



ΙΔΡΥΜΑ
ΕΡΕΥΝΑΣ ΚΑΙ
ΚΑΙΝΟΤΟΜΙΑΣ



ΠΡΟΓΡΑΜΜΑΤΑ ΕΡΕΥΝΑΣ, ΤΕΧΝΟΛΟΓΙΚΗΣ ΑΝΑΠΤΥΞΗΣ ΚΑΙ ΚΑΙΝΟΤΟΜΙΑΣ



Κυπριακή Δημοκρατία



Ευρωπαϊκή Ένωση

EMPOWER Web Platform

Data collection and smart analytics

PHOEBE Research and Innovation Ltd

info@phoebeinnovations.com



Πανεπιστήμιο
Κύπρου



Electricity
Authority
of Cyprus

PHOEBE
RESEARCH & INNOVATION



Deloitte.



Aeolian-Dynamics

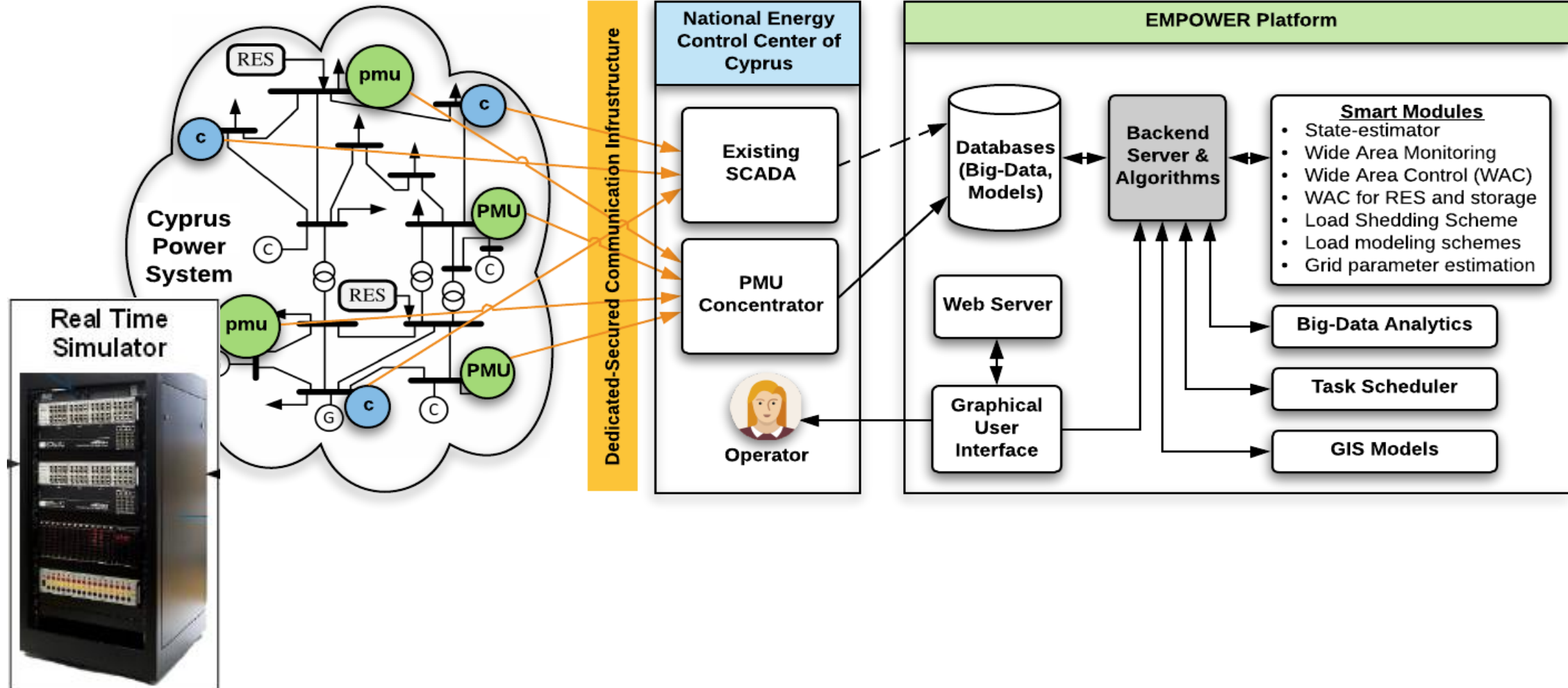


Cyprus
Energy
Agency



MINISTRY OF
ENERGY
COMMERCE
INDUSTRY
AND TOURISM

EMPOWER Platform - Architecture



EMPOWER Pilot instance - Login



empower

E-mail:

Password:

Remember Me

[Sign In](#)

[Forgot password?](#)

Dashboard with available networks as layers

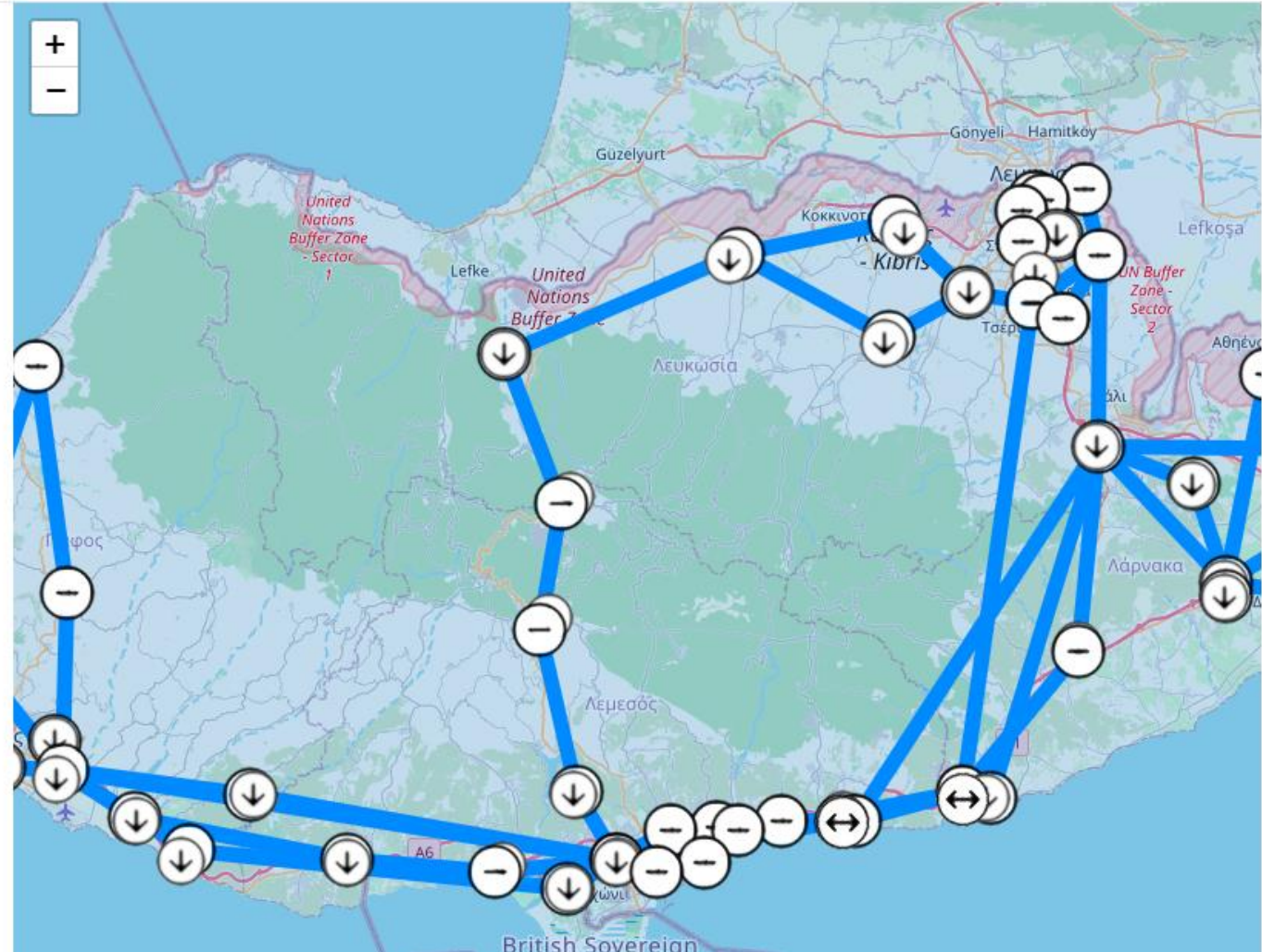
Empower

- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections
- Alarms 0
- kios

List of Networks

Choose Network to show on map

Cyprus Network



Manage topology – Maintain sub-network with components



Empower

- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections
- Alarms 0
- kios

Home / Manage / Cyprus Network / Subnetwork A

Subnetwork A

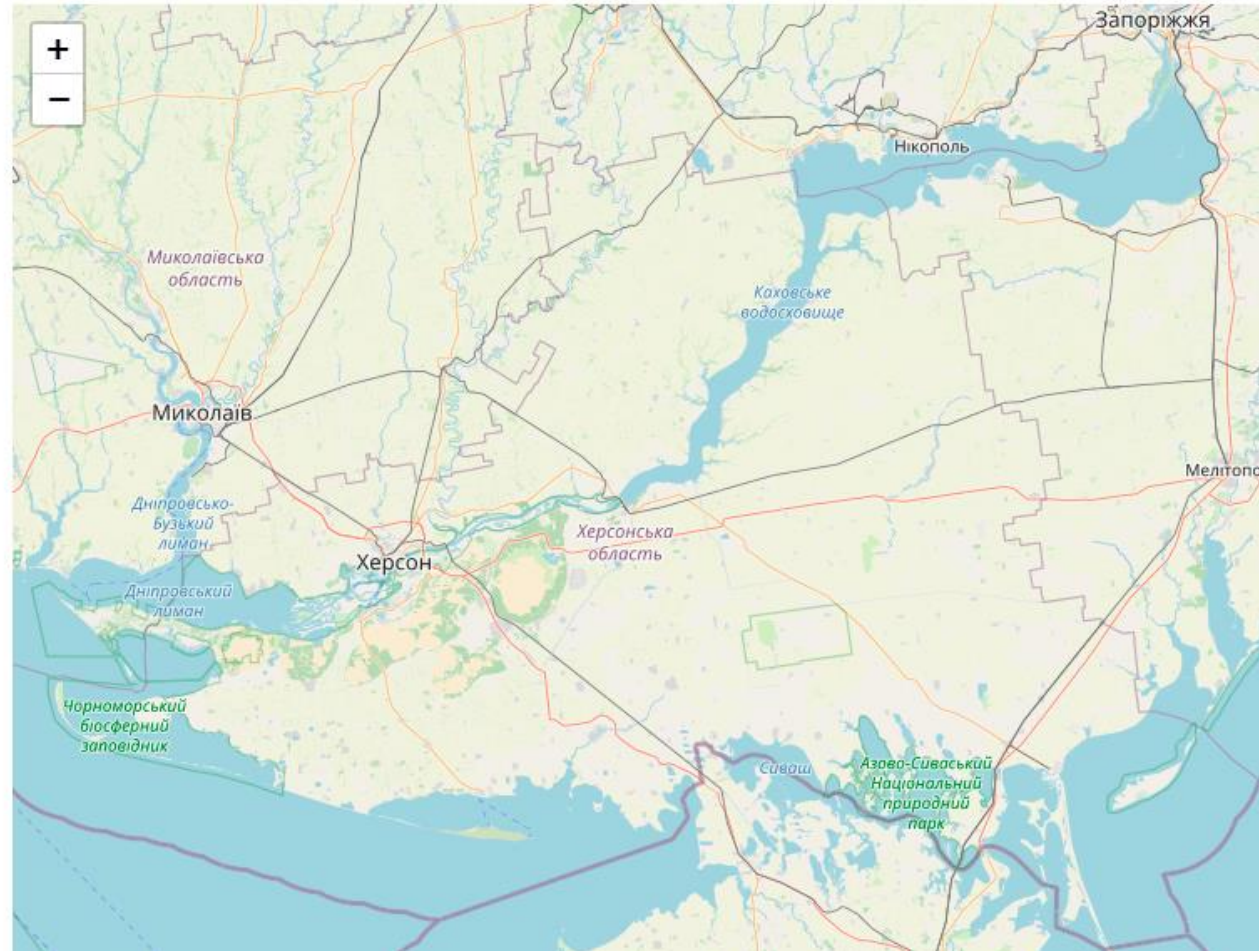
Subnetwork

Search...

Bus (part_of)

- Bus HJPAS
- Bus PAPHOS
- Bus AKURS
- Bus POLIS
- Bus TEMBR
- Bus STRU
- Bus ANATL
- Bus XERPT
- Bus APHRO
- Bus PISSR
- Bus EPSKP
- Bus KOLSS
- Bus ORTS
- Bus TRIMK
- Bus KARVN
- Bus ERGTS

Location



Manage topology – manage individual components

- Empower
- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections

Home / Manage / Cyprus Network / Subnetwork A / Bus XERPT

Bus XERPT

Bus

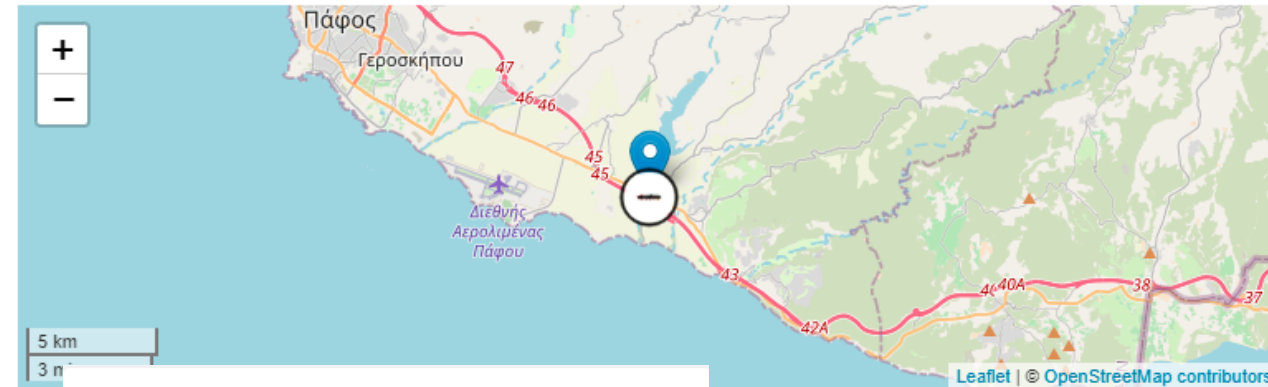
Search...

Sensors

PMU Bus XERPT

Edit Bus Metadata

Location



Line ERGTS to ORNDA

Line

Search...

Line (starts_from)

Bus ERGTS

Line (ends_to)

Bus ORNDA

Edit Line Metadata

Measurements infrastructure – link to network components



Empower <

- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections
- Alarms 0
- kios

Home / Telemetry

List of sensors

All sensors in account

PMU Bus POLIS

PMU Bus TEMBR

PMU Bus ANATL

PMU Bus PISSR

PMU Bus ORNDA

PMU Bus LAKTM

PMU Bus YPSON

PMU Bus PRENTZ

PMU Bus ATHLS

PMU Bus MELZN

Registered Sensors

58

Inactive Sensors

58

Collected Measurements

0

① Measurements taken in the past hour.

Most active sensors

Name and amount of measurements for past week

PMU Bus POLIS	0
PMU Bus TEMBR	0
PMU Bus ANATL	0
PMU Bus PISSR	0
PMU Bus ORNDA	0

Inactive sensors

Name of sensors that haven't sent any data during the past hour

PMU Bus POLIS
PMU Bus TEMBR
PMU Bus ANATL
PMU Bus PISSR
PMU Bus ORNDA

Measurements infrastructure – overview of timeseries per measured attribute



Empower

- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections
- Alarms 0
- kios

Home / Telemetry / PMU Bus POLIS

PMU Bus POLIS

Sensor

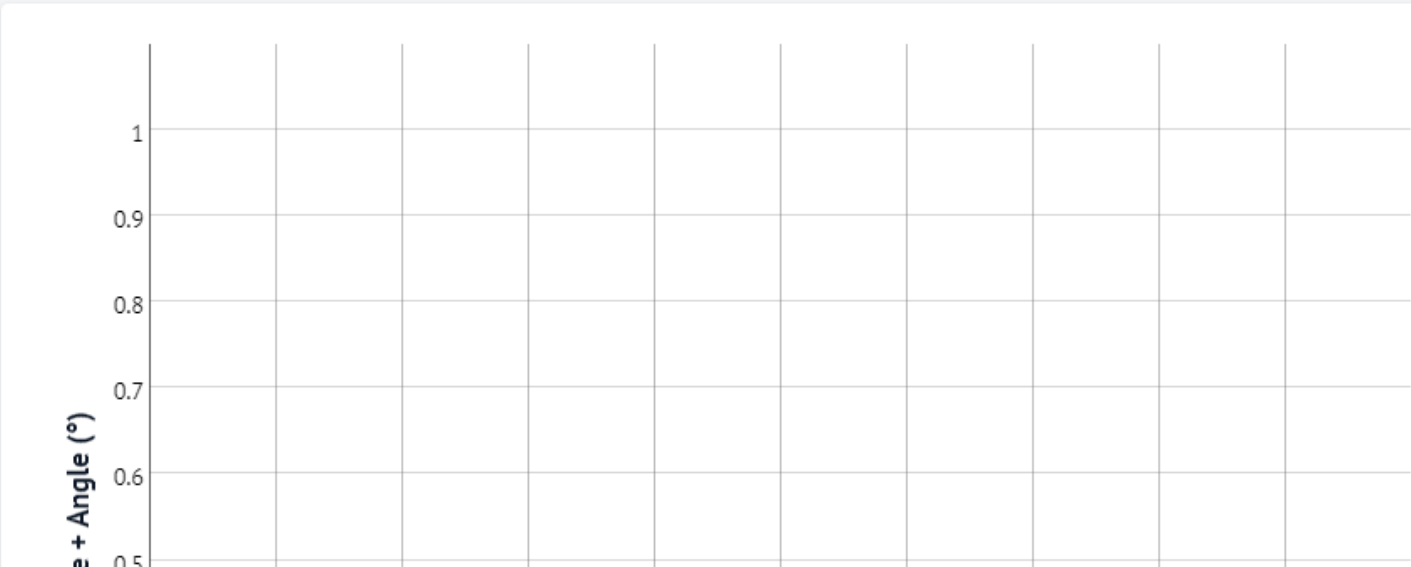
Device ID: 1ae5041b-cce7-4751-84b3-5c4de38eaecb
Battery: Battery status is disabled

Installed in: Bus POLIS (Bus)

Attributes

Choose Attributes to Plot their Data

- Voltage + Magnitude (Volt...
5c5f9c4e-caeb-4948-b11d-0aab4ff50a8a
- Voltage + Angle (Voltage ...
caaddccf-f594-487b-af0d-a6175e506595
- Voltage + Magnitude Esti...
999f8bbc-f1e2-4931-aece-65f178687fb4
- Voltage + Angle Estimatio...
b5bc8558-8cd4-4a86-bd97-4d8ab7841761



Near real-time PMU measurements



Empower

PMU Graphs

PMU Graphs

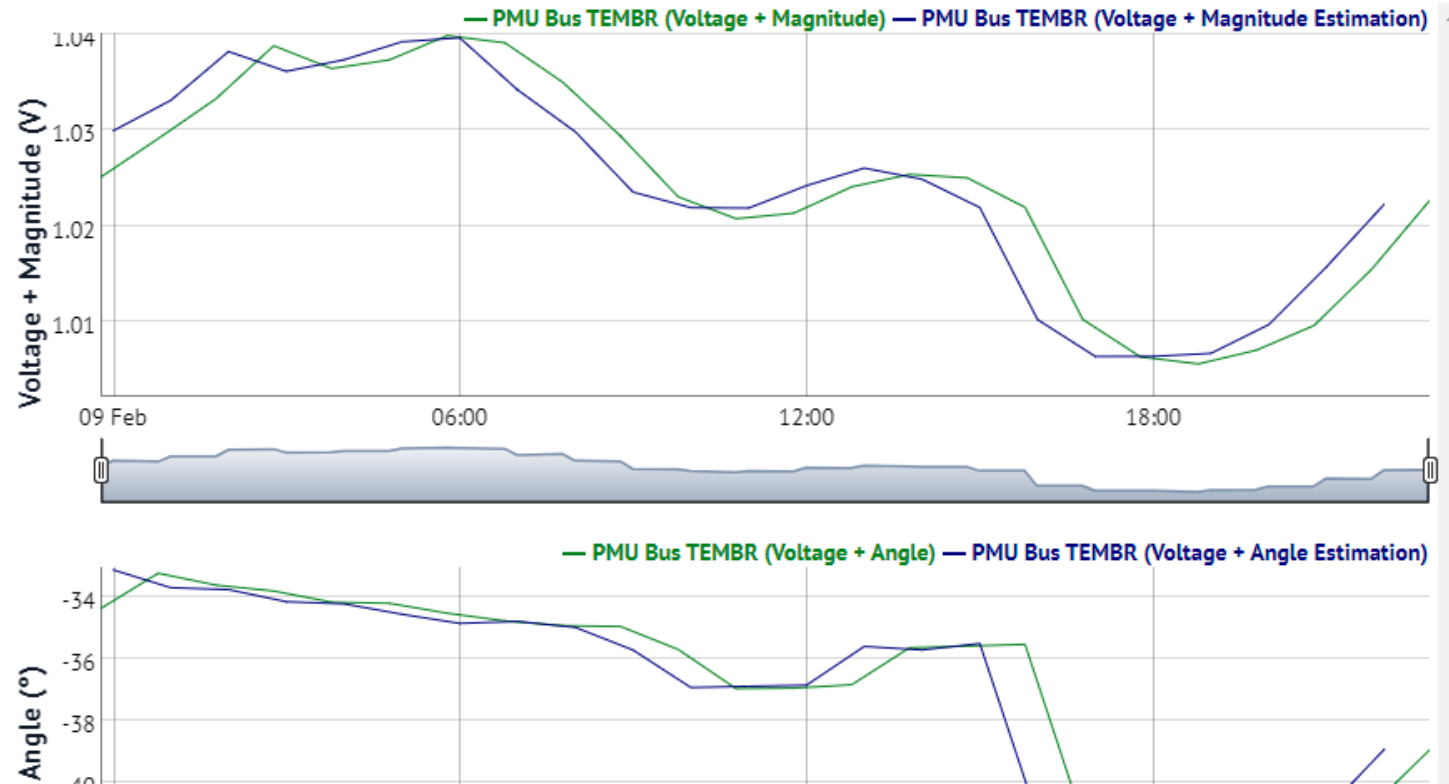
Choose PMU to plot their data

Search...

- PMU Bus POLIS
- PMU Bus TEMBR
- PMU Bus ANATL
- PMU Bus PISSR
- PMU Bus ORNDA
- PMU Bus LAKTM
- PMU Bus YPSON
- PMU Bus PRENTZ
- PMU Bus ATHLS
- PMU Bus MELZN
- PMU Bus SOTRA

From: 2022-01-01 00:00 To: 2022-07-01 00:00 Resolution: 1 min Range preset: Last month

Update Graph



Near real-time PMU Measurements



- Empower
- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections
- Alarms 0
- kios

Home / PMU Graphs

PMU Graphs

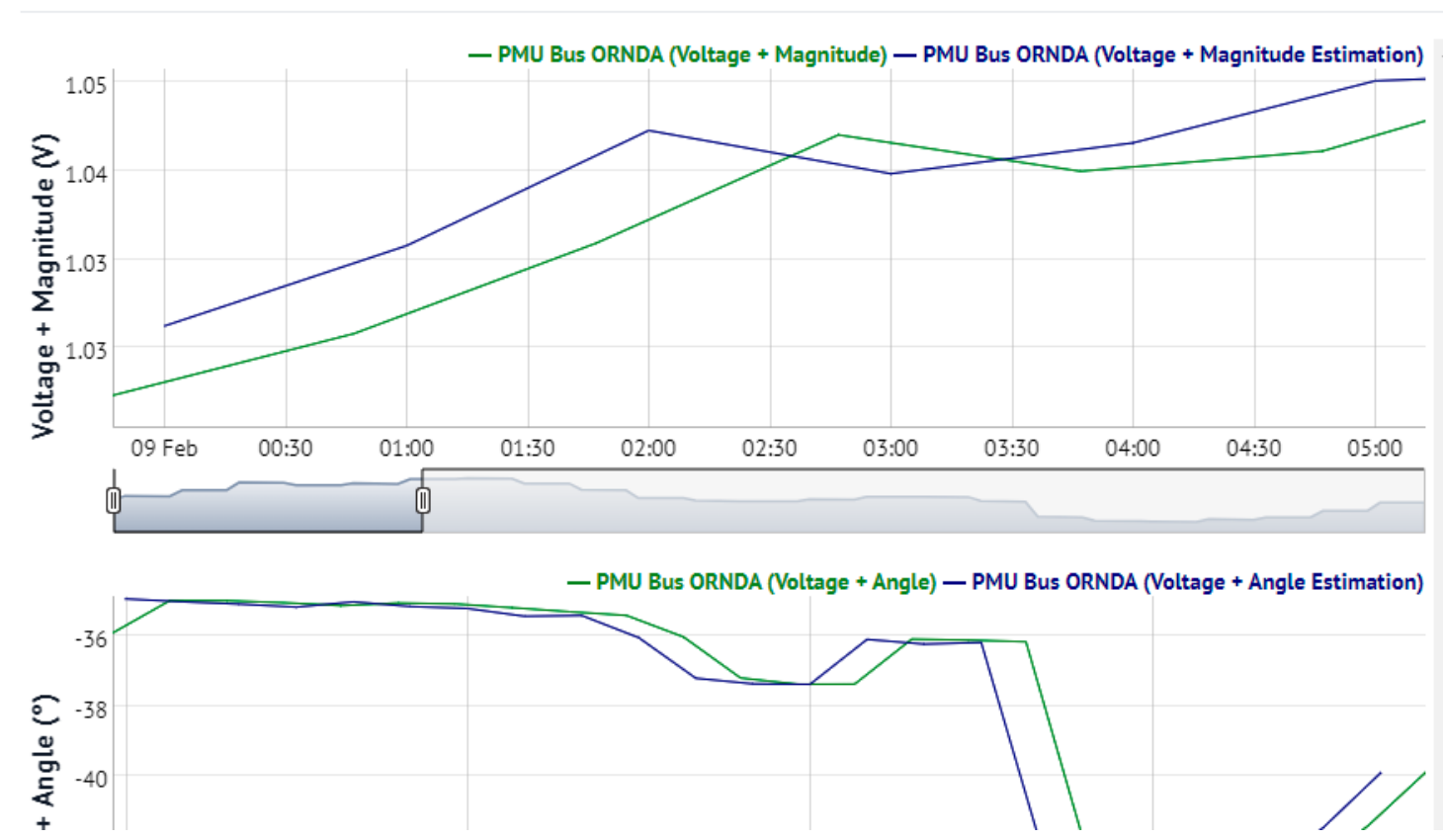
Choose PMU to plot their data

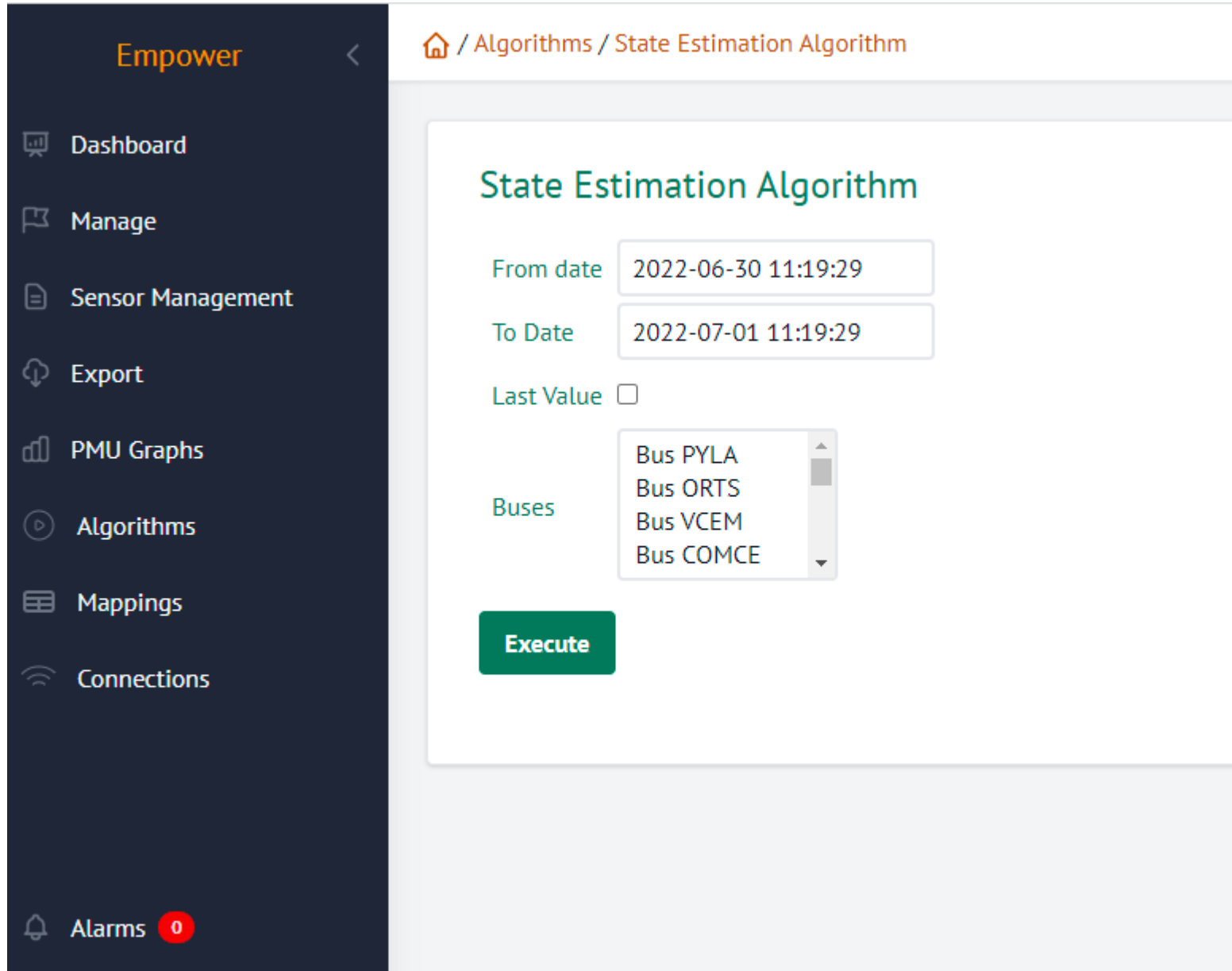
Search...

- PMU Bus POLIS
- PMU Bus TEMBR
- PMU Bus ANATL
- PMU Bus PISSR
- PMU Bus ORNDA
- PMU Bus LAKTM
- PMU Bus YPSON
- PMU Bus PRENTZ
- PMU Bus ATHLS
- PMU Bus MELZN
- PMU Bus SOTRA

From: 2022-01-01 00:00 To: 2022-07-01 00:00 Resolution: 1 min Range preset: Last month

Update Graph

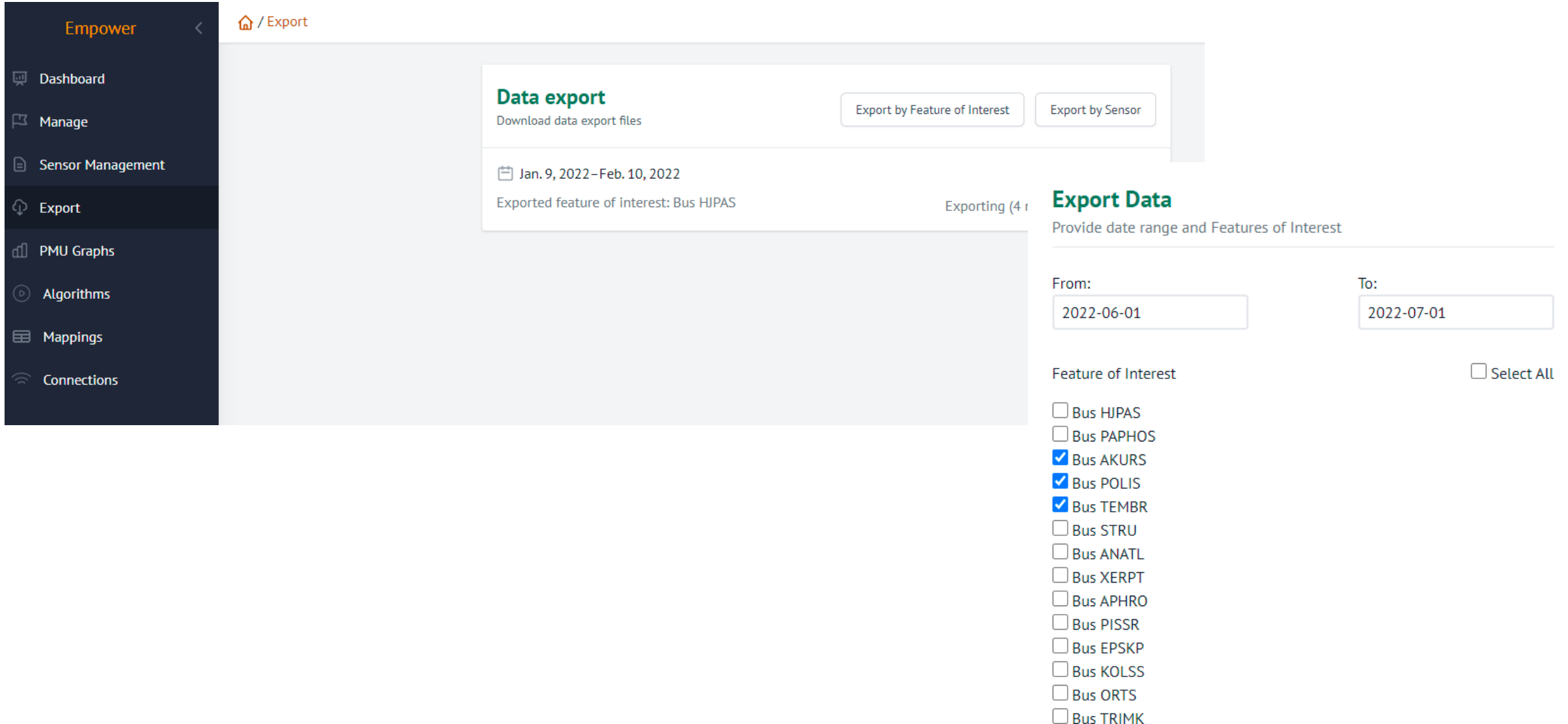




The screenshot displays the 'Empower' web application interface. On the left is a dark sidebar with navigation options: Dashboard, Manage, Sensor Management, Export, PMU Graphs, Algorithms, Mappings, and Connections. At the bottom of the sidebar is an 'Alarms' section with a red circle containing the number '0'. The main content area shows the breadcrumb path: Home / Algorithms / State Estimation Algorithm. The title of the page is 'State Estimation Algorithm'. Below the title are two input fields: 'From date' with the value '2022-06-30 11:19:29' and 'To Date' with the value '2022-07-01 11:19:29'. There is a checkbox for 'Last Value' which is currently unchecked. Below this is a dropdown menu labeled 'Buses' containing the following options: Bus PYLA, Bus ORTS, Bus VCEM, and Bus COMCE. At the bottom of the configuration area is a green 'Execute' button.

**System state
estimation
using PMU
measurements**

Easy exporting of data in csv/pdf formats



The screenshot shows the 'Export' section of the Empower web application. On the left is a dark sidebar with navigation options: Empower, Dashboard, Manage, Sensor Management, Export (highlighted), PMU Graphs, Algorithms, Mappings, and Connections. The main content area is titled '/ Export' and contains a 'Data export' panel with the subtitle 'Download data export files'. This panel has two buttons: 'Export by Feature of Interest' and 'Export by Sensor'. Below these buttons, it shows a date range 'Jan. 9, 2022 - Feb. 10, 2022' and the text 'Exported feature of interest: Bus HJPAS' with a progress indicator 'Exporting (4 r)'. To the right of this panel is the 'Export Data' configuration area, which includes a subtitle 'Provide date range and Features of Interest'. It has two date input fields: 'From: 2022-06-01' and 'To: 2022-07-01'. Below the date fields is a 'Feature of Interest' section with a 'Select All' checkbox. A list of bus names follows, each with a checkbox: Bus HJPAS, Bus PAPHOS, Bus AKURS (checked), Bus POLIS (checked), Bus TEMBR (checked), Bus STRU, Bus ANATL, Bus XERPT, Bus APHRO, Bus PISSR, Bus EPSKP, Bus KOLSS, Bus ORTS, and Bus TRIMK.

Empower / Export

Data export
Download data export files

Export by Feature of Interest Export by Sensor

Jan. 9, 2022 - Feb. 10, 2022
Exported feature of interest: Bus HJPAS Exporting (4 r)

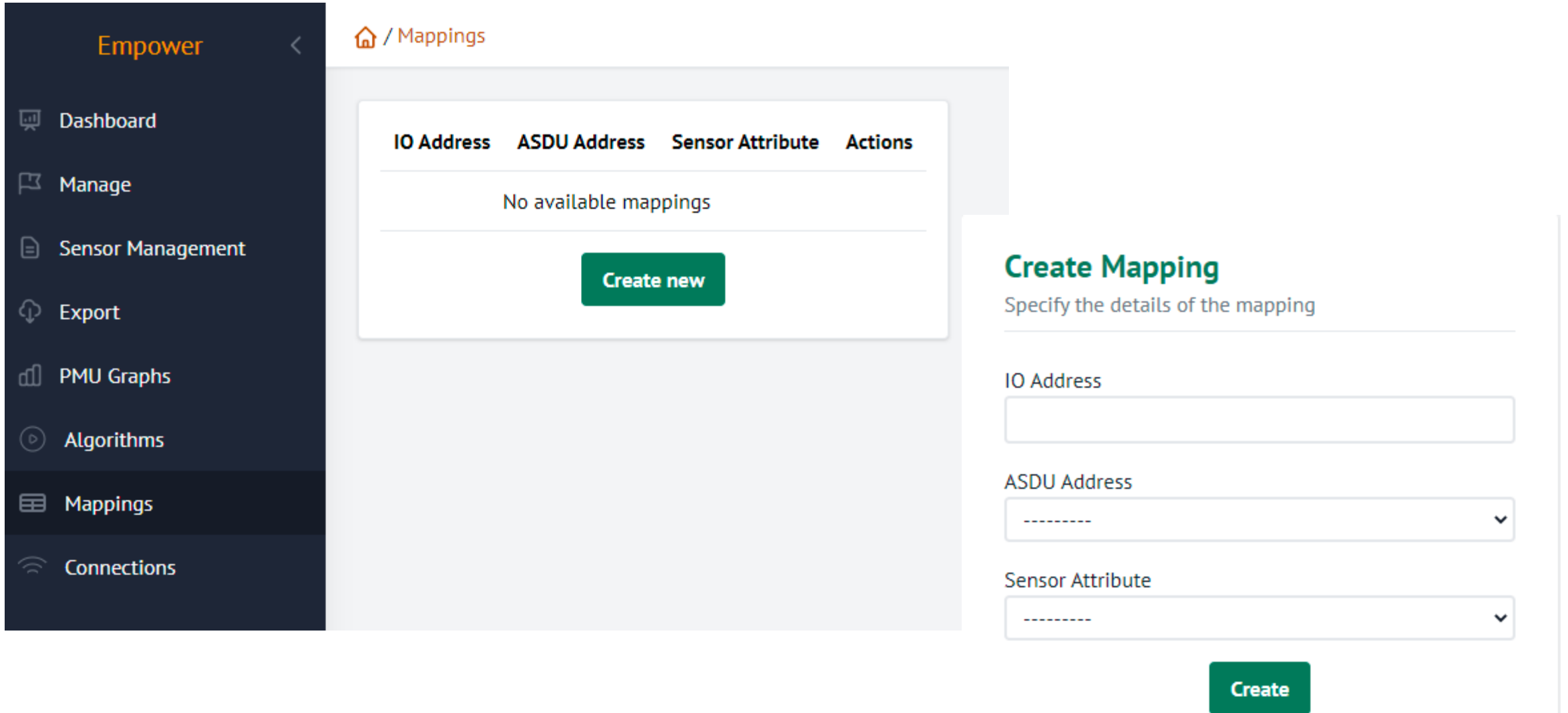
Export Data
Provide date range and Features of Interest

From: 2022-06-01 To: 2022-07-01

Feature of Interest Select All

- Bus HJPAS
- Bus PAPHOS
- Bus AKURS
- Bus POLIS
- Bus TEMBR
- Bus STRU
- Bus ANATL
- Bus XERPT
- Bus APHRO
- Bus PISSR
- Bus EPSKP
- Bus KOLSS
- Bus ORTS
- Bus TRIMK

Mappings of SCADA system addresses and connections



The screenshot displays the 'Empower' SCADA system interface. On the left is a dark sidebar with navigation options: Dashboard, Manage, Sensor Management, Export, PMU Graphs, Algorithms, Mappings (highlighted), and Connections. The main content area shows the 'Mappings' page with a breadcrumb 'Home / Mappings'. A table header lists 'IO Address', 'ASDU Address', 'Sensor Attribute', and 'Actions'. The table is currently empty, displaying 'No available mappings' and a 'Create new' button. To the right is a 'Create Mapping' form with the instruction 'Specify the details of the mapping'. The form includes three input fields: 'IO Address' (text), 'ASDU Address' (dropdown), and 'Sensor Attribute' (dropdown). A 'Create' button is located at the bottom of the form.

Empower < Home / Mappings

IO Address	ASDU Address	Sensor Attribute	Actions
No available mappings			

[Create new](#)

Create Mapping

Specify the details of the mapping

IO Address

ASDU Address

Sensor Attribute

[Create](#)

Mappings of SCADA system addresses and connections



- Empower <
- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections

Home / RTU Connectivity

Hostname/IP	Port	ASDU Address	Message Fragment Timeout	Connection Timeout	Connection Retries	Time No ACK received	Time No ACK sent	Max Idle Time	Interrogation Period	Actions
No configured RTU connections										
Create new										

Mappings of SCADA system addresses and connections



Create Connection

Specify the details of the RTU connection

Hostname/IP

Port

ASDU Address

Message Fragment Timeout

Connection Timeout

Connection Retries

Time no ACK received (T1)

Time no ACK sent (T2)

Max idle time (T3)

Interrogation Period

Create


EMPOWER Alarms and Notifications



- Empower
- Dashboard
- Manage
- Sensor Management
- Export
- PMU Graphs
- Algorithms
- Mappings
- Connections

Home / Alarms

Active Alarms: 0 Cleared Alarms: 0 Total Alarms: 0



Critical	0
High	0
Medium	0
Low	0

Change Time Period:
Last Day
Last 7 Days
Last 30 Days
All in account

Include Cleared Alarms

Notification Management

[Manage My Notification Profile](#)

Event	Description	Time Occured	Severity	Cleared/Not Cleared	Assigned to	More
No data available in table						



ΙΔΡΥΜΑ
ΕΡΕΥΝΑΣ ΚΑΙ
ΚΑΙΝΟΤΟΜΙΑΣ



ΠΡΟΓΡΑΜΜΑΤΑ ΕΡΕΥΝΑΣ, ΤΕΧΝΟΛΟΓΙΚΗΣ ΑΝΑΠΤΥΞΗΣ ΚΑΙ ΚΑΙΝΟΤΟΜΙΑΣ



Κυπριακή Δημοκρατία



Ευρωπαϊκή Ένωση

EMPOWER Web Platform

Data collection and smart analytics

PHOEBE Research and Innovation Ltd

info@phoebeinnovations.com



Πανεπιστήμιο
Κύπρου



Electricity
Authority
of Cyprus

PHOEBE
RESEARCH & INNOVATION



Deloitte.



Aeolian-Dynamics



Cyprus
Energy
Agency



MINISTRY OF
ENERGY
COMMERCE
INDUSTRY
AND TOURISM