



“Promotion of Energy Science Education for Sustainable Development in Myanmar”

THEME 1. UNDERSTANDING SUSTAINABLE DEVELOPMENT

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PART **1**

SUSTAINABLE DEVELOPMENT and MDG

PART

1.1

SUSTAINABLE DEVELOPMENT

PART

1.1.1

What is Sustainable Development?

Sustainable development has been defined in many ways, but the most frequently quoted definition is from Our Common Future, also known as the Brundtland Report:[1]

“Sustainable development is
development that meets the needs of the
present without compromising the ability of
future generations to meet
their own needs”

What is Sustainable Development? (continue)

- *It contains within it two key concepts:*
- *the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs."*

What is Sustainable Development? (continue)

- All definitions of sustainable development require that we see the world as a system—a system that connects space; and a system that connects time.
- When you think of the world as a system over space, you grow to understand that air pollution from North America affects air quality in Asia, and that pesticides sprayed in Argentina could harm fish stocks off the coast of Australia.
- And when you think of the world as a system over time, you start to realize that the decisions our grandparents made about how to farm the land continue to affect agricultural practice today; and the economic policies we endorse today will have an impact on urban poverty when our children are adults.

PART

1.1.2

Why Sustainable Development is important?

- We also understand that quality of life is a system, too. It's good to be physically healthy, but what if you are poor and don't have access to education? It's good to have a secure income, but what if the air in your part of the world is unclean? And it's good to have freedom of religious expression, but what if you can't feed your family?
- The concept of sustainable development is rooted in this sort of systems thinking. It helps us understand ourselves and our world. The problems we face are complex and serious—and we can't address them in the same way we created them. But we *can* address them

Source: www.IISD.ca

Milestones related to SD

1972

- Stockholm, United Nations Conference on the Human Environment

1972

- UN's first major conference on environmental issues

1987

- Brundtland commission, Our common future

1987

- Examines the human environment and how it is interweaved with political and economic issues

1992

- Rio de Janeiro, United Nations Conference on Environment and Development

1992

- Held to mark the twentieth anniversary of the Stockholm Conference

2000

- New York, Millennium Summit

2000

- Attempts to articulate and affirm an animating vision for the UN

2012

- Rio de Janeiro, UN -Conference on SD

2012

- The UN Conference on Sustainable Development have took a place in Brazil to mark the 20th anniversary of the 1992

PART

1.1.4

Brief historical events related to SD

- Here is a brief historical events related to SD.
- More detail focus on contributions to understanding of each event will be explained in the following slides.

1972
STOCKHOLM
UNITED NATIONS CONFERENCE ON THE HUMAN ENVIRONMENT

First UN conference on environmental issues

Agrees a declaration with **26** principles regarding environment and development

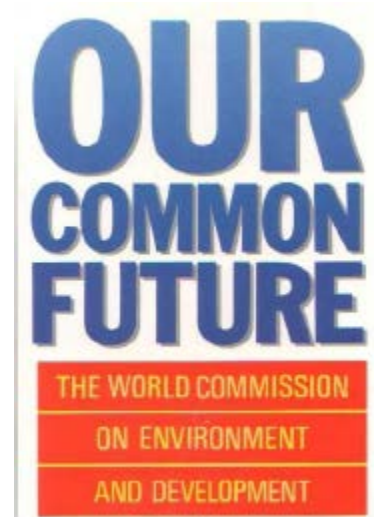
Promote international cooperation against environmental threats

Principle 1, Declaration of the United Nations Conference on the Human Environment

1987

OUR COMMON FUTURE, BRUNDTLAND COMMISSION

- Examines the human environment and how it is interweaved with political and economic issues
- Urges governments to realize the vital needs for environmentally sustainable policies
- Lays the conceptual foundation for sustainable development



SUSTAINABILITY is a way to secure **EQUITY** between present and future generations and within each generations

1992
RIO DE JANEIRO
UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

To mark the **20th anniversary** of the
Stockholm Conference

Explores the interdependence of
environmental protection, social equality,
and economic development



Attended - **178 countries' representatives** and **20,000-30,000 individuals** from governments, non-governmental organizations, and the media

1992

RIO DE JANEIRO, UNITED NATIONS CONFERENCE ON
ENVIRONMENT AND DEVELOPMENT (CONTINUE)

RIO DECLARATION ON
ENVIRONMENT AND
DEVELOPMENT

UNITED NATIONS
COMMISSION ON
SUSTAINABLE DEVELOPMENT

AGENDA 21

STATEMENT OF PRINCIPLES FOR
THE SUSTAINABLE
MANAGEMENT OF FOREST

UNITED NATIONS
CONVENTION ON
BIOLOGICAL
DIVERSITY

UNITED NATIONS FRAMEWORK
CONVENTION ON CLIMATE
CHANGE

RIO DECLARATION ON ENVIRONMENT AND DEVELOPMENT

A comprehensive declaration of environmental rights and duties

Has many progressive approaches:

Polluters pay principle

Precautionary principle

Principle of common but differentiated responsibilities

Public participation principle

Principle of priority for the least developed

The Earth Charter, intended as a declaration on fundamental values, is not included

AGENDA 21



Blue print : Global, National, and Local sustainability

Addresses : Poverty, Public health, Population, Consumption, Social equality, Biodiversity and Pollution

Practical attempt to define the balance between Development, Social goods, and Environmental protection



United Nations **Sustainable Development**

United Nations Conference on Environment & Development

Rio de Janeiro, Brazil, 3 to 14 June 1992

AGENDA 21

**United Nations Conference on Environment &
Development**

Rio de Janeiro, Brazil, 3 to 14 June 1992

AGENDA 21

2000 NEW YORK MILLENNIUM SUMMIT

Attempted to

“articulate and affirm an animating vision for the United Nations”

Attended : **150** world leaders and **8000** delegates

Adopts the Millennium Declaration, that promotes the Millennium Development Goals (**MDG**), originally developed by **OECD**

2012

RIO DE JANEIRO - UN CONFERENCE ON SD

The Conference will focus on two themes: (a) a green economy in the context of sustainable development poverty eradication; and (b) the institutional framework for sustainable development

The preparations for Rio+20 have highlighted **seven** areas which need priority attention; these include decent jobs, energy, sustainable cities, food security and sustainable agriculture, water, oceans and disaster readiness.

Sustainable development model

Sustainable development model

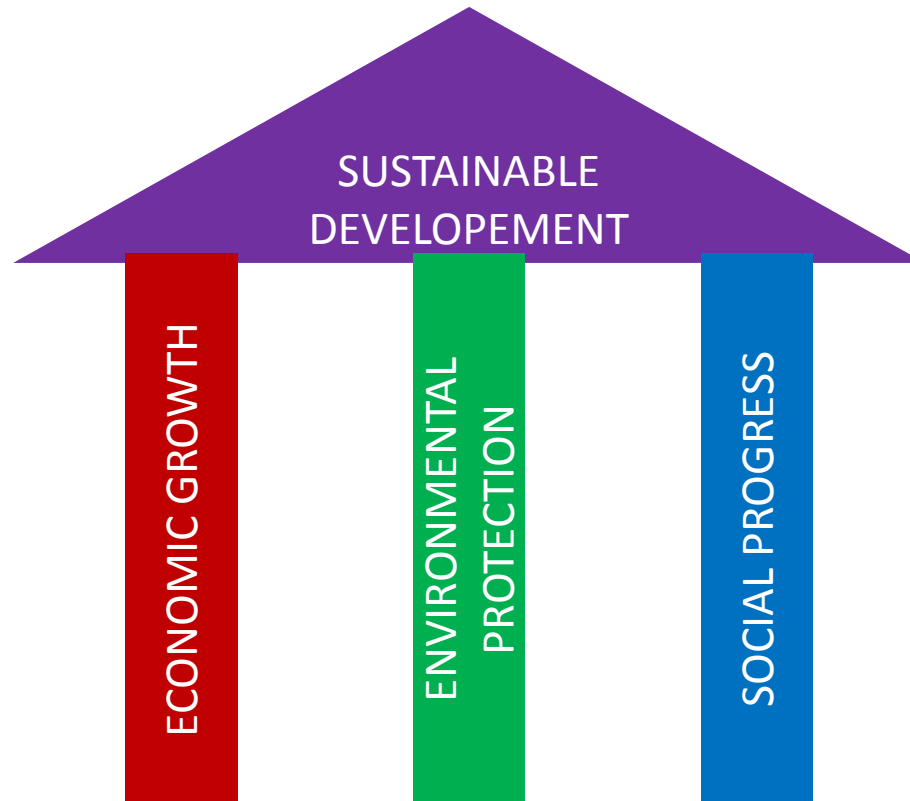
in Market Economy

- Three Pillars Model
- Three Cycles Model
- Concentric-circles Model

SUSTAINABLE DEVELOPMENT MODELS

-THREE-PILLARS MODEL

- Human welfare depends on performance in **three** dimensions: Economic, Environmental, and Social
- If any one of these is weak, society is unstable
- **Downside:** 3 pillars look separate, implying they are independent of one another



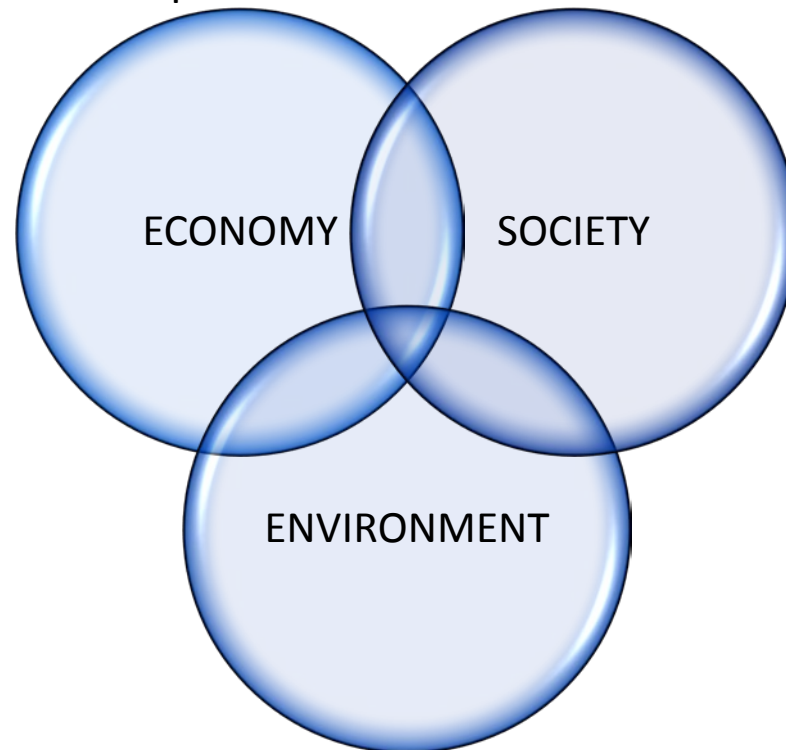
SUSTAINABLE DEVELOPMENT MODELS (CONTINUE)

OVERLAPING-CIRCLES MODEL

Sustainability = the intersection of Economic development, Environmental preservation, and Social progress

Can only be achieved if all three goals are achieved and in balance

Downside: implies economy, society and environment are more or less equal in status and independent in existence

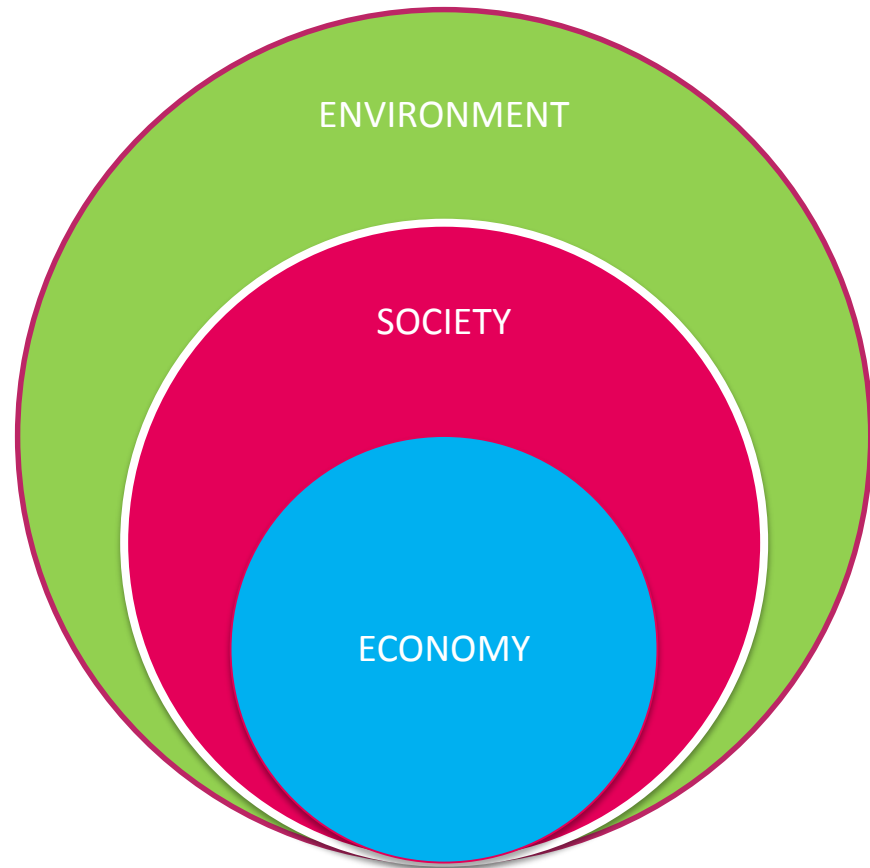


SUSTAINABLE DEVELOPMENT MODELS (CONTINUE)

CONCENTRIC-CIRCLES MODEL

Economy is part of human society, which in turn is part of environment

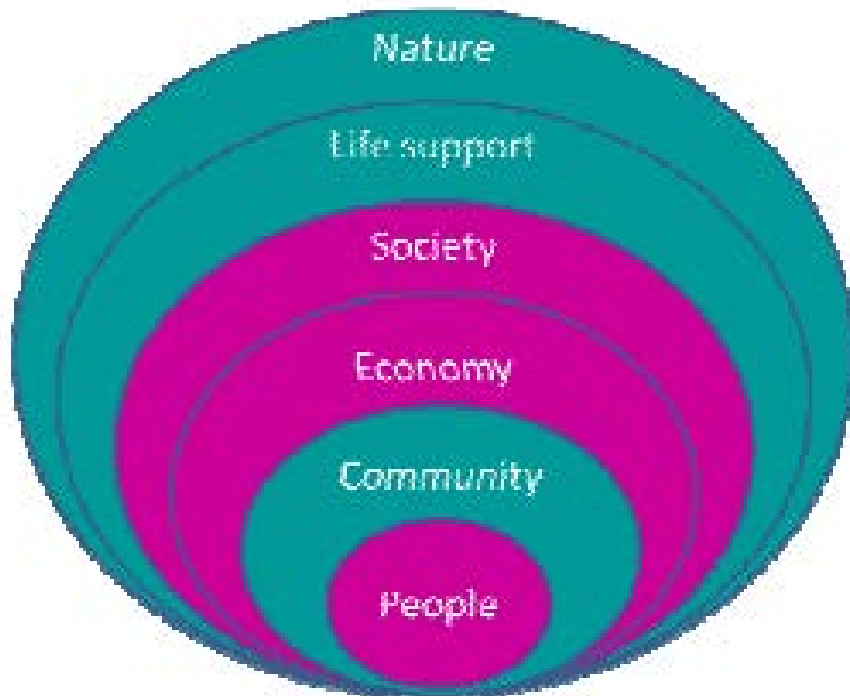
Health of the part is dependent on that of the whole



SUSTAINABLE DEVELOPMENT MODELS (CONTINUE)

The six areas of issues to be sustained or developed have different scopes. In fact, groups of people form communities, which in turn make up a national economy, which can be one aspect of a society, which in turn is part of and depends on nature's life support system, which is but one element of nature as a whole (Figure 1).

Figure 1: From people to nature



Note: purple = to develop; green= to sustain
Source: DESA.

SUSTAINABLE DEVELOPMENT MODELS (CONTINUE)

The above framework is an elaboration of the idea of “interdependent and mutually reinforcing pillars of sustainable development - economic development, social development and environmental protection”, as recognized by UN Member States since the Johannesburg Declaration on Sustainable Development of Sept. 2002 (Table 3). It provides more detail, including on the level of balance between development and sustainability in every pillar. It also allows for other issues that have been suggested as “fourth pillars”, such as institutions, governance or culture.

For example, the UNESCO Universal Declaration on Cultural Diversity, adopted in 2001, stated that “...cultural diversity is as necessary for humankind as biodiversity is for nature”. Some economists have advocated that the three pillars of sustainable development should comprise interlink ages, intergenerational equity, and dynamic efficiency - a perspective that is also captured by the framework.

Table 3. Coverage of three pillars of sustainable development

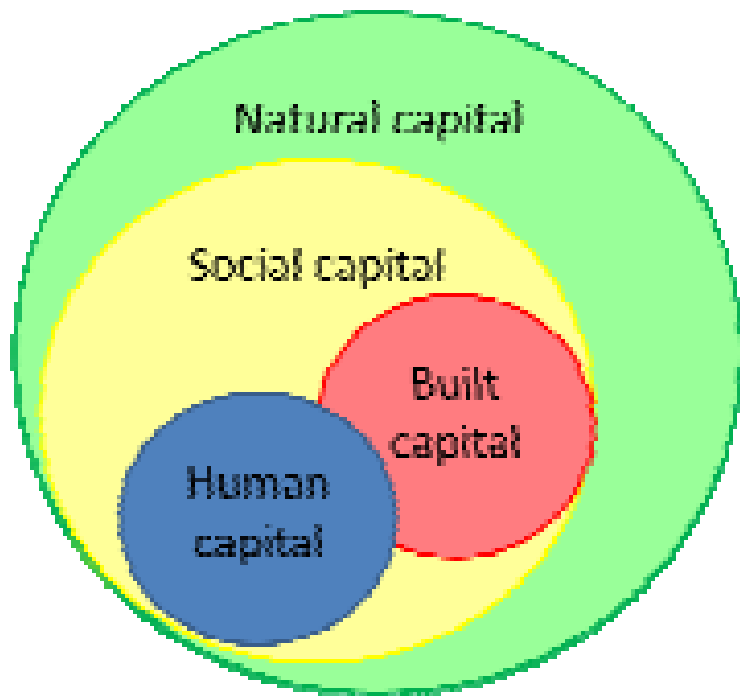
		Social	Economic	Environmental
What is to be developed?	People	+++	++	+
	Economy	++	+++	+
	Society	+++	+	+
What is to be sustained?	Nature	+	+	+++
	Life support	+	++	++
	Community	+++	+	+

Note: The plus signs indicate the level to which each pillar is captured. +++: strong focus; ++: focus; +: related but not a focus.

SUSTAINABLE DEVELOPMENT MODELS (CONTINUE)

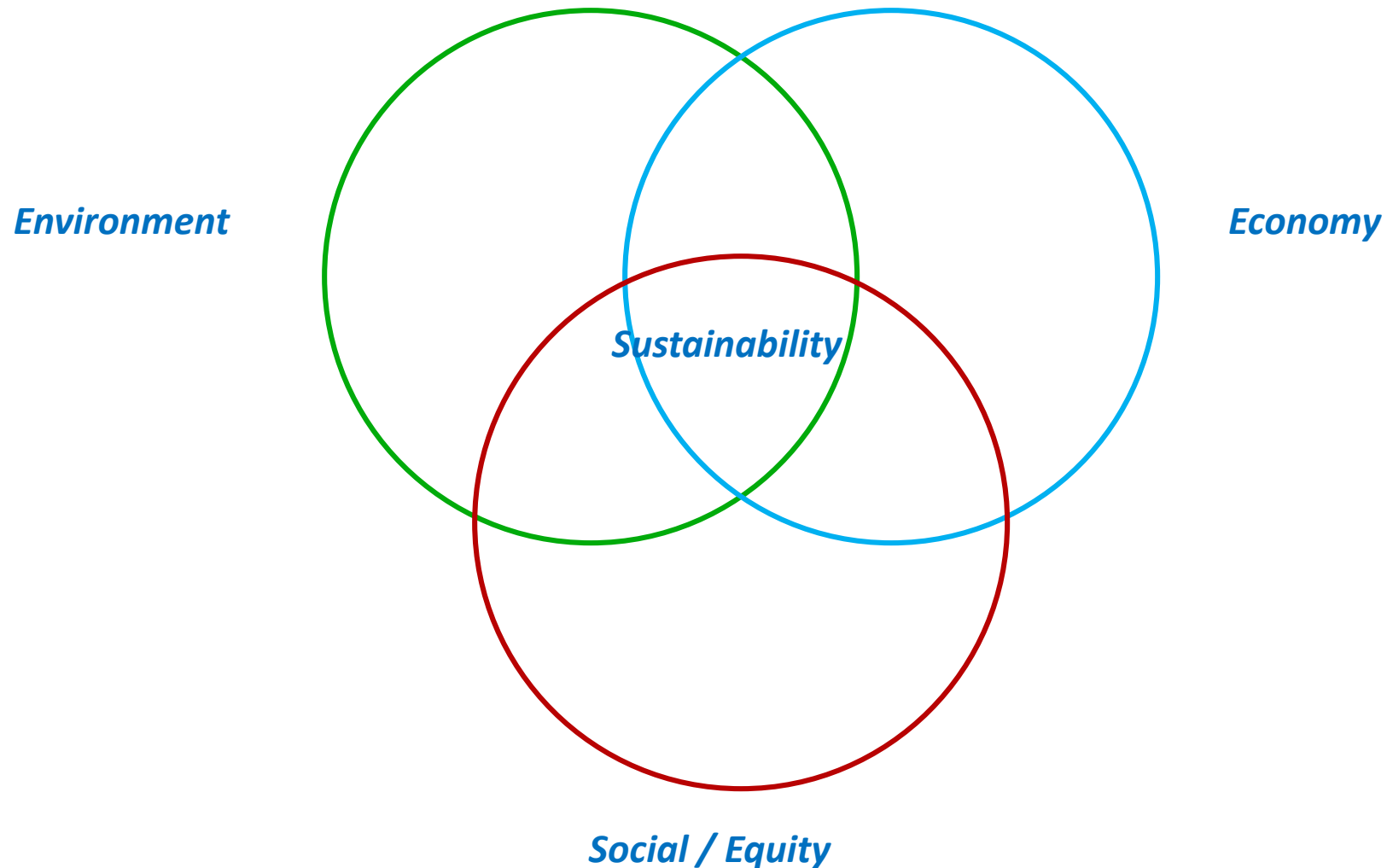
Another variation of the same conceptual framework uses the capital approach. Human and built capital (the economy) is embedded in society and ultimately in nature.

Figure 2. Three dimensions of sustainable development in the capital approach

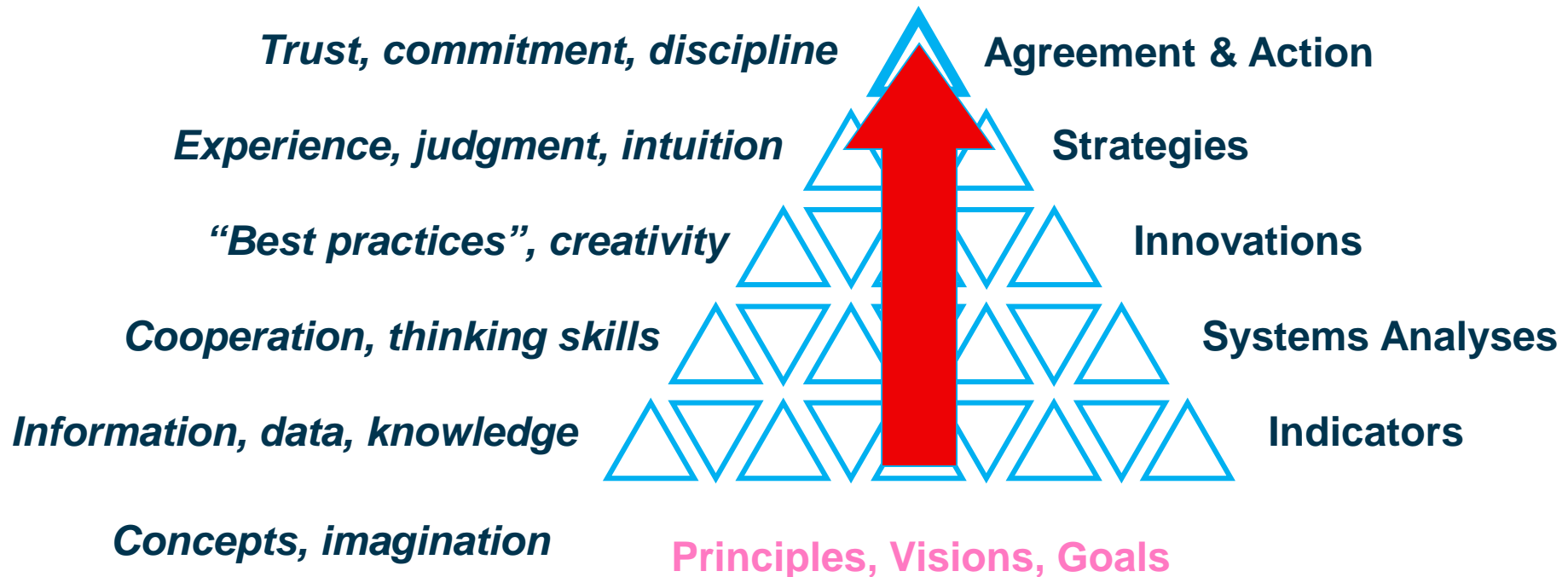


Source: adapted from Costanza et al. (2014)²⁷.

The Triple Bottom Line is Also the Three Legged Stool is Also the ...



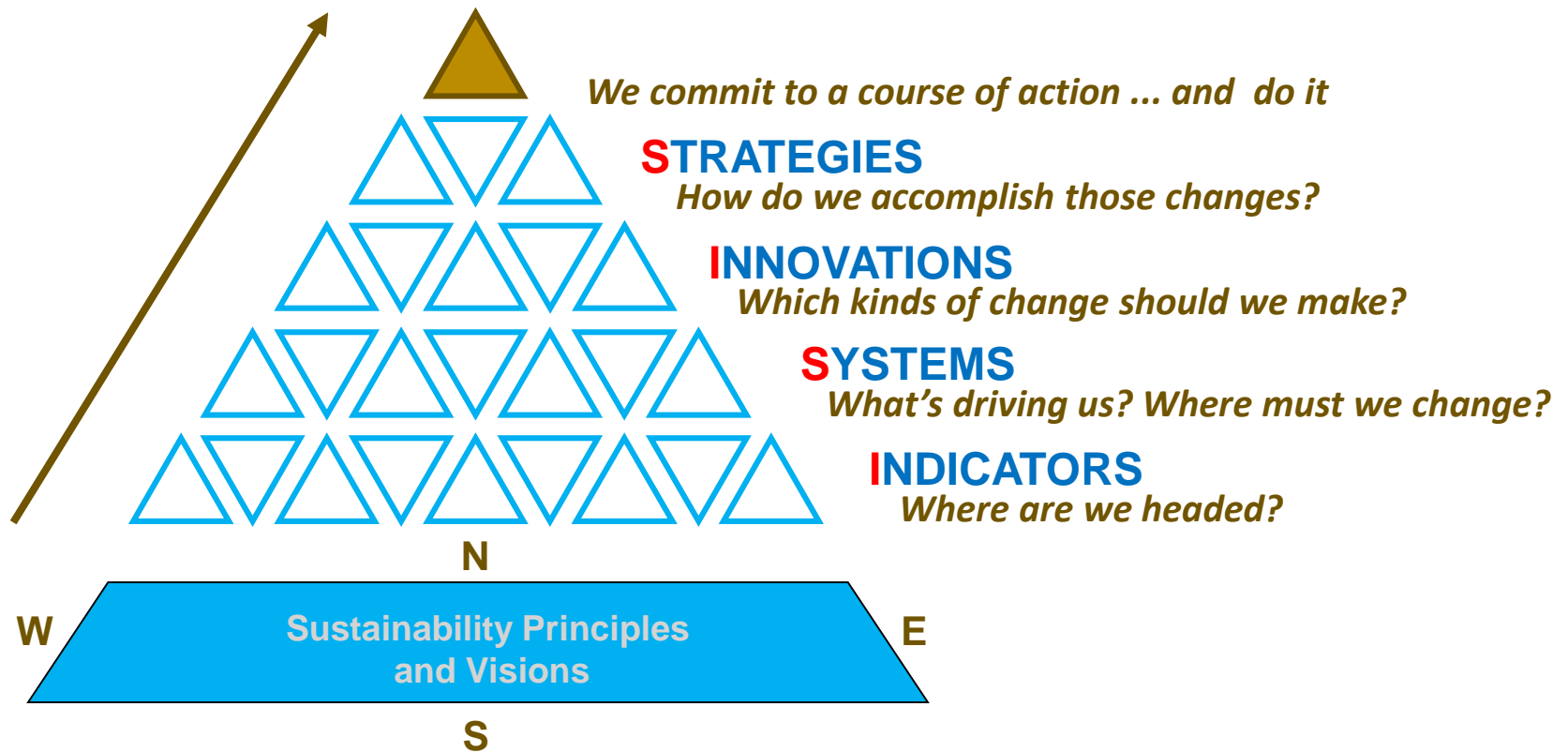
What practical sustainable development requires



Pyramid

A Sustainable Development Framework

Trust, Commitment, and Discipline



ISIS

Doing sustainable development requires:

- A comprehensive description or operating definition of sustainability, and the sustainable outcome you wish to create
- Gathering information and data to produce interpretive indicators of relevant trends
- Using those indicators to develop a shared systems understanding of key dynamics and leverage points
- Identifying sustainability innovations to introduce into the system that will improve its overall condition
- Creating strategies for diffusion and adoption of those innovations
- Securing the agreement of critical actors to implement the strategies
- Monitoring impact with the indicators, and regularly cycling through an evaluative planning process to adjust course appropriately

Key sustainability characteristics include:

Capacities to understand and analyze problems,

Partnering with different resources/organizations to find solutions,

Using local resources for local solutions,

Involving the whole community and all stakeholders with comprehensive participation,

Negotiation and consensus-building from within,

Ability to incorporate and adopt external resources within local contexts,

Respect of historical and cultural issues.

The Seven Sustainability Triads

a&&SnfwnfwHhjcif;¥ vsdKU0Sufcsuf (7) csuf

1. Participation tm;vHk;yl;aygif;yg0ifrl
2. Decision-Making tqHk;tjzwfay;jcif;
3. Partnership tusdK;wl yl;aygif;jcif;
4. Governance tkyfcsKyfrl
5. Knowledge and Information todynm ESifh owif;tcsuftvuf
6. Continual Improvement qufvufwdk;wufaerl
7. Lifestyles vlaerlb 0 yHkpH

Importance of monitoring

- Monitoring is critical for effective implementation of an NSDS
 - Without monitoring, the risk is great that the NSDS is merely a list of good intentions.
 - Without monitoring, there is no basis for correcting NSDS
- Monitoring mechanisms should be built into the NSDS itself
 - Facilitates policy interventions
 - Promotes culture of learning
 - Promotes accountability
 - Promotes public interest and information

[illegible]

Key points for sustainable energy

- ✓ Respect the natural limits of the environment
- ✓ Decouple economic growth from the consumption of fossil fuels
- ✓ Create greater equity in the use of resources
- ✓ Phase out dirty, unsustainable energy sources
- ✓ Implement renewable solutions, especially through decentralized energy systems

PART

1.2

MILLENNIUM DEVELOPMENT GOALS

8 Millennium Development Goals



1. Eradicate hunger and poverty



2. Achieve universal primary education



3. Promote gender equality and empower woman



4. Reduce child mortality



5. Improve maternal health



7. Ensure environmental Sustainability



6. Combat HIV/AIDS, malaria, and other diseases



8. Develop a global partnership for development

Goal 1

**Eradicate
extreme poverty
and hunger**

Target 1.

Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day

Target 2.

Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Goal 2

**Achieve
universal primary
education**

Target 3.

Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Goal 3

**Promote gender
equality and
empower women**

Target 4.

Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015

Goal 4

**Reduce child
mortality**

Target 5.

Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

Goal 5

Improve maternal health

Target 6.

Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio

Goal 6

Combat HIV/AIDS, malaria, and other diseases

Target 7.

Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Target 8.

Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Goal 7

Ensure environmental sustainability

Target 9.

Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources

Target 10.

Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation

Target 11.

Have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers

**Develop a global
partnership for
development****Target 12.**

Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system (includes a commitment to good governance, development, and poverty reduction—both nationally and internationally)

Target 13.

Address the special needs of the Least Developed Countries (includes tariff- and quota-free access for Least Developed Countries' exports, enhanced program of debt relief for heavily indebted poor countries [HIPC] and cancellation of official bilateral debt, and more generous official development assistance for countries committed to poverty reduction)

Target 14.

Address the special needs of landlocked developing countries and small island developing states (through the Program of Action for the Sustainable Development of Small Island Developing States and 22nd General Assembly provisions)

Target 15.

Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term

Some of the indicators listed below are monitored separately for the least developed countries, Africa, landlocked developing countries, and small island developing states

Target 16.

In cooperation with developing countries, develop and implement strategies for decent and productive work for youth

Target 17.

In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries

Target 18.

In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies

PART **2**

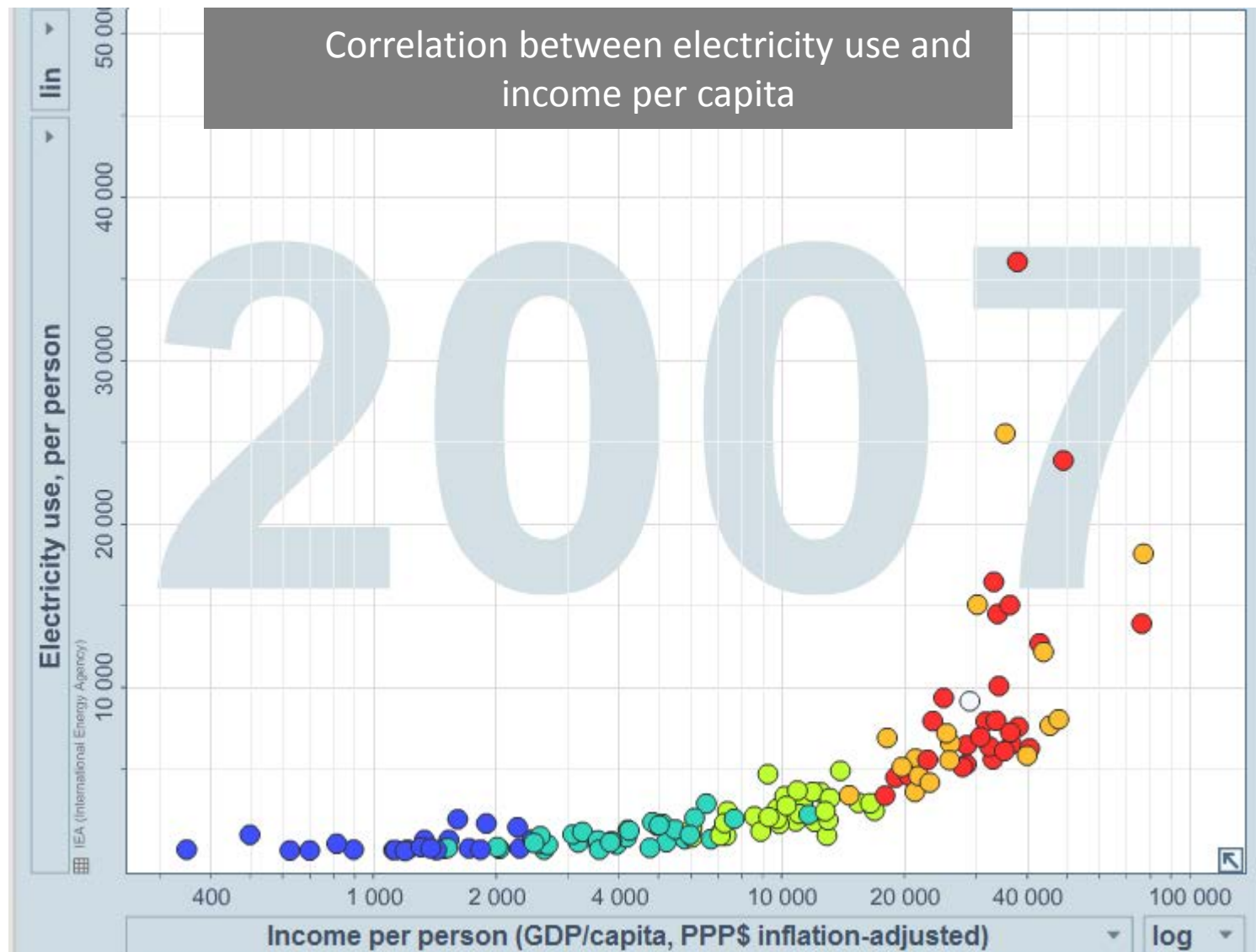
Energy Access and MDG

PART

2.1

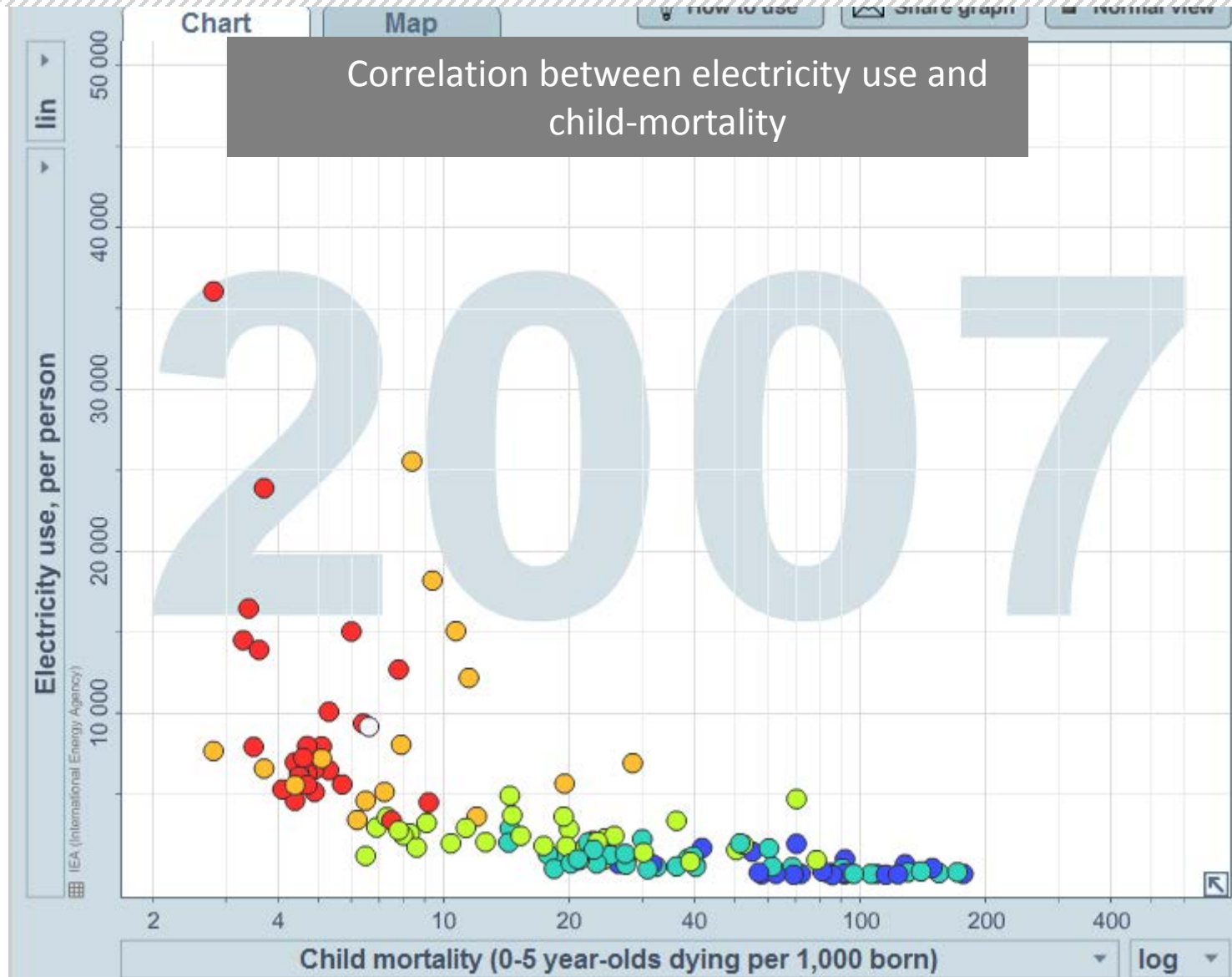
Importance of Energy Access related to MDG

ENERGY ACCESS & MDGs



Source: GapMinder, www.bit.ly/qVYpWJ

ENERGY ACCESS & MDGs



Source: GapMinder, www.bit.ly/rfAWZA

PART
2.2

Definition of Energy Access

ENERGY ACCESS: DEFINITION

Energy access
=
The ability to use
energy safely and
promptly

agriculture

manufacture

lighting

health

commu-
nication

education

cooking

transport

Energy : Key Issues

- Focus on access to energy in rural areas
- Energy conservation and energy efficiency
- Promotion of renewable energy
- Action on climate changes – ratification by countries of the Kyoto Protocol

Source: Md. Shamsul Arefin, Sustainable Development – Concepts, Issues and Challenges, 56th Senior Staff Course, BPATC, Savar, Dhaka

Renewable Energy

are flows of energy that are regenerative or virtually inexhaustible.

- Dr Raymond Wright

Source: Md. Shamsul Arefin, Sustainable Development – Concepts, Issues and Challenges, 56th Senior Staff Course, BPATC, Savar, Dhaka

Sustainable Energy

is energy which is replenishable within a human lifetime and causes no long-term damages to the environment.

- Source: <http://www.jsdnp.org.jm/glossary.html>

Source: Md. Shamsul Arefin, Sustainable Development – Concepts, Issues and Challenges, 56th Senior Staff Course, BPATC, Savar, Dhaka

Sustainable Energy for all

- Household having reliable and affordable access to clean cooking facilities, a first connection to electricity and then an increasing level of electricity consumption over time to reach regional average (IEA)
- Means for providing energy access – central grid, mini-grid, small renewables/off-grid, diesel ?
 - *Is (clean) energy available*
 - *If yes, is it accessible*
 - *If yes, is it affordable*
 - *If yes, is it being used*

Multi-tier framework under SE4All

TIER 1	TIER 2	TIER 3	TIER 4	TIER 5
Task lighting AND phone charging (OR radio)	General lighting AND television AND fan (if needed)	Tier 2 AND any low-power appliances	Tier 3 AND any medium- power appliances	Tier 4 AND any high-power appliances

Energy Options

Fossil fuels (Coal, oil, natural gas)

Hydropower

Nuclear energy

Solar energy

Wind energy

Geothermal energy

Ocean (wave, tidal and ocean thermal) energy

Biomass energy

Biofuels (bioethanol or biodiesel) energy

Source: Md. Shamsul Arefin, Sustainable Development – Concepts, Issues and Challenges, 56th Senior Staff Course, BPATC, Savar, Dhaka

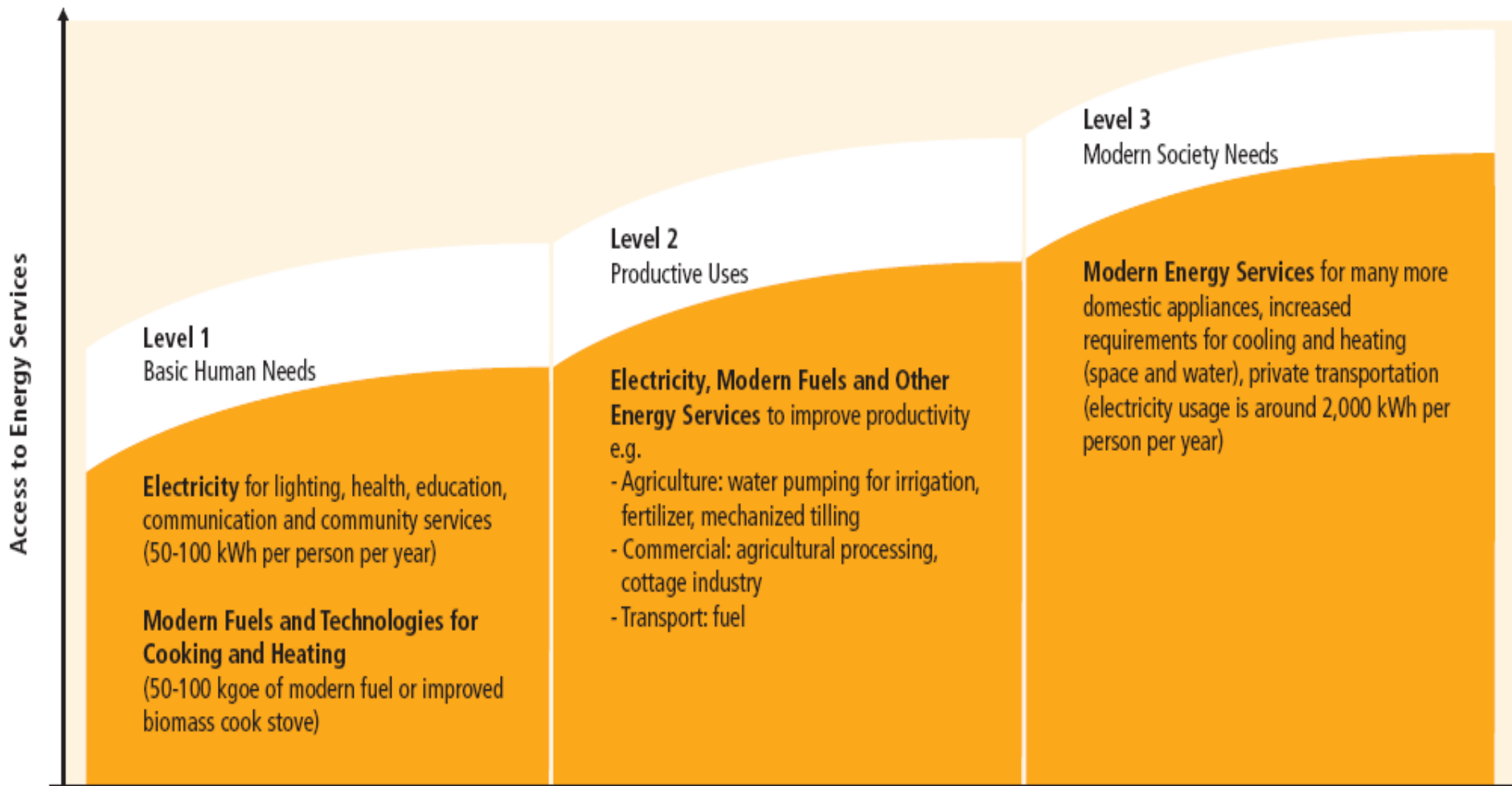


Figure 9.4 | Incremental level of access to energy services (AGECC, 2010; based on IEA data and analysis). Note: kgoe = kilogram(s) of oil equivalent.



The Energy Access Continuum

Scaling up
basic lighting



LEVEL 1: BASIC HUMAN NEEDS

Lighting, health, education,
communication, community services,
Modern cooking etc.

LaBL Plus



LEVEL 2: PRODUCTIVE USES

Agriculture, water pumping,
mechanized tilling, cottage industry
energy needs etc.



LEVEL 3: MODERN SOCIETAL NEEDS

Domestic appliances, cooling
heating, transportation etc.

PART

3

Status of Sustainable Development in Myanmar

PART

3.1

National Sustainable Development Strategy (NSDS) and National Commission on Environmental Affairs (NCEA) in Myanmar

NSDS

- The **National Sustainable Development Strategy** (NSDS) is part of a broader program of the United Nations (UN) Sustainable Development Commission set up after the World Summit on Sustainable Development in 2002. Every country including Myanmar that signed Agenda 21 at the Earth Summit in Rio De Janeiro in 1992, agreed to develop an NSDS by 2010 in line with the Millennium Development Goals (MDGs). UNEP provided funding for Myanmar to develop an NSDS. The main aim of the process was to develop an NSDS in line with international standards by meeting the MDGs and ensure that environmental and social impacts are mitigated when implementing development projects.

Status

- NSDS was officially accepted by the Ministry of Planning.
- It is a guiding document for government ministries, departments and local authorities, UN organizations, and international and local NGOs.
- Main Limitation: Myanmar lacks comprehensive national policies on land use, energy and environment, which makes it difficult to implement the strategies contained in the NSDS.
- There is also a need to consult more NGOs in the process.
- UNEP has stated that there are opportunities to review and further develop the strategy in the future.

Ref: The Burma Environmental Working Group (BEWG) report, "Burma's Environment: People, Problems, Policies"

PART **4**

MYANMAR ACHIEVEMENTS ON ENERGY ACCESS AND MILLENNIUM GOALS

PART

4.1

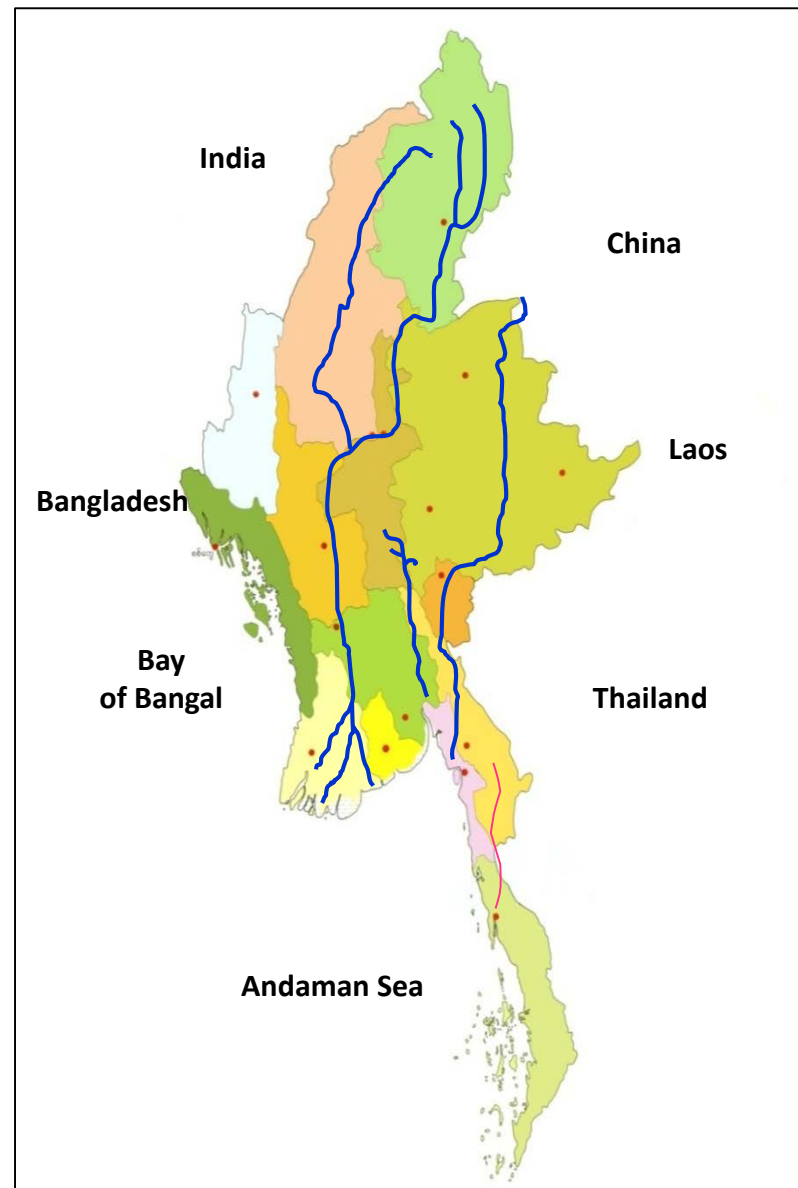
ENERGY ACCESS IN MYANMAR AND ASEAN

Potential Resources

➤ **Population – 59.78 millions**

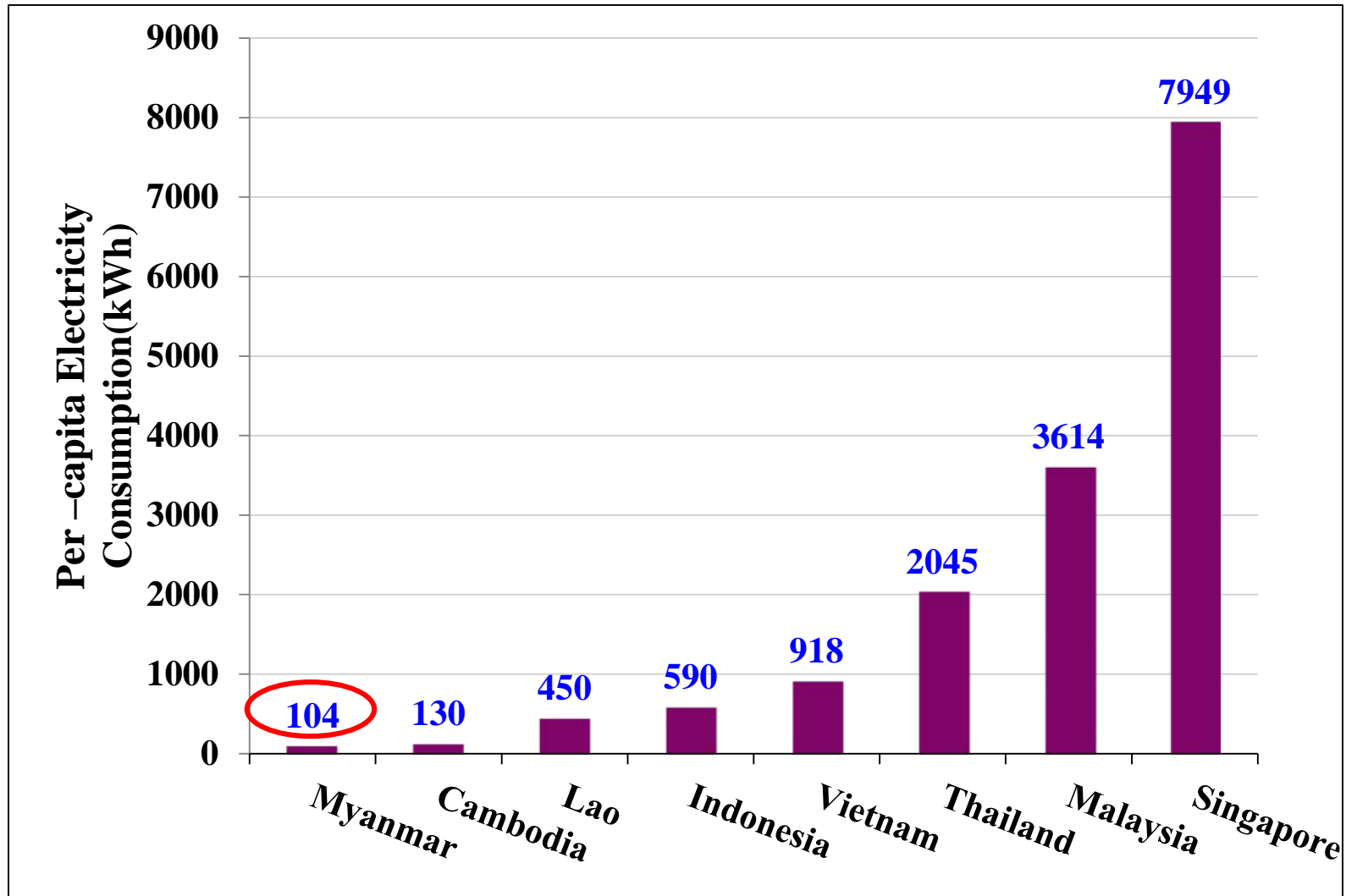
(Average growth rate-1.75% per annum)

Resource		Reserve
Hydropower		>100 GW (Estimate)
Crude Oil	Onshore	102 MMbbl (Proven)
	Offshore	43 MMbbl (Proven)
Natural Gas	Onshore	5.6 TCF (Proven)
	Offshore	11 TCF (Proven)
Coal		540 million tons (Estimate)
Wind		365 TWh/year
Solar		52,000 TWh/year



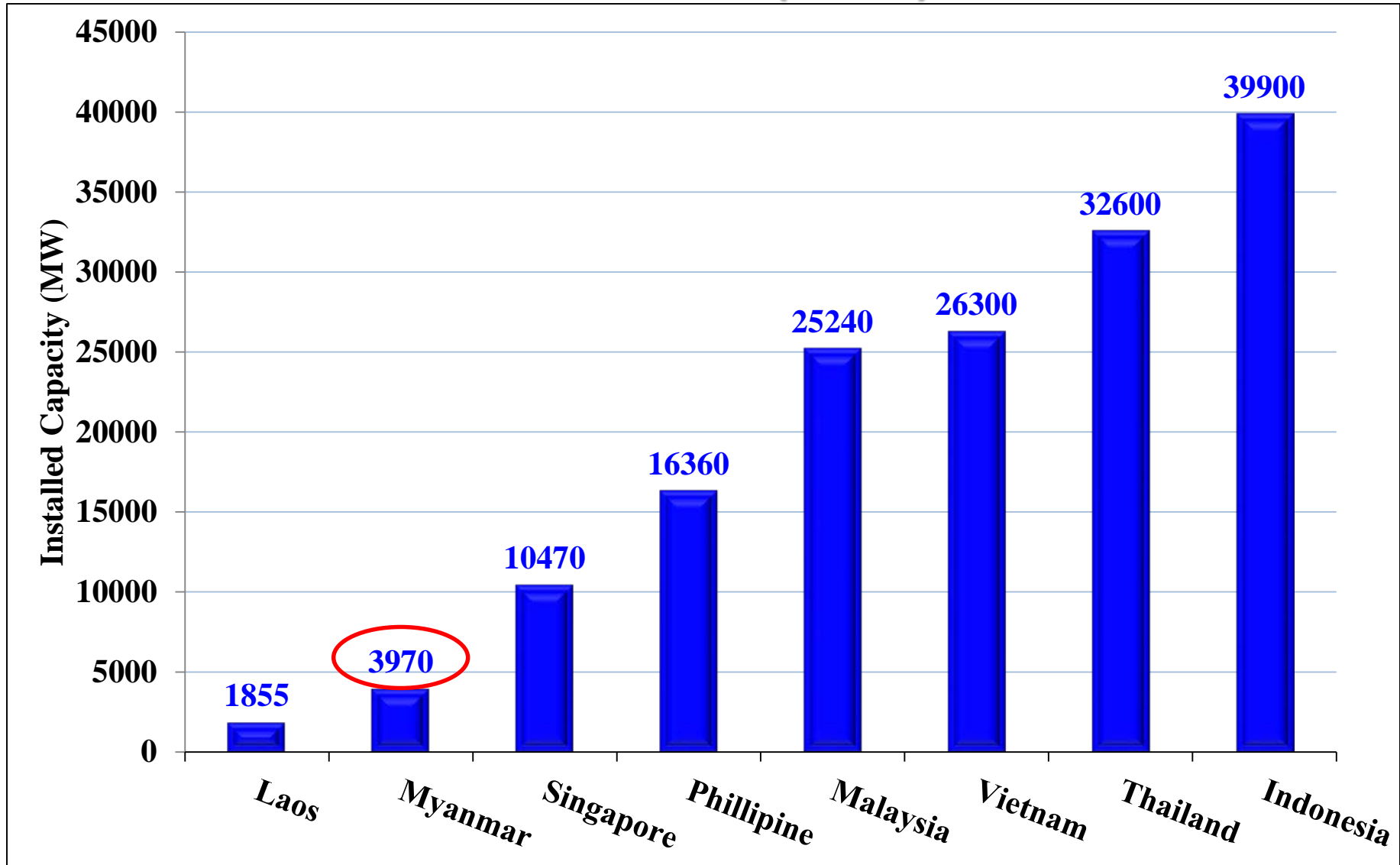
(Source: Ministry of Energy 2013, ADB 2012 and JEPIC 2012)

Per-capita Electricity Consumption in ASEAN Countries(2010)



(Source: World Bank 2011(World Development Indicators Online))

Electricity (Installed Capacity) among ASEAN Countries (2013)

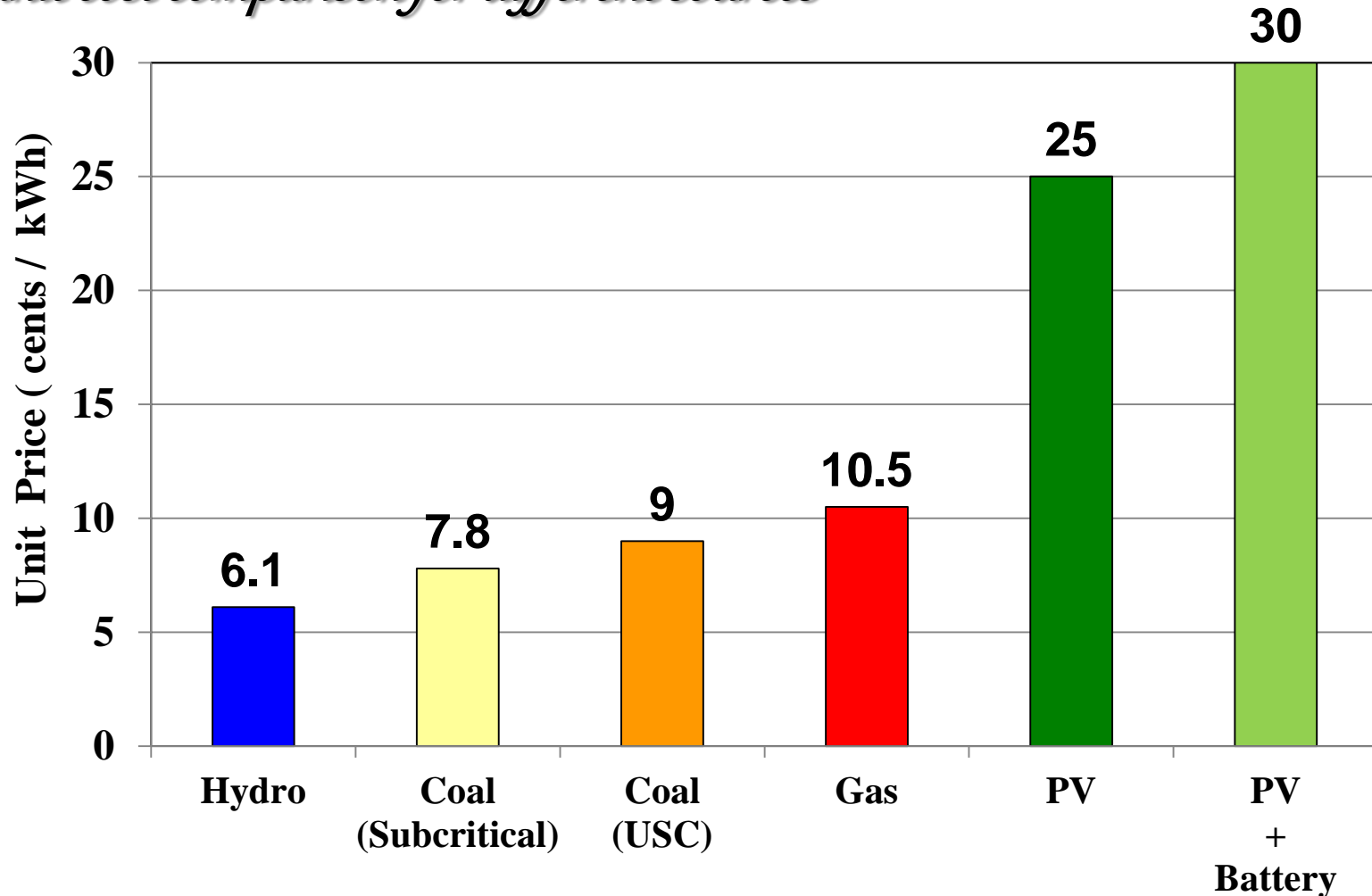


(Source: The world fact book of CIA 2013)

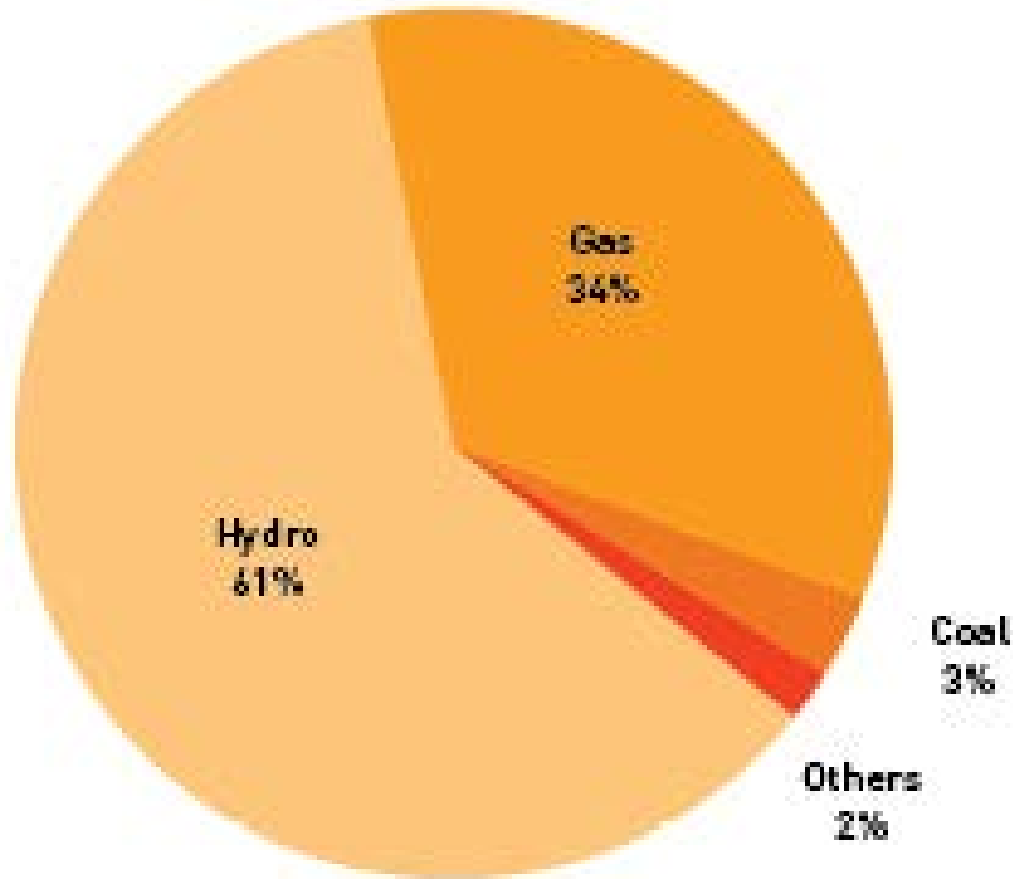
Basic Consideration for Master Plan

- ❖ Least cost, minimum impact and long-term resources availability are considered

Per unit cost comparison for different sources



Electricity Fuel Mix for Myanmar 2010



Source: Greacen and Greacen 2011

National Energy Consumption in Myanmar by Sector, 2010

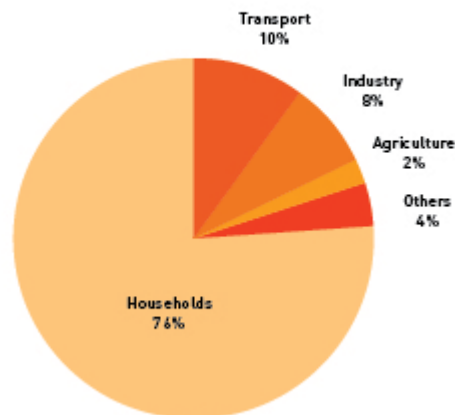


Table 3: Total Primary Energy Supply in Myanmar, 2001 to 2009 (kilotons of oil equivalent)

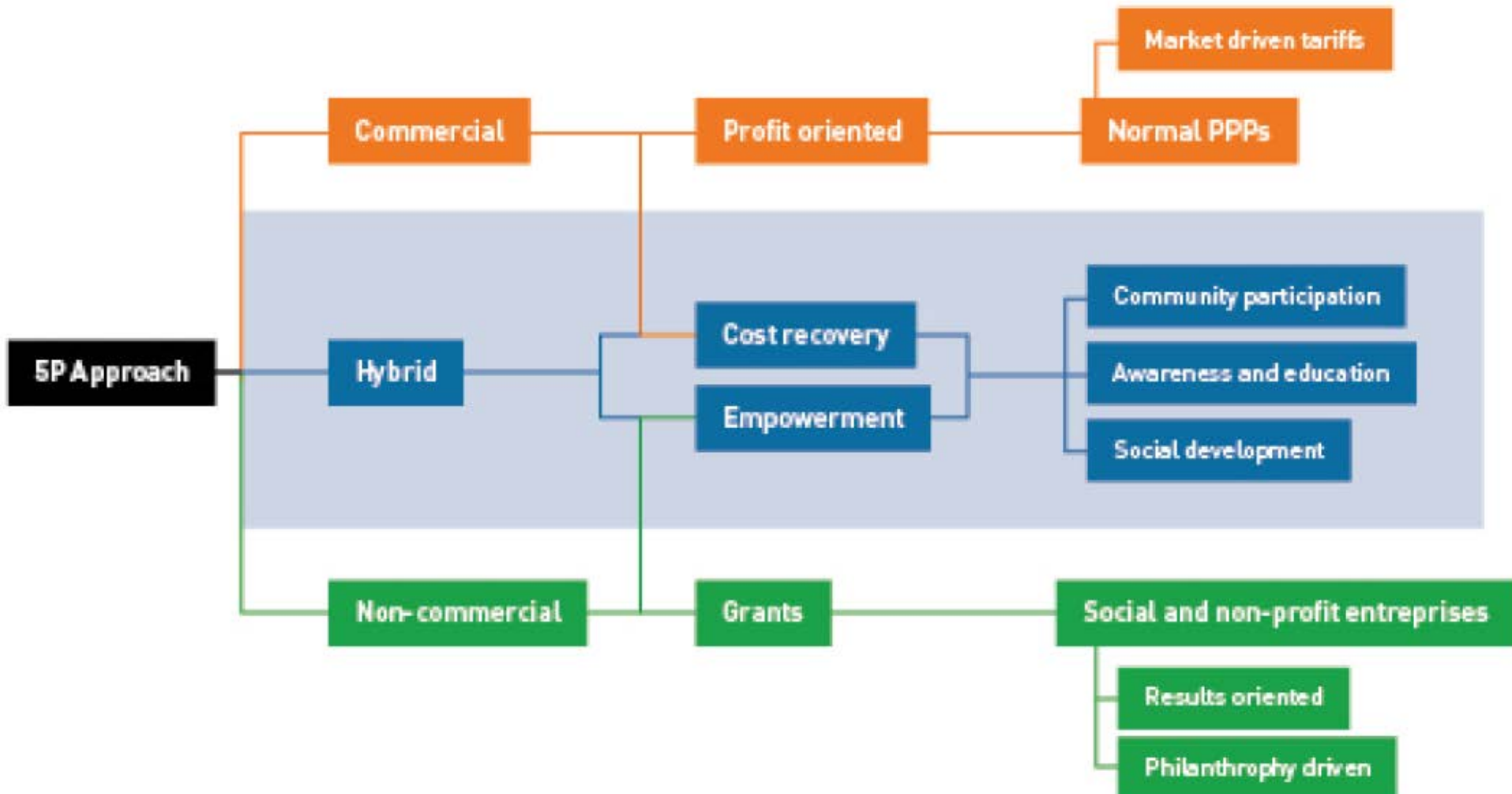
	2001	2002	2003	2004	2005	2006	2007	2008	2009	% (2009)
Crude Oil and Petroleum Products	1,983	1,991	1,924	1,924	1,957	1,756	1,904	1,789	1,280	8.5
Natural Gas	1,205	1,033	1,264	1,428	1,508	1,305	1,511	1,721	2,741	18.2
Coal and Lignite	83	71	76	123	196	85	501	558	135	0.9
Hydroelectricity	728	772	743	788	926	988	1,277	1,541	363	2.4
Biomass (Wood)	7,825	8,036	8,249	8,615	8,526	8,561	9,045	9,280	10,543	70.0
Total	11,824	11,903	12,256	12,878	13,113	12,695	14,238	14,889	15,062	100.0

Source: Ministry of Energy, “Developments in Myanmar Energy Sector,” Presentation to the Subregional Energy Forum, Vietnam, November 22, 2008; and International Energy Agency, “Share of Total Primary Energy Supply in Myanmar,” October, 2011.

Biomass Energy Resources in Myanmar

Type	Quantity per year
Rice Husks	$4,392 \times 10^3$ ton/yr.
Lumber Waste	1.5 million ton/yr.
Bagasse	$2,126 \times 10^3$ ton/yr.
Molasses	240×10^3 ton/yr.
Livestock Waste	$34,421 \times 10^3$ ton/yr.

Figure : Key Institutional Innovations of 5P Approach



APPENDIX III: EIGHT PUBLIC PRIVATE PARTNERSHIP MODELS FOR ENERGY ACCESS FROM ASIA

Model	Description	Example	Primary Partners
Technology improvement and market development	A sort of “supply push” structure where the PPP develops a renewable energy technology to reduce costs	China’s Renewable Energy Development Programme	World Bank, Global Environment Facility, National Development and Reform Commission, local solar manufacturers
End-user microfinance	A sort of “demand pull” which gives loans to energy users so that they can purchase renewable energy equipment	Grameen Shakti in Bangladesh	International Finance Corporation, Infrastructure Development Company Limited, Grameen Bank
Project finance	Where small- and medium-scale projects are supported with loans and financial assistance from commercial banks	Energy Services Delivery Project in Sri Lanka	World Bank, GEF, Ceylon Electricity Board, and national banks
Cooperative	Where communities own renewable energy systems themselves	Cinta Mekar Microhydro Project in Indonesia	Yayasan Ibeka, Hidropiranti Inti Bakti Swadaya, Directorate General of Energy Electricity Utilization, PLN, UNESCAP, Cinta Mekar Cooperative
Community mobilization fund	Where revenues from renewable electricity or energy production are invested back into local communities	Microhydro Village Electrification Scheme in Nepal	World Bank, , Government of Nepal, United Nations Development Programme, Nepal Alternative Energy Promotion Center, District Development Communities, Village Development Communities, Microhydro Functional Groups
Energy services company (ESCO) “fee-for-service”	Where private sector enterprises purchase technology and then charge consumers only for the renewable energy “service” that results	Zambia’s PV-ESCO Project	Ministry of Energy, Stockholm Environmental Institute, Swedish International Development Authority
Cross subsidization	Where tariffs on one type of electricity are then funneled into a fund to support renewable energy	The Rural Electrification Project in Lao PDR	Electricité du Lao PDR, Ministry of Energy and Mines, World Bank, Global Environment Facility, Provincial Electrification Service Companies
Hybrid (end-user microfinance and ESCO “fee-for-service”)	Where private sector enterprises purchase technology and then charge consumers only for the renewable energy “service” that results	India’s Solar Lantern Project	Small-Scale Sustainable Infrastructure Fund, Solar Electric Light Company, local banks and entrepreneurs

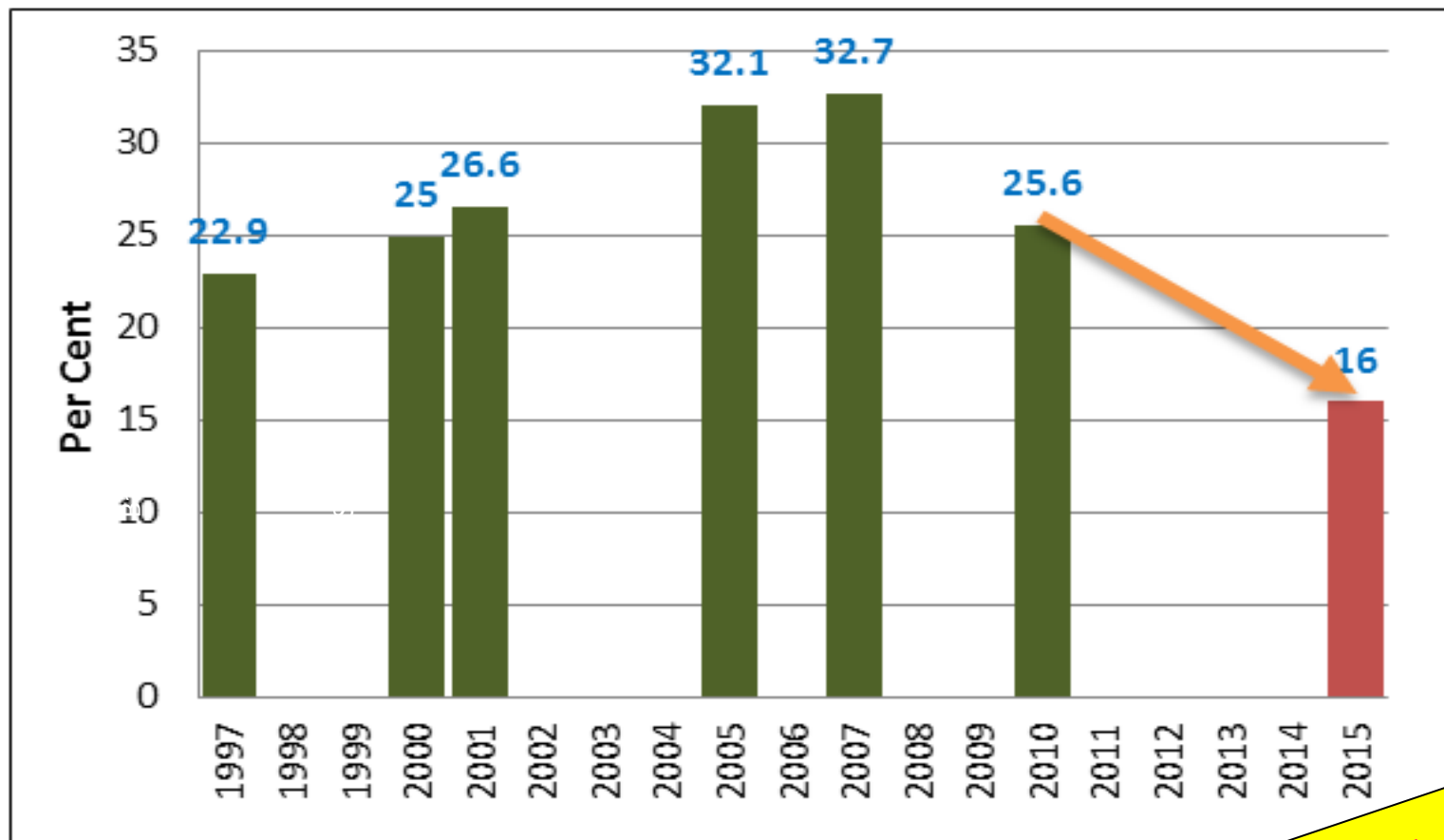
Application	Technology	Dates	Cost (US\$)	Accomplishments
Off-grid (nomadic herders)	Solar home systems	2002 to 2007	\$316 million	Distributed more than 400,000 units in 5 years
Off-grid (rural households)	Solar home systems, biogas digesters, and improved cookstoves	1996 to 2010	-	Installed almost half a million solar home systems, 132,000 cookstoves, and 13,300 biogas plants among 3.1 million beneficiaries.
On-grid and off-grid	Solar home systems, grid-connected hydro, off-grid village hydro	1997 to 2002	\$55.3 million	Installed 21,000 solar home systems and 350 kilowatts of installed village hydro capacity in rural Sri Lanka, in addition to 31 megawatts of grid-connected mini-hydro capacity
On-grid	Microhydro	2004 to present	\$225,000	Constructed a 120 kW microhydro scheme that has electrified homes and creates thousands of dollars of monthly revenue funnelled back to the village
Off-grid	Microhydro	2004 to 2011	\$5.5 million (original proposal)	Distributed 250 units benefitting 50,000 households in less than 10 years
Off-grid	Solar home systems	1999 to 2009	-	Three ESCOs currently lease the services of 400 solar panels and have hundreds of clients waitlisted
On-grid and off-grid	Solar home systems and grid-connected hydroelectricity	2006 to 2009	\$13.75 million	Electrified 36,700 previously off-grid homes and disbursed more than 9,000 solar home systems
Off-grid	Solar lanterns	2005 to present	-	Distributed 80,000 units across 25 separate cities

Part
4.2

MDG access in Myanmar

Prospects of Achieving MDG-1 in Myanmar

Poverty Incidence



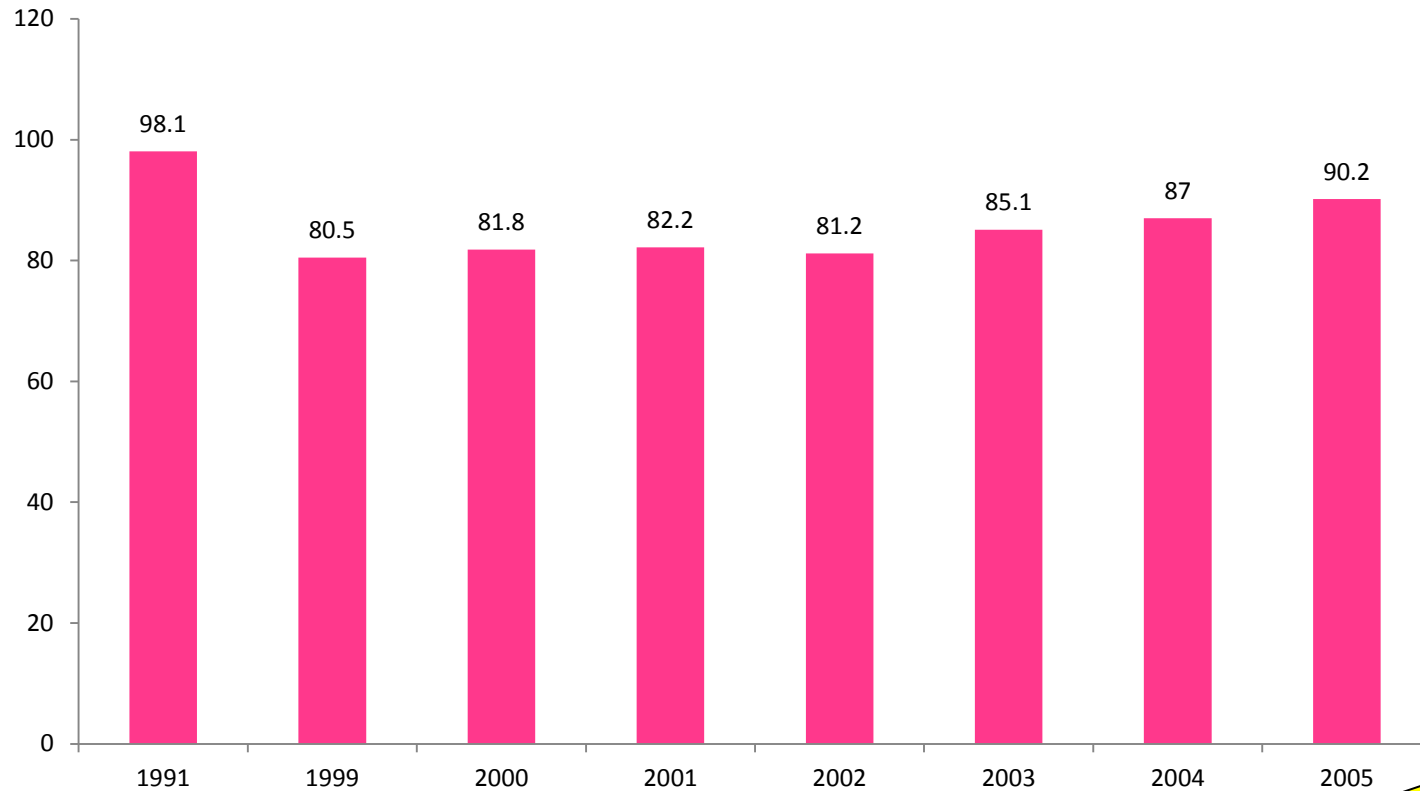
Source: HIES (1997, 2001), IHLCA (2005, 2010), Index Mundi (2000, 2007)

ACHIEVABLE

Prospects of Achieving MDG-2 in Myanmar

Net enrolment ratio in primary education, both sexes

Achieve universal primary education



ACHIEVABLE

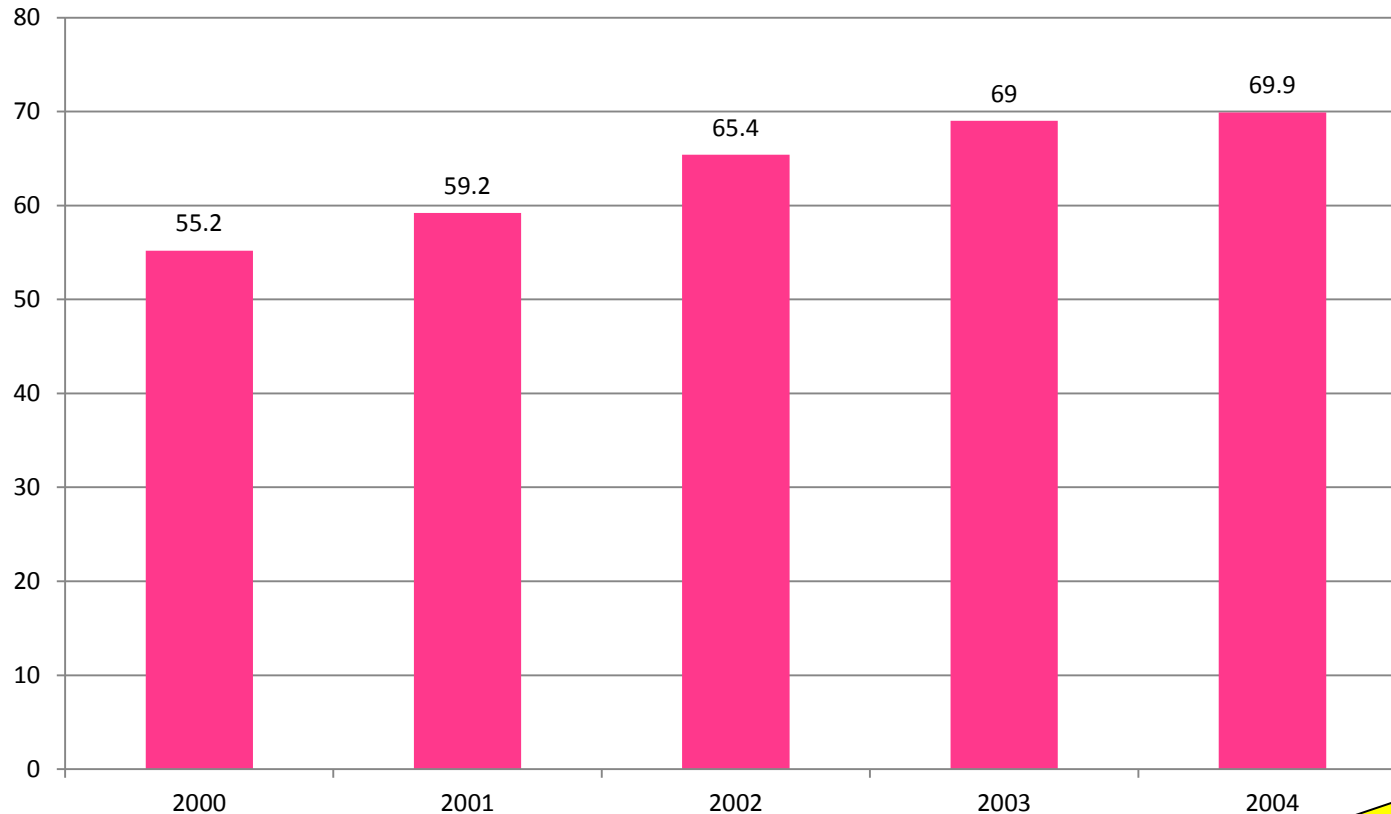
Target 3. Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-2 in Myanmar

Percentage of pupils starting grade 1 reaching grade 5, both sexes

Achieve universal primary education



ACHIEVABLE

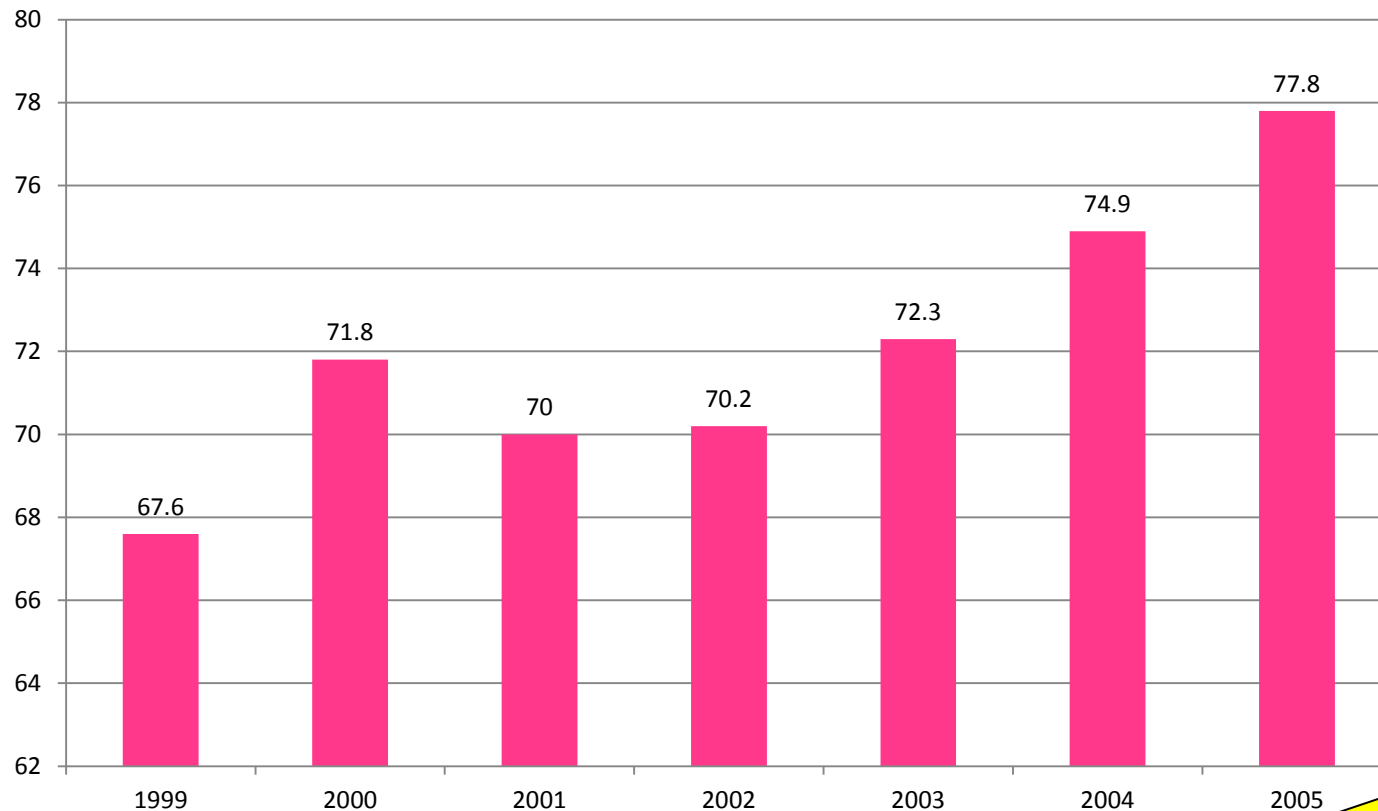
Target 3. Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-2 in Myanmar

Primary completion rate, both sexes

Achieve universal primary education



ACHIEVABLE

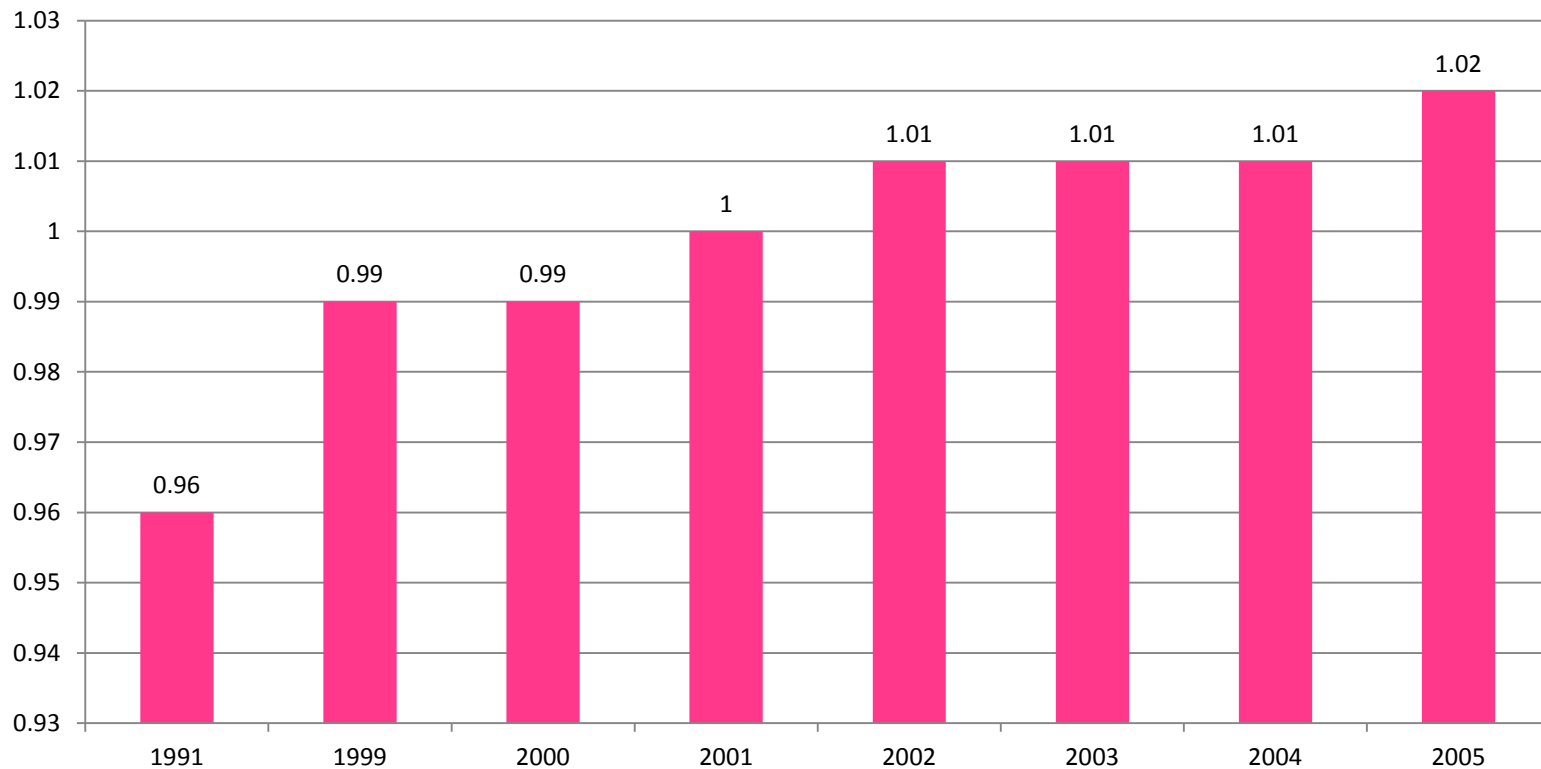
Target 3. Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-3 in Myanmar

Gender Parity Index in Primary level enrolment

Promote gender equality and empower women



ACHIEVABLE

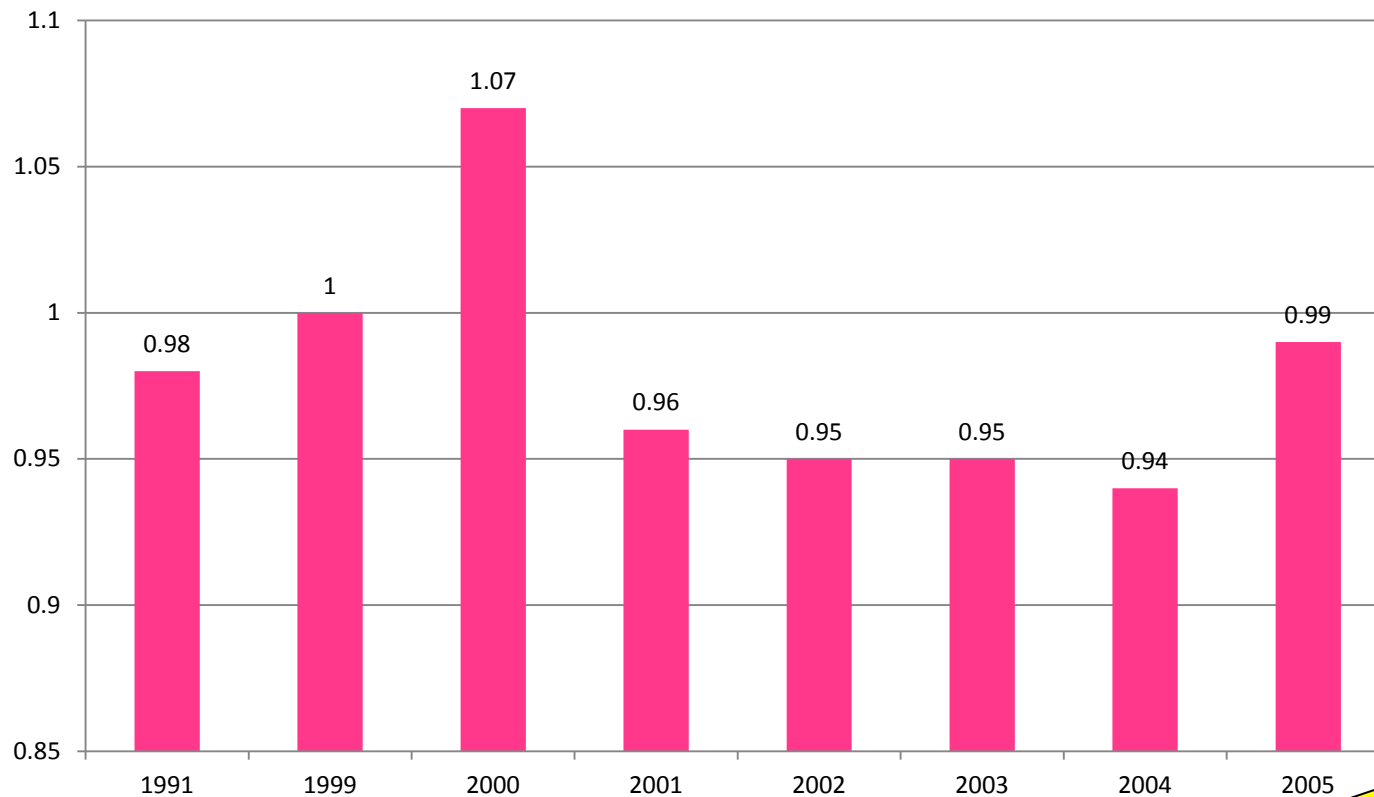
Target 4. Eliminate gender disparity in primary and secondary education, preferably by 2005, and to all levels of education no later than 2015

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-3 in Myanmar

Gender Parity Index in secondary level enrolment

Promote gender equality and empower women



ON TRACK

Target 4. Eliminate gender disparity in primary and secondary education, preferably by 2005, and to all levels of education no later than 2015

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-6 in Myanmar

Combat HIV/AIDS, malaria and other diseases

Well done to stabilize the HIV/AIDS epidemic and the prevalence among the general population (15 - 49 years old) is **below 1 percent.**

ACHIEVED

Target 7. Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Prospects of Achieving MDG-6 in Myanmar

50 percent reduction in malaria morbidity and mortality

Combat HIV/AIDS, malaria and other diseases

Already achieved the goal of a 50 percent reduction in malaria morbidity and mortality since 2007.



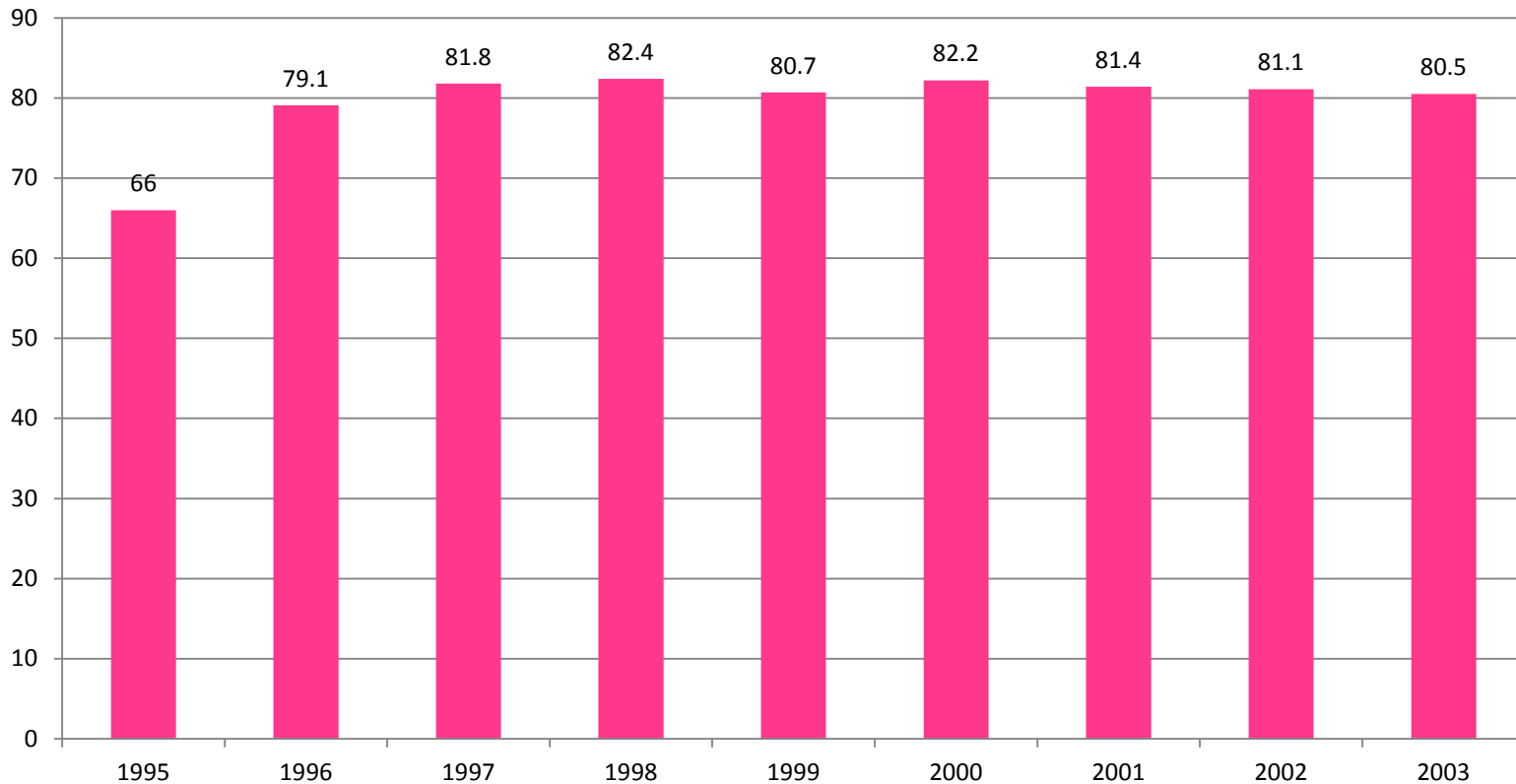
Target 8. Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-6 in Myanmar

Tuberculosis treatment success rate under DOTS, percentage

Combat HIV/AIDS, malaria and other diseases



ACHIEVABLE

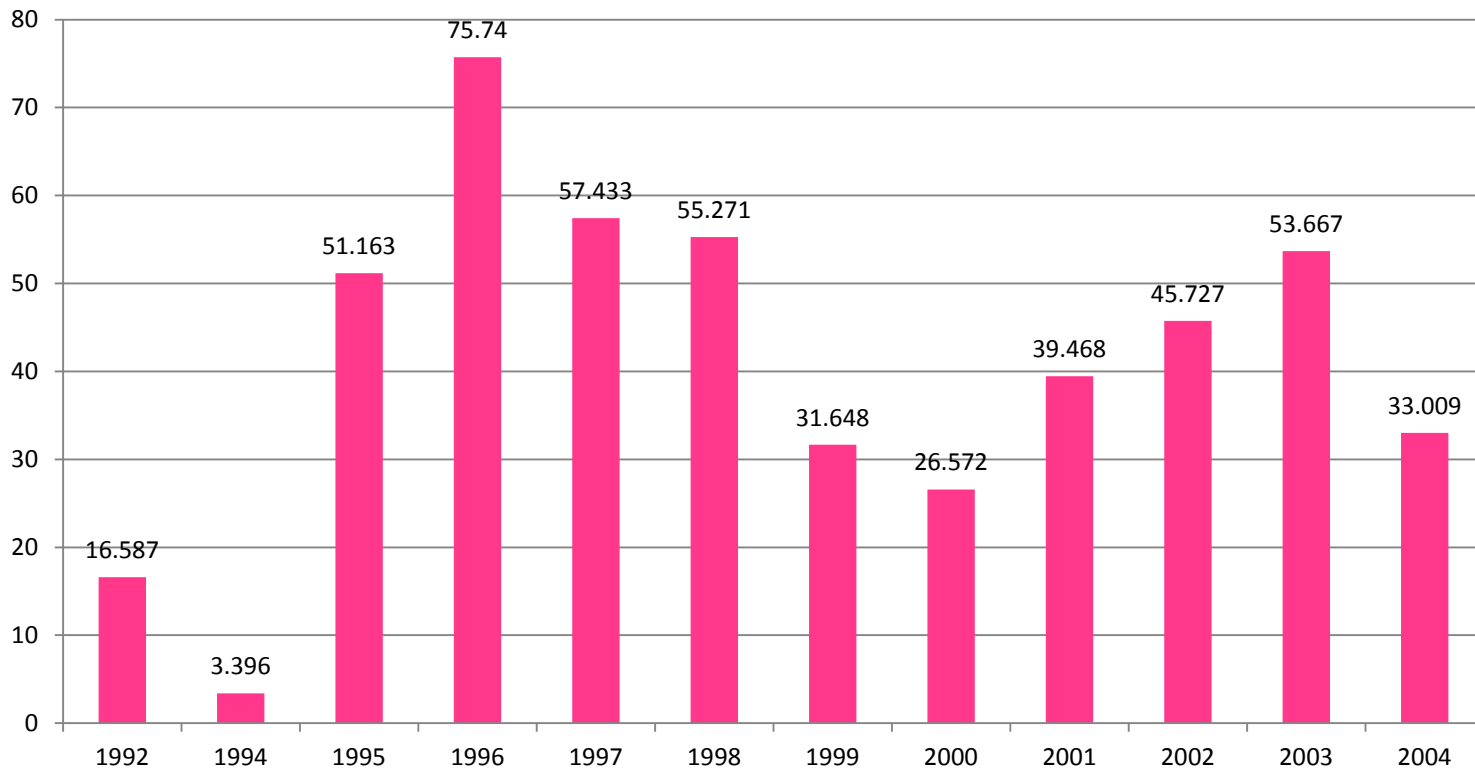
Target 8. Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-7 in Myanmar

Consumption of all Ozone-Depleting Substances in ODP metric tons

Ensure environmental sustainability



ON TRACK

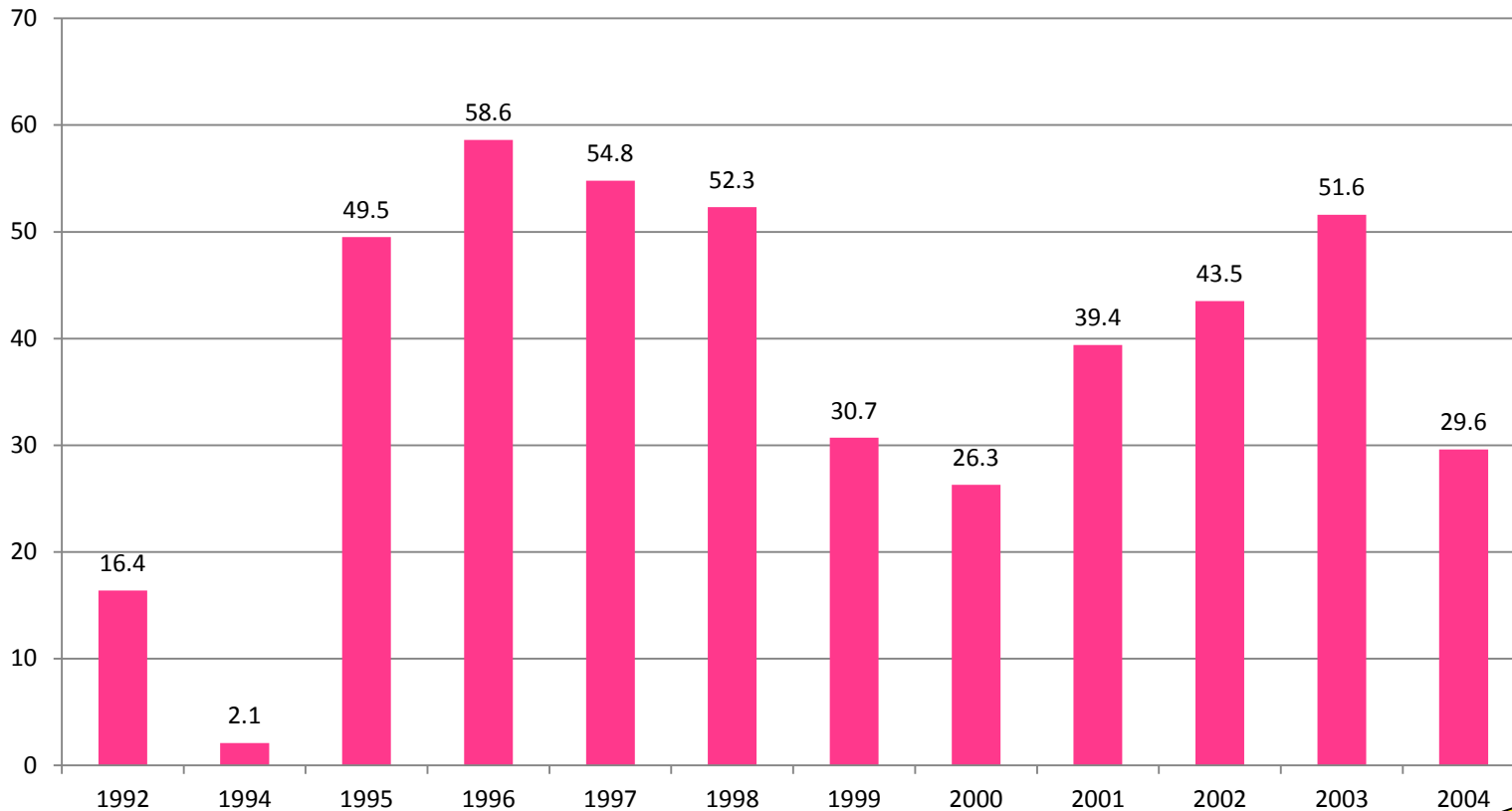
Target 9. Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-7 in Myanmar

Consumption of ozone-depleting CFCs in ODP metric tons

Ensure environmental sustainability



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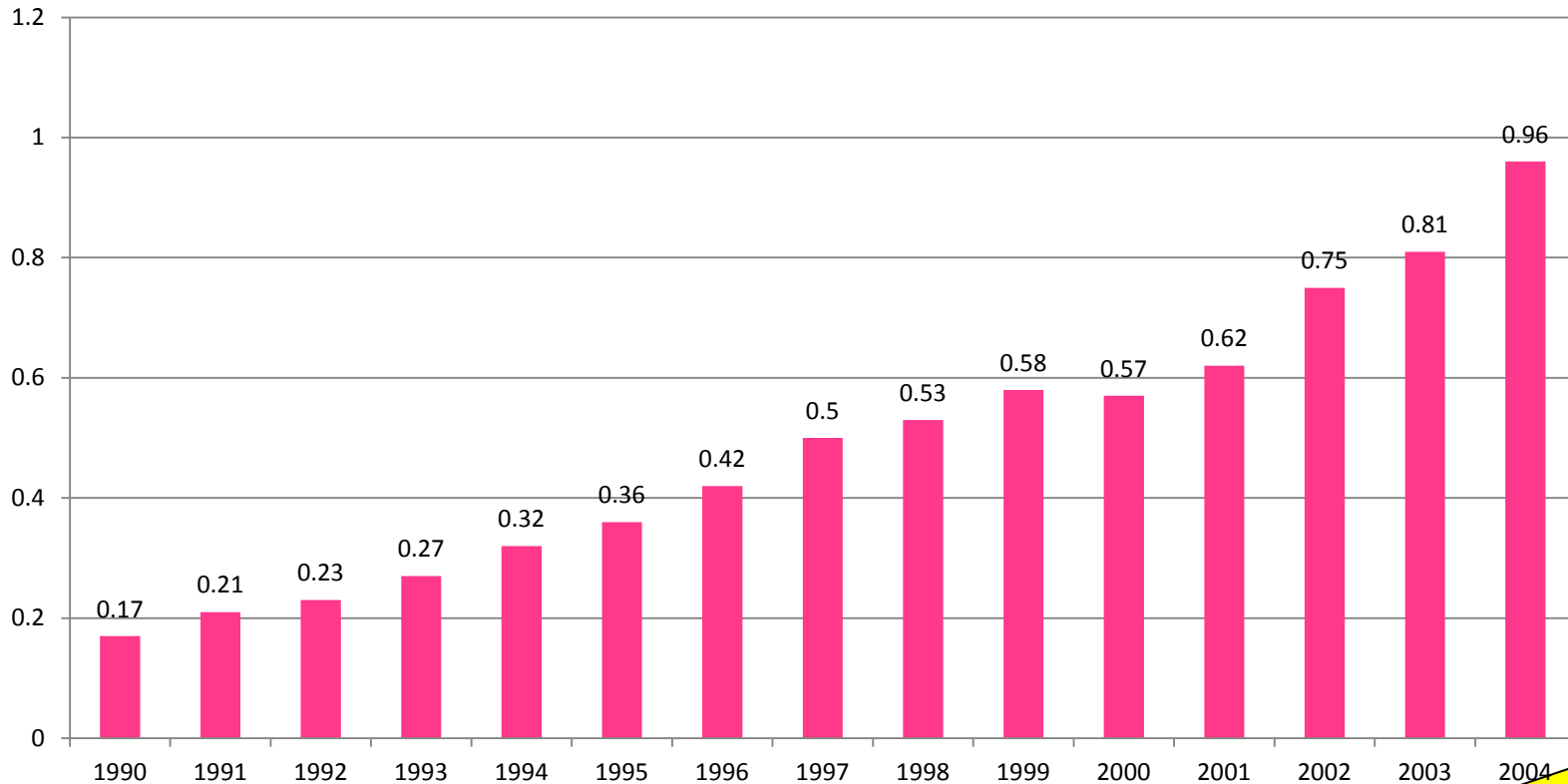
Target 9. Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources

Source: Index Mundi (2000, 2007)

Prospects of Achieving MDG-8 in Myanmar

Telephone lines and cellular subscribers per 100 population

Develop a global partnership for development



ACHIEVABLE

Target 18. In cooperation with the private sector, make available the benefits of new technologies, especially information and communications

Source: Index Mundi (2000, 2007)

Overview of Myanmar's Statistical Indicators, 2008 - 2012

Economic	2008	2009	2010	2011	2012
GDP (\$ billion, current)	20.2	31.4	35.2	45.4	51.9
GDP per capita (\$, current)	351	537.3	595.7	759.1	856.8
GDP growth (% , in constant prices)	5.5	3.6	5.1	5.3	5.5
Agriculture, livestock, fisheries, and forestry (% , in constant prices)	8	3.4	4.7	4.4	4.4
Industry (% , in constant prices)	21.8	3	5	6.3	6.5
Services (% , in constant prices)	12.9	4.2	5.8	6.1	6.3
Consumer price index (annual % change)	32.9	22.5	8.2	7.3	4.2
Liquidity (annual % change)	20.9	23.4	34.2	36.8	33.3
Overall deficit (% of GDP)	-3.8	-2.4	-4.8	-5.7	-5.5
Merchandise trade balance (% of GDP)	4.6	1.6	2	0.8	0.0
Current account balance (% of GDP)	0.6	-2.2	-1.3	-0.9	-2.7
External debt service (% of exports of goods and services)	4.6	5.1	4.3	3.1	3.9
External debt (% of GDP)	37.5	25.8	24.4	24.8	22.8

Overview of Myanmar's Statistical Indicators, 2008 - 2012

Poverty and Social	2000	Latest
Population (million)	50.1	60.6 (2011)
Population growth (annual % change)	2	1.3 (2009-2011)
Maternal mortality ratio (per 100,000 live births)	420 (1990)	240 (2008)
Infant mortality rate (below 1 year/per 1,000 live births)	79 (1990)	50 (2010)
Life expectancy at birth (years)	59.9	62.1 (2009)
Adult literacy (%)	89.9	92 (2009)
Primary school gross enrollment (%)	100 (1999)	126 (2010)
Child malnutrition (% below 5 years old)	34.3 (2005)	32 (2010)
Population below poverty line (%)	32.1 (2005)	25.6 (2010)

Source: Asian Development Bank 2012.

Overview of Myanmar's Statistical Indicators, 2008 - 2012

Population with access to safe water (%)

62.6 (2005)

69.4 (2010)

Population with access to sanitation (%)

67.3 (2005)

79 (2010)

Environment

2000

Latest

Carbon dioxide emissions (thousand metric tons)

4,276.00 (1990)

12,776.00 (2008)

Carbon dioxide emissions per capita (metric tons)

0.1 (1990)

0.3 (2008)

Forest area (million hectares)

34.9

31.8 (2010)

Urban population (% of total population)

28

33.9 (2010)

Myanmar: Development Indicators

Non-MDG

Population in millions	61.12 [2012]
Annual population growth rate (%)	1.1 [2010–2012]
Adult literacy rate (%)	92.3 [2010]
Population in urban areas (%)	32.7 [2011]

MDG

Population living on less than \$1.25 (PPP) a day (%) ...	
Population living below the national poverty line (%)	25.6 [2010]
Under-5 mortality rate per 1,000 live births	62 [2011]
Population using an improved drinking water source (%)	83 [2010]

... = data not available, MDG = Millennium Development Goal,
PPP = purchasing power parity.

Sources: ADB. 2013. *Basic Statistics 2013*. Manila; United Nations Educational, Scientific and Cultural Organization (UNESCO). 2013. Institute for Statistics Data Centre; World Bank. 2013. World Development Indicators Online.

**Part
4.3**

Challenge in Energy and MDG access in Myanmar

Success and Challenges

- Notable progress in poverty reduction. The Government's target to reduce poverty from **26 per cent in 2010 to 16 per cent by 2015** appears to be achievable because of good performance in recent years, accelerated reforms in economy, and assistance from development
- Well done to stabilize the HIV/AIDS epidemic and the prevalence among the general population (15-49 years old) is **below 1 percent**
- **Already achieved the goal of a 50 percent reduction in malaria morbidity and mortality since 2007.**
- **TB incidence rate has declined since 1995** and the target of halving TB mortality compared with **1990 levels was met in 2010**. The TB-related Millennium Development Goals are likely to be achieved by 2015.

Summary of Challenges to Expanding Energy Access and Protecting the Environment

Challenge	Description(s)
Poverty and subsistence needs	Fuelwood collection and charcoal production for cooking and heating place stress on Myanmar's rainforests and mangrove habitats
Conflicting priorities	The government remains focused on producing crude oil and natural gas for export to meet regional energy demands
	The government is committed to upgrading the national grid and building centralized hydroelectric, fossil-fuel, and even nuclear plants to power industrial and agricultural facilities instead of addressing off-grid energy access issues
Lack of resources	The country's state-controlled economy makes it difficult to procure international financing and investment in the energy sector
	A growing deficit and rising inflation constrain government budgets for electricity and energy
	Declining natural gas prices have further reduced state revenue available for energy projects
	Poor access to credit and limited rural banking networks compound efforts to give loans to energy-deprived households
Policy fragmentation	More than a dozen government agencies vie for control and jurisdiction over energy and electricity planning
	Scores of actors in the private sector and civil society further complicate the regulatory landscape

CHALLENGES

- **Need specific Government Guidelines**
- **Lack of Capital Cost**
- **Quality of System Components**
- **Awareness and Knowledge for users and providers**
- **Current Market of weak system design and cheap materials without specifications**
- **Subsidized Projects without PPP Role and Commercial Essence**
- **Weakness in Electricity Management practices**
- **Lack of R&D on SPV Materials and Systems**
- **Need improvement in Power Storage Technique & Hybrid**
- **Systems application will be required for extensive applications**

Source : REAM

**Solar Power Utilization
for Village Electrification
and Rural Livelihood improvement
in Myanmar**

SPV Power applications in Electrification



Source : REAM



Source : REAM

RURAL CLINIC APPLICATIONS



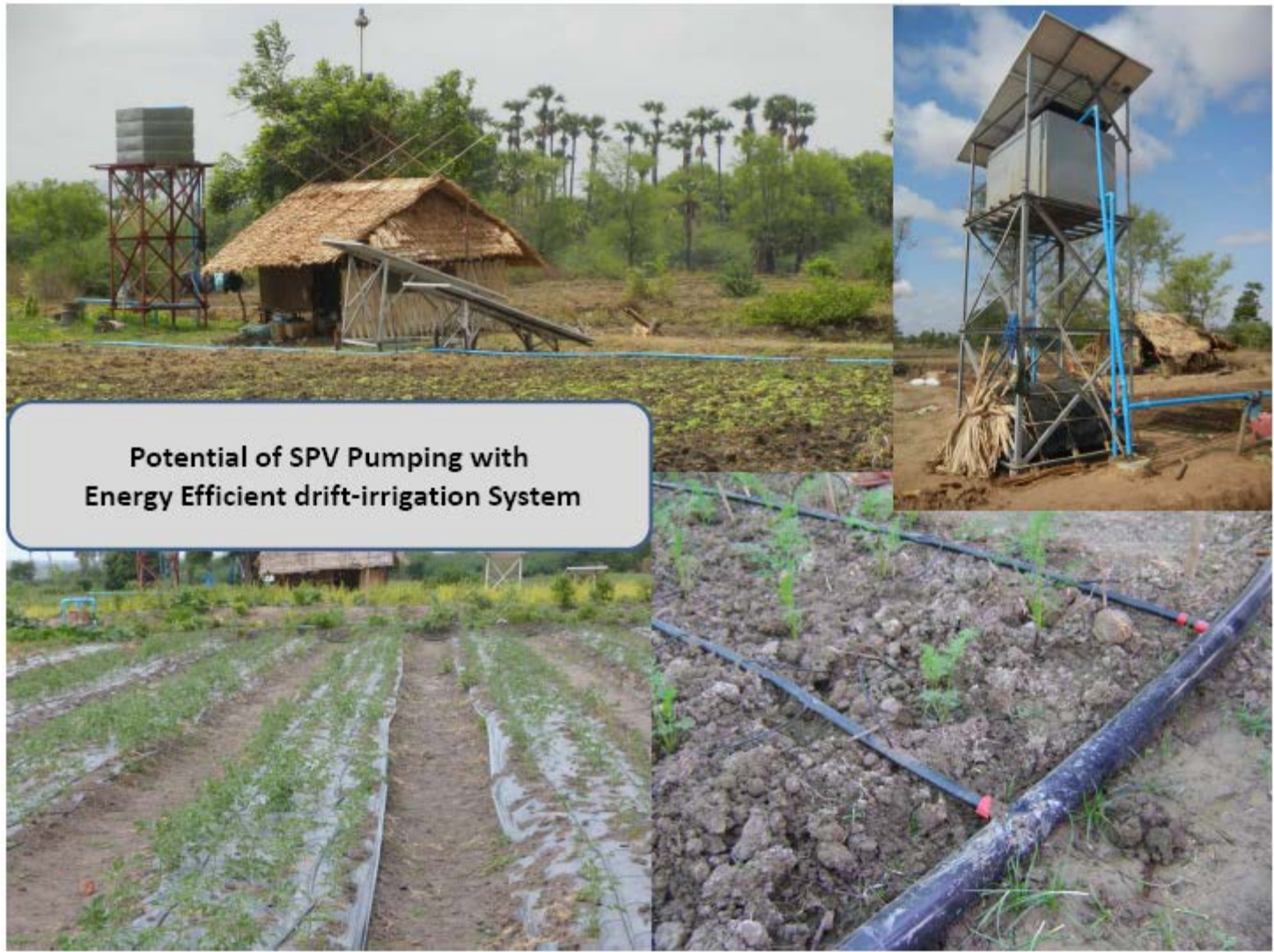


Source : REAM



**Solar Pumping System
establishment
and
application in a village**





Source : REAM

COMMUNITY PARTICIPATION





GOVERNMENT and COMMUNITY levels Advocacy & Mobilization



Energy is essential for development

energy that is secure,
environmentally-friendly, and
produced and used efficiently
is essential for *sustainable
development.*

Source:

OECD Contribution to the United Nations Commission on Sustainable Development 15 ENERGY FOR SUSTAINABLE DEVELOPMENT

Part 4.4

Conclusion

- ❖ *The words “Sustainable development” is very meaningful, but people use it in their own ways.*
- ❖ *Huge Conflict of Interest between the environmentalists and persons responsible on economic development*
- ❖ *Sustainable development must include both economic development and environmental enhancement.*
- ❖ *Every efforts of economic development may impact on environment, but least impacts should be ensured.*
- ❖ *As for developing country which has high unemployment rate and low living standard, renewable energy access is an essential needs to fulfill economic and social development*

Questions and Discussion

How do we try to achieve SD ?

How to decide to choose suitable energy options for our country ?

Discussion -

**Status of Sustainable Development
in Myanmar**

References

Innovation: applying knowledge in development



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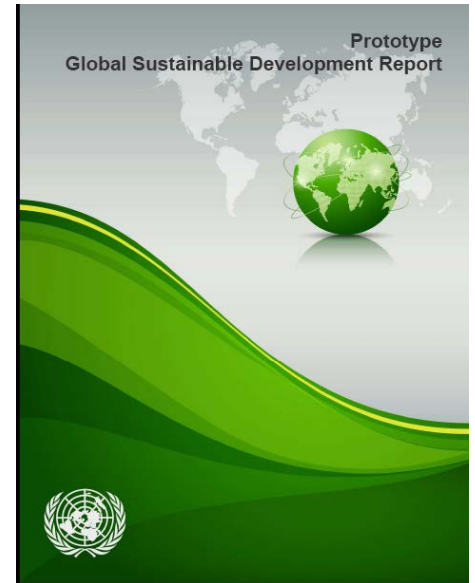
MillenniumProject

OECD Contribution to the United Nations Commission on Sustainable Development 15

ENERGY FOR SUSTAINABLE
DEVELOPMENT



OCDE
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT





THANKS FOR YOUR ATTENTION!

- Organization for Economic Co-operation and Development (OECD)
- PPP = Public Private Partnership
- 5P = Pro-Poor Public Private Partnership
- ISIS = Indicators , Systems, Innovations, Strategies
- National Sustainable Development Strategy (NSDS)
- National Commission on Environmental Affairs (NCEA)

Unit		Thousand	Million	Billion (10 ⁹)
cubic meter	m ³	E3m ³ (sometimes referred to as a "dec")	E6m ³	
barrel	bbl	Mbbl	MMbbl	
Standard cubic feet	scf	Mscf	MMscf	Bcf

Oil conversion factor from m³ to bbl (or stb) is 6.28981100

Gas conversion factor from standard m³ to scf is 35.314666721