Test case scenarios

UC1: Calculate Scope 1 emissions

Test case ID	**UC1_TC1**
Description	Verify that the system can successfully calculate GLEC Framework Scope 1 Emissions when all general information is provided
Test Steps	1. User requests Scope 1 emission calculation providing the following information during a Well-to-Wheel road transportation activity: ◦ Gasoline Van using Gasoline/Ethanol 95/5 Blend and consuming `85,364l` ◦ 7.5 t Diesel Truck using Diesel/Biodiesel Blend 95/5 and consuming `127,257l` ◦ 40 t/Class 8 Truck using Diesel/Biodiesel Blend 95/5 and consuming `7,486l` 2. User sends the request to the application 3. System accepts the request 4. System performs calculation 5. System responds with the following information: ◦ Total of 666153 `kg of CO2-equivalent` emissions ◦ Gasoline Van total of `239,019kg of CO2-equivalent` emissions ◦ 7.5 t Diesel Truck total of `403,404kg of CO2-equivalent` emissions ◦ 40 t/Class 8 Truck total of `23,730kg of CO2-equivalent` emissions
Expected Result	The `kg of CO2-equivalent` produced by the fuel consumption given by the User

Test case ID	**UC1_TC2**
Description	Verify that the system can successfully calculate more detailed GLEC Framework Scope 1 Emissions when all detailed information is provided
Test Steps	1. User requests Scope 1 emission calculation providing a consumption of `374,285l` of diesel-biodiesel blend 95/5 during a a Tank-to-Wheel activity 2. User sends the request to the application 3. System detects that transportation type is missing 4. System responds with a missing transportation type
Expected Result	The `kg of CO2-equivalent` produced by the fuel consumption by each of the vehicles given by the User

Test case ID	UC1_TC3
Description	Verify that System returns an error when any of the required information fields are missing, which are: - The type of transport (Transport mode) - The fuel in `kg` or `l` used during transport - The type of fuel used during transport - Emission type (Well-to-Tank, Tank-to-Wheel, Well-to-Wheel)
Test Steps	1. User requests Scope 1 emission calculation missing one or more of the required information 2. User sends the request to the application 3. System detects that information is missing 4. System responds with a data missing error
Expected Result	System error informing of missing data during the calculation

Test case ID	UC1_TC4
Description	Verify that System returns an error when calculation can't be performed
Test Steps	1. User requests Scope 1 emission calculation providing a consumption of `374,285l` of orange juice blend 95/5 during a Tank-to-Wheel road transportation activity 2. User sends the request to the application 3. System accepts the request 4. System tries to perform such calculation but provided data is not correct 5. System responds with a calculation not possible error
Expected Result	System error informing of not possible to perform such calculation

UC2: Calculate Scope 2 emissions

Test case ID	UC2_TC1
Description	Verify that the system can successfully calculate Scope 2 Emissions when all necessary information is provided.
Test Steps	1. Authenticate as a regular user. 2. Enter valid basic information required for Scope 2 Emissions calculation. 3. Send the request to the application. 4. Verify that the system processes the request without errors. 5. Check if the system sends the correct result back to the user.
Expected Result	The system should calculate and return the correct Scope 2 Emissions value.

Test case ID	UC2_TC2
Description	Verify that the system handles a scenario where the user does not provide all the necessary information.
Test Steps	1. Authenticate as a regular user. 2. Enter incomplete or missing basic information required for Scope 2 Emissions calculation. 3. Send the request to the application. 4. Verify that the system detects the missing information. 5. Check if the system provides an appropriate error message to the user.
Expected Result	The system should detect the missing information and provide a clear error message to the user.

Test case ID	UC2_TC3
Description	Verify that the system restricts unauthorized users from accessing the Scope 2 Emissions calculation.
Test Steps	1. Attempt to access the Scope 2 Emissions calculation without authentication. 2. Enter valid basic information. 3. Send the request to the application. 4. Verify that the system denies access and returns an unauthorized error message.
Expected Result	The system should deny access to unauthorized users and return an appropriate error message.

UC3: Calculate Scope 3 emissions

Test case ID	UC3_TC1
Description	Verify that the system can successfully calculate GLEC Framework Scope 3 Emissions when all general information is provided

Test case ID	**UC3_TC1**
Test Steps	1. User requests Scope 3 emission calculation using the following information from a road transport: ◦ Vehicles using a Diesel/Biodiesel Blend consumed `374,285l` of fuel ◦ Vehicles using a Gasoline/Ethanol Blend consumed `85,364l` of fuel 2. User sends the request to the application 3. System accepts the request 4. System performs calculation 5. System responds with the following information: ◦ Emissions by first vehicle type `235,800 kg of CO2-equivalent` ◦ Emissions by second vehicle type `42,682 kg of CO2-equivalent` ◦ Total of `278,482 kg of CO2-equivalent` emissions
Expected Result	The `kg of CO2-equivalent` produced by the fuel consumption given by the User

Test case ID	**UC3_TC2**
Description	Verify that the system can handle missing information when any of the required information fields are missing, which are: • The type of transport (Transport mode) • The fuel in `kg` or `l` used during transport • The type of fuel used during transport • Emission type (Well-to-Tank, Tank-to-Wheel, Well-to-Wheel)
Test Steps	1. User requests Scope 3 emission calculation using the following information from a road transport: ◦ Vehicles consumed `187,000l` of fuel 2. User sends the request to the application 3. System detects that fuel type is missing 4. System responds with an error message indicating that fuel type is missing
Expected Result	An error informing the user what information is missing

Test case ID	**UC3_TC3**
Description	Verify that System returns an error when there is no corresponding emission factor for the provided information

Test case ID	UC3_TC3
Test Steps	1. User requests Scope 3 emission calculation providing a consumption of 374285 `l` of rainbow blend 95/5 during a Tank-to-Wheel road transportation activity 2. User sends the request to the application 3. System detects that there is no emission factor for the provided fuel type 4. System responds with an error message indicating that there is no emission factor for the provided fuel type
Expected Result	System error informing of missing emission factor for the provided fuel type

Test case ID	UC3_TC4
Description	Verify that System can perform calculations using other possible input data
Test Steps	1. User requests Scope 3 emission calculation using the following information from an air transport activity: ◦ Plane using Jet Fuel A assuming a standard emission intensity of `0.702 kg CO2e/tkm` ◦ The total tonne-kilometers of the transport is `1,301 tkm` 2. User sends the request to the application 3. System accepts the request 4. System performs calculation 5. System responds with the following information: ◦ Total emissions of that transport activity `913 kg of CO2-equivalent`
Expected Result	The `kg of CO2-equivalent` produced by the fuel consumption given by the User

UC4: Edit emission factors

Test case ID	UC4_TC1
Description	Verify that the Administrator can successfully edit an emission factor to the database.
Test Steps	1. Authenticate as an Administrator 2. Send a request to edit an emission factor with the new value 3. Verify that the system processes the request 4. Check if the system eidts the emission factor 5. Confirm that the Administrator receives a success message

Test case ID	UC4_TC1
Expected Result	The emission factor should be edited in the application, and the Administrator should receive a success message

Test case ID	UC4_TC2
Description	Verify that the system handles a scenario where the emission factor being edited already has the same value
Test Steps	1. Authenticate as an Administrator 2. Send a request to edit an emission factor with the new value 3. Verify that the system detects that the new emission factor provided is the same as the old one 4. Check if the system provides an appropriate error message to the Administrator
Expected Result	The system should notify the user that the new emission factor is the same as the old one

Test case ID	UC4_TC3
Description	Verify that the system handles a scenario where the Administrator inserts an invalid value for the emission factor
Test Steps	1. Authenticate as an Administrator 2. Send a request to change the emisison factor to an invalid value 3. Verify that the system detects the invalid value 4. Check if the system provides an appropriate error message to the Administrator
Expected Result	The system should detect the invalid value and provide an error message to the Administrator

UC5: Add emission factors

Test case ID	UC5_TC1
Description	Verify that the Administrator can successfully add an emission factor to the database.
Test Steps	1. Authenticate as an Administrator 2. Send a request to add a valid emission factor. 3. Verify that the system processes the request. 4. Check if the system adds the emission factor. 5. Confirm that the Administrator receives a success message.
Expected Result	The emission factor should be added to the application, and the Administrator should receive a success message.

Test case ID	UC5_TC2
Description	Verify that the system handles a scenario where the emission factor being added already exists in the database.
Test Steps	1. Authenticate as an Administrator 2. Send a request to add an emission factor that already exists in the database. 3. Verify that the system detects the existing emission factor. 4. Check if the system provides an appropriate error message to the Administrator.
Expected Result	The system should detect the existing emission factor and provide an error message to the Administrator.

Test case ID	UC5_TC3
Description	Verify that the system handles a scenario where the Administrator inserts an invalid value for the emission factor.
Test Steps	1. Authenticate as an Administrator 2. Send a request to add an invalid emission factor. 3. Verify that the system detects the invalid value. 4. Check if the system provides an appropriate error message to the Administrator.
Expected Result	The system should detect the invalid value and provide an error message to the Administrator.

UC6: Remove emission factors

Test case ID	UC6_TC1
Description	Verify that the system can successfully remove emission factors
Test Steps	1. User requests to remove a certain emission factor by providing valid indormation such as the ID 2. System find the emission factor the User refers to 3. System removes the emission factor 4. System responds with a operation successful message
Expected Result	The emission factor is not longer available in the system

Test case ID	UC6_TC2
Description	Verify that System returns an error when trying to delete a non existing emission factor

Test case ID	UC6_TC2
Test Steps	1. User requests to remove a certain emission factor by providing valid indormation such as the ID 2. System can’t find the emission factor the User refers to 3. System responds with a cannot find the given emission factor error or not possible to delete such emission factor error
Expected Result	System returns an error when is not possible to remove an emission factor

UC7: Read emission factors

Test case ID	UC7_TC1
Description	Verify that the system can successfully return emission factors
Test Steps	1. User requests to read all emission factors 2. System finds all emission factors 3. System returns all emission factors
Expected Result	The system returns all emission factors

Test case ID	UC7_TC2
Description	Verify that System can return filtered emission factors
Test Steps	1. User requests to read emission factors for a specific transport mode 2. System finds emission factors for the specific transport mode 3. System returns emission factors for the specific transport mode
Expected Result	System returns emission factors for a specified set of filters like transport mode, fuel type, emission type

UC8: User authentication

Test case ID	UC8_TC1
Description	Verify that the User provided valid authentication credentials
Test Steps	1. Send the credentials to be verified 2. Verify that the system responded with a success message
Expected Result	The user has been authenticated

Test case ID	UC8_TC2
Description	Verify that the User provided invalid credentials
Test Steps	1. Send the credentials to be verified 2. Verify that the system responded with an error message

Test case ID	UC8_TC2
Expected Result	The system should detect the the invalid credentials and respond with an error message

UC9: Store emission calculation results

Test case ID	UC9_TC1
Description	Verify that the User can successfully store the result of their calculation for later use and/or review.
Test Steps	1. Authenticate as a User. 2. Complete an emission calculation. 3. See the result of the calculation. 4. Send a request to the system to save the calculation. 5. Verify that the system processes the request. 6. Check if the system stores the calculation result. 7. Confirm that the system returns a success message to the User.
Expected Result	The calculation result should be successfully stored within the application, and the User should receive a success message.

Test case ID	UC9_TC2
Description	Verify that the system handles a scenario where the calculation fails, and the User attempts to store the result.
Test Steps	1. Authenticate as a User. 2. Start an emission calculation that fails 3. Attempt to save the result of the failed calculation. 4. Verify that the system detects the calculation failure. 5. Check if the system provides an appropriate error message to the User.
Expected Result	The system should detect the calculation failure and provide an error message to the User.

Test case ID	UC9_TC3
Description	Verify that the system handles a scenario where communication to the database fails when the User attempts to store a calculation result.

Test case ID	UC9_TC3
Test Steps	1. Authenticate as a User. 2. Complete an emission calculation successfully. 3. See the result of the calculation. 4. Send a request to the system to save the calculation. 5. Simulate a database communication failure during the storage process. 6. Verify that the system appropriately handles the database communication failure.
Expected Result	The system should handle the database communication failure gracefully and provide an error message or notification to the User indicating the failure to store the calculation result.

UC10: Check for past GHG emissions calculations

Test case ID	UC10_TC1
Description	Verify that the system can successfully provide all the past emissions calculations belonging to a certain user
Test Steps	1. User requests to view past emissions calculations 2. System finds past emissions calculations belonging to the User 3. System returns all the past emissions calculations that has found
Expected Result	All the past emissions calculations belonging to the User

Test case ID	UC10_TC2
Description	Verify that the system returns empty list when no past emissions calculations exist for a certain user
Test Steps	1. User requests to view past emissions calculations with or without providing filter options 2. System can’t find past emissions calculations belonging to the User 3. System returns an empty list
Expected Result	Empty list

Test case ID	UC10_TC3
Description	Verify that the system returns past emissions calculations, matching certain filter conditions, belonging to a certain user

Test case ID	UC10_TC3
Test Steps	1. User requests to view past emissions calculations providing valid filter options like calculation dates or period 2. System finds past emissions calculations matching filter conditions and belonging to the User 3. System returns the found past emissions calculations
Expected Result	The found past emissions calculations belonging to the User

Test case ID	UC10_TC4
Description	Verify that System returns an error when an invalid filter is provided
Test Steps	1. User requests to view past emissions calculations providing invalid filter options like invalid dates 2. System can’t parse the provided filter 3. System returns invalid filter error
Expected Result	System error informing of an invalid filter provided

UC11: Manage the previously stored emission calculations

Test case ID	UC11_TC1
Description	Verify that the system can handle delete requests for past emissions calculations.
Test Steps	1. User requests to delete a past emissions calculation 2. System finds past emissions calculations belonging to the User 3. System deletes the past emissions calculation
Expected Result	The past emissions calculation is deleted

Test case ID	UC11_TC1
Description	Verify that the system can handle edit requests for past emissions calculations.
Test Steps	1. User requests to edit a past emissions calculation 2. System finds past emissions calculations belonging to the User 3. System updates the meta data of the past emissions calculation
Expected Result	The past emissions calculation is updated

Test case ID	UC11_TC3
Description	Verify that the system returns an error when the User requests to manage an emission that does not exist

Test case ID	UC11_TC3
Test Steps	1. User requests to manage a past emissions calculation 2. System can’t find past emissions calculations belonging to the User 3. System returns an error
Expected Result	System error informing of an invalid past emissions calculation

UC12: API overview

Test case ID	UC12_TC1
Description	Verify that the API overview has been sent
Test Steps	1. Authenticate as a User of the system (Administrator/User) 2. Send a request to view the API overview 3. Verify that the system processes the request 4. Check if the system returns the API overveiw 5. Confirm that the User receives a success message
Expected Result	The API overview has been sent to the user

UC13: Batch calculations

Test case ID	UC13_TC1
Description	Verify that the system can successfully execute batch calculations when all general information is provided

Test case ID	UC13_TC1
Test Steps	1. User requests batch emission calculations providing the following information: ◦ Well-to-Wheel road transportation activity: ▪ Gasoline Van using Gasoline/Ethanol 95/5 Blend and consuming `85,364l` ▪ 7.5 t Diesel Truck using Diesel/Biodiesel Blend 95/5 and consuming `127,257l` ▪ 40 t/Class 8 Truck using Diesel/Biodiesel Blend 95/5 and consuming `7,486l` ◦ Road transport activity: ▪ First Vehicle using a Diesel/Biodiesel Blend consumed `374,285l` of fuel ▪ Second Vehicle using a Gasoline/Ethanol Blend consumed `85,364l` of fuel 2. User sends the request to the application 3. System accepts the request 4. System performs calculation 5. System responds with the following information: ◦ Total of `944,635 kg of CO2-equivalent` emissions ▪ Gasoline Van total of `239,019 kg of CO2-equivalent` emissions ▪ 7.5 t Diesel Truck total of `403,404 kg of CO2-equivalent` emissions ▪ 40 t/Class 8 Truck total of `23,730 kg of CO2-equivalent` emissions ▪ Emissions by first vehicle type `235,800 kg of CO2-equivalent` ▪ Emissions by second vehicle type `42,682 kg of CO2-equivalent`
Expected Result	The `kg of CO2-equivalent` produced by the fuel consumption given by the User

Test case ID	UC13_TC2
Description	Verify that System returns an error when calculation can’t be performed

Test case ID	**UC13_TC2**
Test Steps	1. User requests batch emission calculations providing the following information: ◦ Well-to-Wheel road transportation activity: ▪ Gasoline Van using orange juice 95/5 Blend and consuming `85,364l` ▪ 7.5 t Diesel Truck using Diesel/Biodiesel Blend 95/5 and consuming `127,257l` ▪ 40 t/Class 8 Truck using Diesel/Biodiesel Blend 95/5 and consuming `7,486l` ◦ Road transport activity: ▪ First Vehicle using a Diesel/Biodiesel Blend consumed `374,285l` of fuel ▪ Second Vehicle using a Gasoline/Ethanol Blend consumed `85,364l` of fuel 2. User sends the request to the application 3. System accepts the request 4. System tries to perform such calculation but provided data is not correct 5. System responds with a calculation not possible error
Expected Result	System error informing of not possible to perform such calculation