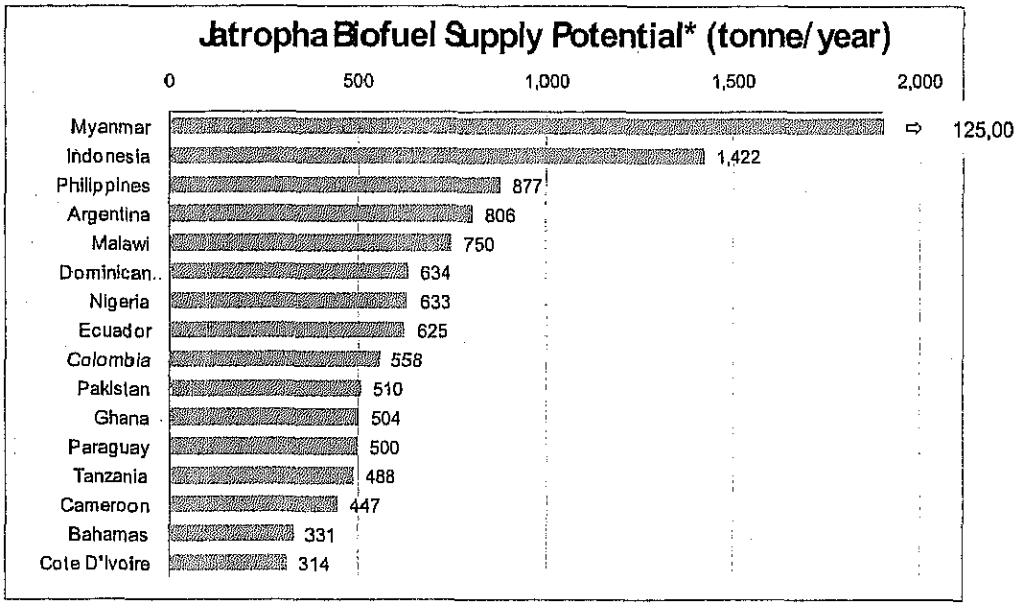
Table. 4.5 Reported Jatropha Seed Yield and Oil Yield in Myanmar

Plant Age	1-2	2-3	3-4	4-5	5-6
Yield: t/Fed./(t/Ha)	0.039/(0.1)	0.35/(0.88)	0.72/(1.8)	1.79/ (4.5)	2.55/(6.4)
Oil Yield: gallons/Feddan/(litter/Ha)	1.6/(15)	14.4/(137)	29.6/(281)	73.6/(699)	105/(998)
Calculated Oil Extraction Rate (OER) (w/w%)*	14%	14%	14%	14%	14%

* OER = oil yield (litter/Ha) * specific gravity (0.9 ton/K-litter)/seed (t/Ha)

Source: USDA GAIN Report Bio-Fuels Update – Burma (2007), *OER is calculated by JDI

In order to assume the theoretical supply capacity of the Jatropha biofuel, we calculated the potential oil production from the collected Jatropha planted area, assumed average yield, and oil extraction rate (Figure. 4.5).



* Biofuel Potential (t/y) = Area (ha) x Average Yield** (0.25 t/ha) x OER (25%***),
** Seed yield highly depending on plantation condition and management, typically 0.25t/ha level by historical records, we assumed 0.25t/ha
*** OER depending on oil content of the seeds and oil expeller, typically high OER in commercial operation, we assumed 25%

Source: Jatropha book, JDI(Myanmar and biofuel potentiality calculation)

Figure. 4.5 Theoretical Capacity of Jatropha Biofuel Supply in the World

Theoretically, the world Jatropha biofuel supply capacity would be 134 thousand (t/y) comprised of 125 thousand t/y by Myanmar (93%) and 9.4 thousand by the rest of the world (7%). Although there are tremendous numbers of Jatropha trees in Myanmar, there are no biofuel supply chain available due to the lack of action plans and scatted plantation and forests within 678 thousand km^2 are with N-S 2,000km and EW 100-800km long. Due to the difficulties of the Jatropha seed trading through the government's regulations and high cost of domestic seed transportation, it is not an

economically viable price level at the oil extraction factories outside of Myanmar as of December 2009 (JDI).

4.3 Potentiality of Egyptian Jatropha Biofuel Supply Capacity

Potentially of the Jatropha cultivation in Egypt highly depends on the availability of the wastewater so that we assumed the potentiality of the Egyptian supply capacity from the HCWW's master plan on wastewater treatment by 2017. Although there are presently some Jatropha plantations in Egypt moment described in section 6, we assumed the theoretical potentiality as calculated as world potentiality in section 4.1. Considering the applicability of the wastewater for Jatropha cultivation, we limit the wastewater use in Upper Egypt only due to the availability of non-arable land and certainty of higher yield by *favorable climate condition for Jatropha. For the conservative purpose, we assumed the applicable* wastewater for Jatropha production would be 50% of available wastewater. In addition to the present potentiality with Luxor practices, we also assumed the future potentiality with HCWW' capacity improvement plan by 2017 and the assumption of "Improved high yield seed application with conservative manner (Table. 4. 6).

Table. 4.6 Availability of Treated Wastewater and Potentiality of Jatropha Biofuel Production in Upper Egypt

		Actual	Design Capacity	Condition
Fayum	1,000 m3/d	NA	68	
Mniya	1,000 m3/d	NA	110	
Asyut	1,000 m3/d	57	472	
Suhaj	1,000 m3/d	76	292	
Quina	1,000 m3/d	158	325	
Luxor	1,000 m3/d	35	56	
New Valley	1,000 m3/d	15	78	
Awswan	1,000 m3/d	106	153	
Total Wastewater in Upper Egypt	million m3	163	567	
Available for Jatropha cultivation	million m3	82	284	50% of wastewater
Jatropha watering	litter/year	365	365	
Maximum Jatropha Trees	million trees	224	777	
Maximum Jatropha Plantation	feddan	487,500	1,690,000	2.5 feddan/ha
Seed Production-Present Potential	tonne	673,000		1.38 t/feddan
Seed Production-Future Potential	tonne		7,774,000	4.6 t/feddan
Biofuel Production-Present Potential	tonne	135,000		20% of seed weight
Biofuel Production-Present Potential	tonne		1,944,000	25% of seed weight
Oil Sales-Present Potential	Mill USD/y	108		800 US$/t-biofuel
Oil Sales-Future Potential	Mill. USD/y		1,555	800 US$/t-biofuel
Oil Sales-Future Potential	Mill.LE/y		8,553	5.5 LE/US$

Source: HCWW (wastewater capacity), JDI (the rest of the calculation and assumption)

With presently available wastewater in Upper Egypt and present yield of Luxor level, potential production of the Jatropha biofuel is 135,000 ton/y. With the potentially available wastewater by 2017 (284 million m^3/y) and higher yield with higher OER (25%), the potential production of the biofuel would reach

1,944,000 ton/y, which is 105% of imported diesel fuel and 118% of sum of domestic and international jet kerosene consumption in Egypt 2007 (Table. 6.1).

5. Potentiality of Egyptian Jatropha Business Model

5.1 Advantage of Egyptian Model

Egypt is the only country applying treated wastewater and has showed potentiality of multi beneficial business model for sustainable economic development. Unlike other countries, Egypt lacks rainfalls so that rain-fed farming including Jatropha is not the case of Egypt. Though the Egyptian model has yet reached economically viable model, its remarkable benefits have been proven by an advanced wastewater management program known as "Safe Use of Treated Sewage Water for Afforestation (SUTSWA)." Due to the 100% manageable water supply and availability of strong sunlight, Egyptian model is rather an industrial production model that maximizes and enjoys high and stable productivities. As biofuel would be one of the fundamental commodities as a source of renewable energy, "Competitiveness" is the key to survive in the continuously competitive environment in the global market. Considering the competitiveness of Egyptian model, it has ecological, physical and geographical advantages (Table. 5.1).

Table. 5.1 Advantage of Egyptian Jatropha Model

Advantage	Remarks
1. 365 days-availability of SUN	● One of three most important components for "Competitive yields" ● Directly affect the yields
2. Reliable availability of nutrient rich water	● One of three most important components ● Stable wastewater supply from treatment facilities
3. Abundant availability of NON arable land	● One of three most important components ● Over 90% of the Egyptian land kept unused ● Typically the hardest part of the business model
4. Competitive access to EU market	● The most profitable market for Egyptian biofuels ● Enabling low cost shipping and enjoying higher profitability
5. Availability of conventional refineries and skilled engineers	● Two of the most important factors to produce bio-jet fuels ● Typically limited availability in developed or oil rich countries rather than biofuel feed producing country
6. Availability of Large Scale Non Arable Land	● Typically the most critical bottleneck in industrializing Jatropha bio energy in other countries ● While in Egypt, abundant availability of considerably large scale non-arable land
7. Availability of competitive logistics network (road, rail, & waterway)	● Fundamental of the competitive business model ● Basis of the low cost production and high profitability ● Not the case in ecologically/potentially suitable Asia and African country

5.2 Potential Benefits on Egyptian Economy

In case of success biofuel industry development, its direct and indirect benefits on Egyptian economy would be strong presence in many ways. For the Egyptian sustainable development strategies, the Egyptian biofuel industry may serve a part of energy security measures and NON-OIL sectors development with competitive technical improvement. Due to the wide coverage of the business sectors from sanitary, agriculture and industry sectors, there will be substantial number of direct and indirect job creation. It is also a suitable sector to integrate public and private efforts to enjoy the "Win-win" collaboration, typically known as public and private partnership (PPP) scheme. Summary of the potential benefits is shown in Table. 5.2.

Table. 5.2 Potential Benefits on Egyptian Economy

Potential Benefits	Remarks
1. Sustainable energy source from sustainable wastewater and abundant non-arable land	● A renewable energy source for Egyptian energy security measure ● Effective wastewater management for sustainable environmental management ● Profitable use of unused or/and non-arable land
2. Competitive NON-OIL exporting commodity	● Alternative competitive exporting product of Egypt for the future ● Diversification of Egyptian economic model
3. Technical transfer in agribusiness and biofuel industries	● Strategic technology development for maintaining competitiveness in the global market ● One of the key sectors of global needs
4. Creation of skilled and unskilled jobs	● Good opportunity for rapidly glowing young people and unskilled elder persons heavily depending on governmental subsidies or fupports ● Effective distribution measure for substantial need creation outside of the Nile delta
5. Sustainable wastewater management	● Effective measure for improper use or illegal dumping in freshwater sources such as the Nile and agricultural drainage ● Potential source for sustainable tariff structure
6. Good FDI & DDI opportunity for PPP projects	● Widely used and practical measure to meet public needs with privates' power ● One of the most popular sectors for investment

Assumption of economic impact of 1.7million[3] plantation in Upper Egypt for Jatropha biofuel industries is shown in Table. 5.3.

[3] Ref. Table. 4.6 Availability of Treated Wastewater and Potentiality of Jatropha Biofuel Production in Upper Egypt

Table. 5.3 Economics of Potential Jatropha Plantation in Upper Egypt

Key Indicators	Potential Impact
1. Size of Plantation*	1.7 million feddan
2. Initial Plantation Cost	US$ 773 million
3. Project Life O&M Cost**	US$ 4,224 million
4. Project Life Seed Sales**	US$ 10,662 million
5. Max Annual Bio Jet Sales***	US$ 1,671 million/y
6. Capacity of Bio Jet Fuel Supply***	1,741 thousand t/y
7. New Permanent Job (0.06w/f****)	102,000 workers
8. Temporary Job (100days/y)****	238,000 workers

* ref. Table. 4.6 Availability of Treated Wastewater and Potentiality of Jatropha Biofuel Production in Upper Egypt
**Best case, ref. section 10.6, Option 6: New Breed and, Cost reduction, Free land, Free wastewater
*** assuming 100% of the extracted Jatropha oil, but practically some portion of fuel become synthetic diesel fuel and the rest become bio-jet fuel
****Based on existing MALR forest management + assumed additional work for the commercial operation

5.3 Suitability of Upper Egypt Development

Jatropha biofuel industry is most suitable for Upper Egypt development. As Jatropha's tropical characteristics, it is rather suitable in Upper Egypt rather than the delta area, which is quite different from other industries. Due to the local need for permanent and seasonal labors, technicians/engineers and management staffs, substantial number of jobs will be created in Upper Egypt. The followings are the list of the advantages in Upper Egypt (Table. 5.4).

Table. 5.4 Suitability of Upper Egypt Development

Suitable Advantages	Remarks
1. STRONGER sunlight	● Condition for the higher yield
2. HIGHER temperature and warmer in winter	● Favorable for higher yield ● Requirement for annual seed production
3. Availability of wastewater	● Requirement for substantial amount of wastewater treatment and its safety discharge
4. Availability of large scale non arable land	● Economical use for the unused land ● Minimal requirement to arrange the present stakeholders/land owners
5. Availability of LABOR forces	● Need for substantial number of permanent and seasonal labors in plantation

5.4 Potentiality of an Advanced Jatropha Center in the World with PPP Scheme

With the highly manageable cultivation environment, Egypt is one of the most favorable environment to lead the Jatropha related research and development (R&D) in the world. Unlike other conventional Jatropha practices-rain fed cultivation, Egyptian practices-drip/surface irrigation is highly manageable for

watering, which is the fundamental factor of any farming activities. As a result, Egypt has advantages to improve the business models with fewer factors.

Table. 5.5 Potentiality of an Advanced Jatropha Center in the World with PPP Scheme

Advantage	Remarks
1. One of the highest productivities of Jatropha seed in the world	● Highest level even with the "Wild" variety ● Faster progress for the high yield breeding program due to the faster growing environment
2. Stable/reliable seed production	● Highly manageable watering condition unlike other "Rain-fed" practices in Asian and Africa ● Relatively stable climate
3. Publics' interests in Upper Egypt development and sustainable energy source development	● Two priority topics of government of Egypt ● Necessary for its sustainable development strategy ● Contribution for other Middle East and African countries' sustainable energy strategies
4. Privates' interests in SUSTAINABLE & INEDIBLE biofuel feed supply chain development	● High demand for dependable centers for Jatropha business development ● Necessary strategies for business sustainability ● Contribution and business opportunity in renewable energy development and GHG reduction and

CHAPTER II
Facts of Jatropha Investment Environment in Egypt

6. Stakeholders and Present Activities in Jatropha Supply Chain Development
7. Potential Use of Jatropha Biofuel in Egypt and Biofuel Standardization

II. Facts of Jatropha Investment Environment in Egypt

6. Stakeholders and Present Activities in Jatropha Supply Chain Development

Unlike conventional business sectors, a Jatropha biofuel supply chain involves a wide variety of government authorities and private business sectors. In case of Egyptian Jatropha industry development, it is also required to include the "Wastewater" management and supply sectors. Although some of three key authorities (MOA, MOH, and EEAA) have already started afforestation programs with treated/untreated wastewater, there is little strategic collaboration among those authorities for the further afforestation at this moment. In addition, there is also little collaboration between wastewater supply, biofuel feed-Jatropha seed supply, and oil extraction and biofuel refining sectors due to little needs to collaborate each other in the past.

It is essential for Egyptian Jatropha biofuel industry development to smartly arrange a wide variety of authorities' jurisdictions and roles. In order to understand the key authorities' interests and involvement in Jatropha biofuel supply chains, summary of key stakeholders' general responsibilities, Jatropha related activities and interests for the further involvement is described in this section.

6.1 Ministry of Petroleum and Egyptian Petrochemicals Holding Company

General Responsibility

http://www.petroleum.gov.eg/en/

Ministry of Petroleum (MOP) is responsible for mineral resources policies in Egypt. Based on the ministry's web page, its primary roles are as follow:

- Supporting oil and gas reserves and increasing their production,
- Meeting the local demand of oil, gas and petrochemicals,
- Supporting the exports and increasing Egypt's income from foreign currency and the state's reserves,
- Setting up clear achievable national plans,
- Increasing job opportunities for youth and improving the workers skills,
- Dealing with developed countries and keeping abreast of technology.

In order to proceed with the varied mineral exploration and secure the domestic energy supply, MOP has five (five) implementation entities, Egyptian General Petroleum Corporation (EGP), Egyptian Natural Gas Holding Company (EGAS), Egyptian Petrochemicals Holding Company (ECHEM), Ganoub El-Wadi Holding Company and Egyptian Geological Survey and Mining Authority.

The minister of MOP has played key roles in the SCE as the responsible ministry for primary energy supply. Though Ministry of Electricity and Energy (MEE) is also responsible for energy supply, but

MEE's responsibility is limited to the security of the electric energy. Since the primary electric energy sources in Egypt are oil and gas, MOP and MEE closely work together for the electric energy supply. Considering the responsibility for the fuel supply, MOP is solely responsible and its relevant entities are responsible for actual activities. Since the growing demand for the electric energy and fuels in Egypt have been critical issues for Egypt's sustainable development, SCE has been seriously discussing the efficient use of the energy and alternative use of the new and renewable energy. MEE and MOP with its relevant entities have been extensively working on the long-term energy strategies. Details of the SCE's discussion are described in the SCE section below.

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

As the responsible entity of the petrochemical products supply in Egypt, ECHEM has been studying possibility of alternative fuel production from conventional, new and renewable resources as a part of the "National petrochemical master plan." Although EGP is supplying conventional gasoline and diesel fuels in Egypt, ECHEM will be responsible for the biofuel production since commercially available technologies for biofuels such as bio-ethanol and biodiesel are mostly under the ECHEM's present activities. Under the super vision of MOP, ECHEM coordinated a taskforce dedicated for the Jatropha biodiesel supply chain development in Egypt with the application of wastewater in desert area in 2007. The taskforce was comprised of MOP, ECHEM, EGAS, relevant institutes of petrochemical, Ministry of Defense, HCWW, EEAA, NRC, MWRI, ARC and international experts recommended by a potential investor in EU. After a series of taskforce meetings, ECHEM set a goal to produce 250,000 tons/y Jatropha based biodiesel (conventional trans etherification, see section 7.1 Biofuel Standardization) in 2008, which is 2% of domestic diesel supply in 2007 or 13% of imported diesel fuel in 2007 (Table. 6.1). Summary of the taskforce's outcomes are shown in Table 6.2.

Table. 6.1 Balance of Fuels in Egypt

Unit: 1,000tonnes	Motor Gasoline	Gas/Diesel	Jet Kerosene
Production	4,195 (109%)*	8,803 (84%)*	2,422 (355%)*
Import	0	1,856 (18%)*	0
Exports	-350 (9%)*	0	-772 (113%)*
International Marine Bunkers	-	-161 (2%)*	-
International Aviation Bunkers	-	-	-967 (142%)*
Domestic Supply	**3,845 (100%)***	**10,498 (100%)***	683 **(100%)***
Energy Sector	-	456 (4%)**	-
Other Sector Total	3,845 (100%)*	9,938 (90%)*	548 (80%)*
Industry	0	1,686 (16%)*	0
Transport	3,845 (100%)*	6,441 (61%)*	548 (80%)*
Agriculture/Forestry	0	1,811 (17%)**	0

* % of domestic consumption

Source: Oil Data for Egypt (2007), IEA

Table. 6.2 Summary of the MOP/ECHEM's Jatropha Biofuel Taskforce

Items	Target
Jatropha plantation	250,000 Feddan
Jatropha BDF	250,000 tonnes/year
Maximum mixture rate	Up to 20% of diesel fuel

Source: ECHEM

Though the potential investor(s) showed positive intentions to proceed with the Jatropha biofuel supply chain development including Jatropha plantation with the collaboration with ECHEM after the positive results from the taskforce study, the intention has been suspended due to the global scale recession followed by the financial crisis in the second half of 2008.

Due to the limited supply capacity, ECHEM had seriously looked for the Jatropha plantation development in African countries to increase the biofuel feed supply. As a long-term energy strategy, MOP and other relevant authorities had started the development efforts of Jatropha plantation in African countries at high level communication, but such efforts have been also suspended after the recession.

Intention for the Further Contribution

As the primary entity to supply alternative fuels in the Egyptian market, ECHEM has strong will to develop the Jatropha biofuel supply chain in Egypt, especially the second half of the chain including oil extraction, refining, and distribution. Since the potential collaboration with private investors for the biofuel supply chain development has been postponed, ECHEM is seeking for another strategy to proceed with the chain development with public collaboration rather than privates' involvement at the initial stage. As ECHEM's interests are the second half of the biofuel supply chain, ECHEM does not have strong intention to invest development of the Jatropha plantation. However, it would be positive potentiality to contribute to minority share of the plantation investment in case ECHEM is able to secure the necessary Jatropha feeds for its BDF plants. Though there is no specific time flame to revise/extend the taskforce on Jatropha biofuel supply chain development, ECHEM has keen intention to proceed with further study on a commercial scale supply chain development including Jatropha cultivation. In case of the needs for technical improvement such as high yield breeding and cultivation technology or/and low cost irrigation, ECHEM has intention to contribute to such efforts.

6.2 Ministry of Agriculture and Land Reclamation

General Responsibility

< www.agr-egypt.gov.eg>

Ministry of Agriculture and Land Reclamation (MALR) is one of the oldest and largest ministries in Egypt. MALR is responsible for most of agricultural activities and land reclamation for farmland creation and afforestation. Since agricultural sector is one of the most important sectors in Egypt for not only economic reasons but also large number of job creation and food security, MALR's responsibility in agricultural are quite wide and essential throughout the country. Because fresh water is one of the most important resources in Egypt, GOE manages fresh water with Ministry of Water Resource and Irrigation (MWRI). As the agricultural sectors are the primary consumer of the freshwater in Egypt, MWRI and MALR are closely working with the management of fresh water in Egypt. However, the irrigation is not the jurisdiction of MALR although irrigation is the most critical factor for Egyptian agricultural activities.

Concerning the afforestation activities in Egypt, Department of Afforestation and Environment (MALR/AE), MALR is responsible for national or community afforestation policies and projects. As fresh water is scarcely limited resource in Egypt, fresh water application is generally restricted for "Edible" agricultural production. On the other hand, the application of the wastewater is prohibited for edible products while it is recommended for the inedible application such as afforestation and oil crop production by The Egyptian code for utilizing the Treated Municipal Wastewater in the field of Agriculture (Egyptian code 501). In order to utilize the treated or untreated wastewater for productive way and avoid the contamination of the Nile River by the wastewater throughout the nation, three responsible ministries (MALR, MOH, and EEAA) started a joint program known as "Safe Use of Treated Sewage Water for Afforestation (SUTSWA program)[4]." As responsible authority for afforestation, MALR/AE has been actively working on the promotion and development of the afforestation with treated wastewater. In addition to the wastewater application, MALR/AE has been also working on afforestation with fresh waters in special circumstances. Following is the summary of updated forest information reported by MALR in 2009 (Table. 6.3), and list of afforestation under safe use of treated sewage water for afforestation reported by EEAA in 2008 (Table 8.2).

[4] www.eeaa.gov.eg/English/main/env_forests.asp

Table. 6.3 List of Afforestation Solely or Jointly Developed and Managed by MALR

Number of Afforestation	Completed (Feddan)	Allocation (Feddan)	Wastewater Availability (m^3)
Existing - Afforestation with sewage water and/or industrial wastewater			
17	3,007	7,461	331,900
Ongoing Plan - Afforestation with sewage water and/or industrial wastewater			
6	N/A	4,911	159,000
Existing - Afforestation with fresh water			
6	303	423	N/A

Source: MALR/AE (2009)

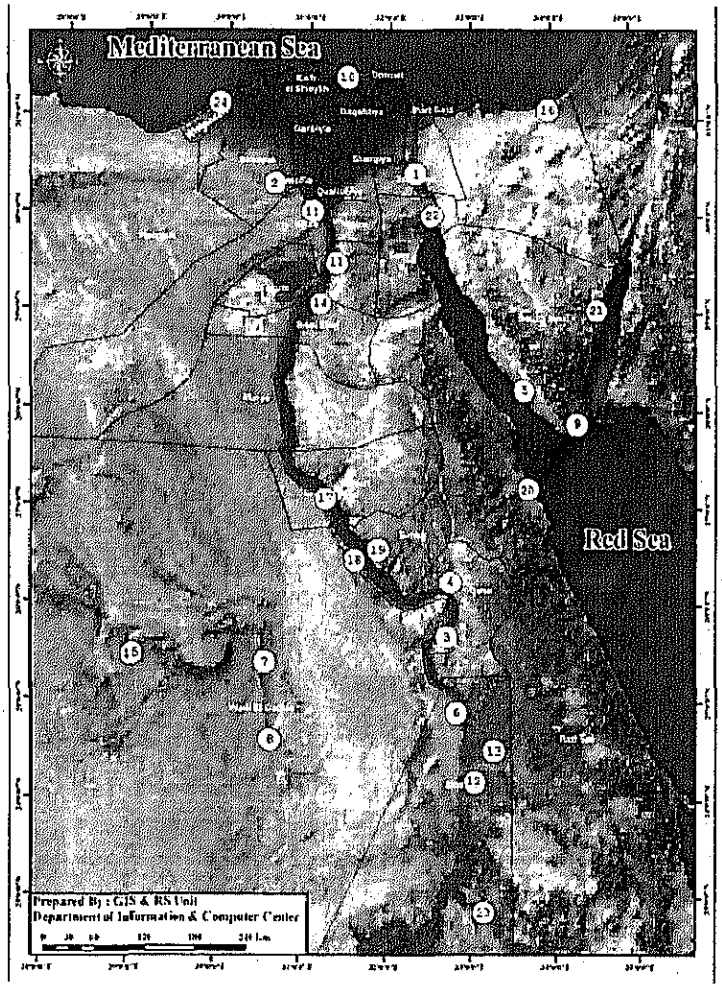
Table. 6.4 List of Afforestation Under Safe Use of Treated Sewage Water for Afforestation

Governorate	Forest	Allocated Area (Feddan)	Wastewater Treatment (m^3/day)	Irrigation System	Cultivated Plants
*1. Ismailia	Serapiom	500	90,000	Drip-Trickle	Cypress, pine, kaya, casuarina, camphor, sisal, berry, bamboo, concarpus, *Jatropha
2. Monoufeya	El-Sadat	500	18,000	Drip-Trickle	Cypress, pine, acacia, casuarina, camphor, sisal, berry, ornamental trees
*3. Luxor	Luxor	1700	30,000	Drip-Trickle & developed surface irrigation	Kaya, jatropha, camphor, acacia, berry trees, *jojoba
*4. Qena	Qena	500	23000	Drip-Trickle & developed surface irrigation	Camphor, kaya, *jatropha, *jojoba
5. South Sinai	AlToar	200	3,500	Drip-Trickle & developed surface irrigation	Casuarina, camphor, berry, botany, cancarpus
6. Aswan	Edf	300	8,000	Developed surface irrigation	Kaya
7. New Valley	AlKharg	400	1,300	Developed surface irrigation	Kaya, terminalia, tamarix, casuarina, camphor
8. New Valley	Paris	200	18,000	Drip-Trickle	Cypress, pine, acacia, casuarina, camphor
9. South Sinai	Sharm ElShiekh	60	3,000	Drip-Trickle	Casuarina, camphor, decorating tree
10. Daqahley	Gamass	150	1,500	Drip-Trickle	Cypress, pine concarpus
11. Giza	AlSaf	500	65,000	Drip-Trickle	Kaya, casuarinas
12. Aswan	Blanna	1,235	32,000	Drip-Trickle	Kaya
13. Aswan	Nasr AlNoba	100	14,000	Drip-Trickle	Camphor, kaya, terminalia
14. Beni Soueif	AlWasta	500	10,000	Drip-Trickle	Kaya, jatropha
*15. New Valley	Mut	700	10,000	Drip-Trickle	Kaya, terminalia, *Jatropha, *jojoba
16. North Sinai	AlAresh	200	15,000	Drip-Trickle	Kaya, jatropha
17. Assiut	Assiut	40	50,000	Drip-Trickle	Kaya, jatropha
18. Sohag	Gharb	1,000	28,000	Drip-Trickle & developed surface irrigation	Kaya, Jatropha
19. Sohag	Shark	1,000	28,000	Drip-Trickle & developed surface irrigation	Kaya, Jatropha
*20. Red Sea	Herghada	200	94	Drip-Trickle	Kaya, casurina, *jatropha
21. South Sinai	Newabaa	200	4,000	Drip-Trickle	Kaya, casuarinas
22. Suez	Atakka	400	30,000	Drip-Trickle	Jatropha
23. Aswan	Allaky Valley	550	8,000	Drip-Trickle	Camphor, kaya, terminalia

Governorate	Forest	Allocated Area (Feddan.)	Wastewater Treatment (m^3/day)	Irrigation System	Cultivated Plants
24. Alexandria	N9	60	10	Drip-Trickle	Kaya, casuarinas
*25.Ismailia	*Faid	*450	N/A	*Drip-Trickle	*Jatropha, *jojoba
*26.Marsa Matruh	*Marsa Matruh	*2,055	20,000	*Drip-Trickle	*Cypress, *pine, *casuarinas
Total		13,245	490,404		

item with "" implies added information by JICA study team

Source: EEAA Annual Report 2007 with updated information by JICA study team's field investigation in 2009



Source: EEAA Annual Report 2007

Figure. 6.1 Forests under Safe Use of Treated Sewage Water for Afforestation Program

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

MALR/AE's active efforts in Jatropha started in 1994 as a potential measure to prevent the desertification and green the desert with least costs and water. In the same time, MALR/AE was working on the generation of sustainable biomass resource and additional income source from wastewater and non-arable

land by the safe use of treated sewage water for afforestation program. One of the primary objectives of the program is to generate valuable biomass resources from wastewater and non-arable land. Thus, MALR/AE started Jatropha and Jojoba pilot plantations as faster cash-generating product rather than longer products such as timber trees.

After the many research efforts in Jatropha seed production, the seed productivities of the large scale plantation in Luxor have been proven to be the highest level in the world[5] due to the favorable condition for Jatropha cultivation. Though the productivities of the Jatropha seed are remarkably high, MALR/AE's pilot plantation also proved that present productivities are not high enough for sustainable operation without public support due to the high cost of irrigation systems and their operation. Presently, seven Jatropha plantations are solely or jointly managed by MALR/AE (table. 8.3)

Table. 6.5 List of Jatropha Plantation Solely or Jointly Managed by MALR

Name of Afforestation	Completed (Feddan)	Allocation (Feddan)	Irrigation Type
Redsea/Suez			
Sarabium	2 (testing plot)	N/A	drip irrigation
Faid	Preparation	N/A	drip irrigation
Hurghada	100	N/A	drip irrigation
Upper Egypt along the Nile			
Qina	2 (testing plot)	N/A	surface irrigation
Suhaj	250 and 500	1,200	drip irrigation
Luxor	500	700	drip irrigation
New valley			
Mut	250	500	drip irrigation

Source: MALR/AE

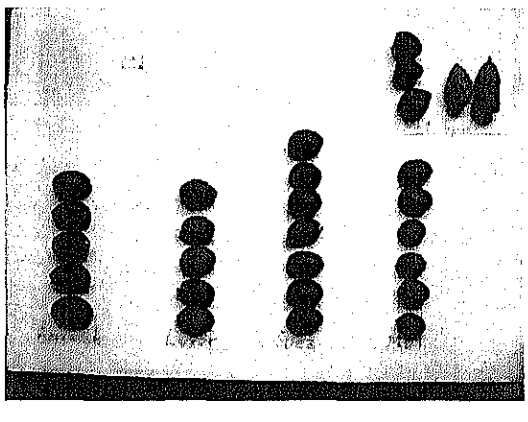
Due to the MOH's ministerial ordinance MOH2008(439)[6], MALR/AE and HCWW seem the two responsible authorities for afforestation development with treated wastewater under present regulation. MALR would be responsible for the supervision of the following matters under the current jurisdiction:

- Land allocation and reclamation for afforestation
- Coordination of relevant authorities such as MOH, EEAA, Ministry of Local Development and Governorate authorities
- Environmental safety for field workers for the treated/untreated wastewater application
- Seed and relevant by-product sales in MALR/AE afforestation

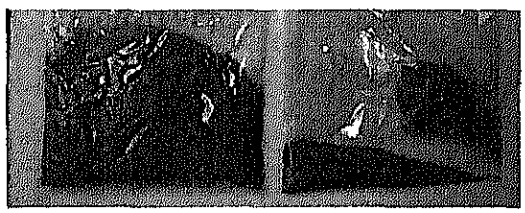
[5] Though the Jatropha seed productivity is quite high in Egypt, Egypt is the only country applying treated wastewater with irrigation. Therefore, the seed productivity is not simply comparable.
[6] Establishing a committee to adjust the rights and the duties derived from allocation of previously allocated land from MOA and some governorates for forests to the HCWW, MOH2008 (439), (Appendix A2)

The Safe Use of Treated Sewage Water for Afforestation Program has successfully proved the high potentiality of untreated or treated water application for "High productive Jatropha cultivation" though the reality of the field operation and Jatropha seed productivities is not well known in public. After the serious argument between food security and biofuel production, Jatropha projects in Egypt have caught serious attentions from biofuel investors for last several years. With the multinational experience in Jatropha cultivation, JICA experts investigated the existing Jatropha fields in Egypt.

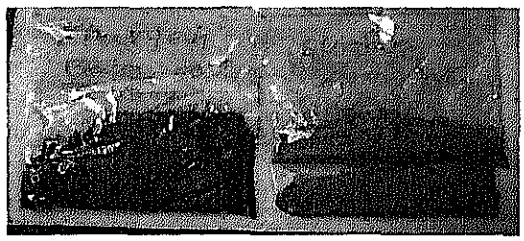
Due to the variety of soil type, quality of irrigated water and irrigation type, the productivities and cost of the operation vary greatly. In this study, we did not measure any scientific data, but we have assumed the seed productivities based on local experts' hearing, scientifically collected data by reliable institutes/organizations and JICA experts' observation at site including soil type, development and shape of the branches and size of the collected seeds. Though assumed seed productivity is given by the experts' observation, such number was not scientifically proved productivities so that the assumed productivities should be considered as reference purpose only. Difference of seed size and soil type is shown below for the reference purpose.



Seed Size Difference:
Abrawash (far left)/17-20mm
Luxor (2nd left)/16-18mm
Suez (2nd right)/14-17mm
Mut (far right)/10-15mm



Fine Sand (left) top layer & clay bottom layer ,
Drip Irrigation Only



Fine Sand (right) top layer & sand with mud bottom layer (left), applicable for surface irrigation

Following are the summary of the field investigation.

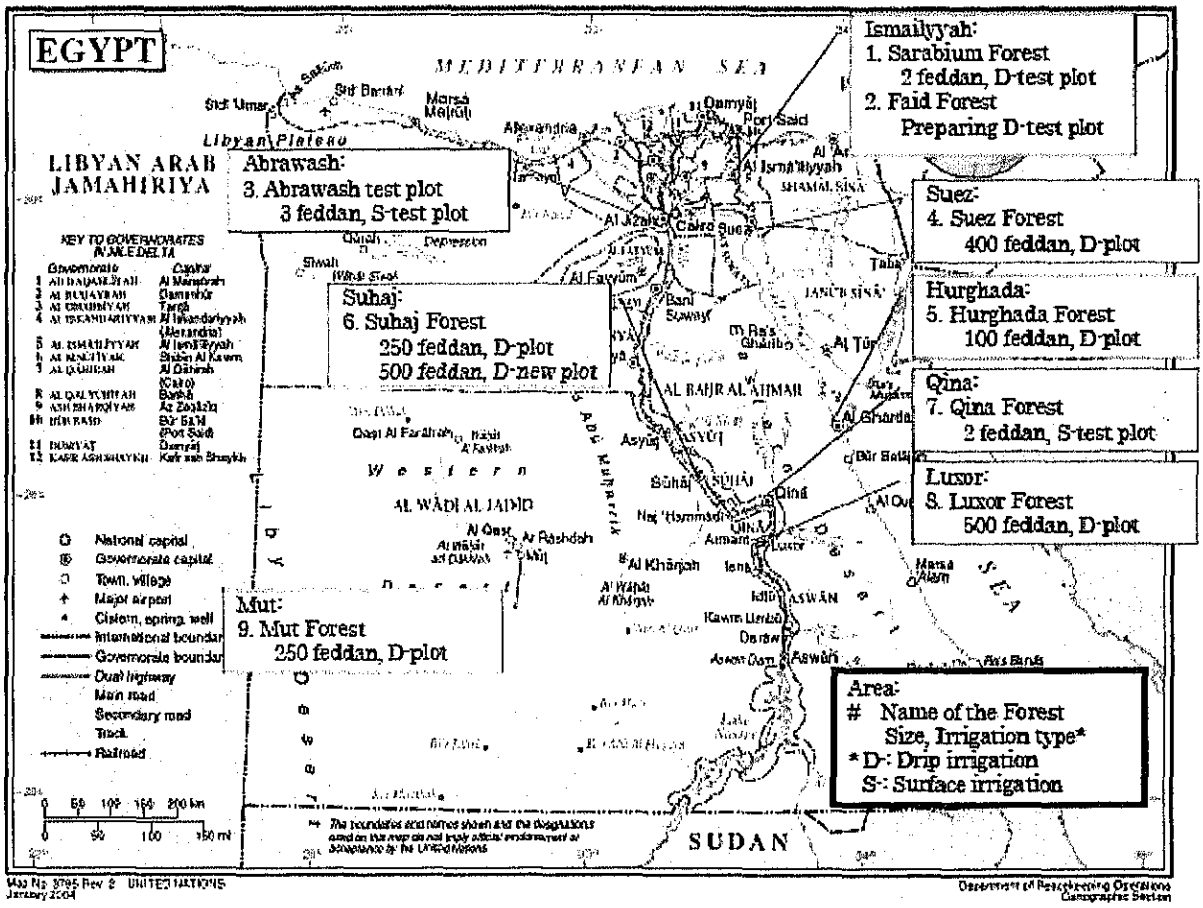


Figure. 6.2 Investigated Jatropha Forest in Egypt

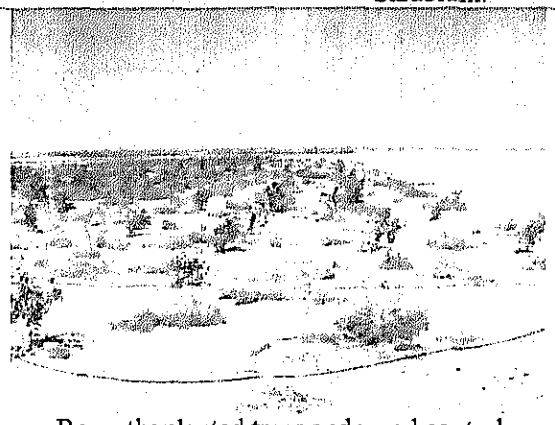
1. Sarabium, Ismailia	
Cultivated /Potential Area	2 (test plot)/ 200 (feddan)
Source of wastewater	Residential sewage
Treatment category/ methods	Secondary treatment/ series of open lagoons
Irrigation type	Drip irrigation
Soil type	Fine sand
Origin of Jatropha seed	Luxor
Assumed seed productivity	N/A, it is too early to comment.
Comments	It is too early to comment, but the initial growth shows that the climate seems favorable for Jatropha but sandy soil condition may require relatively higher volume of treated waste water

1. Sarabium, Ismailia	

Roughly 2 Feddan Test Plot

Sandy Soil

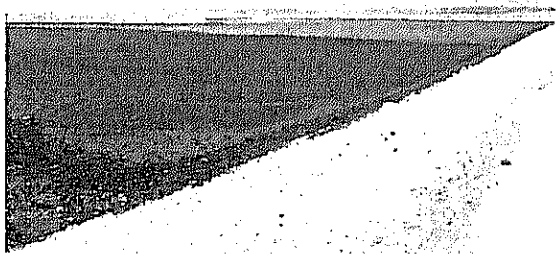
2. Faid, Ismailia	
Cultivated /Potential Area	preparing/ 200 (feddan)
Source of wastewater	Residential sewage
Treatment category	Secondary treatment/ series of open lagoons
Irrigation type	Drip irrigation
Soil type	Fine sand
Origin of Jatropha seed	Luxor
Assumed seed productivity	N/A
Comments	This forest is one of the latest forests developed under SUTSWA programs. The soil and weather condition is similar to Sarabim, Ismailia so that productivities shall be similar to be Sarabium as long as applying same Jatropha seeds. Since the water treatment facilities is not located next to the forest, operation cost would be higher than Sarabium.



Recently planted trees and weed control

Jatropha seeds for plantation

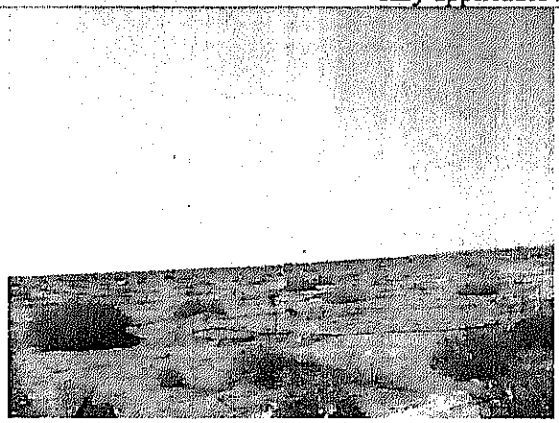
3. Abrawash, Giza	
Cultivated /Potential Area	3/ 3,000 at sludge dry pond in western desert (feddan)
Source of wastewater	Residential sewage
Treatment category	Primary treatment/ mechanical treatment
Irrigation type	Surface irrigation
Soil type	Muddy soil with fine sand
Origin of Jatropha seed	Luxor
Assumed seed productivity	0.5-1.0 t/feddan (cf. size of seeds at each plantation in the previous

3. Abrawash, Giza	
	picture)
Comments	This test plot was developed by Agricultural Research Center (ARC) for the scientific data collection for Jatropha cultivation with treated wastewater for over 5years. After the evaluation test, Abrawash wastewater treatment plant took over the test plot for the further testing. Since the fertility of the soil is relatively better than any other Jatropha plantations, size of the seeds is largest of any other Jatropha plantation in Egypt. Based on the ARC records and JICA expert's field investigation, average productivities of the Jatropha seed would be the highest level in Egypt. Primary treated water application with surface irrigation would be other key factors for such higher productivities. Since Abrawash treatment plant area has been developed for commercial usage, the potential site for the plantation is limited. However, there are good potentialities in and around its sludge pond sites in western desert roughly 30km west of the treatment plant. At this moment, the total area for sludge ponds are over 3,000 feddan and additional several thousand feddan would be reserved for the sludge disposal.
 Well developed branches with surface irrigation	 Sludge ponds

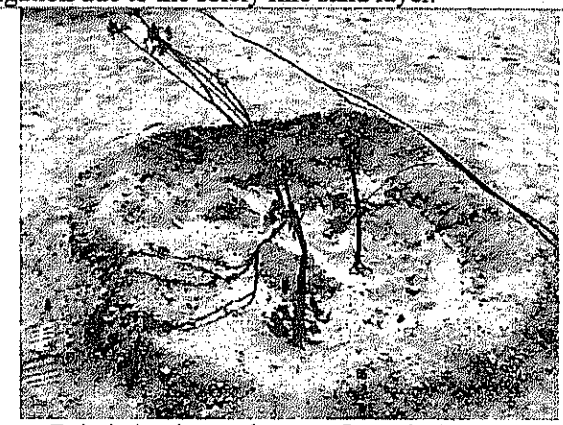
4. Suez	
Cultivated /Potential Area	400/ 400 (feddan)
Source of wastewater	Industrial wastewater and residential sewage
Treatment category/ methods	Secondary treatment/ series of open lagoons
Irrigation type	Drip irrigation
Soil type	Fine sand with little muddy soil
Origin of Jatropha seed	Unknown
Assumed seed productivity	0.2-0.4 t/feddan (cf. size of seeds at each plantation in the previous picture)
Comments	Though the plantation is well developed and managed, property of soil and treated wastewater may not be suitable for productive Jatropha seed production. There have been many agronomical trials to improve the productivities including different variety of seeds, soil improvement and drainage management. The experience and collected information would be one of the most valuable sources of records for the innovation of Jatropha business and improvement of the seed

	productivities.

5. Hurghada, Redsea	
Cultivated /Potential Area	100/ 500 (feddan)
Source of wastewater	Residential sewage
Treatment category	Secondary treatment/ series of open lagoons
Irrigation type	Drip irrigation
Soil type	Fine sand
Origin of Jatropha seed	Luxor
Assumed seed productivity	N/A, it is too early to comment.
Comments	Jatropha trees had just planted in September, 2009. Due to the hot summer and warmer winter climate, it seems favorable condition for Jatropha cultivation. With conventional practices, drip irrigation is the only applicable irrigation due to the solely fine sand layer.



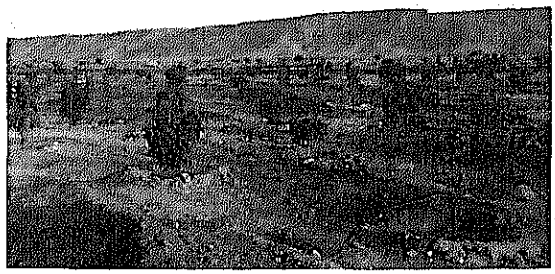
Just Planted Jatropha Trees



Drip irrigation and young Jatropha Tree

6. Suhaj	
Cultivated /Potential Area	250 + 500/ N/A (feddan)
Source of wastewater	Residential sewage
Treatment category	Secondary treatment/ mechanical treatment
Irrigation type	Drip irrigation
Soil type	Fine sand
Origin of Jatropha seed	Luxor
Assumed seed productivity	0.2-0.6 t/feddan with present condition
Comments	Due to the coarse to fine sand condition, drip irrigation would be the only applicable method for irrigation. In order to improve the productivities, appropriate trimming should be applied.

Relatively well developed tree in 250 fed. site



Recently planted trees in 500 fed. site

7. Qina	
Cultivated /Potential Area	2 (testing plot)/ N/A (feddan)
Source of wastewater	*Residential sewage*
Treatment category	Primary treatment/ mechanical treatment
Irrigation type	Surface irrigation
Soil type	Fine sand & muddy soil
Origin of Jatropha seed	Luxor
Assumed seed productivity	N/A, it is too early to comment.
Comments	Due to the suitable soil for the surface irrigation, it has tested cultivation with surface irrigation. Though there are growth varieties in juvenile trees, the development of the branches are generally very strong and healthy.

Surface irrigation

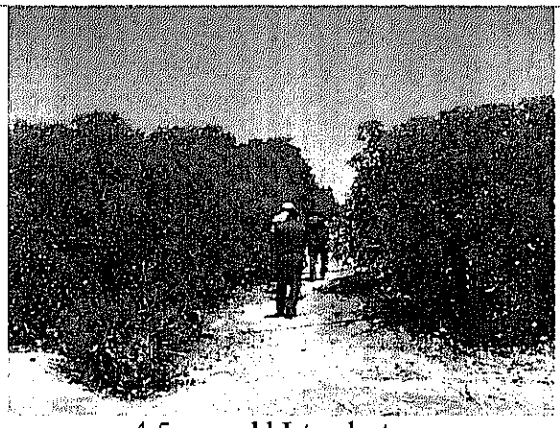
Surface irrigation and young Jatropha tree

8. Luxor	
Cultivated /Potential Area	500+/ 700 (feddan)
Source of wastewater	Residential sewage
Treatment category	Secondary treatment/ series of open lagoons
Irrigation type	Drip irrigation
Soil type	Fine sand with muddy soil
Origin of Jatropha seed	India, Tanzania, etc.
Assumed seed productivity	0.3-1.0 t/feddan (cf. size of seeds at each plantation in the previous picture)
Comments	There are a test plot supported by USAID grant for the purpose of the economical feasibility study and a 500 feddan large scale plantation.

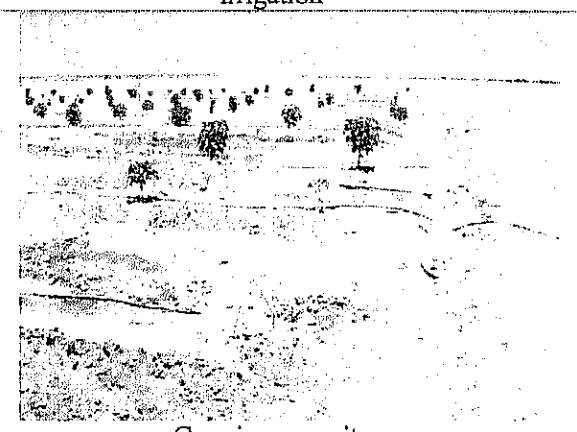
8. Luxor	
	This Jtroph9 plantation is considered as one of the best cases in Egypt. Though the productivities have seemed to be monitored by MARL, Agricultural Research Center (ARC), HCWW and others, series of dependable information are not available for public at this moment. Due to the over 10years of experiences, management team and field technicians are well trained and knowledgeable in Jatropha cultivation. In addition to the present practices, high yield Jatropha test and higher yield techniques including pruning and fertilization may immediately increase the seed productivity.

Jatropha nursery for variety testing

One of the oldest Jatropha trees fed by surface irrigation



4-5years old Jatropha trees



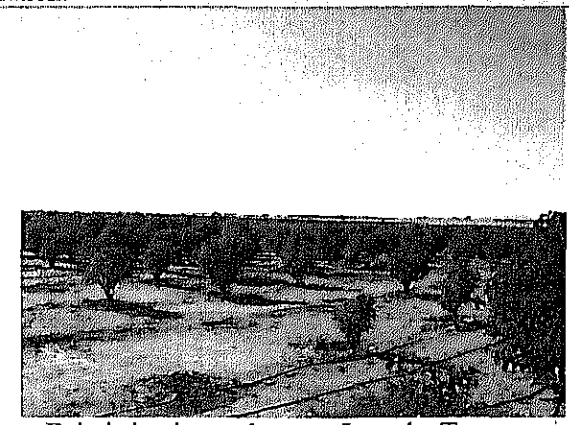
Growing new site

9. Mut	
Cultivated /Potential Area	250/ 500 (feddan)
Source of wastewater	Residential sewage
Treatment category	Secondary treatment/ series of open lagoons
Irrigation type	Drip irrigation
Soil type	Fine sand
Origin of Jatropha seed	Luxor
Assumed seed productivity	0.1-0.4 t/feddan (cf. size of seeds at each plantation in the previous picture)
Comments	This is relatively new and well managed Jatropha plantation so that site manager is rather focusing on energy crops, Jatropha and Jojoba. Based on the hearing with the site manager, Jojoba productivities are as high level as other plantations and Jojoba seems profitable.

9. Mut

Due to the coarse and find sand soil, application of the adequate water and nutrition to Jatropha would be the limiting factors of higher productivities. As shown in the previous picture, size of the Jatropha seeds varies and is relatively smaller than any other forests. Basic study for soil improvement and productive operation would be needed for the further operation.

Well developed trees but need for pruning techniques for higher yield



Drip irrigation and young Jatropha Trees

Intention for the Further Contribution

As the primary authority for the agricultural and land reclamation activities under the present jurisdiction, MALR and its relevant authorities and institutions are keen to lead the first half of the Jatropha biofuel industry development. The interested sectors include technical improvement of Jatropha seed productivities and cost-effective irrigation, allocation of Jatropha plantation, land reclamation for the plantation, solely or jointly development and management of the plantations, and delivery of Jatropha seeds for the second half of the Jatropha biofuel industry including oil extraction and refining, and domestic and international distribution of the biofuel products. MALR's contributions, especially in technical improvement sectors are expected to be delivered by ARC, one of the most reliable instate in applied/practical agriculture sectors in Egypt. ARC's present activities and further contributions are described below.

Due to the enormous efforts in Jatropha activities in the past, MALR might be the most knowledgeable and experienced entity in development of Jatropha plantation and seed production in Egypt. At this moment, MALR/AE is seeking for coordinating Egyptian authorities and guiding private investors in the first half of the Jatropha biofuel supply chain development.

As described previously, MALR/AE's pilot plantation in Luxor shows the remarkable productivities of Jatropha seeds. However, this pilot project also proved that the present productivities are not high enough

for financially self-sufficient manner due to the high cost of irrigation systems and their maintenance costs. The following table shows the experienced seed productivities in Luxor (table. 8.4). With the collaboration with MALR/AE's responsible officers and JICA study team members, the most updated cost analyses were conducted in this report (Chapter III: Cost Analysis of Egyptian Model).

Table. 6.6 Experienced Seed Productivities in Luxor with 2nd Treated Wastewater

Year after Planting	Average Yield (kg/feddan)
1	400
2	450
3	500
4	800
5	1,200
6 and onwards	2,000

Source: MALR/AE

With the cost analysis and the long experience on the manmade forest development and management throughout the nation; MALR/AE is willing to lead the improvement of the Jatropha seed productivities with the collaboration with relevant stakeholders. Though the MALR/AE's primary responsibility is not technical improvement, the actual activities would involve some authorities and institutes beyond the MALR jurisdiction so that MALR/AE is willing to deal with this matter with policy level. At this moment, MALR is not actively working on further collaboration for the next level national program on Jatropha plantation development, but it is keen to start the coordination efforts with taking advantage of a stakeholders' meeting arranged by MTI and JICA study team on 27th December, 2009 (Appendix A1).

6.3 Agricultural Research Center

General Responsibility

http://www.arc.sci.eg/AboutARC.aspx?TabId=&NavId=0&lang=en

Agricultural Research Center (ARC) is the most respectable research center in agriculture in Egypt, especially in applied field rather than scientific study. As agricultural products are some of the most important sources for Egyptian food security and foreign exchange. ARC have been playing key roles to strengthen the agricultural sectors such as productivity improvement and effective water and fertilizer application since early 1970s under MARL with the support of Ministry of Water Resource and Irrigation (MWRI) and collaboration of relevant universities. Based on the ARC web site, "Over the past two decades, remarkable achievements have been realized, including the development of new varieties, improved agronomic practices, livestock development, maintenance of the national herds and better food processing techniques. New crops and animal breeds have also been introduced and research has been dedicated to problem- solving, side by side with basic science."

Within the national agricultural development strategies, ARC's functions are stated as follow:

- Conducting applied and basic research to generate a continuous flow of technologies that help increase productivity and reduce production cost;
- Transfer of new technologies to the farming community through extension service; and monitoring their adoption by the end users; and
- Human capital development as a continual process.

In order to achieve such goals, ARC has developed sixteen (16) institutes and thirteen (13) laboratories to improve its performance. ARC's and each institute and laboratory has diverted and coordinated tasks under the ARC's pivotal themes:

1. Sustainable development of research and extension capabilities;
2. Upgrading technology transfer channels; and
3. Utilizing, to the maximum level possible, the findings of science and technology developed abroad.

Institutes
● Agricultural Economics Research Institute (AERI)
● Agricultural Engineering Research Institute (AENRI)
● Animal Health Research Institute (AHRI)
● Animal Production Research Institute (APRI)
● Field Crops Research Institute (FCRI)
● Horticulture Research Institute (HRI)
● Plant Protection Research Institute (PPRI)
● Veterinary Serum and Vaccine Research Institute (VSVRI)
● Agricultural Extension & Rural Development Research Institute (AERDRI)
● Agricultural Genetic Engineering Research Institute (AGERI)
● Animal Reproduction Research Institute (ARRI)
● Cotton Research Institute (CRI)
● Food Technology Research Institute (FTRI)
● Plant Pathology Research Institute (PPATHRI)
● Soil, Water and Environment Research Institute (SWERI)
● Sugar Crops Research Institute (SCRI)
Laboratories
● Central Laboratory for Agricultural Climate (CLAC)
● Central Laboratory for Agricultural Expert System (CLAES)
● Central Laboratory for Design and Statistical Analysis Research (CLDSAR)
● The Central Laboratory for Evaluation of Veterinary Biologics (CLEVB)
● Central Laboratory for Research on Medicinal and Aromatic Plants (CLMAP)
● Central Agricultural Pesticide Laboratory (CAPL)
● Central Laboratory for Aquaculture Research (CLAR)
● Central Laboratory for Date Palm Research and Development(CLDPRD)
● Central Laboratory for quality control of poultry production(CLQP)
● Central Laboratory of Organic Agriculture (CLOA)
● Central Laboratory of Residue Analysis of Pesticides & Heavy Metals in Foods (QCAP) Accredited according to ISO 17025
● Regional Center for Food & Feed (RCFF). Accredited according to ISO/IEC 17025 from A2LA

- Weed Research Central Laboratory (WRCL)

Source: ARC Website

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

As an objective of the safely and effective use of wastewater for agricultural activities, Soil, Water and Environment Research Institute (SWERI) has been working on the effective application of the wastewater for Jatropha seed production for over ten (10) years. SWERI has conducted extensive study on the reaction of Jatropha seed production by wastewater and fertilizer application at a three feddan testing plot next to Abrawash wastewater plant by the support of the Abrawash wastewater plant under HCWW's affiliate company.

The results clearly show the one of the highest productivities compared to the other large scale Jatropha production in the world. However, the results also show the limitation of the seed productivities for the solely wastewater application and effectiveness of the fertilizer application for the higher yield.

Summary of the SWERI's studies are as follow.

Table. 6.7 Water Quality of Applied Treated Wastewater

Components	mg/litter*	Components	meq/litter
Ph	7.55*	$HCOO_3^-$	3.4
NO_3-N	1.33	Cl^-	2.77
NH_4-N	26.4	SO_4^-	2.16
P	3.77	Ca^+	2.09
K	15.99	Mg^+	1.91
Pb	0.004	Na^+	3.92
Se	0.008	K^+	0.41

* except Ph, Source: ARC

Table. 6.8 Amount of Applied Wastewater (m^3/feddan)

Age of Tree	1	2	3	4	5+
January	31.3	30.9	28.4	34.2	46
February	34.2	33.2	33.2	39.4	53
March	44.9	44.5	35.4	44.1	62
April	46.2	46.2	39.9	51	68.7
May	60.8	60.2	55.5	99.3	92.9
June	65.4	77.2	78.5	79.8	95.5
July	99.4	94.2	98.1	105	109
August	100.8	106	106	107	120
September	90.7	94.2	96.8	106	117

October	77.8	71.2	70.2	81.5	95.2
November	55.3	47.6	40.4	79.5	88.2
December	41.2	40.2	35.4	39.2	61.2
Total	748	746	748	836	1,008

Source: ARC

Table. 6.9 Difference Between Applied and Consumed Treated Wastewater

Age of Tree	Applied (m^3/fed.)	Consumed(m^3/fed)	Difference(m^3/fed.)	Cons./Applied(%)
1	1,026	748	278	74
2	1,032	746	286	73
3	1,041	748	293	71
4	1,118	836	282	77
5+	1,328	1,008	320	75

Source: ARC

Table. 6.10 Sensitivity Test for Fertilizer Applications and Seed Productivities

	Phosphate/ P (kg/m)	Potassium/ K(kg/m)	Year 1:2007 Seed Production kg/fed. (kg/ha)	Year 2:2008 Seed Production kg/fed. (kg/ha)
Control	0	0	400 (1,000)	600-800 (1,500-2,000)
Case 1	10	5	500-600 (1,250-1,500)	700-1,000 (1,750-2,500)
Case 2	15	10	700-800 (1,750-2,000)	1,200-1,500 (3,000-3,750)
Case 3	25	15	800-1,200 (2,000-3,000)	1,500-2,500 (3,750-6,250)

Source: ARC

Intention for the Further Contribution

As a leading research institute not only SWERI but also relevant institutes are keen to work on the Improvement of Jatropha productivities to realize the economically variable practices for Jatropha seed production. After the completion of the Jatropha study in Abrawash in 2009, SWERI started another small scale research supported by MALR and another international organization at another plot in the Abrawash treatment plan. Due to the on-going process of the research, relevant information cannot be disclosed at this moment. Over the 10years of scientific studies, SWERI has also realized the need for "Further" improvement of seed productivities. Based on the discussion with SWERI representatives, SWERI is proposing an extensive program for Jatropha plantation development including productivity improvement, effective wastewater application and improvement of cultivation technologies.

Considering the productivity improvement, based on the discussion with SERI, Horticulture Research Institute (HRI) of ARC may have capabilities to improve the yield. Furthermore, once the achievement of the high yield breed of Jatropha, Agricultural Genetic Engineering Research Institute (AGERI) may have capabilities to further improvement of the high yield seed with genetic engineering. Considering the effective wastewater application and improvement of cultivation technologies, SWRI is keen to contribute to such matter with the experience as well as advanced technologies such as using remote sensing techniques and application use of organic and bio-fertilizers to replace the conventional chemical fertilizer.

6.4 Ministry of Housing, Utility and Urban Development

General Responsibility

http://www.housing-utility.gov.eg/english/

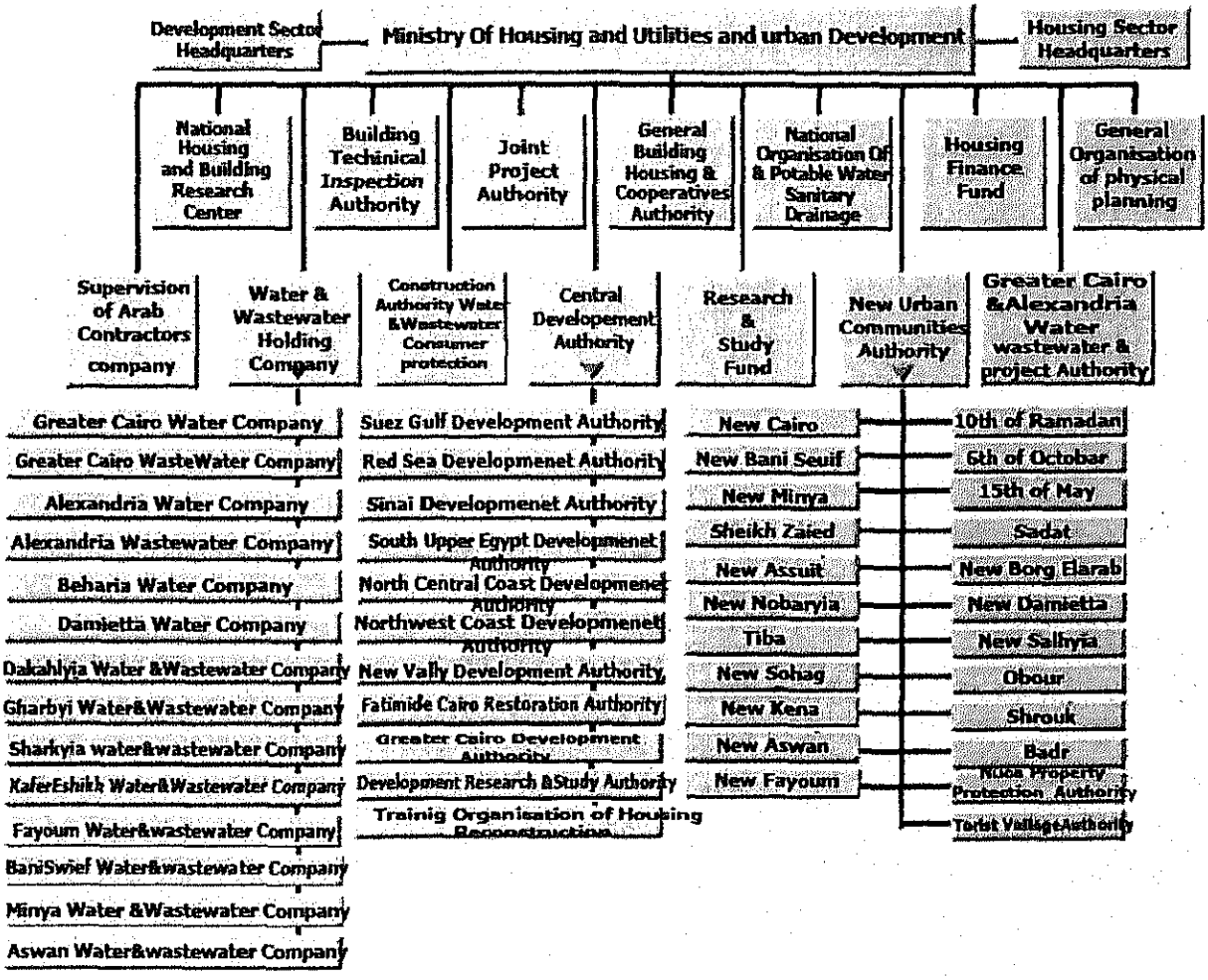
Ministry of Housing, Utility and Urban Development (MOH) is the responsible ministry concerned with Egypt's comprehensive development, including urban, communal and economic development. It is responsible for comprehensive and structural plans of master planning and actual detailed plans of infrastructure networks including roads, bridges, potable water and sewerage plants through the ministry and its relevant authorities/organizations.

Decree 164/1996 of MOH states the general guideline for the MOH's responsibilities. Followings are the some of the representative responsibilities in the decree:

- Drawing MOH policy, study and preparation of urban development and programs, inter co-ordination with production and service programs in the framework of the state national plan, as well as the control of metropolitan and rural planning projects and different types of Housing.
- Design and execution of the different types and levels of construction and building projects whether for private or public housing as the construction of public buildings housing and utilities building major structures, different types of factories and setting relevant specifications standards, models and rates , subject to the state general policy.
- Study and preparation, designing , setting rules, standards and technical specifications, control of execution and follow up of the design / execution / operation / management of potable water and sanitary drainage plans, projects and executive programs.
- Study and preparation of the regional and comprehensive planning of the economic & community priority areas, subject to the cabinet decided projects in this planning.

Concerning the wastewater treatment activities in Egypt, National Organization of Portable Water & Sanitary Drainage (PWSD) and Holding Company for Water & Wastewater (HCWW) are responsible as

shown in Figure 8.3. Generally, PWSD is responsible for planning and financing and HCWW is responsible for implementation and operation of water and wastewater plant. Responsibilities of HCWW is described separately below.



Source: MOH Web Site as of January 2010

Figure. 6.3 Organization Structure of MOH

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

As one of key ministers of supreme council for energy, MOH has been deeply involved in the first half biofuel chain, especially in treated wastewater supply and land allocation and the second half in biofuel supply chain development in policy development level. Since MOH has specialized implementation agencies for each Jatropha related matter, MOH would be only involved in policy making level or high level coordination.

Due to the government's rising interests in Jatropha biofuel as an alternative energy source and effective use of wastewater in Egypt, MOH set a ministerial decree on 20 November, 2008, No.439 of 2008 MOH,

on establishing a committee to adjust the rights and the duties derived from allocation of previously allocated land from MOA and some governorates for forests to the HCWW (Appendix A2). List of the committee members are shown below.

1. General /Assaid Nasr Arafat	Member of administrative board of the HCWW
2. Advisor / Mohamed Yusri Zein AI-Abdin	Head of advisory group to the cabinet
3. Advisor / Assam El-Din Abdedlaziz Gad-el-haqq	Deputy Head of State Council and legal advisor to MOH
4. Advisor / Osama YusefShalby	Deputy Head of State Council and legal advisor to MOH
5. General / Ahmad Mohamed Amrag AI-Faiyoumy	HCWW
6. Dr. Ziyad Ahmad EI-Menshawi	HCWW
7. Mr. Mahmoud Ahmad Shahin	HCWW
8. Mr. Mohsen Abdelmagied Abdelrahim	HCWW
9. Eng. I Mohamed Ahmed Mostafa	Head of Central Department for Afforestation, MALR
10. Representative for MOH	Representative will be assign
11. Representative for Ministry of State for Local Development	Representative will be assign
12. Representative for Survey Authority	Representative will be assign
13. Representative for Desert Development	Representative will be assign
14. Representative for Ministry of Environment	Representative will be assign
15. Representative for governorate in which the allocated land lies	Representative will be assign

The status of the committee and outcomes of the committee are not available for the public at this moment. However, based on this decree, HCWW seems solely working on Jatropha matter under MOH at this moment. Based on a discussion with a PWSD official, PWSD used to be involved in safe use of treated sewage water for afforestation program, but relevant responsibilities were taken over by HCWW after the ministerial decree. Under present jurisdiction, HCWW would be the solely authority for the Jatropha seed cultivation. The other half of the biofuel production and distribution would be apart from HCWW and one of MOH agencies would be involved.

Intention for the Further Contribution

It is likely to play the key role for the policy making and coordination of other agencies in treated wastewater usage and land allocation for the treated wastewater usage. Its intention is not clear at this moment, but MOH's clear vision is shown in the ministerial decree 439 of 2008. Based on the cabinet's publication, MOH and MALR have been actively working together for the restriction of illegal use of treated wastewater as well as safety and effective use of wastewater for valuable usage. Detail information of the cabinet's interests are described in the cabinet section bellow.

6.5 Holding Company for Water and Wastewater

General Responsibility

http://www.hcww.com.eg/En

Holding Company for Water and Wastewater (HCWW) is the largest public company responsible for drinking water supply and wastewater treatment in Egypt as the solely implementation agency under MOH. After the presidential decrees[7] on establishment of HCWW (No. 135/2004), restructuring efforts on Egyptian drinking water and wastewater sector has been led by HCWW and the efforts are still underway as of December 2009. At this moment, there are still some water and wastewater companies managed by local governments, but most of such companies have been under the preparation of switchover to HCWW's management. Ultimate purpose of the restructuring is to provide adequate services for citizens and businesses with sustainable business models technically and financially. Therefore, the management of the HCWW has been driven by business-oriented mind with the technical and financial support from the international aid agencies.

Some of the key profiles of HCWW as of February 2008 are as follow:

Mission:	Meet Egyptian standards of water and wastewater service through the effective management of subsidiary companies
Vision:	Achieve world-class levels of water and wastewater service management
Strategic goals:	• Provide excellent service for customers • Safeguard and develop infrastructure • Upgrade company performance standards • Develop leaders and staff • Achieve financial autonomy • Upgrade citizen awareness of water issues
Scope of work:	17 governorates in addition to the city of Shubra El-Kheima
Number of affiliate companies:	19 companies
Number of subscribers to Drinking Water services:	7.5 million subscribers
Production of Drinking Water:	17.6 million m^3/day
Number of water treatment plants:	150 filtering plants, 540 small plants and 878 well plants
Length of distribution networks:	85,000 km
Number of wastewater treatment plants:	187 plants
Length of wastewater collection networks:	29,000 km
Number of subscribers to wastewater services:	4 million subscribers
Number of inhabitants served:	64 million citizens
Treated wastewater:	6.9 million m^3/day

Source: HCWW web site

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

[7] Establishment of the Holding Company by Presidential Decree no. 135 of year 2004: the transfer of the municipalities in Egypt into subsidiary companies of the Holding Company.

Since rationalization of water use and sound handling of wastewater are the primary objectives of the HCWW, effective use of wastewater resource for value creation such woods and oil crops is one of primary interests of the company. As a responsible authority and operator of wastewater collection and operation, HCWW has taken over the MOH's roles under "Safe Use of Treated Sewage Water for Afforestation (SUTSWA)." In addition to the primary responsibilities in wastewater management, HCWW is keen to maximize its profitability from untreated/treated wastewater for its financial independency. Based on HCWW's highly interests, MOH set a ministerial decree (No.439 of 2008) on setting up an intergovernmental committee on transferring MALR and relevant local governments' responsibilities in afforestation activities with wastewater to HCWW. As described previously, the present status and outcomes of the committee under the decree are not known.

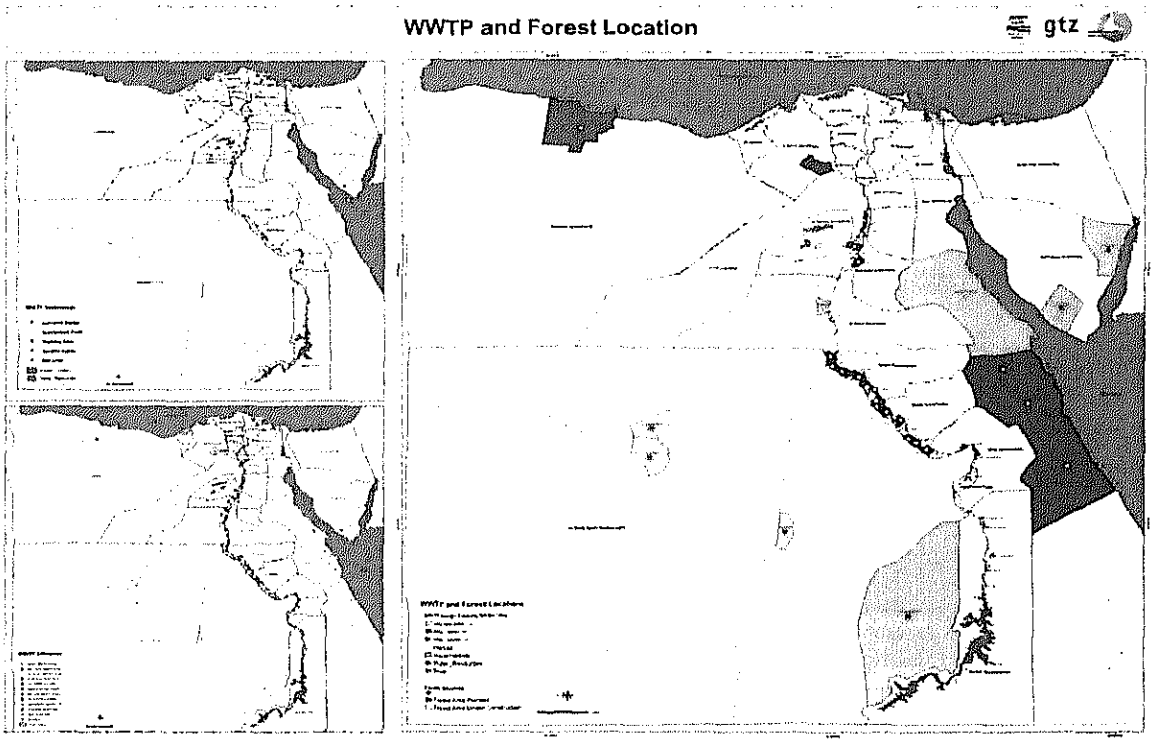
Based on the discussion with HCWW officials, HCWW has been taking over the operation of existing forests and is going to develop and manage the "Jatropha plantation" solely or jointly with domestic and international investors. HCWW's agro-industry engineers have been actively working on technical analysis of the Jatropha plantation development and the master plan on the nationwide afforestation program. On the other hand on the actual field, most of existing and newly developed forests irrigated by the affiliate companies of HCWW are managed by mutual collaboration with MALR and the affiliate companies. Therefore, the development and management of the forests are likely to be conducted by the MALR and HCWW's collaboration under the SUTSWA. However, new forests developed by HCWW and/or other investors would be initially allocated by HCWW and transferred to the affiliate companies and/or other investors. Following is the forest under the HCWW originally developed by ARC.

Table. 6.11 List of Jatropha Plantation Managed by HCWW or Affiliate Companies

Name of Afforestation Greater Cairo	Completed (Feddan)	Allocation (Feddan)	Irrigation Type
Abrawash	3(testing plot)*	N/A	surface irrigation

Source: HCWW, * the testing plot was originally developed and tested by ARC for the scientific analysis of Jatropha seed production and essential factors such as irrigated wastewater quality and fertilizer application.

Followings are the relevant information provided by the HCWW engineers for Jatropha forest development.



Source: HCWW, 2009

Figure. 6.4 Wastewater Plant and Forest Location

Table. 6.12 MASTER PLAN FOR WATER AND WASTEWATER

Objective	Covering water & wastewater needs overall Egypt till 2037, in addition to the high priority projects and studying the different interventions & alternatives of funding
Scope period	2007 – 2037
Target region	Rural and Urban
Scope infrastructure	Drinking water plants, wastewater treatment plants, water & wastewater networks, relevant infrastructures
Target infrastructure	New, extension, completion, other
Phase 1	Assessment of existing situation and the high priority projects for all governorates by HCWW Engineers
Phase 2	Comprehensive analysis and completion of the Strategic Master Plan for Egypt by international consultant
Official language	Arabic and English

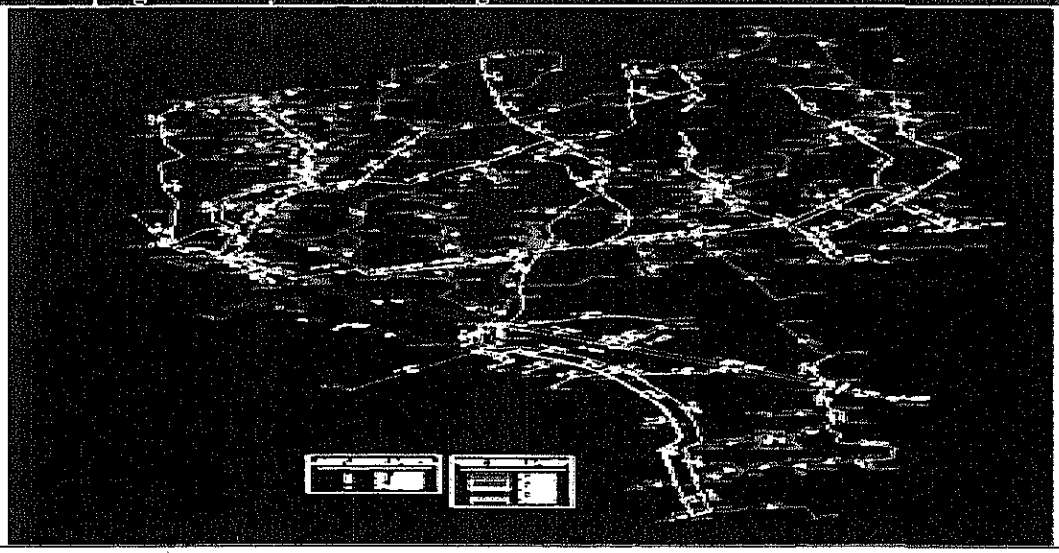
Source: HCWW, 2009

Table. 6.13 Integration of Modern Technologies

Geographic Information Systems (GIS)	
Objective	Equipping centers with modern programs and devices for efficient operation and resource management throughout whole HCWW network
Phase 1	Assessment of existing situation and the high priority projects for all governorates by HCWW Engineers

Phase 2	Comprehensive analysis and completion of the Strategic Master Plan for Egypt by international consultants

Water Cad program for Hydraulic Modeling



Intention for the Further Contribution

HCWW is considering the ODA application for its serious consideration on economical and effective use of wastewater throughout the HCWW network, and the application of Jatropha biofuel feed production is one of its primary objectives. It has been a part of the "Master plan for water and wastewater", HCWW has been preparing for the strategic wastewater usage by using the mentioned modern technologies.

In addition to the ODA usage, HCWW has been also considering the collaboration with private investments into Jatropha plantations. At the 10th meeting of the "Supreme Council for Energy (SCE)" in December 2008, SCE reviewed a report of the "Possibility of alternative energy production by cultivation of oil crops in desert areas with treated sewage water" submitted by the Minister of Environment. Dr. Ahmed Nazif, the president advised to promote such efforts further (http://www.cabinet.gov.eg/news). Based on the discussion with HCWW officials, there have been serious interests for the Jatropha investment, especially from EU, Chinese and Korean companies for last several years. HCWW has not concluded the actual implementation plan throughout the HCWW network.

Following are the summary of the present and future plan for the wastewater capacity and allocation of the forests prepared by HCWW engineers.

Table. 6.14 HCWW's Afforestation Plan throughout the Affiliate Companies

Affiliate Company	Capacity 1,000 m^3/day		Forrest Allocation Feddan		
	design	actual	allocation	actual	future plan
G-Cairo and Surround					
Matruh	50	25	2,055	1,000	1,055
Monufia	35	33	1,200	1,200	-
Beni Suef	74	38	2,121	300	1,186
Faiyum	7	-	220	80	140
Eastern	100	100	4,681	-	4,681
Red Sea and Upper Egypt					
Red Sea	94	27	4,809	200	4,609
Minya	110	-	7,000	-	7,000
Asuit	472	57	12,907	400	12,507
Suhaj	292	76	14,758	2,143	12,615
Quina	325	158	17,240	900	16,340
Luxor	56	35	2,206	700	1,510
Aswan	153	106	4,464	1,105	3,359
New Valley	78	15	4,933	650	4,283
Sinai					
N-Sinai	39	18	2,400	250	1,950
S-Sinai	22	8	540	340	200
Total					

Source: HCWW

6.6 Ministry of State for Environmental Affairs / Egyptian Environmental Affairs Agency

General Responsibility

http://www.eeaa.gov.eg/English/main/about.asp

Ministry of State for Environmental Affairs (MSEA) is the responsible ministry for environmental matters in Egypt. As the executive arm of the MSEA, Egyptian Environmental Affairs Agency (EEAA) was restructured with the new mandate to substitute the institution initially established in 1982.

The Principal Functions of the Agency Include:

- Formulation of environmental policies,
- Preparation of the necessary plans for environmental protection and development projects, follow-up of their implementation, and implementation of pilot projects.

As the solely responsible agency for the environment and coordination agency for the national and international organization, EEAA covers the following roles:

- Preparing draft legislation and decrees related to the fulfillment of its objectives
- Preparing state of the environment studies and formulating the national plan for environmental protection and related projects.

- Setting the standards and conditions to which applicants for construction projects must adhere before working on the site and throughout operations
- Setting the rates and proportions required for the permissible limits of pollutants.
- Periodically collecting national and international data on the actual state of the environment and recording possible changes.
- Setting the principles and procedures for mandatory Environmental Impact Assessment of projects.
- Preparing Environmental Contingency Plans and supervising their implementation.
- Participating in the preparation and implementation of the national and international Environmental
- Monitoring Programs and employing data and information gained thereof.
- Establishing Public Environmental Education Programs and assisting in their implementation.
- Coordinating with other empowered authorities for the control and safe handling of dangerous substances.
- Managing and supervising the natural reserves of Specially Protected Areas.
- Following up the implementation stages of International Conventions concerned with the environment.
- Suggesting an economic mechanism, which encourages the observation of pollution prevention procedures.
- Implementing pilot projects for the preservation of natural resources and the protection of the environment against pollution.
- Listing of national establishments and institutions, as well as experts qualified to participate in the preparation and implementation of environmental protection programs, and coordinating measures with the Ministry in charge of international Cooperation to ensure that projects funded by donor organizations and states are compatible with environmental safety.
- Participating in the preparation of an integrated national plan for the coastal zone management of the Mediterranean and the Red Sea areas.
- Participating in the preparation of a plan to prevent illegal entry into the country of dangerous and polluting substances and waste.
- Preparing an annual report on the state of the environment to be submitted to the President and the Cabinet of Ministers.

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

As the regulatory agency for wastewater management and promotion agency for the environmentally sound practices, EEAA has been the central role to promote the SUTSWA program. EEAA has annually published the achievement of the SUATSUWA program in its annual report. As a key member of Supreme Council of Energy (SCE), the Minister of MSEA has been providing technical and economical

information/study of the Jatropha cultivation by applying treated wastewater (8th and 10th meeting of SCE). In order to analyze the technical and economical feasibility of Jatropha plantation, EEAA has developed a test plantation in Luxor and completed the study in 2008 supported by USAID. Based on the discussion with an EEAA official, the Jatropha production with treated wastewater is technically and economically feasible. The final study report was not available in public so that it is not able to compare the final result and this study at this moment. However, based on the discussion with the EEAA official, the basis of the study only included irrigation piping and over priced seed sales. As a result, the financial feasibility becomes the attractive numbers. At the discussion at the 10th SCE in December, 2008 based on the MSEA's study, the prime minister advised to promote the planting of oil crops in desert regions to provide alternative means for energy. It is assumed that not only Jatropha but also Jojoba, an oil plant producing edible lubricant oil, are included in the president's recommendation.

Except the SUTSWA program, EEAA is not working on the Jatropha related project at this moment. However, due to its role defined by the Egyptian environmental law, EEAA would be always responsible for safety use of wastewater and promotion of the environmentally sound practices in Egypt. Thus, EEAA would play significant role for any wastewater application in the future for both HCWW and MALR's afforestation as well as privates' activities in Jatropha plantation.

Intention for the Further Contribution

As the regulator of the wastewater usage and promoter of the effective use of wastewater, EEAA is keen to play a key role in Jatropha biofuel industry development in Egypt. Especially in its capability to coordinate the relevant agencies as well as international organizations, it is willing to organize a pilot project on large scale Jatropha plantation.

6.7 Ministry of Trade and Industry

General Responsibility

< http://www.mfti.gov.eg/english/index.htm >

Ministry of Trade and Industry (MTI) is comprised of three major divisions, foreign trade, industry and internal trade. MTI is responsible for most of industrial business activities and all of the international and internal trading activities in Egypt. As the primarily responsible authority for Egyptian industry development, MTI has been actively involved in conventional industry reform and new industry development with collaboration with international aid agencies and private companies. Since energy price has been kept low with subsidies and the energy consumption of the industrial sectors is one of primary and fast growing sectors in Egypt, MTI is also responsible for encouraging effective use of energy in industrial sectors. As a responsible ministry for major energy sectors in Egypt, MTI is also one of eleven

primary ministries of supreme council for energy, headed by Dr. Ahmed Nazif, Prime Minister, and the ministers of Defense, Finance, Petroleum, Electricity and Energy, Economic Development, Foreign Affairs, Environment, Investment, Trade and Industry, and Housing.

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

Since there is no Jatropha biofuel supply chain available in Egypt, MTI is no responsibility at this moment. Once the Jatropha biofuel supply chain starts functioning, the spheres would be as follows:

- Jatropha seed production (as a biofuel feed) and internal/international sales activities
- Oil extraction and refining activities
- Biofuel standardization (Egyptian General Organization for Standardization and Quality (EOS)-the solely authorized agency in Egypt)
- Biofuel sales and internal or international trading

Intention for the Further Contribution

MTI is one of the frontier authorities to seek for the potential use of Jatropha bioenergy as Egyptian sustainable energy source in the future. Contribution to a biofuel industry development study[8] in 2007 and EOJ/JICA renewable energy workshop in 2008 were two of knowable involvement/contribution by MTI. MTI has been also communicating with MOP's Jatropha biofuel working group as one of many stakeholders. It has been also working with European aid agencies and consulting firms mainly for energy efficiency or sustainable energy management matter, but those activities also involved in the potential use of Jatropha bioenergy as a source of sustainable energy in Egypt.

As one of key ministries of supreme energy council, MTI is keen to contribute to the development of commercial Jatropha biofuel supply chains with public private partnership (PPP) scheme for one of energy security measures in the future. Since MTI's jurisdiction may cover the whole set of the Jatropha biofuel supply chain except wastewater supply, MTI is seeking for active contribution for the competitive supply chain development technically and strategically/politically. In the case of agro-industry, Food and Technology Center (FTC) of MTI are actively collaborating with MALR and MALR's institutes for the technical improvement of productivities and cost effective cultivation. Thus, improvement of the Jatropha seed productivities would be one of key interests and contributions by MTI in the next stage.

As effective integration of privates' interests and public interests in economic development or public infrastructure development/improvement in Egypt is one of essential strategies for MTI, it is keen to

[8] Appendix A3: Summary of Egyptian Biofuel Industry Development Study (JICA2007)

improve the investment environments for investors in such important sectors. Both foreign trade and industrial wings of MTI have actively communicated with JICA for the consideration of Jatropha biofuel industry development and facilitation of private investments in such sectors since 2007. Though there is a specialized authority for investment, MOI, in Egypt, MTI is seeking for effective collaboration with privates in renewable energy sectors as MTI has been closely working with privates in conventional industrial and trading activities. At this moment, two of keen interests of MTI is promotion and support for Jatropha biofuel industry development and implementation of favorable policies in such sectors for private investors.

MTI is also the responsible authority for goods trading so that it is also seeking for the potential contribution for the competitive and cost-effective trading system development for the Jatropha biofuel industry in the future.

In addition to the industrial and trading business matters, EOS of MTI would be also required to establish Egyptian biofuel standards since EOS is the only authority to issue product standards in Egypt. Since there are no biofuel standards in Egypt at this moment, EOS is seeking for the development of Egyptian biofuel standards as well as institutional improvement such as adaptation of testing methods, installation of necessary instruments, and capacity development of EOS officers and laboratory technicians for the quality control.

Furthermore, MTI is seeking for potential application of Jatropha plantation as a sustainable and "Economical" industrial wastewater management measures for its relevant activities. In general, water and wastewater companies under local governments or HCWW are responsible for industrial wastewater treatment. However, there are some exceptional cases such as specialized industrial zones.

ROBBIKI Leather City (RLC)[9] is one of the example cases of such industrial zone. At this moment, RLC has been prepared by a project management unit (PMU) under stakeholders including MTI. Once the RLC starts its operation in 2010, RLC will be managed by a special purpose company, RLC Co. Since RLC Co. is responsible for treatment of tanning industrial wastewater and seeking for "Sustainable and economical" treatment, it is keen to use the treated wastewater for the most profitable way to reduce the water treatment charge for the tanners.

[9] The new tanning industry zone development project managed by an Egyptian and Italian JV company fully supported by Italian government, MTI, Ministry of International Cooperation, Ministry of Environment, Ministry of Antiquities, Ministry of Economic Development, Ministry of Local Development, Ministry of Finance, Cairo governorate, Badr city, Chamber of Tanning industries, Chamber of Leather Industries, National Investment Bank < http://www.robbiki.com/ >

As a part of RLC project, there would be 800 feddan afforestation area available for the "Potential income creation" by applying the treated wastewater. PMU had consulted with experts in MALR for the potential application of Jatropha as an income source. Though PMU has received the technical feasibility of treated wastewater use for Jatropha plantation, financial feasibilities were not clear enough to make a decision. At this moment, there are several options to generate additional cash flow from the afforestation area such as timber production, which has already been implemented and performed by MALR, known as manmade forest program. Since the timber production requires at least 5 to 10 years to start generating cash flow, PMU is seriously seeking for another application such as Jatropha. As one of major stakeholders of RLC project MTI is keen to utilize Jatropha at this moment.

6.8 Ministry of Civil Aviation

General Responsibility

http://www.civilaviation.gov.eg/HOME.html

The Ministry of Civil Aviation (MCA) is responsible for any civil aviation matter in Egypt defined by Decree No. 56 of 2002 the functions and competencies of the MCA. The primary objectives of MCA are as follows:

- To promote civil aviation facilities with international standards,
- To ensure the safety and aviation security,
- To provide necessary employments and capacity development program for employees,
- To guide economic and social development policy frameworks of the State to cope with global changes.

Followings are some of responsibilities listed in the MCA web site relevant to safety operation and environment.

1) the general policy of the Ministry in the framework of established goals and to develop plans to achieve these goals in coordination with state agencies and follow up the implementation of these plans and evaluate the results.
2) Status of integrated planning to ensure upgrading of facilities and services in civil aviation part of a plan economic and social development in line with global development.
3) rules and systems of safety and security of civil aviation to ensure the security of aircraft and passengers in accordance with international conventions.
4) supervision and control of airlines and airports, all the facilities, fixed and mobile, as well as services and equipment associated with air transport activity in coordination with appropriate agencies to ensure the safety and security of civil aviation.

5) determining the fees of civil aviation in conjunction with the competent bodies.
6) issuance of licenses for the construction of air transport companies operating in transport, whether external or internal transport, all within the laws and regulations.
7) develop and support the performance of the Holding Company for Egypt Air to adapt the global changes.
8) Develop plans to ensure the provision of specialized labor in the area of activity of the ministry and raising the productivity of their workers, in line with scientific and technological development.
9) activation studies and research in the area of the ministry.
10) control over the price of air transport services and examine the change requests.
11) assess the overall quality of the services provided by companies operating in the civil aviation activity and comparison of quality in the implementation of internationally agreed standards and follow correct any deviation in these standards.

MCA is comprised of the central MCA units with four (4) specified agencies to meet the mentioned responsibilities.

Ministry of Civil Aviation			
Egypt Air Holding Company	Egyptian Holding company for Airports & Navigation	Meteorological Authority	Egypt Aviation Academy
● Egypt Air Airlines ● Egypt Air Cargo ● Egypt Air Express ● Egypt Air ground Services ● Egypt Air Maintenance & Engineering ● Egypt Air In Flight service ● Egypt Air Medical service ● Egypt Air Supplementary	● Cairo Airport Company ● Egyptian Airports Company ● National Air Navigation Services company ● Aviation Information Technology	● Cairo Airport Company ● Egyptian Airports Company ● National Air Navigation Services company ● Aviation Information Technology	● Misr Flying College ● Air Traffic Control College ● Civil Aviation Management Training College ● Institute Of Aviation Engineering & Technology ● Institute Of Computer & Information Technology Of Aviation & Aerospace

Present Jurisdiction/Responsibility for Jatropha Biofuel Supply Chain and Related Activities

At this moment, there are no relevant activities regarding Jatropha biofuel or any other relevant activities.

Intention for the Further Contribution

Though the EGYPTAIR and EGYPTAIR CARGO are independent public companies, MCA is responsible for the supervision of those companies complying with the domestic and international regulations. For the compliance of the EU regulation on CO_2 emission, MCA/EGYPTAIR/EGYPT AIR CARGO are keen to find sustainable solutions. As long as the bio-jet fuel meets the competitive level, MCA may consider Egyptian Jatropha bio-jet fuel use. For the purpose of understanding technical and economical matters, MCA had been very cooperative for the JICA study team. Followings are the consumption of jet fuel by EGYPT AIR that are required to comply with EU's regulation (Table. 6.15 and 6.16). Though the information was given by MCA, the numbers are quite larger than the EIA statistics (Table. 6.1). It is even larger than major EU countries shown in Table. 3.2. There might be some simple errors such as units so that the Table. 6.15 and 6.16 should be considered as reference purpose.

Table. 6.15 EGYPTAIR Holding Company Jet Fuel Consumption for Budget 2009-2010

Region	Block Hours	Fuel Consumption (1,000 U.S. Gallon)	Fuel Consumption (1,000 ton)
Domestic	8,365	7,158	21,760
EU	**53,693**	**53,307**	**162,053**
Others	128,297	179,225	544,844
Total Schedule	190,354	239,690	728,658
Total Non Schedule	6,000	8,548	25,986
Total	**196,354**	**248,238**	**754,644**

* Though the information was given by MCA, the numbers are quite larger than the EIA statistics (Table. 6.1). It is even larger than major EU countries shown in Table. 3.2. There might be some simple errors such as units so that the Table. 6.15 and 6.16 should be considered as reference purpose.

Source MCA

Table. 6.16 EU Fuel Consumption by EGYPTAIR Holding Company for Budget 2009-2010

Region	Number of Fights	Fuel Consumption (1,000 U.S. Gallon)	Fuel Consumption (1,000 ton)*
B735	364	1,342	4,080
B738	730	5,068	15,407
B738 NEW	1,421	9,725	29,564
B777/200	354	7,443	22,627
B777/300	11	302	918
AB330	417	7,239	22,007
AB320	2,265	11,736	35,677
AB321	1,204	10,451	31,771
Total EU	**6,766**	**53,307**	**162,053**
5% of Total**	338	2,665	8,103
15% of EU Fuel ***	**964**	7,596	23,093

*Assuming 1 gallon = ** 5% mandate reduction or 95% of historical emission to meet EU CO_2 regulation (section 2.1), *** Requirement of purchasing 15% of total allowances (95% of historical level) (ref. section 2.1))

Source: MCA

Table. 6.17 Egypt Air Measures For Facing The European Regulation

	Compliance Activities
Stage 1	● Already completed the Monitoring Plans for Emission and Ton-km report and submitted to the administering member state before the deadline. ● Will develop an IT solution to prepare the annual emission and ton-km reports
Stage 2	● Coordinate with the focal member of Kyoto protocol , the Egyptian representative in UNFCCC conference of parties (COP15), Copenhagen 2009 , the aviation industry's positions for a global solution to tackle aviation's emission in and POST-Kyoto agreement under the UNFCCC
Stage 3	● In case, COP15 could not reach an agreement that includes aviation sector in a global solution, EGYPTAIR will call for developing a regional Arabic or African emission-trading scheme. (as of 12/2009) (ref. Appendix 6, 7, 8)

Source: MCA

6.9 Ministry of Higher Education and State Ministry for Scientific Research and National Research Center

General Responsibility

http://www.egy-mhe.gov.eg/english/index-e.html

Ministry of Higher Education and State Ministry for Scientific Research (MHE) is responsible for any high and intermediate education in Egypt including universities, state and private higher institutes, and intermediate institutes. It is also responsible for higher institutes for the Egyptian scientific research.

Based on its web site, following are the primary responsibilities of MHE:

- Proposing higher education policy
- Setting the plans, projects and programs necessary to implement the higher education policy
- Putting the means that lead to spreading university and higher education in light of the current and future needs of the country
- Developing the means that lead to strengthen the relationship between universities, colleges and higher institutes, on one hand, and the environment, on the other
- Realizing the best public service to society
- Supervising the Egyptian cultural bureaus and centers overseas, and the foreign cultural relations