SUSCON

Αειφόρος Κατασκευή στο Δημόσιο και Ιδιωτικό Τομέα μέσω της Ολοκληρωμένης Πολιτικής Προϊόντων

Εφαρμογή Λογισμικού
Building Design and Assessment Tool

Λευκωσία, 3 Απριλίου 2008

Πανίκος Παλόχης / P.P.P. Operations Manager - CYBARCO PLC.

Πανεπιστήμιο Κύπρου

Building Facilities for the Faculty of Science and Technology

- Architectural designs jointly prepared by A. Kyprianou & Partners and MCA Mario Cuccinella Architects

- Comprises a complex of three distinct buildings.
  - Building Science & Technology – 01 Departments of Mathematics, Statistics and Information Technology, (8,925m2).
  - Building Science & Technology – 02 Departments of Physics, Chemistry and Biology studies, (10,628m2).
  - Common teaching areas, (3,133m2).

Building Facilities for the Faculty of Science and Technology

- Modern design utilising materials such as glass, aluminium, exposed concrete and metal.
- Full advantage of bioclimatic architecture.
- Blend of teaching and research labs, offices of academic staff and researchers, amphitheatres and seminar rooms, various storage spaces and electromechanical systems supportive spaces.
- Hot and cold water for use and for the heating/air conditioning system is supplied by the campus energy centre.
- Central Sewage Treatment Plant. The resulting effuent is further utilised for campus irrigation.
- Conforms to all necessary criteria for persons with disabilities.

Building Facilities for the Faculty of Economics and Management

- Architectural designs jointly prepared by the offices of Alecos Gavrielides of Cyprus and Alexandros Toumazis of Athens.
- Total cost of the project is expected to each €20mil.
- It comprises of three buildings in five levels of a total covered areas of 17,000m2.
- Cybarco Plc has been awarded the construction of this project and the construction period has been set to 36 months.
- Modern design with pleasant interior spaces taking seriously bioclimatic architecture. Simplicity, clear lines, ample internal spatial design, strict square lines of the buildings themselves bring out the modern picture of the surrounding areas. Materials such as glass, aluminium exposed concrete and metal used facilitate its integration with the nearby areas.
- The complex comprises of three buildings interconnected by a metal bridge in two building levels.

Building Facilities for the Faculty of Economics and Management

- The first building of the complex will house the Department of Management and the postgraduate course for Business Administration. Emphasis has been given to the amphitheatres and the office spaces, so as to build in latest technology/modern infrastructure.
- The second building will house the Department of Economics, management offices and the management of the research group for the Banking and other studies.
- The third building will house teaching facilities for 2,320 people comprising an amphitheatre of capacity 250 people, three smaller amphitheatres, teaching rooms and a canteen.
- Hot and cold water for use and for the heating/air conditioning system is supplied by the campus energy centre.

Building Facilities for the Faculty of Economics and Management

- Central Sewage Treatment Plant. The resulting effluent is further utilised for campus irrigation.
- Conforms to all necessary criteria for persons with disabilities.

Ecodesign criteria groups

Environmental performance

- Land Use & Siting
- Energy & Atmospheric pollution
- Health & Safety
- Material Resource Efficiency
- Water Conservation

Ecodesign criteria groups

Economic Performance

- Local Economy
- Efficiency
- Adaptability
- Operational Costs
- Capital Costs

Ecodesign criteria groups
Initial Considerations

For each environmental performance parameter a specific weight is assigned and the product of all three weights determines the total weight for the building.

- Spatial extent of effect
  - (3=global, 2=national or regional, 1=building or site)
- Intensity of effect
  - (3= direct or strong, 2=moderate, 1=indirect or weak)
- Duration of effect
  - (3 for > 50 yr, 2 for > 10 yr, 1 for < 10yr)

Ecodesign criteria groups
Initial Considerations

All individual factors assessed are given a specific weight adding for each category to 100%

Energy & Atmospheric pollution	**100%**
Site Design & Building Orientation	**8%**
Building Envelope	**12%**
Foundation Systems	**5%**
Lighting	**15%**
Mechanical Heating & Cooling Systems	**20%**
Water Heating	**15%**
Renewable Energy	**10%**
Air Pollution	**15%**

Land Use & Siting

- Land Use (Brownfield development 100%, Urban area 75%, Agriculture area 50%.Greenfield 25%, Forest 0%)
- Access to public transportation and alternative transportation means (500m 100%, 1km 50%, 2 km 0%)
- Conservation of native vegetation during construction (erosion control)
- Minimize site disturbance (clearing and soil movement) - restoration of disturbed soil
- Minimize impervious surfaces (reduced runoff)
- Construction must not divert water runoff from it's natural paths
- Prevent soil and air pollution during construction process (50% soil, 50% air)
- Use shading techniques (native vegetation) to minimize heat island effect in urban areas

Energy & Atmospheric pollution

- Site Design & Building Orientation
  - Building orientation to take advantage of solar energy (south orientation)
  - Site design to take advantage of solar and topographic conditions (natural ventilation, deciduous trees etc)
  - Construction designed for use of passive solar techniques
- Building Envelope
  - Insulated exterior windows and doors framing
  - Install double glazed windows
  - Install Low-E windows
  - Insulated floor, ceiling, roof and exterior walls
  - Seal all mechanical penetrations
  - Seal all attic penetrations
  - Specify construction materials and details that reduce heat transfer.

Energy & Atmospheric pollution

- Foundation Systems
  - Insulation below concrete slab
  - Permanent insulation to the foundation
  - Insulated basement walls from footer to top of wall
- Lighting
  - Installation of Energy Star Qualified fluorescent bulbs (CFLs)
  - Advanced Lighting and Automation Control System capable of unified automation control of lighting loads.
  - Installation of tubular skylights in interior areas (bathrooms, hallways and kitchens) that receive limited daylight.
  - Motion detector activators or photocells/ timers on all exterior lighting
  - Use of Daylighting Strategies

Energy & Atmospheric pollution

- Mechanical Heating & Cooling Systems
  - HVAC equipment properly sized using computer models
  - Zoning building's spaces based on the heating and/or cooling loads
  - Use of programmable thermostat for the adjustment of the operation timetable
  - Installation of radiant or hydronic floor systems
  - Use of Energy Star qualified equipment
  - Centrally locate the main heating unit (boiler or furnace)
  - Insulation and sealing of water pipes and air ducts to minimize heat and/or air leakage
  - Use of natural ventilation methods
  - Design for passive solar heat storage (Trombe wall)
  - Use of ventilation heat recover techniques.

Energy & Atmospheric pollution

- Water Heating
  - Set up the water heater thermostat at a lower temperature
  - Insulate all hot water lines / Insulate the water heater
  - Combined domestic hot water/space heating system
  - Drain wastewater heat recovery system installed
- Renewable Energy
  - Active solar thermal heating system installed
  - Solar electric system (photovoltaic panels) installed
  - Small Wind turbine installed or whole community wind driven electricity
  - Geothermal heat pumps for water and space heating needs when subsurface conditions allow
- Air Pollution
  - Use of non ozone depleting refrigerants in HVAC equipment

Health & Safety

- Indoor Air Quality
  - Use low VOCs-emitting materials (paints, finishings, adhesives, carpets, insulation, synthetic wood)
  - Design and install a whole building ventilation system (ASHRAE standard 62.2 – 2003)
  - Spot ventilation in kitchen & bathrooms (moisture/air contaminants control)
  - Install High Efficiency Particulate Air Filters (HEPA)
  - Install carbon monoxide (CO) and dioxide (CO2) monitoring system that provides feedback on space ventilation performance
  - Regular and proper maintenance of HVAC equipment, combustion equipment (stoves, boiler, furnace etc) and building spaces
  - Environmental Tobacco Smoke (ETS) Control
  - Install soil suction radon reduction system (if required)
  - Garage detached from all living areas

Health & Safety

- Thermal, Visual and Acoustic Comfort
  - Achieve Thermal Comfort conditions (ASHRAE 55-2004, ISO 7730)
  - Achieve a minimum Daylight Factor of 2% in 75% of all regularly occupied areas
  - Use low noise equipment
  - Locate noisy mechanical equipment, office equipment, and functions away from noise-sensitive spaces
  - Sound isolation of walls and ceilings to prevent noise and vibrations transmission

Material Resource Efficiency

- Reduce quantity of material and waste generation
  - Achieve Thermal Comfort conditions (ASHRAE 55-2004, ISO 7730)
  - Achieve a minimum Daylight Factor of 2% in 75% of all regularly occupied areas
  - Use low noise equipment
  - Locate noisy mechanical equipment, office equipment, and functions away from noise-sensitive spaces
  - Sound isolation of walls and ceilings to prevent noise and vibrations transmission
- Renewable materials
  - Use wood from renewable forestry (e.g. bamboo)
  - Use wood from certified sustainable wood
- Locally acquired and produced materials
  - Use of locally harvested wood
  - Use of locally produced brick
  - Use of Indigenous stone

Material Resource Efficiency

- Recycled content materials
  - Use of recycled content construction materials (low-embodied energy)
- Reuse materials
  - Reuse recovered materials from building deconstruction
  - Design building for deconstruction and not demolition
  - Use of durable materials
- Recycle materials during construction/demolition
  - Plan of an on-site recover/recycle program during construction or demolition
  - On-site separation of waste by type (metal, wood, plastic, glass etc) for off-site recycling
  - On-site recycling of construction waste (e.g. grinder)

Water Conservation

- *Reduce water quantity*
  - Install low-flow bathroom, kitchen, shower faucets (aerating taps) and sensor faucets.
  - Install dual-flush toilets or non-water urinals (mostly for commercial buildings)
  - Use of shower instead of bathtub
  - Use of horizontal axis (frond loading) clothes washing machine
  - Use of high performance dish washer

- *Water management*
  - Frequent plumping maintenance to minimize leakage
  - Monitoring water consumption to detect possible leak

Water Conservation

- Wastewater recycling/reuse
  - Install dual plumbing to separate grey water from black water
  - On-site grey water treatment installation
  - Use of recycled grey water for toilet flushing (75%) or irrigation(25%)
- Rainwater harvest
  - *Rainwater directed towards landscaping and natural pathways instead of sewer*
  - *Install a rainwater harvesting and storage system*
  - *Use rainwater for non-potable domestic use (toilet flushing, irrigation etc.)*
  - *Proper maintenance of stored rainwater to prevent mosquito breeding*
  - *Proper roof material installation for rainwater harvesting*

Economic Performance

- Local Economy
- Efficiency
- Adaptability
- Operational Costs
- Capital Costs

Economic Performance

- Local Economy
  - % value of the building constructed by local (within 50km) contractors
  - % of materials (sand, bricks, blocks, roofing material) sourced from within 50km
  - % of components (windows, doors etc) made locally (in the country)
  - % of furniture and fittings made locally (in the country)
  - % of maintenance and repairs by value that can, and are undertaken, by local contractors (within 50km)

Economic Performance

- Efficiency
  - % capacity of building used on a daily basis (actual number of users / number of users at full capacity)
  - % of time building is occupied and used (actual average number of hours used / all potential hours building could be used (24))
  - Space provision per user not more than 20% above national average for building type
  - Site/building has access to internet and telephone (100%), telephone only (50%)
  - % increase of the building's value due to implementation of green measures.

Economic Performance

- Adaptability
  - % of spaces that have height to enable a range of uses (residential to office conversion)
  - Design facilitates flexible external space use
  - Easily adaptable internal partitions (loose partioning (100%), studwall (50%), masonary (25%), brick wall (0%))
  - Installation of integrate systems for easier adaptation.
  - Design of foundations for potential vertical expansion of the building

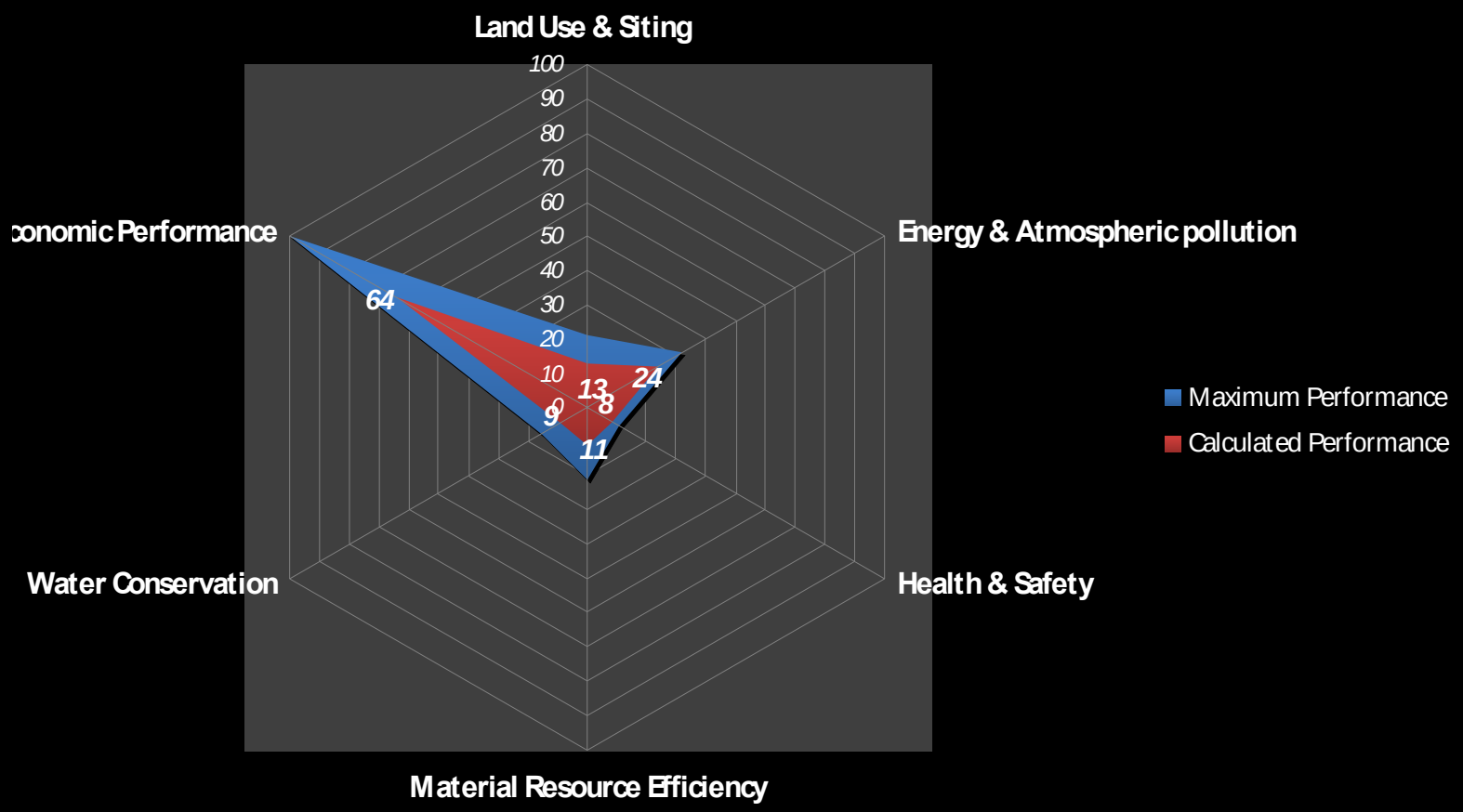
Economic Performance

- Operational Costs
  - % of renewable energy contribution on a monthly basis to building's performance figures
  - Easily monitored localised metering system for water (50%) and energy (50%)
  - % of building that can be cleaned and maintained easily and safely using simple equipment and local non-hazardous materials
  - % of water savings on a monthly basis due to water conservation techniques applied
  - % of value of all materials/equipment used in the building on a monthly basis supplied by local (within the country) manufacturers

Economic Performance

- Capital Costs
  - Capital cost not more than 20% above national average building costs for the building type
  - % of capital costs allocated to new sustainable/indigenous technology
  - Maximum amortization period of 15 years for renewable energy installations (solar panels, geothermal pumps, wind turbine)
  - % of capital costs for equipment allocated for high efficiency equipment (bulbs, boiler, furnace, washing machines, HVAC, fans etc)
  - Existing buildings reused

Building Facilities for the Faculty of Science and Technology

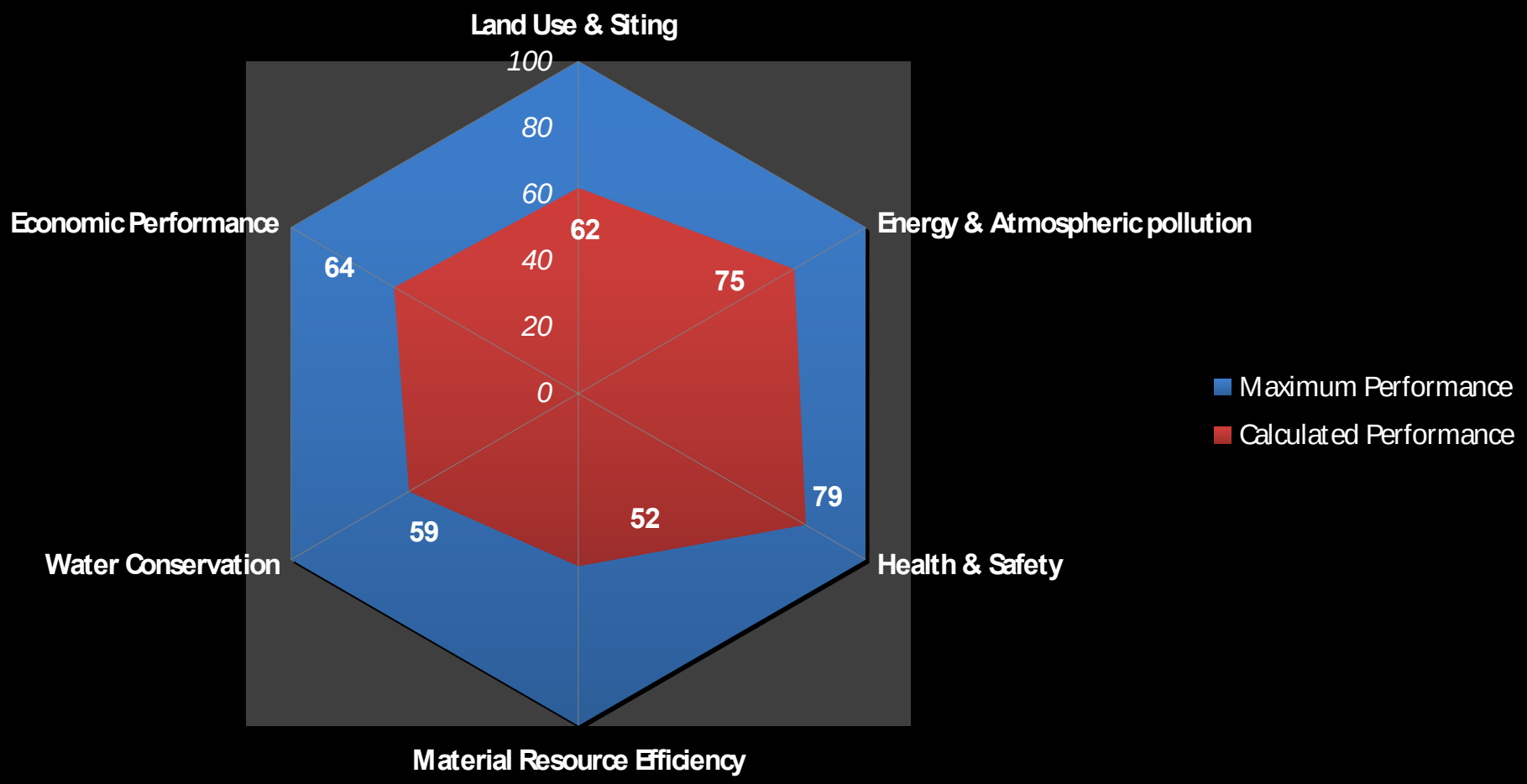


Building Facilities for the Faculty of Science and Technology

Actual Values

Environmental Issues	Max Credits	Credits aquired
Land Use & Siting	21	13
Energy & Atmospheric pollution	32	24
Health & Safety	11	8
Material Resource Efficiency	21	11
Water Conservation	16	9
Economic Performance	100	64

Building Facilities for the Faculty of Science and Technology

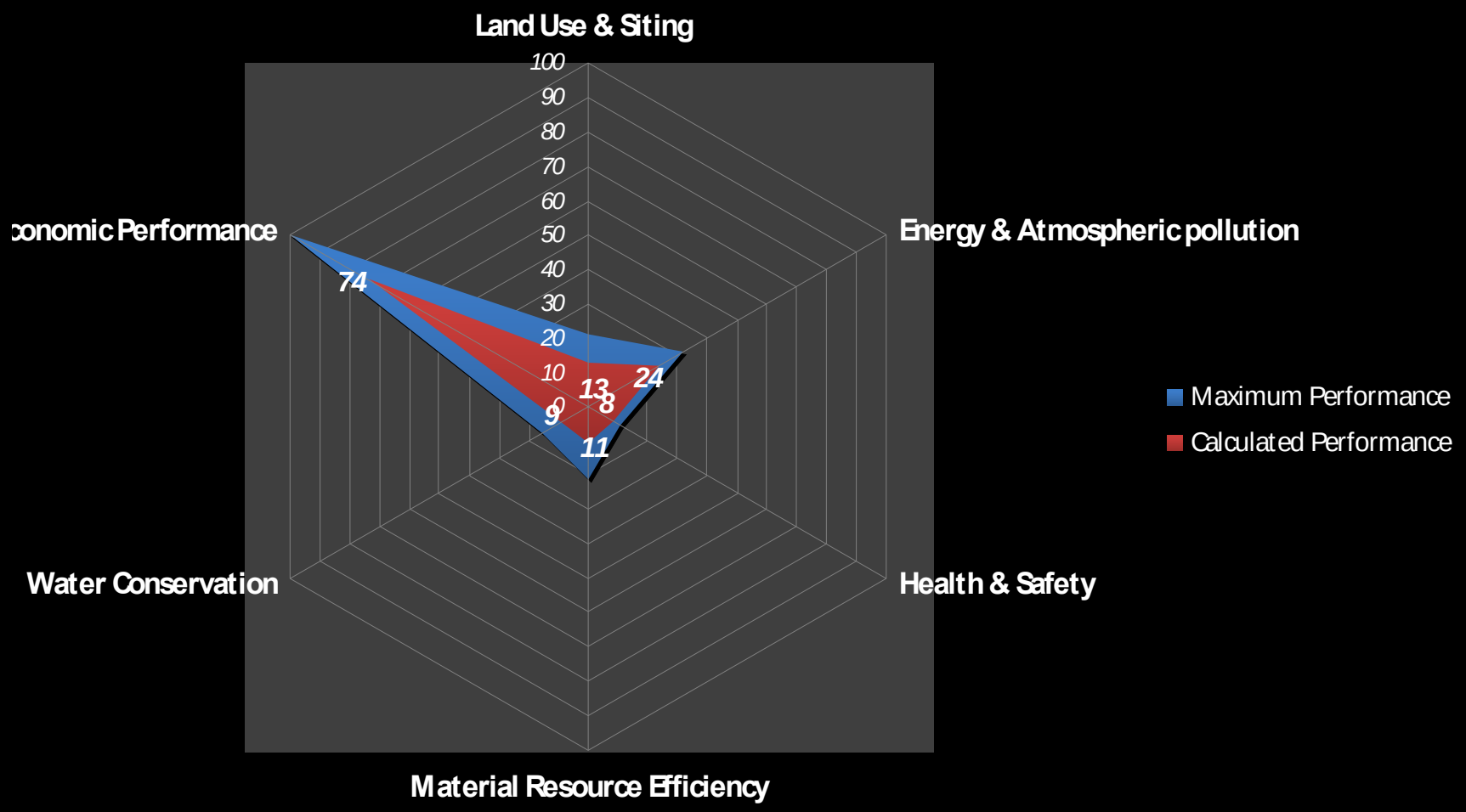


Building Facilities for the Faculty of Science and Technology

Normalised Values

Environmental Issues	Max Credits	Credits aquired
Land Use & Siting	100	62
Energy & Atmospheric pollution	100	75
Health & Safety	100	79
Material Resource Efficiency	100	52
Water Conservation	100	59
Economic Performance	100	64

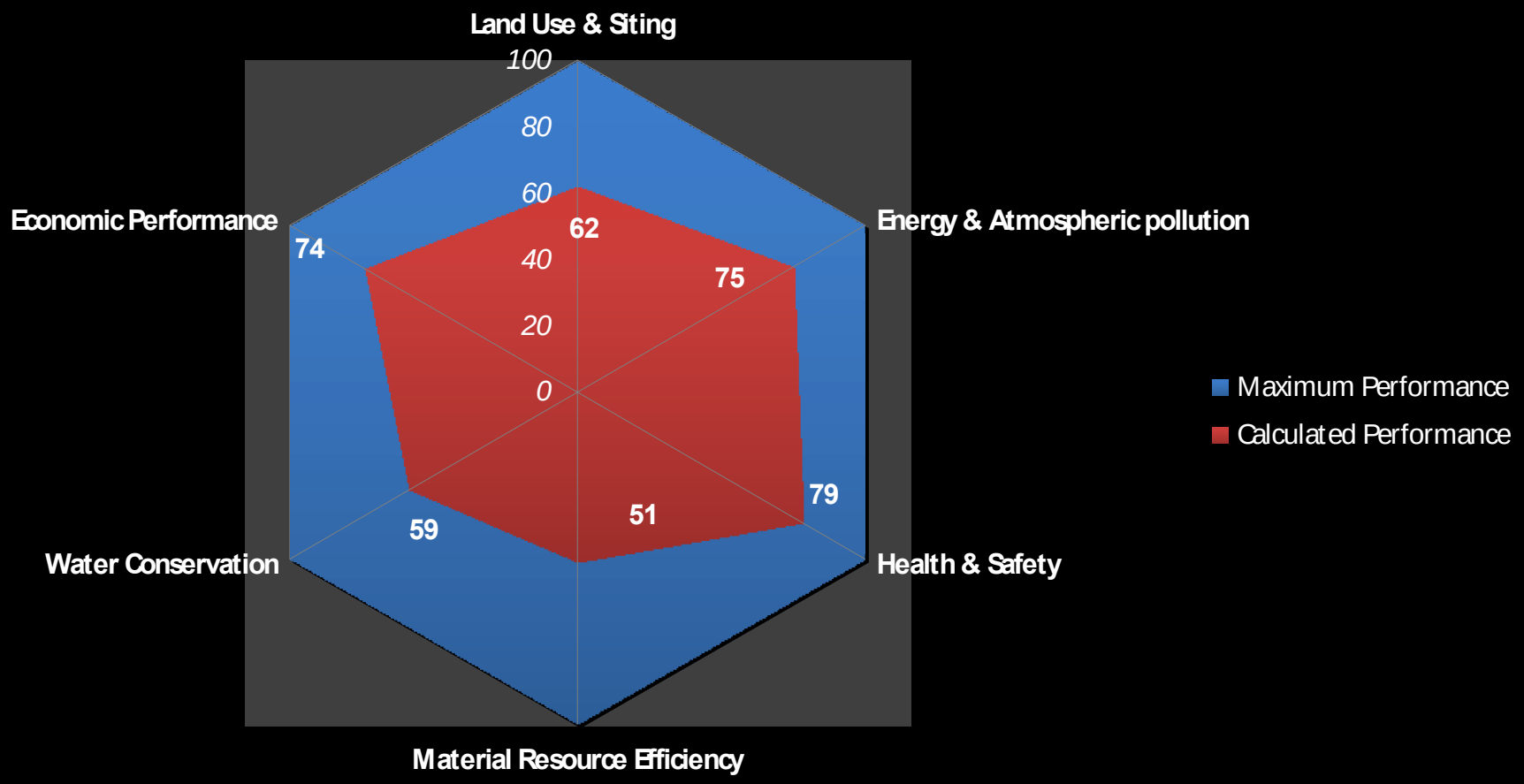
Building Facilities for the Faculty of Economics and Management



Building Facilities for the Faculty of Economics and Management
Actual Values

Environmental Issues	Max Credits	Credits aquired
Land Use & Siting	21	13
Energy & Atmospheric pollution	32	24
Health & Safety	11	8
Material Resource Efficiency	21	11
Water Conservation	16	9
Economic Performance	100	74

Building Facilities for the Faculty of Economics and Management



Building Facilities for the Faculty of Economics and Management
Normalized Values

Environmental Issues	Max Credits	Credits aquired
Land Use & Siting	100	62
Energy & Atmospheric pollution	100	75
Health & Safety	100	79
Material Resource Efficiency	100	51
Water Conservation	100	59
Economic Performance	100	74

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Ερωτήσεις/ Απορίες

Πανεπιστήμιο Κύπρου