



Ukrainian Sustainable Energy Systems

joint Ukrainian-Swedish project

2022-12-19



IVL Swedish Environmental Research Institute

Sweden's leading organisation for applied environmental and sustainability research

The people we serve

Trade and
industry

Politicians and
government
agencies

Collaborative
partners

Interest groups
and industry
organisations

PROJECT PARTNERS



Swedish Environmental
Research Institute



National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute"



Needs Analysis

Total damage assessment in monetary terms as of the end of the February, 2023

Property type	Damage assessment, \$ billion
Housing	53,6
Infrastructure	36,2
Assets of enterprises, industry	11,3
Education	8,9
Agriculture and land resources	8,7
Energy	8,1
Forests	4,5
Transport	3,1
Trade	2,6
Culture, sport, tourism	2,2
Healthcare	1,8
Utilities	1,4
Electronic communications	0,6
Administrative buildings	0,5
Social sphere	0,2
Financial sector	0,04
Total	143,8

Damages and destroyed infrastructure objects of Ukraine total

\$ 143,8 bln



207 500



153 900



3 170



16 000



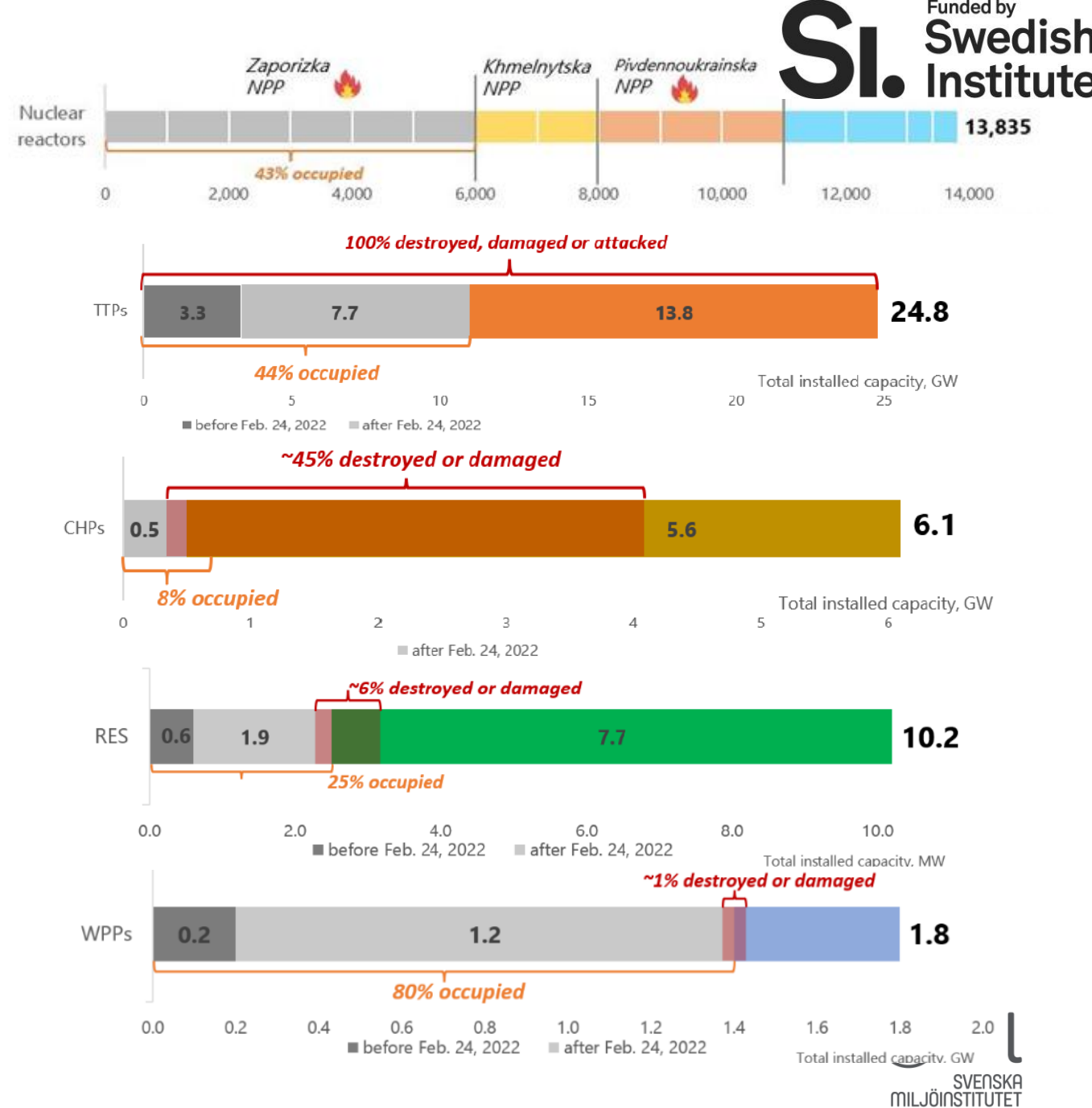
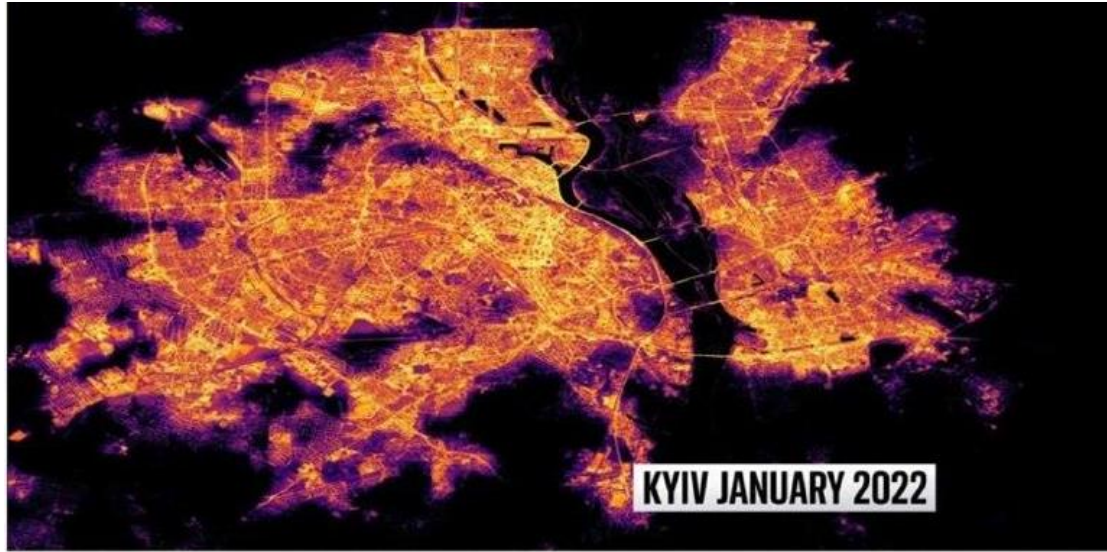
1 216



1 800



Needs Analysis



Project Goals

- **Build the capacities** of IVE and KPI staff in **four distinct areas of sustainable energy** design and implementation: 1) energy systems modeling, 2) complex and hybrid energy systems, 3) district heating, 4) energy carriers of the future electric (i.e., batteries and hydrogen).
- **Expose IVE and KPI staff to implemented holistic Swedish designs** in complex and hybrid energy systems, district heating and energy carriers of the future (i.e., electric batteries and hydrogen).
- **Integrate IVE and KPI in research and teaching networks** of professionals in the four areas of sustainable energy design and implementation mentioned above.
- **Develop outreach and teaching materials** for IVE and KPI staff to disseminate the knowledge gained from the capacity building efforts with IVL.
- **Build the capacities** of IVE and KPI staff to **apply for EU Horizon research funds** by undertaking a joint application with IVL to maintain the collaboration and support rebuilding a more sustainable and resilient Ukrainian energy system.

Partners and their contribution

- A total of **18 workshops and 4 networking events** will be undertaken by IVL. The workshops will be supported by videos of relevant examples of holistic designs implemented in Sweden with clear linkages to energy systems. **(IVL)**
- **The workshops will be video, or audio recorded and translated to Ukraine**, providing potential teaching materials for IVE and KPI staff in the form of video and/or audio content **(IVL, IVE and KPI)**
- **A virtual energy system modeling laboratory** will be setup to provide a space for knowledge sharing between IVL, IVE and KPI **(IVL, IVE and KPI)**
- Each area of sustainable energy systems covered will culminate with a **networking event to be organized by IVL where IVL, IVE and KPI will invite external experts** to discuss research questions relevant to reconstructing Ukraine's energy system **(IVL, IVE and KPI)**
- IVE and KPI staff will **develop teaching and training materials** in energy systems modeling, complex and hybrid energy systems, district heating and energy carriers of the future. These materials will be used for Ukrainian professionals and students to acquire skills in sustainable energy system design and implementation **(IVE and KPI)**
- An **EU Horizon application will be jointly compiled and submitted** to maintain ongoing collaborative research on sustainable energy systems between Sweden and Ukraine **(IVL, IVE and KPI)**

Work Plan


- **Module 1 – Energy Systems Modeling:** The activities undertaken in this module will first focus on establishing a virtual energy system modeling laboratory which will provide a space to explore various aspects of energy systems throughout the duration of the project. The virtual energy system modeling laboratory will be housed on the KPI e-learning platform.
- **Module 2 – Complex and Hybrid Energy Systems:** how various types of renewable energy sources, energy generation and storage systems can be integrated together, which can be isolated or connected to the grid. The workshops will explore the pros and cons of various types of complex and hybrid energy systems and their potential for implementation in Ukraine such as smart and micro grids and co-generation such as wind-hydro power generation systems.
- **Module 3 – District Heating:** district heating and cooling that can be implemented to improve the sustainability and resilience of Ukraine’s heating and cooling systems.
- **Module 4 – Energy Carriers of the Future:** Electric batteries have improved significantly storing more power using less weight and space. The latest development in electric batteries industry and where it is headed will be discussed. Hydrogen energy is now being used in energy intensive industries such as steel and cement manufacturing as well as in transportation to move commercial goods and passengers.
- **Module 5 – EU Horizon Funding Application:** The activities undertaken in this module will focus on developing and compiling a joint EU Horizon research funding application to strengthen the IVL, IVE and KPI partnership and build the capacities of IVE and KPI staff to apply for future EU funding opportunities.

Budget

Budget	Total costs (SEK)
TOTAL	1 000 000

Gantt chart

Task	Months																	
	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24
Project kickoff																		
IVL, IVE and KPI project review																		
SI revision of potential project changes																		
Module 5 EU Horizon Application																		
5.1 Workshop Delivery																		
5.2 Compilation of project proposal for EU Horizon research funds																		
Module 1 Energy systems modeling																		
1.1 Establishment of the virtual energy systems modeling laboratory																		
1.2 Maintenance of the virtual energy systems modeling laboratory																		
1.3 Workshop Delivery																		
1.4 Networking Event																		
1.5 Development of Teaching and Training Materials																		
1.6 Communication Content Development and Outreach																		
Module 2 Complex and Hybrid Energy Systems																		
2.1 Workshop Delivery																		
2.2 Networking Event																		
2.3 Development of Teaching and Training Materials																		
2.4 Communication Content Development and Outreach																		
Module 3 District Heating																		
3.1 Workshop Delivery																		
3.2 Networking Event																		
3.3 Development of Teaching and Training Materials																		
3.4 Communication Content Development and Outreach																		
Module 4 Energy Carriers of the Future																		
4.1 Workshop Delivery																		
4.2 Networking Event																		
4.3 Development of Teaching and Training Materials																		
4.4 Communication Content Development and Outreach																		
Project Close																		
Final project roundtable meeting																		



Thank you for your attention!

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