

BDR THERMEA GROUP

BDR THERMEA GROUP

Project proposal

Aurélien Massein | BDU Heat Pumps

Mertzwiller
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About us

About us

Our business

BDR Thermea is a world leading manufacturer and distributor of climate and domestic hot water solutions

Providing intelligent thermal comfort solutions with a near zero carbon footprint



About us

BDR Thermea Group



Our group is present in more than **100 countries** around the world and employs approximately **6,200 people**.



BDR THERMEA is headquartered in **Apeldoorn** (The Netherlands).



The Group has a turnover of approximately **EUR 1.8 billion**.

About us

World progress



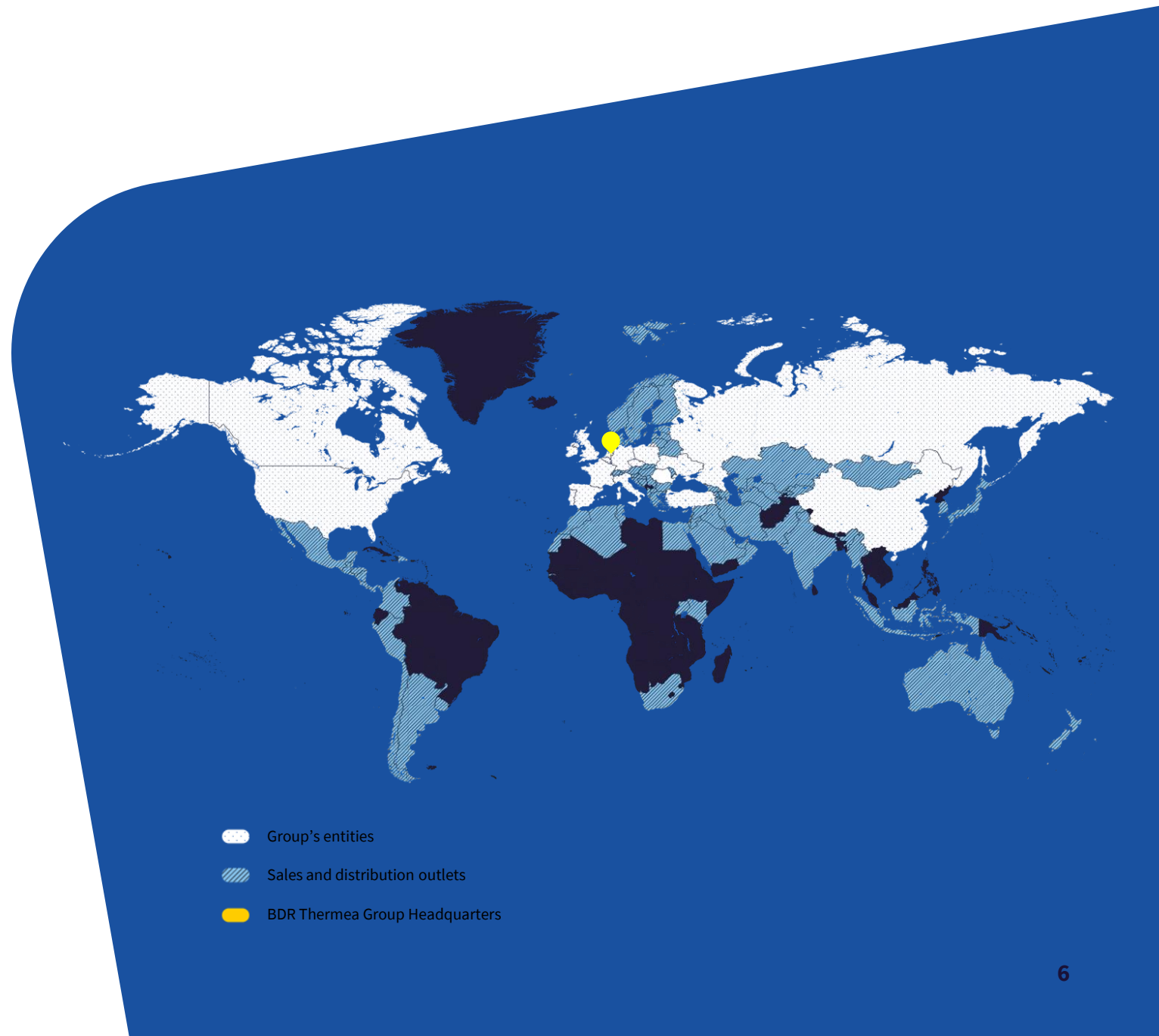
Presence in over **100 countries**



15 production sites in Europe

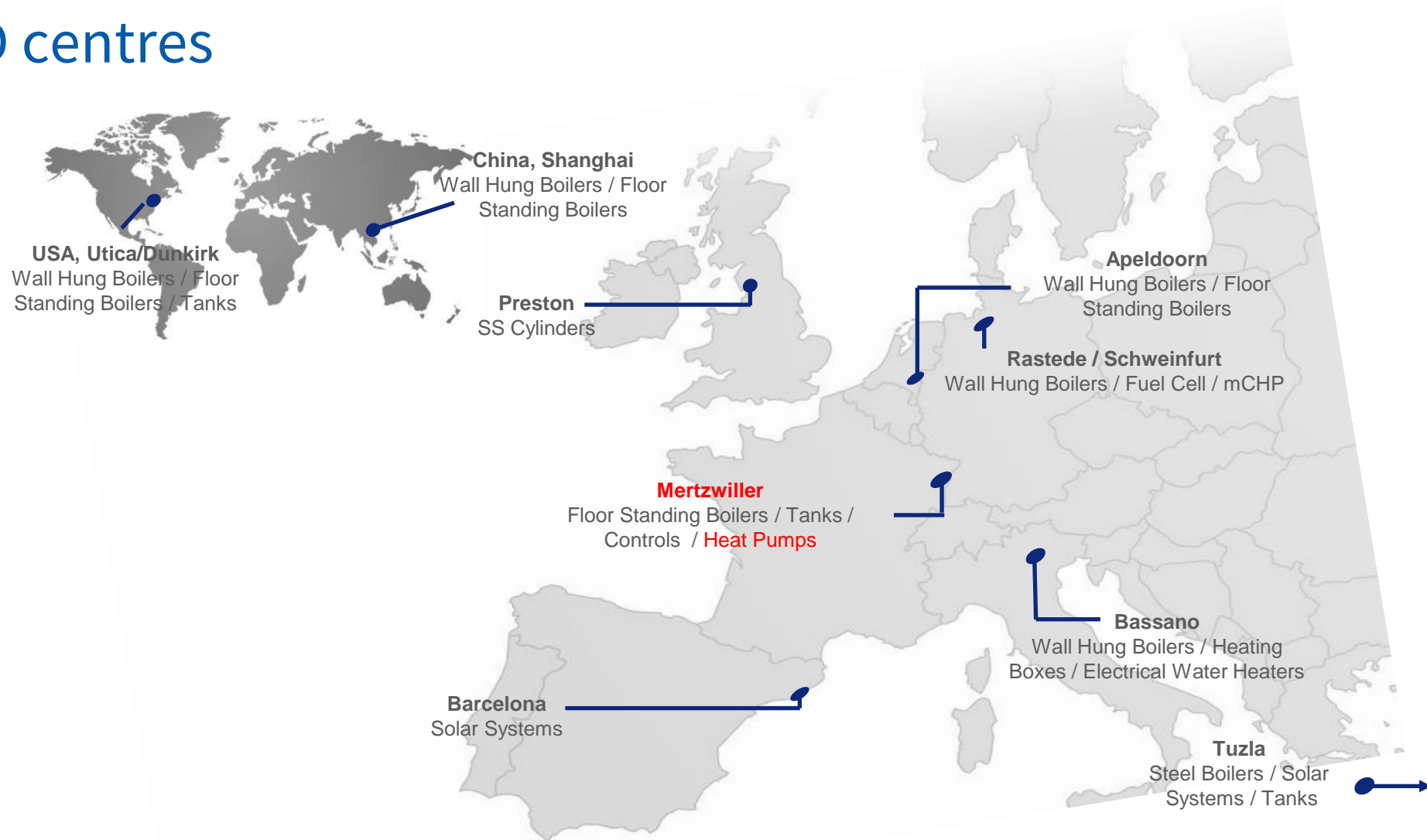


12 R&D centres worldwide



About us

R&D centres



About us

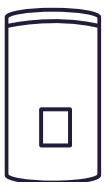
Mertzwiller



37,000 m² dedicated to production



350 employees



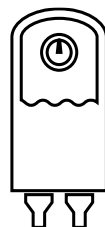
40 000



41 000



25 000



11 000

BDR THERMEA GROUP



[Watch the video](#)

About us

Our French brands and products



- Wall-hung boiler
- Heat pump
- Solar heating system
- Thermodynamical water heater
- Hot water tank
- Radiator
- Regulation and connected solution



- Burner
- Floor standing boiler
- Wood-burning stove
- Solar hot water system
- Electric water heater
- Photovoltaic
- Air conditioner
- and more!



LA TRANQUILLITE CHAUFFAGE



About us

BDU Heat Pump

At Mertzwiller, we are the R&D department developing new heat pump products for the group and all its worldwide brands





Project

Project Context

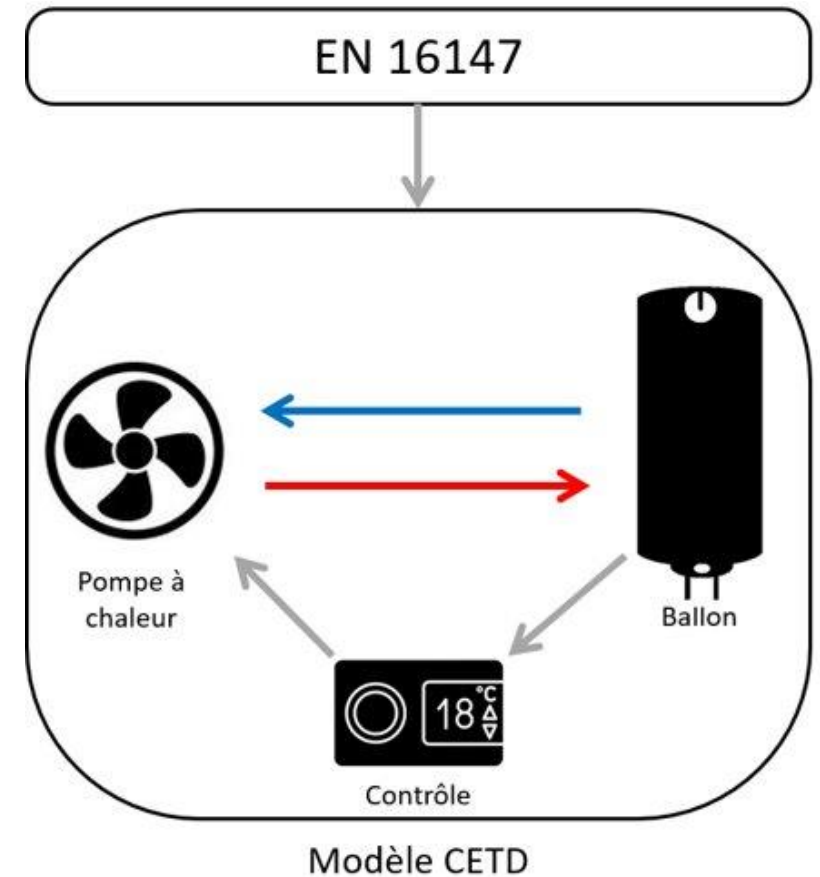
Development of our thermodynamic products, we have to:

- improve various performances
- satisfy numerous constraints

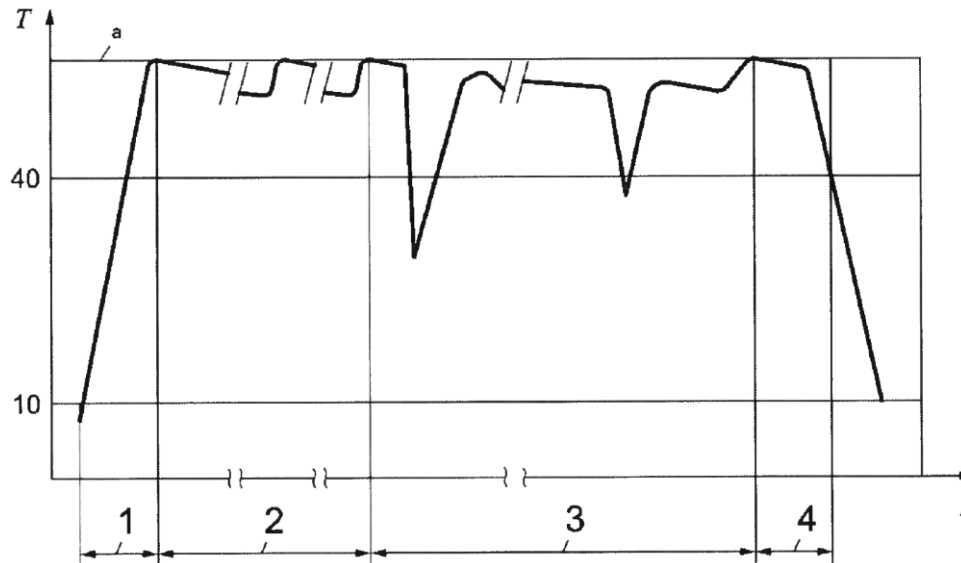
Ultimately, these performance are evaluated and certified through normative laboratory testing of our products; e.g. EN 16147, LCIE 103-15, IdCET, RT2012...

Numerical models are available to simulate these experiments as to:

- optimise and meet these standards
- determine the best values of the tunable parameters



Project Example



Légende

- | | |
|--------------------------------------------------------------------------------------|---------------------------|
| 1 [Étape C] remplissage et période de mise en température (voir 7.7) | T température |
| 2 [Étape D] Puissance absorbée en régime stabilisé (voir 7.8) | t temps |
| 3 [Étape E] Puisages d'eau (voir 7.9) | a température de consigne |
| 4 [Étape F] Eau mitigée à 40 °C et température d'eau chaude de référence (voir 7.10) | |

Figure 1 — Étapes et ordre des essais

A norm test interacts with our product to quantity at its end performances of interest; e.g. EN 16147

A standard EN16147 test may last 30 minutes depending on tested product and its modelling complexity.

=> Only a few performances are needed at test's end to optimise our product design

Project

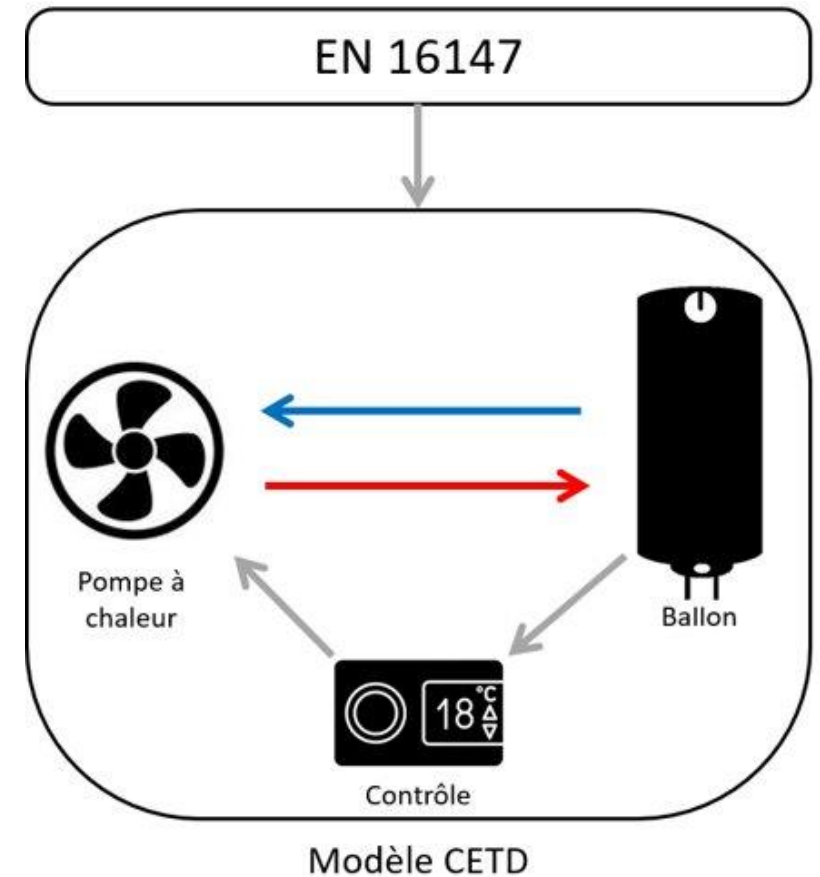
Problematic

Then, our models' simulation duration and our problem parameter space are quite important.

We want to improve our optimisation process so that it is fast, robust and versatile.

⇒ Model reduction is proposed to:

- simplify our complete model, providing the normative performances for a given product and test
- explore a wide range of possible design solutions



Project Objectives

Objectives:

- reduce black-box models
- determine the appropriate parameters for model reduction
- statistically compare pure model reduction and a reduced model on the same problem and data set

Tools: Python, SMT, scipy, pandas...



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