Green Hotelling

A Feasibility Study in the Hellenic Island of Skyros

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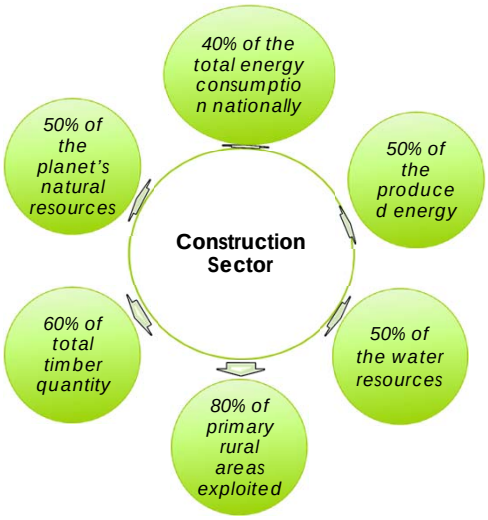
FIG Working Week 2012

Knowing to manage the territory, protect the environment, evaluate the cultural heritage

Rome, Italy 6 -10 May

- **Ecological Consciousness** — * Construction Sector
- **Environment – Friendly Solutions** — * Bioclimatic Architecture
- **"Green" Entrepreneurship** — * Operational Framework
- **"Green" Development** — * Co-existence with Local Features; * High Environmental Necessity; * Economy Environmental Adjustment; * Few Cons/ces to Local Environment
- **"Green" Tourism** — * Tourism vs Environment; * "Eco-tourists"; * "Green" Hotelling

"GREEN" ENTREPRENEURSHIP (1/4)



Inquiry and Implementation of Environment-Friendly Solutions is now the Challenge to the Construction Sector

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"GREEN" ENTREPRENEURSHIP (2/4)

"AGENDA 21"

A special strategic tool recently implemented by the United Nations.

A comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment.

Adopted by more than 178 Governments at the U.N. Conference on Environment & Development (UNCED), Rio de Janeiro, Brazil, 3-14 June 1992

"GREEN" ENTREPRENEURSHIP (3/4)

Operational Framework:

- Location of the Business: needing protection, prudent management of resources and designation of its natural and cultural identity, ensuring a brand awareness
- Identity of the Business: built through economical, technical, legal, political, cultural and ecological processes, forming its special features and novelties
- Quality of the Business: strongly connected to adhering to the terms and criteria of sustainable development and to certifying its co-existence with the environment
- Competitiveness of the Business: depending on the two previous factors
- Financial Resources: looked for through subsidy programs, usually in the public sector (for infrastructures), needing special management planning and expenses allocation

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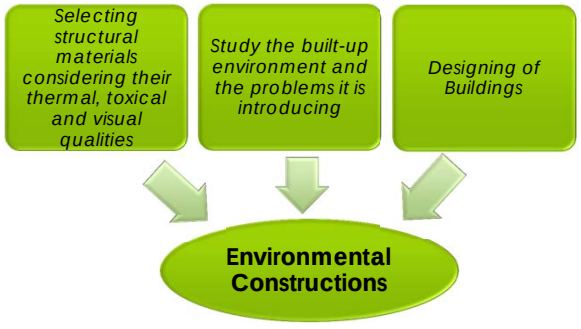
"GREEN" ENTREPRENEURSHIP (4/4)

The best way to achieve energy-efficient constructions
is by reconsidering the way buildings are designed until today.



Reduction of energy consumption achieved by simple methods & techniques:
- Bioclimatic Design
- Energy-efficient Systems & Technologies

"GREEN" DEVELOPMENT

- Passive House
- Sustainable Building
- "Green" Building

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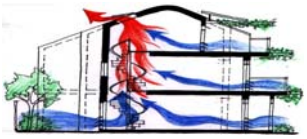
BIOCLIMATIC ARCHITECTURE

Takes into account the topography, climate, ground relief, orientation, solar radiation, wind, temperature, humidity, rain etc in order to:

- restrain their consequences to the shell of the building
- exploit them to achieve conditions of thermal ease & healthy living inside
- achieve cleaner environment with less emissions and energy saving through restraining the use of conventional power resources

It is essentially an effort to commit to natural and renewable energy sources

Bioclimatic Architecture is best achieved using a combination of the above



Passive Systems

- Passive Solar Heating Systems
- Passive Natural Cooling Systems & Techniques
- Natural Ventilation Systems & Techniques

Energetic Systems

Minimum or Zero Emissions Local Energy Systems

(Using renewable sources to produce thermal & mechanical energy)

Renewable Energy Sources (R.E.S.)

Minimize Energy Consumption Effects to the Environment

"GREEN" TOURISM (1/3)

640.000.000 people each year worldwide make leisure trips → 30% of them visit the Mediterranean → 85% of the European coasts host approximately 2/3 of the European tourism industry

↓

The impact of this kind of magnified activity can be catastrophic for the environment

←

Large number of arrivals in a relatively short period of time, by carefree people being on holidays

↑

Reckless waste of natural resources along with other environmental consequences

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"GREEN" TOURISM (2/3)

Tourists grow environmentally sensitive → Concern about the energy footprint that a trip leaves to the environment → The energy footprint influences the choice of destination, means of transportation, accommodation and activities

↓

Adoption of ecological consciousness and incorporation of "green" aspects to the touristic activities

"Green" Tourism ←

43.000.000 tourists consciously select environment-friendly hotels

↑

"Eco-tourists"

↑

"Green" Hotelling

"GREEN" TOURISM (3/3)

Greece attracts more than 16.000.000 tourists/year → Tourism industry in Greece accounts for over 78,8% of GDP (along with the other components of the service economy) → Jobs related to the tourism industry is approximately 19% of the total labor force

↓

The Hellenic Archipelago takes up to 11.242 km of the country's total 15.320 km coastline, consisting of 9.835 islands, islets and rocks.

↓

Hellenic Islands gather 58,5% of the country's lodging establishments and 62,6% of hotel beds.

← *Massive tourism activity with catastrophic environmental consequences*

↑

Within Greece more than 100 "green" hotel units are located at the time, while more than 365 existing hotel units will convert into "green" → **"Green" Entrepreneurship in Greece**

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FEASIBILITY STUDY (1/10)

The operational, financial and technical analysis of a business problem is called a "Feasibility Study" ⇨ A "Feasibility Study" usually aims to roughly estimate the feasibility of a business plan, by quantifying costs and benefits, resulting to the decision to proceed if found feasible or not

1. Basic Idea, Description & History of the Investment Project
2. Market Analysis & Products Marketing
3. Technology, Mechanical Equipment & Raw Materials
4. Financial Analysis
5. Environmental Consequences

"Feasibility Studies" are used in various types of investments and so the structure and contents are rather flexible ⇦ Generally referring to market analysis, product marketing, analysis of the production procedures, infrastructure and equipment, financial analysis and social consequences analysis.

FEASIBILITY STUDY (2/10)

Location of the Investment: Achilli, Skyros

Skyros

- located at the Aegean Sea
- biggest island of North.Sporades complex
- 210 km², 2.960 inhabitants
- mountainous, Mediterranean climate
- reached by local flights from Athens and by ship from the port of Kymi in Evia

Achilli

- one of the twenty island's settlements
- small coastal village over Achilli gulf
- middle of Skyros, northern orientation
- equidistancing port, airport and capital
- hosts a marina for small boats and fishing refuge
- ~15 permanent inhabitants

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FEASIBILITY STUDY (3/10)

Basic idea & description of the project

- Regularly-shaped land-plot
- Northern orientation
- 6.180,40 m²
- 5 min walking-time from marina
- 3*** Hotel
- Bioclimatic design, ecological operation
- Challenge for best R.E.S. exploitation & ecological materials
- Hosting main & auxiliary infrastructure & surrounding and outdoor activities

FEASIBILITY STUDY (4/10)

Basic idea & description of the project

- 27 Independent Apartments to Rent (of either 50 or 100 m^2 each)
- 60 Beds in total
- Administration building of 200 m^2 (Reception, Office & Restaurant)
- Underground Parking & Storage

- 24/7 room service / Free parking / Restaurant
- Skyrian ponies farm / Free bicycles provision / Biological products

Scenarios were built in order to arrive to conclusions about the most efficient financial solution:

- Development of a hotel unit + 6 independent residences to be sold in advance (in order to gain extra capital to cover the construction costs)
- Development exclusively of apartments to rent (postponing the investment's first income until the first year of operation & after the completion of constructions)

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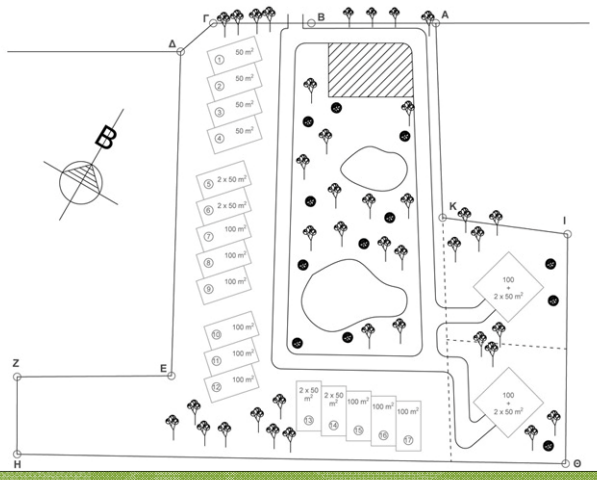
FEASIBILITY STUDY (5/10)

Basic idea & description of the project

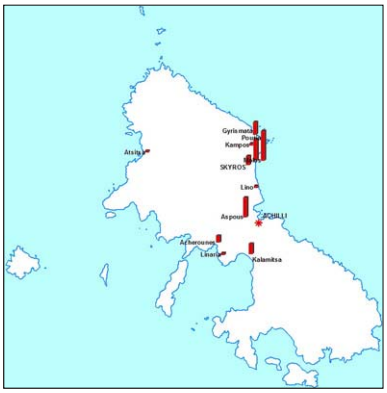


FEASIBILITY STUDY (6/10)

Market analysis & competition

- 69 operational lodgment facilities of various categories
- No other hotel unit operating in Achilli so far
- No other “green” hotel units exist on the whole island

- Unique & appealing upcoming investment



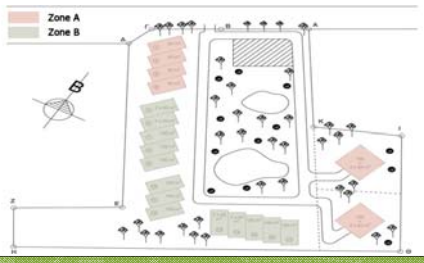
FEASIBILITY STUDY (7/10)

Technology, Mechanical Equipment & Materials

Mechanical Equipment					
Actions		Description	#	Costs	Saving
Building Shell	Double glass windows	Heating-Cooling energy saving system		200 €/sq.m.	10%
	Openings with thermal interruption	Heating-Cooling energy saving system		350 €/sq.m.	
	Double insulation	Heating-Cooling energy saving system			50%
	Ecological paints	Heating-Cooling energy saving system			
	Shading systems	Heating-Cooling energy saving system			20%
Renewable Energy Sources systems	Geothermal energy	Heating-Cooling system	1	30.000 €	50-60% / 200sq.m.
	Solar water heaters	Water heating for use	21		
	Biomass radiators	Heating system	7	16.600 €	65%
	Photovoltaics	Electrical power production	7	247.000 €	15%
Passive systems	Evergreen trees planting	Natural passive cooling system			
	Artificial ponds	Natural passive cooling system			
Bioclimatic elements	Underfloor heating	RES systems optimal performance		50 €/sq.m.	30%
	Wooden floors	Ecological structural materials			
	Linoleum floors	Ecological structural materials		20 €/sq.m.	
	Ceramic tiles	Ecological structural materials		10 €/sq.m.	
	Fluorescence lighting	Energy saving system			82%
	Rainfall water collection	Water saving system	1	10.000 €	
	BMS systems	Energy saving system	4	40.000 €	15% / system
Total				364.600 €	

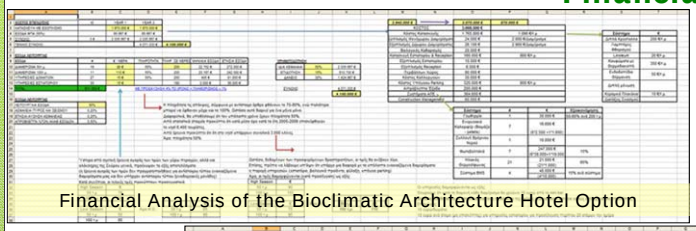
Construction Cost for a 100sq.m. Residence (per sq.m.): 1.090 €		
Construction Stages	Percentage	Costs
Planning & building permit	4%	4.360 €
Excavations / earthworks	2%	2.180 €
Reinforced concrete framework	24%	26.160 €
Masonry - bricks	4%	4.360 €
Plaster	6%	6.540 €
Insulations totally	3%	3.270 €
Windowpanes	3%	3.270 €
Ironworks	2%	2.180 €
Windows - doors - closets	7%	7.630 €
Marbleworks	3%	3.270 €
Floors	8%	8.720 €
Electricityworks	5%	5.450 €
Kitchen cabinets	5%	5.450 €
Paintworks	7%	7.630 €
Sanitary articles - tiles - faucets	5%	5.450 €
Heating system	4%	4.360 €
Water supply - sewerage - natural gas	5%	5.450 €
Various (fireplace, door handles etc)	3%	3.270 €
	100%	109.000 €

Total Construction Costs	
Expenses Category	Cost
Construction Costs	1.765.800 €
50sq.m. equipment	24.000 €
100sq.m. equipment	26.100 €
Biological treatment	20.000 €
Restaurant & Reception construction	160.000 €
Restaurant equipment	10.000 €
Reception equipment	6.000 €
Surrounding spaces	80.000 €
Cultivations costs	30.000 €
Basement construction	320.000 €
Extra costs	200.000 €
RES systems	364.600 €
Construction Management	60.000 €
	3.066.500 €

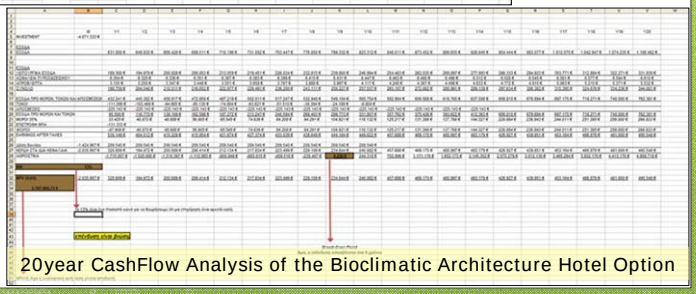


FEASIBILITY STUDY (8/10)

Financial Analysis



Financial Analysis of the Bioclimatic Architecture Hotel Option



20year CashFlow Analysis of the Bioclimatic Architecture Hotel Option

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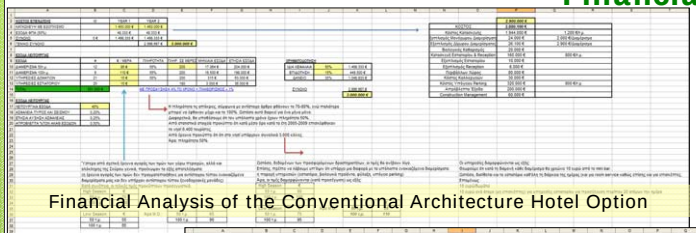
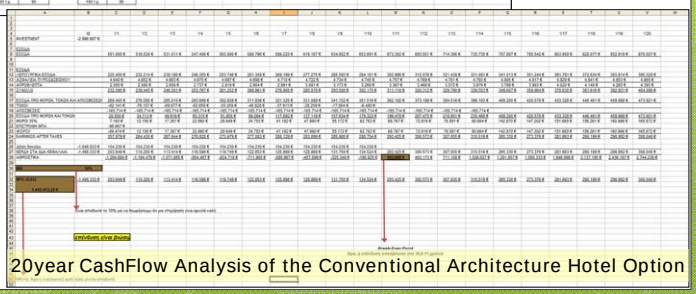
FEASIBILITY STUDY (9/10)

Financial Analysis



Financial Analysis of the Conventional Architecture Hotel Option



20year CashFlow Analysis of the Conventional Architecture Hotel Option

FEASIBILITY STUDY (10/10)

Financial Analysis

Bioclimatic Architecture Hotel:
- IRR = 13%
- NPV = 2.787.805,72 €
- Break Even Point -> 9 yrs

Conventional Hotel:
- IRR = 11%
- NPV = 1.903.655,02 €
- Break Even Point -> 11 yrs

NPV (Net Present Value)

IRR (Internal Rate of Return)

If...	Then...
IRR > cost of capital	accept the project
IRR < cost of capital	reject the project

$$\mathrm{NPV} = \sum_{t=0}^{N} \frac{R_t}{(1+i)^t}$$

$$\mathrm{NPV} = \sum_{n=0}^{N} \frac{C_n}{(1+r)^n}$$

If...	It means...	Then...
NPV > 0	the investment would add value to the firm	the project may be accepted
NPV < 0	the investment would subtract value from the	the project should be rejected
NPV = 0	the investment would neither gain nor lose value for the firm	We should be indifferent in the decision whether to accept or reject the project. This project adds no monetary value. Decision should be based on other criteria, e.g. strategic positioning or other factors not explicitly included in the calculation.

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ENVIRONMENTAL CONSEQUENCES

- Study of the environmental consequences of the investment
- Determines the importance of the above consequences' impact on the social, economic, financial & technical potential of the investment's implementation

European Union
- Obligatory
- Describes the technique & procedure during which data about negative consequences is collected from the investor & other sources
- Taken into account on whether investment could proceed or not

Greece
- Law 1650/1986
- Provides the legal framework on studying environmental consequences
- Applied since 1990
- Obligatory for complex hotel units

CONCLUSIONS

- Investments of the Future
- Environmental Benefits
- Low Operation Costs
- Legislation Motivations & Benefits to Invest

Even though the construction cost is higher, due to the lower operation cost along with the high rate of return, a "green" investment is a Feasible & Profitable Investment