

Energytransition Amstelveen

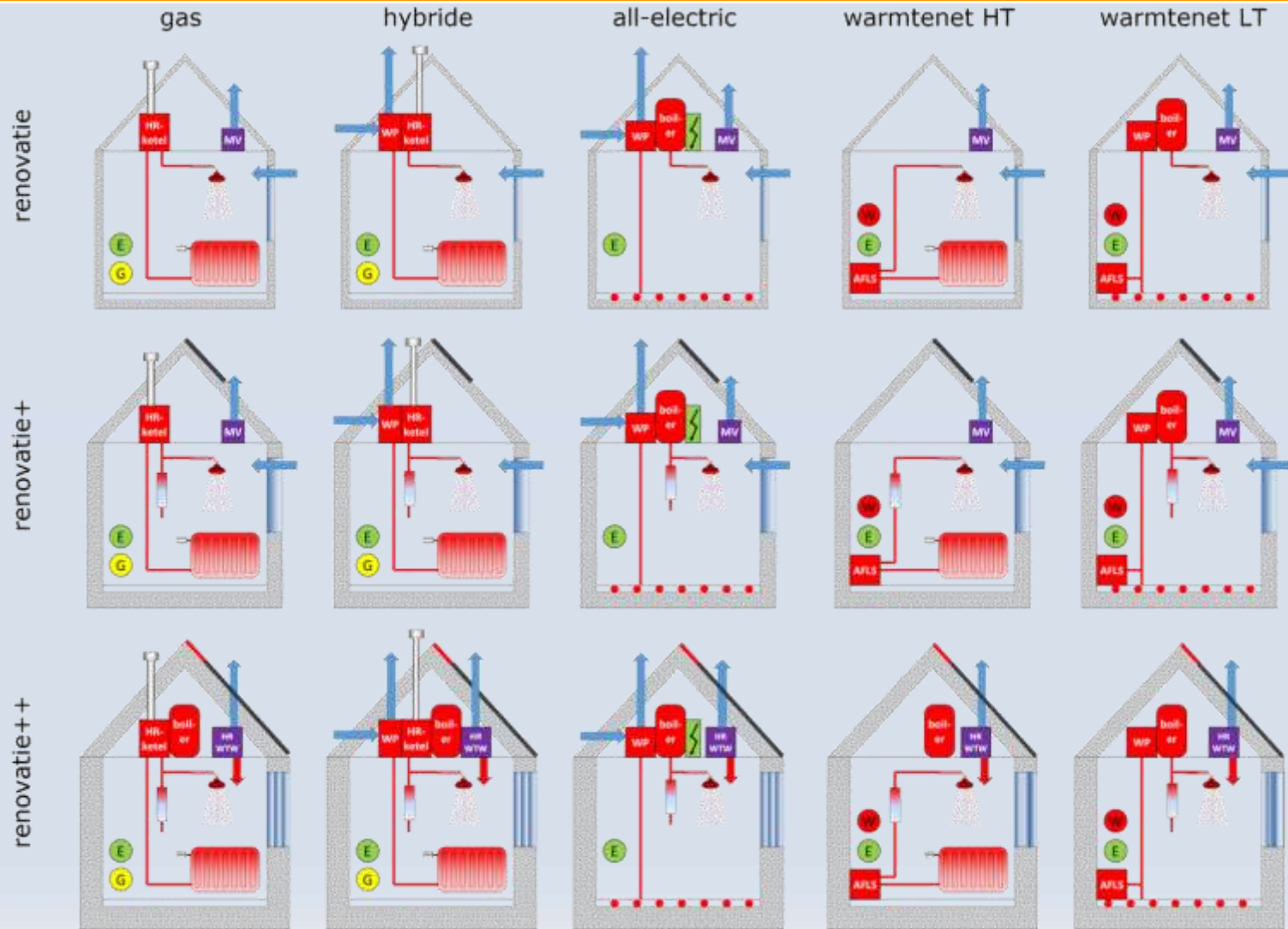


innoforte
DHC in control

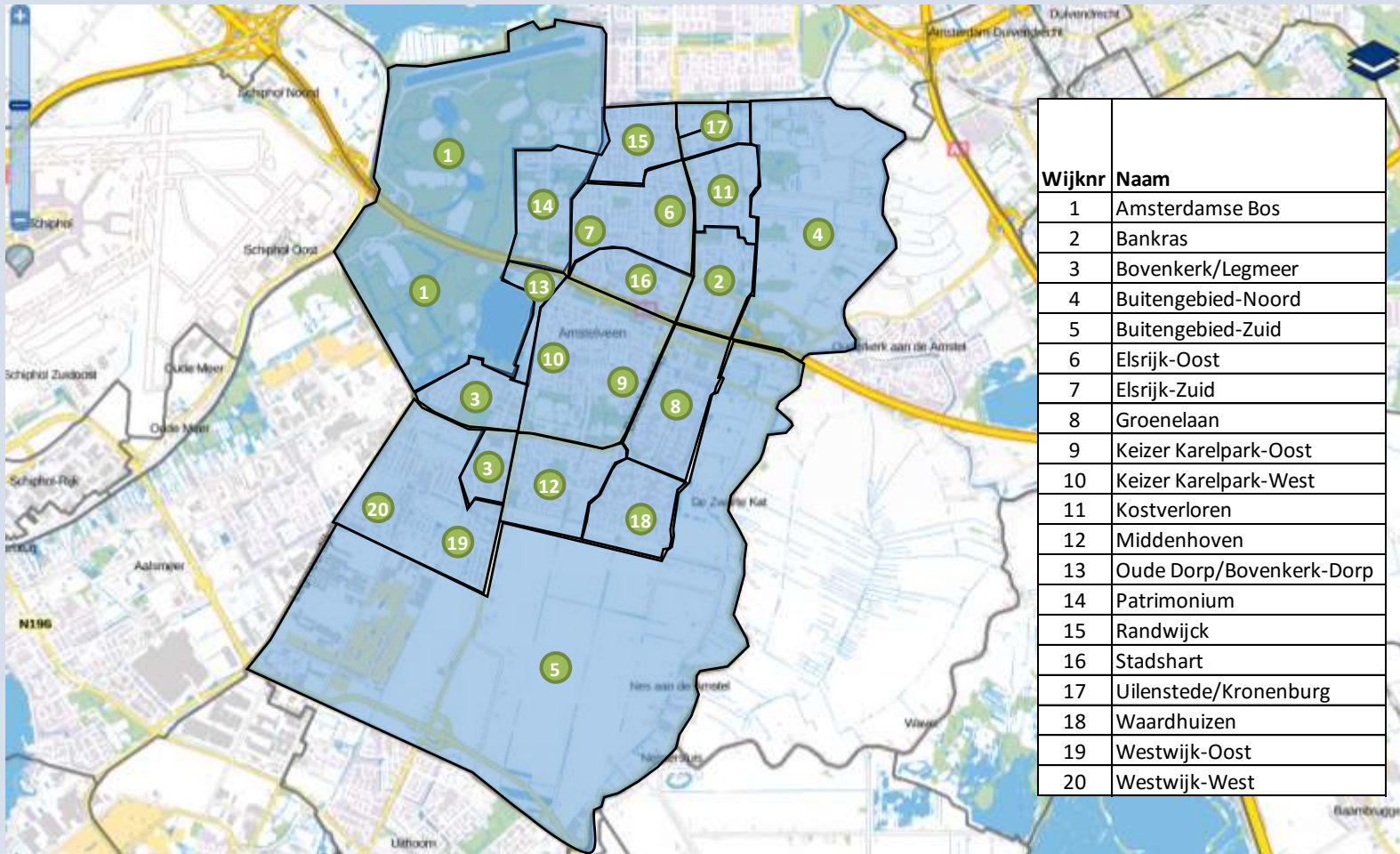
- Bottom-up
 - Buildings central
 - Building and district measures
 - Search for possibilities
 - Optimization targets
 - Value chain costs
 - Strategic flexibility
 - CO2 emission
 - Etc.
- Participation (aim)
 - Transparant process
 - Invitation to participate
 - Energy grid companies
 - Housing associations
 - Public

- Calculation model
- total municipal building database
- Standardization: type of building and construction period
- 15 sustainability routes:
 - 3 architectonic variants: renovation, renovation⁺ and renovation⁺⁺
 - 5 different kinds of energy infrastructure: natural gas, hybrid, all electric, district heating (HT), district heating (LT) with matching installations in the buildings gebouwen
- Total costs per district:
 - Capital costs building
 - Capital costs infrastructure (new, more capacity)
 - Operation and maintenance
 - Energy (gas, electricity, heat).
- CO₂ emission

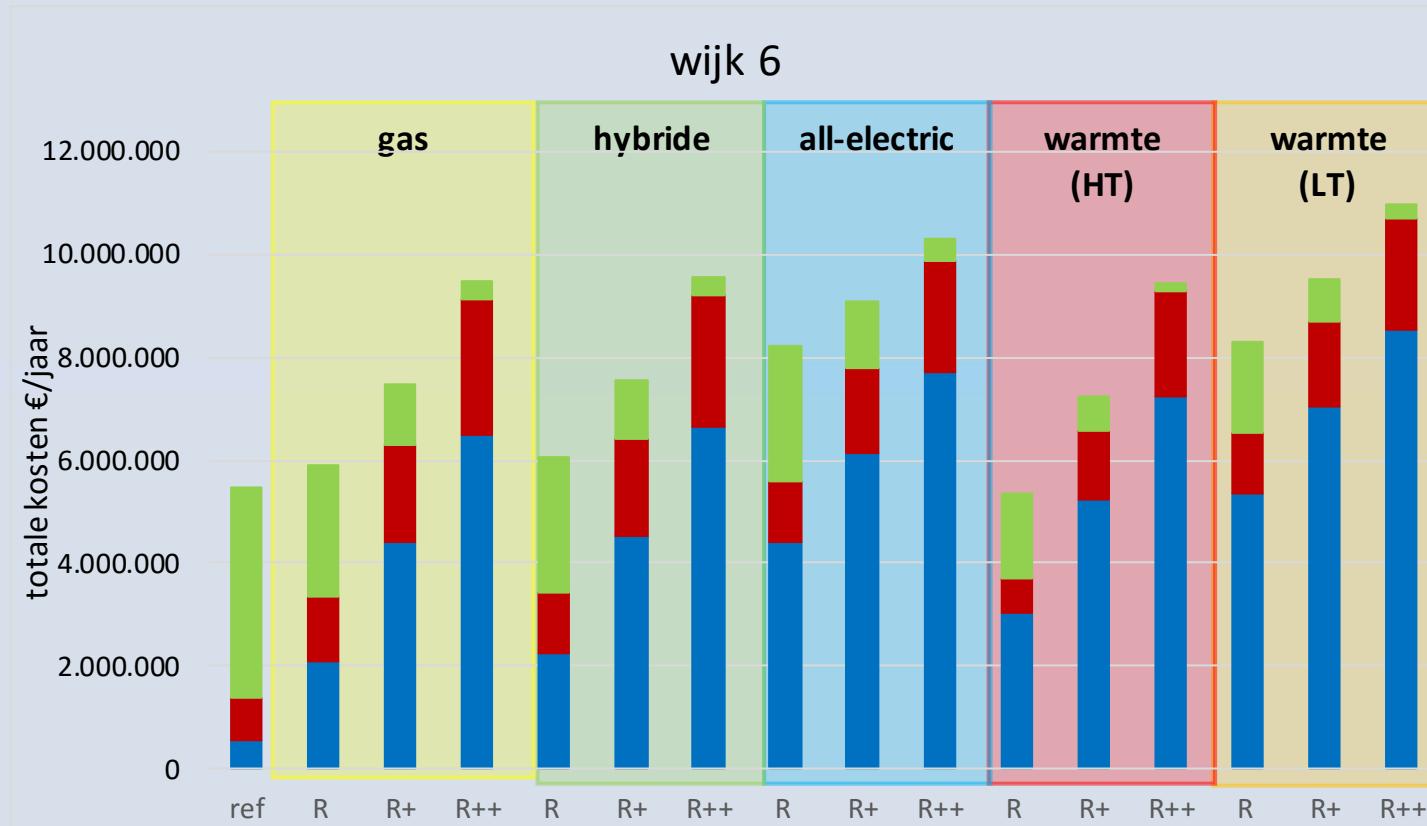
Sustainability routes



Gebieden Amstelveen



example district 6



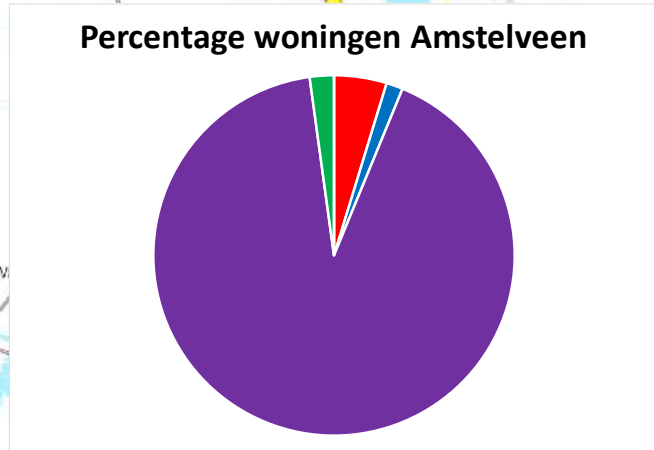
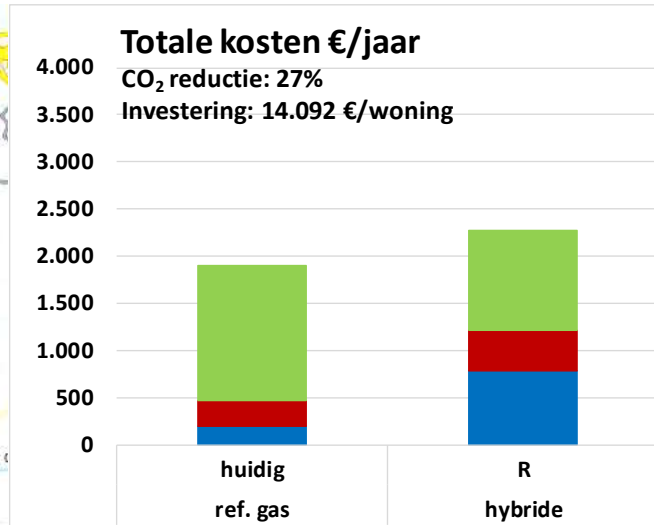
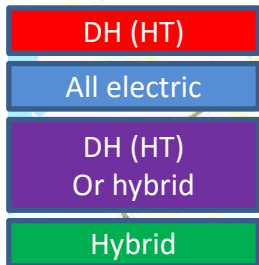
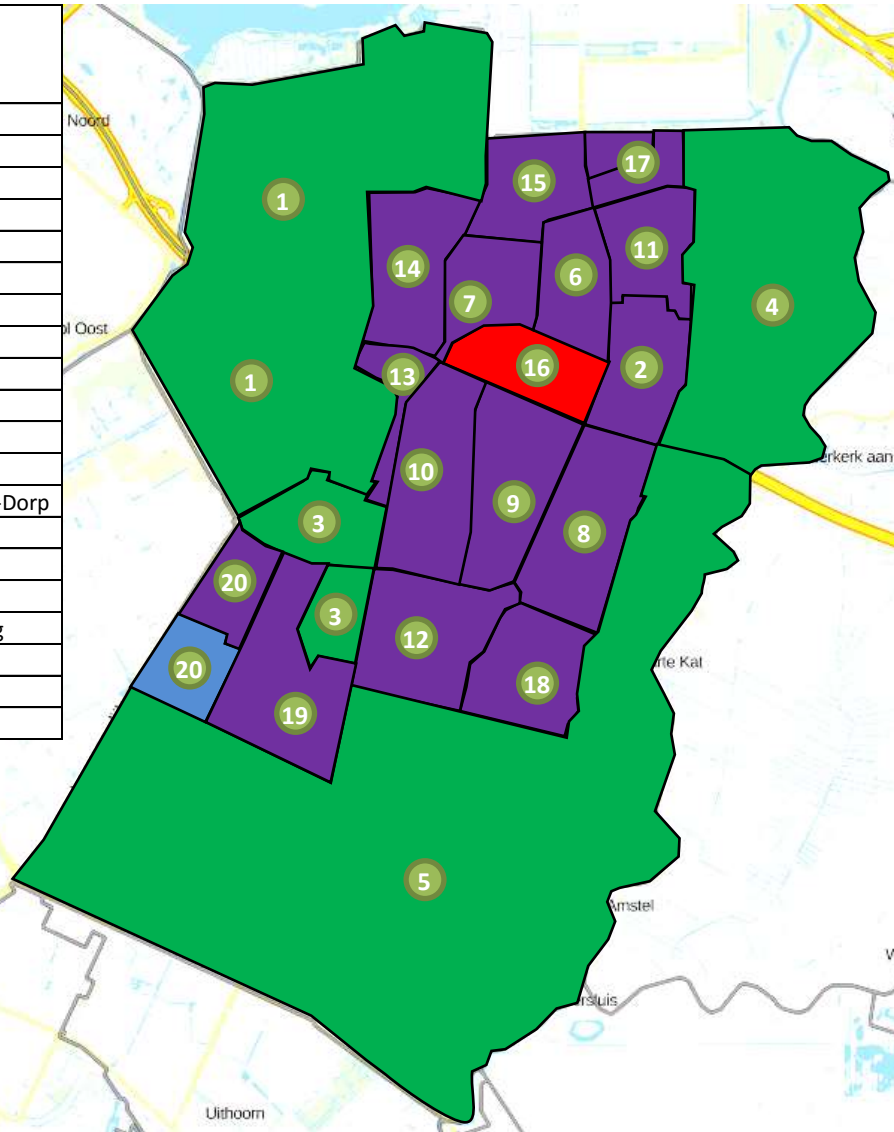
The results: through which glasses?



- Wich level of CO₂ reduction?
- Is natural gas allowed or not?
- Current prices: including VAT, energy taks and subsidies?
- Macroeconomic: excluding VAT, energy taks and subsidies?
- Social costs: Macro + CO₂ tax (50€/ton)
- Futures prices: higher energy taks and CO₂ tax (100€/ton)

Current prices: reasonable CO₂ reduction with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

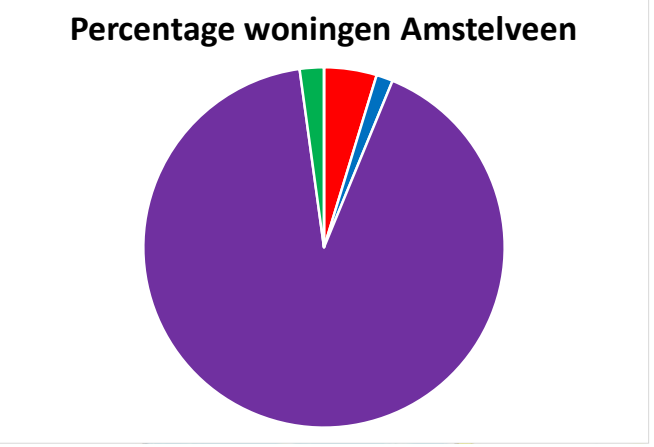
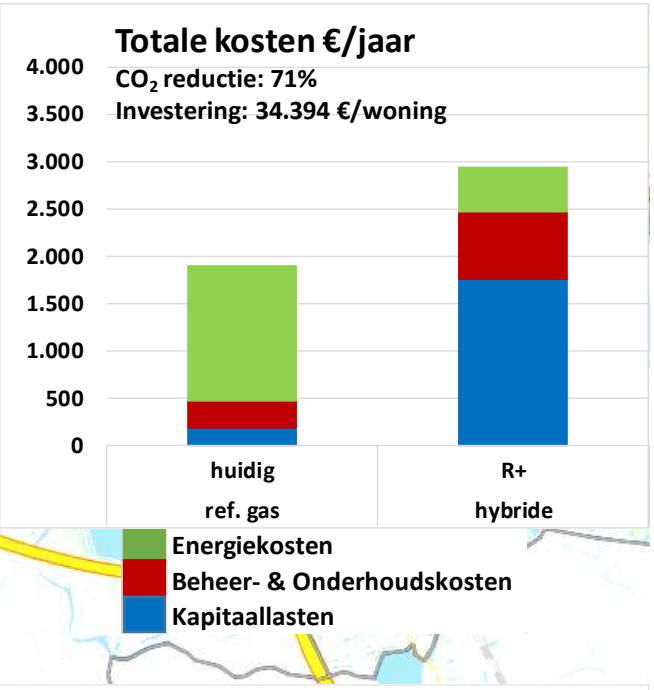
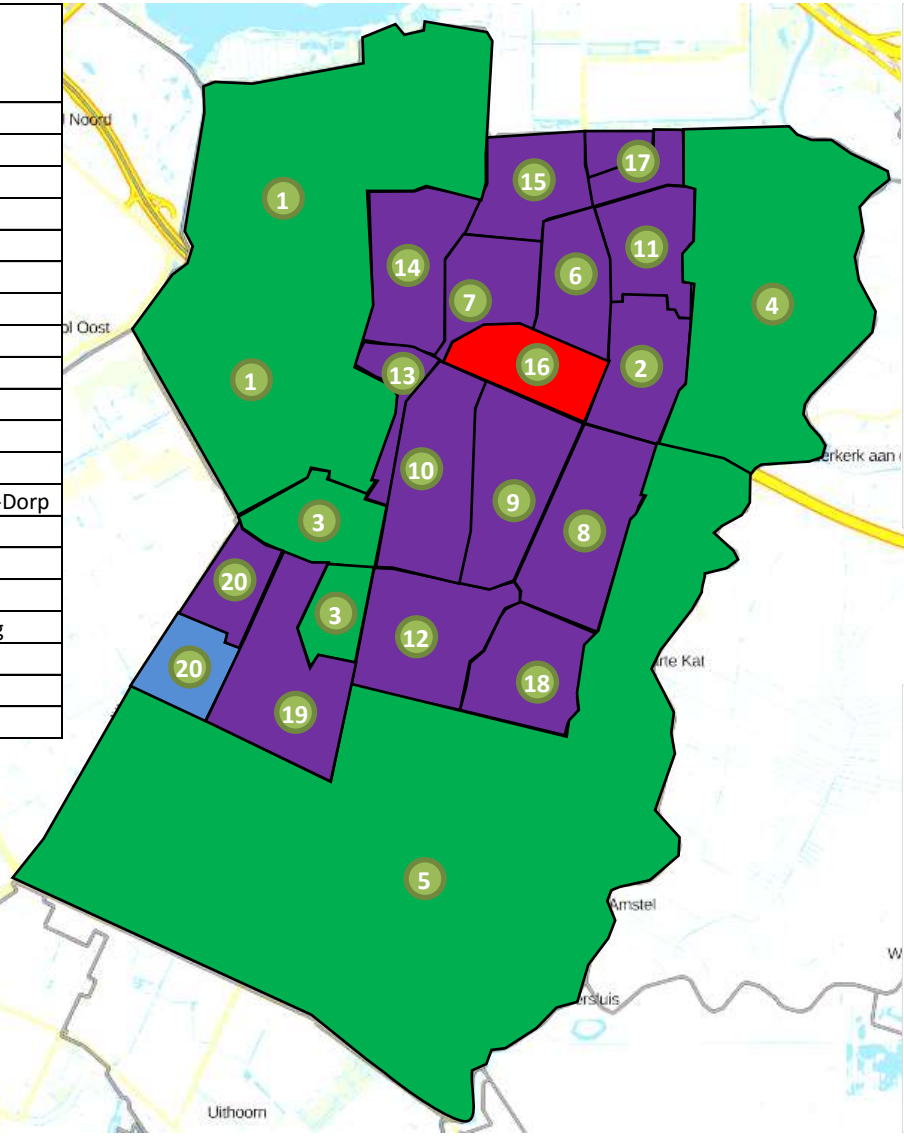


Current prices: high CO₂ reduction with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

N196

- DH (HT)
- All electric
- DH (HT)
Or hybrid
- Hybrid



Current prices: reasonable CO₂ reduction without natural gas

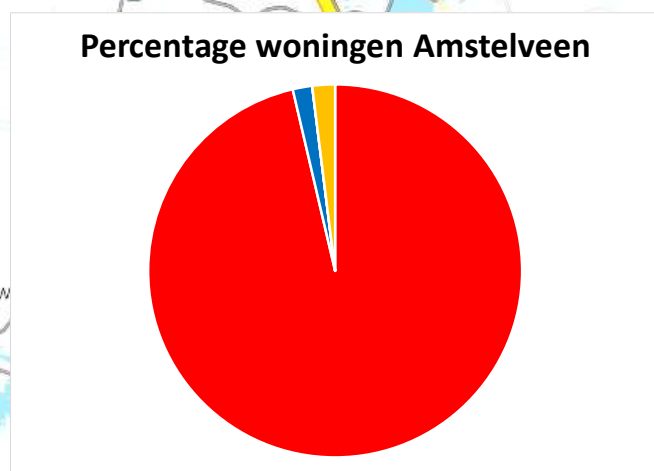
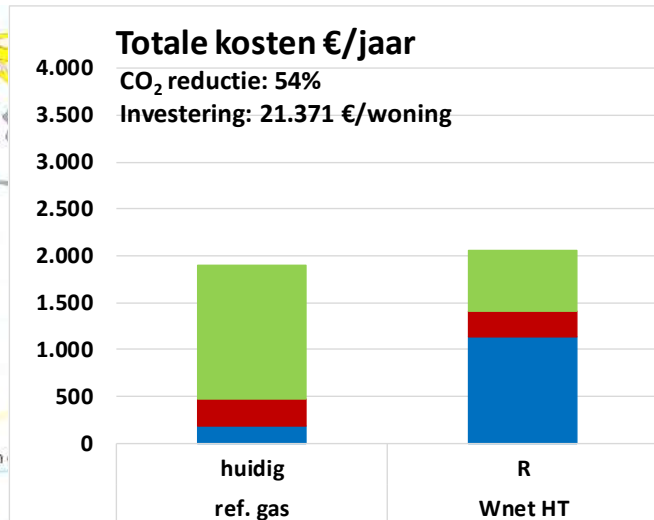
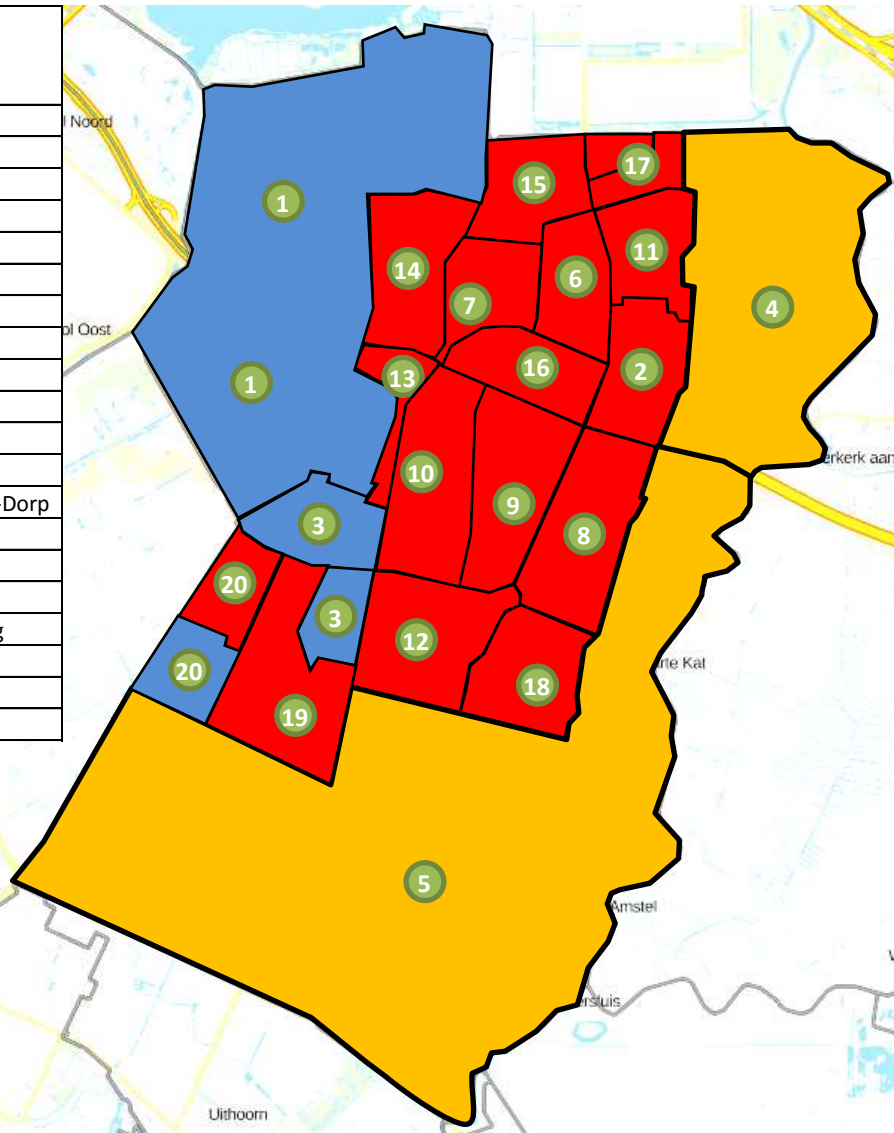
| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

N196

DH (HT)

All electric

DH (HT)
All electric



Current prices: high CO₂ reduction without natural gas

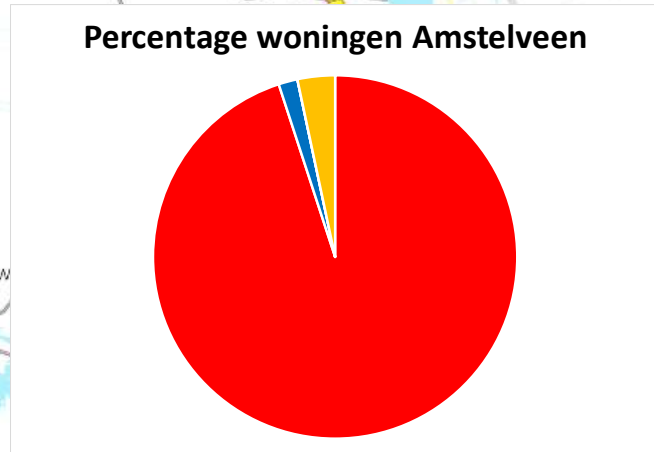
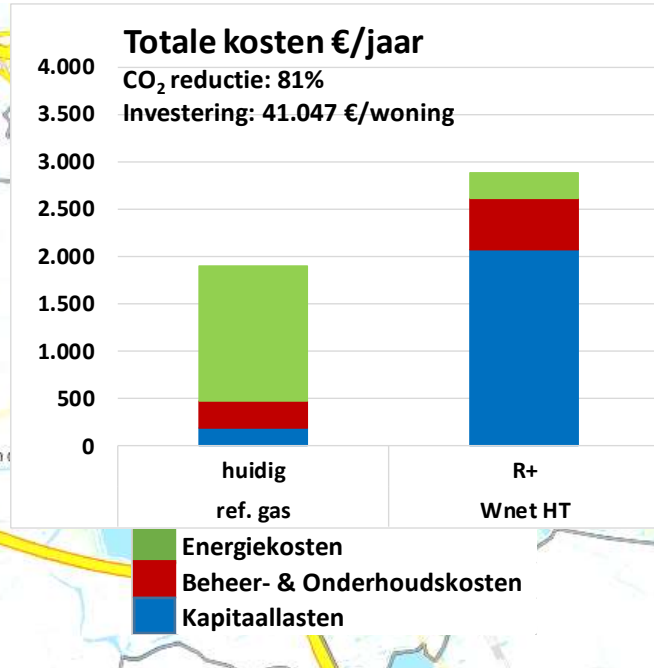
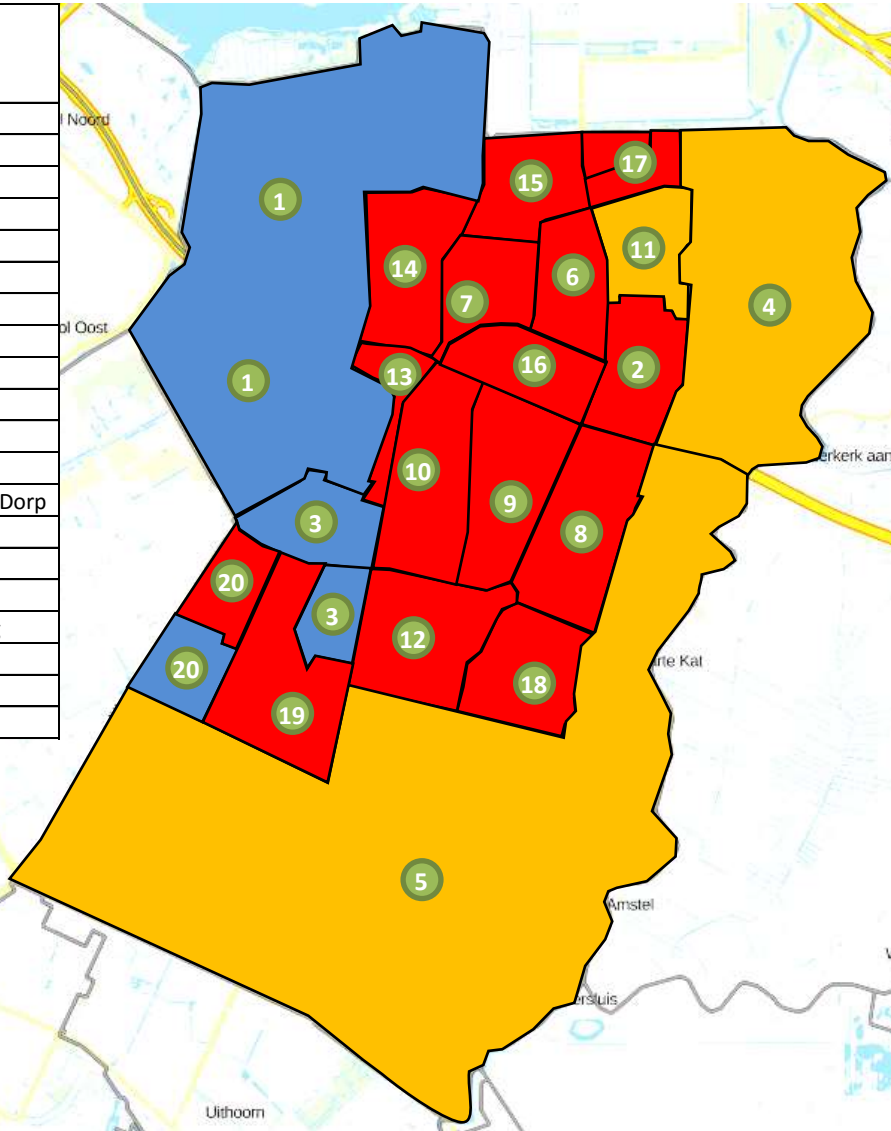
| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

N196

DH (HT)

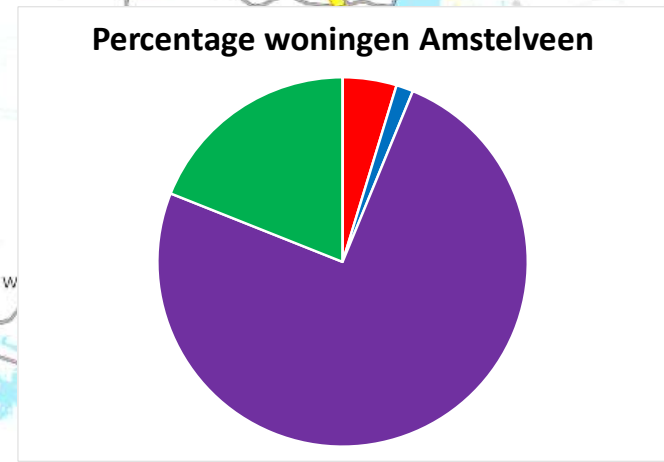
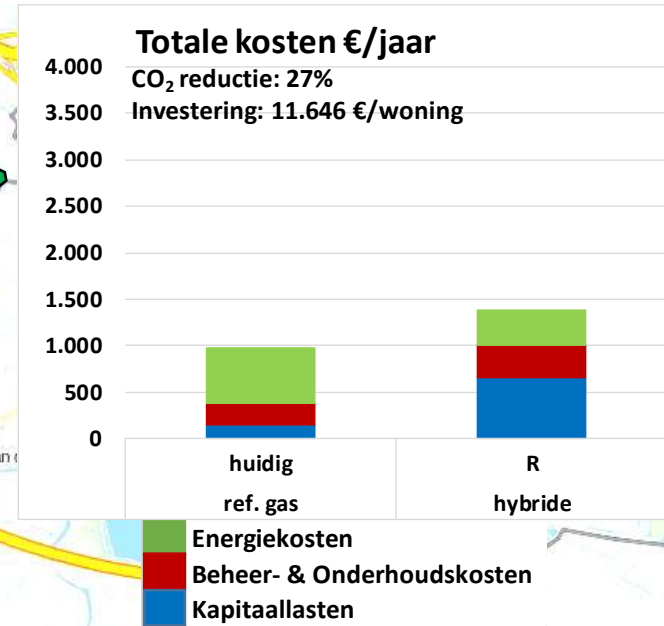
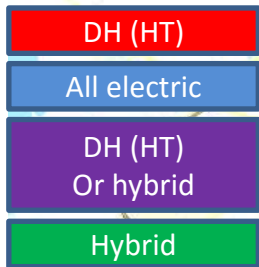
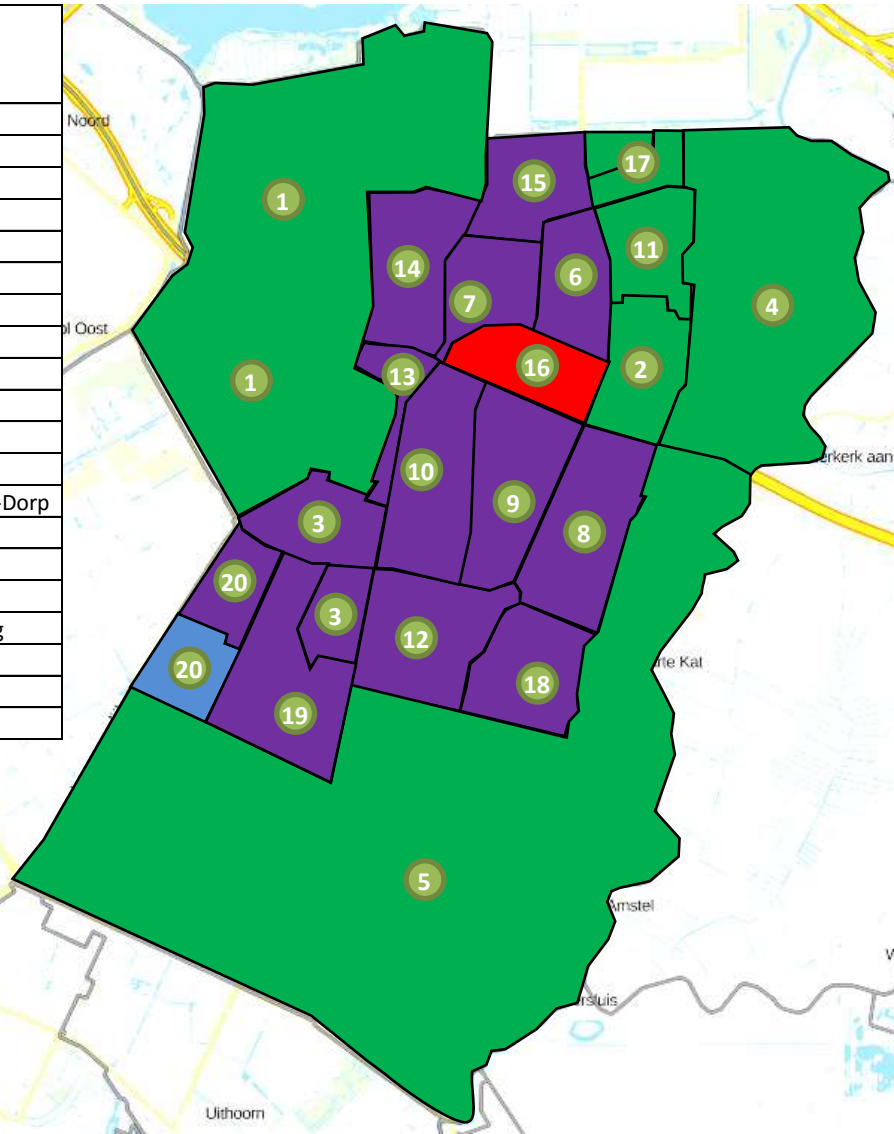
All electric

DH (HT)
All electric



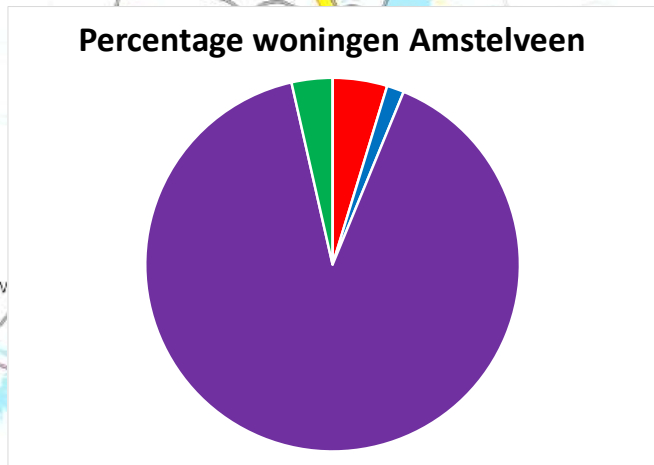
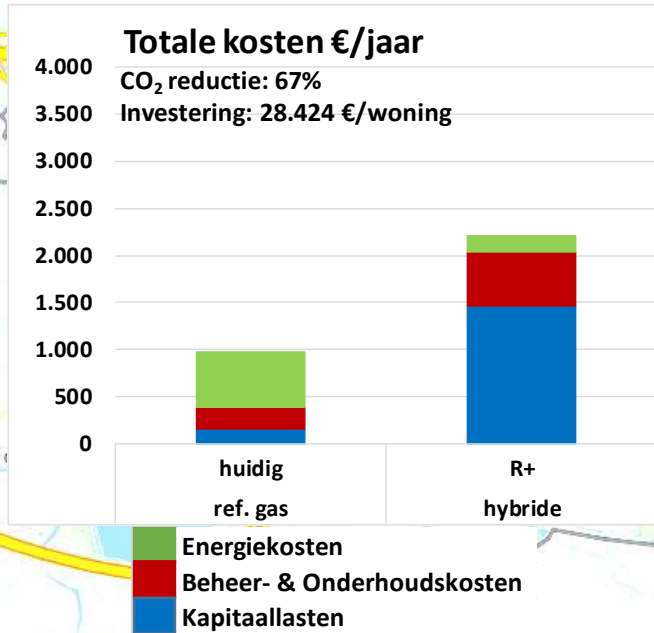
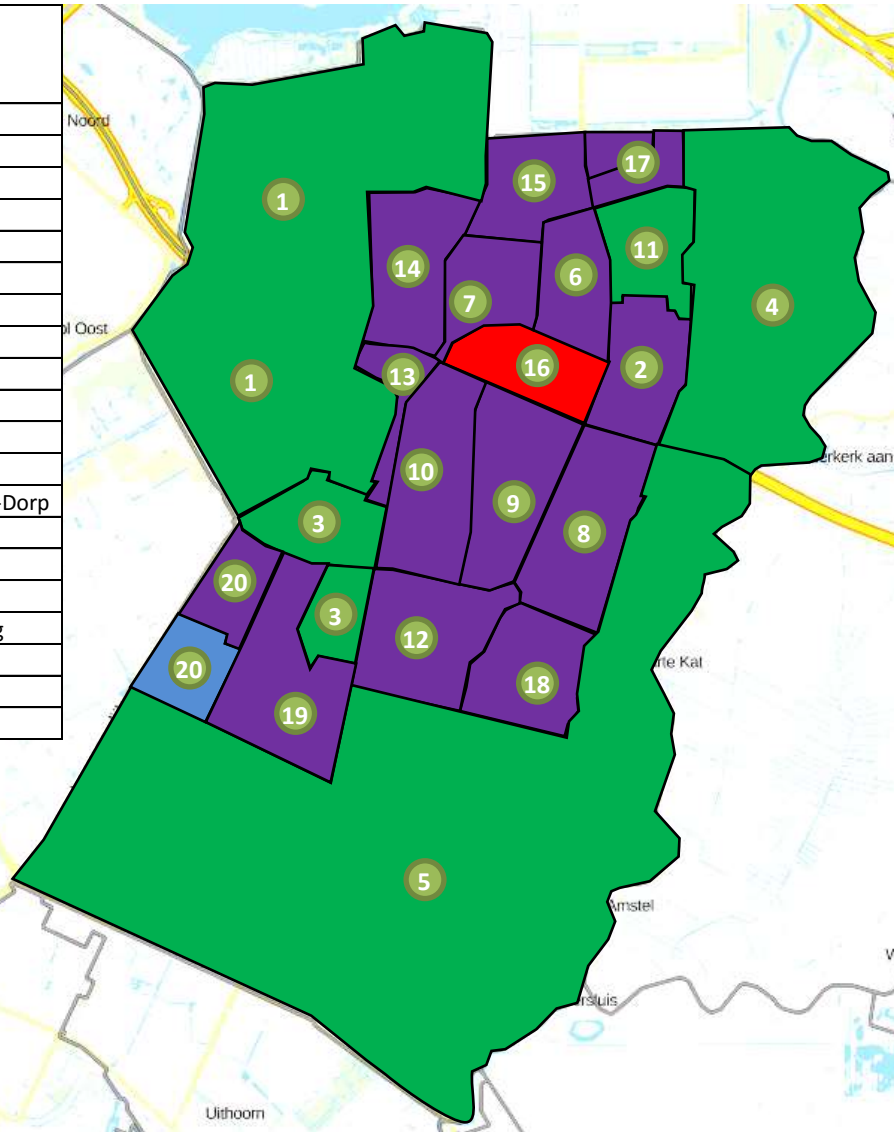
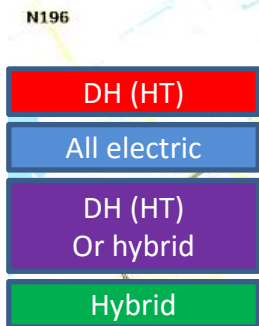
Macro: reasonable CO₂ reduction with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |



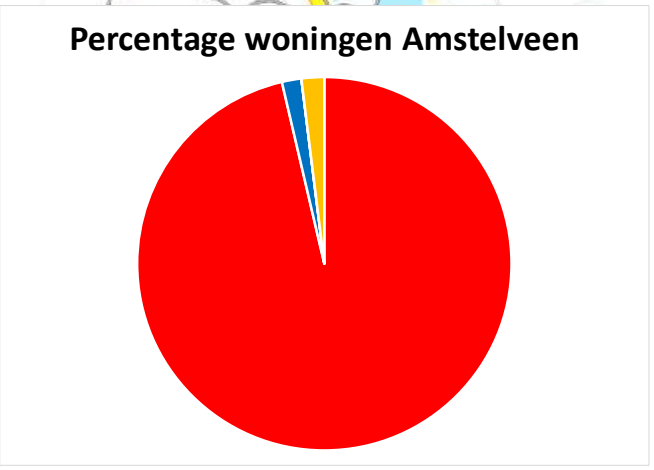
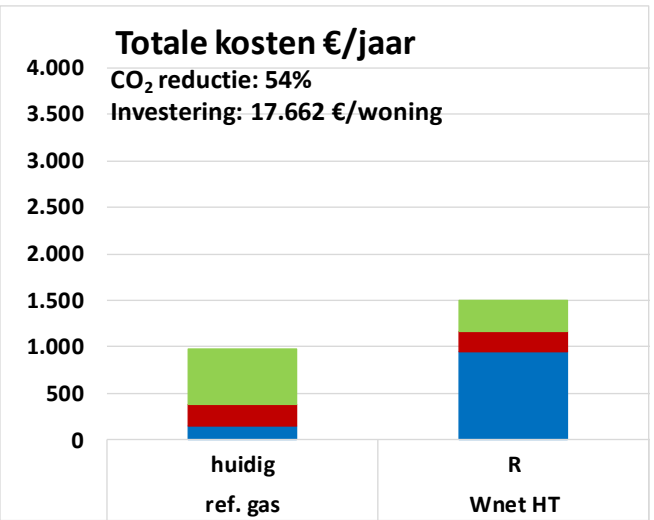
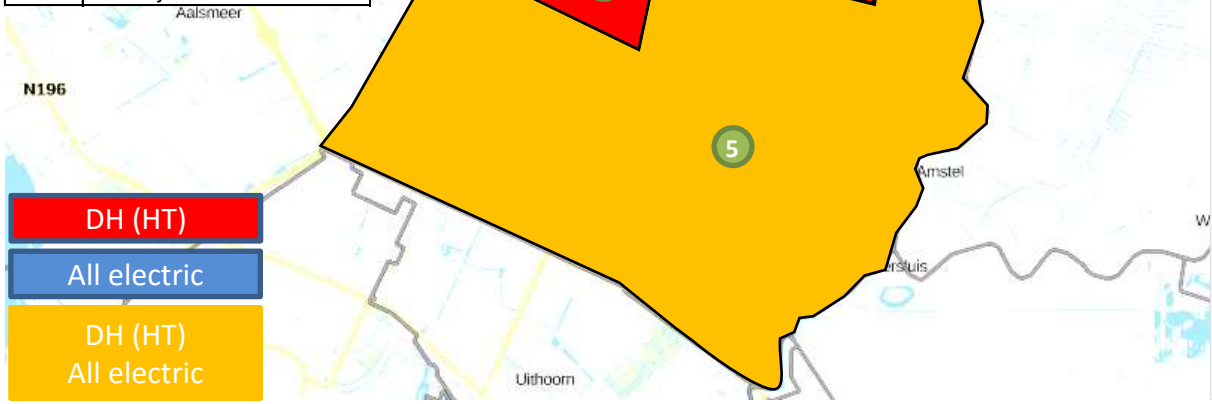
Macro: high CO₂ reduction with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |



Macro: reasonable CO₂ reduction without natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |



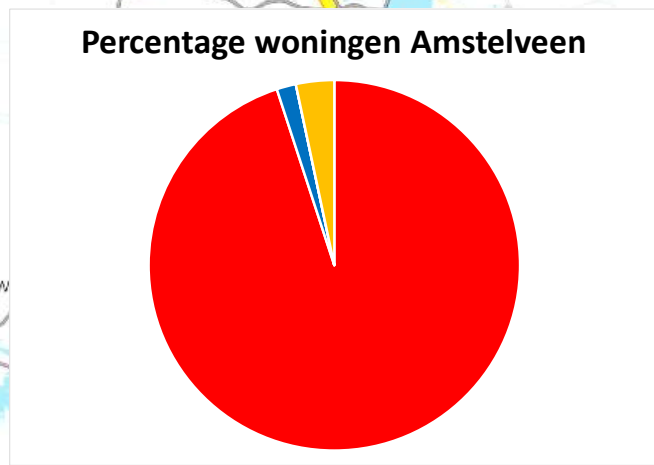
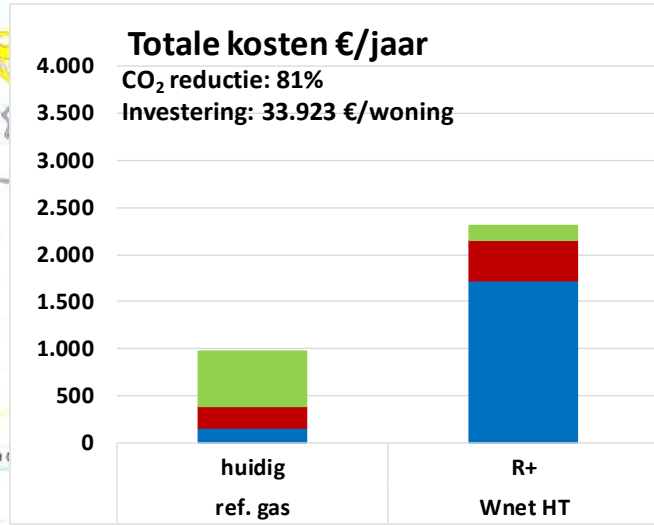
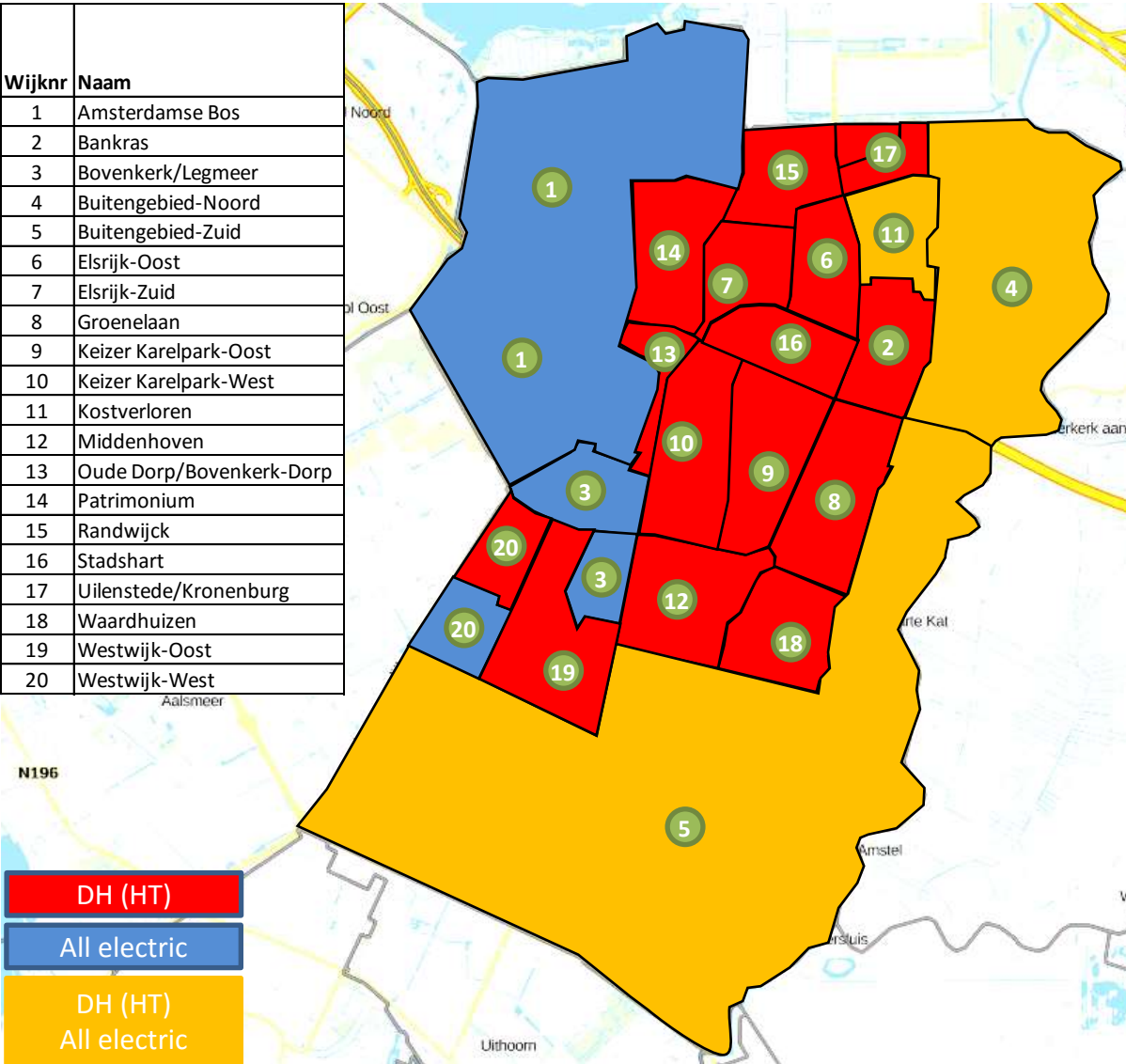
Macro: high CO₂ reduction without natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

DH (HT)

All electric

DH (HT)
All electric

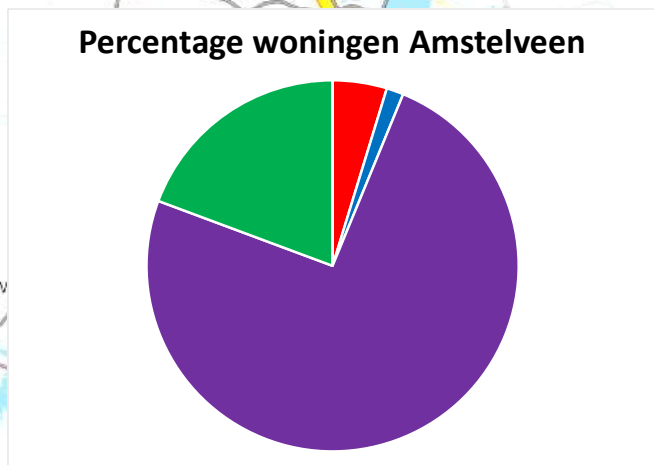
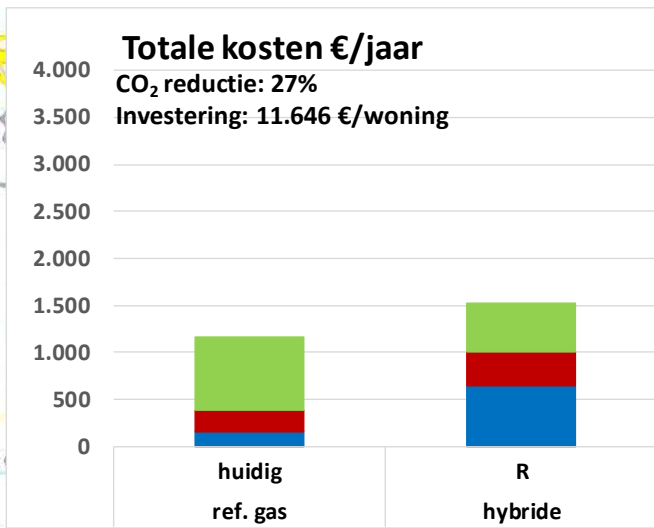
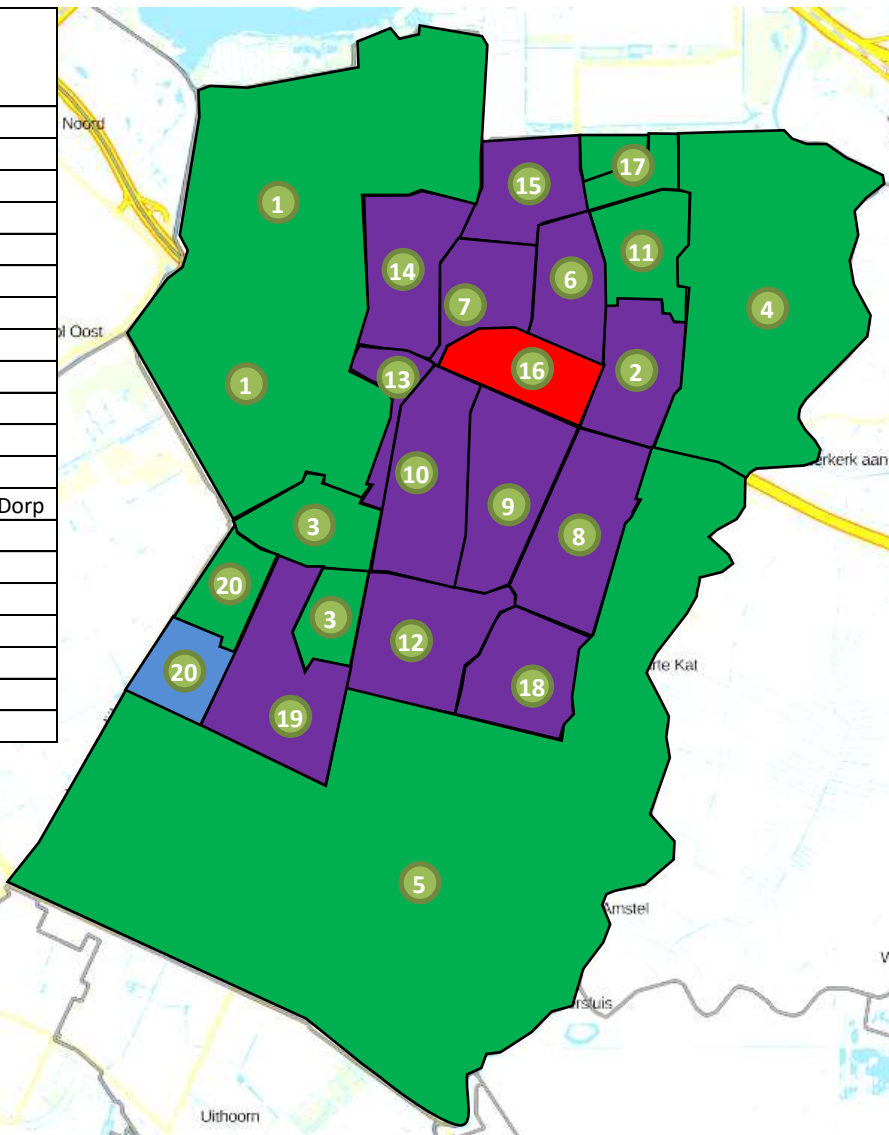


Social costs: reasonable CO₂ reduction with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

N196

- DH (HT)
- All electric
- DH (HT) or Hybrid
- Hybrid

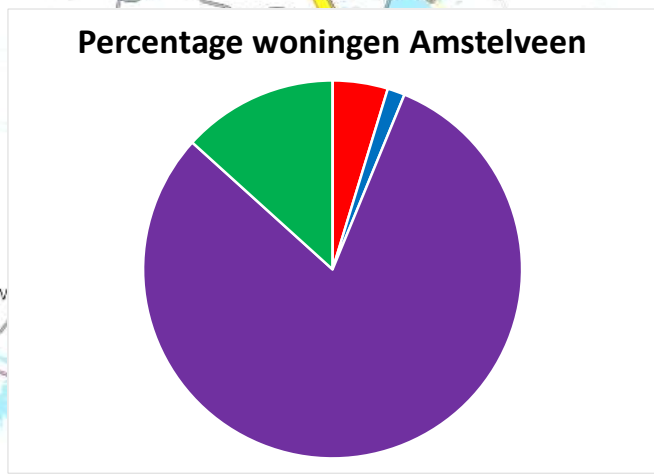
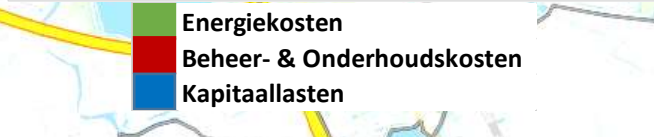
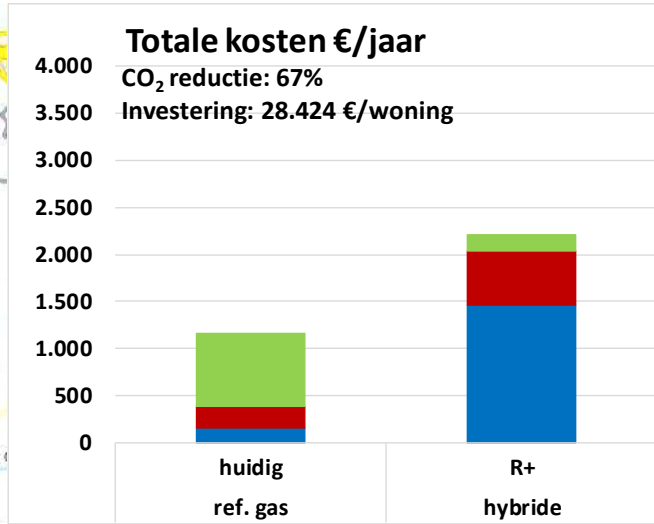
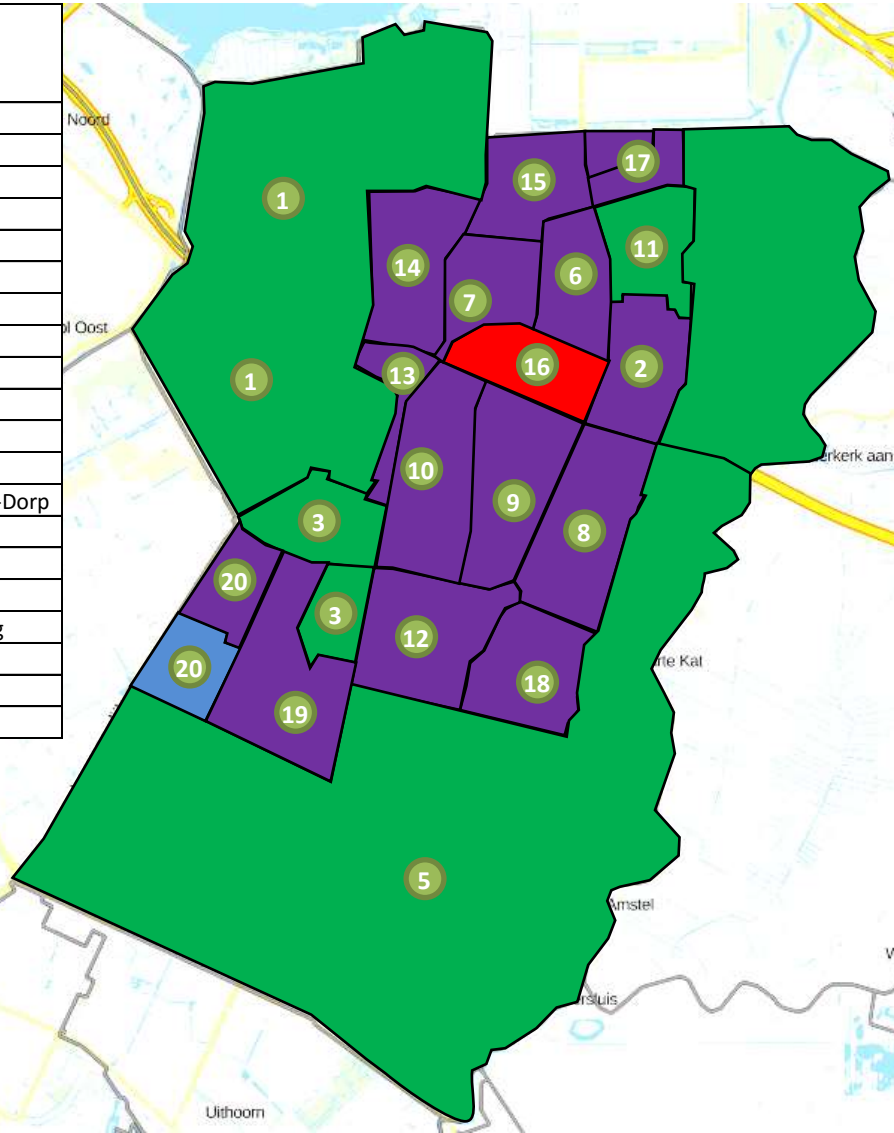


Social costs : high CO₂ reduction with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

N196

- DH (HT)
- All electric
- DH (HT) or Hybrid
- Hybrid



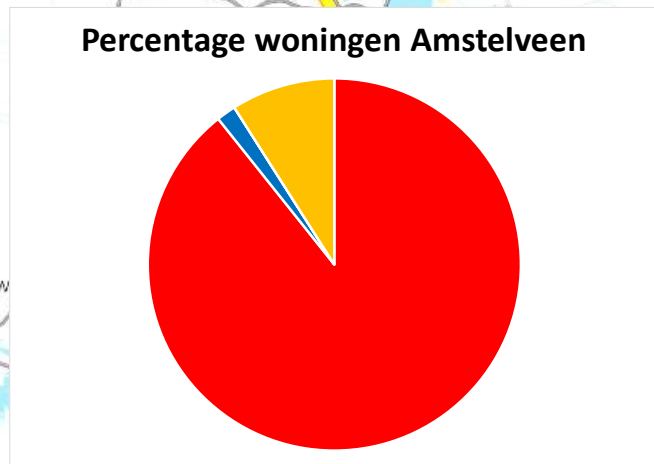
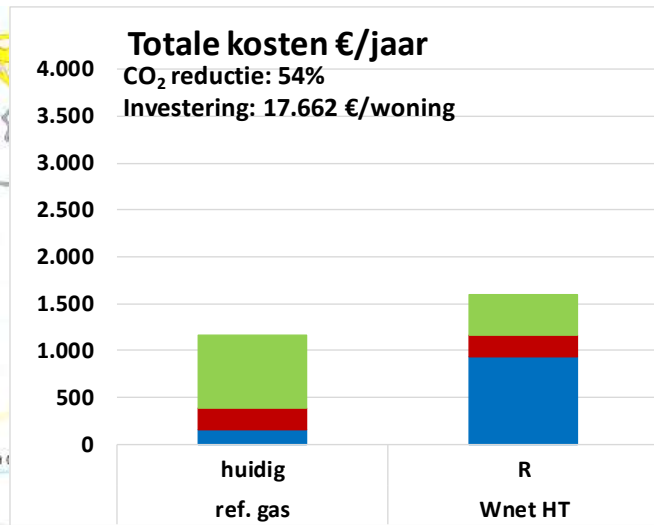
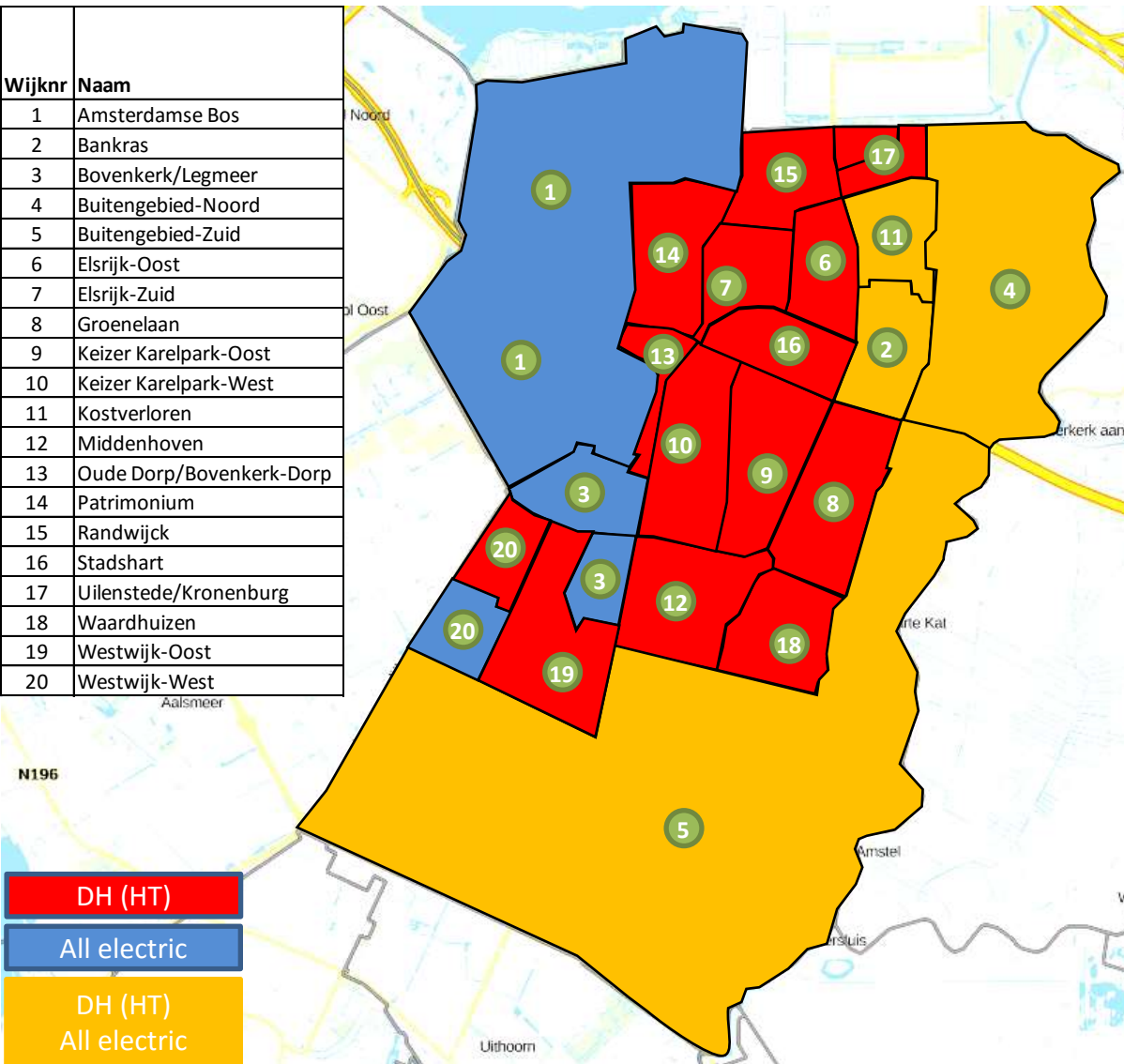
Social costs : reasonable CO₂ reduction without natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

DH (HT)

All electric

DH (HT)
All electric



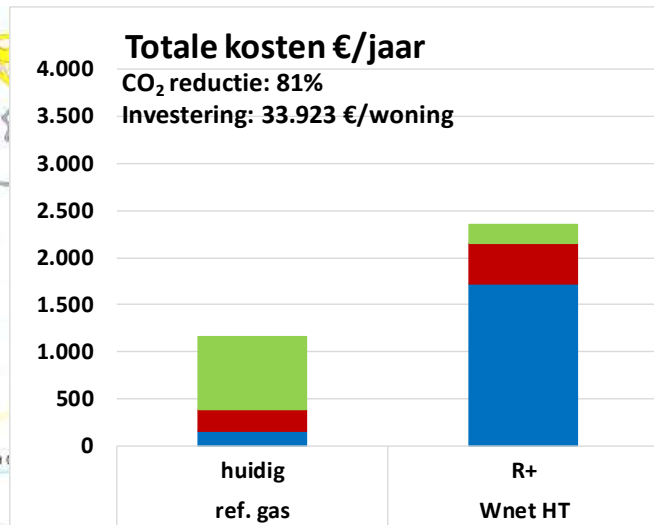
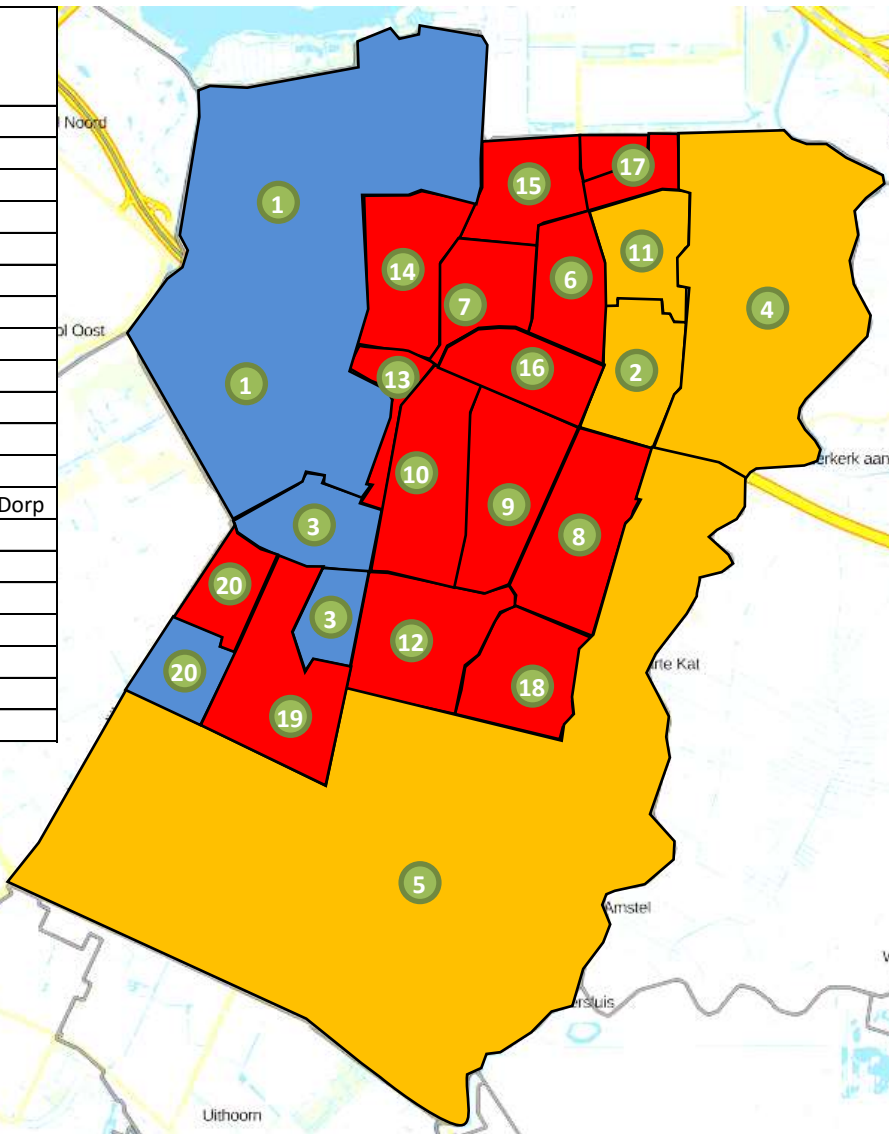
Social costs: high CO₂ reduction without natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

DH (HT)

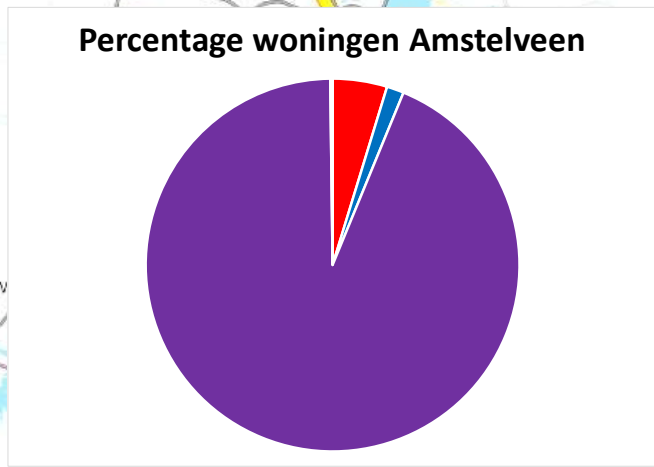
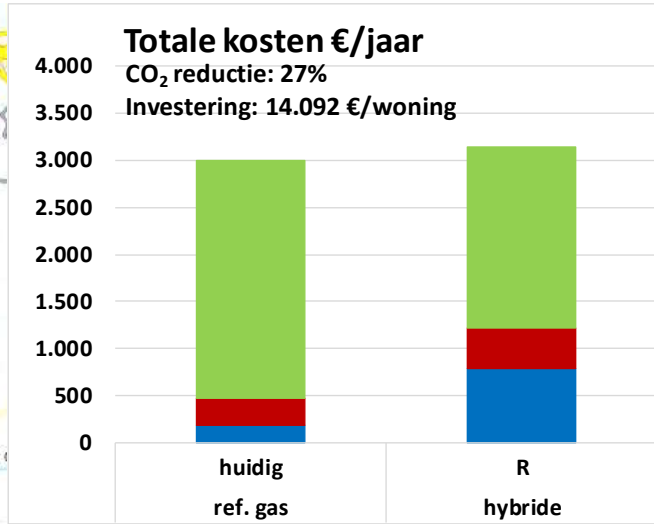
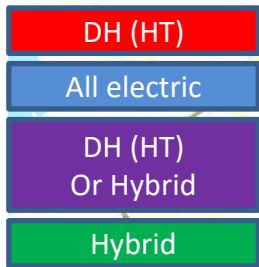
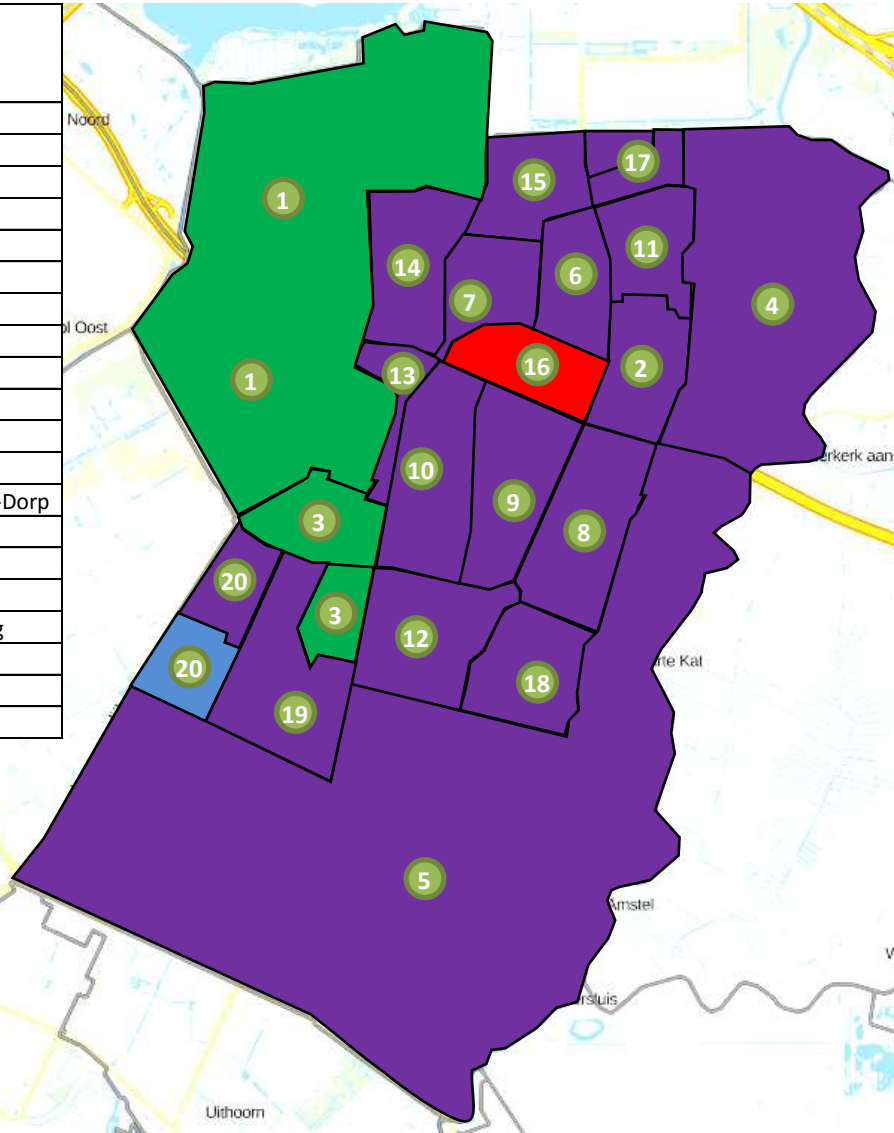
All electric

DH (HT)
All electric



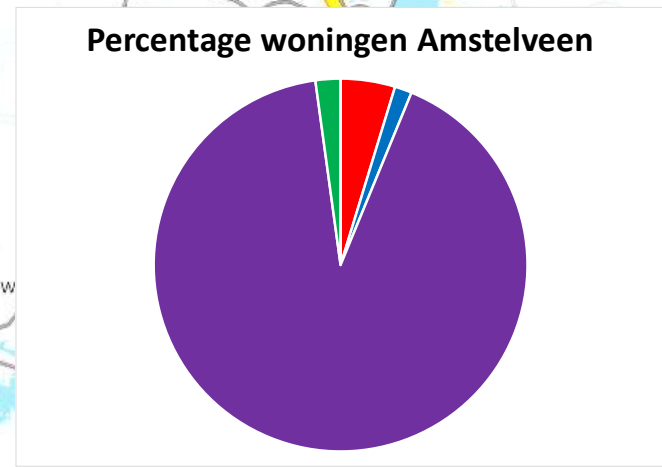
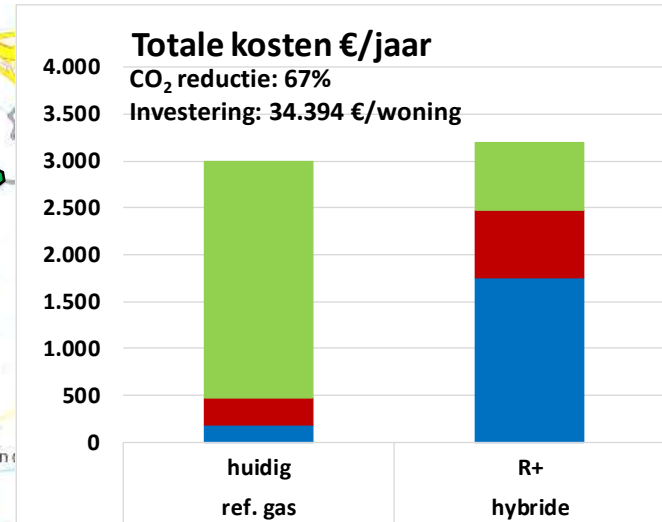
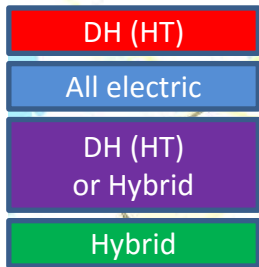
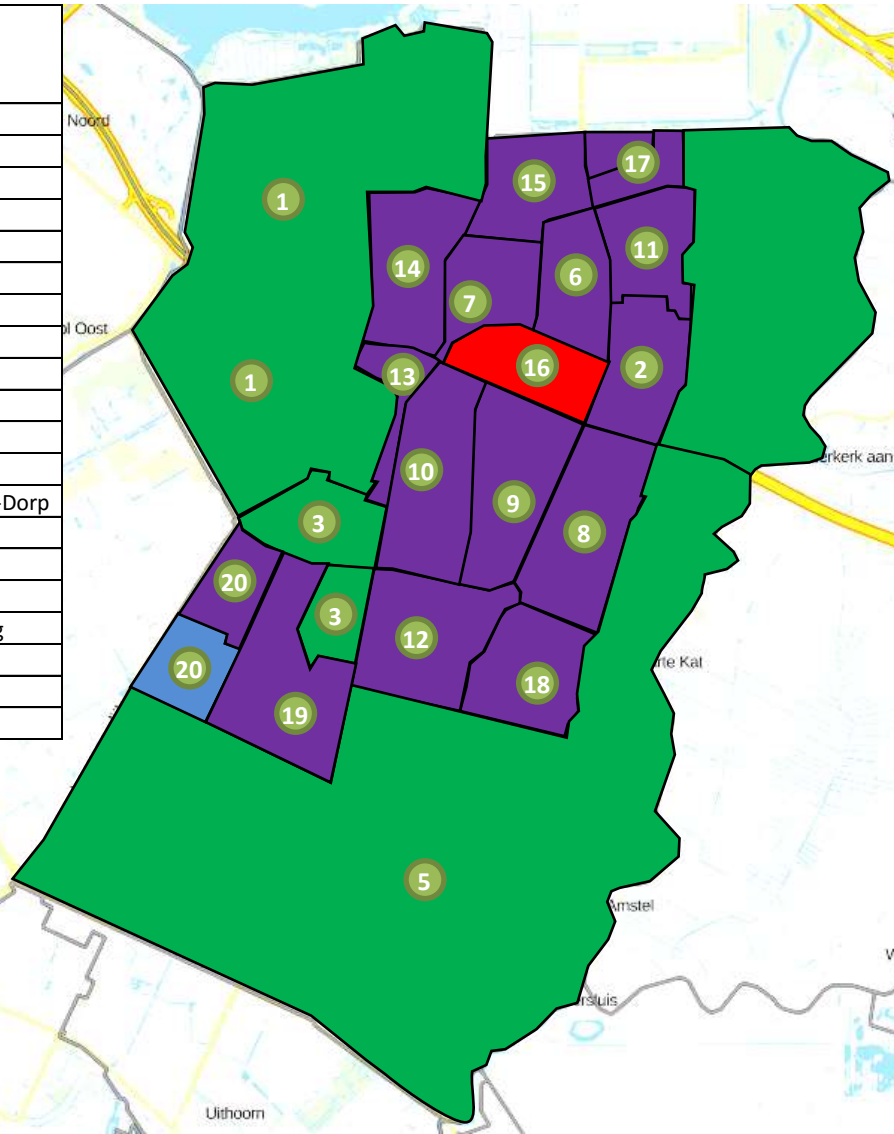
Double energy taxes: reasonable CO₂ reduction with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |



Double energy taxes : high CO₂ reductions with natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |



Double energy taxes : reasonable CO₂ reductions without natural gas

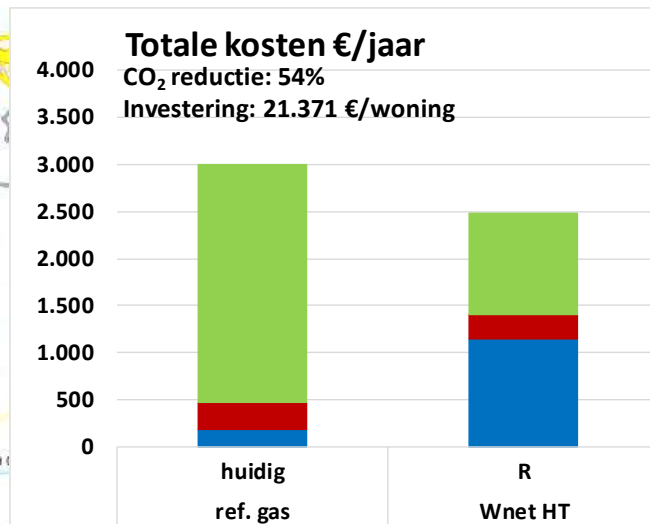
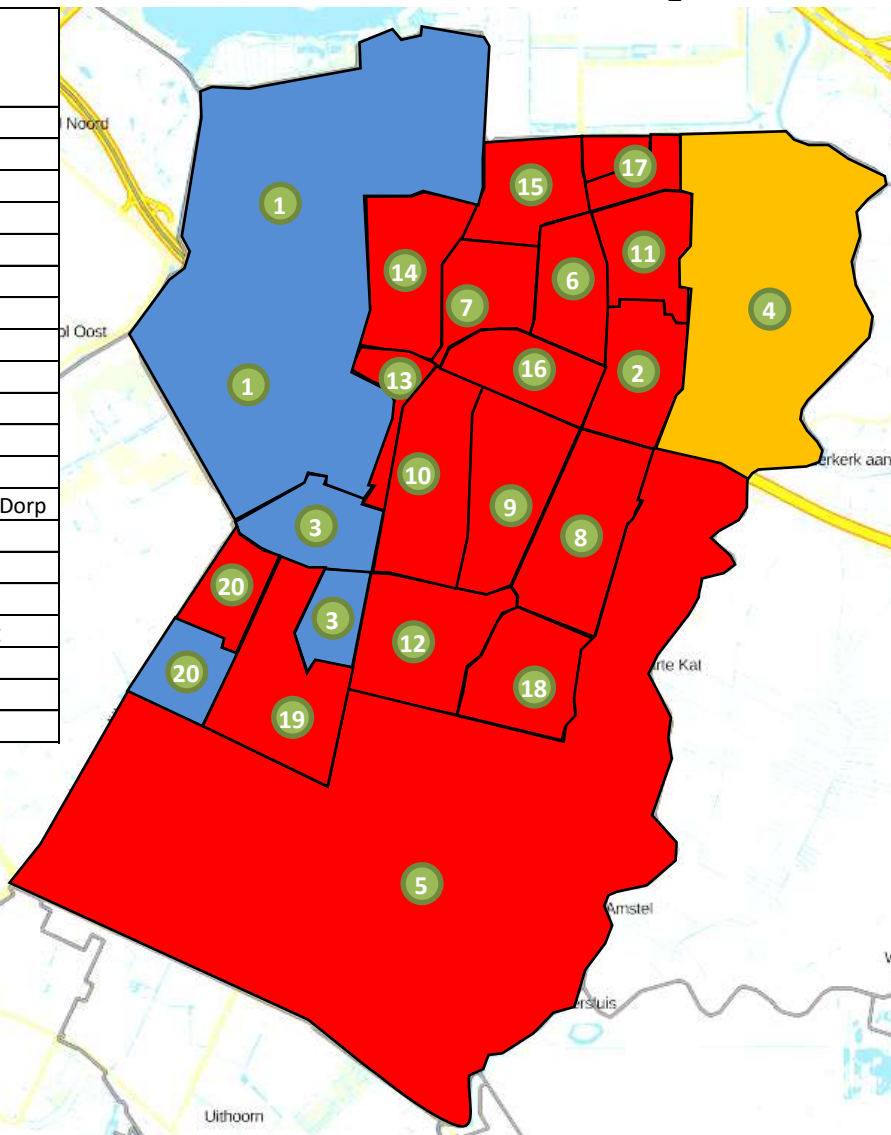
| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

N196

DH (HT)

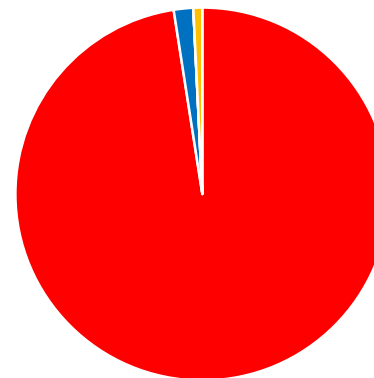
All electric

DH (HT)
All electric



■ Energiekosten
■ Beheer- & Onderhoudskosten
■ Kapitaallasten

Percentage woningen Amstelveen

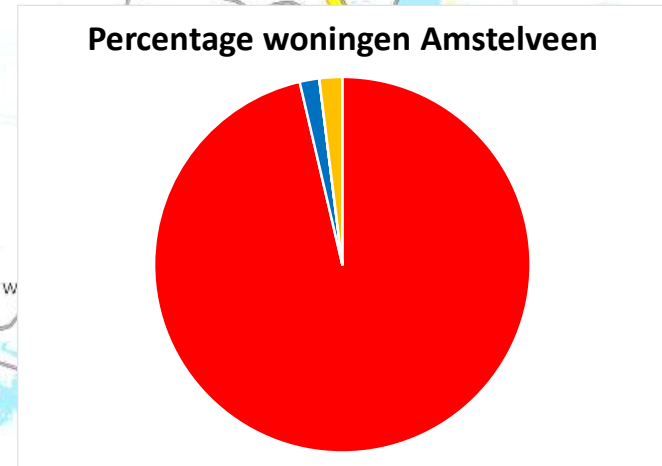
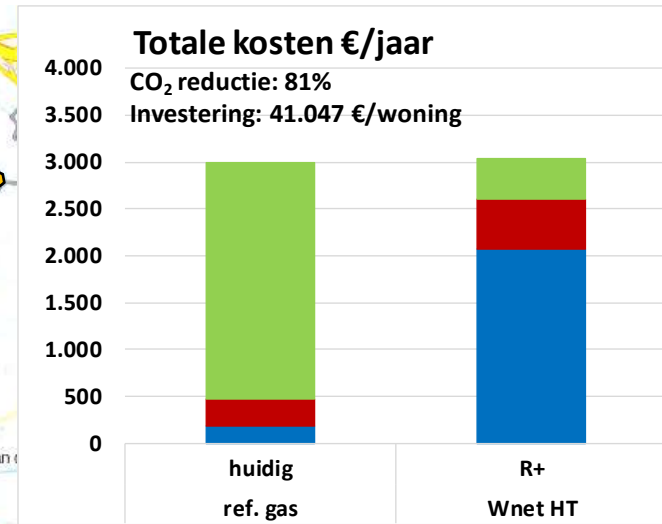
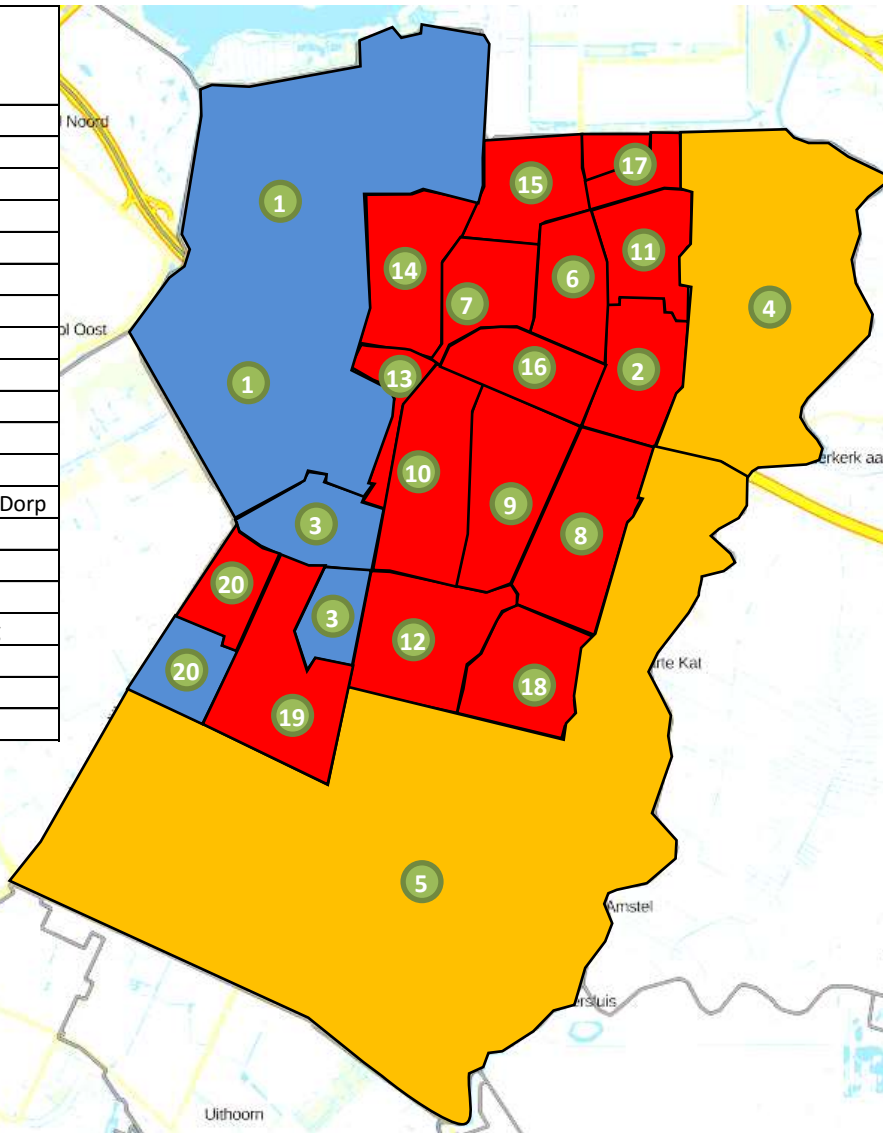


Double energy taxes : high CO₂ reduction without natural gas

| Wijknr | Naam |
|--------|--------------------------|
| 1 | Amsterdamse Bos |
| 2 | Bankras |
| 3 | Bovenkerk/Legmeer |
| 4 | Buitengebied-Noord |
| 5 | Buitengebied-Zuid |
| 6 | Elsrijk-Oost |
| 7 | Elsrijk-Zuid |
| 8 | Groenelaan |
| 9 | Keizer Karelpark-Oost |
| 10 | Keizer Karelpark-West |
| 11 | Kostverloren |
| 12 | Middenhoven |
| 13 | Oude Dorp/Bovenkerk-Dorp |
| 14 | Patrimonium |
| 15 | Randwijck |
| 16 | Stadshart |
| 17 | Uilenstede/Kronenburg |
| 18 | Waardhuizen |
| 19 | Westwijk-Oost |
| 20 | Westwijk-West |

N196

| |
|-------------------------|
| DH (HT) |
| All electric |
| DH (HT) All electric |



Flexibility

