

Solar thermal potential in the residential building stock – achievable levels of solar thermal energy supply

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Starting points

- **Case studies city of Zurich and canton of Fribourg**
- **Existing building stock / roofscape as is**
- **Building traditions and standards**
- **Building by building**
- **No drawing-board / from scratch but...**
- **... Future / modern energy efficiency standards**
- **... Advanced solar thermal (storage) systems**

à **Starting from today's reality for the future potential**



Approach – Building stock



Source: NET Nowak Energy & Technology Ltd.

Approach – Building stock



Source: Etat de Fribourg

Approach – Paths (need and storage capacity)

104 kWh per m²



54 kWh per m²

Optimised storage



100 l per m²

Approach – Reference systems / scenarios



104 – 100 I

54 – 100 I



104 – opt

54 – opt

Approach – Roofscape and interpretation?



Source: NET Nowak Energy & Technology Ltd.



Approach – Roofscape and interpretation?



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Approach – Roofscape and interpretation?



Source: NET Nowak Energy & Technology Ltd.



Approach – Roofscape and interpretation?



Source: Schweizer Ltd.

Approach – Roofscape and interpretation?



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Approach – Roofscape and interpretation?

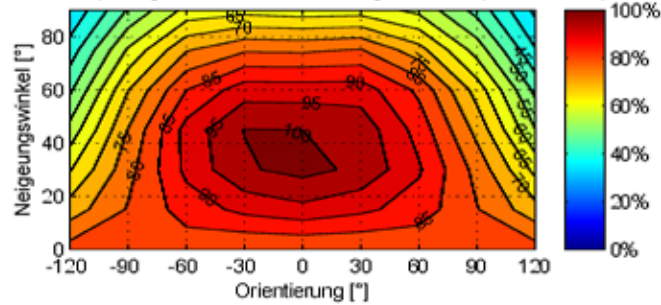


Source: NET Nowak Energy & Technology Ltd.

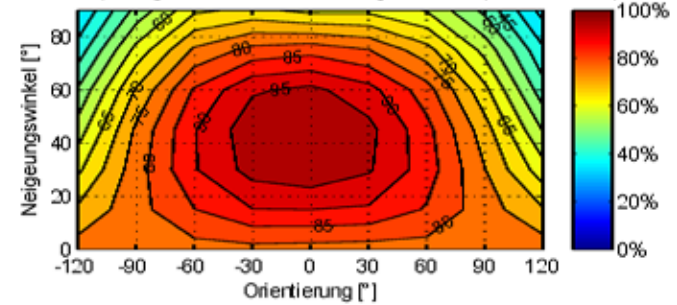


Approach – Weighted collector surface

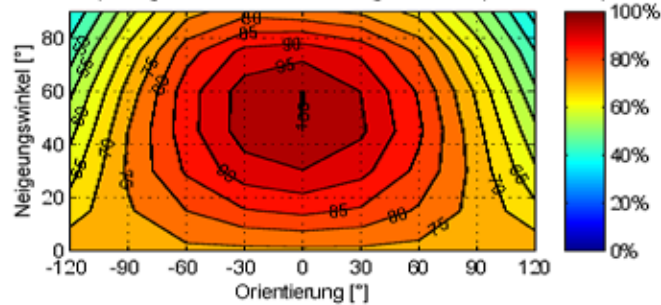
Solare Einsparungen relativ zur Ausrichtung 45, Sued, (0.01 m²/EBF)



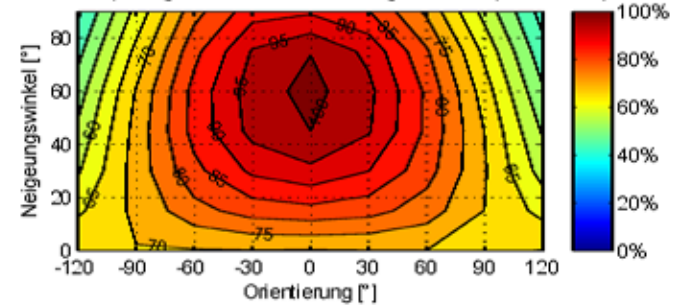
Solare Einsparungen relativ zur Ausrichtung 45, Sued, (0.025 m²/EBF)



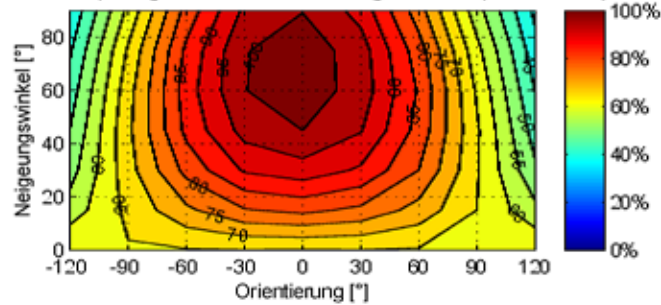
Solare Einsparungen relativ zur Ausrichtung 45, Sued, (0.05 m²/EBF)



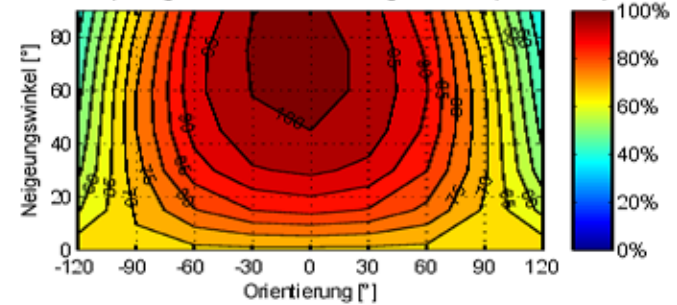
Solare Einsparungen relativ zur Ausrichtung 45, Sued, (0.1 m²/EBF)



Solare Einsparungen relativ zur Ausrichtung 45, Sued, (0.25 m²/EBF)



Solare Einsparungen relativ zur Ausrichtung 45, Sued, (0.5 m²/EBF)

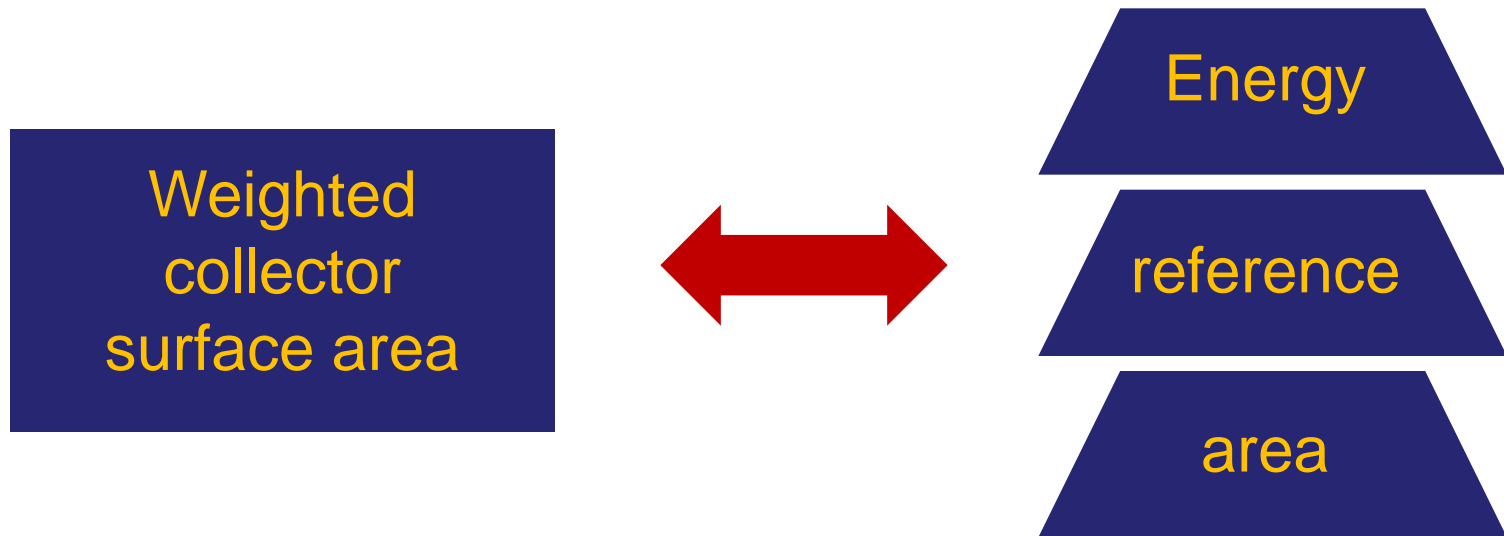


Source: SPF

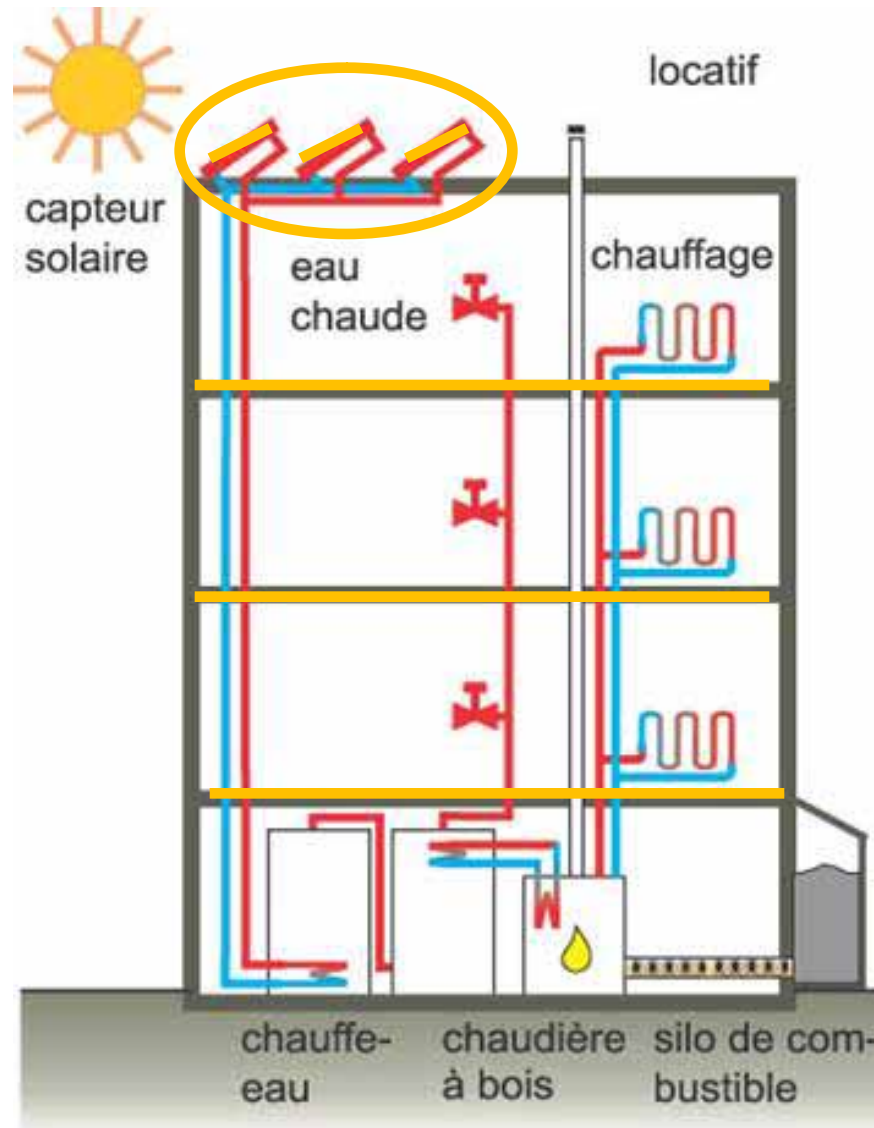
Approach – Weighted collector surface



Approach – Solar thermal potential index

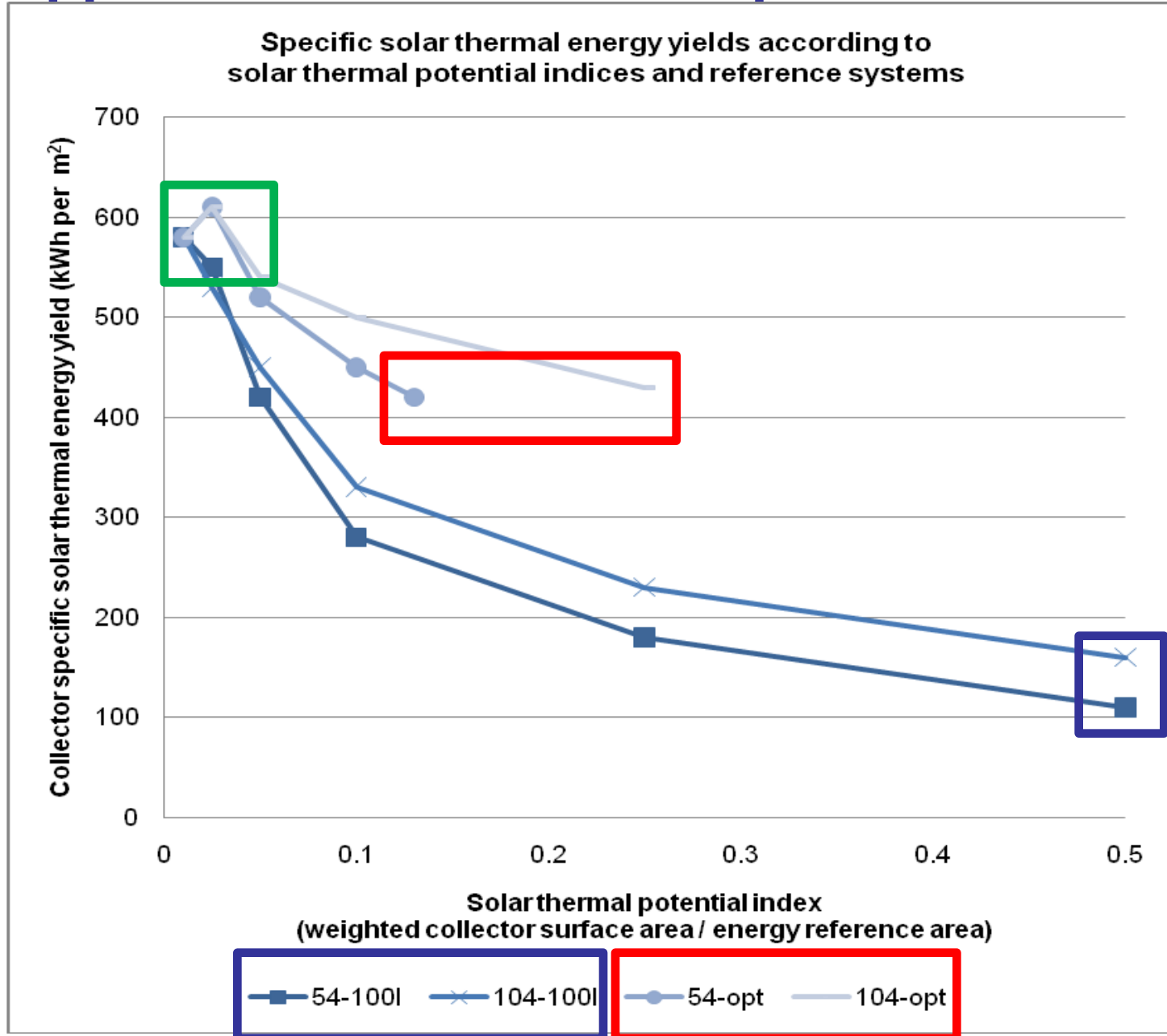


Approach – Solar thermal potential index

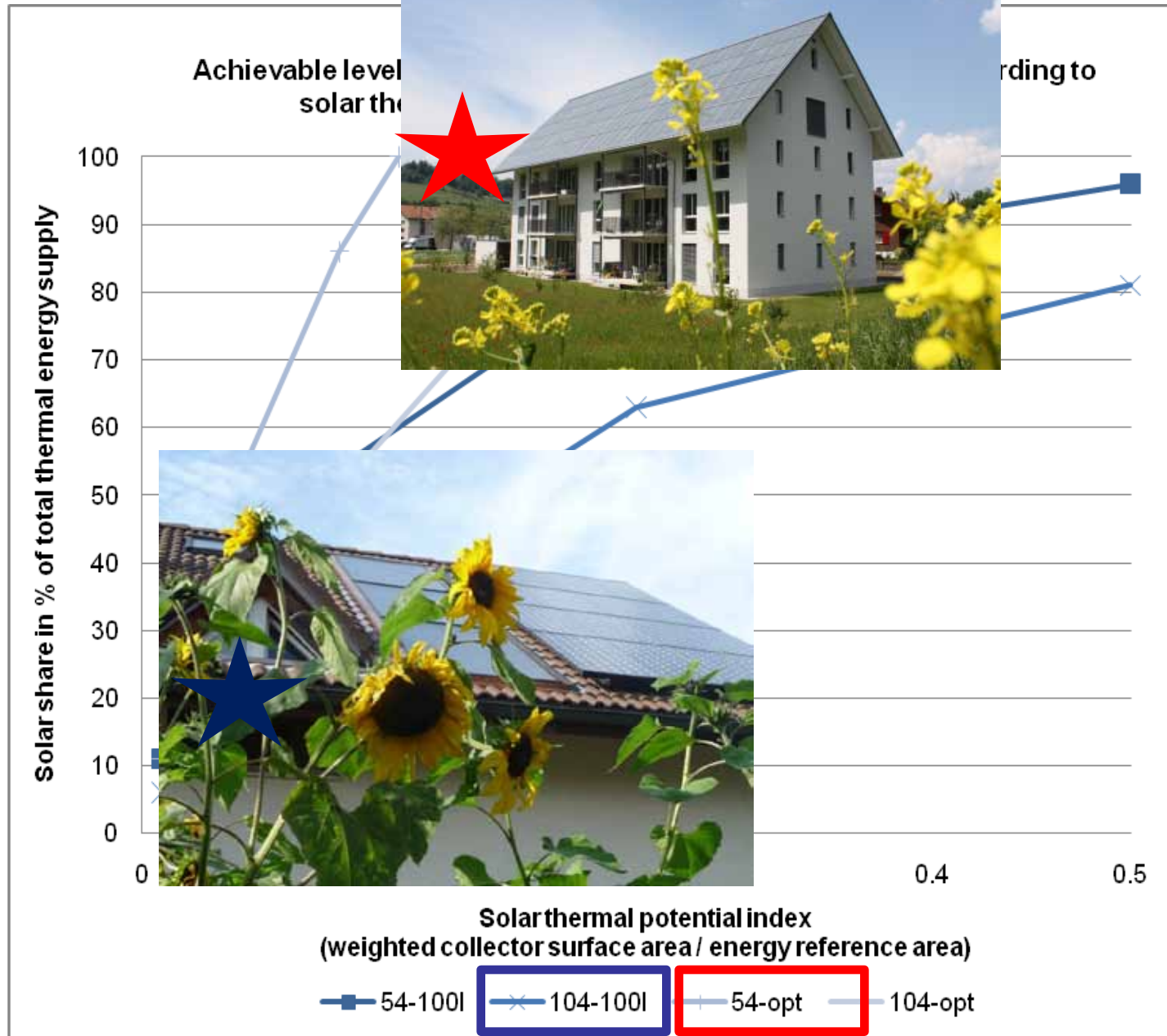


Source: SFOE / Swissolar

Approach – Solar thermal potential index



Approach – Solar Thermal Potential Index



Results - Indices

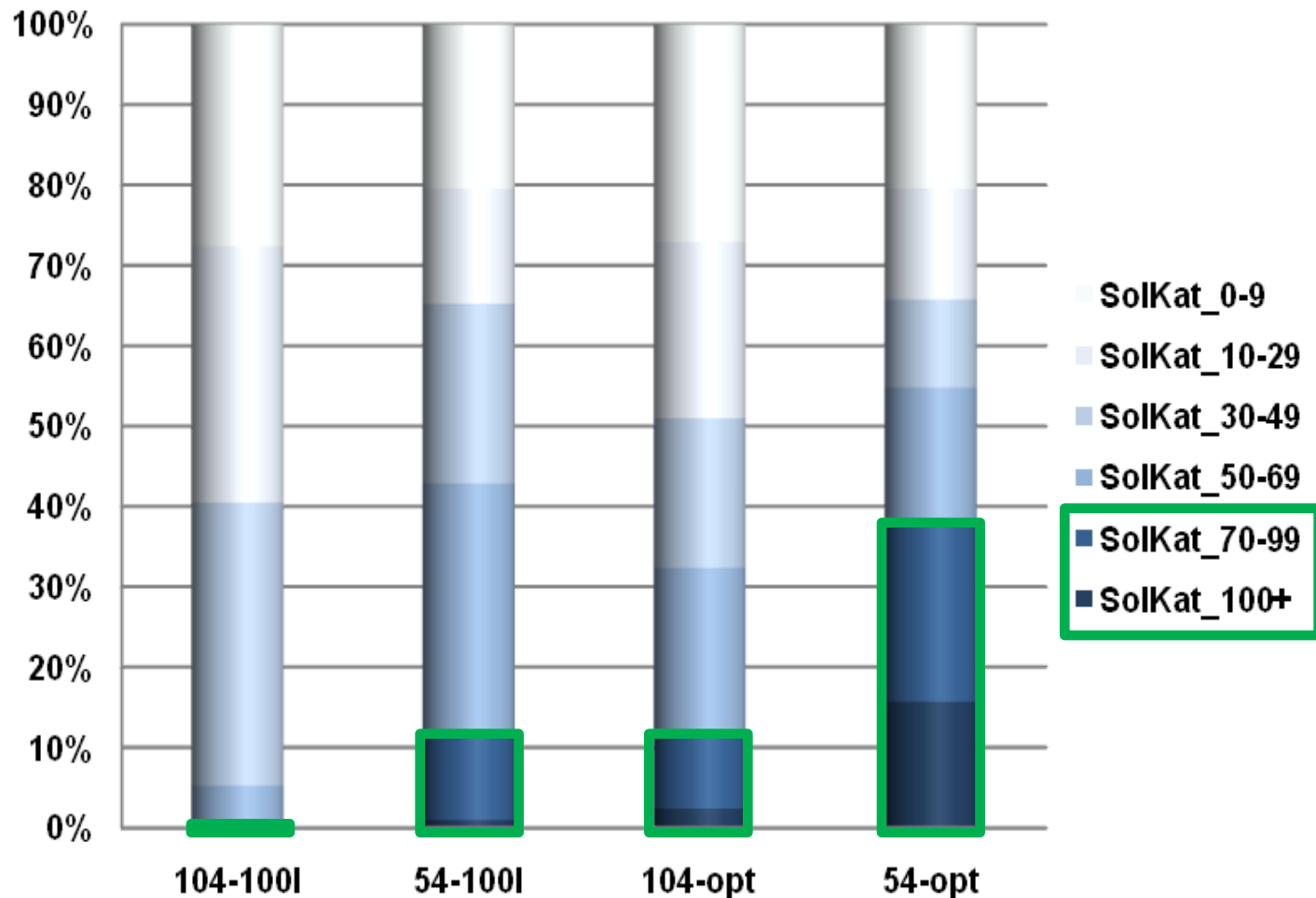
Indices	Residential building stock of the canton of Fribourg	Residential building stock of the city of Zurich
Roof surface area potential index	32,1%	31,6%
Solar thermal potential index	11,7%	4,8%

Results - Indices

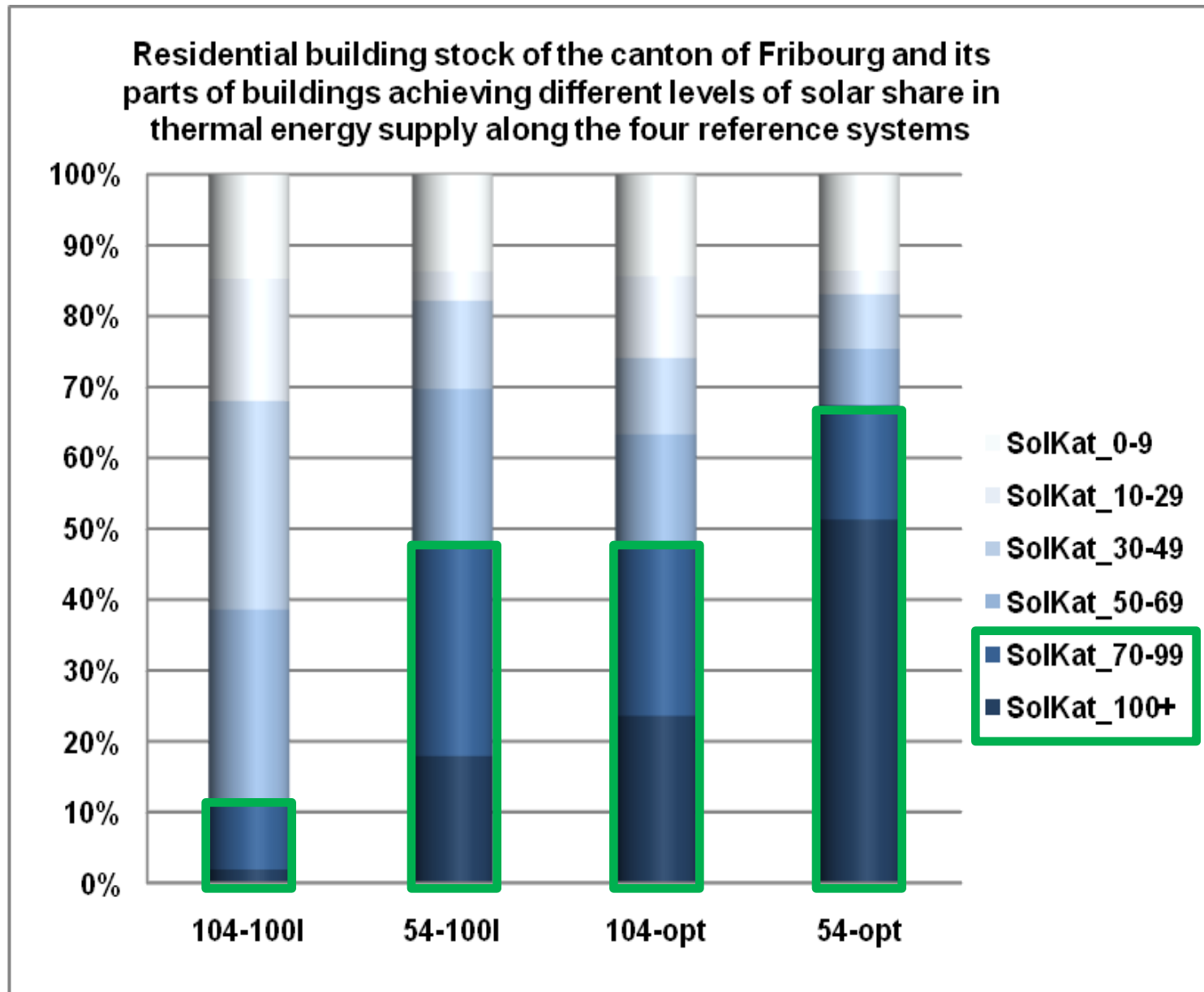
Solar thermal potential indices	Residential building stock of the canton of Fribourg	Residential building stock of the city of Zurich
Single-family houses	17,4%	7,8%
Multi-family houses	9,4%	5,3%
Residential buildings with mixed use (mainly residential purpose)	11,8%	4,2%
Residential buildings with mixed use (mainly other than residential purpose)	7,2%	3,1%
<i>Total residential building stock</i>	11,7%	4,8%

Results – Achievable levels

Residential building stock of the city of Zurich and its parts of buildings achieving different levels of solar share in thermal energy supply along the four reference systems



Results – Achievable levels



Results – Achievable levels

	104-100l	54-100l	104-opt	54-opt
Canton of Fribourg	34%	55%	50%	67%
Energy efficiency		+ 60%		
Optimised storage			+ 50%	
Energy efficiency + optimised storage				x 2
City of Zurich	19%	34%	26%	43%
Energy efficiency		+ 80%		
Optimised storage			+ 40%	
Energy efficiency + optimised storage				x 2,3

Conclusions

- **Achievable levels of solar thermal supply**
- **Robust and differentiated potential**
- **Wealth of data for targeted results**
- **Multi-tool approach**
- **Pragmatic and efficient assessment**

Acknowledgement

- **Swiss Federal Office of Energy**
- **SPF Institut für Solartechnik**
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- **Statistical Office of the Canton of Fribourg**
- **Office of Land Registry and Geomatics of the Canton of Fribourg**
- **Office for Informatics and Telecommunication of the Canton of Fribourg**



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