Climate Change related Domestic retrofit Overheating Risk Mitigation (CC-DORM)

SEAI Grant No. RDD/855

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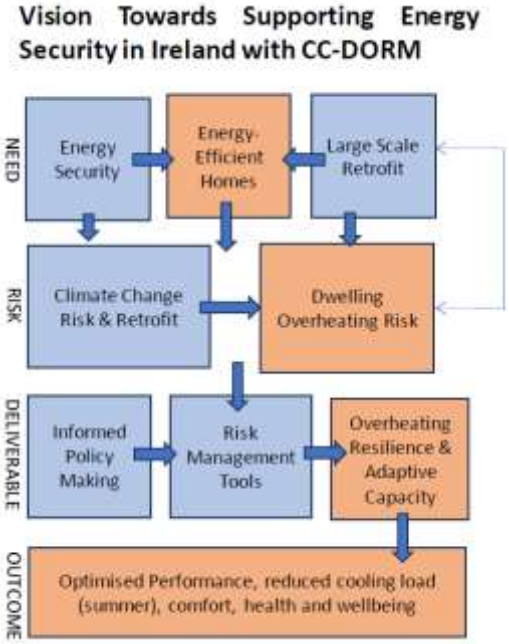
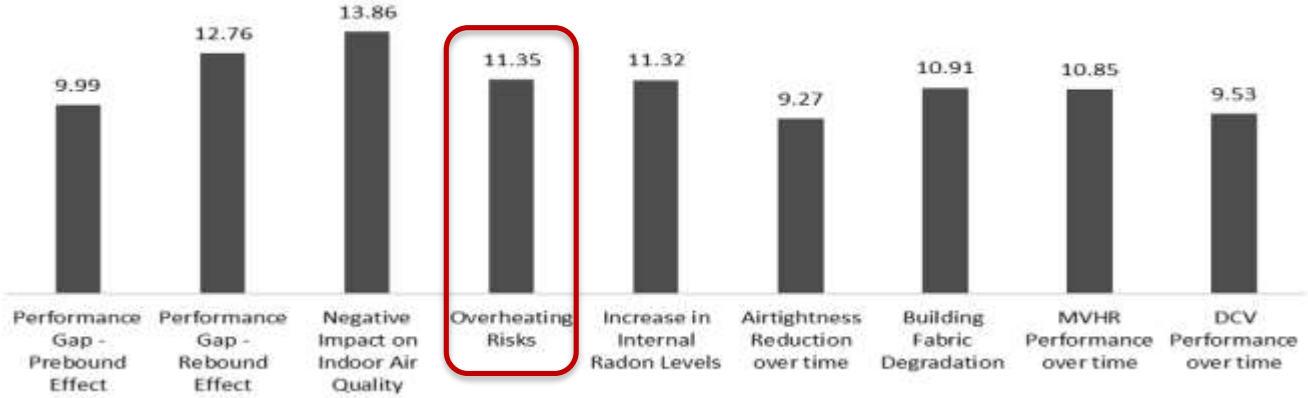
Overview

- Aims to address overheating risk concerns in domestic dwellings
- Utilising outputs from Met Éireann's TRANSLATE project
- Combining Dynamic Building Simulation and dwelling monitoring
- Aligned with BER inputs
- To develop a simple overheating risk assessment tool
- To inform policy/ regulatory directions



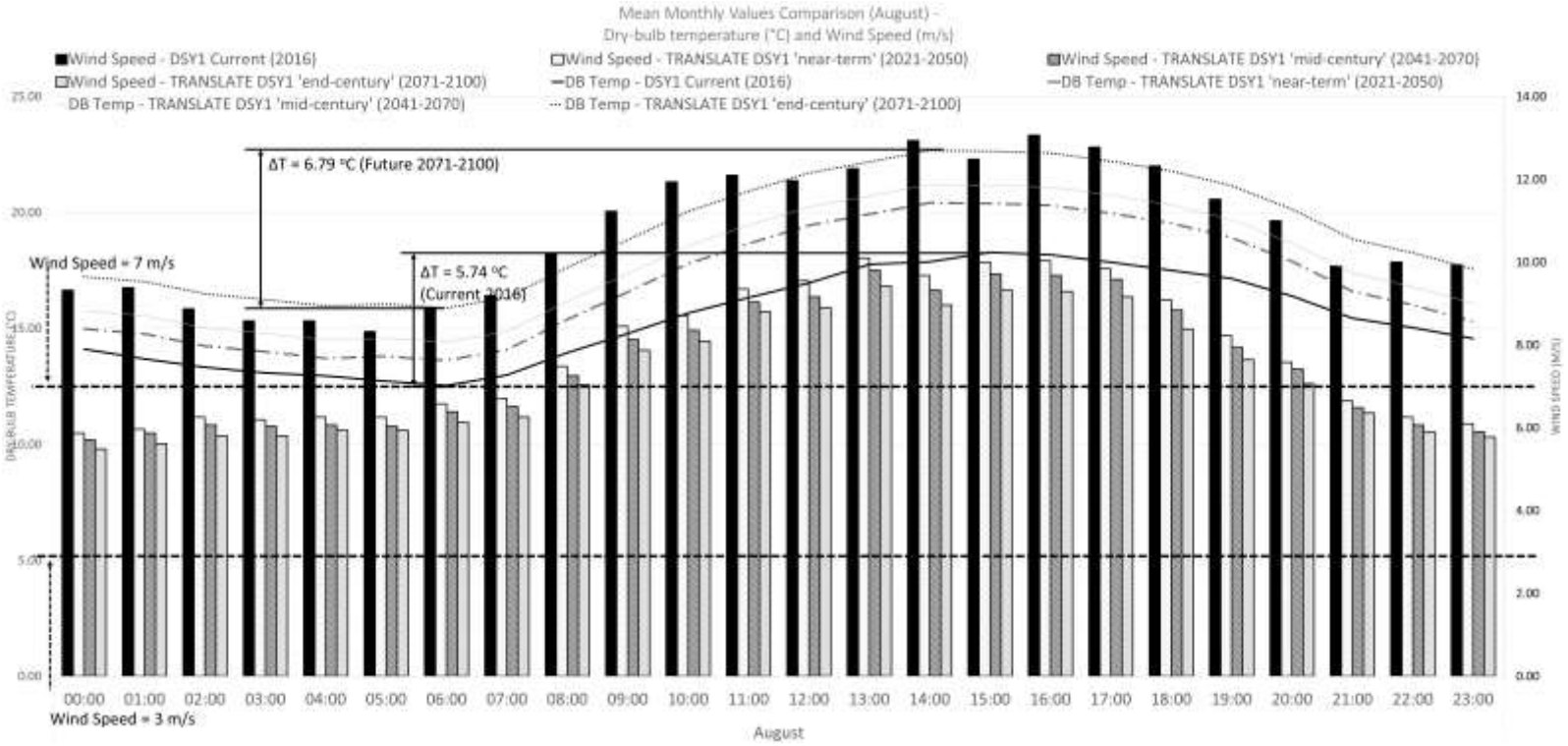
Overheating Risk

- Some evidence of predicted and actual overheating in cool climates
  - Industry Concerns (Harrington & Mulville, 2021)
  - Risk that retrofitted/low energy dwellings may become the *'hard-to-treat'* dwellings of the future
  - Climate Change may impact further

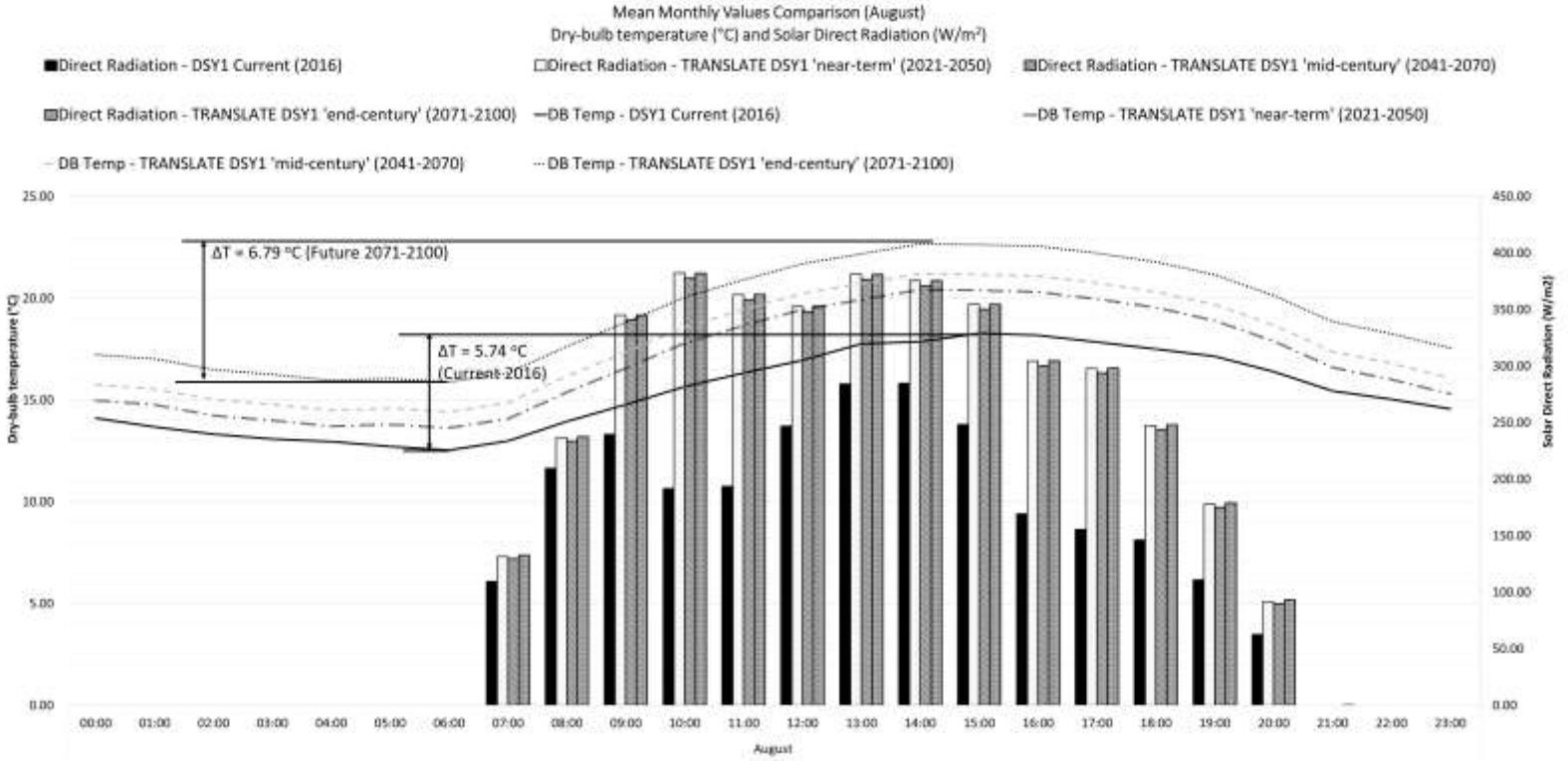


Industry Reported Retrofit Related Performance Risk Factors – Harrington & Mulville, 2021

Future Climate



Future Climate



Work to Date

Conflicting findings nationally and internationally

- Washan 2019
- Colcough & Salaris 2024
- Lomas 2021

Higher Risk Typologies

- Mid & Top-Floor Apartments
- ‘Compact’ Dwellings
- ‘Scheme’ Developments

Some thermal retention measures may offer protection from o/h

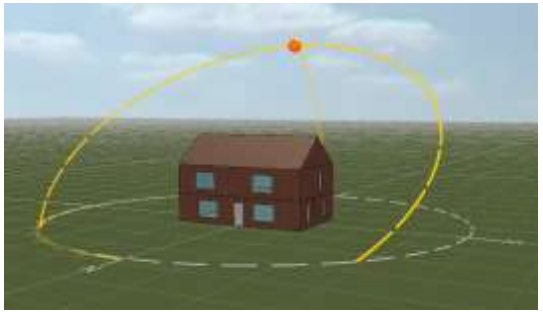
- Roof insulation
- EWI

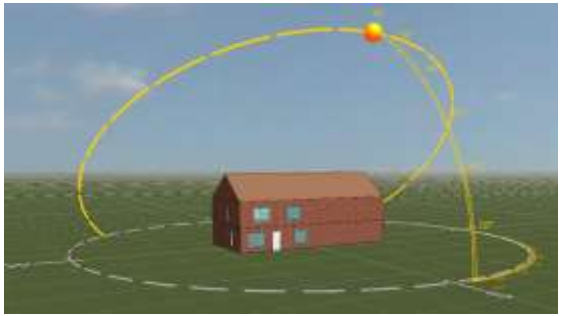
Key contributors to internal gains

- Solar Gain ~50% (window specification)
- Fabric 20-30%
- Internal ~15-20%

Key Mitigations

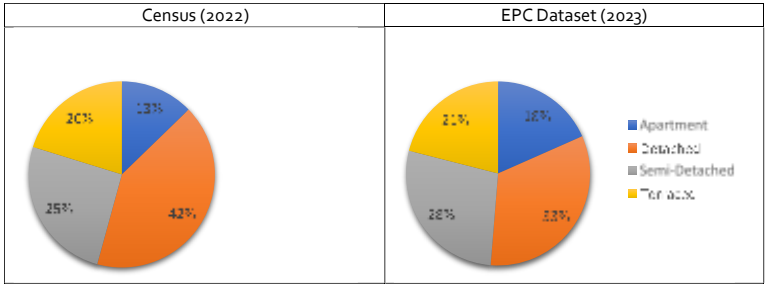
- Window Opening - must consider noise, security, safety (see UK part O)
- Thermal Mass, but somewhat limited
- Solar Protection





Work to Date

- Analysis of ‘cleaned’ BER and CSO databases
- 15 dwelling ‘clusters’ created representing 85% of as built stock



			Apartments									Terraced House						Detached House			Semi-Detached House		
			Top-floor			Mid-floor			Ground-Floor			Mid-terrace			End of terrace								
			Census	EPC	Margin of Error	Census	EPC	Margin of Error	Census	EPC	Margin of Error	Census	EPC	Margin of Error	Census	EPC	Margin of Error	Census	EPC	Margin of Error	Census	EPC	Margin of Error
Construction Period	**Before 1900**	Pre-Thermal Era	7,709	847	4%	4,897	592	5%	7,439	831	4%	29,706	2,579	2%	7,882	684	5%	67,372	6,082	2%	11,633	723	5%
	1900-1929		1,995	1,631	1%	1,488	927	3%	2,087	1,575	2%	14,571	7,148	1%	5,836	2,024	2%	27,767	14,257	1%	9,879	2,730	2%
	1930-1949		1,970	676	4%	1,637	679	4%	2,548	803	4%	24,087	9,464	1%	11,169	4,557	1%	39,746	11,632	1%	21,437	6,876	1%
	1950-1966		2,673	657	4%	2,091	523	5%	4,306	1,214	3%	35,538	14,065	1%	17,536	6,882	1%	58,223	17,994	1%	50,077	16,464	1%
	1967-1977		2,895	1,038	3%	2,243	853	3%	4,124	1,451	3%	29,618	14,400	1%	15,834	7,460	1%	86,984	28,419	1%	64,601	25,339	1%
	1978-1982	Post-Thermal Era	1,793	807	3%	1,283	592	4%	2,453	1,027	3%	13,330	6,534	1%	7,519	3,910	1%	47,707	20,150	1%	30,382	10,672	1%
	1983-1993		7,050	2,746	2%	6,505	2,073	2%	8,806	3,557	2%	22,362	9,665	1%	13,296	5,799	1%	106,239	33,180	1%	64,037	22,338	1%
	1994-1999		6,649	5,270	1%	8,015	6,581	1%	7,827	6,018	1%	10,984	5,894	1%	6,623	3,577	1%	69,957	32,110	1%	49,943	31,781	0%
	2000-2004		12,060	10,286	0%	15,296	11,142	1%	14,452	13,173	0%	18,924	13,715	1%	11,629	8,258	1%	81,842	44,217	0%	51,966	45,559	0%
	2005-2009		13,690	12,394	0%	17,450	17,602	-	16,435	14,210	0%	21,367	14,173	1%	13,156	8,796	1%	87,728	32,272	1%	54,553	33,721	0%
	2010-2022		8,028	2,840	2%	16,623	7,798	1%	9,107	3,189	2%	18,438	5,211	2%	13,408	4,065	2%	71,296	8,816	1%	48,912	13,138	1%
		Total	66,512	39,192	0.4%	77,526	49,362	0.3%	79,585	47,048	0.4%	238,924	102,848	0.3%	123,887	56,012	0.4%	744,859	249,129	0.2%	457,420	209,341	0.2%

Work to Date

- Mid & Top-Floor Apartments with compact dwellings account for ~11% of existing stock
- 47% increase in apartment construction year on year (2023)
- In Q3 2023 40% of completions were apartments
- Growing number of new dwellings in risk category
- Retrofit will make older dwellings thermally similar to new..

Dublin

Owners of 'uninhabitable' D4 apartments suing developers over excessive heat

Five owners of Lansdowne Place apartments in Ballsbridge claim they have to endure temperatures of close to 30 degrees

Next Steps

- Dynamic Building Simulation due to commence in May
  - Key parameters across multiple locations/scenarios against 15 typologies
  - 11,000+ initial model ‘runs’
- Monitoring study: Dwellings sought
  - Particularly Apartments
  - Low impact equipment May-September
  - With supplemental occupant survey
- Limitations
  - Urban Heat Island/ Urban Environments
  - Range of parameters
  - Role of occupants
  - Typologies covered
  - Building Simulation – All models are wrong, but some are useful…

Notes

Data

- Cleaned BER Database - https://data.mendeley.com/datasets/yhgdzfpnym/1
- Met Éireann TRANSLATE Project - https://www.met.ie/science/translate

References

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Thank You

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Get Involved in CC-DORM

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