

Concrete – Sustainability Matters

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Scope

- Introduction to the Royal Group
- Drivers for change in Abu Dhabi
- Pros and cons of concrete
- An introduction to Estidama
- What the future might hold ...
- Closing remarks



Introduction to the Royal Group

- ▶ Conglomeration of over 80 companies spanning construction, manufacturing, retail, leisure, media – eg Hydra, Tamouh, NPC, Reem Emirates Aluminum, Reem Readymix, RAK Cement, etc
- ▶ Over 10,000 employees
- ▶ His Highness Sheikh Tahnoon bin Zayed al Nahyan – Chairman
- ▶ Based mainly in Abu Dhabi but with operations world wide
- ▶ Environment and sustainability underpin how we conduct our business



Reem Readymix

- ▶ Leading supplier of all types of Readymix concrete and cement-based plastering materials.
- ▶ Expertise in all concrete-related services from production to final product placing, using the latest equipment and experienced personnel.
- ▶ Four fully-automated state-of-the-art 4 batching plants produce 480 cubic m./hour
- ▶ Fully integrated laboratory equipped with latest technology testing facility.



RAK Cement

- ▶ 1.1 Million tonne per annum (Mtpa) integrated plant
- ▶ Specializes in manufacturing Ordinary Portland Cement (OPC) and fly ash cement.
- ▶ State-of-the-Art plant that uses locally available high quality raw materials to produce a consistent high quality cement.
- ▶ The five-stage suspension pre-calciner kiln equipped with high efficiency cyclones and a high recuperation efficient cooler.
- ▶ The fully automated control systems with a centralized control room to permit continuous surveillance of every aspect of the process.



Drivers for change in Abu Dhabi

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- ▶ Regulation / mandatory requirements
- ▶ Cost
- ▶ Capital investment requirements
- ▶ Return on investment – profit / payback period
- ▶ Speed / ease of construction
- ▶ Labour / skills requirements
- ▶ Product quality / durability
- ▶ Availability of competing materials
- ▶ Environmental protection



Key drivers for change

- Policy and regulation
 - Plan Abu Dhabi 2030
 - UPC Development Code
 - DMA Building Code
 - Estidama Pearl Rating System



Urban Structure Framework Plan



استدامة
estidama



Pros and cons of concrete

Pros and Cons

▶ Pros

- Proven material
- Ready availability
- Mature network for manufacture / distribution
- Ease of construction
- Speed of construction
- Physical properties / strength
- Versatile (eg pre-cast, column / beam, block work, slab, etc + self compaction, 'green' products, thermal / light weight properties...)
- Durable
- Fire resistant



Pros and Cons / contd.

▶ Cons

- Energy use during production
- Pollution potential during manufacture / construction (eg cleaning of vehicles after delivery)
- Quantities of water used for mixing / curing
- Heavy vehicles required to distribute product to site
- Product quality can deteriorate over time
- Heavy lifting equipment required to be able to move / manoeuvre pre-cast panels



How sustainable is life in the UAE?

- UAE ecological footprint is the highest per capita in the world – 9.5 ha per person per year. Worldwide, the average is 2.6 ha per capita
- UAE emits almost twice the CO2 per capita as America
- UAE consumes almost four times the quantity of water per capita as the European Union, USA and Australia
- In 2005, UAE consumed 4,180 Million cubic meters of water.
 - Agriculture 60%,
 - Domestic consumption 25%,
 - Industrial activities 9%,
 - Landscaping 6%.
- Current maximum production capacity is only 1,504 Million cubic meters per year. That's just 36% of the total water we need.
- **Abu Dhabi population will grow until 2030 from 1 up to 3 million (Abu Dhabi Plan 2030)**



An introduction to Estidama

Estidama – a tool to help manage sustainability impacts

- Means “Sustainability” in Arabic
- Borne out of Abu Dhabi Plan 2030;
- Provides a structured methodology to improve sustainability performance / establish minimum mandatory requirements;
- Applies to **communities** (developments) and all **buildings** types – specific guidance for villas



Estidama Credits

- ▶ **Mandatory Requirements** – these must be met to obtain a Building Permit / certificate of completion

- ▶ **Optional Credits** – the backbone of the system, dependent on the pearl rating target of the development
 - *New Communities*: Total 159 credit points,
 - *New Buildings*: Total 177 credit points,
 - *Villas*: Total 90 credit points.

- ▶ **All new Government Buildings / Government funded projects in Abu Dhabi must achieve a 2 Pearls rating**



Estidama Credit Categories

- ▶ Integrated development process
- ▶ Liveable communities / buildings / villas
- ▶ Resourceful energy
- ▶ Precious water
- ▶ Stewarding materials
- ▶ Innovating practice

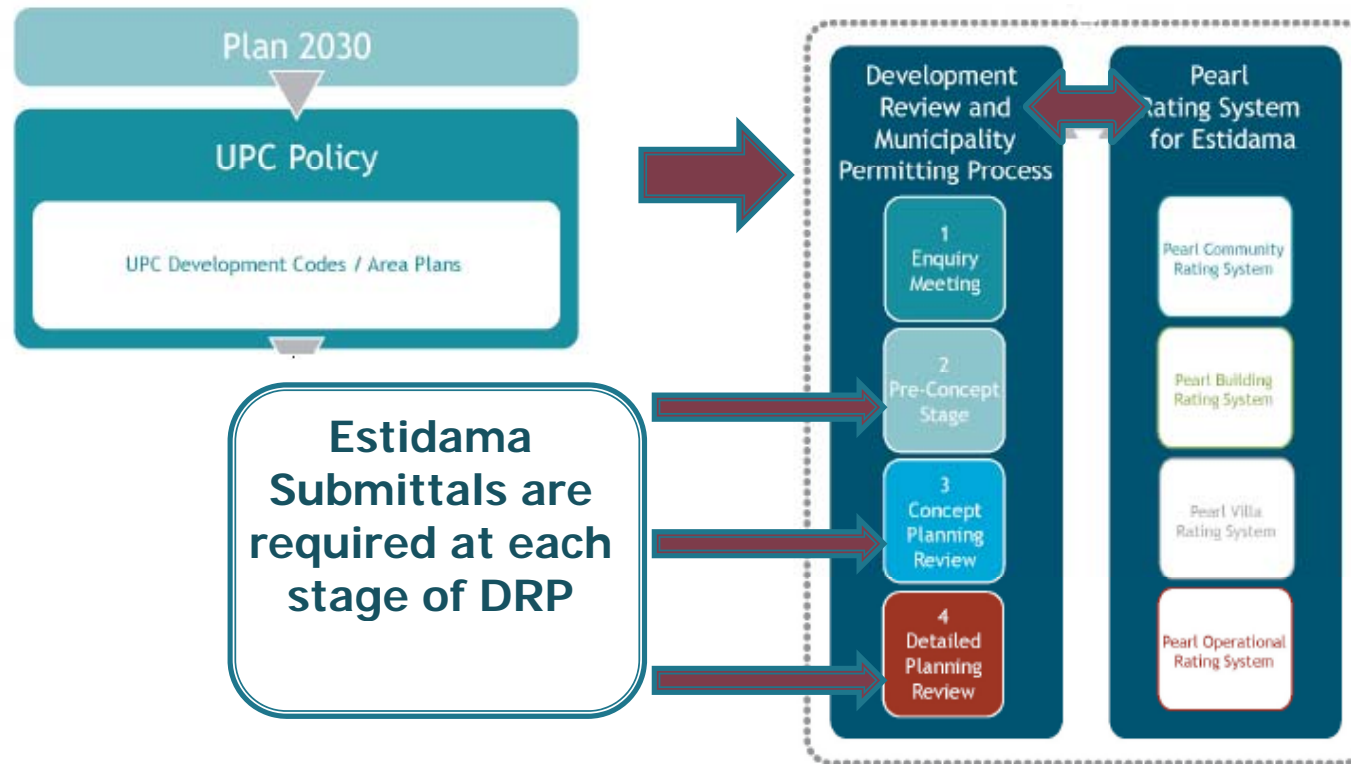


Estidama Pearl Rating Levels

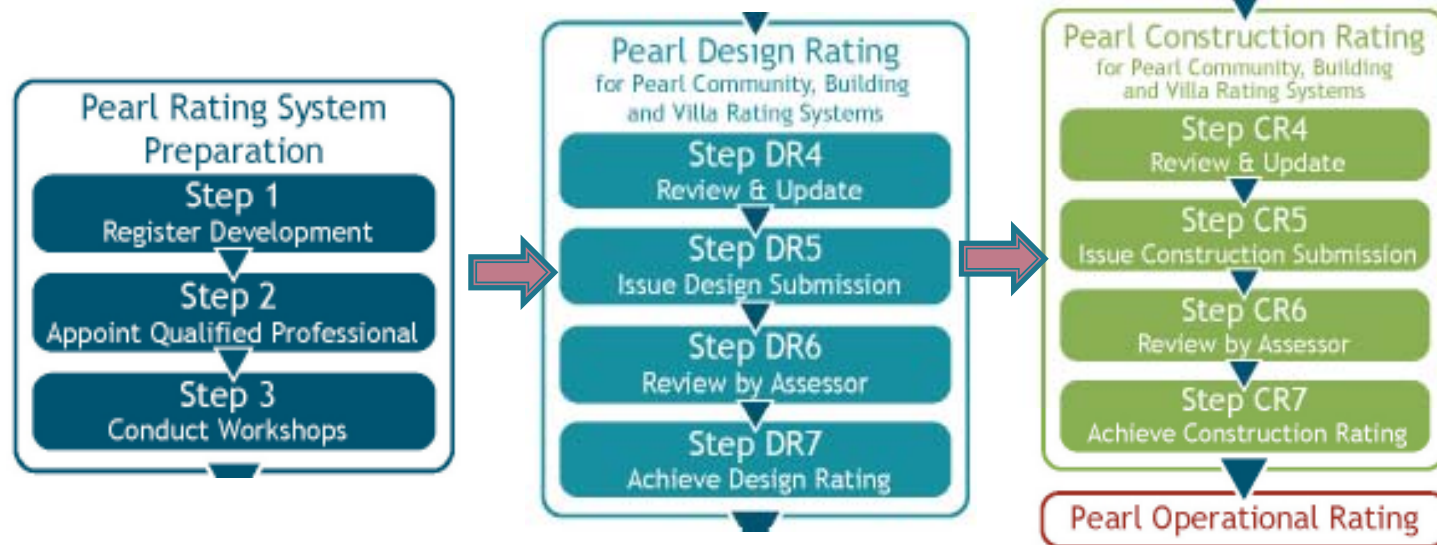
Rating Level	Community	Building	Villa
1 Pearl	Minimum Mandatory Requirements		
2 Pearls	55	60	30
3 Pearls	75	85	44
4 Pearls	100	115	57
5 Pearls	125	140	70
<u>Total:</u>	<u>159</u>	<u>177</u>	<u>90</u>



Development review process – now incorporates Estidama submittals



Pearl Rating Process



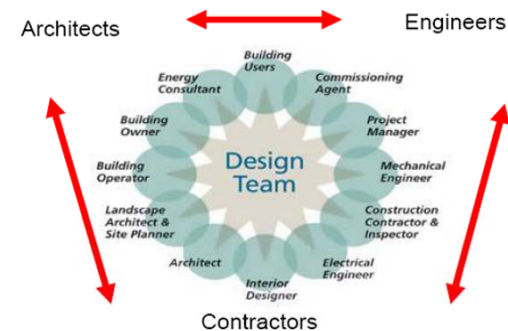
... And in simple terms

- ▶ You need a **Design Rating** to be able to obtain a **Building Permit**
- ▶ You need a **Construction Rating** to be able to obtain a **Certificate of Completion**



Integrated Development Process

- ▶ Integrated Design Strategy
 - Process Chart of IDP,
 - Objective and Target Description
 - Workshops' Meeting Minutes, Action Items and Project Team Responsibilities



Integrated Development Process

Communities

- ▶ Sustainable Building Guidelines

Buildings

- ▶ Tenant Fit-Out Design
& Construction Guide
(Core and Shell Building)



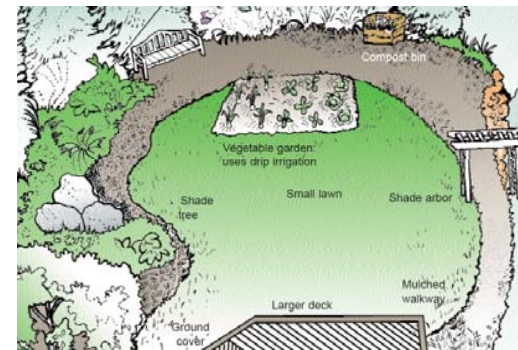
Both documents describe requirements for the project in relation to Sustainable Design and Construction and shall include:

- IDP Plan for Buildings
- Sustainability Vision, Objectives and Targets



Natural Systems

- ▶ Environmental focus
- ▶ Interaction with local environment / neighbourhood
- ▶ Land use
- ▶ Preservation of habitat where appropriate
- ▶ Resource protection



Liveable Buildings / Communities

- ▶ Building / community performance
- ▶ Link to Plan Abu Dhabi 2030
- ▶ Transport links / walkability
- ▶ Urban vitality
- ▶ Thermal comfort
- ▶ Public transport
- ▶ Accessibility
- ▶ Air quality
- ▶ Paints and sealants, etc
- ▶ Smoking control
- ▶ Light pollution



Precious Water

- ▶ Minimising water use
- ▶ Fixtures and fittings
- ▶ Water model
- ▶ Water meters
- ▶ Stormwater
- ▶ Water quality
- ▶ Infrastructure design
- ▶ Irrigation systems



Resourceful Energy

- ▶ Minimising energy use
- ▶ Energy model
- ▶ Energy metering
- ▶ Cool buildings / thermal comfort
- ▶ Use of 'ozone friendly' refrigerants
- ▶ District cooling
- ▶ Renewable energy
- ▶ Smart grid technology



Stewarding Materials

- ▶ Certified timber (FSC, PEFC, etc)
- ▶ Waste strategy
- ▶ Recycled materials
- ▶ Cement replacement
- ▶ ‘Virtuous water’
- ▶ Recycled aggregate
- ▶ Modularity
- ▶ Labour practices
- ▶ Durability
- ▶ Construction waste management



Innovating Practice

- ▶ Innovation in design
- ▶ Innovation in construction
- ▶ Innovation in operations



Cement replacement

Demonstrate through either the use of supplementary cementing materials (SCMs) (including fly ash, ground granulated blast furnace slag (GGBFS) and silica fumes) or the increased use of aggregates or admixtures, that the project has reduced the overall amount of Portland cement used and associated embodied greenhouse gas emissions as shown below:

Table SM 10.1: Embodied Greenhouse Gas Emissions of Concrete

Row A	Strength Grade	25	30	35	40	45	50	55	60	Estidama Credits
	Type	Embodied GHG								
Row B1	Cast in place	162	192	218	240	259	277	292	307	1 Credit
Row B2	Cast in place	121	144	163	179	194	206	218	229	2 Credits
Row C1	Precast	176	209	236	260	281	300	317	332	1 Credit
Row C2	Precast	149	176	199	220	237	253	268	281	2 Credits
Row D1	Stressed	183	217	245	270	292	312	329	345	1 Credit
Row D2	Stressed	162	192	218	240	259	277	292	307	2 Credits

Recycled aggregates

- **1 Credit Point**

Demonstrate that at least 15% of all aggregates used on site (by volume), in structural and non-structural applications are recycled

- **2 Credit Points**

Demonstrate that only recycled aggregates and / or aggregate from industrial waste by-products are used as base, sub-base or backfill



A look to the future...

- ▶ Increasing competition from alternative materials / variants of concrete
- ▶ Marketing will increasingly align product properties / characteristics to Building Code requirements (eg Estidama)
- ▶ Climate change and water use properties will become even more important to differentiate products from each other
- ▶ Product innovation – at no extra cost – will help to protect markets



A look to the future...

- ▶ ‘Hybrid construction’ will serve to optimise building performance and create new markets for entrepreneurial design / construction (eg combination of ‘conventional’, pre-cast and 3D on Yas island)
- ▶ Developers will place stricter demands on contractors ... that will be passed along all elements of the value chain (eg linked to environmental / sustainability characteristics / Estidama compliance, etc)



A look to the future...

- ▶ Reporting to regulators will become more demanding / holistic (eg EHSMS for Building and Construction)
- ▶ Manufacturers will need to diversify / improve product characteristics to survive in an increasingly competitive market ... Think outside the box!
- ▶ Don't get caught out – when was the last time you carried out a stakeholder engagement exercise with your main clients to understand their needs?



Closing remarks

Closing remarks

- ▶ Sustainability is a complex topic – and often means different things to different people
- ▶ Managing sustainability performance demands the use of a structured approach to help inform decision making
- ▶ The Integrated Development Process is a central pillar of Estidama in respect of how to manage sustainability



Closing remarks / contd

- ▶ The basic premise must be to make more informed decisions...
- ▶ .. drawing on the inputs of technical experts – eg energy, water, waste, transport, logistics, etc – and assessing them using an integrated approach
- ▶ Living and working in Abu Dhabi and the UAE generates high sustainability impacts – which at the same time provides us with many opportunities to help our sustainability performance!



Closing remarks / contd

- ▶ Whilst 'concrete related considerations' form a small part of the Estidama credit scores, the choice of construction materials can make a major difference overall to the sustainability performance of buildings and communities
- ▶ It is anticipated that in the future, concrete producers will need to work more closely with key stakeholders to report on their performance, improve product characteristics and to offer more holistic solutions linked to construction generally



Further information

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