

- **A HOSPITAL SCHOOL FOR AFRICA**
- **INTERNATIONAL SCHOOL OF PERINATAL MEDICINE**  
**REFERENCE HOSPITAL FOR MOTHERS AND CHILDREN**
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  - IFHE past President
  - Consultant engineer

**A PROJECT OF MATRES MUNDI**

# A MATERNITY HOSPITAL SCHOOL , WHY ?



WOMAN SITUATION IN  
SUB-SAHARAN AFRICA  
IS THE WORST IN THE  
WORLD

SOME FIGURES

AFRICA: THE HIGHEST RATE of

## ADOLESCENTS MOTHERS

(per 100 pregnancies)

- *Developed countries:*
- *Africa:*
- *Sub-Saharan Africa:*

<5

10-15

>20

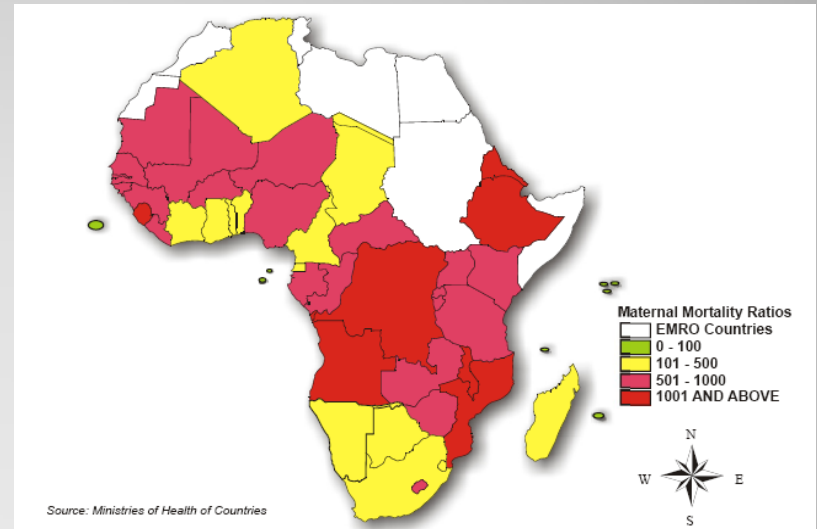


AFRICA: THE HIGHEST RATE of

# MATERNAL MORTALITY

MMR/100.000 live births

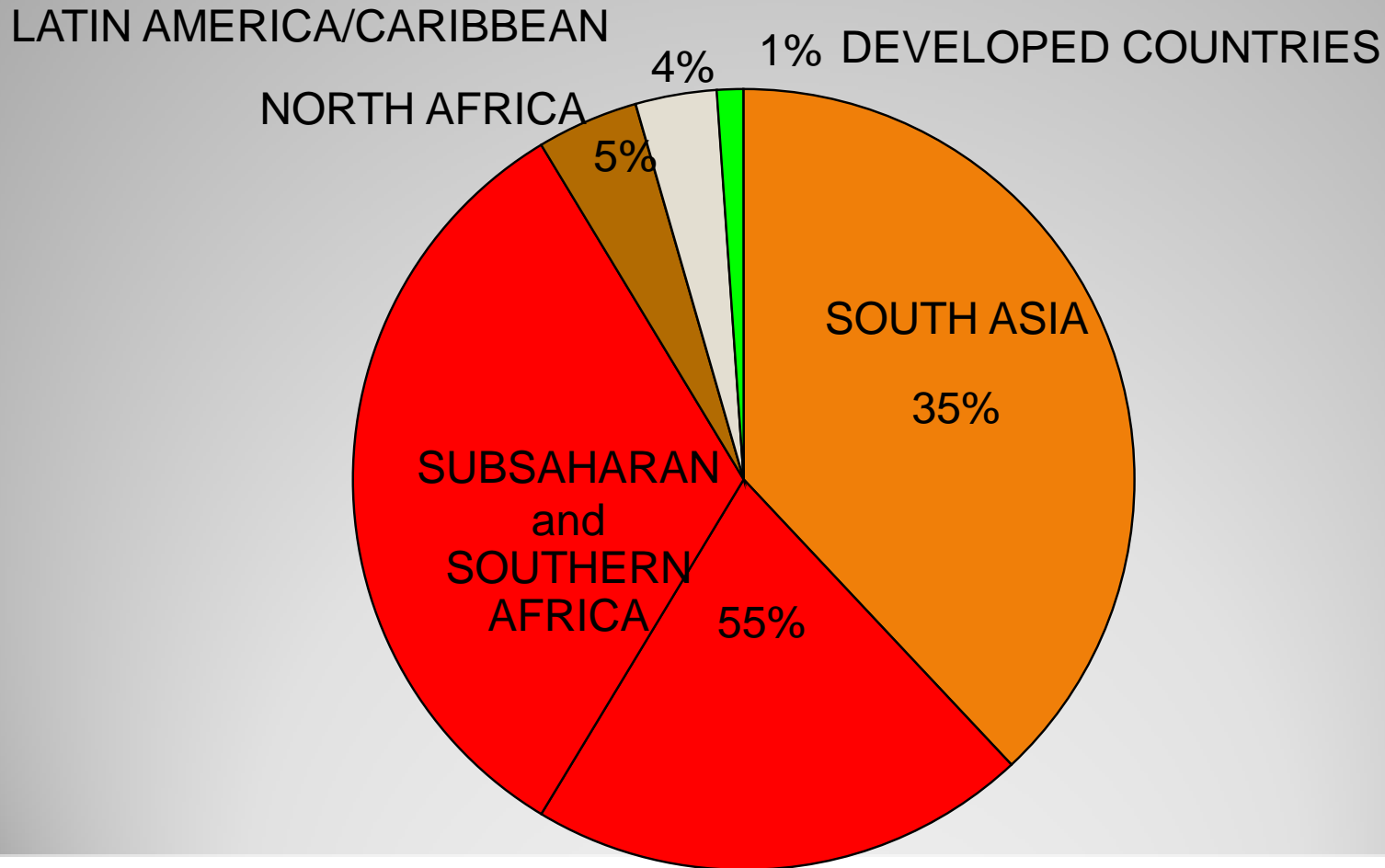
- *Developed countries:* **5-20**
- Developing countries: 440
- Africa: 500-600
- *Sub-Saharan Africa:* **920**



WHO, World Bank (200-2005)

Half of the Maternal Mortality happens in Sub-Saharan Africa

# GLOBAL DISTRIBUTION OF MATERNAL DEATHS



Source: UNICEF: The state of the world's children. 2009



## AFRICA: THE HIGHEST RATE of

### MATERNAL MORTALITY DUE TO UNSAFE ABORTION

MMR/100.000 live births

- *Developed countries:* 0,6
- Africa: 400
- *Sub-Saharan Africa:* 600

WHO, IMF, MICS (2.000-2006)



18 Million women suffer illegal abortions in risky conditions

80% of induced abortions are illegal

AFRICA: THE HIGHEST RATE of

## OBSTETRIC FISTULA

- *Developed countries:* irrelevant
- Africa: 2-3 million
- *Sub-Saharan Africa:* 1,5-2 million

WHO, 2006, Quid, 2007



50.000-100.000 additional cases each year

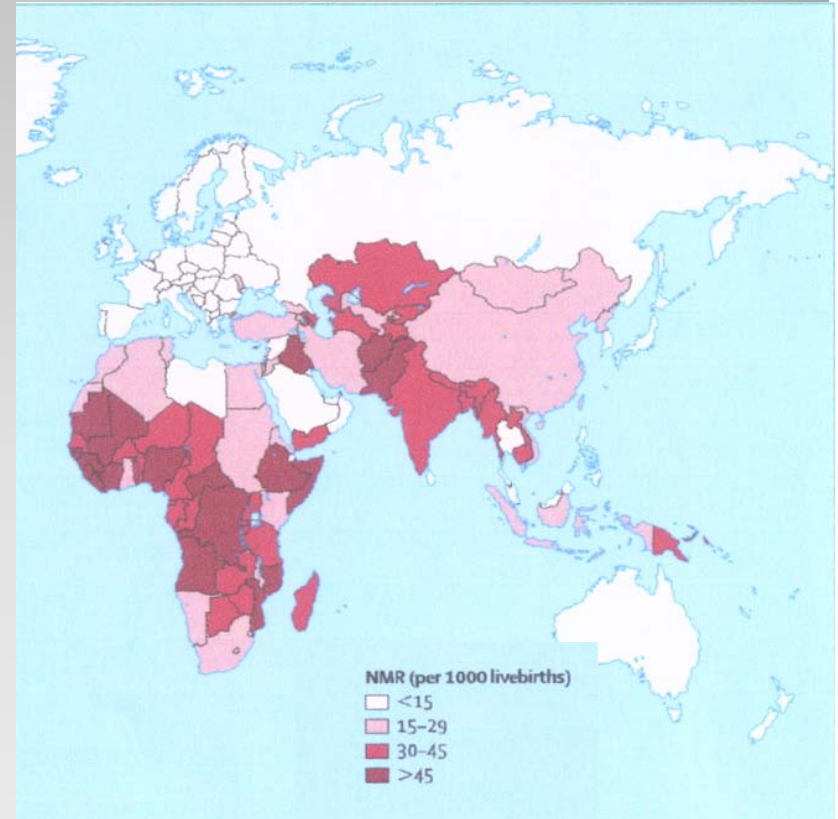
AFRICA: THE HIGHEST RATE of

## NEONATAL MORTALITY

NMR 1.000 livebirths

- *Developed countries:* 3-4
- *Africa:* 30-45
- *Sub-Saharan Africa:* >45

WHO, UNICEF, World Bank



1.2 million newborns are dying each year in AFRICA



AFRICA: THE HIGHEST RATE of

## PERINATAL MORTALITY

IPMR /1.000 livebirths

- *Developed countries:* 4-7
- *Developing countries* 33
- *Africa:* 100
- *Sub-Saharan Africa:* 140-160

WHO, UNICEF, World Bank



50% of Perinatal Mortality happens in Sub-Saharan Africa

AFRICA: THE HIGHEST RATE of

# INFANT MORTALITY

IMR/1.000

- *Developed countries:* 3-20
- Developing countries: 88
- Africa: 90
- *Sub-Saharan Africa:* 172

UNICEF, WHO (2000-2005)



14 million infants (<5 y.) are dying each year  
40.000 every day

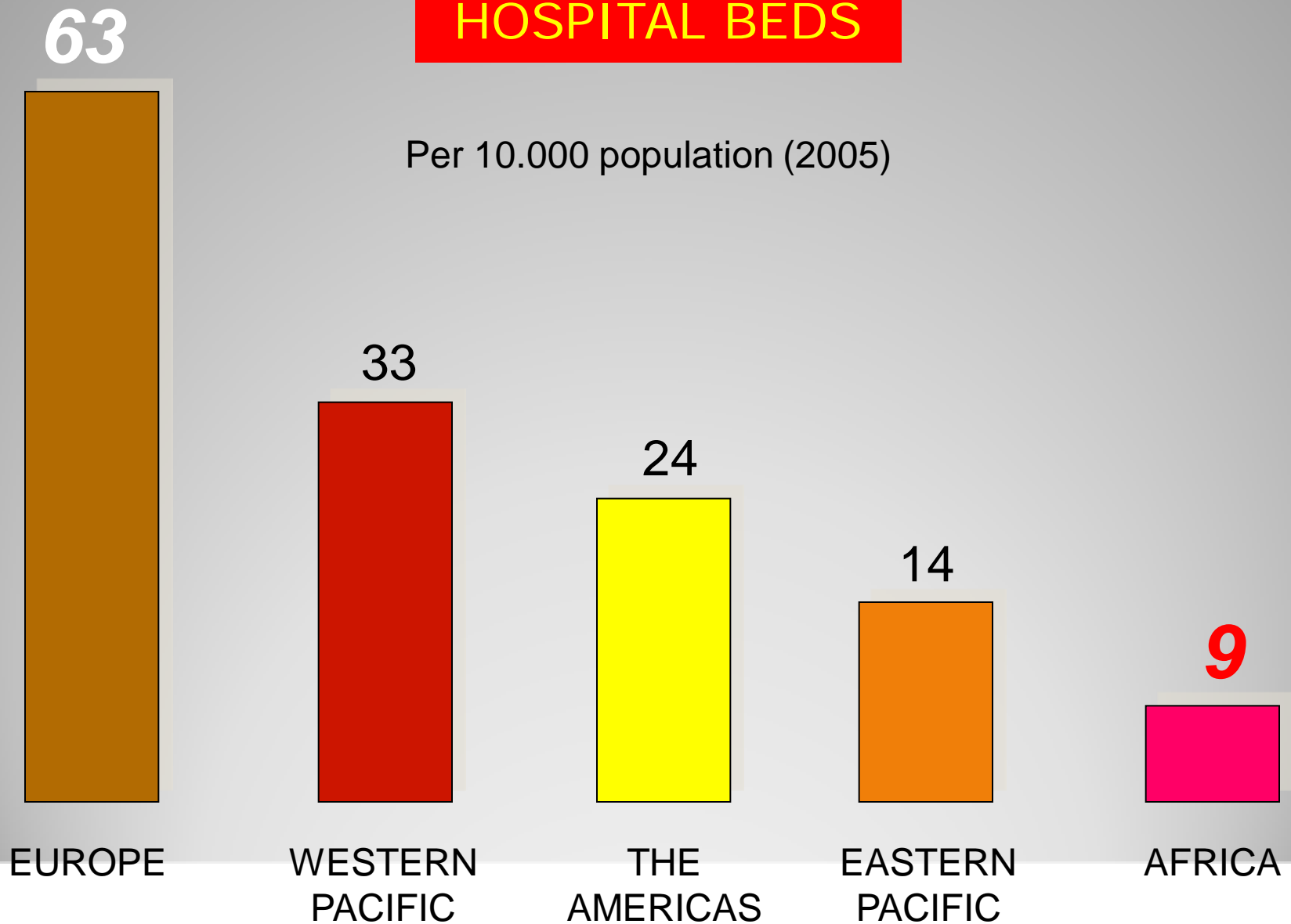




Usual African maternity

## HOSPITAL BEDS

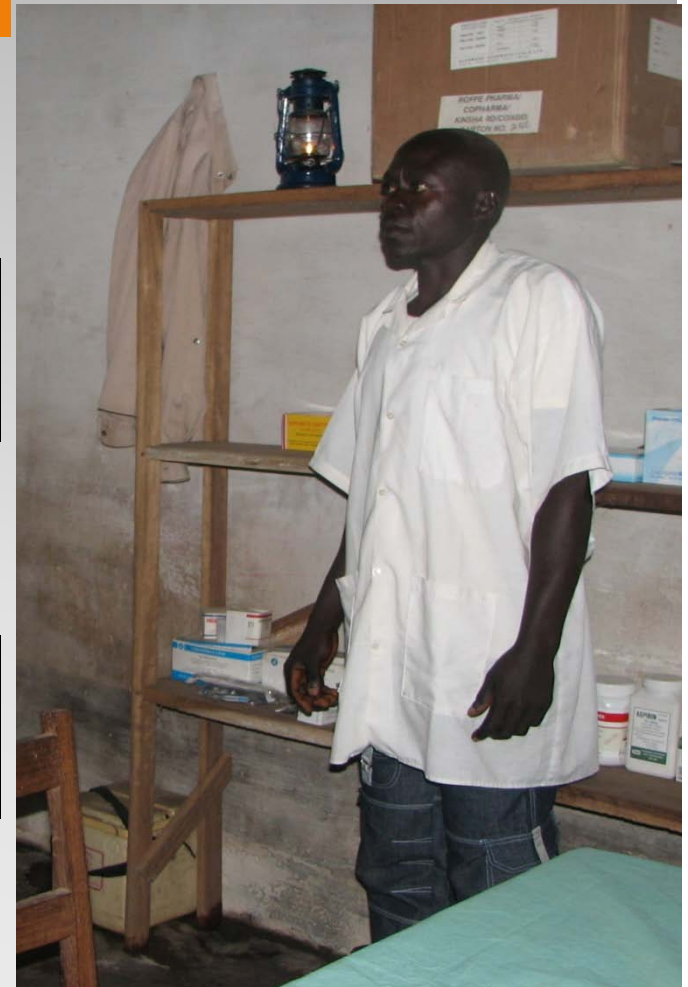
Per 10.000 population (2005)





# THE LOWER RATES of MEDICAL PRACTITIONERS

- Developed countries:  $\frac{1}{500}$  population
- Developing countries:  $\frac{1}{5.000}$  population
- Sub-Saharan Africa:  $\frac{1}{50.000}$  population





## SUBSAHARAN COUNTRIES: MEDICAL SCHOOLS and PHYSICIANS

Countries	: 47
Population	: 800 million inhabitants
MEDICAL SCHOOLS	: 87
School / Inhabitants	: 1/10.000.000
Physycians / Inhabitants	: 1/50.000

Proportion  $\frac{\text{EUROPE}}{\text{Subsaharan countries}}$  : 200 times more



AFRICA NEEDS HELP ,  
but in an effective way

# A PROJECT OF MATRES MUNDI

1. EDUCATION & TRAINING CENTER  
to become a Reference for the whole Continent
2. MATERNAL AND INFANT HEALTH RESEARCH  
for maternal and infant epidemiological studies
3. MATERNAL AND INFANT HEALTH CARE ,  
Hospital School for training

# **PROJECT DESIGN GUIDELINES**

## **HOSPITAL SCHOOL FOR AFRICA**

FUNCTIONAL PROGRAM

AFFORDABLE BUILDING COST

**QUALITY STANDARDS**

SUSTAINABLE OPERATION

# **FUNCTIONAL PROGRAM**

**The Functional Program is based on**

**MATRES MUNDI KNOWLEDGE  
AFRICA CULTURAL BACKGROUND  
EDUCATIONAL OBJECTIVES**



# **AFFORDABLE BUILDING COST**

**ADJUSTED COVERED AREA  
NATURAL DAYLIGHT AND VENTILATION  
MODULAR, FLEXIBLE, EXPANDABLE  
POSSIBLE EXECUTION BY PHASES**

# QUALITY STANDARDS

**INTERNATIONAL HYGIENE STANDARDS  
HOMOLOGATED HEALTHCARE CONDITIONS  
SAFETY AND RELIABILITY STANDARDS**

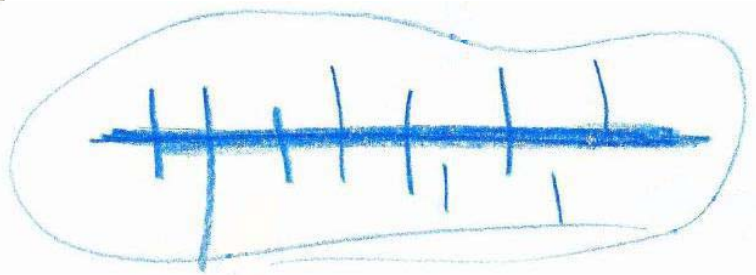
# **SUSTAINABLE OPERATION**

**SELF SUFFICIENCY  
RENEWABLE RESOURCES  
ENERGY EFFICIENCY  
EASY MAINTENANCE**

# INTERNATIONAL SCHOOL OF PERINATAL MEDICINE FOR AFRICA

## REFERENCE HOSPITAL FOR MOTHERS AND CHILDREN

### ARCHITECTURE DESIGN,



Horizontal topology  
Traffic flows  
Zones definition & Accesses  
Modular growth  
Construction approach  
Bioclimatic design

## Horizontal Topology

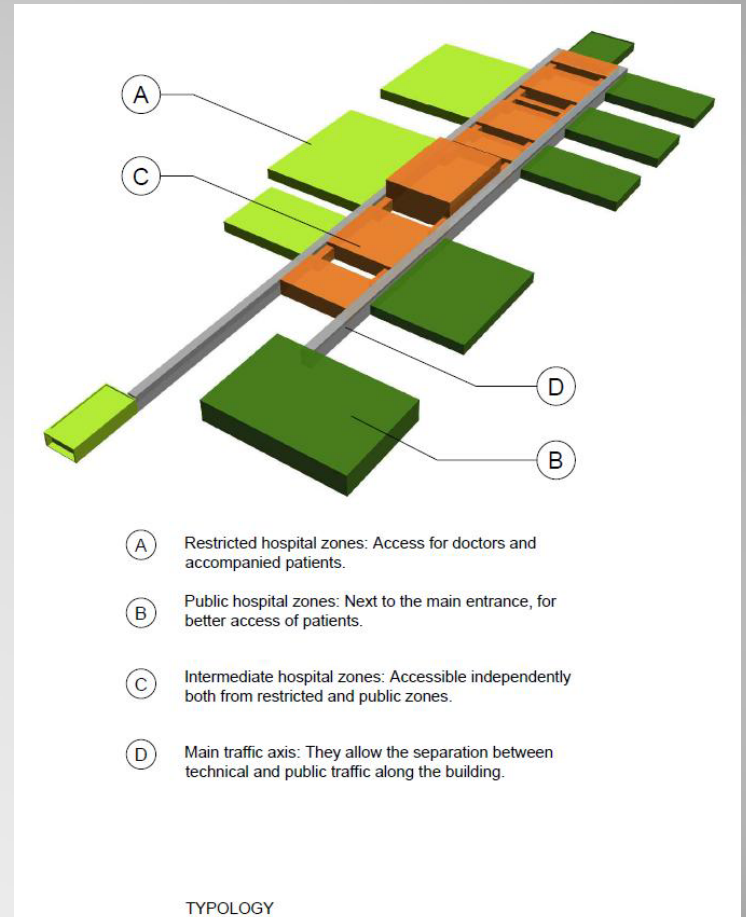
The Basic Design alternative of horizontal topology, mainly solved at ground floor level, was implemented in an hypothetical, flat piece of land of about 4 hectare with easy vehicle access.

In the central, rectangular shaped "spine", are located those services that must be accessible to users and to medical and auxiliary staff.

## Traffic flows

This way, 2 parallel traffics are defined: One for users and one restricted to the staff.

Both can be communicated in strategic points, making easier the hospital communications.



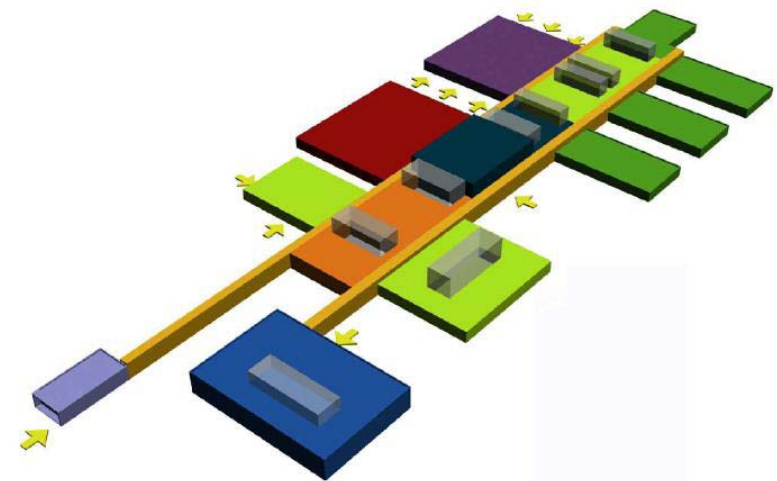


## Zoning

This central "spine" acts as a hinge between public and service modules, guaranteeing the independent functioning of both areas so that hospitalization facilities and outpatients clinic are in one side, and the surgical wing, emergencies, and general services are located in the opposite side. Administrative area, diagnostic imaging, laboratories, pharmacy, day hospital, etc. are located in the central axis.

## Accesses

The proposed topology favors the creation of independent accesses: the main entrance to the hospital and the entrance to the teaching unit are located in the public area whereas the accesses to the emergency service and independently to supplies, loading and unloading, installation units and maintenance, are located in the opposite area.



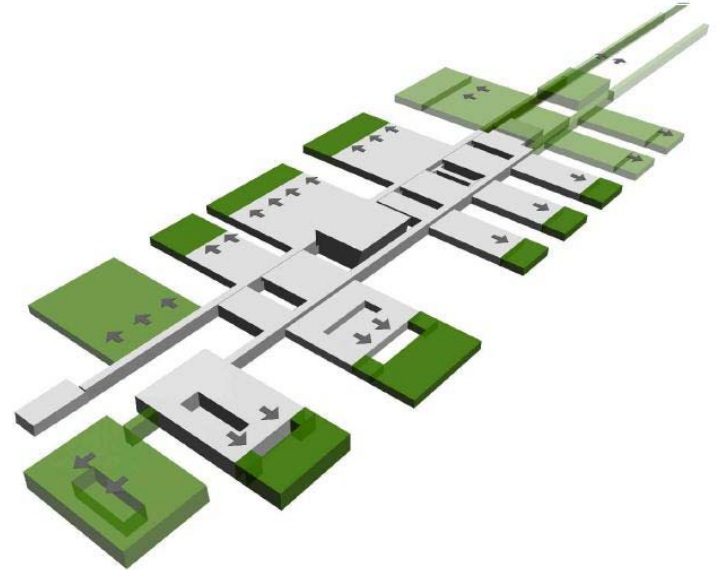
- HOSPITALISATION FACILITIES
- OUTPATIENT SERVICES
- SURGICAL WING
- MAIN DIAGNOSIS SERVICES
- UNITS OF WELFARE SUPPORT
- GENERAL SERVICES
- TEACHING UNIT AND DORMITORIES
- MORGUE
- GENERAL TRAFFICS
- COURTYARDS / EXTERNAL WAITING ROOMS
- ACCESS POINTS

ZONING

## Modular growth

The fact of having designed several independent buildings - attached to the central spine that vertebrate them is intentional, allows the modular growth and, hence, the execution by phases depending on the needs and the economic resources of the moment.

So it would be possible to think in a first stage that would consider the construction of those areas and implementation of general services essential to initiate the Program, and then the successive stages that would be undertaken by means of the aggregation and finishing of those not initially completed.



MODULAR GROWTH

## Constructive approach

The building has been designed on the basis of simple and affordable building systems, adapted to the constructive possibilities of the place.

At the time of construction, information of the available materials in the local market will be collected, with the intention of prioritizing their use in the building.

In these latitudes, it is very common to find local manufacturing of concrete blocks in different formats. If so, this material could be borne in mind to solve different constructive elements such as walls for external closing, partition walls, lattice walls, lightened floor structures, etc.



# FUNCTIONAL PROGRAM SUMMARY

- **1- SCHOOL** (we need a school for Africa)
- 1.1 **Teaching unit**: continuous training of staff , medical residents and scholars from different countries
- 1.2 **Residence** and services for the in training health workers
- **2-HOSPITAL**(we need a hospital for the school)
- 2.1 **Hospitalisation**: 150 beds
- 2.2 **Outpatient** services and consultation
- 2.3 **Emergency** area boxes for urgent assistance
- 2.4 **Surgical area**: obstetrical and surgical wing, the ambulatory surgery and intensive care units
- 2.5 **Diagnosis area** imaging and labs
- 2.6 **Units of support**: administration, admission, pharmacy warehouse, and others.
- 2.7 **General services**: , hotel services, energy, and maintenance,.

# GROUND FLOOR



TOTAL SUPERFICIE INTERIOR CONSTRUIDA 12.525 m²

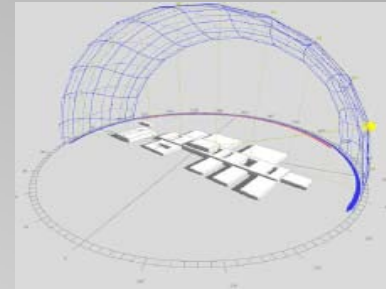


# LOCATION PLAN

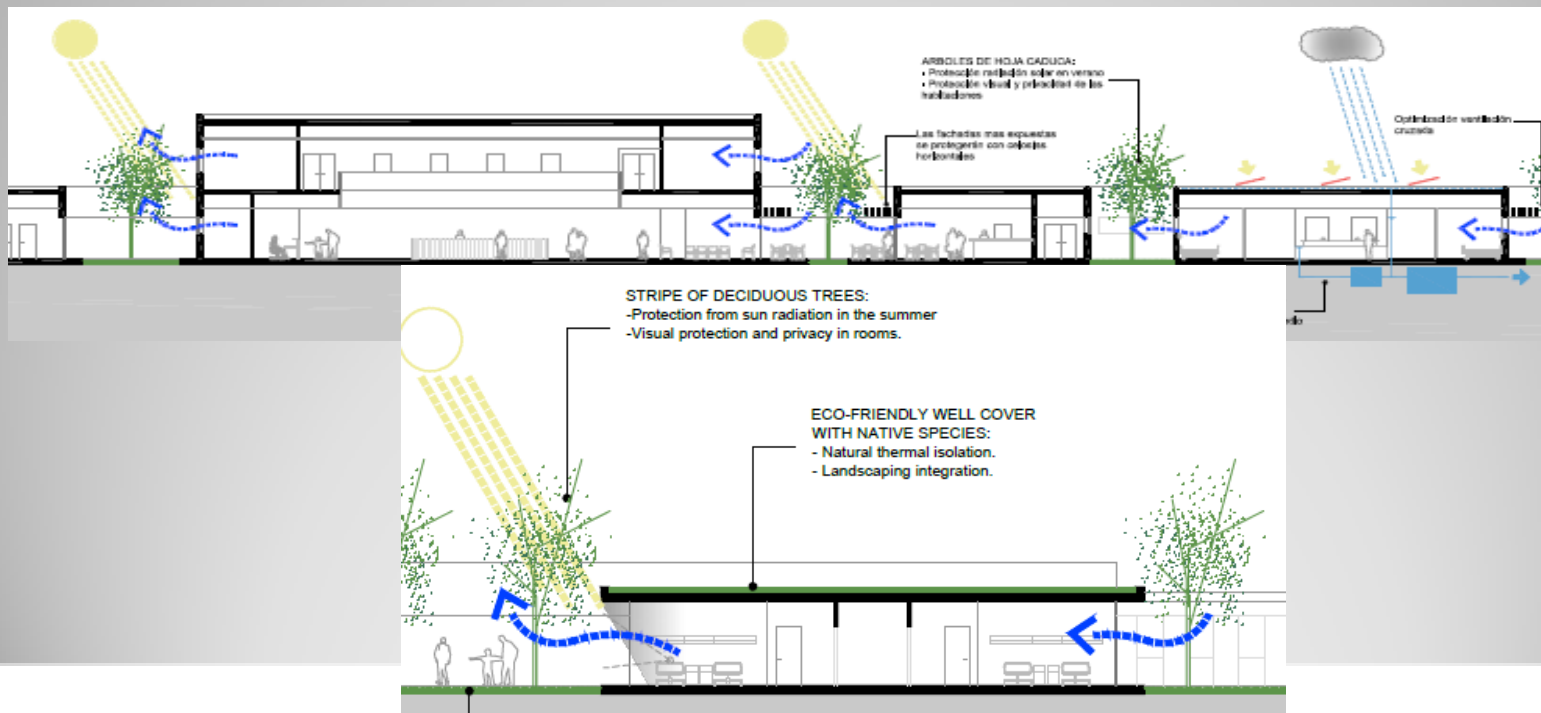


## BIOCLIMATIC OF THE BUILDING. Design

The use of inner courtyards and open corridors in the building allows enjoying areas where natural light is received at any time of day the whole year.



The courtyards and interstitial landscaped green areas guarantee the building's natural ventilation and lighting. They give visual comfort to the patient



## HOSPITAL ENTRY



<b>SUMMARY OF GLOBAL SURFACES</b>	<b>M2</b>	<b>11000</b>
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<b>CENTRAL BODY m2</b>	<b>2000</b>
Diagnostic by Image	300
Laboratories	250
Day hospital/ Rehabilitation.	300
Pharmacy	200
Lockers /Cleaning	150
Administration/Admissions	250
Perimetral circulation	550

<b>MODULES at ground floor</b>	<b>4500</b>
Emergencies	600
Surgical-Obstretic bloc	1400
Outpatients consultancies	900
Caffeteria -Kitchen	600
Laundry - Wardrobe	300
General Warehouse	400
Maintenance	200
Morgue	100

<b>HOSPITALIZATION WARDS 4 units of 20 rooms &amp; 675 m2 each</b>	<b>2700</b>
<b>TEACHING AND RESIDENTIAL BUILDING 2 stories of 900m2 each</b>	<b>1800</b>

**RESIDENCE**

**EDUCATION**

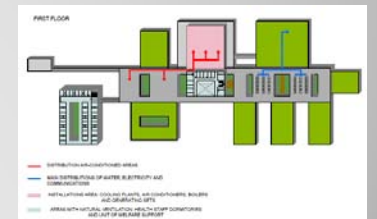
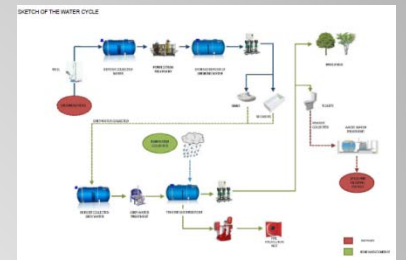
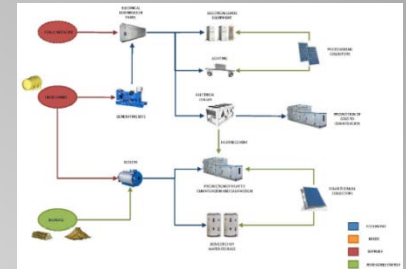
**MATERNITY HOSPITAL**

**SERVICES**



## INSTALLATIONS. Essential design criteria

- Low construction cost.
- Simplicity, robustness and safety. Widely-proven technology.
- High flexibility. Easy adaptation to changes and growing.
- Easy maintenance. Standard solutions for equipment and spare parts.
- Sustainable operation - Minimum consumption.
- Maximum self-sufficiency.



## ENERGY APPROACH

**Self sufficiency** Faced to an eventual situation of inadequate or irregular supply of services and public utilities, the energy approach of the building will be oriented as much as possible to self-sufficiency.

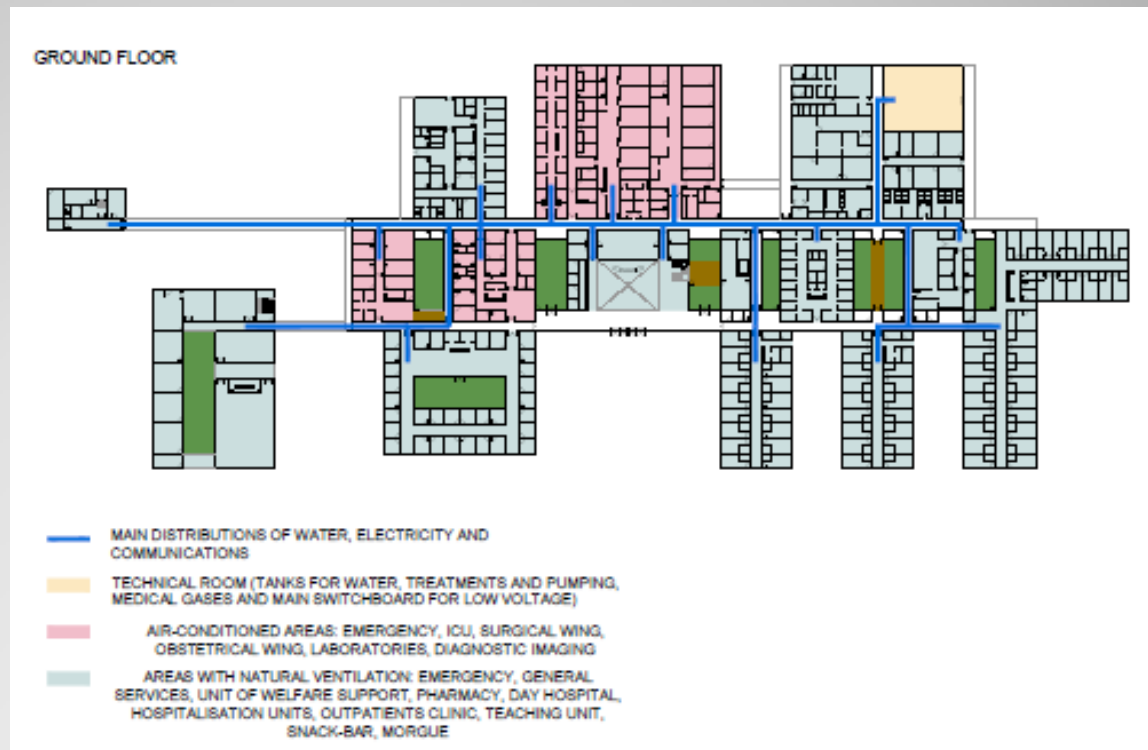
**Minimum consumption** Moreover, we reduce the energy consumption of the building through the empowerment of the so-called passive systems such as natural lighting and natural cross ventilation, in order to have limited air-conditioning in certain spaces only



## INSTALLATIONS. Air Conditioning

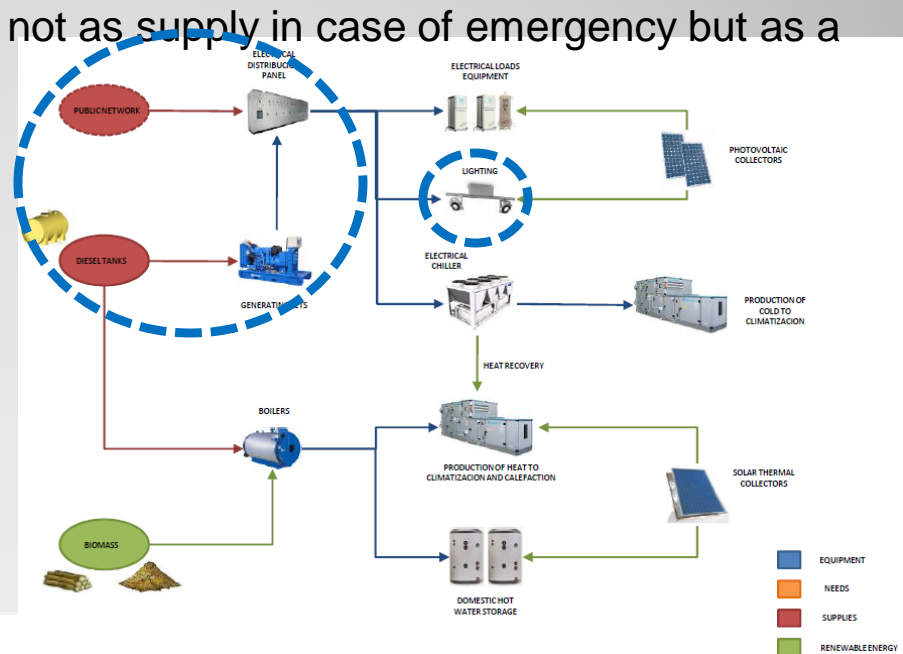
Following the principle that the most efficient building is the one that has not installed consuming equipment, only certain areas of the hospital will have air conditioning:

- Surgical areas.
- Obstetrical areas.
- ICU.
- Laboratories.
- Diagnostic Imaging.
- .

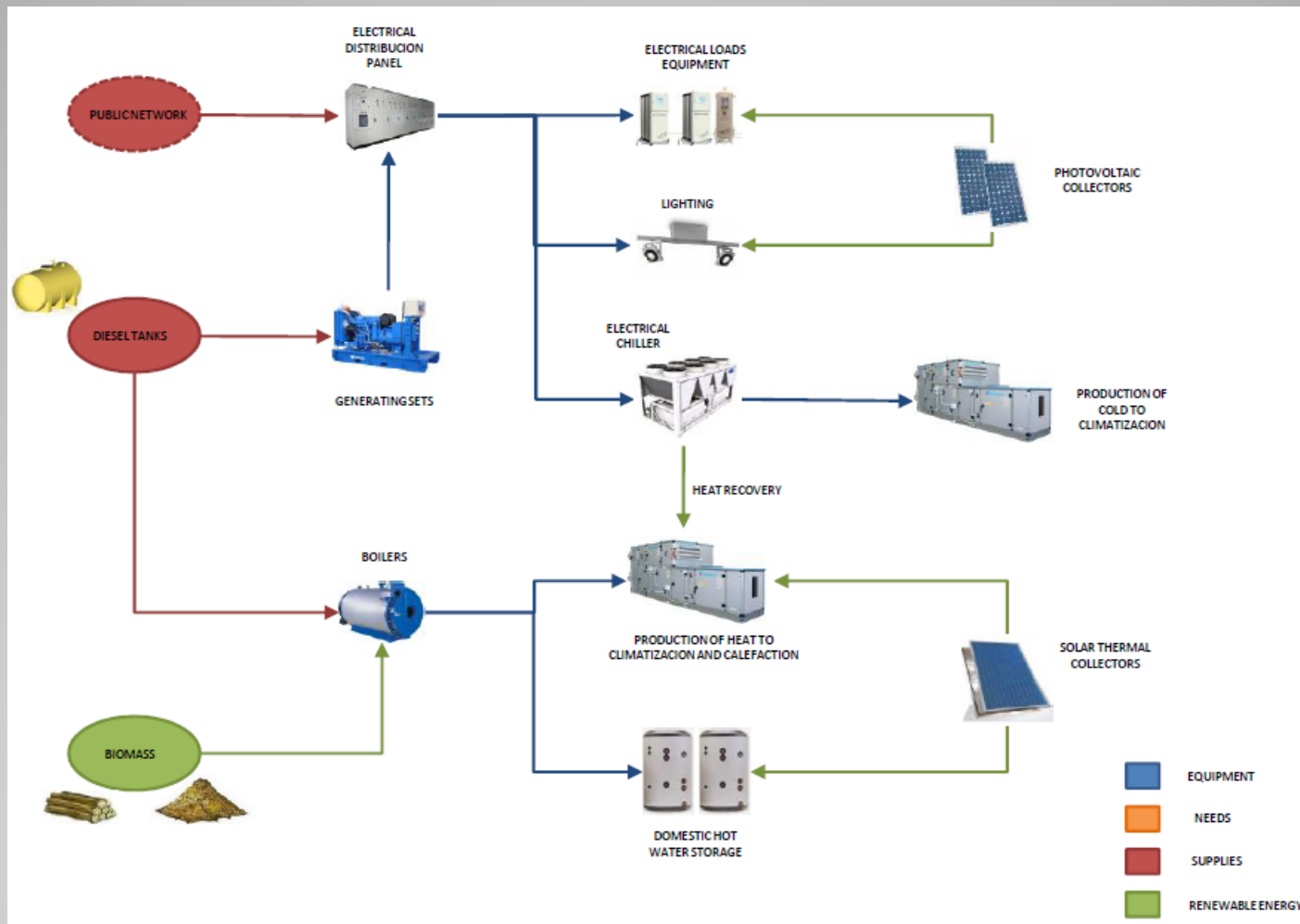


## INSTALLATIONS. Electricity.

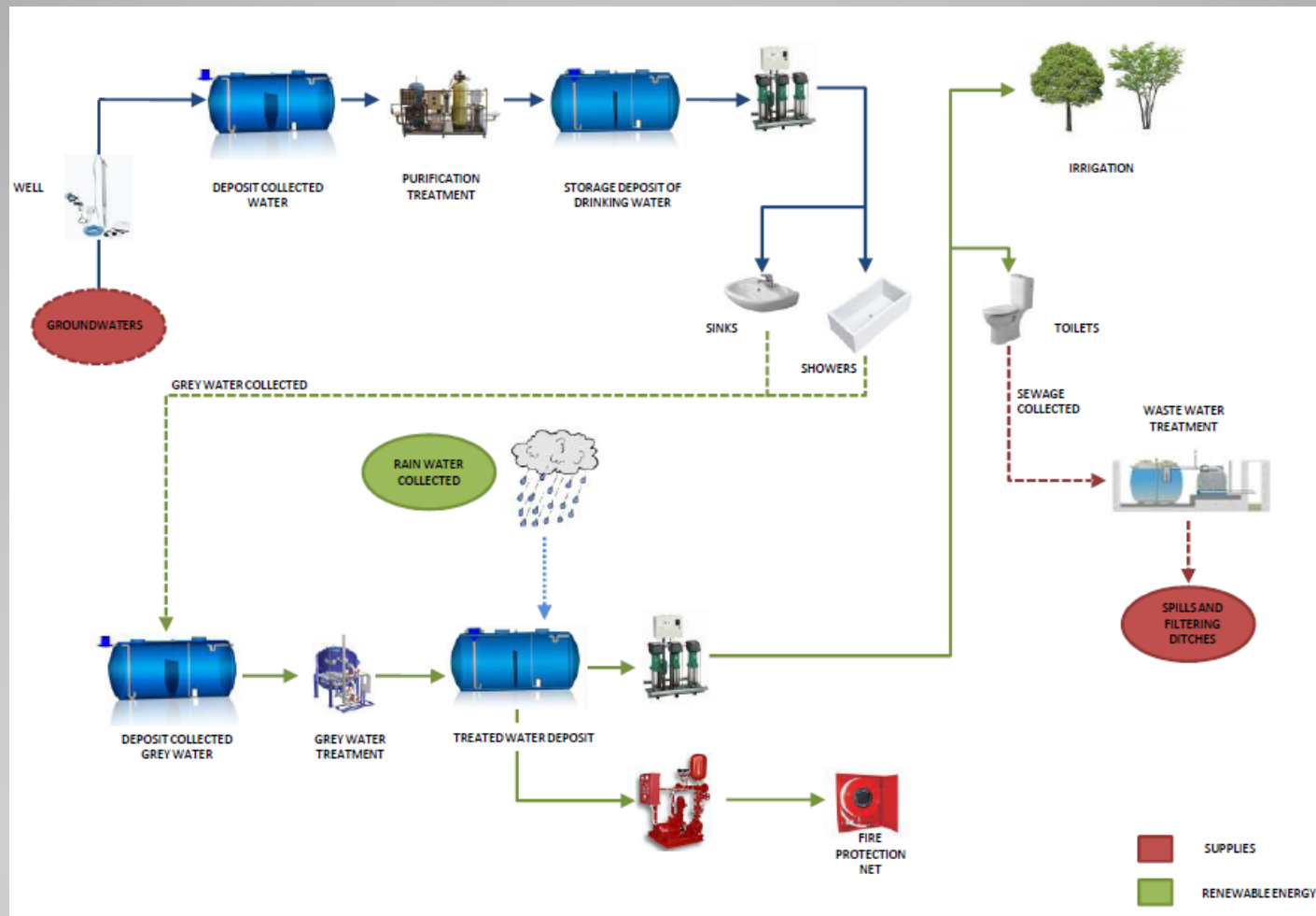
- We are aware that in these regions the quality of electric power supply to the hospital could fail or be deficient in some moments. The best way of protecting the internal network of the hospital at a reasonable cost will be studied.
- Generating sets will be considered not as supply in case of emergency but as a "second normal full power supply".
- Solutions will be standardized, trying to reduce the number of different elements, thus decreasing the number of spare parts to store in the hospital.



# INSTALLATIONS. Energy Cycle



# INSTALLATIONS. Water cycle.



# SUMMARY OF CONCLUSIONS

- Maternal and Infant Health in Sub-Saharan Africa is worrying
- Africa needs help but in an effective way based on education and training
- Matres Mundi is promoting a Hospital School , a reference point for the whole continent.
- The characteristics of the design make this Project different
- The hospital project must be sustainable, self sufficient, modular, low cost, easy to maintain
- The Project requires international cooperation and funds to make it viable