Development of GSAS Framework

**Groundwork 2007-2009**

- **STAGE (I)**
  - 140+ BUILDING RATING SYSTEMS TOOLS GUIDELINES

- **STAGE (II)**
  - 40 WHOLE BUILDING RATING SYSTEM

- **STAGE (III)**
  - 6 ESTABLISHED RATING SYSTEMS

**Development Teams**

- **International**
  - [1] Energy Experts
  - [2] System Developers
  - [3] Industry Specific

- **Expert Reviewers**
  - [1] US
  - [2] UK
  - [3] Netherlands
  - [4] Canada
  - [5] Japan
  - [6] China
  - [7] Hong Kong
  - [8] Australia

- **Local**
  - [1] In-house Team
  - [2] Public Sector
  - [3] Private Sector

**New Rating System**

- **STAGE (IV)**
  - GLOBAL SUSTAINABILITY ASSESSMENT SYSTEM
    - Design Guidelines
    - Rating Elements
    - Weighting + Scoring

**Stage Overview**

- **STAGE (I)**: Groundwork with 140+ rating systems tools and guidelines.
- **STAGE (II)**: Development of 40 whole building rating systems.
- **STAGE (III)**: Establishment of 6 rating systems.
- **STAGE (IV)**: Global sustainability assessment system development with design guidelines, rating elements, and weightings.

**Regional Context**

- **UK**: BREEAM
- **US**: LEED
- **Canada**: Green Globes
- **Hong Kong**: CEPAS
- **Japan**: CASBEE
- **EU**: CEN-ISO
- **US**: ASHRAE

**Development of GSAS Framework**

- **EU**: CEN-ISO
- **US**: ASHRAE
- **Canada**: Green Globes
- **Hong Kong**: CEPAS
- **Japan**: CASBEE

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- [1] US
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**Local**

- [1] In-house Team
- [2] Public Sector
- [3] Private Sector
# GSAS System Weighting Methodology

## MEASUREMENT METHODS

### Criteria

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Unit (m, m/sec, m², etc)</th>
<th>Yes / No (questionnaire)</th>
</tr>
</thead>
</table>

### SCORING

#### Scale

- Scale value for each criterion:
  - 3
  - 2
  - 1
  - 0 Baseline
  - -1

#### Category

- AHP (Analytic Hierarchy Process) determined weighting

#### Criteria

- **Impact weighting**
  - (Extend, Intensity, Duration)

#### Table

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Extend</th>
<th>Intensity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &lt;10m or space</td>
<td>Weak</td>
<td>Transient</td>
<td>&lt;25hr</td>
</tr>
<tr>
<td>2. 10&lt;100m or building</td>
<td>Low Single Impact</td>
<td>Weeks</td>
<td>months</td>
</tr>
<tr>
<td>3. Site</td>
<td>Low Multiple Impact</td>
<td>Years</td>
<td></td>
</tr>
<tr>
<td>4. Neighbourhood</td>
<td>Moderate Single Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Urban</td>
<td>Moderate Multiple Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Regional / National</td>
<td>Strong Single Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Global</td>
<td>Strong Multiple Impact</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Weighting for each criterion

\[ \text{Final Score for each Criterion} = a \times x \times z \]
Integrated Life Cycle Approach of GSAS

Integrated Project Life-Cycle Approach

DESIGN | CONSTRUCTION | OPERATIONS

GSAS Categories

Urban Connectivity
Site
Energy
Water
Materials
Indoor/Outdoor Environment
Cultural & Economic Value
Management & Operations

Environmental Challenges

Air Pollution
Land Use & Contamination
Fossil Fuel Depletion
Water Depletion
Water Pollution
Materials Depletion
Human Health & Comfort
Climate Change
Types of GSAS Certification

- GSAS CERTIFICATES
  - DESIGN & BUILD (GSAS-D&B)
  - CONSTRUCTION MANAGEMENT (GSAS-CM)
  - OPERATIONS (GSAS-OP)
GSAS Certification and Project Stages

**PROJECT STAGES**

**DESIGN**

- **DESK REVIEW**
  - Provisional Certificate - Letter of Conformance (LOC)

**CONSTRUCTION**

- **SITE AUDITS**
  - Conformance to Design Audit (CDA) Report
  - GSAS Design & Build Certificate

**OPERATIONS**

- **DESK REVIEW**
  - Audit Advisory Notices (AAN)
  - GSAS Construction Management Certificate

**CERTIFICATION TYPES**

- **DESIGN & BUILD**
  - Provisional Certificate - Letter of Conformance (LOC)
  - GSAS Design & Build Certificate

- **CONSTRUCTION MANAGEMENT**
  - Audit Advisory Notices (AAN)
  - GSAS Construction Management Certificate

- **OPERATIONS**
  - GSAS Energy Performance Label (EPL)
  - GSAS Water Performance Label (WPL)
  - GSAS Operations Certificate
Bar Chart as Indicated in GSAS Scoring Sheet

Categories Achieved Score vs. Attainable Score

- Management & Operations
- Cultural & Economic
- Indoor Environment
- Materials
- Water
- Energy
- Site
- Urban Connectivity

Score Comparison:
- Attainable
- Achieved

Scores shown in the chart for each category range from -0.3 to 1.0.
Line Chart as Indicated in GSAS Scoring Sheet

The chart represents the overall score with a range from -1.00 to 3.00. The certification is denied if the score falls below 0.00. The maximum rating is indicated by 3 stars, with each star representing an increase of 0.50 points in the score. The star rating system ranges from 0.00 to 3.00, with 3.00 being the highest score leading to certification.
## GSAS Design & Build
### Tabulated Certification Scores and Ratings

<table>
<thead>
<tr>
<th>SCORE</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>X &lt; 0</td>
<td>Certification Denied</td>
</tr>
<tr>
<td>0.00 ≤ X ≤ 0.50</td>
<td>★</td>
</tr>
<tr>
<td>0.50 &lt; X ≤ 1.00</td>
<td>★★</td>
</tr>
<tr>
<td>1.00 &lt; X ≤ 1.50</td>
<td>★★★</td>
</tr>
<tr>
<td>1.50 &lt; X ≤ 2.00</td>
<td>★★★★</td>
</tr>
<tr>
<td>2.00 &lt; X ≤ 2.50</td>
<td>★★★★★</td>
</tr>
<tr>
<td>2.50 &lt; X ≤ 3.00</td>
<td>★★★★★★</td>
</tr>
</tbody>
</table>
### GSAS Construction Tabulated Certification Scores and Ratings

<table>
<thead>
<tr>
<th>SCORE</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X &lt; 0.5$</td>
<td>CERTIFICATION DENIED</td>
</tr>
<tr>
<td>$0.5 \leq X &lt; 1.0$</td>
<td>CLASS D</td>
</tr>
<tr>
<td>$1.0 \leq X &lt; 1.5$</td>
<td>CLASS C</td>
</tr>
<tr>
<td>$1.5 \leq X &lt; 2.0$</td>
<td>CLASS B</td>
</tr>
<tr>
<td>$2.0 \leq X &lt; 2.5$</td>
<td>CLASS A</td>
</tr>
<tr>
<td>$X \geq 2.5$</td>
<td>CLASS A★</td>
</tr>
</tbody>
</table>
GSAS Design & Build Categories Weights

- Urban Connectivity [UC] 6%
- Site [S] 17%
- Energy [E] 24%
- Water [W] 16%
- Materials [M] 9%
- Indoor Environment [IE] 19%
- Cultural and Economic Value [CE] 4%
- Management and Operations [MO] 5%
GSAS Operations Certification Rating

Overall Score

BRONZE  SILVER  GOLD  PLATINUM  DIAMOND

Certification denied
<table>
<thead>
<tr>
<th>SCORE</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X &lt; 0.5$</td>
<td>CERTIFICATION DENIED</td>
</tr>
<tr>
<td>$0.5 \leq X &lt; 1.0$</td>
<td>BRONZE</td>
</tr>
<tr>
<td>$1.0 \leq X &lt; 1.5$</td>
<td>SILVER</td>
</tr>
<tr>
<td>$1.5 \leq X &lt; 2.0$</td>
<td>GOLD</td>
</tr>
<tr>
<td>$2.0 \leq X &lt; 2.5$</td>
<td>PLATINUM</td>
</tr>
<tr>
<td>$X \geq 2.5$</td>
<td>DIAMOND</td>
</tr>
</tbody>
</table>
GSAS Design & Build Assessment Schemes

ASSESSMENT SCHEMES

- Bespoke
- Commercial
- Districts
- Education
- Energy Centers (SEER)
- Healthcare
- Homes
- Hospitality
- Interiors
- Light Industry
- Mosques
- Neighborhoods
- Offices
- Parks
- Railways
- Renovation
- Residential
- Sports
Environment Challenges Resulting from Built Environment

- Air Pollution
- Climate Change
- Land Use & Contamination
- Fossil Fuels Depletion
- Water Depletion
- Water Pollution
- Materials Depletion
- Human Health

Environmental Challenges Resulting From Built Environment
GSAS Design & Build
Plaque of Recognition & Certificate

 Designed & built to create healthier spaces and reduce negative impacts on the environment.

GSAS Certificate
Design & Build

This is to certify that [Name of the Certificate Recipient] has successfully fulfilled the certification requirements of Global Sustainability Assessment System (GSAS) for Design & Build achieving (3) STAR rating.
GSAS Construction
Plaque of Recognition & Certificate

This is to certify that

اسم المشروع

PROJECT NAME

(Class A)

has successfully fulfilled the certification requirements of Global Sustainability Assessment System (GSAS) for Construction Management achieving (Class A) rating.

COPY ONLY NOT FOR PRINT

Dr. Yousef Mohammed Albery
Founding Chairman

GSAS Construction
GSAS Operations
Plaque of Recognition & Certificate

This is to certify that

اسم المشروع
PROJECT NAME

وذلك لاحظ متوقع شهادة المسوغة العالمية التي القيمة الاستدامة (GSAS) في التشغيل نجاح والتحقيق على المستوي الذهبي
has successfully fulfilled the certification requirements of Global Sustainability Assessment System (GSAS) for Operations achieving GOLD rating

GOLD

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Dr. Yousef Mohammed Alherr
Founding Chairman (SAAD)
GSAS Design & Build Categories

- Urban Connectivity
- Management & Operations
- Cultural & Economic Value
- Outdoor/Indoor Environment
- Site
- Energy
- Water
- Materials

Outdoor/Indoor Environment

Cultural & Economic Value

Management & Operations

Urban Connectivity

Site

Energy

Water

Materials
GSAS Operations Categories

Energy
Sustainability Awareness
Facility Management
Waste Management
Indoor Environment
Water
GSAS Design & Build Certification Process

DESIGN & BUILD CERTIFICATION

PROVISIONAL CERTIFICATION (Design Stage)
- Project Registration on GSASgate
- Assessment of Design
- Provisional GSAS Design & Build Certificate - Letter of Conformance (LOC)

FINAL CERTIFICATION (Construction Stage)
- Project Registration on GSASgate
- Conformance to Design Audit (CDA)
- GSAS Design & Build Certificate
This is to notify that GSAS Trust has assessed the project based on the submitted information. The project is found eligible to receive the Provisional GSAS-D&B Certificate in the form of “Letter of Conformance (LOC)”; achieving the following:

<table>
<thead>
<tr>
<th>SCORE</th>
<th>STAR RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.160</td>
<td>⭐⭐⭐</td>
</tr>
</tbody>
</table>

The summary of the obtained rating is attached herewith.

In the event of any future changes applied to the criteria pertaining to the issued LOC, the changes are required to be re-assessed once again.

Finally, Congratulations for partaking in this noble endeavor, and together let us build a healthy and a sustainable future.

Yours sincerely,

Dr. Yousef Alhorr
Founding Chairman
GSAS Construction Certification Flowchart - PCR Route

Registration on GSASgate

Payment of:
1. GSASgate Registration Fee
2. Certification Fee
3. PCR Review Fee

Activation of Project on GSASgate

Project Submits CMP for Review

GSAS Trust Reviews

Satisfactory?

Yes

GSAS Trust Approves CMP

*Assessment Process per Stage

Project Submits for Screening

GSAS Trust Screens

GSAS Trust Conducts Site Audit(s) to Verify the Implementation

Project Submits for PCR1

GSAS Trust Review 1

Project Submits for PCR2

GSAS Trust Review 2

Project Submits for Verification (up to each stage cut-off date)

GSAS Trust Verifies and Awards Scores

Project Acknowledges

*Assessment Process

Initiation of Enabling & Foundation Stage Assessment Processing*

GSAS Trust Issues AAN 1

*Assessment Process

Initiation of Sub & Superstructure Stage Assessment Processing*

GSAS Trust Issues AAN 2

*Assessment Process

Initiation of Finishing Stage Assessment Processing*

GSAS Trust Issues AAN 3

Project Acknowledges

*Assessment Process

Appeal Process

Initiation of Appeal Request

Payment of Appeal Fees

Projects Submits Appealed Criteria

GSAS Trust Reviews

Project Acknowledges

Issuance of GSAS-CM Certificate

Payment of:
1. GSASgate Registration Fee
2. Certification Fee
3. PCR Review Fee

Registration on GSASgate

Project Acknowledges
Audits Plan:
The required number of routine and random audits for a project as outlined in Form - 08 shall be implemented during the following phases:

**Phase (A)** Envelop Construction Works (Walls, Windows, Claddings, etc.)

**Phase (B)** Systems Installation

**Phase (C)** Commissioning Stage/Pre-occupancy

Audit Process:

1. **Registration on GSASgate**
   - Payment of:
     1. GSASgate Registration Fee
     2. CDA Fee
     3. PCR Fee, if requested

2. **Activation of Project on GSASgate**

3. **Check if New Criteria are Targeted in CDA?**
   - Yes: Payment of New Criteria Assessment Fee
   - No: GSAS Trust Screens

4. **Project Submits for Screening**

5. **GSAS Trust Screens**

6. **GSAS Trust Conducts Site Audit (Phase A) and Checks Conformance to Design Submission**

7. **Project Submits for Verification**

8. **GSAS Trust Verifies and Awards Scores**

9. **GSAS Trust Conducts Site Audit (Phase B) and Checks Conformance to Design Submission**

10. **GSAS Trust Conducts Site Audit (Phase C) and Checks Conformance to Design Submission**

11. **Project Acknowledges?**
   - Yes: Issuance of GSAS-D&B Certificate
   - No:
     - Appeal Process:
       - Initiation of Appeal Request
       - Payment of Appeal Fees
       - Project Submits Appealed Criteria
       - GSAS Trust Reviews
       - Project Acknowledges
GSAS Design & Build
Certification Flowchart - PCR Route

**Project Registration**
- Registration on GSASgate
- Payment of:
  1. GSASgate Registration Fee
  2. Provisional Certification Fee
  3. PCR Review Fee
- Activation of Project on GSASgate

**GSAS-D&B Assessment Process**
- Project Submits for PCR1
  - GSAS Trust Review 1
  - Project Submits for PCR2
  - GSAS Trust Review 2
- Project Submits for Screening
- Project Submits for Verification
- GSAS Trust Verifies and Awards Scores
- Project Acknowledges?
  - Yes: Issuance of Provisional GSAS-D&B Certificate
  - No: GSAS Trust Screens

**Appeal Process**
- Initiation of Appeal Request
- Payment of Appeal Fees
- Project Submits Appealed Criteria
- GSAS Trust Reviews
- Project Acknowledges

**Provisional Certification**
- Issuance of Provisional GSAS-D&B Certificate
- Letter of Conformance (LOC)
GSAS Design & Build Certification Flowchart - Standard Route

1. Project Registration
   - Registration on GSASgate
   - Payment of:
     1. GSASgate Registration Fee
     2. Provisional Certification Fee
   - Activation of Project on GSASgate

2. GSAS-D&B Assessment Process
   - Project Submits for Screening
   - GSAS Trust Screens
   - Project Submits for Verification
   - GSAS Trust Verifies and Awards Scores
   - Project Acknowledges?
     - Yes: Issuance of Provisional GSAS-D&B Certificate Letter of Conformance (LOC)
     - No: GSAS Trust Reviews

3. Appeal Process
   - Initiation of Appeal Request
   - Payment of Appeal Fees
   - Project Submits Appealed Criteria
   - GSAS Trust Reviews
   - Project Acknowledges
GSAS Operations Certification Flowchart

1. Project Registration
   - Registration on GSASgate
   - Payment of:
     1. GSASgate Registration Fee
     2. Certification Fee
     3. PCR Review Fee, if required
   - Activation of Project on GSASgate

2. GSAS-OP Assessment Process
   - Project Submits for Screening
   - GSAS Trust Screens
   - Project Submits for Verification
   - GSAS Trust Verifies
   - GSAS Trust Audits the Facility and Awards Score
   - Project Acknowledges?
     - Yes: Issuance of GSAS-OP Certificate
     - No: Appeal Process

3. Appeal Process
   - Initiation of Appeal Request
   - Payment of Appeal Fees
   - Project Submits Appealed Criteria
   - GSAS Trust Reviews
   - Project Acknowledges

Issuance of GSAS-OP Certificate