Credit: BanksPhotos

How to finance DHC: a European perspective

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Act!onHeat Webinar: How to finance sustainable solutions in district heating?

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Financing DHC: Factors to consider

Business Model

Roles:
- *Operation and mgmt*
- *Payment for services*
- *Investment*
- *Ownership*

***Private/public** combinations:*
- *Traditional/public agr.*
- *Mgmt agreement*
- *Leasing/Concession agr.*
- *Privatized*
- *ESCO, Energy Communit*

Cost Structure

CAPEX:
- *Installation: heat plant, back-up, network pipes, connection, storage…*
- *Other: planning, permitting*

OPEX:
- *Operation: fuel, personnel*
- *Maintenance, heat loss*

RISK:
- *Resources, consumption, retention, debtor, prices*

Revenue Stream

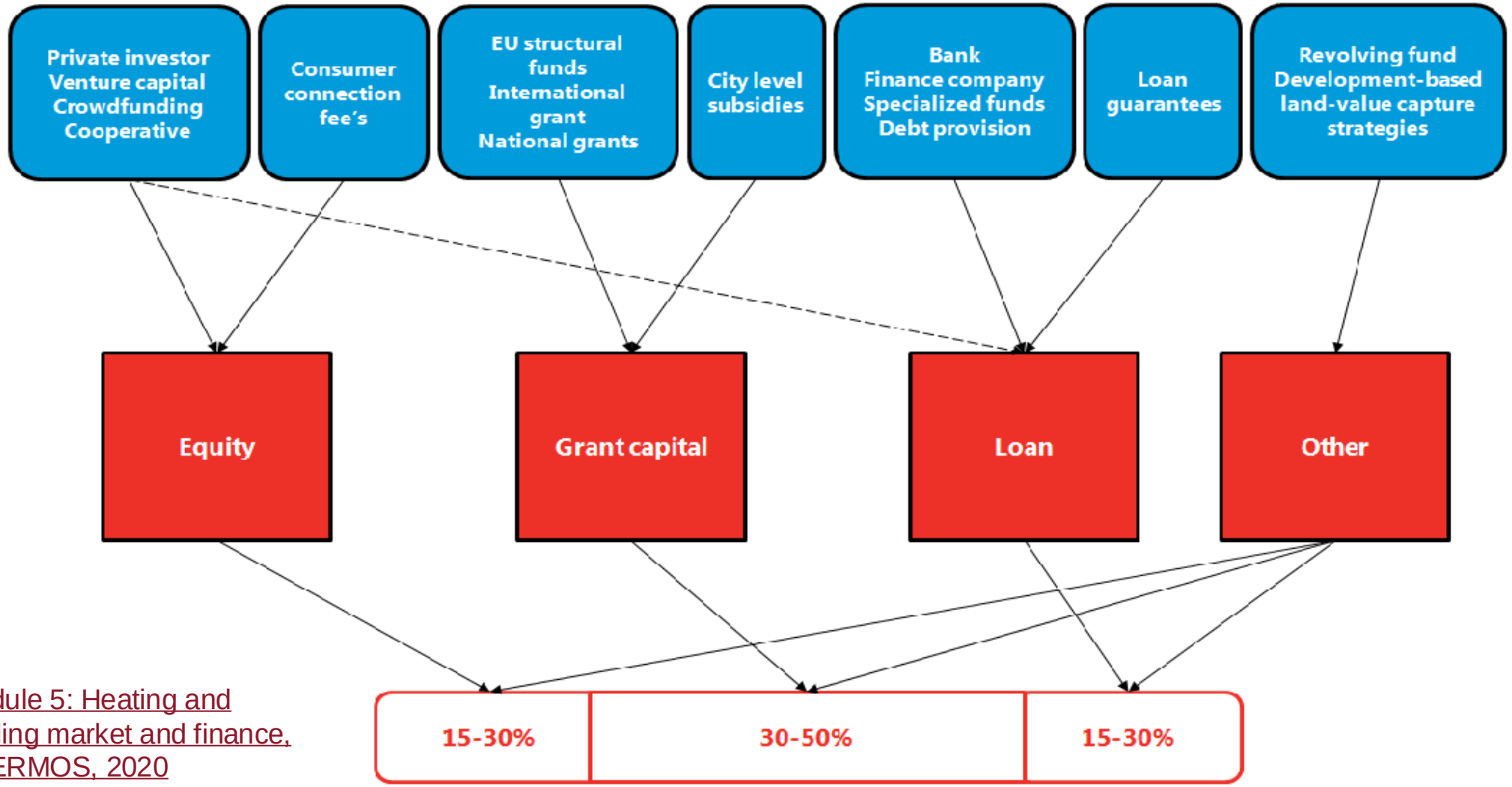
- ***Tariffs**: variable rate, fixed rate, risk mitigation, discount rate (return on capital you want to achieve)*
- ***One-time Payments**: new customer connection*
- ***Subsidies**: tax rebates, capital grants, operating subsidies*

Financing

- ***Equity** (private equity from project developers, venture capital, external investors, crowdfunding, cooperative, connection fees)*
- ***Debt** (loans, guarantees)*
- ***Grants** (capital or operating subsidies, tax rebates)*
- ***Alternative Sources** (e.g., revolving funds)*

Source: Module 5: Heating and cooling market and finance, THERMOS, 2020; Guidelines on Community Heating and Cooling, RESCOOP, 2023 Icons: Uniconlabs, Vitaly Gorbachev, Freepik, Rukanikon

Financing DHC Projects



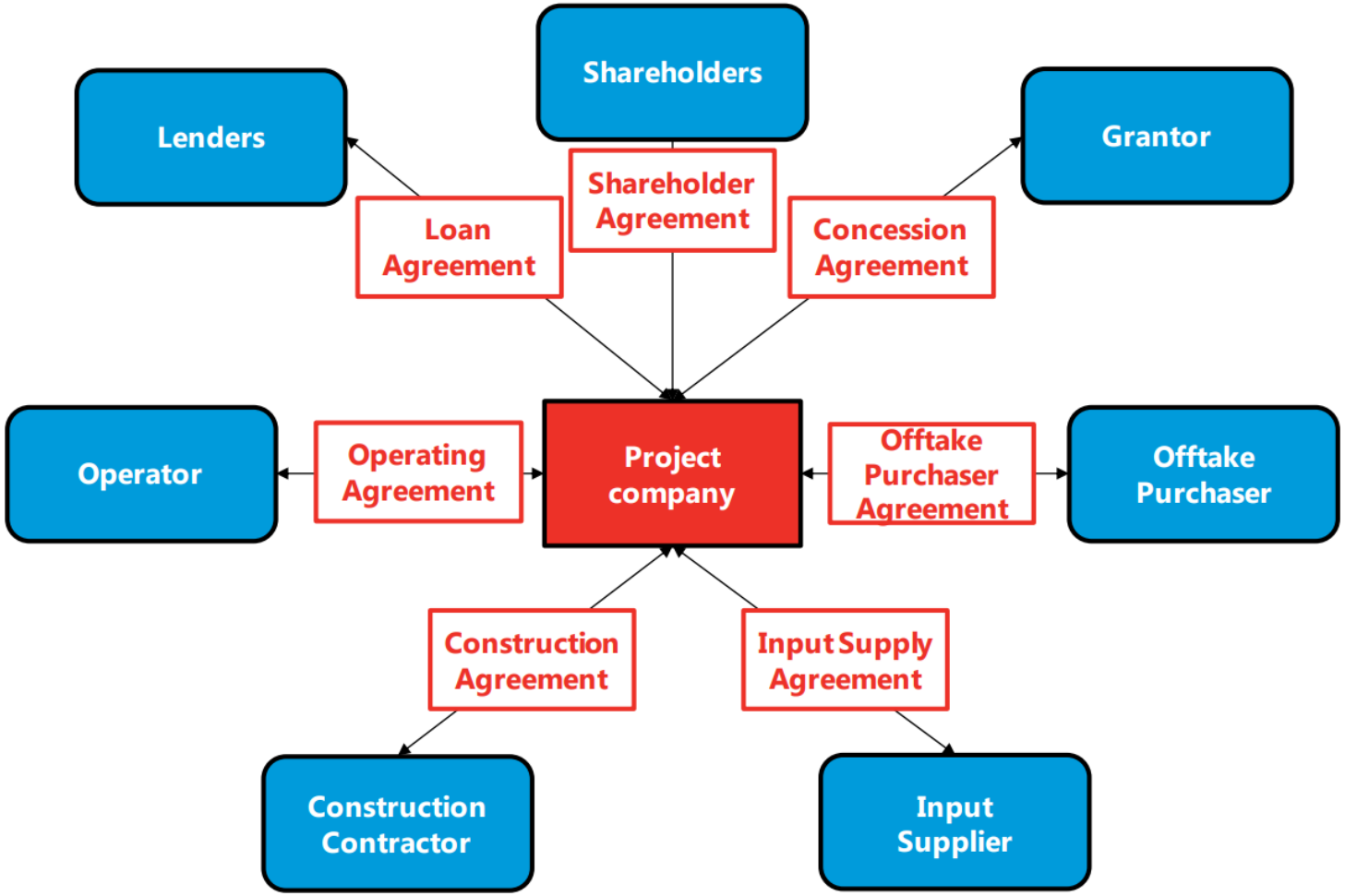
Source: Module 5: Heating and cooling market and finance, THERMOS, 2020

Project Financing for DHC

Project Finance: The funding of long-term infrastructure, industrial projects, and public services using a nonrecourse or limited-recourse financial structure.(Investopedia)

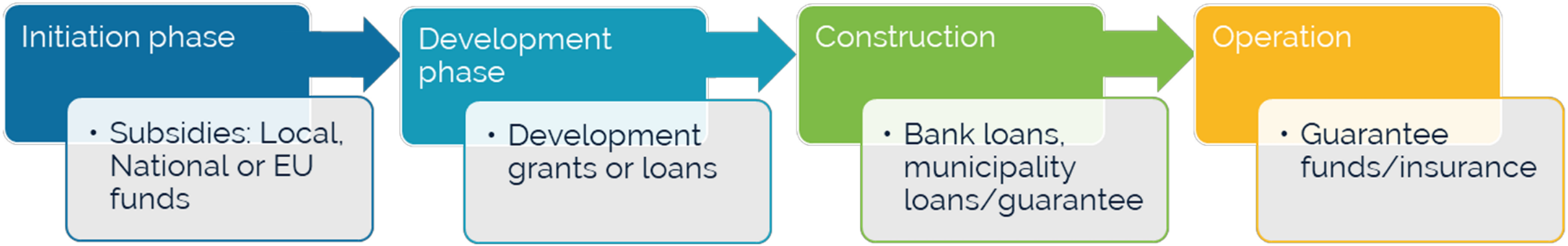
Typical ways in which two or more parties share risk and rewards for a specific project are:

- **Joint Venture (JV)** agreement,
- **Special Purpose Vehicle (SPV)**,
- **Public-Private Partnership (PPP)**.



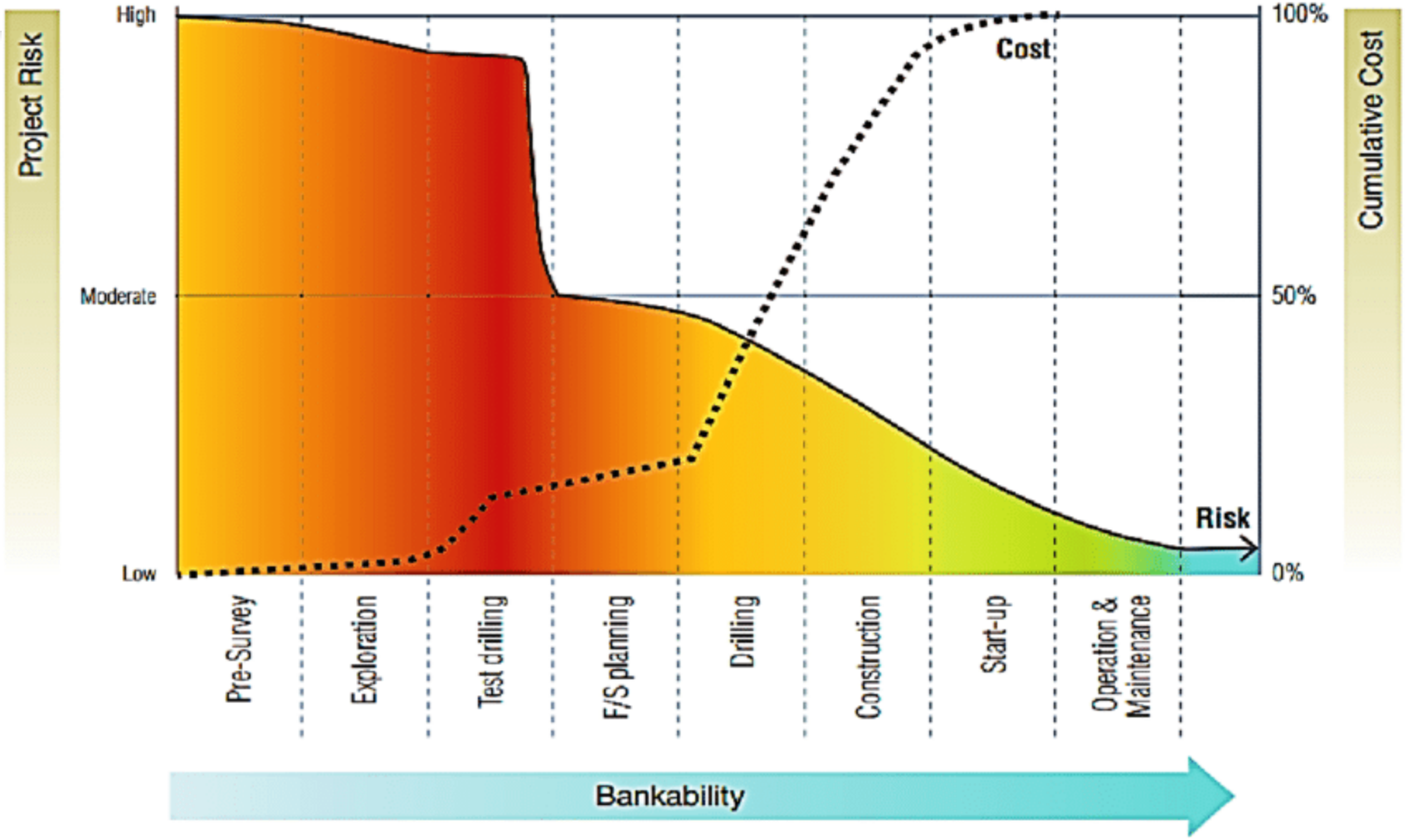
Source: Module 5: Heating and cooling market and finance, THERMOS, 2020

Financial framework for community DHC



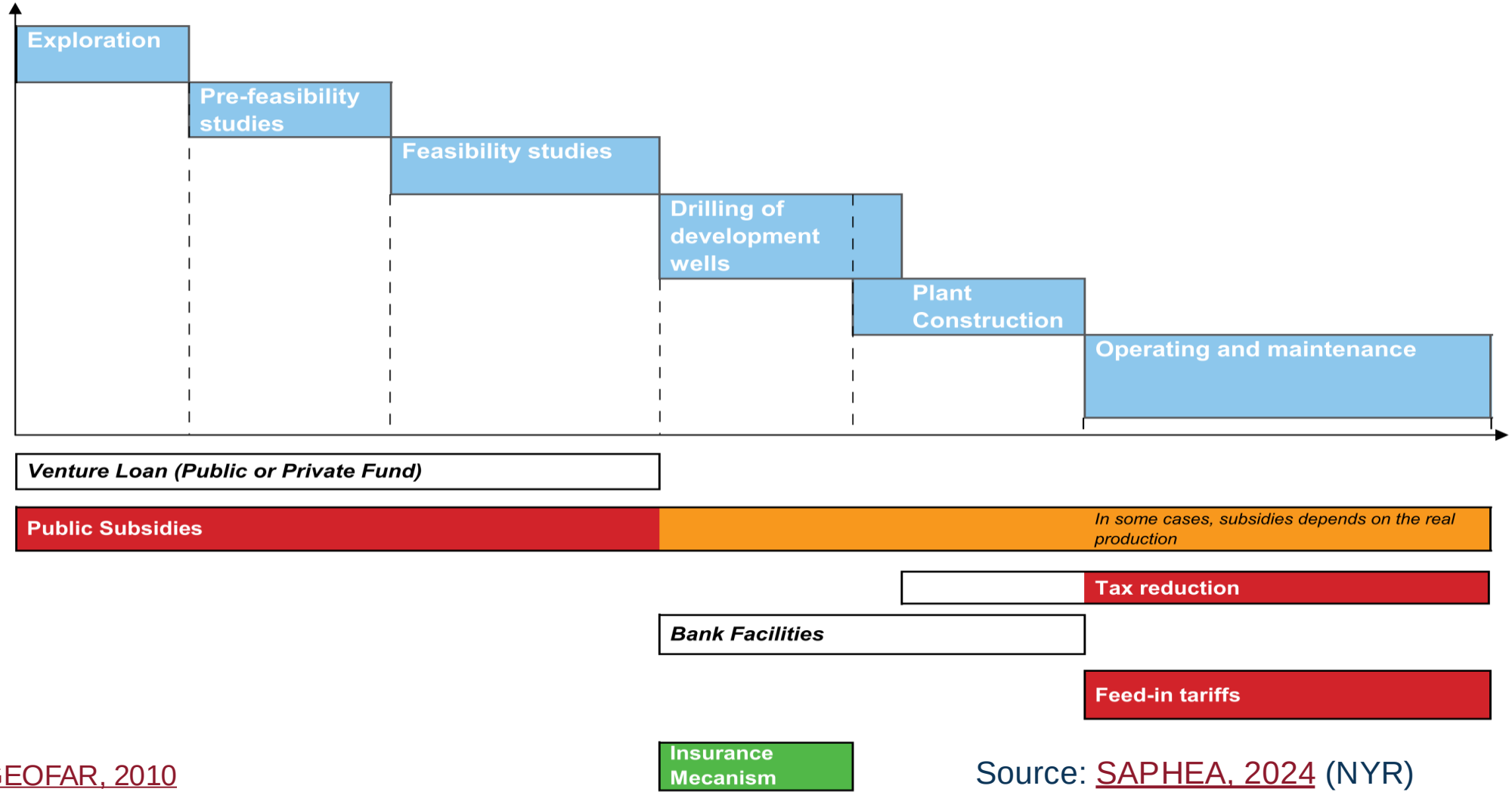
Source: Guidelines on Community Heating and Cooling, RESCOOP, 2023

Geothermal Project Risk Curve (e.g., deep geothermal, open loop)



Source: Geothermal Handbook, Gehringer & Loksha, 2012

Financing Geothermal Projects



Source: GEOFAR, 2010

Source: SAPHEA, 2024 (NYR)

Financing as a main barrier

Funded by:

Cool LIFE

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Who pays?
building retrofit, H&C upgrade, DHC

EU-27 Mapping:
public and private financing schemes for building decarbonization

EU Funding:
are not enough,
hard to apply for/get..

Mapping Overview

- Almost **600 schemes**
- 2/3 Public, 1/3 Private
- Only Italy, Sweden and Slovakia more private than public schemes (bank fragmentation)
- DHC, GeoDHC and Cooling were addressed the least
- Budget Opacity

Public Schemes	Public	Building Eff	H&C Eff	H&C RES	DHC	Geo DHC	Cooling	Residential	Non-Residential
Grand Total	376	272	317	287	162	141	203	235	220
Country \ %		72%	84%	76%	43%	38%	54%	63%	59%
Germany	42	27	37	31	10	9	18	24	24
France	32	26	30	32	17	17	30	20	14
Austria	27	7	16	12	16	8	8	9	21
Belgium	26	22	22	17	8	5	7	12	17
Poland	26	13	26	24	16	15	14	19	11
EU-27	23	19	21	21	21	21	21	22	22
Netherlands	20	17	16	18	12	13	14	16	13
Spain	7	5	6	5	3	3	4	5	6
Slovenia	13	13	8	8	4	5	8	11	4
Bulgaria	12	9	9	7	1	1	4	7	9
Ireland	12	10	10	10	1	1	3	9	6
Czechia	11	8	10	7	4	1	5	4	7
Luxembourg	11	8	11	11	5	5	6	7	4
Italy	10	8	9	6	5	5	5	6	4
Croatia	9	7	9	7	3	3	8	5	5
Denmark	9	4	8	6	3	1	3	5	3
Finland	9	6	8	8	5	4	5	5	6
Hungary	10	9	9	9	4	5	8	4	6
Latvia	9	9	8	9	4	5	6	7	6
Portugal	9	9	8	8	0	0	9	7	4
Estonia	7	5	3	3	2	0	0	6	2
Malta	7	4	2	1	1	1	1	5	4
Romania	7	5	6	3	3	0	0	5	6
Slovakia	7	5	7	7	5	5	5	4	4
Sweden	7	5	5	5	1	0	0	4	2
Cyprus	5	5	4	3	3	3	3	3	5
Greece	5	4	5	5	1	1	4	2	4
Lithuania	4	3	4	4	4	4	4	2	1

Private Schemes	Public	Building Eff	H&C Eff	H&C RES	DHC	Geo DHC	Cooling	Residential	Non-Residential
Grand Total	214	180	166	164	40	39	89	174	72
		84%	78%	77%	19%	18%	42%	81%	34%
Italy	18	17	18	18	1	1	6	17	3
France	14	12	14	14	3	3	14	14	3
Poland	16	11	13	12	1	0	1	10	6
Sweden	14	11	11	11	7	6	2	12	3
Austria	13	9	9	9	8	8	8	8	9
Denmark	11	10	10	10	1	1	3	10	2
Slovakia	11	11	7	7	1	1	3	10	3
Netherlands	10	9	5	5	0	0	5	9	2
Belgium	9	8	7	6	2	2	2	6	4
Luxembourg	9	7	7	7	1	1	5	7	4
Finland	8	6	4	4	0	0	0	6	5
Germany	9	7	8	9	7	8	8	6	7
Ireland	7	7	3	3	0	0	0	7	0
Portugal	7	7	7	6	2	1	7	6	3
Cyprus	6	6	5	4	1	1	2	4	1
Estonia	4	4	3	3	1	1	2	3	1
Malta	6	4	4	3	0	0	1	6	1
Spain	6	5	4	5	0	0	2	3	4
Czechia	5	5	5	5	0	0	3	4	1
Hungary	5	5	5	5	1	1	5	5	3
Latvia	5	4	5	5	1	1	2	5	1
Croatia	4	3	3	3	0	0	2	2	2
Lithuania	4	4	3	3	0	0	1	4	0
Bulgaria	3	2	2	2	1	1	2	2	1
Greece	3	3	0	0	0	0	0	3	0
EU-27	4	1	1	2	1	2	3	2	2
Slovenia	2	1	2	2	0	0	0	2	0
Romania	1	1	1	1	0	0	0	1	1

Types of Instrument and Sectors

Public Instruments	Count	%
Grant/Subsidy	193	51%
Debt financing	50	13%
Grant/Subsidy, Debt Financing	32	9%
Tax Incentives	30	8%
Multiple (Grant/Subsidy, Tax rebate, Debt, Equity, Guarantee, TA)	20	5%
Energy efficiency obligations	15	4%
Other public scheme	13	3%
Advisory Service, Technical Assistance	9	2%
Guarantee	9	2%
Equity financing	5	2%
Total	**376**	

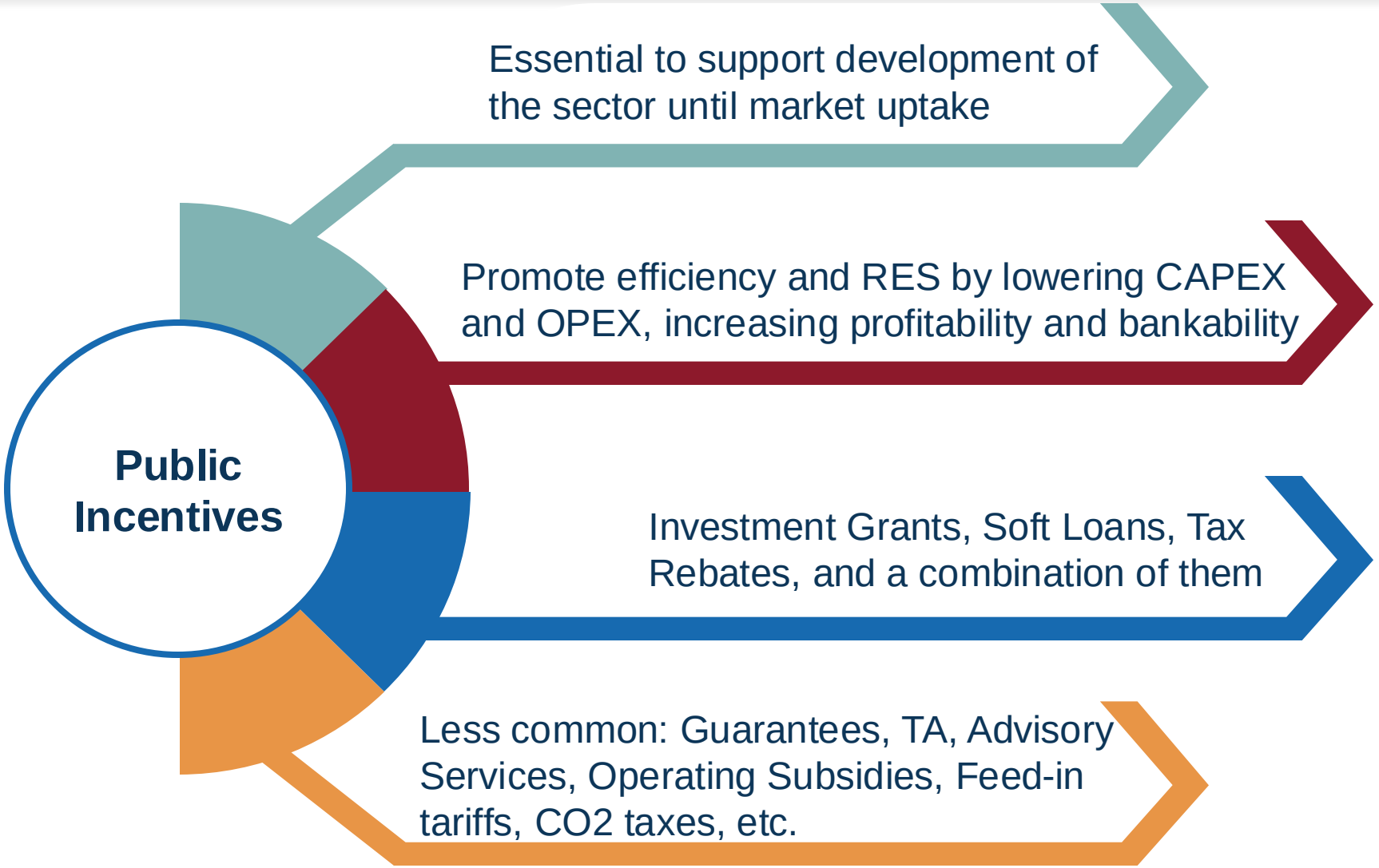
Private Instruments	Count	%
Green Loan	124	58%
Green Mortgage	47	22%
Green Bonds	14	7%
Equity financing	6	3%
Insurance/Guarantees	5	2%
On-bill financing	5	2%
Grants/ subsidy	4	2%
Green Leasing	4	2%
Advisory Service, Technical Assistance	3	1%
Green Loan, Advisory Service	2	1%
Total	**214**	

Sector	Count	%
Building Eff	452	76%
H&C Eff	483	81%
H&C RES	451	76%
DHC	202	34%
Geo DHC	180	30%
Cooling	292	49%
Residential	409	69%
Non-Residential	292	49%
Total	**596**	

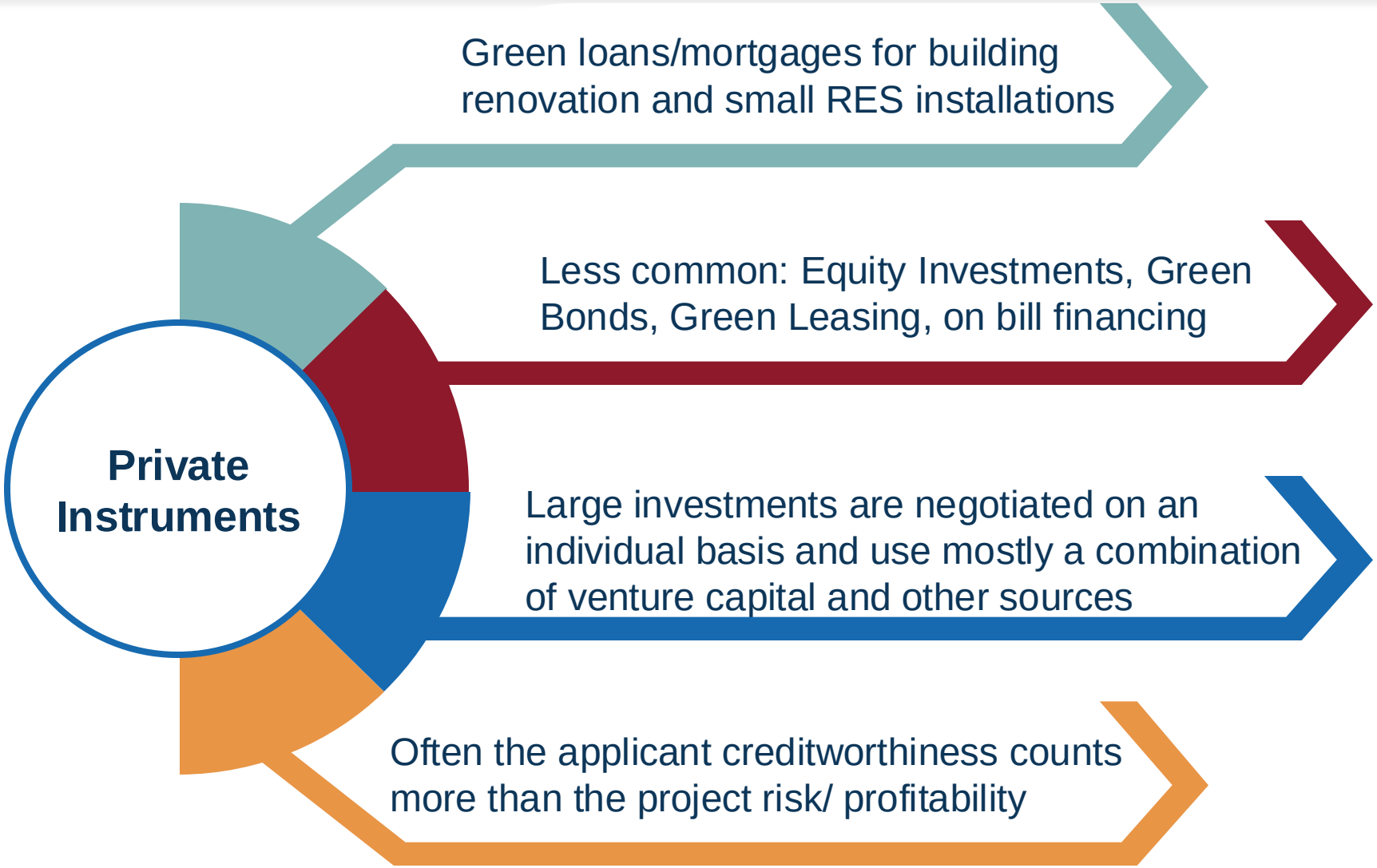
Financing Instruments for Building Decarbonization

<table>
<tr><th></th><th colspan="3">Traditional</th><th colspan="2">Innovative</th></tr>
<tr><td rowspan="2">Non-repayable</td><td colspan="3">Grants, Prizes and Subsidies</td><td colspan="2" rowspan="2">Energy-Efficiency Feed-in-Tariff</td></tr>
<tr><td colspan="3">Tax Incentives</td></tr>
<tr><td rowspan="4">Debt</td><td colspan="3" rowspan="2">Loans</td><td>Green/Soft Loans</td><td>Energy Efficient Mortgages</td></tr>
<tr><td>Green Bonds, Community Municipal Investment Bonds, Social Bonds</td><td>On-Bill Financing (OBF) Loans, Tariffs</td></tr>
<tr><td colspan="3" rowspan="2">Credit Enhancement (guarantees, securities, insurances, additional collateral, etc.)</td><td rowspan="2">Energy Performance Contracting (EPC) and Agreements (EPA)</td><td>Energy Service Agreement (ESA)</td></tr>
<tr><td>Green/Energy Revolving Funds</td></tr>
<tr><td>Equity</td><td colspan="3">Third-Party Funding</td><td>Green Leasing, PACE</td><td>Crowdfunding</td></tr>
<tr><td rowspan="2">Other</td><td colspan="2" rowspan="2">Technical Assistance (TA), Project Development Assistance (PDA)</td><td colspan="2">Energy Communities/Cooperatives</td></tr>
<tr><td>Advisory Services</td><td colspan="2">Energy Efficiency Quota Obligations</td></tr>
<tr><td></td><td colspan="2">Capacity Building</td><td colspan="2">One-stop shops (OSS)</td></tr>
</table>

Public Incentives



Private Capital



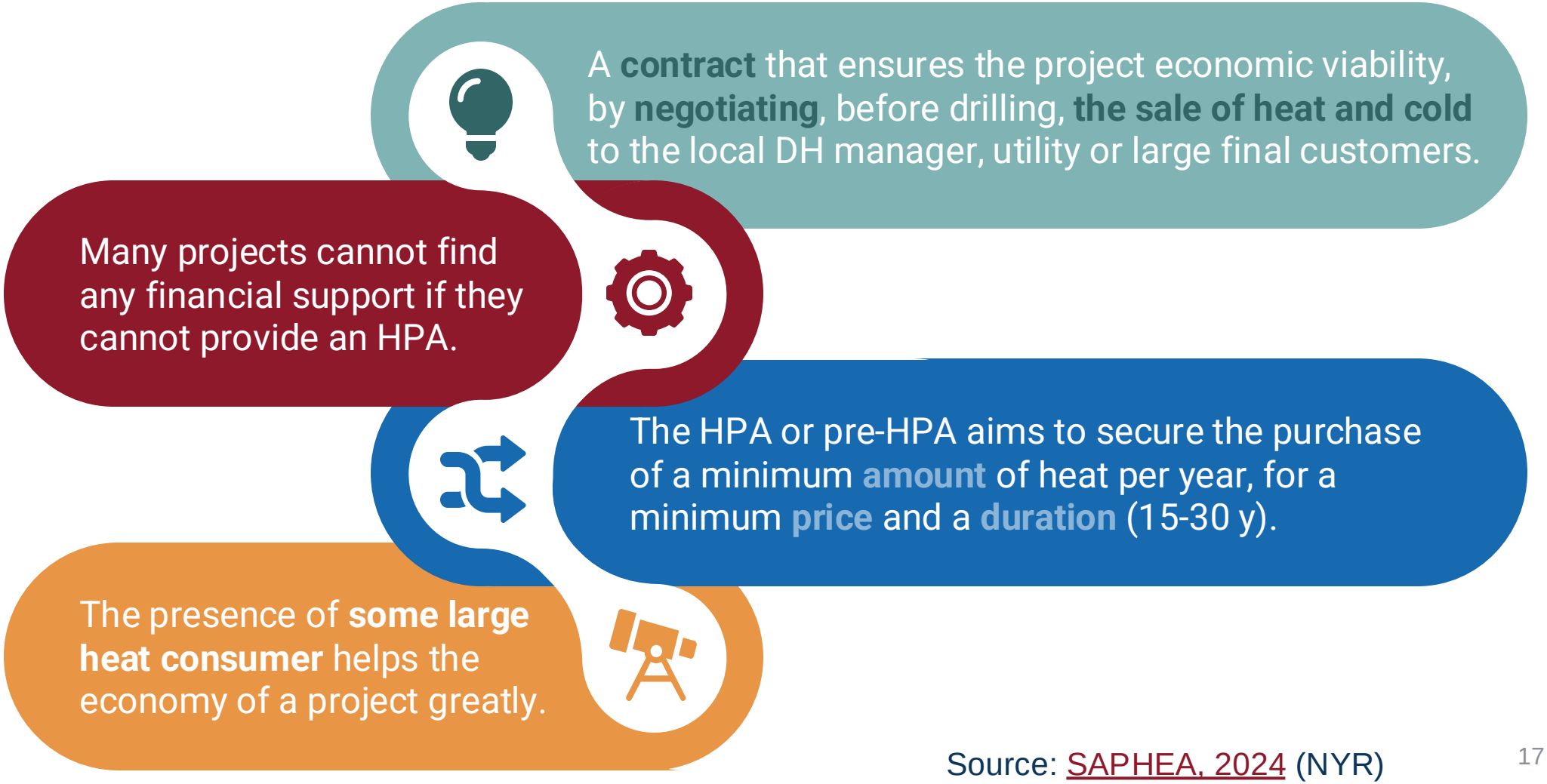
Lessons Learned #1

1	Public Incentives only partially ease **access to credit**	**Benchmarking Platform** (e.g. DEEP). Standard **Assessment Toolkit**. Structural interventions (cost of borrowing).
2	Without legal obligations, **incentives are not enough**	**Obligations to transition/decarbonize**, white certificates, carbon tax, building codes for new constructions, etc.
3	**Perception bias**: higher costs/risks, lower profitability	**Communication** is key: awareness campaigns, consultations, stakeholder engagement, open-access data, etc.
4	**Able to pay** does not mean being able to transition	Support all along the process: **One-Stop Shops**

Lessons Learned #2

5	**Budget opacity**: only erratically disclosed	Detailed budget data would not disclose details on **usage** and **effectiveness**
6	The n. of schemes indicates the strategy, not intensity of support	Is a higher number ispersive of helpful to achieve a **greater outreach**?
7	**Dispersion**: hard to find, overlapping, rapidly obsolete	Centralized portals at the national & EU level: **CoolLIFE & SAPHEA Tool & Hub**
8	Great **proliferation of schemes** and investment increase	Despite that, **CET Investments** are still barely **half of what needed** to achieve 2030 targets

Heat Purchase Agreement (HPA)



Source: SAPHEA, 2024 (NYR)

Download the full Mapping of Financing Instruments

https://zenodo.org/records/13741716

Full Dataset: Building Decarb., H&C and DHC

Are there any questions?

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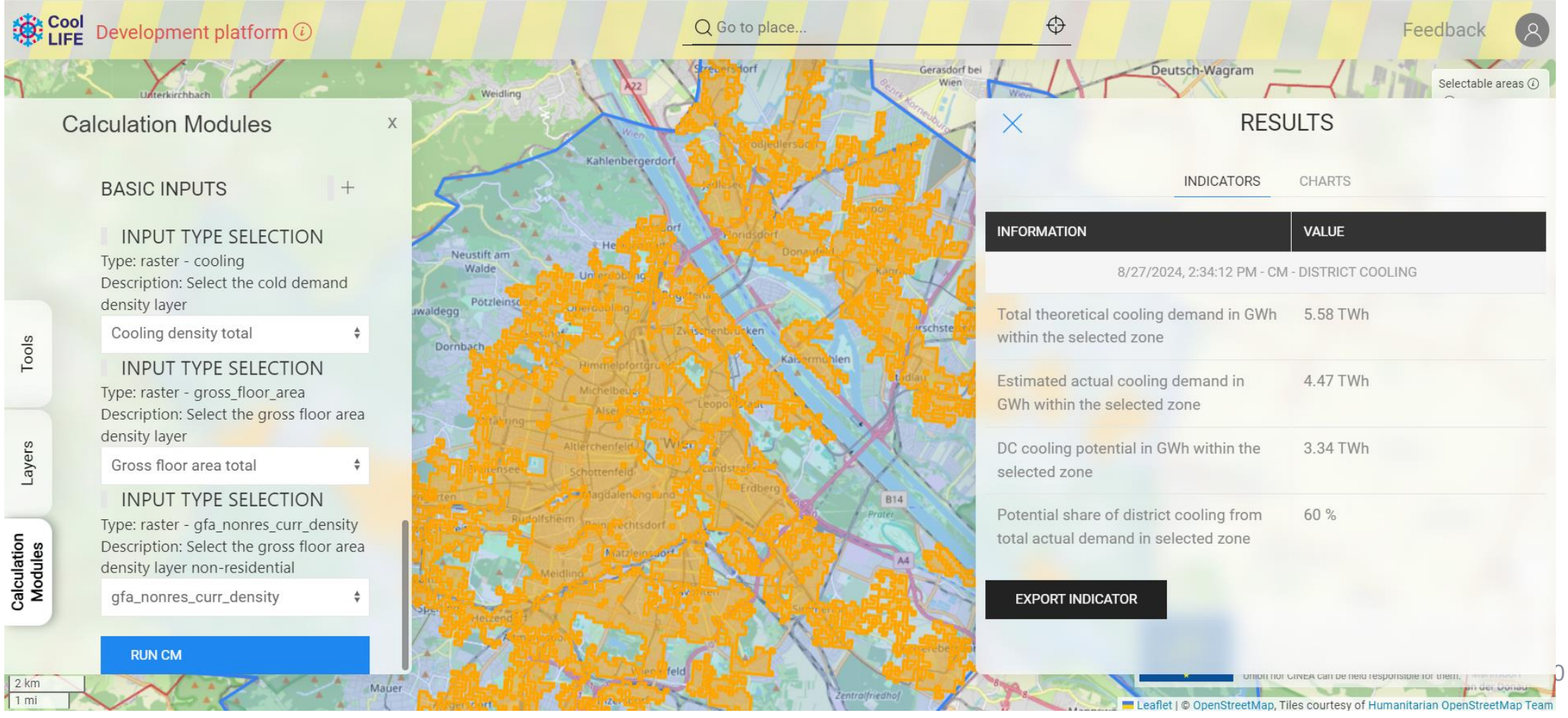
ENERGY RESEARCH

Thank you for your attention!

Credit: 1xpert

CoolLIFE

➢ **CoolLIFE Tool & Knowledge Hub: https://coollife.revolve.media/**



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- **SAPHEA Market Uptake Hub:** https://www.saphea.eu/

Resources

- THERMOS, Module 5: Heating and cooling market and finance, 2020
- RESCOOP, Guidelines on Community Heating and Cooling, 2023
- Conforto, G. et al., EU-27 Country Mapping of Financing Schemes to Decarbonize Buildings, Heating and Cooling [Data set], 2024, Zenodo, https://zenodo.org/records/13741716
- CoolHeating, Guidelines on improved business models and financing schemes of small renewable heating and cooling grids, 2017
- HeatNet NWE, HeatNet Guide to Financing 4DHC, 2019
- HeatNet NWE, Guide to Governance and Business Models, 2020
- GEOFAR, Financial instruments as support for the exploitation of geothermal energy, 2010