

Collection of available solar process heat related national and trans-national research and funding programs

Subtask E “Guideline to Market”

Deliverable Report D.E1

IEA SHC TASK 64 | IEA SolarPACES Task 4 | Solar Process Heat

Collection of available solar process heat related national and trans-national research and funding programs

**This is a report from SHC Task 64 /
SolarPACES Task IV: Solar Process Heat
and work performed in
Subtask E: Guideline to Market**

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- Solar District Heating (Tasks 7, 45, 55)
- Solar Buildings/Architecture/Urban Planning (Tasks 8, 11, 12, 13, 20, 22, 23, 28, 37, 40, 41, 47, 51, 52, 56, 59, 63, 66)
- Solar Thermal & PV (Tasks 16, 35, 60)
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1 Introduction

Within Task 64/IV Solar Process Heat, Subtask E “Guideline to Market” is aiming to support a wider penetration of solar thermal technologies in the supply of heating (and cooling) in industry, demonstrating Solar Heat for Industrial Processes (SHIP) to be an important contribution to the decarbonisation of the industrial sector. This requires not only to overcome technical and/or technological barriers, but it is crucial to also address non-technical barriers. Whereas well suited system integration strategies, design tools, standardized procedures or modular components are all in all paramount for the development of reliable and prompt “off the shelf” solutions, experience shows that often non-technological barriers might have a critical role in the decision making process. Above all, competitiveness and investment/financing related barriers prove in many cases to be the bottleneck for the adoption of solar thermal technologies in the industrial framework.

Thus, Subtask E aims at drafting the guidelines of a market approach more prone to be successful among industrial end-users. Closing the circle of strategies tackling technical and non-technical barriers to market penetration, in this subtask Solar Heat for Industrial Processes (SHIP) is to be delivered to industrial end-users as a simple, reliable, innovative, affordable and profitable technological solution for the decarbonization of heating (and cooling) supply to industry. By this, SHIP shall be seen as one of the core technologies of a hybrid industrial supply system, well optimized and integrated to the demand.

Whereas “simple” and “reliable” technical and technological solutions are already addressed in the other Subtasks, Subtask E builds upon the remaining aspects of how Solar Process Heat is to be seen by end-users:

- “Innovative”: demonstrating that the use of solar thermal technologies in industrial applications is recognized as a potential innovative technological solution for industrial decarbonization; investigate how it is reflected in innovation strategies at regional, national or trans-national levels; fostering the dissemination and use of available research funding for the development of R&D projects aiming at technology cost reductions and demonstration activities;
- “Affordable”: defining suitable indicators enabling a levelled comparison of CAPEX driven investments in SHIP to the OPEX driven investments of competitor technologies (e.g. boilers or heat pumps); gathering updated information and disseminating the technology cost reduction trends; defining suitable energy cost evolution scenarios enabling a due perception of future heat production costs and a quantification of the “hedging effect” of SHIP towards other energy sources; apply the findings to position SHIP as a core part of a hybrid industrial energy system;
- “Profitable”: : demonstrating that a “Payback driven” appraisal of SHIP is short sighted as it does not capture the NPV potential of these CAPEX driven investments; gathering updated information and disseminating new trends on SHIP financing models; developing suitable “PPA-like” scenarios demonstrating that SHIP based LCOH is competitive with other (conventional and/or renewable) energy sources; pooling available SHIP financing possibilities among potential project promoters and/or end-users.

Innovation should be mainly driven by industrial development which, however, can be supported through publicly funded research and development, allowing e.g. to include research centres and other support for R&D. The availability of public research funding can thus be one factor to support further innovation even for “ready-to-market” technologies at high TRL. Here, innovation can aim at further improvement of technical performance, simplification of integration and application, cost reductions, new materials or processes or any other means of improvement of overall competitiveness.

In most markets, competitiveness of SHIP technologies is challenging while fossil based heat supply remains available at comparably low cost. To support the competitiveness of low carbon technologies, some countries established incentive programs, aiming for SHIP technologies to become affordable and more profitable for industry.

Therefore, as a first deliverable of Subtask E, a collection of research and incentive programs available for SHIP has been performed by the expert group and is reported in the following.

Besides the collection of available programs, some additional aspects have been discussed in the expert group of Subtask E and are reported here. Based on these discussions, some recommendations are provided.

Disclaimer:

The information contained in this report is, by nature of both the type of information and the methodology of information gathering, not exhaustive and represents a snapshot in time at the time of information gathering. We strongly recommend to explicitly search for first-hand and updated information before using information in any way.

The methodology of information gathering is laid out in section 2. Due to the chosen methodology, the information is not exhaustive in terms of the countries with available programs and may be not exhaustive in available programs in the countries listed either. For further details, refer to section 2.

Received answers reflect the expert knowledge of the contributing experts. Thus, the listed information may not be exhaustive, and does not reflect any official statement by a government or national agency or any other body.

Yet, despite being a non-exhaustive snapshot, the results reported here may be used as indicator of countries and programs, or at least as additional source of search terms (funding bodies or agencies, program names, ...) to look for updated and first-hand information.

1.1 Executive Summary

Solar Heat for Industrial Processes (SHIP) is a ready-to-market technology that can provide renewable heat to industry. Subtask E “Guideline to Market” of the Task 64/IV “Solar Process Heat” aims to support faster and broader market rollout by demonstrating that SHIP technologies are innovative, affordable and profitable.

To accelerate innovation and improve competitiveness, programs and instruments of public funding and incentives can be issued, supporting the objectives of Subtask E. To disseminate opportunities provided by such instruments, Subtask E therefore initiated a survey on available funding programs for SHIP related research and on funding/incentive programs and instruments for SHIP installations.

In a survey amongst experts involved or connected to Task 64/IV Solar Process Heat, available incentives for SHIP installations and research funding programs from 18 countries (out of 32 countries approached in total) have been collected and are provided in this report.

The funding programs for SHIP installations use different incentive types like a grant on investment, tax exemptions, loan programmes or others. The incentive type used most amongst the received answers is a direct grant on initial investment of SHIP plants (in place in 9 countries), followed by advantageous taxation of even tax exemptions (8) and loan programmes (6). In 5 countries, other types of incentives are installed.

A comparison of the availability of funding programs to the status of SHIP implementations in the investigated countries, represented by the number of plants and the total installed gross collector area as retrieved from the SHIP projects database www.ship-plants.info, allowed for a qualitative check whether a broad SHIP rollout is correlated to the availability of funding programs. As a result, in those countries showing the most advanced SHIP rollout, funding instruments are available. However, the availability of funding instruments alone seems not sufficient for a successful broad SHIP rollout.

Based on the results of the survey, the subsequent analysis of the feedback and discussions in the Subtask, the expert group active in Task 64/IV “Subtask E: Guideline to Market” recommends incentive/funding instruments to support the faster and broader market rollout of SHIP technologies. Based on the feedback of relevant technology suppliers within the Subtask E expert group, direct subsidies on initial investment for SHIP installation (CAPEX) are the preferred option of funding/incentive programmes as it is easiest to include in an economic assessment approach, for communication with end users and by this, to support actual implementation including financing. But as diverse SHIP plants are, as important are specific solutions for all relevant stakeholders along the different project phases including the industrial end-users, the technology suppliers but also plant operators and investors. This is further discussed in this report.

2 Methodology

In the following sections, the methodology applied to gather the information presented in this report is briefly described. The main concept of information gathering was based on the expert group active in Task 64/IV. Experts were approached and asked for contributions referring to their “home” country by means of standardised basic information entered into a template. This information gathering was iterated several times to increase the number of responses. All responses were collected and evaluated.

2.1 Scope of countries

Experts from 32 countries are listed to participate in Task 64/IV. As the information gathering relied on contributions from experts, the countries included in the information gathering activities correspond to the “home” countries of the Task 64/IV expert list. These are listed in the following Table 1.

Table 1: List of countries where experts were approached (in alphabetic order)

Argentina	Denmark	Ireland	South Africa
Australia	Ethiopia	Italy	Spain
Austria	Finland	Korea	Sweden
Belgium	France	Mexico	Switzerland
Brazil	Germany	Morocco	The Netherlands
Canada	Greece	Namibia	UK
Chile	Hungary	North Macedonia	Uruguay
China	India	Portugal	USA

Since we did not receive responds from all contacted experts / countries, the results presented below may refer only to a smaller number of countries, see details listed with the results.

2.2 Collection of information

In a first round, one expert from each country was chosen and contacted via E-mail, asking for support and information feedback. Several reminders have been sent out, and where no responses were received, another expert from the respective country was contacted. The contacting and communication to experts was mostly done by E-mail exchange.

Received answers reflect the expert knowledge of the contributing expert. Thus, the listed information may not be exhaustive, and does not reflect any official statement by a government or national agency or any other body.

Interim status of information gathering was reported together with the interim results during several Task 64/IV expert meetings and Subtask E meeting, together with the request to participating experts to provide information on countries where no feedback had been received so far.

The results were collected in an MS EXCEL spreadsheet which has been made available to the Subtask E expert group through a joint cloud drive of the Subtask.

2.3 Type of information and information processing

It should be noted that the request for information on programs was explicitly addressing all programs where SHIP research or SHIP projects could apply to. These may be not *SHIP specific* programs, but also rather broader programs e.g. on renewable energy integration or innovations in industry. Despite the fact that this had been communicated repeatedly, some responses received stated that in a requested category « no SHIP specific instruments / programs were available ».

Furthermore, all approached experts had been asked to provide also information if no programs are known to be

available, thus providing a negative answer. Nevertheless, only answers were received from countries where one or the other program/instrument or both was available.

Information was collected in two main categories, namely

- **Information on available SHIP related research programs**
Programs offering public funding for SHIP related research, development and demonstration projects.
- **Information on available SHIP related funding/incentive programs**
Programs offering incentives for the implementation of SHIP projects and installations. Since different types and concepts of incentives are available, the type of incentive was retrieved as well.
For more detail, see Sections 3.1.2. and 3.3.

For the evaluation of the results, the status of SHIP implementation in the investigated countries was retrieved from the SHIP projects database www.ship-plants.info, maintained by AEE – Institute for Sustainable Technologies (AEE INTEC), Austria. This database was an output of the IEA SHC Task49.

Interim results and final results have been presented to the expert group in Task and Subtask E expert meetings and discussed with respect to the experiences and recommendations. For more detail, see Chapter 5.

3 Collection of available research and funding/incentive programs

3.1 Collected information

For each country where feedback was received, the detailed information is provided in the Annex. The information contains the following categories (where applicable / available):

3.1.1 Funding/incentive program

Name of Funding Program: Specific name of the funding program / instrument available for SHIP funding

Funding institution: Public bodies and/or agencies providing the funding and/or involved in the funding process

Funded technology: Technologies addressed by the funding instrument

Funded sector / beneficiaries: Industrial sector or group of beneficiaries addressed by the funding instrument

Instrument type: Type of funding instrument – see section 3.1.2

Incentive (quantitative): If available, quantitative information on the funding (e.g. % of CAPEX)

Conditions/requirements: Requirements, prerequisites and conditions to qualify for this instrument

Duration / expiry date: Duration of the instrument / program

Source / Reference (for details): A direct reference to the primary source describing this instrument, e.g. Weblink / URL.

Last update, provided by: source and date of last entry

3.1.2 Type of Funding/incentives

Subsidies / CAPEX: Direct subsidy on initial investment (capital expenditure, CAPEX) for SHIP investments or cost related to SHIP installations

Loan: Loans, typically provided under advantageous conditions, for SHIP investments or cost related to SHIP installations

Taxation: Tax exemption of tax abatement for SHIP investments or cost related to SHIP installations

Services: Support / Grant / Subsidy for services related to SHIP installations, e.g. Energy Audits, Planning/Engineering support, Consultancy,

OPEX / Generated heat: Feed in Tariffs, subsidised heat supply, ...

Others: Support for Contracting, issue of certificates, vouchers, or any other type of support (contributors were asked to please specify / provide some info on the specific type of instrument)

Research funding: Partial or full coverage / support of research activities on SHIP related topics, including demonstration projects

3.2 Overview on available funding programs for SHIP related RTD and funding/incentive programs for SHIP installations

Of 32 countries approached, 18 answers were received. The following table gives an overview on the availability of programs/instruments.

Table 2: List of countries where answers on the (non-)availability of programs/instruments was received (18 of 32 approached, in alphabetic order). Green indicates availability of programs, Yellow indicates that no program is available. No feedback was received from Argentina, Australia, Belgium, Canada, China, Ethiopia, Finland, Hungary, Ireland, Korea, Namibia, North Macedonia, Switzerland and the Netherlands.

Country	Incentive	RTD Funding
Austria	x	x
Brazil	x	x
Chile	x	
Denmark		x
France	x	x
Germany	x	x
Greece	x	x
India	x	x
Italy	x	x
Mexico	x	
Morocco	x	x
Portugal	x	x
South Africa	x	
Spain	x	
Sweden	x	x
UK	x	x
Uruguay	x	x
USA	x	x
Total	17	14

As can be seen, all of the countries where feedback was received do have one or the other type of programs available, or both. This means that no response has been provided by experts not aware of any program in the respective country, even though we had asked also for negative answers (not available).

3.3 Overview on available types of funding/incentive programs for SHIP installations

The following table gives an overview on the types of funding/incentive programs for SHIP installations. For the definition of types, see listing in section 3.1.2.

Table 3: List of types of programs/instruments for SHIP installations (for 18 countries of 32 approached, in alphabetic order). Green indicates availability of programs, Yellow indicates that no program is available. No feedback was received from Argentina, Australia, Belgium, Canada, China, Ethiopia, Finland, Hungary, Ireland, Korea, Namibia, North Macedonia, Switzerland and the Netherlands.

Country	CAPEX/			
	Grant	Loan	Taxation	...
Austria	x			
Brazil	x			
Chile		x		
Denmark				
France	x			
Germany	x	x		
Greece	x	x	x	x
India	x	x		
Italy	x	x	x	x
Mexico		x	x	
Morocco			x	
Portugal	x			
South Africa			x	
Spain	x			
Sweden			x	
UK				x
Uruguay			x	x
USA			x	x
Total	9	6	8	5

Of the instrument types which provide direct incentives for SHIP installations, the direct subsidy on initial investment (“CAPEX”/Grant - 9) is the most frequently available instrument, followed by taxation (8) and loans (6). Other types of instruments are available in 5 countries (OPEX, Services, Financing instrument support). For more Details, see the complete collection of information in the Annex.

4 Further evaluations and recommendations

The collection on availability of incentives and funding for both R&D and actual SHIP installations was one goal of this collection. Within the expert group of Subtask E, discussions have been initiated whether further conclusions or recommendations could be derived from the results of the collection. The outcome of these discussions and considerations is provided in the following.

4.1 Relation between available programs and status of SHIP implementation

For each country where feedback was received, the detailed information is provided in the Annex. Since any public funding and incentive probably has the main goal to support broader market rollout if SHIP (or, depending on the scope of funding instrument) e.g. renewable technologies in general. Therefore, one interesting question is whether the availability of SHIP incentives does show in the degree of market rollout.

As an indicator of the status of SHIP implementation in the investigated countries, information on existing SHIP installations was retrieved from the SHIP projects database www.ship-plants.info, maintained by AEE INTEC, Austria. There, general information, e.g. total installed collector aperture area or number of SHIP plants are available per country. To account for the different size of the investigated countries, the number of SHIP plants and the total installed aperture area were both normalised to a value per 50 Mio inhabitants, and are shown alongside the availability of incentives and funding programs in the following graphs.

It should be noted that the numbers will not reflect the actual state of implementation of SHIP in a country, e.g. because not all plants may be registered in the database. This is due to unknown implementations worldwide, but also linked to the definition of SHIP (excluding plants that may be accepted in other surveys) and a defined minimum size of plants. To be accepted and registered on the database, a thorough approval process has to be followed. By this some plants may be discouraged to be listed. On the other hand, using this database allows to use one single data source for the comparison of the countries discussed here, while using different (maybe more detailed specific) data bases e.g. specific for single countries may give rise to even more questions with respect to such an evaluation and comparison. See further remarks in the text following Figure 2 below.

Similarly, the availability of funding and incentive programs reflects the current situation, whereas the number of plants and the total installed area are the result of installations in the past, i.e. cumulated over a long time. Nevertheless, both may be used as indicators for a rough and qualitative cross-check whether any obvious correlations may be noticed.

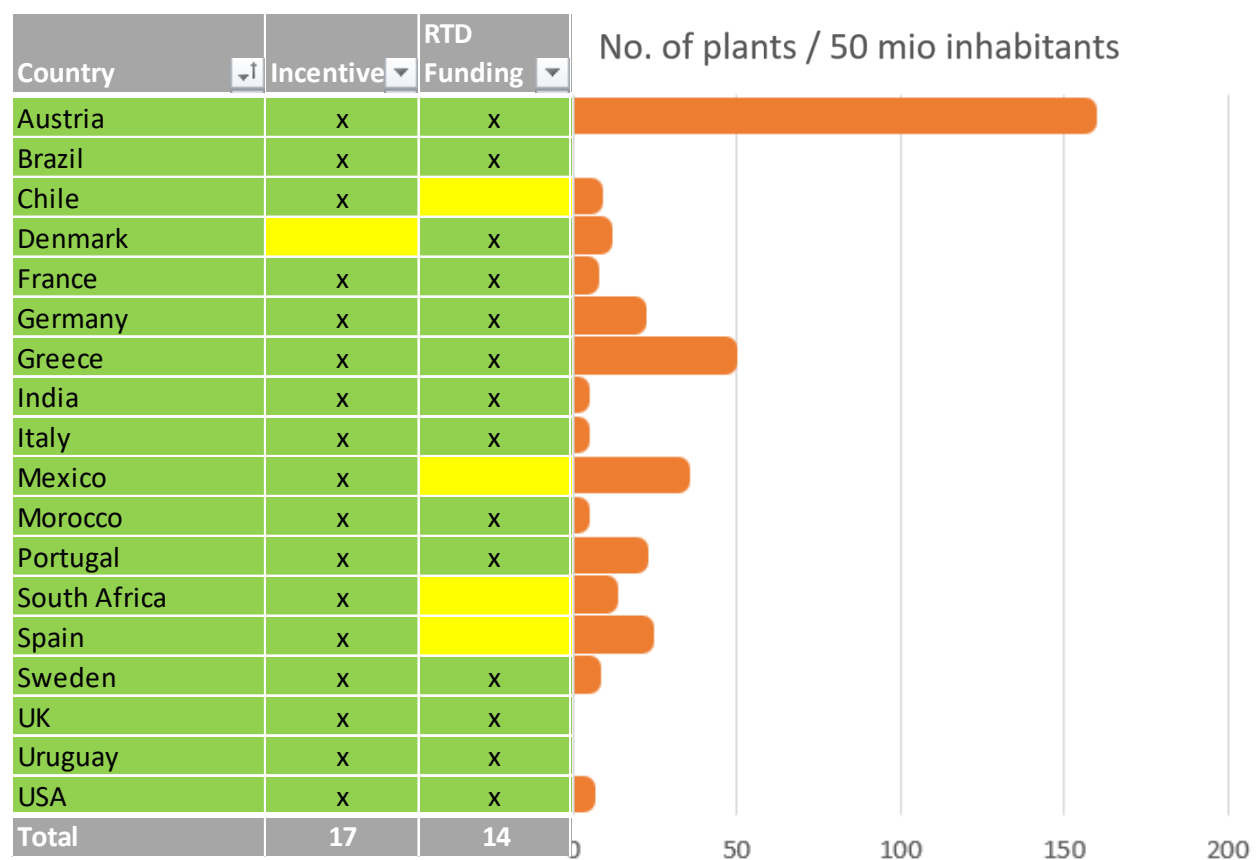


Figure 1: Availability of funding and incentive programs alongside the current status of implementation of SHIP technologies per country. Listed are only countries where answers on incentives/funding was received. As indicator of SHIP implementation, the number of installed SHIP plants per 50 Mio inhabitants is shown.

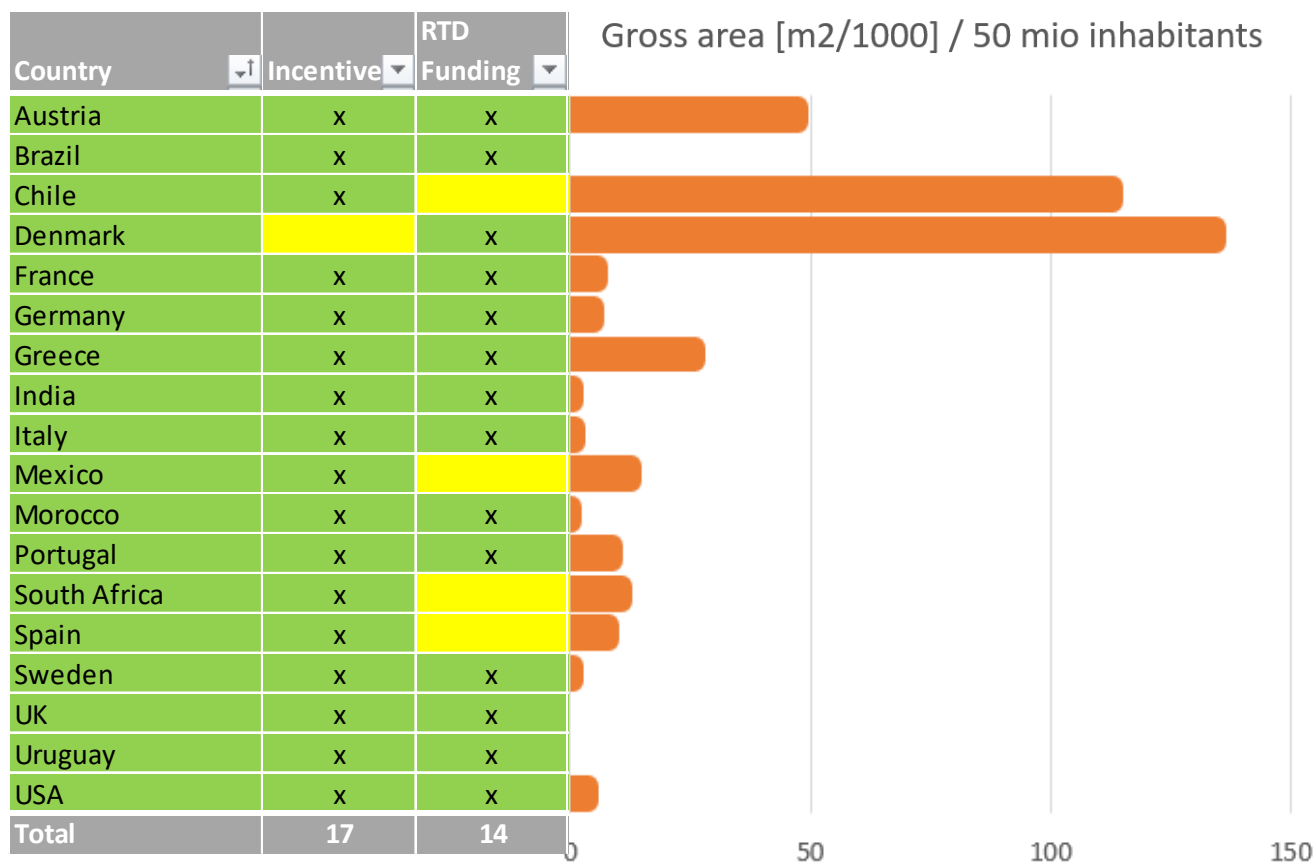


Figure 2: Availability of funding and incentive programs alongside the current status of implementation of SHIP technologies per country. Listed are only countries where answers on incentives/funding was received. As indicator of SHIP implementation, the total gross collector aperture area of installed SHIP plants in 1000 m² per 50 Mio inhabitants is shown.

From the graphs above, it is obvious that there are a few countries (Austria, Chile, Denmark, Greece) where the status of SHIP implementation seems to be more advanced than in the majority of other countries. The graph also does not take into account what is the number of plants per total installed gross area (example Chile: very large size of one implementation). It should be noted that Mexico has a very high number of existing plants which are, however, obviously not registered in the database used. Similar weaknesses may apply to other countries or absolute numbers. However, we believe that the general conclusions drawn from the evaluation still remain valid even if the used database may be incomplete in some instances.

While a few countries show a very advanced status of implementation (when compared to the other countries - yet, on a still rather low level in total absolute numbers), there is no clear correlation between SHIP implementation and availability of funding/incentives. On the other hand, in all countries where SHIP is already more advanced, funding/incentives for either RTD or actual SHIP implementation or both is available.

A similar exercise has been made including all countries approached (all 32 countries). This showed that in none of the countries where no feedback on funding/incentive programs was received (and thus presumably no strong funding/incentive programs exist), the status of implementation is very well advanced if compared to other countries in this survey.

The fact that there is no clear correlation between the status of SHIP implementation and the availability of funding/incentive programs also indicates that there are many other factors impacting the success and rollout of SHIP. This is in line with results and conclusions found in the EU project INSHIP¹.

4.2 Recommendations

4.2.1 Funding/incentive programs

From the results of this survey, it can be clearly concluded that the availability of incentives for SHIP significantly supports the broader implementation of SHIP technologies. However, the availability of incentives/funding alone is not sufficient, as there are many other factors decisive on the successful market rollout.

With fossil fuels and fossil based heat supply being available at comparatively low cost and through well proven state-of-the-art technologies at usually well known investment cost, competitiveness of solar heat is usually seen challenging and one very important factor in the decision making process of an end user / customer. This is also due to the traditional financial based project assessment via payback driven approaches. Even with unknown development of fuel costs in the future, decisions are often taken based on investment considerations only.

Therefore, the broad majority of experts in Subtask E recommends the installation of a funding/incentive scheme to support market rollout of SHIP as long as competing heat supply from fossil fueled technologies is comparatively cheap and the cost related to CO₂ emissions remain at a low level.

4.2.2 Type of funding/incentive program

The above presented survey results address funding/incentive programs being one key to a broader market penetration of SHIP plants. A more detailed analysis of available schemes in different countries within this topic highlight that direct subsidies on initial investment for SHIP installation (CAPEX) are a prevalence. This is further supported by the feedback of relevant technology supplier within the Subtask E (expert group of the subtask), naming this support as the preferred option of funding/incentive programmes. Compared to other instruments, this grant is easiest to include in an economic assessment approach, for communication with end users and by this, to support actual implementation including financing. Nevertheless, it is necessary to couple CAPEX driven approaches to constant high-level performance ensuring an optimisation along the whole project life-time.

This Deliverable does not have the ambition to assess all available or possible funding schemes and by this create a priority list of most preferred schemes all along the phases of project development, implementation and operation of these systems. As diverse SHIP plants are, as important are specific solutions. Solar Heat for Industrial Processes has to become a business case for all relevant stakeholders including the industrial end-users, the technology suppliers but also plant operators and investors. Therefore, it will be necessary to further elaborate different schemes tailor-made for these stakeholders. Examples are fundings for project development, funded guarantees for investments, risk management schemes both technical and financial, necessary insurances, but also the development and implementation of legal framework conditions that have to be adapted to the needs of SHIP. This will be further addressed in the activities E2 and E3 within the Subtask E.

¹ "Report on analysis of needed national and regional innovation strategies on SHIP", - Public Deliverable Report D8.1, August 2019, and "Report on comparative analysis and innovation support roadmaps in Europe" - Public Deliverable Report D8.3, April 2020, of the EC funded Research project INSHIP (Grant Agreement no. 731287).

5 ANNEX: Detailed results and detailed list of available SHIP RTD funding and SHIP incentives

5.1 Detailed results and numbers used in the analysis

The following table shows the list of all countries and results of the survey and analysis. In the analysis shown in section 4.1, numbers on the status of SHIP implementation extracted from the SHIP projects database www.ship-plants.info, maintained by AEE INTEC, Austria, have been used. They have been normalised to an imaginary country size of 50 Mio inhabitants to allow for a comparison of countries. All numbers used in this valuation are listed in the following table.

	Country	Incentive	RTD Funding	No of plants	Gross Area[m ²]	Gross Area [m ²]/ 1000	Thermal Power [kWth]	inhabitants	inh/ 50 mio	No of plants per 50 mio	gross area per 50 mio	Incentives type				
												Country	CAPEX/ Grant	Loan	Taxation	...
1	Argentina			1	737.00	0.74	477.40	44,938,712	0.89877424	1.11	0.82	Argentina				
2	Australia					0.00		25,713,700	0.51427400	0.00	0.00	Australia				
3	1 Austria	x	x	28	8,450.80	8.45	5,126.63	8,935,112	0.17870224	156.69	47.29	Austria	x			
4	Belgium					0.00		11,492,641	0.22985282	0.00	0.00	Belgium				
5	1 Brazil	x	x			0.00		210,147,125	4.20294250	0.00	0.00	Brazil	x			
6	Canada			2	1,572.00	1.57	846.00	38,005,238	0.76010476	2.63	2.07	Canada				
7	1 Chile	x		2	39,740.00	39.74	25,164.74	17,574,003	0.35148006	5.69	113.06	Chile		x		
8	China			13	53,135.70	53.14	24,393.36	1,400,050,000	28.00100000	0.46	1.90	China				
9	1 Denmark		x	1	15,680.00	15.68	9,880.00	5,837,213	0.11674426	8.57	134.31	Denmark				
10	Ethiopia					0.00		109,224,414	2.18448828	0.00	0.00	Ethiopia				
11	Finland					0.00		5,528,737	0.11057474	0.00	0.00	Finland				
12	1 France	x	x	6	7,471.00	7.47	4,630.88	67,081,000	1.34162000	4.47	5.57	France	x			
13	1 Germany	x	x	31	7,845.70	7.85	3,984.52	83,166,711	1.66333422	18.64	4.72	Germany	x	x		
14	1 Greece	x	x	10	5,553.00	5.55	3,515.72	10,724,599	0.21449198	46.62	25.89	Greece	x	x	x	x
15	Hungary					0.00		9,769,526	0.19539052	0.00	0.00	Hungary				
16	1 India	x	x	47	18,882.20	18.88	6,230.03	1,352,642,280	27.05284560	1.74	0.70	India	x	x		
17	Ireland					0.00		6,572,728	0.13145456	0.00	0.00	Ireland				
18	1 Italy	x	x	2	1,178.00	1.18	544.00	60,317,116	1.20634232	1.66	0.98	Italy	x	x	x	x
19	Korea					0.00		51,709,098	1.03418196	0.00	0.00	Korea				
20	1 Mexico	x		83	32,698.60	32.70	14,154.05	128,649,565	2.57299130	32.26	12.71	Mexico		x	x	
21	1 Morocco	x	x	1	110.00	0.11	61.00	37,112,080	0.74224160	1.35	0.15	Morocco			x	
22	Namibia					0.00		2,746,745	0.05493490	0.00	0.00	Namibia				
23	North Macedonia					0.00		2,077,132	0.04154264	0.00	0.00	North Macedonia				
24	1 Portugal	x	x	4	1,836.00	1.84	873.89	10,295,909	0.20591818	19.43	8.92	Portugal	x			
25	1 South Africa	x		12	12,804.20	12.80	7,800.99	59,622,350	1.19244700	10.06	10.74	South Africa			x	
26	1 Spain	x		20	7,753.75	7.75	4,442.82	47,431,256	0.94862512	21.08	8.17	Spain	x			
27	1 Sweden	x	x	1	100.00	0.10	40.00	10,367,232	0.20734464	4.82	0.48	Sweden			x	
28	Switzerland			6	2,004.00	2.00	1,067.80	8,570,146	0.17140292	35.01	11.69	Switzerland				
29	The Netherlands			2	9,400.00	9.40	5,952.40	17,418,808	0.34837616	5.74	26.98	The Netherlands				
30	1 UK	x	x			0.00		67,886,004	1.35772008	0.00	0.00	UK				x
31	1 Uruguay	x	x			0.00		3,518,552	0.07037104	0.00	0.00	Uruguay			x	x
32	1 USA	x	x	20	24,660.40	24.66	10,793.52	328,239,523	6.56479046	3.05	3.76	USA			x	x
	Total	17	14									Total	9	6	8	5
18																

Table 3: Full detailed list of countries where experts were approached (32, in alphabetic order) and feedback received (18).
Grey indicates: no feedback received; Yellow indicates: feedback received, but no instrument available; Green indicates: instrument available.
Left columns: availability of instruments;
Center columns: indicators for the status of SHIP implementation, extracted from the SHIP projects database www.ship-plants.info, maintained by AEE INTEC, Austria.
Right columns: Listing of incentive type.

5.2 SHIP related research funding and funding/incentives programs for SHIP installations

The detailed collection of all feedback received is annexed by means of an MS-EXCEL file. This file contains

- one spreadsheet on SHIP related RTD funding,
- one spreadsheet on funding/incentives for SHIP installations and
- one sheet listing the funding/incentive types (as also listed in section 3.1.2).

Incentives (funding/support options) for solar process heat installations in different countries

Date: 26.02.2021

Country	Program Name	Funding Institution	Funded Technology	Funded Sector / Beneficiaries	Instrument type (CAPEX/Loan/Taxation/ etc.)	Incentive (quantitative)	Brief Conditions / requirements	Duration/ Expiry Date	Impact / total available funds	Source / Reference (for details)	last update, provided by
Austria	UFI – betriebliche Umweltförderung im Inland	Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK) / EU	Solar Thermal, biomass, geothermal, hydro, wind	Natural or legal persons. The extent of the support/reimbursement might differ for companies, municipalities or private individuals.	CAPEX	Depends on the size of the installation. Aid up to € 200,000 over a period of three years. Or reimbursement of 30 - 45% of the investment costs to a maximum additional 10% (for medium-sized companies) or even 20% (for small-sized companies).	Environment-related investment costs must amount to a minimum of € 10,000	ongoing	For 2017-2021 the annual budget stands at € 80 million.	https://www.umweltfoerderung.at/alle-foerderungen.html	AEE, Sept 2020
Austria	Programme des Klima- und Energiefonds	Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK)	Large solar thermal for industrial heat or district heating and space and water heating	All private and legal entities engaging in commercial activities	CAPEX	Solar process heat: € 700 per MWh up total support of € 750,000 Feed-in of solar heat into district heating grids: € 550 per MWh up total support of € 750,000 High solar coverage rates (>20%) in service and commerce: € 950 per MWh up total support of € 750,000 Combinations of solar thermal with heat pumps: € 1,100 per MWh Combination of solar thermal with heat pumps and PVT collector: € 1,600 per MWh		ongoing		https://www.klimafonds.gv.at/	AEE, Sept 2020
Austria	Specific to each state	Federal state government (9 states in Austria)	Solar, biogas, geothermal, etc.	Especially for private individuals in the scope of housing subsidies or for farmers in the agricultural sector	CAPEX	Specific to each state		ongoing	Specific to each state	https://www.wko.at/service/umwelt-energie/Betriebliche_Umweltfoerderung_in_den_Bundeslaendern.html	AEE, Sept 2020
Brazil	National Development Bank FINAME – Renewable Energy program	BNDES - National Development Bank	Renewable energy, including solar water heaters	National companies, private persons, private or public, including e.g. farmers or contractors.	CAPEX	Up to 100% of financiable items (solar water heaters acquisition and installation costs included as financiable item)		ongoing		https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finame-energia-renovavel	September 2020, LEPTEN/UFSC
Brazil	National Development Bank FINEM – Energy Efficiency	BNDES - National Development Bank	Reduction of energy demand of processes	National companies and public sector	CAPEX	Up to 80% of total project cost, limited to 100% of the cost of financiable items.		ongoing		https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finem-eficiencia-energetica	September 2020, LEPTEN/UFSC
Chile	NAMA - Nationally Appropriate Mitigation Action: Energias Renovables para Autoconsumo	GIZ - Chile /Energy Ministry	All renewable energies for self consumption	Small and medium companies	Loan	N.A.	N.A.	Starts in 2021	N.A.	https://autoconsumo.minenergia.cl/?page_id=629#:~:text=El%20proyecto%20Nama%3A%20Energ%C3%ADas%20Renovables,adecuadas%20para%20etapas%20tempranas%20de	January 2021 by José M. Cardemil I., Pontificia Universidad Católica de Chile
Cyprus	At the moment, there is no support scheme for RES H&C for commercial activities. The only regulations concerning solar heating/cooling are those related to buildings. Decree No. 446/2009 contains the following regulations for buildings: Mandatory solar installations on every new residential building to satisfy domestic hot water requirements; RES installations on every new building for power generation.									http://www.mcit.gov.cy/mcit/EnergySe.nsf/All/A5148E4373FBABAC22580E200424078?OpenDocument	AEE, Sept 2020
France	Fonds Chaleur	ADEME	heat pump, solar thermal, geothermal, biomass, energy efficiency...	Heat producers for industrial or commercial purposes or heat consumers	CAPEX	up to 65% of CAPEX (depends on the size of the beneficiary if SME)		ongoing	350 M€	https://www.ademe.fr/expertises/energies-renouvelables-enr-production-reseaux-stockage/passer-a-l'action/produire-chaaleur/fonds-chaaleur-bref	September, NewHeat
Germany	Zuschuss - Bundesförderung für Energieeffizienz in der Wirtschaft - Modul 2: Prozesswärme aus Erneuerbaren Energien	BAFA (Federal Office for Economic Affairs and Export Control)	Solar Thermal, Heat Pump, Biomass	Heat producers for industrial or commercial purposes	CAPEX	Up to 55 % of CAPEX or enlargement of solar thermal systems	>= 50% of produced heat for industrial processes	ongoing	n.a.	https://www.bafa.de/DE/Energie/Energieeffizienz/Energieeffizienz_und_Prozesswaerme/Modul2_Prozesswaerme/modul2_prozesswaerme_node.html	June 2020, Fraunhofer ISE
Germany	KfW-Programm - Bundesförderung für Energieeffizienz in der Wirtschaft - Modul 2: Prozesswärme aus Erneuerbaren Energien	KfW (German state-owned development bank)	Solar Thermal, Heat Pump, Biomass, CHP, Storage, RE Heating networks (similar scheme for energy efficiency)	National companies, private persons, private or public, including e.g. farmers or contractors.	Loan	Up to 25 million € per project, Up to 100 % of eligible investment costs, low interest loan and combination with subsidy (reduced payback, up to 55%)	>= 50% of produced heat for industrial processes	ongoing	n.a.	https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/Foerderprodukte/Energieeffizienz-und-Prozesswaerme-aus-Erneuerbaren-Energien-(295)/	June 2020, Fraunhofer ISE
Greece	Development Law (Law 4399/2016) Subsidies	Ministry of Economy, Development and Tourism (YPOIAN)-Υπουργείο Οικονομίας, Ανάπτυξης και Τουρισμού	All RES H&C are eligible.	All enterprises based in Greece or have a branch in Greece at the time the Development Law	CAPEX	Depending on the size of the company from: 45-65% for cases a and b of the EU Regulation 651/2014 and from 30-50 % for case c of the EU Regulation 651/2014	To be eligible, the investment should be > than a certain amount depending on the size of the company	ongoing		https://startupgreece.gov.gr/procedures-laws-regulations/development-law-43992016	AEE, Sept 2020
Greece	Development Law (Law 4399/2016) Tax regulation	Ministry of Economy, Development and Tourism (YPOIAN)	All RES H&C are eligible.	All enterprises based in Greece or have a branch in Greece at the time the Development Law	Taxation	The following types of support are alternatively offered by the Development law (art. 10 Law No. 4399/2016): 1. Income tax relief and 2. Stabilisation of income tax coefficient	To be eligible, the investment should be > than a certain amount depending on the size of the company	ongoing		https://startupgreece.gov.gr/procedures-laws-regulations/development-law-43992016	AEE, Sept 2020
Greece	Law No. 2238/1994 on the Income Tax	Ministry of Economy, Development and Tourism (YPOIAN)	Primarily solar thermal. But all RES-H technologies are eligible	Natural and legal persons of Greek nationality and Greek descent	Taxation	10% of the project costs may be deducted from taxable income (up to a maximum of € 3,000).		ongoing		https://www.e-forologia.gr/lawbank/document.aspx?digest=D2510C09ACCA3910.1D031AE53&version=2018/12/24	AEE, Sept 2020
Greece	Development Law (Law 4399/2016) Subsidies	Ministry of Economy, Development and Tourism (YPOIAN)-Υπουργείο Οικονομίας, Ανάπτυξης και Τουρισμού	All RES H&C are eligible.	All enterprises based in Greece or have a branch in Greece at the time the Development Law	CAPEX	Depending on the size of the company from: 45-65% for cases a and b of the EU Regulation 651/2014 and from 30-50 % for case c of the EU Regulation 651/2014	To be eligible, the investment should be > than a certain amount depending on the size of the company	ongoing		https://startupgreece.gov.gr/procedures-laws-regulations/development-law-43992016	AEE, Sept 2020
Greece	Development Law (Law 4399/2016) Tax regulation	Ministry of Economy, Development and Tourism (YPOIAN)	All RES H&C are eligible.	All enterprises based in Greece or have a branch in Greece at the time the Development Law	Taxation	The following types of support are alternatively offered by the Development law (art. 10 Law No. 4399/2016): 1. Income tax relief and 2. Stabilisation of income tax coefficient	To be eligible, the investment should be > than a certain amount depending on the size of the company	ongoing		https://startupgreece.gov.gr/procedures-laws-regulations/development-law-43992016	AEE, Sept 2020
Greece	Law No. 2238/1994 on the Income Tax	Ministry of Economy, Development and Tourism (YPOIAN)	Primarily solar thermal. But all RES-H technologies are eligible	Natural and legal persons of Greek nationality and Greek descent	Taxation	10% of the project costs may be deducted from taxable income (up to a maximum of € 3,000).		ongoing		https://www.e-forologia.gr/lawbank/document.aspx?digest=D2510C09ACCA3910.1D031AE53&version=2018/12/24	AEE, Sept 2020

Greece	"Law 4342/2015, Part B Integration of the European Energy Efficiency Directive 2012/27/EU" (Article 10) and "Circular ΔΕΠΕΑ/Γ/οικ.181906/5.10.2017, Clarifications on the energy audits of Law 4342/2015", impose to large enterprises to perform energy audits	Ministry of Environment and Energy of the Hellenic Republic - Υπουργείο Περιβάλλοντος και Ενέργειας	Energy audits and implementation of specific energy interventions including ST installations	As large enterprises are regarded the ones with total number of employees over 250 or total number of employees less than 250 but with annual turnover over 50 million € and annual balance sheet total over 43 million €.	Services	Obligation for large enterprises to perform energy audits. The cost of the energy audit for SMEs and the implementation of the measures given in the energy audits may be covered by various support schemes (Law 4342/2015, Article 10, paragraph 8).	For the industrial sector, the category for large enterprise is "Industrial and small-scale installations with a total installed capacity of more than 1,000 kW".	ongoing	n.a.	http://www.publicrevenue.gr/elib/view?d=/gr/act/2015/4342	CRES, Jan 2021
Greece	"Law 4342/2015, Part B Integration of the European Energy Efficiency Directive 2012/27/EU" (Article 9), establish "Energy efficiency obligation schemes", created according to the Article 7 of the "Energy Efficiency Directive 2012/27/EU".	Ministry of Environment and Energy of the Hellenic Republic - Υπουργείο Περιβάλλοντος και Ενέργειας	ST installations are included in the given list of indicative measures for achieving the requires energy saving targets	Energy distributors and/or retail energy sales companies must achieve a cumulative end-use energy savings target	Services	Avoiding penalties that will be implemented in case of not reaching the targets		ongoing	n.a.	www.cres.gr/obs/index.html	CRES, Jan 2021
Greece	"Government Gazette B 4159 / 29.11.2017" (Article 1), establish an "Infrastructure Fund" ("Τομείο Υποδομών") aiming at maximizing the use of financial instruments, in the field of energy saving and promotion of RES.	Ministry of Development and Investments - Υπουργείο Ανάπτυξης και Επενδύσεων	RES and other technologies	Private and public sector for the implementation of small and medium-sized projects, with emphasis on energy, environment and urban development.	Other (Financial support scheme, which aims to ensure the maximum possible use of different financial instruments, such as loans etc.)	The total resources of the "Infrastructure Fund" is 450 million Euro, while the funds of the "Operational Program Competitiveness, Entrepreneurship, Innovation" (OP-CEI) in the energy sector is 128.7 million Euro.	The total resources are distributed to different Greek Regions.	ongoing	n.a.	https://www.teepelop.gr/wp-content/uploads/2017/12/FEK-B-4159-29.11.2017.pdf	CRES, Jan 2021
Greece	"Greek Development Law 4399/2016" (Article 9), aims at encouraging investments, mainly in the field of manufacturing and energy	Ministry of Development and Investments - Υπουργείο Ανάπτυξης και Επενδύσεων	RES and other technologies	Enterprises that are established or have a branch in Greece at the time of the submission of their investment plan	CAPEX	Currently, there are three "open" calls for submissions under the Development Law, with total budget 525 million Euro. The percentage covering the eligible cost varies per Region and size of enterprises and reaches up to 55% (https://www.taxheaven.gr/news/51895/treis-nees-prokhrxeis-toy-anaptyxiakoy-nomoy-synolikoy-proypologismoy-525-ekat-yepgrapse-o-an-yp-anaptyxhs-kai-ependysewn-k-nikos-papaoanashs).	The requirements are given in Article 5 and the beneficiaries in Article 6 of the Development Law.	ongoing	n.a.	http://elib.aade.gr/elib/view?d=/gr/act/2016/4399/	CRES, Jan 2021
India	Off-Grid and Decentralized Concentrated Solar Thermal (CST) Scheme'	Ministry of New and Renewable Energy (MNRE)	Solar Thermal	all kind of organizations are eligible	CAPEX	Up to 30% to 60% financial aid on per m2 benchmark cost (of individual solar thermal collector type). (i) Project finance based on the installation of total solar thermal area m2 and (ii) type of solar thermal collector	No special requirement for eligibility	43891	n.a.	https://mnre.gov.in/img/documents/uploads/e06e6e26f1f24cc89bb0e52004b5c547.pdf	September 2020, GERMI
India	Soft loan application form for concentrating solar thermal systems for process heating/cooling applications in industrial sectors	Indian Renewable Energy Development Agency Ltd. (IREDA) + United Nations Industrial Development Organization (UNIDO)	Solar Thermal	Process heating/cooling applications	Loan	Bridge loan by IREDA provided at interest rate of 7% pa for 45% of project cost (after 5 % interest subvention provided by UNIDO)	minimum loan for CST projects should be above by 3 million INR	ongoing	n.a.	• https://www.ireda.in/doc/financing-norms/unido-ireda-loan-application-5sep2016-01.pdf • Personal email communication with IREDA officer	September 2020, GERMI
India	Off-Grid and Decentralized Concentrated Solar Thermal (CST) Scheme'	Ministry of New and Renewable Energy (MNRE)	Solar Thermal	all kind of organizations are eligible	CAPEX	New proposed scheme by GERMI to MNRE (presently for public comments till 21.09.2020) • Performance based incentives for 5 years w.r.t. imaging and non-imaging technology • Capital financial assistance for the installation of performance monitoring instruments • additional 10% financial assistance for ESCO projects having more than 6 year contract • additional 10% financial assistance to Dairy/ Food processing/ and Process heat industries • financial assistance of INR 2000 per TR of single stage 'Vapor Absorption Machine' for solar thermal cooling projects	• minimum 160 m2 solar thermal area for the eligibility	under public comments (draft)	n.a.	https://mnre.gov.in/img/documents/uploads/file_f-1599462875132.pdf	September 2020, GERMI
Italy	Conto Termico	Ministero dello sviluppo economico	Small RES-H sources. Heat pumps, biomass and solar thermal	Public administration and private individuals or institutions	OPEX / Annual incentive	Paid annual (2-5 years) incentive in €/KWhth for each m2 of installed solar area. Depending on the type and surface of the installation	Installations are eligible provided that they fall in some specific cases	ongoing		https://www.sviluppoeconomico.gov.it/index.php/it/normativa/decreti-interministeriali/2034123-decreto-interministeriale-16-febbraio-2016-aggiornamento-conto-termico	AEE, Sept 2020
Italy	Art. 14 DL 4/6/2013 Art. 1, c. 344 – 347, l. 296/06	Ministero dello sviluppo economico	Biomass, Aerothermal, geothermal and solar thermal	Any party installing eligible plants	Taxation	This scheme allows for a 50-75% tax deduction for expenses related to refurbishment of existing buildings and / or energetic requalification of buildings and / or installation of RES-H technologies		ongoing		<a "="" href="https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto-legge:2013-06-04:631vig=">https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto-legge:2013-06-04:631vig=	AEE, Sept 2020
Italy	Fondo nazionale per l'efficienza energetica	MISE (Ministero Sviluppo Economico)	The solutions that allow a reduction of the energy consumption in the industrial processes, the realization of district heating or cooling, building efficiency solutions	Private or public	Loan	Up to 70% of the admissible costs	An evaluation is performed in order to evaluate the technical feasibility of the intervention, so the acceptance of the requirements. In addition, the conditions reported in Conto Termico apply	ongoing	310 M€	https://www.mise.gov.it/index.php/it/198-notizie-stampa/2039728-il-20-maggio-online-la-piattaforma-del-fondo-nazionale-per-l-efficienza-energetica	January 2021, Alessandro Guzzini, University of Bologna

Mexico	Fiscal incentives: Accelerated Depreciation	Secretariat of Finance and Public Credit	Renewable Energy	Private Companies	Taxation	In October 2015 the Mexican Congress approved several amendments to the tax statutes, in particular the Mexican Income Tax Law (MITL), which entered into force in January 2016. The MITL provides that taxpayers are allowed to deduct for corporate income tax purposes 100 percent of the value of the machinery and equipment acquired in a fiscal year to generate green energy (accelerated depreciation). Solar collectors are included among the assets whose acquisition is subject to accelerated depreciation. Because of the high value of this kind of machinery, a net operating loss will be created after applying the accelerated depreciation. The NOL can be carried forward to offset corporate income taxes for a 10-year period. This means that for up to 10 years, the taxpayer may not have any taxable income. After that period, any remaining amount of the NOL is written off.	Have the equipment installed for at least 5 years	ongoing	n.a.	http://www.creelabogados.com/assets/PDF/Mexican-Tax-Incentives-for-Green-Energy-Companies_TaxNotes_August2016.pdf	September 2020, Inventive Power
Mexico	FIDE: Energy efficiency	Federal Electricity Commission and FIDEICOMISO PARA EL AHORRO DE ENERGÍA ELÉCTRICA	Solar, Energy Efficiency	Shops and services Industries Micro, Small and Medium Enterprises (MIPyMES)	Loan	Its purpose is to promote and induce, with actions and results, the efficient use of electrical energy, through projects that allow the link between technological innovation and energy consumption, through the application of efficient technologies. These projects are aimed at the productive sector, by providing advice and technical assistance -with and without financing-, for the modernization of facilities, development and application of new technologies, in such a way that savings and energy efficiency contribute to the conservation of non-renewable natural resources, the sustainable use of energy and the reduction of emissions of Greenhouse Gases (GHG). These projects also allow the development of a consulting market and highly efficient technologies, contributing to the growth of employment. With these projects the following environmental benefits are obtained: Reduce the emission of Greenhouse Gases (GHG), Reduce the burning of oil barrels, Encourage the use of alternative energy sources. The minimum rate established by FIDE is the equivalent of the Interbank Equilibrium Interest Rate (TIE) + 5.5 points. Prime rate for financing over 2.5 million pesos of TIE plus 4.5 points. Benefits for the user: Become a company committed to protecting the environment. Have cutting-edge technology in the consumption of electrical energy.	Good Financing Score	ongoing	n.a.	http://www.fide.org.mx/?page_id=14731	September 2020, Inventive Power
Morocco					Taxation	partial VAT exoneration on flat plate collectors					January 2021, Green Energy Park
Portugal	P2020, in particular the Operational Programs PO SEUR and COMPETE2020	EU trough the European structural and investment funds (ESIF)	Generic	Companies, public institutions, R&D centers, etc	CAPEX	Depending on call	n.a.	ongoing	n.a.	https://www.portugal2020.pt/ https://poseur.portugal2020.pt/ https://www.compete2020.gov.pt/	August 2020, UEvora
Portugal	No direct support scheme for RES in the heating sector is currently in place (as of November 2018). The Energy Efficiency Fund (FEE) provided a subsidy to investments in solar thermal installations for heating water through "Efficient Buildings 2016" that opened for new applications on 8 July 2016 and ran until 8 November 2016.										AEE, Sept 2021
South Africa	12B TAX		Renewable Energy		Taxation		Renewable Energy Income Tax Incentive Section 12B of the Income Tax Act makes provision for a capital allowance for movable assets used in the production of renewable energy. The incentive makes allowances 100% asset accelerated depreciation in first financial year that the asset is brought online.				
Spain	"Ayudas a la inversión en instalaciones de producción de energía térmica con fuentes de energía renovable" / "Incentives to investments in installations to generate thermal energy by renewable energy sources"	IDAE (Institute for Diversification and Energy saving)	Solar thermal, heat pump powered by renewable sources, biomass, geothermal	Public or private companies and persons	CAPEX / grant	up to 15 million € per project, up to a maximum amount between 50% and 80% (depending on the development degree of the region within Spain) of the eligible investment cost.	General requirements: those related to ERDF (European Regional Development Fund)	to be opened in Q4-2020	110 million EUR for thermal installations	https://www.idae.es/en/node/14672	September 2020, Rioglass Solar

Spain	Currently no support schemes for RES-H&C are in place in Spain. The only regulations concerning solar heating/cooling are those related to building. All new buildings or buildings undergoing major renovation in which there is demand for warm sanitary water / air conditioning of a covered swimming pool must satisfy some of this demand through solar thermal installations (CTE, HE 4)											AEE, Sept 2020
	The contribution varies between 30 and 70% of the total warm sanitary water demand of the building, depending on the demand level, the geographic position and the main heating source.											
Spain	Ayudas a la inversión en instalaciones de producción de energía térmica con fuentes de energía renovable, susceptibles de ser cofinanciadas con fondos de la Unión Europea	IDAE (Instituto para la Diversificación y Ahorro de Energía)	Thermal Energy: Solar Thermal, Heat Pump, Biomass, Geothermal energy, Green gases, RE Heating networks	Industrial processes, Public sector, ESCOs, Energy communities	CAPEX	From 74 % to 54 %, depending on the region, technology and size		Submission closed. Evaluation ongoing	73.7 ME	https://www.idae.es/ayudas-y-financiacion/lineas-de-ayudas-la-inversion-en-renovables-fondos-feder/consulte-el-estado-de-la-convocatoria-en-su-comunidad-autonoma-produccion-energia-termica	Jan 2021, SOLATOM	
Sweden	Act No. 2009:194 (Lag om förfarandet vid skattereduktion för hushållsarbete - Act on the Tax-Deduction Process for Installation Works in Households) Act No. 1994:1776 (Lag om skatt på energi - Act on the Energy Tax) Act No. 1990:613 (Lag om miljöavgift på utsläpp av kväveoxider vid energiproduktion - Act on Environmental Charges on Nitrous Oxide Emissions from Energy Generation) Act No. 2010:598 (Lag om hållbarhetskriterier för biodrivmedel och flytande biobränslen - Act on sustainability criteria for biofuels and bioliquids)	Swedish Tax Agency (Skatteverket)	All renewables	All beneficiaries: households and industry	Taxation	Renewables are exempt from taxes in relation to technologies used for heating at houses, industry or NO tax.		ongoing		In government pages. But also available in English here: http://www.res-legal.eu/search-by-country/sweden/tools-list/c/sweden/s/res-hc/t/promotion/sum/200/lpid/199/	2019; Feb 2021 by Rafael Guédez, KTH	
Turkey	Currently no support schemes for RES-H&C are in place in Turkey											AEE, Sept 2020
UK	Renewable Heat Incentive (RHI)	General government (Department for Business, Energy & Industrial Strategy)	Aerothermal, Hydrothermal, Biomass, Geothermal and Solar thermal	Industry, businesses and public sector organisations	OPEX / Annual incentive	A fixed amount per kWth produced, payable for 20 years. The tariffs are calculated on a quarterly basis and published by Ofgem each year.	ES-H installation needs to be first commissioned on or after 15 July 2009	The RHI will continue to be paid for installations commissioned before 31 March 2021. After that new commercial installations may not receive any form of subsidy.		https://www.ofgem.gov.uk/environmental-programmes/non-domestic-rhi/installers-and-industry	AEE, Sept 2020	
United Kingdom	The Renewable Heat Incentive (RHI) is a UK Government scheme aiming to encourage uptake of renewable heat technologies amongst householders, communities and businesses through financial incentives, and contribute towards the 2020 ambition of 12% of heating coming from renewable sources	The UK Government's Department for Business, Energy & Industrial Strategy (BEIS) makes key policy decisions and energy regulator Ofgem E-Serve administers the scheme	Solar thermal, geothermal, biomass, heat pumps	Businesses, public sector and non-profit organisations can apply if equipment was installed in England, Scotland or Wales on or after 15 July 2009	OPEX	Payment is a certain amount per kilowatt hour of renewable heat generated. The payment can vary from 0.8 -11.52 pence/kWh, depending on technology, age of appliance, amount of heat produced.	n.a	ongoing	n.a.	https://www.ofgem.gov.uk/system/files/docs/2016/06/eligible_technologies_in_the_non-domestic_rhi.pdf https://energysavingtrust.org.uk/renewable-energy/installation/renewable-heat-incentive#:~:text=The%20Renewable%20Heat%20Incentive%20RHI%29%20is%20a%20UK,of%2012%25%20of%20heating%20coming%20from%20renewable%20sources.	September 2020, Cranfield University	
Uruguay	Ley de Promoción de Inversiones (Investment promotion Law) 16906, Decree 143/018	Government	Non obligatory Clean energy technology	Enterprises which pay IRAE (Income tax from economic activity)	Tax	Discount on the initial investment (up to 100% depending on the value obtained in a matrix of indicators), to be distributed in a period of time of up to 20 years (also depending on the total investment, and exemption obtained). The amount of taxes that can be deducted in each year is as much as 60% for existing companies and 80% for new.	Goal accomplishments in several aspects (labor generation, increase in exports, decentralization, increase in local added value, use of clean energy and research investment, development and innovation), accounted through a matrix of indicators	ongoing		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios https://www.mef.gub.uy/innovaportal/file/24538/1/mef_985.pdf		
Uruguay	Ley de Promoción de Inversiones (Investment promotion Law) 16906, Decree 143/018	Government	Non obligatory Clean energy technology	Enterprises which pay IRAE (Income tax from economic activity)	Tax	Total exoneration of the tax on assets (impuesto al patrimonio) for those goods that not apply to other benefits, during all of their lifetime.		ongoing		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios	Oct 2020, Pedro Galione, UdelaR	
Uruguay	Ley de Promoción de Inversiones (Investment promotion Law) 16906, Decree 143/018	Government	Non obligatory Clean energy technology	Enterprises which pay IRAE (Income tax from economic activity)	Tax	Tax exoneration for imports, including IVA (22%), for material goods and construction materials	Imports must be declared as not competitive to the national industry.	ongoing		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios	Oct 2020, Pedro Galione, UdelaR	
Uruguay	Ley de Promoción de Inversiones (Investment promotion Law) 16906, Decree 143/018	Government	Non obligatory Clean energy technology	Enterprises which pay IRAE (Income tax from economic activity)	Tax	IVA refund, for the acquisition of material goods and construction materials.		ongoing		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios	Oct 2020, Pedro Galione, UdelaR	
Uruguay	Solar Thermal Energy Law 18585, Decree 325/12	Government	Solar Thermal		Tax	Total exoneration of Import taxes, IVA, consular taxes and all taxes related to import of solar collectors	technology non-competitive with local industry. Minimum requirements on thermal efficiency	46081		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios	Oct 2020, Pedro Galione, UdelaR	
Uruguay	Solar Thermal Energy Law 18585, Decree 325/12	Government	Solar Thermal		Tax	IVA exoneration for the acquisition of solar collectors fabricated by local industry	local industry	46081		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios	Oct 2020, Pedro Galione, UdelaR	
Uruguay	Solar Thermal Energy Law 18585, Decree 325/12	Government	Solar Thermal		Tax	IVA exoneration for the acquisition of machinery, equipment and materials needed for the manufacturing of solar collectors	local industry	46081		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios	Oct 2020, Pedro Galione, UdelaR	

Uruguay	Certificados de Eficiencia Energética	Ministry of Industry, Energy and Mining (MIEM)	Energy Efficiency projects	energy users or energy service providers	services	Up to 30% of initial investment, through Energy Efficiency Certificates, depending on the amount of energy savings in the lifetime of the efficiency measure.	Verification of investment/benefit < 1. For investments made 1 year before applying for certificates. Efficiency measures which must be certified by an Energy Saving Certificate Agent. Total amount of available Certificates depends on available funding (~USD 2 million in 2019 and USD 1.5 million in 2020). A single project cannot take more than 20% of available certificates.	ongoing		http://www.energiasolar.gub.uy/index.php/medidas-promocionales/beneficios http://www.eficienciaenergetica.gub.uy/certificados-de-eficiencia-energetica-cee-	Oct 2020, Pedro Gallone, UdelaR
USA	Investment Tax Credit (ITC)	US Internal Revenue Services (IRS)	Solar Water Heat, Solar Space Heat, Geothermal Electric, Solar Thermal Electric, Solar Thermal Process Heat, Solar Photovoltaics, Wind (All), Geothermal Heat Pumps, Municipal Solid Waste, Combined Heat & Power, Fuel Cells using Non-Renewable Fuels, Tidal, Wind (Small), Geothermal Direct-Use, Fuel Cells using Renewable Fuels, Microturbines	Commercial, Industrial, Investor-Owned Utility, Cooperative Utilities, Agricultural	Taxation	26% Federal tax credit, where there is a reduction in the income taxes paid to the federal government	New solar installation, tax credit claimed after operational	Ongoing	NA	https://www.nrel.gov/docs/fy18osti/70384.pdf	Sept. 2020, NREL
USA	Modified Accelerated Cost Recovery System (MACRS)	US Internal Revenue Services (IRS)	Solar Water Heat, Solar Space Heat, Geothermal Electric, Solar Thermal Electric, Solar Thermal Process Heat, Solar Photovoltaics, Wind (All), Geothermal Heat Pumps, Municipal Solid Waste, Combined Heat & Power, Fuel Cells using Non-Renewable Fuels, Tidal, Wind (Small), Geothermal Direct-Use, Fuel Cells using Renewable Fuels, Microturbines	Commercial, Industrial, Investor-Owned Utility, Cooperative Utilities, Agricultural	Financial	5 - 7 years of accelerated depreciation	New installation	Ongoing	NA	https://www.nrel.gov/docs/fy18osti/70384.pdf	Sept. 2020, NREL

Funding for Research and Development (R&D) on solar process heat in different countries

Date: 26.02.2021

Country	Program Name	Funding Institution	Funded Technology	Funded Sector / Beneficiaries	Instrument type (CAPEX/OPEX/Loan/etc.)	Funding (quantitative)	Brief Conditions / requirements	Duration/ Expiry Date	Impact / total available funds	Source / Reference (for details)	last update, provided by
Austria	several	Austrian Climate Fund	no specific, beside the Large Scale Funding								Sept 2020, AEE INTEC
Austria	several	BMK									Sept 2020, AEE INTEC
Brazil	FINEP INOVACRED	Funding Authority for Studies and Projects - FINEP		Companies with yearly gross revenue up to R\$ 90 million	Research funding	Up to 90% of eligible costs	depending on call	ongoing		http://www.finep.gov.br/apoio-e-financiamento-externa/programas-e-linhas/inovacred-empresa-e-ict-s	September 2020, LEPTEN/UFSC
Denmark	EUDP, Energy Technology Development and Demonstration Program	Danish Energy Agency	All energy technologies	Private/Industry and R&D	Research funding						September 2020, Technical University of Denmark
Denmark	Different programs on different topics	Innovation Fund Denmark	All energy technologies	Private/Industry and R&D	Research funding						September 2020, Technical University of Denmark
EU	Horizon 2020	European Comission - DG Research	Solar Thermal, besides many others (topic restriction by call)	Trans-National consortia, typically containing private and public members from industry and R&D	Research funding	Up to 100 % of eligible costs for R&D activities, depending on call type	depending on call	2020		https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/home	June 2020, Fraunhofer ISE
EU	Hirozon Europe	European Comission - DG Research	Solar Thermal, besides many others (topic restriction by call)	Trans-National consortia, typically containing private and public members from industry and R&D	Research funding	Up to 100 % of eligible costs for R&D activities, depending on call type	depending on call	2022	Work Programmes and Call details still under Definition		January 2021, Fraunhofer ISE
EU	Clean Energy Transition Partnership CETP New program, in definition phase; is announced and expected to provide a follow-up to the previous "ERA.net" transnational funding schemes. Involvement and commitment of national agencies/ministries (i.e. countries to participate) is not clear yet, and neither are the respective topics. Definition is currently ongoing; Status Sept 2020: SRIA paper as basis for funding program/topics, final expert consultation.	EU/EC + National funding agencies	tentative: CSP related RTD and Industry related RTD, i.e. also heat pumps, storage, other heat supply technologies, ...	Trans-National consortia, typically containing private and public members from industry and R&D	Research funding	not clear yet, program is under definition	not clear yet, program is under definition	not clear yet, program is under definition	not clear yet, program is under definition	Currently (Sept 2020), SRIA papers are being prepared, which shall serve as a basis for the funding. No public source yet; Expert involvement to SRIA papers through EXPERA platform.	Sept. 2020, Fraunhofer ISE (Peter Nitz)
EU	CSP ERANET	European Commission - National funding organisation	CSP	SME, large companies, non-profit research organisations, higher education institutions, public research organisations and public organisations may participate according to their national / regional financing regulations	Research funding	Depending on national rules	depending on call and on specific national rules	2019 - ongoing?		https://csp-eranet.eu/about-us	January 2021, Alessandro Guzzini, University of Bologna
France	Projets de Recherche, de Développement, d'Innovation (RDI)	ADEME	Solar Thermal, besides many others (topic open)	Private/Industry and R&D	Research funding	Up to 70 % of eligible costs for R&D activities, depending on call type and size of the company	depending on call	ongoing	25 M€	https://agirpourlatransition.ademe.fr/entreprises/dispositif-aide/projets-recherche-developpement-dinnovation	November 2020, CEA
France	Programme d'Investissements d'Avenir	ADEME	Solar Thermal,	Private/Industry and R&D	Research funding	Up to 40 % of eligible costs for R&D activities, depending on	depending on call	ongoing	350 M€	https://www.ademe.fr/recherche-innovation/programme-dinvestissements-davenir/presentation-pia-3	November 2020, CEA
France	Appel à projets générique - AAPG 2021	ANR	Solar Thermal, besides many others (topic open)	Private/Industry and R&D	Research funding	Up to 68 % of the personnel cost and 7% of other eligible costs, depending on call type and size of the company RQ: mix of Grant and Refundable Advance	depending on call	ongoing 1 decembre 2020	?	https://www.ademe.fr/recherche-innovation/programme-dinvestissements-davenir/presentation-pia-3	November 2020, CEA
Germany	Energy Research: Angewandte nichtnukleare Forschungsförderung im 7. Energieforschungsprogramm „Innovationen für die Energiewende“	BMWi (Federal Ministry for Economic Affairs and Energy)	Solar Thermal, besides many others (topic open)	Private/Industry and R&D	Research funding	Up to 50 % of expenses for research activities for large companies, up to 60 % of expenses for research activities for SMEs, up to 70 % of expenses for research activities for Start-ups	To check with the Project administration - Projektträger Jülich PTJ	ongoing		https://www.foerderinfo.bund.de/energieforschung-181.php	June 2020, Fraunhofer ISE
Germany	Different programs on different topics which may adress/touch SHIP, e.g. - transnational cooperations (CLIENT, WTZ) - SME funding instruments (ZIM) - ...	BMWi (Federal Ministry for Economic Affairs and Energy), BMBF (Federal Ministry for Education and Research), BMU (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) and others	Solar Thermal, besides many others (topic open)	Private/Industry and R&D	Research funding	div., depending on program and call specifics	div., depending on program and call specifics	ongoing	div.		June 2020, Fraunhofer ISE
Greece	Saving – Improving the Energy Efficiency of Small Greek Ministry of Environment, Energy	Energy interventions with respect to	Small and Medium Sized Enterprises (SMEs)	CAPEX		The public expenditure of the programme is 30 million Euros and the eligible budget per project: 20,000 – 600,000 Euros. The percentage covered varies from 35-80%.		expected		https://www.espa.io/programmata/anamenomena/eksoikonomo-epixeiro/	January 2021, CRES
Greece	Modern Processing programme ("Σύγχρονη Μετε Ministry of Development and Invertme	Energy saving technologies besides other categories	Industry sector. Specifically, SMEs enterprises that aim at creating new or diversified production lines, products and processing services.	CAPEX		The programme's total budget is 100 million euro, with 40% being public expenditure. The eligible budget of investment projects is in the range of 250,000-3,000,000 €.		expected		https://www.espa.io/programmata/anamenomena/sigxroni-metapoiisi/	January 2021, CRES
Greece	"Research - Creation - Innovation" programme ("ΕΡΕΥΝΑ – ΔΗΜΙΟΥΡΓΙΑ – ΚΑΙΝΟΤΟΜΙΑ")	General Secretariat for Research and Technology (GSRT) of the Ministry of Development and Investments	Solar Thermal technology is included besides many others	Research organisations and enterprises	CAPEX	The programme has been completed in three cycles, with total budget 280 million Euro. It is possible that a new such programme will be established in the future.		expected		Completed programme: https://www.espa.io/programmata/olokliromena/programma-drasi-erevno-dimiourgo-kainotomo/ (GSRT site: http://www.gsrt.gr/)	January 2021, CRES

India	Renewable Energy Research and Technology Development Programme	Ministry of New and Renewable Energy (MNRE)	Solar Thermal, besides many others	academic institutions, universities, government/nonprofit/private research organisations, industries/private institutes	Research funding	Up to 100 % of financial support for academic institutions, universities, research institutes, government/nonprofit research organisations etc. Up to 50 % of financial support for private institutes, research organization	should be on relevant area proposed by ministry The relevant research areas for solar thermal are as under: • Improving conversion efficiencies and reducing costs through improved designs, new materials, manufacturing processes, deployment of higher conversion temperatures, alternative heat transfer fluids etc. • Thermal storage systems integrated with power, heating or cooling applications • Indigenizing Reflector materials with good outdoor durability, high solar reflectivity, good mechanical resistance.	44286	1.75 billion INR	https://mnre.gov.in/img/documents/uploads/file_f-1595989931161.pdf	September 2019, GERMI
Morocco	Green INNO Project	IRESEN Institut de Recherche en Energie Solaire et Energies Nouvelles	Solar Thermal, besides many others (topic restricted to renewable technologies and applications as well as energy efficiency)	containing at least one Moroccan private and publi	Research funding	Up to 100 % of eligible costs for R&D activities		2018 - 1st edition	https://iresen-aap.org/en_US/offers/detail/green-inno-project-1	January 2021, Green Energy Park	
Morocco	Green INNO Boost	IRESEN Institut de Recherche en Energie Solaire et Energies Nouvelles	Solar Thermal, besides many others (topic restricted to startups targeting renewable technologies and applications as well as energy efficiency)	Trans-National consortia, typically containing at least one Moroccan private and public member from industry and R&D	Research funding	Up to 1.5Million MAD and technical support against a percentage of startup revenue or against participation in capital		ongoing - 2nd edition	https://iresen-aap.org/en_US/offers/detail/green-innoboost-2-0-6	January 2021, Green Energy Park	
Morocco	Programme de Soutien à la Recherche & Développement Multithématique	CNRST - Centre National pour la Recherche Scientifique et Technique	Solar Thermal, besides many others (open call)	Private/Industry and R&D (Morocco)	Research funding	Up to 100 % of eligible costs for R&D activities		2020 - phase 1	https://cnrst.ma/index.php/fr/financement-de-la-recherche/programmes-nationaux/financement-des-projets-de-recherche?id=175	January 2021, Green Energy Park	
Morocco/Spain	INNO-ESPAMAROC ENERGY	IRESEN/CDTI	Solar Thermal, besides many others	Private/Industry and R&D (Morocco) and private Spanish industries	Research funding	70% loan and 30% funding for Spanish companies. Up to 70% funding and 30% own contribution for Moroccan partners		2020 -2nd edition	https://iresen-aap.org/en_US/offers/detail/inno-espamaroc-energy-2021-8	January 2021, Green Energy Park	
Portugal	P2020	EU trough the European structural and investment funds (ESIF)	Generic	Private/Industry and R&D	Research funding	Up to 70% depending on the beneficiaries	depending on call	ongoing	n.a.	https://www.portugal2020.pt/	August 2020, UEvora
Portugal	Individual grants and research projects funding	FCT (Fundação para a Ciência e a Tecnologia)	Generic	Individual scientists, research teams and R&D centres	Research funding	Up to 100 % of eligible costs for R&D activities, depending on call type	depending on call	ongoing	n.a.	https://www.fct.pt/	August 2020, UEvora
Sweden	TERMO program for research and innovation programs on sustainable thermal energy solutions, but not specifically for SHIP e.g.	Swedish Energy Agency (Energimyndigheten)	Solar Thermal, thermal energy storage, and thermal technologies in general	Non-profit research centers, industries and academia. Can apply individually or in consortium (recommended).	Research Funding	Up to 100% for academic / non-for profit Funding for industries varies between 25% and 70% depending on company size and type of project (fundamental research, industrial research, experimental or feasibility)	depending on call	ongoing, every 2 years	16M€ until 2021, program to be reviewed then	http://www.energimyndigheten.se/forskning-och-innovation/forskning/omraden-for-forskning/termo-varme-och-kyla-for-framtidens-energisystem/innovationskluster-inom-termo/	Dez 19; Feb 2021 by Rafael Guédez, KTH
Sweden	Different programs on different topics which may adress/touch SHIP, e.g. - SME funding instruments - SME technology prototyping	Swedish Energy Agency (Energimyndigheten) Swedish Innovation Agency (Vinnova)	Not-specific to SHIP	Industry	Innovation funding, higher TRL	From 25 to 70% depending on company size and type of project	depending on call	ongoing, calls are frequent		http://www.energimyndigheten.se/ https://www.vinnova.se/	Feb 2021 by Rafael Guédez, KTH
United Kingdom	Innovate UK	UK Research and Innovation (UKRI) is the national funding agency investing in science and research in the UK. Operating across the whole of the UK with a combined budget of more than £6 billion, UKRI brings together the 7 Research Councils, Innovate UK and Research England	Solar thermal and other renewable energy research and development	Innovate UK funds industry-led R&D, in collaboration with research institutions. International partners can be included and may be specific for some calls.	Research funding	For industrial partners, up to 100% of eligible costs, depending on TRL level. Lower TRL projects attract higher percentage of costs.	Call dependent	ongoing		https://www.gov.uk/government/organisations/innovate-uk	September 2020 Cranfield University
Uruguay	BENEFICIOS FISCALES PARA I+D DE EMPRESAS (Fiscal benefits for R&D in enterprises) – ANII	Agencia Nacional de Investigación e Innovación (ANII, National Agency of Research and Innovation)	Solar Thermal besides many others	Private/Industry	Research funding	Up to 35% of expenses, or up to 45% if the project includes universities or technological centers. Up to USD 1 million through tax exemptions		10/09/2020 – 20/12/2020		https://www.anii.org.uy/apoyos/investigacion/254/beneficios-fiscales-para-id-de-empresas/	Oct 2020, Pedro Galione, UdelaR
Uruguay	Several Programs	ANII	Solar Thermal besides many others	R&D, private	Research funding	depending on call. More or less USD 70.000 for projects of 2 years duration	depending on call	ongoing		https://www.anii.org.uy/apoyos/investigacion/	Oct 2020, Pedro Galione, UdelaR
USA	American Made Solar Prize - Solar Desalination	US Department of Energy (DOE)	Solar thermal	Private/Industry and R&D	Prizes	Staged amounts which increase per stage	depending on call	2021	\$10M	https://americanmadechallenges.org/solardesalination/	Sept. 2020, NREL

Overview on instrument types for SHIP installations and SHIP related R&D incentives and funding instruments

Type	Brief description
CAPEX	Financing support, typically covering a certain portion of the investment for a SHIP installation, e.g. through investment grants or subsidies
Loan	Loan with special (typically favourable) credit conditions for SHIP installations; sometimes combined with partial subsidies
Taxation	Special (typically favourable) taxation conditions, tax exemptions for SHIP installations, or other fiscal instruments
Services	Support / Grant / Subsidy for services related to SHIP installations, e.g. Energy Audits, Planning/Engineering support, Consultancy,
OPEX	Feed in Tariffs, subsidised heat supply, ...
Others	Support for Contracting, issue of certificates, vouchers, or any other type of support (please specify / provide some info on the specific type of instrument)
Research funding	Partial or full coverage / support of research activities on SHIP related topics, including demonstration projects