Vattenfall Heat – Power Climate Smarter Living

London, 10 May 2017

VATTENFALL HEAT

- We are one of Europe's **largest heat suppliers** …

- We record **less than 1% p.a. customer churn** in our **>2 m end customer base** …

- We **deliver 9% ROCE** in the Heat portfolio …

- … and we **serve Europe's growth powerhouses** (Berlin, Amsterdam, Hamburg, Uppsala, …)

- … and we enjoy **substantial political support from our partners to grow and expand** our presence

- … and base this on a detailed roadmap towards **CO_2 neutrality** in Heat

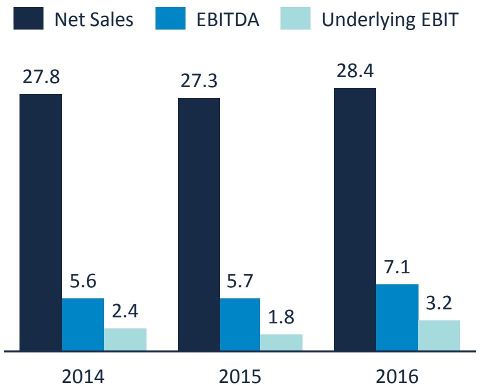
Vattenfall Heat fits well with the new energy landscape and offers further growth potential

VATTENFALL HEAT IN NUMBERS

Highlights

- Solid, semi-regulated, revenue streams
- A growing customer base with low churn
- An accelerating contribution to climate smartness
- An established platform to tap into new decentral heat businesses

Financial development (SEK bn)[1]



Key data

>2m end customers
measured in dwelling equivalents[2]

Growth by 50k new customers
in 2016

20.3 TWh Heat sold
in 2016

3,790 employees
in 2016

Vattenfall is a European leader in district heating

[1] Including condensing
[2] Based on average household heat consumption

THREE CORE MARKETS WITH DIFFERENT CHARACTERISTICS

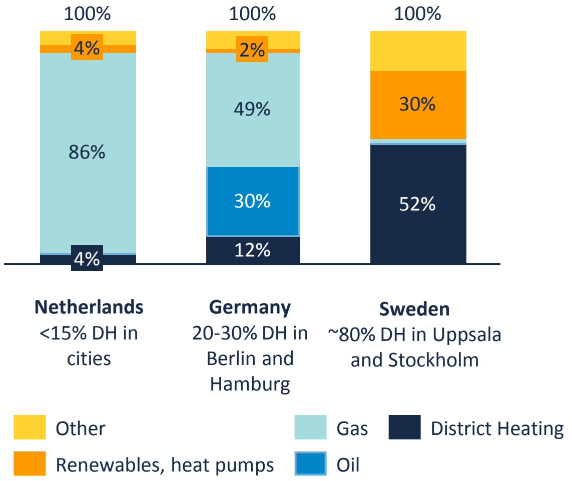
Market characteristics (all market players)	Germany	Netherlands	Sweden
Total (space) heating market size (TWh)[1]	712	203	83
Dominating fuel	gas/coal/waste	gas/waste	wood/waste/el. no gas grid
Share of renewables in District Heating (DH)[1]	10%	1%	68%
Average customer heat price €ct/kWh	8	10	7
Number of customer equivalents	1,7m	210k	230k
Vattenfall's market position	#1	#1	#3
	Growing German market	Young Dutch Market	Mature Swedish market

A well balanced market mix allows Vattenfall to capitalize on growth opportunities

[1] Source: Vattenfall analysis

POTENTIAL FOR PROFITABLE GROWTH

Residential heat market structure[1]



Our (current) footprint

Sweden – mature DH market
- Strong growth in metropolitan areas expected (esp. Stockholm, Uppsala)
- District heating providing CO_2-free base supply, heat pumps taking larger market share

Netherlands – young DH market
- Strong growth in Amsterdam and surroundings (+6% p.a.)
- Ambition to replace gas by 2050; an opportunity for district heating growth
- District heating with high usage of third party heat sources (waste, etc.), growth of heat pumps

Germany – developing DH market
- Hamburg and Berlin "boom" towns of the future
- District heating based on climate neutral solutions in densely populated areas; modern decentralised solutions (gas based, heat pumps) replacing old oil and gas boilers elsewhere

A well balanced market mix allows Vattenfall to capitalize on growth opportunities

[1] Source: Vattenfall analysis

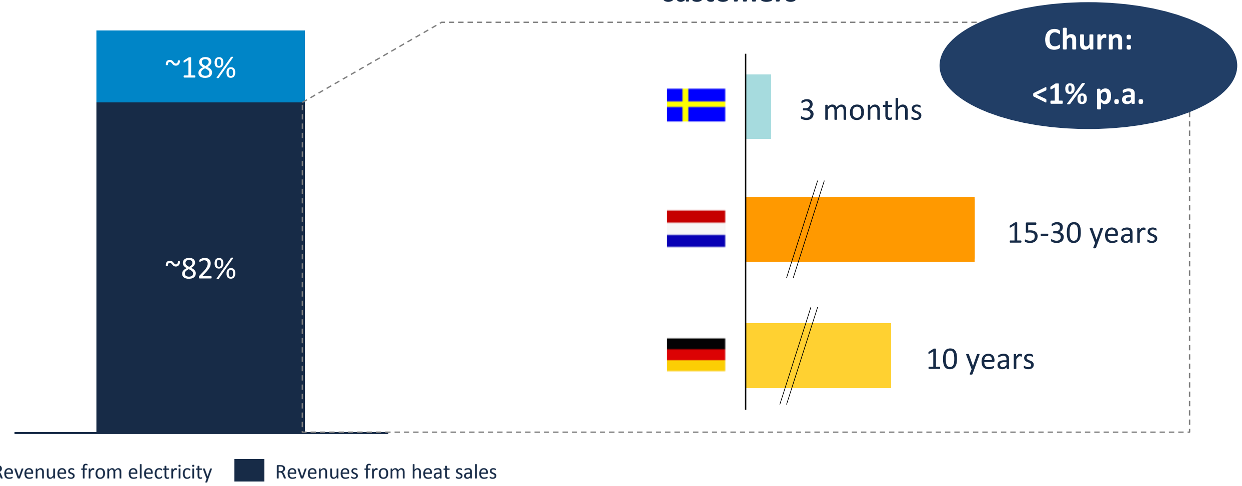
REVENUE SOURCES

Drivers for district heating revenues

- “Additional” revenue from electricity sales
- Revenues from district heating based on price – indexed long-term contracts in most cases

Revenue breakdown

Contract lengths for district heating customers



Customers stay with us long-term,
providing Heat with a highly stable revenue stream

WE CONTRIBUTE ACTIVELY TO "POWER CLIMATE SMARTER LIVING"

Customer growth

- Broaden product offering
- Realise strong customer growth in district heating and decentralised energy solutions
- Position Heat as partner of choice for cities
- Regulatory management

Shape a sustainable portfolio

- Develop and deliver on climate neutrality/CO_2 roadmaps
- Increase the share of third party heat sources (TPI)
- Integration of renewable energy sources with Power-to-Heat solutions

Drive innovation

- Foster and implement digital solutions on supply and customer side
- Smart meter roll-out
- Test new CO_2-free fuels (ammonia, hydrogen)

Improve performance

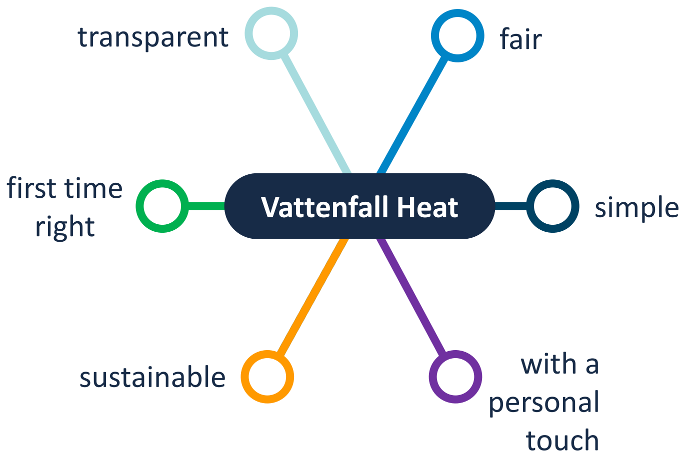
- High performing operations (top quartile ranking in external benchmarks)
- Reduce maintenance Capex and Opex
- Excellence in project execution

Develop our team and culture

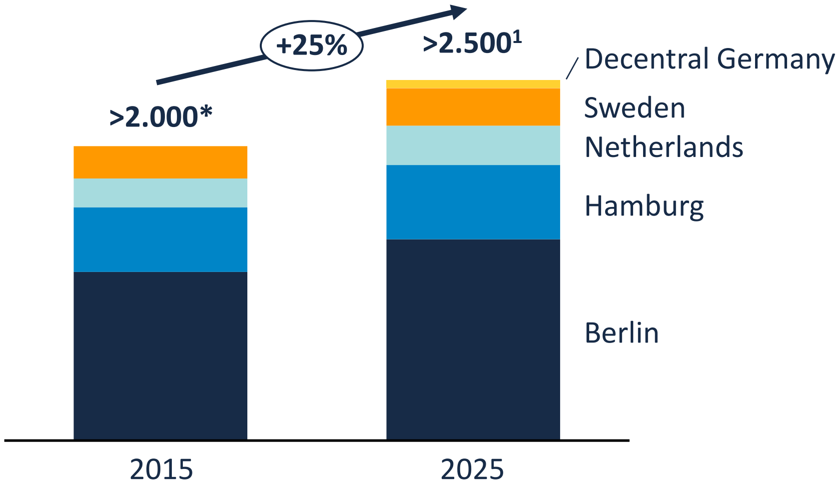
- Deliver on industrial safety targets
- Secure new competences
- Encourage entrepreneurship and collaboration

25% MORE CUSTOMERS BY 2025

A strong customer value proposition…



…will create continued growth



Heat has strong growth ambitions – within district heating and decentralised solutions across all markets

[1] Heat customers in dwelling equivalents x 1000

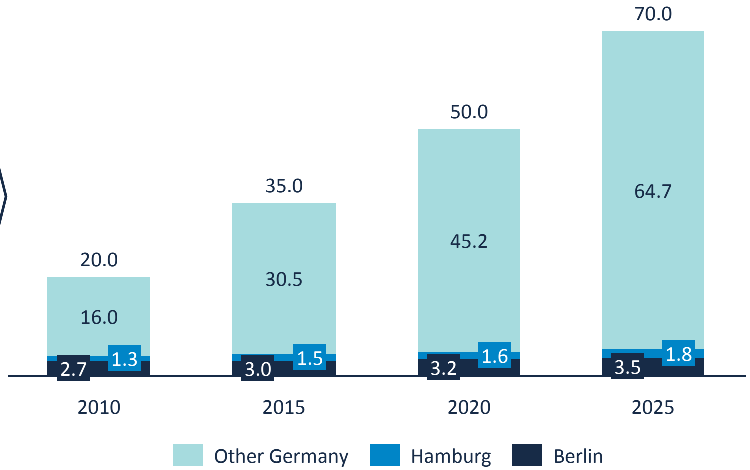
GROWTH OPPORTUNITY IN DECENTRALISED SOLUTIONS

Customer growth

Decentral growth

- Focus on B2B-segment
- Organic growth in Berlin and Hamburg and adjacent cities and potential for inorganic growth
- Bundling of our distributed business into one entity
- Current product = heat solutions with gas boilers and mCHPs
- Future: add renewable sources to offering

Decentral heat contracting demand in Germany (TWh)[1]



Decentralised solutions are already today substantial contributors to Vattenfall Heat's performance and have a strong potential for future growth

[1] Source: Prognos & Vattenfall analysis

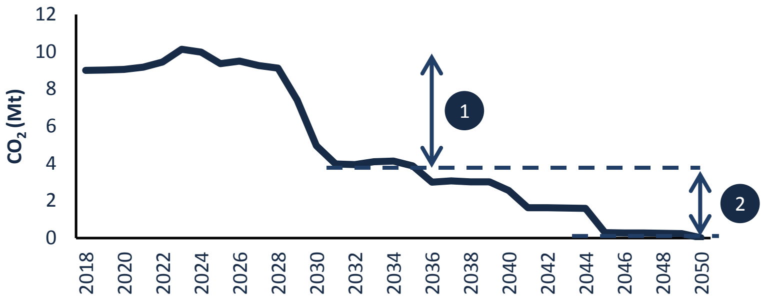
VATTENFALL HEAT WILL GO GREEN BY 2050

Shape a sustainable portfolio

Ambition for zero CO_2 emissions by 2050

- Switch from coal to gas and from peat to biomass
- Add heat storages and Power-to-Heat (results in -2.8 Mt savings in 2035 vs. today, i.e. -30%)
- Take advantage of existing sources of industrial “waste heat” (Third Party Integration)
- Work with technology partners on new CO_2-free technologies (hydrogen, ammonia)
- Align closely and integrate city partners

Vattenfall Heat CO_2 reduction path



1. More than 50% of CO_2 reduction achieved by 2030 due to coal phase out in Germany
2. Remaining CO_2 part will by reduced by stepwise implementation of CO_2 technologies

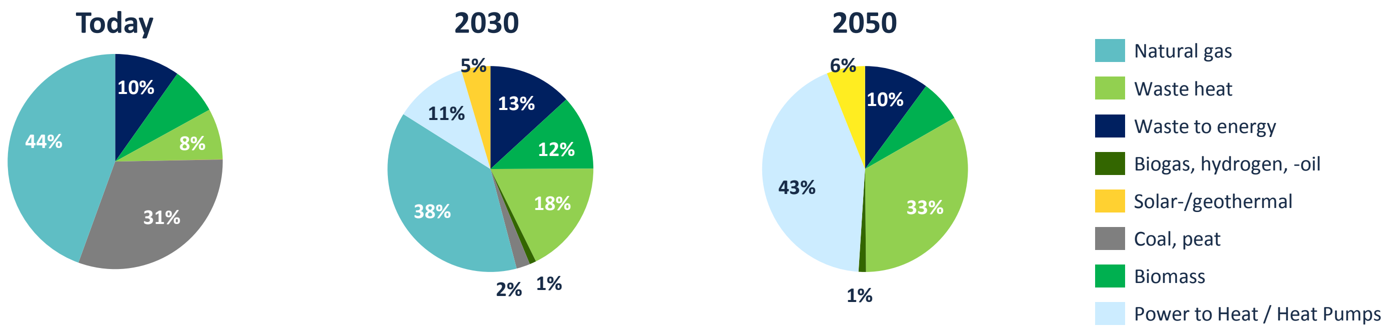
A clear path towards substantial CO_2 reductions

VATTENFALL

INCREASE IN THIRD PARTY HEAT SOURCES

Shape a sustainable portfolio

Fuel mix [1]



	Today	2030	2050
Third Party Integration (TPI) vol.	**800 MW**	**1,500 MW**	**1,800 MW**
TPI examples	▪ Waste incineration (Berlin, Hamburg + NL) ▪ Green heat from digesters and biomass boilers (NL) ▪ Industrial waste heat (SWE)	+ Moorburg (300 MW) + Waste water (130 MW) + Industrial process (60 MW) + Others	+ Power to Gas small scale CHP + Geothermal (NL) + Biomass (SWE) + Waste incineration (NL) + Low temp. Heat (all)

We are already today integrating external supply and will foster this going forward

[1] Vattenfall analysis

Drive innovation

WE DRIVE INNOVATION

Load mgt.

Consumption opt.

Production data

Consumption data

Currently 60 Network information points
New: 19,100 Network information points

Distribution:
1. Electronic accounting
2. Heat revenue planning
3. Densification potential

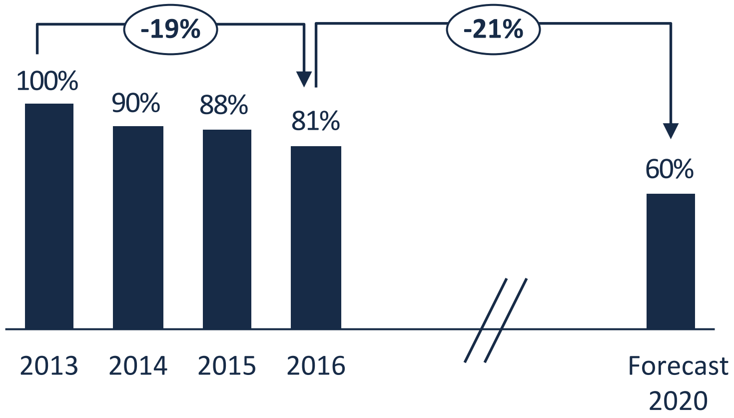
Operation:
1. Support fault mgt.
2. Elimination of manual meter reading

Going "digital" is top ranked on Vattenfall's agenda

WE HAVE REDUCED MAINTENANCE SPEND BY >20% OVER THE LAST 4 YEARS

Improve performance

What we have achieved



What we will continue to do until 2020 on top

- **Portfolio optimisation** → decommissioning of aging assets and strategic portfolio adjustments
- **We permanently benchmark ourselves to learn from the past:** the yearly Solomon benchmark provides an outside-in perspective on the performance of our assets, costs, reliability and efficiency
- **With Structured Maintenance Review (SMR) we plan the future asset related activities:** enables risk/benefit based maintenance decisions
- **International procurement optimisation** (economy of scale effects) results in lower costs and higher quality of provided services

… and will continue this route consistently

STRATEGY – DELIVERED

Customer growth	Shape a sustainable portfolio	Drive innovation	Improve performance	Develop our team and culture
✓ Broaden product offering ✓ Realise strong customer growth in district heating and decentralised energy solutions ✓ Position Heat as partner of choice for cities ✓ Regulatory management	✓ Develop and deliver on climate neutrality/CO_2 roadmaps ✓ Increase the share of third party heat sources (TPI) ✓ Integration of renewable energy sources with Power-to-Heat solutions	✓ Foster and implement digital solutions on supply and customer side ✓ Smart meter roll-out ✓ Test new CO_2-free fuels (ammonia, hydrogen)	✓ High performing operations (top quartile ranking in external benchmarks) ✓ Reduce maintenance Capex and Opex ✓ Excellence in project execution	✓ Deliver on industrial safety targets ✓ Secure new competences ✓ Encourage entrepreneurship and collaboration