ENERGY EFFICIENCY AND GHG EMISSION INTENSITY VALUES FOR LOGISTICS SITES

GILA Webinar – 2 February 2023

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German, Italian and Latin American consortium for resource efficient logistics hubs & transport
<table>
<thead>
<tr>
<th>Agenda GILA webinar 02-02-2023</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome and setting the scene:</td>
<td>Andrea Fossa</td>
</tr>
<tr>
<td>Project GILA &amp; sustainability performance of logistics hubs</td>
<td></td>
</tr>
<tr>
<td>Set up of the GILA’s market studies: Objectives &amp; scope</td>
<td>Jan-Philipp Jarmer</td>
</tr>
<tr>
<td>Data base and results on GHG emissions and KPIs</td>
<td>Kerstin Dobers</td>
</tr>
<tr>
<td>Energy efficiency measures</td>
<td>Sara Perotti</td>
</tr>
<tr>
<td>Sustainable asset tool: Dashboard for logistics hubs</td>
<td>Scarlet Romano</td>
</tr>
</tbody>
</table>
German, Italian and Latin American consortium for resource efficient logistics hubs & transport

The GILA project is designed to contribute to global efforts in reducing the environmental impact of logistics sites: with view to sustainability in general & GHG emissions in specifically.

The GILA project addresses two main areas of research:

➢ Best practices & future requirements, services and concepts for sustainable logistics sites within an energy & resource efficient transport chain

➢ Methodological framework for describing detailed the environmental performance of logistics sites

Involvement of external partners

Project duration 07 / 2020 – 07 / 2023
GILA’s scope for “sustainable logistics sites”

Sustainable logistic sites aim at realising...

- carbon neutrality (if not even carbon negative)
- no accidents
- use of energy efficient solutions
- charging infrastructure for e-vehicles
- no losses
- reduced emissions
- waste reduction via prevention, reduction, recycling, reuse
- less surface sealing
- resilient to external effects
- raised sustainability awareness & behaviour
- sustainability monitoring & reports
- combines data from WMS and material handling to develop KPIs
- water & waste
- renewable energies
- refrigerants
- surface sealing
- building shell
- yard logistics
- resources & materials
- emissions
- technical building equipment
- material handling
- refurbishment, retrofitting, …
- revitalization, reuse, recycling & remediation
Measuring sustainability performance at logistics sites

Life cycle of a logistics site:

- Selection of premises, land acquisition & development
  - building shell
  - technical building equipment
- Layout & construction (premise, real estate, yard etc.)
  - yard logistics
  - material handling
- Operation of site
  - resources & materials
  - emissions
- Refurbishment, retrofitting, …
  - renewable energies
  - refrigerants
- Revitalization, reuse, recycling & remediation
  - water & waste
  - surface sealing

Indicators used in relation to relevant functional unit, e.g. throughput, m², employee:

- greenhouse gas emissions of site, service, client
- share of renewable energy
- share of on-site generated electricity
- circular products
  - share of renewable, recyclable materials
  - energy and material efficiency
  - single vs. multiple use
- embedded carbon of infrastructure or equipment
- water footprint of site
- modal split of commuting, inbound transport
- modal split of commuting, inbound transport
Motivation for measuring sustainability performance of logistics sites

- Fulfil legal requirements → Avoid that the site becomes a stranded asset!
- Prepare for certification requirements
- Understand own resource consumption for sound investment decisions
- Internal / external benchmarking
- Reduce environmental impact → resource consumption and emissions
- Prepare for clients’ requests → GHG KPIs for supply chain calculations

ISO 14083
ISO/FDIS title: Quantification and reporting of GHG emissions arising from transport chain operations

planned 05/2023
SET UP OF THE GILA’S MARKET STUDIES: OBJECTIVES & SCOPE

Jan-Philipp Jarmer
Fraunhofer IML

German, Italian and Latin American consortium for resource efficient logistics hubs & transport
GILA market study
„Energy efficiency and GHG emission intensity values for logistics sites“

There is still very little data available on environmental performance and GHG emissions reduction potential of logistics sites.

Objective
- Identify main influencing parameters on energy efficiency and GHG emissions at sites
- Elaborate average GHG emissions intensity values for sites and a reasonable classification scheme for sites

Let’s overcome this gap!

Thanks to all participating in and supporting this market study!
Changes in market study 2022
- online survey offering individual questionnaires
- thus, focus on site type specific questions
- extension by liquid/dry bulk and RoRo terminals
- inclusion of qualitative questions
- introduction of mandatory questions

Improve data base and analysis scheme

Increase of participating sites by almost factor 4 (market study 2021 → 2022)
Set-up of GILA‘s market studies

- Online REff Tool® (World)
- Excel survey (Italy)
- Online (Latin America)

- Partly done by REff Tool®
- Completeness of data
- General range of provided values (outliers)

Status quo: kg GHG per tonne or alternative base unit, m² logistical area indoor

For classification scheme: processes & temperature level

- Alignement questions among GILA partners
- Coverage of ISO/FDIS 14083 requirements
- Additional questions for further interpretation

- What are relevant GHG emission sources?
- What influences resource consumption?
- How to fill data gaps?
  - ...

Check of individual values not included
Data gaps for energy use & refrigerants refill exist

Average GHG KPIs
General analysis
GHG KPIs
Total carbon footprint
Partial carbon footprint
Calculation of GHG emissions
Validation of data
Data submission
Data collection

From measuring to reducing emissions

Focus on GHG emissions accounting aligned with ISO/FDIS 14083

Part A
- Data collection
- Validation of data
- Verification of data
- Calculation of GHG emissions
- Partial carbon footprint
- Total carbon footprint
- GHG KPIs

Part B
- Focus on improvement: Fields of action and measures for sustainable logistics sites
- Share of implementation
- Status quo

GILA's roadmap
- Average GHG KPIs
- General analysis
- Template for collecting examples

GHG KPIs
- General analysis
- Template for collecting examples

From measuring to reducing emissions:

Validation of data
- Data collection
- Data submission
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- Total carbon footprint

Share of implementation
- Status quo

GILA's roadmap
- Average GHG KPIs
- General analysis
- Template for collecting examples
From measuring to reducing emissions

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- Data collection
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- Calculation of GHG emissions
- Partial carbon footprint
- Total carbon footprint
- GHG KPIs
- Average GHG KPIs

Focus on improvement:
Fields of action and measures for sustainable logistics sites

- Share of implementation
- General analysis
- Status quo

GILA’s roadmap

# [Relamping & sensors]

Visualisation

- Analysis of plant data
- Design & construction
- Operation
- Renovation
- Rationalization

General Description
- Relamping facility to LED
- Sensors that turn on/off by presence and adjust intensity according to external light

Key Facts Measure
- Implementation scenario: N/A
- Implementation time: N/A
- Savings:
  - Cost: X
  - Before: xxx kWh
  - After: yyy kWh
  - Result: -xxx kWh (-xx%)

Key Facts Hub
- Location: City
- Logistic area: x m²
- Throughput: y tons
- No. of employees: z
- No controlled temp

Recommendations
- What planning tasks / other measures should be carried out in advance?
- What lessons were learned during implementation?

Let’s learn from each other!
Which data was submitted by companies?

Classification of site

- **Type**: Transhipment, warehouse, storage and transhipment, container terminal, liquid bulk terminal etc.
- **Temperature level**: ambient, chilled, frozen, mixed

Basic data

- Location (country), building year, size, operation
Which data was submitted by companies?

**Annual data**
- **Throughput**
- **Consumption**: electricity, heating energy, other energy, refill of refrigerants, (transport packaging)

**Sustainability measures**
- Implementation or priorities of 31 measures
GILA MARKET STUDY 2022:
DATA BASE AND RESULTS ON GHG EMISSIONS AND KPIS

Kerstin Dobers
Fraunhofer IML

Logistics sites
Tran-shipment site
Inland container terminal
Intermodal terminal
Ambient warehouse
Repacking site (automotive)
Maritime container terminal
Parcel center
Air freight hub
Refrigerated warehouse
Ferry terminal
City-logistics hub

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GILA
German, Italian and Latin American consortium for resource efficient logistics hubs & transport
Date base of GILA market study 2021 & 2022

2021
159 sites
> 2.58 Mio. m² logistical area indoors
> 110 Mio. tonnes outgoing goods
no terminals

2022
605 sites
> 9.45 Mio. m² logistical area indoors
sites(1): > 44 Mio. t outgoing goods
terminals(2): > 213 Mio. t outgoing goods

14 countries
44 countries
x 3.8
x 3.7
x 0.4

(1) warehouses & transhipment sites
(2) terminals (container, liquid bulk)
Sample size: From total number of participants to final KPIs

Data collection from May to November 2022

Sample size 2022

- Data collection
- Validation of data
- Verification of data
- Calculation of GHG emissions
- Partial carbon footprint
- Total carbon footprint

GHG KPIs

- Average GHG KPIs
- General analysis

GHG per tonne: 211
GHG per m²: 262

Info on underlying sample size

Data collection from May to November 2022

Sample size: From total number of participants to final KPIs

Data collection from May to November 2022

Sample size 2022

- Data collection
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- Calculation of GHG emissions
- Partial carbon footprint
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GHG KPIs

- Average GHG KPIs
- General analysis

GHG per tonne: 211
GHG per m²: 262

Info on underlying sample size

Data collection from May to November 2022
Data base of GILA market study 2022

In total 605 sites
44 countries worldwide

> 9.45 Mio. m² logistical area indoors\(^{(1)}\)

sites\(^{(1)}\): > 44 Mio. tonnes outgoing goods

terminals\(^{(2)}\): > 213 Mio. tonnes outgoing goods

539 with real estates \(^{(1)}\)

66 terminals \(^{(2)}\)

> 9.45 Mio. m² logistical area indoors\(^{(1)}\)

sites\(^{(1)}\): > 44 Mio. tonnes outgoing goods

terminals\(^{(2)}\): > 213 Mio. tonnes outgoing goods

Completeness of data sets\(^{(3)}\)

<table>
<thead>
<tr>
<th>KPI sample size</th>
<th>kg CO(_2)e/tonne</th>
<th>kg CO(_2)e/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>W, T, S+T (^{(1)})</td>
<td>159</td>
<td>262</td>
</tr>
<tr>
<td>Terminals (^{(2)})</td>
<td>52</td>
<td>n/a</td>
</tr>
<tr>
<td>All</td>
<td>211</td>
<td>262</td>
</tr>
</tbody>
</table>

\(^{(3)}\) total carbon footprint, throughput, logistical area indoors

\(^{(1)}\) warehouses & transhipment sites

\(^{(2)}\) terminals (container, liquid bulk)
Data base of GILA market study 2022
Number of sites per category (type, temperature level)
Data base of GILA market study 2022
Age, size, height, throughput and dwell time

- **Logistic area indoor**
  - Min: 180 m²
  - Median: 12,000 m²
  - Max: 750,000 m²

- **Building height**
  - Min: 3 m
  - Median: 10.7 m
  - Max: 31 m

- **Throughput**
  - **Storage & transhipment**
    - Min: 18 t
    - Median: 70,000 t
    - Max: 1.3 Mio t
  - **Liquid bulk terminals**
    - Min: 500 t
    - Median: 700,000 t
    - Max: 108 Mio t

- **Dwell time**
  - **Warehouses**
    - Min: 1 d
    - Median: 20 d
    - Max: 12 a
  - **Liquid bulk terminals**
    - Min: 1 d
    - Median: 30 d
    - Max: 1 a

50% of the sites were built in 2006 or later.
Data base of GILA market study 2022

Data availability

<table>
<thead>
<tr>
<th>Category</th>
<th>Data Provided</th>
<th>No Data Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of electricity</td>
<td>91%</td>
<td></td>
</tr>
<tr>
<td>Use of heating energy</td>
<td>85%</td>
<td></td>
</tr>
<tr>
<td>Use of other energy</td>
<td>63%</td>
<td></td>
</tr>
<tr>
<td>Refill of refrigerants</td>
<td>38%</td>
<td></td>
</tr>
<tr>
<td>Transport packaging (1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) at warehouses and transhipment sites (excl. terminals)
What are relevant GHG emission sources at logistics sites?

- Reduced database: analysis of site with total carbon footprint
- 91% of the carbon footprint\(^{(2)}\) of the logistics sites result from energy use (75% electricity, 13% heating, 2% material handling)
- 4% of the GHG emissions result from leakage of refrigerants (estimated by refills)
- 5% of the GHG emissions are caused indirectly by the use of transport packaging\(^{(3)}\)

(1) warehouses, and transhipment sites (excl. terminals)
(2) national electricity mix (location based)
(3) emissions refer to transport packaging from plastics and cardboard
What are relevant GHG emission sources at logistics sites?

- National electricity mix (location based)
- Emissions refer to transport packaging from plastics and cardboard

(1) National electricity mix (location based)
(2) Emissions refer to transport packaging from plastics and cardboard
What are relevant GHG emission sources at liquid bulk terminals?

- Reduced database: analysis of terminals with total carbon footprint
- The carbon footprint\(^{(1)}\) of the liquid bulk terminals result from energy use
  - 40% electricity
  - 53% heating
  - 7% material handling

\(^{(1)}\) national electricity mix (location based)
What is the electricity used for?
Allocation to activity clusters for site types

► **23% of the sites** allocated their electricity consumption to activity clusters
► They represent **11% of the total electricity consumption** of the market study
► They allocated **83% of their consumption** to the predefined activity clusters, i.e. 9% of the total market study

► **Overall shares per activity cluster:**
  - Chilling of goods 35%
  - Lighting indoors 28%
  - Material handling 19%
  - Yard logistics
  - HVAC
  - IT (e.g. server rooms)
  - Rest
What is the electricity used for?
Allocation to activity clusters for temperature level

Frozen and chilled sites use most electricity for temperature control
- 78% and 70% respectively
- remark: small sample size
How renewable is the electricity used?

► At least 15% of the total electricity consumed bases on greener energy sources than the national electricity mix
   - 193 sites use electricity that is “greener” than the national mix
   - [2021 study: 67% of the total was greener than national mix]

► More than 70% of the total consumption bases on national electricity mix

► 43 sites\(^{(1)}\) (7%) produce electricity on-site with PV panels,
   - representing 10% of the total electricity consumption of market study
   - with a share from 0.04% to 100% of the site’s total electricity consumption

\(^{(1)}\) located in Italy (34), Germany, Sweden, UK, Taiwan and Thailand
Emission intensity values for logistics sites

Annual carbon footprint (CF)
- Total annual CF of logistics site
  kg CO$_2$e / a

Emission intensity values
- based on throughput
  - kg CO$_2$e / tonne
  - kg CO$_2$e / pallet
  - kg CO$_2$e / m$^3$ goods

Emission intensity values
- based on site parameters
  - kg CO$_2$e / m$^2$
  - kg CO$_2$e / m$^3$ real estate

ISO 14083:
- kg CO$_2$e / tonne

Suggested categorization of logistics hubs
- Stock-keeping requirement:
  - transhipment
  - transhipment + storage
  - warehouses
  - terminal

- Site conditions:
  - ambient
  - chilled
  - frozen
  - mixed
Emission intensity values for logistics sites

Annual carbon footprint (CF)
- Total annual CF of logistics site kg CO₂ e / a

Emission intensity values
- based on throughput kg CO₂ e / tonne
- ISO 14083: kg CO₂ e / tonne

<table>
<thead>
<tr>
<th>Work in progress!!</th>
<th>Ambient</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transhipment</td>
<td>0.5 kg CO₂ e / t n=55</td>
<td>3.6 kg CO₂ e / t n=4</td>
</tr>
<tr>
<td>Storage + transhipment</td>
<td>2.1 kg CO₂ e / t n=45</td>
<td>11.1 kg CO₂ e / t n=7</td>
</tr>
<tr>
<td>Warehouse</td>
<td>27.8 kg CO₂ e / t n=36</td>
<td>26.8 kg CO₂ e / t n=8</td>
</tr>
<tr>
<td>Liquid bulk terminal</td>
<td>3.7 kg CO₂ e / t n=21</td>
<td>6.4 kg CO₂ e / t n=26</td>
</tr>
</tbody>
</table>

Remark: A comparison with initial KPI values from 2021 market study is not reasonable as 2021 sample size included sites with partial carbon footprint which may reduce values decisively.
Emission intensity values for logistics sites

**Emission intensity values**
- based on site parameters
  - kg CO₂e / m²

**Annual carbon footprint (CF)**
- Total annual CF of logistics site
  - kg CO₂e / a

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**Work in progress!!**

<table>
<thead>
<tr>
<th></th>
<th>Ambient</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transhipment</td>
<td>10.2 kg CO₂e / m²</td>
<td>55.3 kg CO₂e / m²</td>
</tr>
<tr>
<td>Storage + transhipment</td>
<td>14.4 kg CO₂e / m²</td>
<td>22.6 kg CO₂e / m²</td>
</tr>
<tr>
<td>Warehouse</td>
<td>12.6 kg CO₂e / m²</td>
<td>14.9 kg CO₂e / m²</td>
</tr>
</tbody>
</table>

**Work in progress!!**

<table>
<thead>
<tr>
<th></th>
<th>Chilled</th>
<th>Frozen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage + transhipment</td>
<td>58.8 kg CO₂e / m²</td>
<td>61.9 kg CO₂e / m²</td>
</tr>
</tbody>
</table>

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Remark:
Due to low sample size, m²-based KPIs were not elaborated in 2021 market study.
What to do if not all data is available?

**Partial CF**
- Total annual CF of logistics site
  - kg CO$_2$e / a

**Idea:**
Data base on average resource use

**Resource clusters**

<table>
<thead>
<tr>
<th>Site type</th>
<th>Electricity</th>
<th>Heating</th>
<th>Material handling</th>
<th>Refrigerants</th>
</tr>
</thead>
<tbody>
<tr>
<td>T, a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S+T, a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>W, a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Individual GHG KPI**
- x% primary data
- y% secondary data

**Electricity & heating energy**

**Energy for material handling**
Interim conclusions & short outlook

Great extension of global data base (sample size)

More participating companies
Additional sites

Duplicated data sets online

Further analysis on influencing factors (e.g. implemented measures)

Further enhance quality of KPIs

Include further site types

Initial set of average KPIs

Aligned with ISO/FDIS 14083

Online calculation of
• total carbon footprint & individual KPIs
• partial carbon footprint

Increase share of complete data sets

100% primary data
x% primary data
y% secondary data

Total carbon footprint
Partial carbon footprint
Individual GHG KPI
Average GHG KPIs

Great extension of global data base (sample size)

Extend survey by new resources (e.g. steam)

Update of provided data by duplication of data sets online
ENERGY EFFICIENCY MEASURES

Sara Perotti
Politecnico di Milano

German, Italian and Latin American consortium for resource efficient logistics hubs & transport
Energy efficiency measures

Analysis of 31 design variables referred to 6 different areas of intervention

**Green building & yard**
Thermal insulation, loading docks with insulated doors, cool roof, green roof, unsealing of yard, biodiversity, climate resilience, inclusive design

**Lighting**
LED lamps, natural lighting & white walls, solar tubes, sensors for reducing lighting consumption

**Material handling & automation**
Lithium-ion batteries, hydrogen powered fuel cell forklifts, hybrid forklifts, high frequency battery charging, sensors for reducing MHS consumption, energy recovery during braking

**Utilities**
Self-generated power, photovoltaic, solar panels, wind power, fuel cells or batteries for energy provision, smart HVAC systems, rainwater collection & reuse systems, smart metering/data collection

**Materials management**
Packaging reduction, separation of waste fractions for better recycling, packaging reuse & recycle, use of renewable & biobased materials, use of recycled materials, local sourcing of materials

**Operational practices**
Travel distance optimization for MHS, optimal planning for MH activities & battery charging, optimized location of charging equipment, energy efficient behavior, support of sustainable commuting

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HVAC – Heating, ventilation, air conditioning, MH - material handling, MHS – material handling systems
Green building
Current adoption vs. prospective scenario

► 115 sites provided answers on the measure “Thermal insulation”, half of which have implemented it.
► Loading docks with insulated doors is another widespread solution (33 sites).
► Innovative solutions such as cool roof and green roof are still scarcely adopted.
Utilities
Current adoption vs. prospective scenario

► Photovoltaic panels for own use and smart HVAC systems are particularly widespread (40 resp. 29 sites).

► Priorities for future interventions seem to confirm a market interest in both (16-20 sites) as well as smart metering (26 sites).
LED lighting is the most implemented solution by far (113 sites), followed by sensors for reducing consumption (95 sites).

A relevant share also uses natural lighting and white walls (41%) for energy efficient working conditions.
Material handling and automation
Current adoption vs. prospective scenario

- Current adoption is mainly concentrated on forklifts,
  - especially lithium-ion batteries (75 sites), high-frequency battery charging (47 sites) or fuel cell/battery hybrid forklift (34 sites).
Operational practices
Current adoption vs. prospective scenario

► Improvement by **optimising the location of charging equipment** of material handling system has been adopted by 45 sites.

► Almost all sites already support or plan to encourage **energy efficient behaviour** (44% resp. 54%), one third of the sites support **sustainable commuting**.
High adoption: One of the main levers for companies consists in the improvement of packaging materials used, according to two main strategies:

- adopting more sustainable materials (local sourcing, renewable/bio-based materials), and
- working on processes (packaging reduction, enhancing materials reuse and recycle)
Summary on energy efficiency measures

► The solutions adopted mainly refer to **Green Building, Lighting,**
  **Materials management** and **Operational practices.**

► Increasing interest in existing and new sustainability measures can be stated.

► Industry ask for best practice and implementation guidance.
GILA market study 2023
Interested in participating?

Please contact one of us:

- Andrea Fossa: andrea.fossa@greenrouter.com
- Sara Perotti: sara.perotti@polimi.it
- Kerstin Dober: kerstin.dobers@iml.fraunhofer.de
- G. Wilmsmeier: g.wilmsmeier@uniandes.edu.co

No matter …
- how many sites you want to contribute
- which country the site(s) is/are located
- which site type the site(s) can be allocated to
- how experienced you may be regarding carbon accounting

Data collection is from March 1st to May 30th 2023!

No deadline extension for market study possible as the GILA project ends in summer. [REff Tool® can further be used!]
GILA’s tasks for remaining months

► GILA market study 2023 (data collection March – May)
► Consolidated analysis of market studies (2021, 2022, 2023)
  – elaborating average KPI values for selected site types
  – identifying interdependencies of sustainability measures and carbon footprint results
► Collection of implementation examples of sustainable measures (→ template)
► Development of an online platform “Sustainable Logistics Sites”
  – Basic information on sustainability measures
  – Provision of templates for examples of sustainable measures
► Support of implementing coming ISO 14083 (planned for May 2023)
  – by market study, update of guidelines(1), elaboration of examples.

SUSTAINABLE ASSET TOOL
Dashboard for Logistics Hubs

Scarlet Romano
Arcadis Deutschland

German, Italian and Latin American consortium for resource efficient logistics hubs & transport
Sustainable services required by the market

Most required sustainable services in 2022

There is a demand for predictive energy management, net zero carbon strategies and costs associated in logistic hubs.
“A dashboard is a way of displaying various types of visual data in one place. Usually, a dashboard is intended to convey different, but related information in an easy-to-digest form”

- Easy to use and understand
- Can showcase numerous data visualizations side by side
- Provide a general transparent summary information (quality related to the amount of information available)
- Higher investment of resources at the beginning to systematize and organize the information compared to a manual process but this is reduced over time

Objective:

1. Provide a platform “Sustainable Assessment tool” for owners, FM, researchers, etc., to make better, more informed and data-driven decisions.

The outcome are:

A. Embodied carbon benchmark
B. Summary Report on Capex (Maintenance Technical Expenditures) and CarbEx (Carbon Expenditures)
C. Summary Report on inflation rates
EXAMPLE:
A model for single-building/single-use facilities
To estimate electric and fuel usage, as well as estimate potential areas for savings

https://c03.apogee.net/mvc/home/comcalc/eac?utilityname=union-power
Methodology
3 steps to achieve Sustainability Asset tool

STEP 1
Data Collection

STEP 2
Definition of Benchmark

STEP 3
Visualization Dashboard
Data collection

What information is required?
HOW OUR SOLUTION WORKS?

1. Get Data
   - ESG CDD
   - Reports
   - Manual DataSet
   - + information = + % of reliability of the results

2. Train Model & Validation
   - Data collection
   - Data ownership & Custody
   - Who owns the customer details?
   - Who has the authority to decide the next steps?
   - Who is most impacted by data accuracy?
   - Training is required

3. Clean, Prepare & Manipulate Data

4. Test Data

5. Improve
   - Anonymous information available to the public
   - Agreement

Conditions included in the contracts & implementation of constant revisions of the available information
Definition of benchmark

STEP 2

How Do We Extract the Key Data?
HOW OUR SOLUTION WORKS?

1. Get Data
   - ESG
   - CDD
   - Reports

2. Clean, Prepare & Manipulate Data
   - Benchmark/Data Set creation

3. Train Model & Validation
   - Dashboard creation

4. Test Data
   - User input-test run

5. Improve
   - Benchmark expansion + Machine Learning

[Diagram showing the process with hexagons for each step]
Dashboard visualization

Information Required from User

STEP 3
Visualization Dashboard

Input

- Data Preprocessing

ESG CDD

Reports

Power BI Visualization

Output

- Visualized Dashboard

- Embodied Carbon Benchmark
- CarbEx
- Capex
- Inflation Rate
3 Dashboard visualization

Information Required from User

STEP 3

Visualization Dashboard

Sustainable Asset Tool

Energy Data Source

Year Constructed
2007

Building Area, sq.m.
49,331.00

Asset Type
Warehouse

Primary Energy Demand
105.00

Requirement Primary Energy Demand
86.00

CarbEx
€ 271.3K
Year 1

CapEx
€ 319.7K
Year 2-5

Inflation rate
5%

€ 4.5M
Year 5-10
ENERGY EFFICIENCY AND GHG EMISSION INTENSITY VALUES FOR LOGISTICS SITES

GILA Webinar – 2 February 2023

Thank you for your participation!

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German, Italian and Latin American consortium for resource efficient logistics hubs & transport
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The GILA project is designed to contribute to global efforts in reducing the environmental impact of logistics sites.

It addresses two main areas of research:

(1) Best practices & future requirements, services and concepts for sustainable logistics sites within an energy & resource efficient transport chain

(2) Methodological framework for describing detailed the environmental performance of logistics sites

The work is performed collaboratively by 10 international partners.
References


- ISO/FDIS 14083 „Greenhouse gases – Quantification and reporting of greenhouse gas emissions arising from transport chain operations


- LinkedIn Group of project GILA: https://www.linkedin.com/groups/13969874/