmental Affairs, Egypt (9/7)

Climate Change Unit/EEAA, Egypt (9/7)

Participatory Forest Management Project Site Map, Ethiopia

Findings

➢Constraints to conduct GHG emission reduction projects including MRV in Africa
- Limited financial support, knowledge, capacity in governmental agencies
- Limited participation of private companies
- Lack of coordination among various governmental agencies and donors
- Relatively small scale of projects

➢Opportunities for GHG emission reduction projects, MRV, and new mechanisms in Africa
- Strong interests for future crediting mechanism
- Existence of various donors to support climate mitigation projects
- Potential for coordination with NAMAs
- Cooperation with research institute (e.g. university)

➢Issues need to be considered to establish new mechanisms
- Co-existence with Kyoto Mechanisms
- Coordination with existing donors
- Sustainable technology transfer

Edurando Mondale University, Mozambique (8/29)

THE INSTITUTE OF ENERGY ECONOMICS, JAPAN

Policy Dialogue on Climate Change in Africa

Energy Statistics and Climate Change Issue

Tokyo, Japan
31 October 2011

Shigeru Kimura
Senior Research Fellow
EDMC, IEEJ

EDMC The Energy Data and Modelling Center, The Institute of Energy Economics, Japan

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- Experience in ASEAN
- Conclusion

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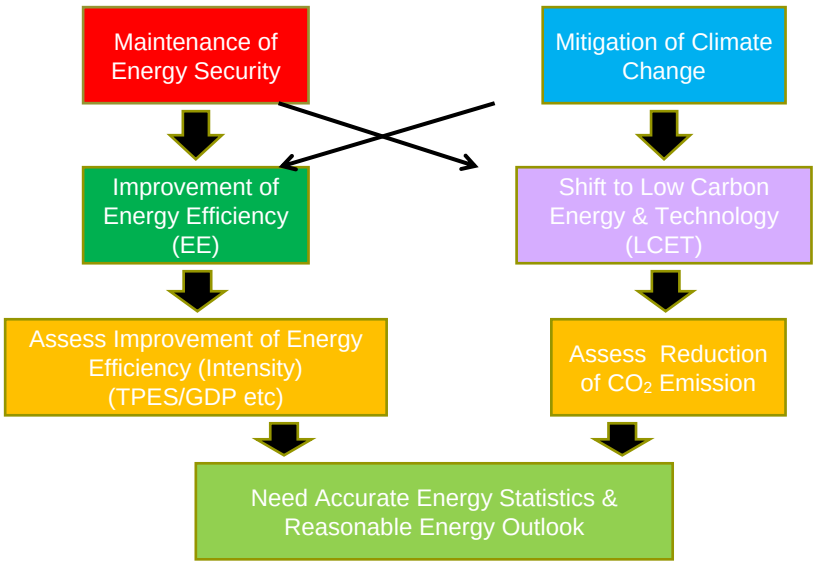
Current Energy & Environmental Issues



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Current Energy & Environmental Issues

- Promotion of EE and LCET
  - PDCA (Plan-Do-Check-Act) cycle for EE
    - Action plans -> Implementation -> Check -> Action
      - Industry: Voluntary action plans in sub-sectors
      - Road: Top-runner regulation on cars
      - Residential: Top-runner regulation on appliances & HEMS (Home Energy Management System)
      - Commercial: Building Energy Codes, Building Labeling & BEMS (Building Energy Management System)
      - Power generation: Thermal efficiency
  - Application and Development of Low Carbon Technology
    - Use of existing low carbon energy: Nuclear, hydro, geothermal
    - Use of NRE: Solar, wind, tide and biomass (Biofuel)
    - Technologies
      - High efficient appliances, HV(Hybrid Vehicle)/ PHV(Plug-in Hybrid Vehicle) /EV(Electric Vehicle) & Fuel Cell Car etc
      - Low carbon town, Carbon capture storage etc

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Energy Statistics

- Primary Energy Statistics
  - Supply side：Coal, Oil (Crude oil & Petroleum products), Gas, Electricity and Heat
  - Demand side: Sales data to final users (by sector) or energy consumption data of final users
  - Units: ton, liter, barrel, m^3, kWh, joule
  - Sources: National administrations (General statistics office, energy organizations) and industry associations
- Secondary Energy Statistics
  - Energy Balance Table
    - Source: Primary energy statistics
    - Thermal units: ton oil equivalent (toe), ton coal equivalent (tce), joule, calorie, BTU, etc
      - Gross calorific value (GCV) and Net calorific value (NCV)
  - Data source for estimation of CO_2 emission from fuel combustion
  - Key data source for analysis of energy demand/supply situation

Concept of Energy Balance Table

- Energy Balance Table
  - Matrix
    - Sectors vs Energy Products
  - Three major sectors
    - Primary energy sector: Production + import – export – international bunkers + stock change (opening – closing) = Total primary energy supply
      - Gross Inland delivery
    - Transformation sector: power generation, oil refinery, coke production, etc
      - Energy input – output > 0
    - Final consumption sector: Industry, Transport & Other (residential & commercial)
      - Classified by activity
  - Energy Products: Coal, Oil, Gas, Nuclear, Hydro, Geothermal, NRE, Electricity and Heat
  - Assumption of thermal efficiency on primary electricity
    - International organizations: Hydro 100%, Nuclear 33%, Geothermal 10%, NE: 100%
    - National administrations: average thermal efficiency of coal, oil and gas
      - Japan applies 41% currently

	Coal and coal products	Crude, NGL and feedstocks	Oil products	Natural gas	Hydro	Biofuels and waste	Electricity	Total
Production	0.0	82,069.9					0.0	152,291.9
Imports	265.4	370.4					1.7	1,881.1
Exports	0.0	-47,664.9					4.8	-113,548.6
International marine bunkers	0.0	0.0					0.0	-286.3
International aviation bunkers	0.0	0.0	-471.9	0.0	0.0	0.0	0.0	-471.9
Stock changes	152.9	96.7	-358.0	0.0	0.0	0.0	0.0	-108.5
Total primary energy supply	418.3	34,872.0	-18,836.1	23,220.0	29.4	57.2	-3.1	39,757.8
Transfers	0.0	-9,602.1					0.0	523.5
Statistical differences	0.0	-142.9					7.4	-856.3
Main activity producer electricity plant	0.0	0.0					1.0	-6,700.5
Autoproducer electricity plants	0.0	0.0					7.1	-111.1
Blast furnaces	-173.3	0.0	0.0	0.0	0.0	0.0	0.0	-173.3
Gas works	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke ovens	-48.0	0.0	0.0	0.0	0.0	0.0	0.0	-48.0
Oil refineries	0.0	-24,447.7	22,965.7	0.0	0.0	0.0	0.0	-1,482.0
Energy industry own use	0.0	-504.6	0.0	-3,927.2	0.0	0.0	-251.7	-4,683.6
Losses	-79.6	-174.7	0.0	-197.1	0.0	0.0	-756.5	-1,208.0
Total final consumption	117.4	0.0	13,080.3	9,069.4	0.0	57.2	2,694.2	25,018.5
Industry	117.4	0.0					3	4,438.2
Iron and steel	117.4	0.0					8	557.8
Chemical and petrochemical	0.0	0.0					5	135.2
Construction	0.0	0.0					4	2,211.7
Textile and leather	0.0	0.0					0	0.0
Non-specified (industry)	0.0	0.0					6	1,533.5
Transport	0.0	0.0					1	10,182.0
Domestic aviation	0.0	0.0					0	0.0
Road	0.0	0.0					0	9,264.8
Rail	0.0	0.0					9	40.9
Pipeline transport	0.0	0.0					2	876.2
Other	0.0	0.0					7	8,228.3
Residential	0.0	0.0					7	8,228.3
Commercial and public services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-energy use	0.0	0.0	919.1	1,251.0	0.0	0.0	0.0	2,170.0
Non-energy use in industry/transforma	0.0	0.0	919.1	1,251.0	0.0	0.0	0.0	2,170.0
Memo: feedstock use in petrochem	0.0	0.0	59.0	1,251.0	0.0	0.0	0.0	1,310.0
Electricity output (GWh)	0	0	861	41566	342	0	0	42769
Electricity output (GWh)-main activity	0	0	313	41566	342	0	0	42221
Electricity output (GWh)-autoproducer	0	0	548	0	0	0	0	548

Primary Energy Supply

Transformation

Final Consumption Sector
Industry
Transport
Other
Non-energy

Structure of EBT

Source: Algerian EBT 2009 from IEA Non-OECD Energy Balances

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Current Situation of EBT in Africa

- Total primary energy supply in 2009

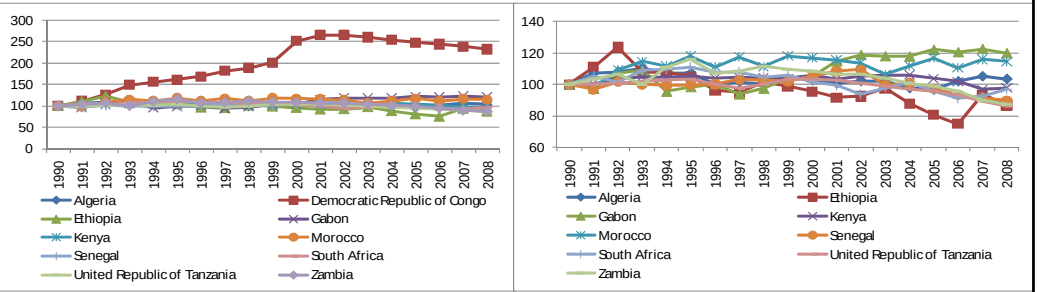
	Coal	Oil	Gas	Nuclear, Hydro & Geothermal	Solar/Wind/ Tide	Biomass & Others	Total
Algeria	418.3	16,036.0	23,220.0	29.4	0.0	54.1	39,757.8
Democratic Republic of Congo	296.2	541.3	7.1	670.4	0.0	21,405.8	22,920.9
Ethiopia	0.0	2,305.0	0.0	321.0	0.0	30,052.0	32,677.9
Gabon	0.0	458.8	150.3	76.2	0.0	1,108.7	1,794.0
Kenya	58.5	3,090.9	0.0	1,337.7	1.4	14,234.6	18,723.2
Morocco	2,705.4	10,715.9	527.4	223.4	33.6	877.7	15,083.4
Senegal	157.2	1,525.8	14.5	20.6	0.3	1,220.7	2,939.1
South Africa	98,368.3	24,426.9	3,709.1	3,462.2	64.2	14,010.7	144,041.4
United Republic of Tanzania	58.5	1,570.3	543.1	239.4	0.0	17,204.6	19,616.0
Zambia	0.6	599.8	0.0	883.7	0.0	6,372.4	7,856.5

- Data source: IEA Non-OECD Energy Balances 2009
- Burkina Faso, Cape Verde, Chad, Gambia, Lesotho, Malawi, Mali, Uganda are not available.

- Most African countries hugely depend on Biomass energy except Algeria, Morocco and South Africa.
- Algeria, Morocco and South Africa seem to have saving potential for fossil energy.
  + Power generation sector in Algeria and South Africa due to low thermal efficiency
  + Final consumption sectors such as road and residential/commercial sectors in Morocco

8

Historical Trend of Energy Intensity in Africa



- Energy Intensity = TPES/GDP; GDP 2005 PPP
- Data source: IEA Non-OECD Energy Balances 2009, World Development Indicators 2010 (WB)

- The historical energy intensities of African countries seem to be flat except for D.R. Congo.
- But Ethiopia, Senegal, South Africa and Zambia indicate small downward trend (small improvement) in 2000s.

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Methodologies on Estimation of CO_2 Emission

- Reference Approach
  - Estimate CO_2 emission at Total Primary Energy Supply level in the EBT:
    - Total primary energy supply = Production + Import – Export –International bunkers + Stock change
    - Fossil energy;
      - Coal and coal products consumption * 25.8~27.6 (tC/TJ)
      - Crude oil and NGL consumption * 17.2~20.0 (tC/TJ)
      - Petroleum products consumption * 17.2~27.5 (tC/TJ)
      - Gas consumption * 15.3 (tC/TJ)

        Source of carbon emission factors: UNFCCC
  - The EBT should be prepared on NCV basis if carbon emission factors of UNFCCC are to be applied.
  - CO_2 ton is an another unit of Carbon dioxide emission. Generally CO_2 ton is approximately three times of Carbon ton.

	Coal and coal products	Crude, NGL and feedstocks	Oil products	Natural gas	Hydro	Biofuels and waste	Electricity	Total
Production	0.0	82,069.9	0.0	70,135.4	29.4	57.2	0.0	152,291.9
Imports	265.4	370.4	1,213.6	0.0	0.0	0.0	31.7	1,881.1
Exports	0.0	-47,664.9	-18,933.4	-46,915.4	0.0	0.0	-34.8	-113,548.6
International marine bunkers	0.0	0.0	-286.3	0.0	0.0	0.0	0.0	-286.3
International aviation bunkers	0.0	0.0	-471.9	0.0	0.0	0.0	0.0	-471.9
Stock changes	152.9	96.7	-358.0	0.0	0.0	0.0	0.0	-108.5
Total primary energy supply	418.3	34,872.0	-18,836.1	23,220.0	29.4	57.2	-3.1	39,757.8

EDMC The Energy Data and Modelling Center The Institute of Energy Economics, Japan

Methodologies on Estimation of CO_2 Emission

- Sectoral Approach
  - Estimate CO_2 emission of Energy Consumption in each Sector level in the EBT:
    - Sector: Transformation sector & final consumption sector
    - Energy: Coal & coal products, crude oil & petroleum products, gas
    - Energy consumption * carbon emission factor

	Coal and coal products	Crude, NGL and feedstocks	Oil products	Natural gas	Hydro	Biofuels and waste	Electricity	Total
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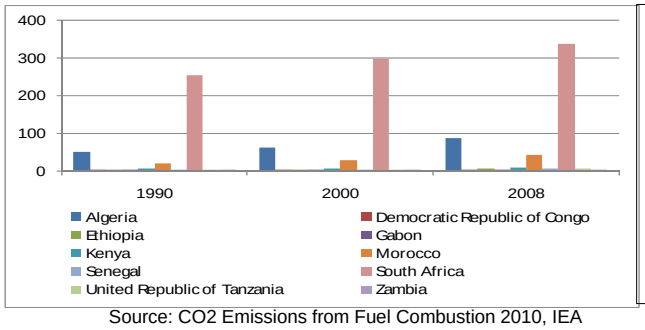
Stock changes	152.9	96.7	-358.0	0.0	0.0	0.0	0.0	-108.5
Total primary energy supply	418.3	34,872.0	-18,836.1	23,220.0	29.4	57.2	-3.1	39,757.8
Transfers	0.0	-9,602.1	10,125.6	0.0	0.0	0.0	0.0	523.5
Statistical differences	0.0	-142.9	-919.5	178.6	0.0	0.0	27.4	-856.3
Main activity producer electricity plants	0.0	0.0	-97.2	-10,204.5	-29.4	0.0	3,631.0	-6,700.5
Autoproducer electricity plants	0.0	0.0	-158.2	0.0	0.0	0.0	47.1	-111.1
Blast furnaces	-173.3	0.0	0.0	0.0	0.0	0.0	0.0	-173.3
Gas works	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke ovens	-48.0	0.0	0.0	0.0	0.0	0.0	0.0	-48.0
Oil refineries	0.0	-24,447.7	22,965.7	0.0	0.0	0.0	0.0	-1,482.0
Energy industry own use	0.0	-504.6	0.0	-3,927.2	0.0	0.0	-251.7	-4,683.6
Losses	-79.6	-174.7	0.0	-197.1	0.0	0.0	-756.5	-1,208.0
Total final consumption	117.4	0.0	13,080.3	9,069.4	0.0	57.2	2,694.2	25,018.5
Industry	117.4	0.0	1,189.1	2,223.3	0.0	0.0	908.3	4,438.2
Iron and steel	117.4	0.0	161.3	207.3	0.0	0.0	71.8	557.8
Chemical and petrochemical	0.0	0.0	33.1	20.6	0.0	0.0	81.5	135.2
Construction	0.0	0.0	133.4	1,820.9	0.0	0.0	257.4	2,211.7
Textile and leather	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-specified (industry)	0.0	0.0	861.3	174.6	0.0	0.0	497.6	1,533.5
Transport	0.0	0.0	9,264.8	864.0	0.0	0.0	53.1	10,182.0
Domestic aviation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road	0.0	0.0	9,264.8	0.0	0.0	0.0	0.0	9,264.8
Rail	0.0	0.0	0.0	0.0	0.0	0.0	40.9	40.9
Pipeline transport	0.0	0.0	0.0	864.0	0.0	0.0	12.2	876.2
Other	0.0	0.0	1,707.3	4,731.1	0.0	57.2	1,732.7	8,228.3
Residential	0.0	0.0	1,707.3	4,731.1	0.0	57.2	1,732.7	8,228.3
Commercial and public services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-energy use	0.0	0.0	919.1	1,251.0	0.0	0.0	0.0	2,170.0
Non-energy use in industry/transformation	0.0	0.0	919.1	1,251.0	0.0	0.0	0.0	2,170.0
Memo: feedstock use in petrochemical	0.0	0.0	59.0	1,251.0	0.0	0.0	0.0	1,310.0

CO_2 Emission in Africa



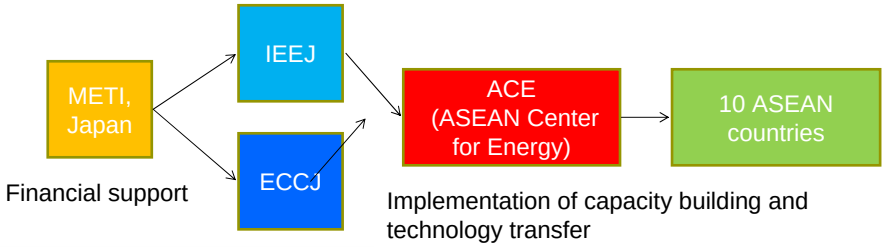
-South Africa is a largest CO_2 emitter among the 10 countries followed by Algeria and Morocco.
-This trend is the as same as the energy trend.

Source: CO2 Emissions from Fuel Combustion 2010, IEA

- The African countries, which have no EBTs in the IEA energy balances, such as Burkina Faso and Chad, are able to apply the reference approach for estimation of their CO_2 emission amount due to small amount of data requirements:
  - Sector: Production, Import, Export, International bunkers, Stock change
  - Energy: Coal & coal products, crude oil & petroleum products and natural gas
- The future CO_2 emission estimated in the energy outlook is also very important for the preparation of appropriate energy & environmental policies.

Experience in Southeast Asia (ASEAN)

- Energy Cooperation Program between ASEAN and Japan
  - ESSPA (Energy Supply Security Planning in ASEAN):
    - Capacity Building on Energy Statistics and Energy Outlook
    - Information sharing through workshops and seminars
    - The Institute of Energy economics, Japan (IEEJ)
  - PROMEEC (PROMotion of Energy Efficiency and Conservation):
    - Technology transfer of EEC to each ASEAN countries
    - The Energy Conservation Center, Japan (ECCJ)



Experience in ASEAN

- ESSPA Project
  - Energy Statistics:
    - Started in 2000
    - Support on development of the ASEAN Energy Database
    - Capacity building on energy statistics
      - Individual activity: Enhance CLMV (Cambodia, Lao PDR, Myanmar and Viet Nam)
      - Whole activity: Workshop with energy statisticians from the 10 ASEAN countries
    - Contents
      - Understanding of APEC/ASEAN Joint Questionnaire
      - Understanding of energy balance table
      - Collection of energy consumption data
  - Energy Outlook:
    - Started in 2004
    - Methodology: Econometrics approach
    - Tools: MICROFIT for estimating energy demand functions and LEAP for developing simulation models
    - Contents: Training on the tools and making energy outlooks
    - Dissemination: Publication of 1st, 2nd and 3rd ASEAN Energy Outlook.

Experience in ASEAN

- ASEAN is diverse
  - ASEAN consists of following 10 countries:
    - Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam

ASEAN in 2006

Item	Unit	Range	Total	Share of World (%)
Land Area	1000 km^2	0.7 – 1,919	3,397	2.30
Population	Million	0.38 – 223.04	487.82	7.49
GDP at 2000	Billion US$	6.99 – 219.27	779.35	2.06
GDP per capita	US$/person	723 – 30,269	2150.48	–
Energy Production	MTOE	0.3 – 273.1	518.9	4.40
TPES	MTOE	4.0 – 174.9	444.6	4.20
TFEC	MTOE	0.8 – 119.3	301.2	4.30

  - ESSPA has worked or not worked? Source: APEC Energy Database

Experience in ASEAN

- Good example of Improvement on Indonesian Energy Statistics

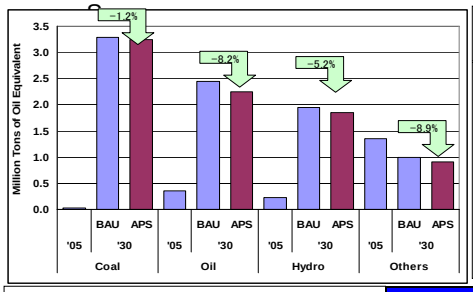
Energy Balance Table
Indonesia

	1980 Unit:KTOE											2008 Unit:KTOE										
	1 Coal	2 Coal Pro	3 Crude Oil	4 Petroleu	5 Gas	6 Hydro	7 Nuclear	8 Geother	9 Others	10 Electric	11 Heat	12 Total	1 Coal	2 Coal Pro	3 Crude Oil	4 Petroleu	5 Gas	6 Hydro	7 Nuclear	8 Geother	9 Others	10 Electric	11 Heat	12 Total
1. Indigenous Production	200	-	76731	-	14828	325	-	-	-	-	-	92083	134652	-	55318	1087	72604	991	-	7146	44781	-	-	316579
2. Imports	26	-	4387	2955	-	-	-	-	-	-	-	7367	63	-	12839	20618	-	-	-	-	-	-	-	33520
3. Exports	-59	-	-50379	-7637	-10002	-	-	-	-	-	-	-68076	-94080	-	-20619	-	-33873	-	-	-	-	-	-	-148572
4. International Marine Bunkers	-	-	-	-308	-	-	-	-	-	-	-	-308	-	-	-	-	-	-	-	-	-	-	-	-
5. International Aviation Bunkers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Stock Changes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	976	-	-	-	-	-	-	-	976
7. Total Primary Energy Supply	166	-	30739	-4990	4827	325	-	-	-	-	-	31067	40635	-	48514	21705	38731	991	-	7146	44781	-	-	202503
8. Transfers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9. Total Transformation Sector	-	-	-	-	-	-	-	-	-	-	-	-	-18277	21	-47601	34958	-12689	-991	-	-7146	-14	12852	-	-38889
9.1 Main Activity Producer	-	-	-	-1690	-	-325	-	-	-	855	-	-1161	-18252	-	-	-9692	-5961	-991	-	-7146	-14	12852	-	-29205
9.2 Autoproducers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.3 Gas Processing	-	-	-	465	-1278	-	-	-	-	-	-	-813	-	-	-	-	-6727	-	-	-	-	-	-	-6727
9.4 Refineries	-	-	-25704	25865	-	-	-	-	-	-	-	161	-	-	-47601	44650	-	-	-	-	-	-	-	-2952
9.5 Coal Transformation	-	-	-	-	-	-	-	-	-	-	-	-	-25	21	-	-	-	-	-	-	-	-	-	-5
9.6 Petrochemical Industry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.7 Biofuel Processing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.8 Charcoal Processing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.9 Non-specified Transformatio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Loss & Own Use	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-939	-78	-12030	-	-	-	-	-1498	-	-14545
11. Discrepancy	-91	-	-5035	-1597	-1223	-	-	-	-	-230	-	-8176	-	-	26	-2309	-1424	-	-	-	-	-251	-	-3958
12. Total Final Energy Consump	75	-	-	18052	2326	-	-	-	-	624	-	21078	22357	21	-	54276	12589	-	-	-	44767	11103	-	145112
13. Industry Sector	61	-	-	4751	1664	-	-	-	-	280	-	6756	22357	21	-	6288	12503	-	-	-	7126	4125	-	52421
13.1 Iron and Steel	1	-	-	68	285	-	-	-	-	19	-	373	187	-	-	-	1407	-	-	-	-	-	-	1593
13.2 Chemical (incl. Petro-Chem	0	-	-	188	0	-	-	-	-	63	-	252	-	-	-	-	6674	-	-	-	-	-	-	6674
13.3 Non Ferrous Metals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.4 Non Metallic Mineral Prod	55	-	-	607	753	-	-	-	-	53	-	1469	4023	-	-	-	1175	-	-	-	-	-	-	5199
13.5 Transportation Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.6 Machinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	201	-	-	-	-	-	-	201
13.7 Mining and Quarrying	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.8 Food, Beverages and Toba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	366	-	-	-	-	-	-	366
13.9 Pulp, Paper and Printing	-	-	-	91	-	-	-	-	-	16	-	107	736	-	-	-	374	-	-	-	-	-	-	1110
13.10 Wood and Wood Product	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2
13.11 Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.12 Textiles and Leather	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	-	-	-	-	-	-	210
13.13 Non-specified Industry	-	-	-	-	-	-	-	-	-	-	-	-	17412	21	-	6288	2094	-	-	-	7126	4125	-	37066
14. Transport Sector	14	-	-	6221	-	-	-	-	-	-	-	6236	-	-	-	26001	17	-	-	-	-	7	-	26025
14.1 Domestic Air Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2202	-	-	-	-	-	-	-	2202
14.2 Road	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15681	17	-	-	-	-	-	-	15698
14.3 Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	7
14.4 Inland Waterways	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.5 Pipeline Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.6 Non-specified Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8118	-	-	-	-	-	-	-	8118
15. Other Sector	-	-	-	6687	107	-	-	-	-	344	-	7138	-	-	-	21987	68	-	-	-	37640	6970	-	66666
15.1 Residential & Commercial	-	-	-	6687	107	-	-	-	-	344	-	7138	-	-	-	8555	68	-	-	-	37640	6970	-	53234
15.1.1 Commerce and Public Se	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1060	50	-	-	-	225	2654	-	3990
15.1.2 Residential	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7495	18	-	-	-	37415	4316	-	49244
15.2 Agriculture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.3 Fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.4 Non-specified Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13432	-	-	-	-	-	-	-	13432
16. of which Non-Energy Use <8	-	-	-	393	554	-	-	-	-	-	-	948	-	-	-	10790	3051	-	-	-	-	-	-	13841
17. Electricity Output in GWh	-	-	6157	-	-	3780	-	-	-	-	-	9936	61392	-	40449	-	27711	11528	-	8309	47	-	-	149437

Source: APEC Energy Database

Experience in ASEAN

- Good example of Lao PDR's Energy Outlook



Scenario Analysis
BAU vs APS (including EE Policies)

Total Primary Energy Supply

TPES in the BAU is projected to increase from 2.2 Mtoe in 2007 to 8.7 Mtoe in 2030 at an average growth rate of 6.3%. Coal demand will increase sharply from 0.1 Mtoe in 2007 to 3.3 Mtoe in 2030 at average rate of 17.6% per annum as a new coal power plant called Hongsa Lignite Power Plant will be operated from 2015 onwards. Hydro will also increase sharply but at a lower rate of 8.6% as compared to that of coal. Oil demand will rise at a relatively slower pace of 7.5% from 0.5 Mtoe in 2007 to 2.5 Mtoe in 2030.

Summary Table

In this energy outlook, the GDP of Lao P.D.R is assumed to grow at an average annual growth rate of 7.7% from 2007 to 2030 while population growth is assumed to grow at an average annual rate of 1.6%. By the year 2030, if the three energy measures of the government are implemented, the TPES will decrease from 8.7 Mtoe in the BAU scenario to 8.3 Mtoe in the APS. It means that Lao P.D.R can reduce TPES by 0.43 Mtoe. At the same time, TFEC can decrease from 6.03 Mtoe in BAU to 5.66 Mtoe in the APS.

	Unit	2005	2030		Decrease	
			RS	APS	Value	%
TFEC	Mtoe	1,799	6,027	5,657	(370.0)	(6.14)
TPES	Mtoe	1,977	8,692	8,263	(429.0)	(4.94)
CO2 Emission	Mt-C	330	5,820	5,611	(209.3)	(3.60)
Energy Intensity	toe/Million 2000 US$	824	581	552	(28.7)	(4.94)
TPES/Capita	toe/person	0.34	0.99	0.94	(0.05)	(4.94)
TFEC/Capita	toe/person	499	687	645	(42.16)	(6.14)
CO2/TPES	t C/toe	0.17	0.67	0.68	0.01	1.41
CO2 Intensity	t C/Million 2000 US$	138	389	375	(14.0)	(3.60)

Source: The 3rd ASEAN Energy Outlook

Conclusion

- Energy Statistics especially energy balance table is one of important background information for addressing climate change issues:
  - Energy demand supply structure
  - Accurate calculation of CO_2 emission
  - Appropriate energy policies
- But supply side energy data are sufficient for estimating CO_2 emission using the reference approach.
  - Production, import/export, international bunkers, stock change
- Energy outlook results are also useful information for:
  - Future energy demand/supply structure
  - Future CO_2 emission
  - Assessment of energy policies in terms of energy efficiency and low carbon energy and technology
- In this regard, the African countries can increase their capacity on energy statistics and outlook through relevant opportunities such as capacity buildings and workshops.
- Japan as well as IEEJ will be ready to implement the capacity buildings and workshops with the cooperation of IEA.

Thank you for your attention