Welcome to the online tool for CSSC solutions!

Interreg
Danube Transnational Programme
CSSC LAB

Short description

This online tool is developed through the CSSC Lab project, which stands for City Storage and Sector Coupling (CSSC) Lab and financed by INTERREG. It is freely accessible to the public. The aim of this tool is to provide a quick check of suitable CSSC solutions for your municipality without requiring lots of technical information. It is user-friendly and informative for the beginners in CSSC solutions.

As part of CSSC Lab project, our main target groups are municipalities in Danube region. After inserting some basic information, you will be provided with CSSC solutions which might suit your municipality and other useful resources. The output can be downloaded by the users as pdf for future reference. Please first choose the language you wish to proceed with this tool.

Disclaimer

This tool is based on the available information of common technical requirements of CSSC solutions, our experience from our demo centres and our assessments based on the provided input. The main target groups are primarily the small-/medium-sized municipalities in Danube region. Therefore, it may not be always applicable for other communities in other contexts. Technical requirements and the economic efficiency are both considered when evaluating the suitability of CSSC solutions for the given criteria. This tool is not intended to replace the professional assessment from technicians and experts, as it requires much more technical information. If you are inspired by this tool to initiate a CSSC project in your community, please consult the professionals for the detailed planning of your project.

Instructions	
Input sheet	Please provide short information about your case (7 questions)
Data processing	Sheet used to apply criteria determination for selected case
Output	Overview of recommended solutions in 3 categories (Fit the best, May be fit, Not fit)

Classification of colours	
	necessary input
	do not touch (formulas)

1. Select your language *

English

2. Select your municipality/city *

Name of city/municipality	Zaprešić
Name of region	Urban Agglomeration Zagreb
Name of country	Croatia

2.1. **If there is no municipality on the list, select country**

Germany

2.2. **Write the name of your municipality**

Gutach im Breisgau

2.3. **What description fit the best to your community regarding the main industries and population?**

Small agricultural town, under 10,000 inhabitants, about 50 km2 in size, shaped with offshoots | A

3. Who is your target group? *

Big industries	No
Small/medium-sized industries	Yes
Energy generators	No
Private households	Yes
Public buildings	Yes
Office buildings	Yes
Hospitals and health care buildings	No
Sport centers / Swimming pools	No

4. What is the main purpose of this new project? *

refurbishing old buildings

5. What minimum indoor storage space do your target groups typically have? *

At least a small/medium storage room (under 50m2)

6. What minimum outdoor storage space do your target groups typically have? *

They might not have any

7. What technical installation do your target groups typically have? *

rooftop solar panel	Yes
solar park	No
wind turbines in communities	No
wind power park	No
hydropower plant	Yes
solar thermal system	Yes
biomass energy installations	No
heat pumps	No
batteries	No
CHP	No
district heating	Yes

CSSC Lab Online Tool

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Selected municipality	Zaprešić
County/Region	Urban Agglomeration Zagreb
Country	Croatia

City type description	small town, agricultural and industrial , under 10,000 inhabitants, about 50 km2 in size, shaped with offshoots

Main purpose of the project	refurbishing old buildings
Indoor space	At least a small/medium storage room (under 50m2)
Outdoor space	They might not have any

Included target groups:	, Small/medium-sized industries , Private households , Public buildings , Office buildings
PV installations in target area:	rooftop solar panel , hydropower plant , solar thermal system , district heating

Ranking of measures		#	Feedback
MS 1	Heat Pumps	3	May be fit
MS 2	Batteries	1	Fit the best
MS 3	Latent heat storages in combination with photovoltaic systems	4	Not fit
MS 4	Sensible heat storages in combination with photovoltaic systems	5	Not fit
MS 5	Fuel cells combined with solar systems or heat pumps	6	Not fit
MS 6	Electric Cars/infrastructure	2	Fit the best

Capacity building materials

Check out our training materials on CSSC aspects!

Legislation

Check out relevant legislation on CSSC aspects in your country!

Contact points

Check out relevant contact points for CSSC aspects in your country!

More about CSSC Lab

Check out more info about our project!

CSSC Lab Online Tool

Results

Name of solution:	MS 1	Heat Pumps		
Recommendation	May be fit		Ranking	3

Short description of model solution

A heat pump is a thermal system which could heat or cool buildings or domestic water by exchanging the heats with a refrigeration cycle. It transfers the heat to where it is needed without the application of external power. When used to cool a building, it functions as an air conditioner by transferring heat from the inside to the outside and operates in reverse when heating up a building. Heat pumps are also often used in district heating systems. Heat pumps require little maintenance and heating costs are low. However, the acquisition costs can be high. They can be used in both new and old buildings. Heat pumps are used in the building sector; electric cars etc. Green electricity should be used for climate-friendly operation. Heat pumps are high in energy efficiency, which take about 75% of the energy needed for heating from the environment and only remaining 25% of the energy is provided by electricity. This makes the heat pump the most climate-friendly form of heat generation, fuels are not required.

Degree of efficiency	%	0,33 kWhel per kWhth
Availability	TLR*	4-9
Investment costs	€/ kW	NA
Lifetime	cycles	NA
	years	15-20
Scalability		High
Replication potential		High

Back to front page

Recommendation of RES installation complied to the solution

photovoltaic system, Sensor and controll system, batteries or heat storage

Best practices from your country / CSSC technology / Target groups:	
Name	Energy Center Bračak
Location	Krapina-Zagorje County, HR
More info	Check out report on Energy Center Bračak

Name	Heat pump concept Neusiedl am See
Location	Neusiedl am See, AT
More info	Check out report on Heat pump concept Neusiedl am See

Name	Solar Thermal HVAC input
Location	Târgoviște, RO
More info	Check out report on Solar Thermal HVAC input

Name	PV driven Microgrid
Location	Târgoviște, RO
More info	Check out report on PV driven Microgrid

Name	Solar thermal system for DHW preparation
Location	Brașov, RO
More info	Check out report on Solar thermal system for DHW preparation

Name	Reconstruction of School EMILA BELLUŠA
Location	Trenčin, SK
More info	Check out report on Reconstruction of School EMILA BELLUŠA

Name	Freiburg technisches Rathaus
Location	Freiburg, DE
More info	Check out report on Freiburg technisches Rathaus

Name	Fontis Sol L.T.D
Location	Nikšić, MNE
More info	Check out report on Fontis Sol L.T.D

Name	Solar.one Building
Location	Stegersbach, AT
More info	Check out report on Solar.one Building

Name	Integration of heat pumps in building
Location	Varna, BG
More info	Check out report on Integration of heat pumps in building

Name	City Hall
Location	Freiburg, DE
More info	Check out report on City Hall

Name	Luxury tourist village "Luštica Bay"
Location	Nikšić, MNE
More info	Check out report on Luxury tourist village "Luštica Bay"

Name	Integration of heat pumps in public buildings
Location	Alba Iulia, RO
More info	Check out report on Integration of heat pumps in public buildings

Name	Green Households II project
Location	Poprad, SK
More info	Check out report on Green Households II project

Name	Kindergarten Miklavž pri Ormožu
Location	Miklavž pri Ormožu, SI
More info	Check out report on Kindergarten Miklavž pri Ormožu

Check out our demo centers with CSSC technologies to get inspired!	
Stegersbach, Austria	https://cssclab.eu/austria-demon-center-2/

CSSC Lab Online Tool

Results

Name of solution:	MS 2	Batteries		
Recommendation	Fit the best		Ranking	1

Short description of model solution

Renewable energy installations experience fluctuations in energy production due to the weather and sunlight. Batteries store the extra energy production and enable its later usage when production is low. This optimize the self-consumption of renewable energy for buildings. The big variety in sizes and capacities makes them suitable for most kinds of buildings. Lithium-ion batteries are suitable as buffer storage for renewable energies, for load management, for grid services and in emergency power supply. They are also used in mobile applications such as electromobility, notebooks and aviation. They also have high energy efficiency and relatively manufacturing costs due to the quantities in production. However, the lifecycle of batteries has to be considered. their production and deposit are still controversial due to the environmental and social impact especially on the global South.

Degree of efficiency	%	90-97
Availability	TLR*	8
Investment costs	€/ kW	170-600
Lifetime	cycles	400-1900
	years	15
Scalability		High
Replication potential		High

Back to front page

Recommendation of RES installation complied to the solution
photovoltaic system, Sensor and controll system

Best practices from your country / CSSC technology / Target groups:	
Name	Energy Center Bračak
Location	Krapina-Zagorje County, HR
More info	Check out report on Energy Center Bračak

Name	Sumer resorts “Albena”
Location	Albena, BG
More info	Check out report on Sumer resorts “Albena”

Name	Solar Thermal HVAC input
Location	Târgoviște, RO
More info	Check out report on Solar Thermal HVAC input

Name	PV driven Microgrid
Location	Târgoviște, RO
More info	Check out report on PV driven Microgrid

Name	Battery storage facility
Location	South-Bohemian Region, CZ
More info	Check out report on Battery storage facility

Name	Reconstruction of School EMILA BELLUŠA
Location	Trenčin, SK
More info	Check out report on Reconstruction of School EMILA BELLUŠA

Name	GRIDBOOSTER project, Bratislava
Location	Bratislava, SK
More info	Check out report on GRIDBOOSTER project, Bratislava

Name	PV installation Humenné
Location	Myslina, SK
More info	Check out report on PV installation Humenné

Name	E-car sharing
Location	Donaueschingen; DE
More info	Check out report on E-car sharing

Name	Municipality Ollersdorf
Location	Burgenland, AT
More info	Check out report on Municipality Ollersdorf

Name	Integration of batteries
Location	Albena, BG
More info	Check out report on Integration of batteries

Name	Energy Storage at the Heilbronn power plant
Location	Heilbronn, DE
More info	Check out report on Energy Storage at the Heilbronn power plant

Name	Multipurpose Hall (BTarena)
Location	Cluj-Napoca, RO
More info	Check out report on Multipurpose Hall (BTarena)

Name	Li-ion NMC storage technology
Location	Levice, SK
More info	Check out report on Li-ion NMC storage technology

Name	Talum factory
Location	Kidričevo, SI
More info	Check out report on Talum factory

Check out our demo centers with CSSC technologies to get inspired!	
Stegersbach, Austria	https://cssclab.eu/austria-demon-center-2/
Varna, Bulgaria	https://cssclab.eu/bulgaria-demo-center-4/

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Results

Name of solution:	MS 3	Latent heat storages in combination with photovoltaic systems	
Recommendation	Not fit	Ranking	4

Short description of model solution
latent heat storage system is a thermal system which stores the excess heat during the low-heat-demand hours and release it when the demand is high. In latent heat storage system, the energy required for a phase change is stored in addition to the sensible heat. In practice, this is usually the solid-liquid transition. This phase change happens at a constant temperature which is similar to freezing or melting process (which absorbs or release energy without significant change in the temparature). Water is often used as the liquid storage medium for space heating. Even though it is used in some buildings for sports and hospitals (as shown in our good practices), the technology is maturing and costs are relatively high.

Degree of efficiency	%	75-90
Availability	TLR*	4-9
Investment costs	€/ kW	80-160
Lifetime	cycles	5000
	years	NA
Scalability		medium
Replication potential		High

Back to front page

Recommendation of RES installation complied to the solution
photovoltaic system, heatpump (e.g. geothermal power plant), Sensor and controll system

Best practices from your country / CSSC technology / Target groups:	
Name	Ice Storage at Ludwigsburg Hospital
Location	Ludwigsburg, DE
More info	Check out report on Ice Storage at Ludwigsburg Hospital

Name	Latent heat storage in Library
Location	Lendava, SI
More info	Check out report on Latent heat storage in Library

Check out our demo centers with CSSC technologies to get inspired!	
Stegersbach, Austria	https://cssclab.eu/austria-demon-center-2/

CSSC Lab Online Tool

Results

Name of solution:	MS 4	Sensible heat storages in combination with photovoltaic systems	
Recommendation	Not fit	Ranking	5

Short description of model solution

sensible heat storage system is a thermal system which stores the excess heat during the low-heat-demand hours and release it when the demand is high. The energy is stored by the difference in storage material temperature. The insulation is thus of central importance. It is considered cost-effective, established, proven and simple technology. Sensitive heat storage is necessary for the use of geothermal energy, heat pumps and to make cogeneration more flexible, and represents an opportunity for district heating. The storage medium is often water. Sensible heat storage systems are often used in building services for the operation of buffer storage tanks. However, they are also suitable as seasonal storage units. Depending on the design, impacts on nature and the landscape are to be expected.

Degree of efficiency	%	45-75
Availability	TLR*	9
Investment costs	€/ kW	80-130
Lifetime	cycles	5000
	years	NA
Scalability		Medium
Replication potential		High

Back to front page

Recommendation of RES installation complied to the solution

photovoltaic system, heatpump,Sensor and controll system

Best practices from your country / CSSC technology / Target groups:	
Name	Energy Center Bračak
Location	Krapina-Zagorje County, HR
More info	Check out report on Energy Center Bračak

Name	Heat pump concept Neusiedl am See
Location	Neusiedl am See, AT
More info	Check out report on Heat pump concept Neusiedl am See

Name	Solar Thermal HVAC input
Location	Târgoviște, RO
More info	Check out report on Solar Thermal HVAC input

Name	PV driven Microgrid
Location	Târgoviște, RO
More info	Check out report on PV driven Microgrid

Name	Solar thermal system for DHW preparation
Location	Brașov, RO
More info	Check out report on Solar thermal system for DHW preparation

Name	Reconstruction of School EMILA BELLUŠA
Location	Trenčin, SK
More info	Check out report on Reconstruction of School EMILA BELLUŠA

Name	Solar.one Building
Location	Stegersbach, AT
More info	Check out report on Solar.one Building

Name	Geothermal energy for heating in Sarajevo
Location	Sarajevo, B&H
More info	Check out report on Geothermal energy for heating in Sarajevo

Name	Large heat storage system from cupasol
Location	Horb am Neckar, DE
More info	Check out report on Large heat storage system from cupasol

Name	Olympic Swimming Pool in Alba Iulia
Location	Alba Iulia, RO
More info	Check out report on Olympic Swimming Pool in Alba Iulia

Name	SOS Senice
Location	Senice, SK
More info	Check out report on SOS Senice

Name	Primary School Miklavž pri Ormožu
Location	Miklavž pri Ormožu, SI
More info	Check out report on Primary School Miklavž pri Ormožu

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Varna, Bulgaria	https://cssclab.eu/bulgaria-demo-center-4/

CSSC Lab Online Tool

Results

Name of solution:	MS 5	Fuel cells combined with solar systems or heat pumps	
Recommendation	Not fit	Ranking	6

Short description of model solution

Fuel cells use hydrogen, which produces thermal and electrical energy through a chemical process. There are low-temperature and high-temperature fuel cells, as well as stationary and mobile applications. Fuel cells can be used for off-grid power supply and to supply buildings with heat and electricity (fuel cell heating systems) as well as to power vehicles. One advantage of the fuel cell is its self-sufficient application; electrical and thermal energy are generated directly on site. It is efficient and low in pollutants. The devices are very low in wear and maintenance. Installation, operation and maintenance are not very complicated. Fuel cell heating systems require a natural gas connection, a buffer storage tank and a central heating system with central water heating. Hydrogen filling stations are required for vehicle propulsion; the technology is only climate-friendly if the hydrogen is produced using surplus renewable electricity. So far, the investment costs are high and the operating experience in field tests is low. The service life is comparatively short, and there are few suppliers. However, these disadvantages could become less important in the future due to the fas development in this technology.

Degree of efficiency	%	43-53
Availability	TLR*	8
Investment costs	€/ kW	2305
Lifetime	cycles	NA
	years	NA
Scalability		High
Replication potential		Medium

Back to front page

Recommendation of RES installation complied to the solution

photovoltaic system to create hydrogen, Sensor and controll system, batteries

Best practices from your country / CSSC technology / Target groups:	
Name	HOTFLEX project
Location	Fernitz-Mellach, AT
More info	Check out report on HOTFLEX project

Name	Bergwelt Kandel
Location	Waldkirch, DE
More info	Check out report on Bergwelt Kandel

Name	Hydrogen plant at Wyhlen HPP
Location	Whylen, DE
More info	Check out report on Hydrogen plant at Wyhlen HPP

Name	Waste management vehicles on hydrogen
Location	Baden-Württemberg
More info	Check out report on Waste management vehicles on hydrogen

CSSC Lab Online Tool

Results

Name of solution:	MS 6	Electric Cars/infrastructure	
Recommendation	Fit the best	Ranking	2

Short description of model solution

Battery-powered electric vehicles are powered by electrical energy from a battery, usually a lithium-ion battery. Vehicles include, for example, battery-powered cars, buses and motorcycles. Once the battery has been discharged, it must be recharged at electric charging stations. Electric vehicles can make an important contribution to more climate-friendly traffic when their energy consumption is from renewable energy sources. They are around 3 to 4 times more efficient than conventional vehicles. Another positive aspect is that no emissions are produced when driving. It improves the air quality in cities and reduce noise pollution. The topic of "second life" for their batteries is considered promising; after the battery has been used in the vehicle, it can be used for electricity storage after a few years at significantly lower investment costs. The investment in its infrastructure, such as the coverage of charging stations is crucial for its success.

Degree of efficiency	%	45-75
Availability	TLR*	9
Investment costs	€/ kW	80-130
Lifetime	cycles	5000
	years	NA
Scalability		Medium
Replication potential		High

Back to front page

Recommendation of RES installation complied to the solution

photovoltaic system, Sensor and controll system, batteries

Best practices from your country / CSSC technology / Target groups:	
Name	Energy Center Bračak
Location	Krapina-Zagorje County, HR
More info	Check out report on Energy Center Bračak

Name	PV driven Microgrid
Location	Târgoviște, RO
More info	Check out report on PV driven Microgrid

Name	GRIDBOOSTER project, Bratislava
Location	Bratislava, SK
More info	Check out report on GRIDBOOSTER project, Bratislava

Name	E-car sharing
Location	Donaueschingen; DE
More info	Check out report on E-car sharing

Name	Municipality Ollersdorf
Location	Burgenland, AT
More info	Check out report on Municipality Ollersdorf

Name	EV infrastructure in Varna
Location	Varna, BG
More info	Check out report on EV infrastructure in Varna

Name	Municipality owned electric vehicle
Location	Ebhausen, DE
More info	Check out report on Municipality owned electric vehicle

Name	Electric bus fleet
Location	Cluj-Napoca, RO
More info	Check out report on Electric bus fleet

Name	InoBat
Location	Voderady, SK
More info	Check out report on InoBat

Name	Electric car MG ZS EV LUXURY
Location	Municipality of Šalovci, SI
More info	Check out report on Electric car MG ZS EV LUXURY

Check out our demo centers with CSSC technologies to get inspired!		
Stegersbach, Austria	https://cssclab.eu/austria-demon-center-2/	

Check out our training content on CSSC technologies!

Heat system: energy storage & sector coupling

Electric system: energy storage & sector coupling

Emerging technologies & sector coupling applications

Use cases and good practice examples

Basic understanding of macro-economic energy market conditions

Micro-economic factors influencing economic efficiency of CSSC installations in urban settings

Business models and financing solutions

Economic assessment of practice examples

Back to front page

Legal aspects

Name	National Resilience and Recovery Plan
Type	National
Descriptio	For its Plan under the Mechanism, Croatia has provided financial resources to focus on measures that support the strengthening of the framework for research, development and innovation, and policies in five components and one initiative.
Link	https://planoporavka.gov.hr/

Name	Environmental Protection and Energy Efficiency Fund
Type	National
Descriptio	The Fund for Environmental Protection and Energy Efficiency (EPEEF) is a central place for collecting and investing extra-budgetary funds in programs and projects for environmental and nature protection, energy efficiency and the use of renewable energy sources.
Link	https://www.fzoeu.hr/

Name	Law and ByLaws on Local and Regional Self-Government
Type	Regional
Descriptio	Regulates local self-government units and regional self-government units - their scope and structure, manner of work, supervision and other issues. Also regulates the sources of funds and financing of activities, distribution of revenues and other.
Link	https://www.zakon.hr/z/132/Zakon-o-lokalnoj-i-podru%C4%8Dnoj-%28regionalnoj%29-

Name	Electricity Market Law (and bylaws)
Type	National
Descriptio	This Act prescribes common rules for production, transmission, distribution and storage of energy and electricity supply, together with provisions on consumer protection, in order to create an integrated, competitive, flexible, fair and transparent electricity market of the Republic of Croatia.
Link	https://narodne-novine.nn.hr/clanci/sluzbeni/2021_10_111_1940.html

Name	Heat Market Act (and bylaws)
Type	National
Descriptio	This Act regulates measures for safe and reliable supply of thermal energy, thermal systems for the use of thermal energy for heating and cooling, conditions for obtaining a concession for heat distribution, rules and measures.
Link	https://www.zakon.hr/z/606/Zakon-o-tr%C5%BEi%C5%A1tu-toplinske-energije

Back to front page

Contact points

Name	REGEA
Type of support	technical support/legislative support/CSSC Lab contact point
Link	https://regea.org/

Name	HEP Toplinarstvo
Type of support	technical support
Link	https://www.hep.hr/toplinarstvo/toplinarstvo@hep.hr

Name	Ministry of Finance
Type of support	legislative support
Link	https://mfin.gov.hr/en

Name	FZOEU
Type of support	legislative support
Link	https://www.fzoeu.hr/hr/kontakt/1371

Name	Zagreb County
Type of support	legislative support/CSSC Lab contact point
Link	https://www.zagrebacka-zupanija.hr/

Back to front page

About CSSC Lab

City Storage and Sector Coupling Lab (CSSC Lab) is an INTERREG-financed project, which will run from July 2020 to December 2022. It tests and supports the roll-out of innovative city storage and sector coupling solutions at the municipal level in Europe. As part of the project, the consortium will:

1) Craft and test a comprehensive training programme for municipalities, which will showcase the application of typical city storage and sector coupling solutions

2) Develop a tool kit for a quick assessment of both the ecological and economic effects of a given investment

3) Create action plans for each of the project regions to ensure that the newly acquired know-how is applied in practice

4) Elaborate strategic recommendations within a roadmap, guiding the target municipalities in their future implementation of the city storage and sector coupling solutions

5) Share all relevant material on the CSSB Lab Platform, making it accessible to stakeholders beyond the original project region.

Official website	https://www.interreg-danube.eu/approved-projects/cssc-lab
Official Facebook page	https://www.facebook.com/cssclab/
Official LinkedIn page	https://www.linkedin.com/company/cssc-lab/
Online CSSC Lab platform	https://cssclab.eu/

Back to front page