

# The Green Injection

- into the existing gas grid of Endinet or GTS -

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## Agenda

- Definitions
- Study assigned by Agentschap NL
- Introduction
- Endinet and Green Gas
- Green Gas Injection
- Potential natural gas replacement
- Demand versus production
- Technical solutions
- Grid investment costs
- Conclusions
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## Definitions

**Biogas** = gas produced by digestion of biomass, Synthetic Natural Gas or landfill gas

**Green Gas** = upgraded biogas that meets the properties of natural gas quality and can be injected into the existing gas grid

**Distribution grid** = grid operated by the regional grid operators

**Transmission grid** = grid operated by the national grid operator

## Study assigned by Agentschap NL

“Green Gas Injection into the Natural Gas Grid – Scenario Development”

- Possibilities and grid investment costs of Green Gas Injection into:
  - 8 bar distribution grid of Endinet
  - 40 bar transmission grid of GTS
- Study performed by



## Introduction

Endinet is grid operator of the region Eindhoven and Oost-Brabant

### Number of connections

- Electricity: 107.000
- Gas: 385.000



## Endinet and Green Gas

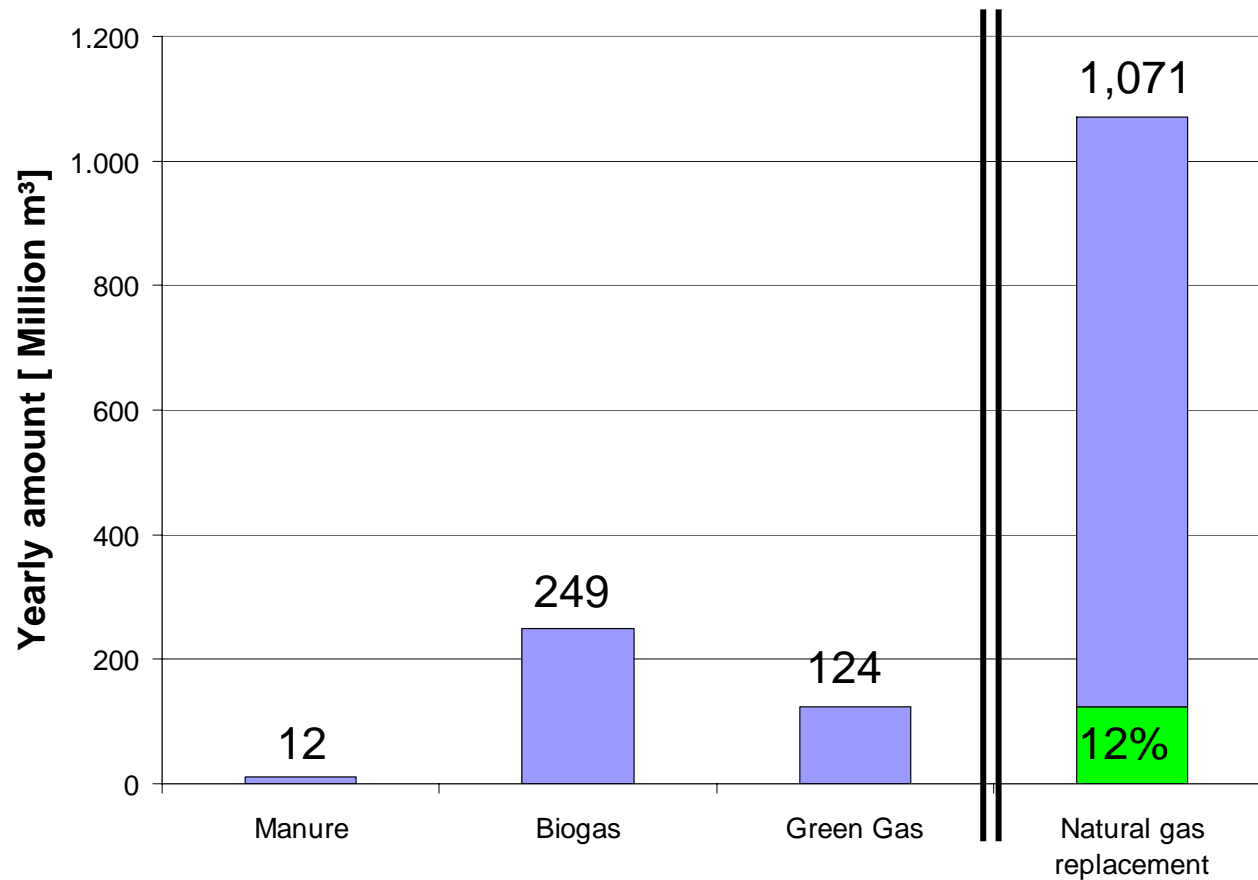
- Landfill gas injection (Nuenen, 1990)
- Several new initiatives
- Endinet's vision:
  - Long term perspective
  - Facilitate injection
  - Number of pilot projects
  - Controlled expansion
  - Conform current corporate values:
    - Safety
    - Security of supply
    - Cost effective



## Green Gas Injection

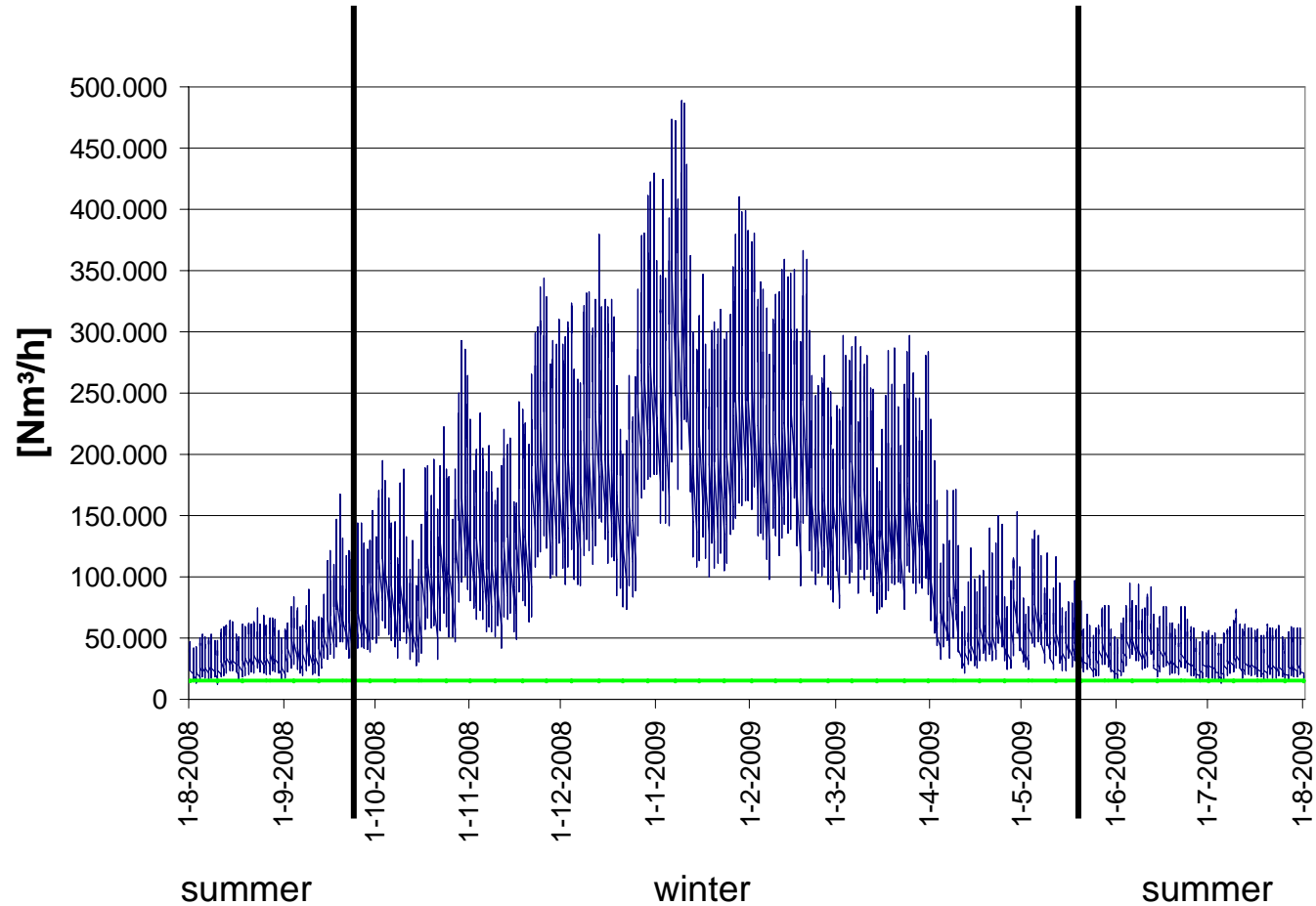
- Green Gas can be injected into the existing natural gas grid
- Preconditions injection:
  - Quality must be equal to natural gas
  - Sufficient capacity current grid
  - According to current pressure ranges

# Potential replacement of natural gas in the Endinet region

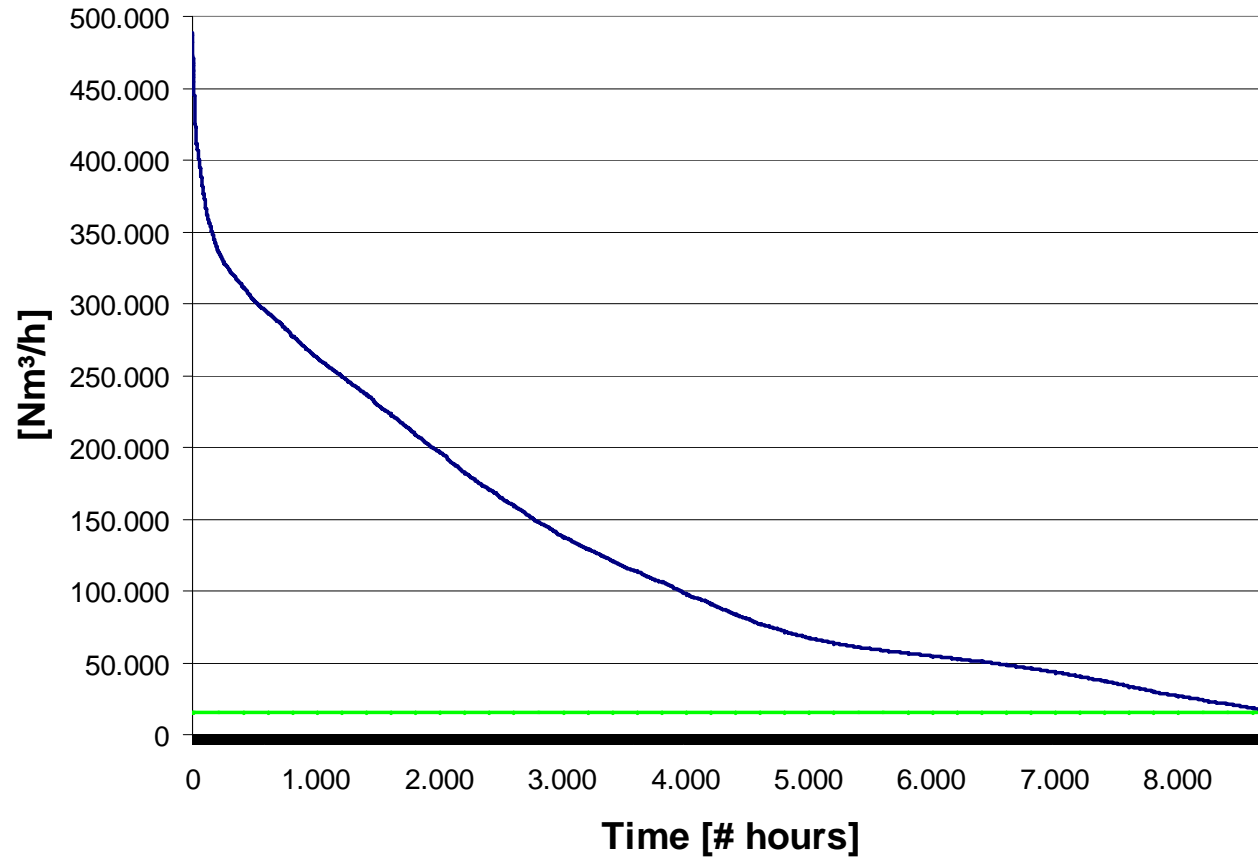




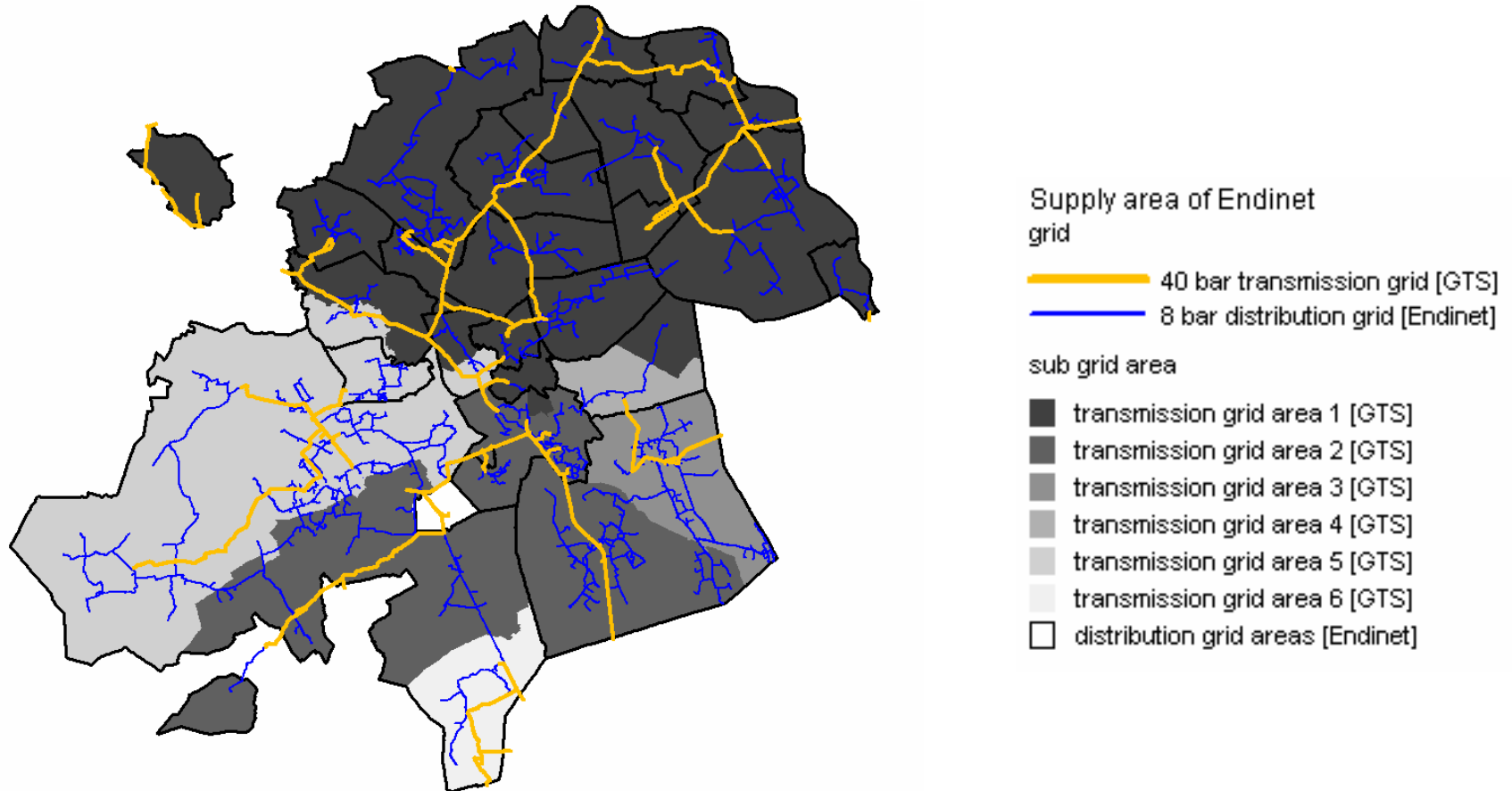
# Gas demand profile total distribution grid of Endinet



# Duration curve total distribution grid area of Endinet



# Gas infrastructure

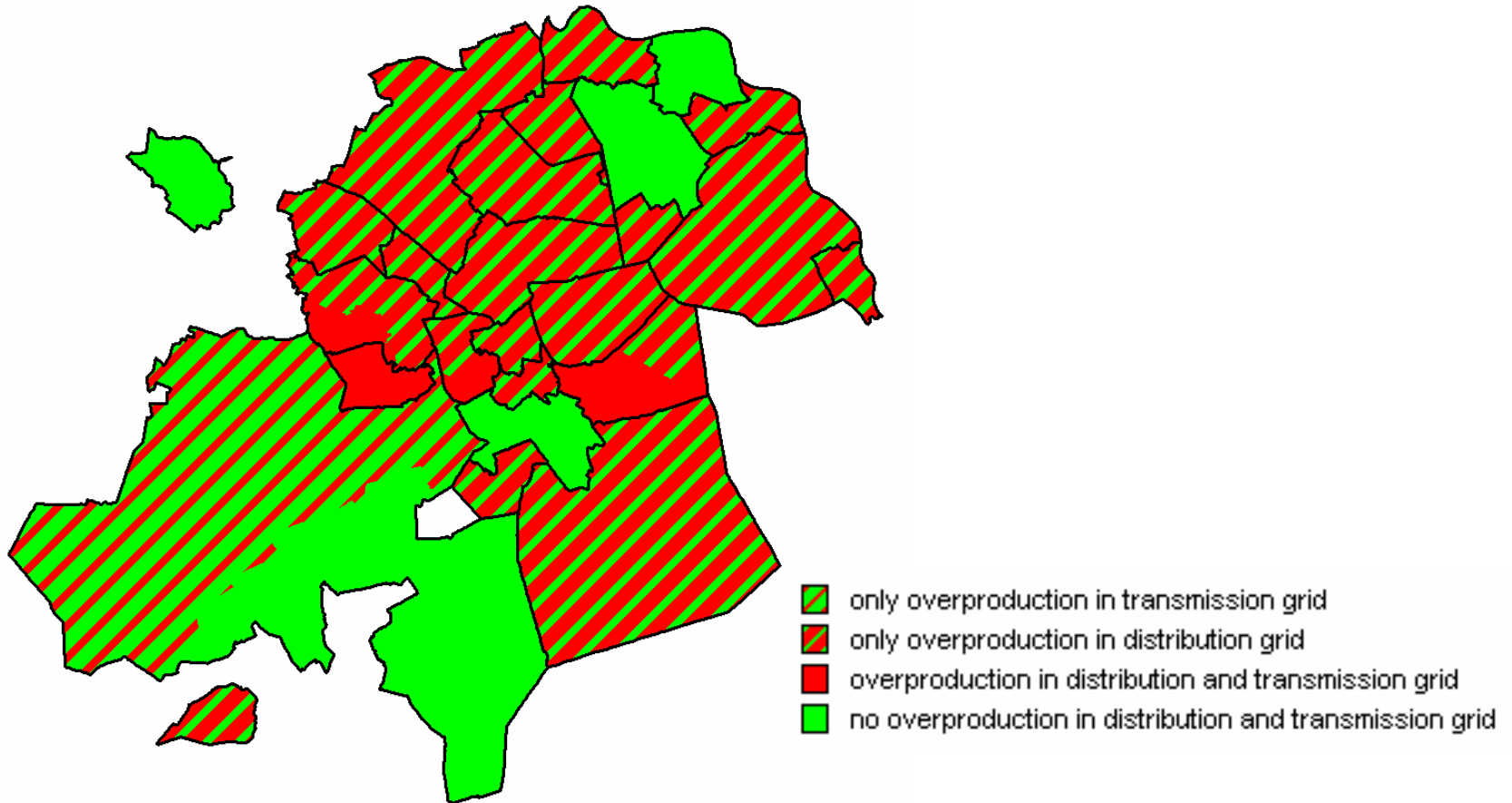


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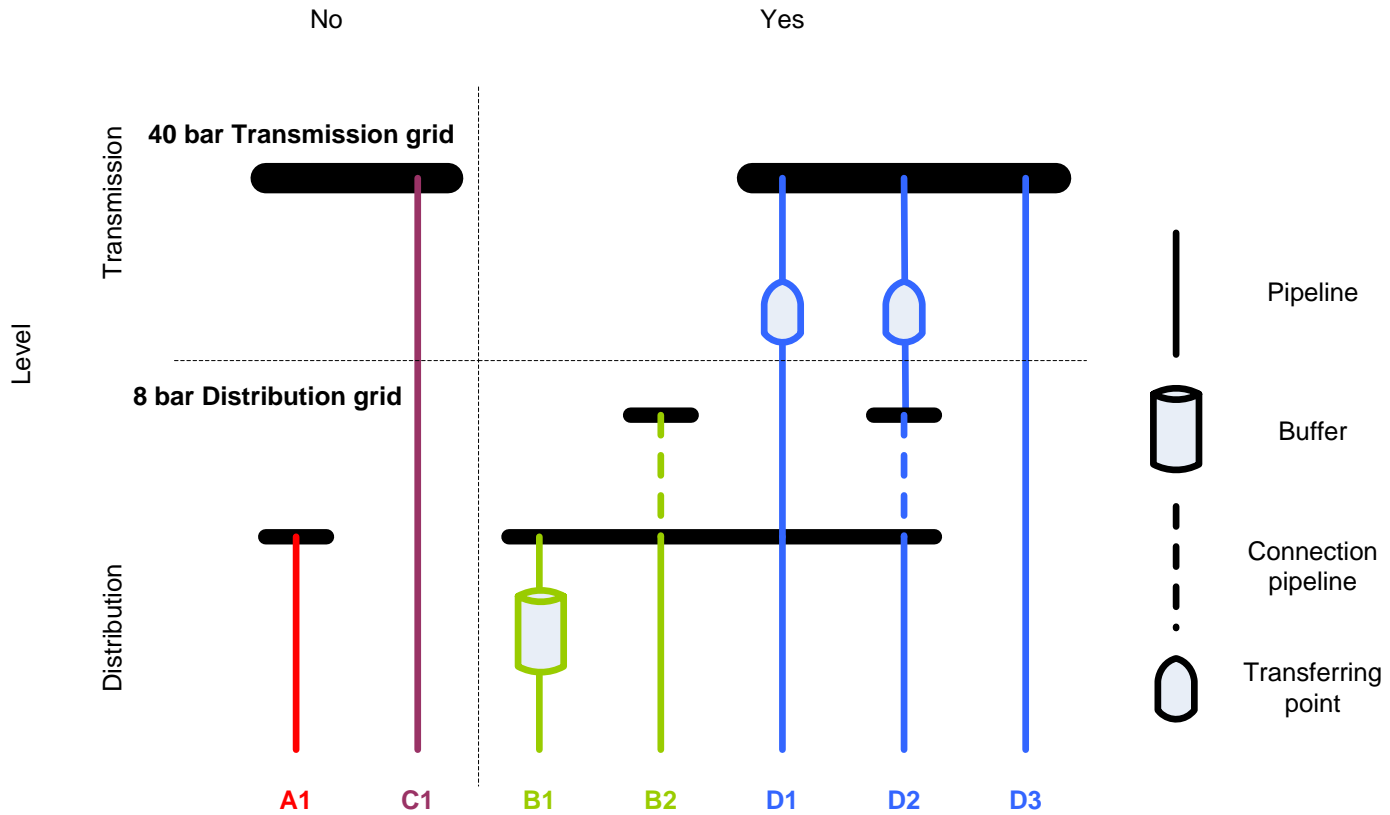
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# Overproduction in supply area of Endinet

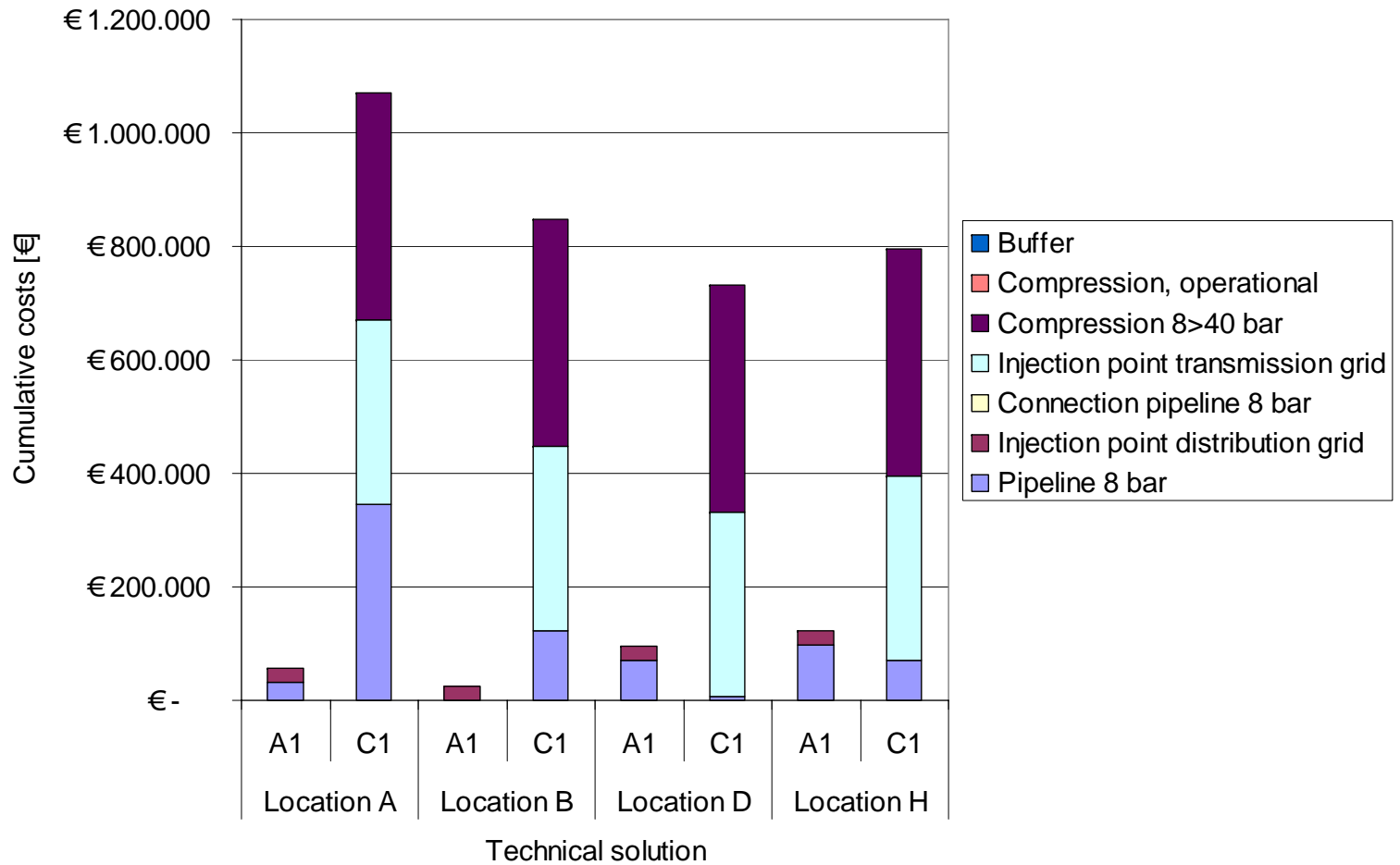


# Technical solutions

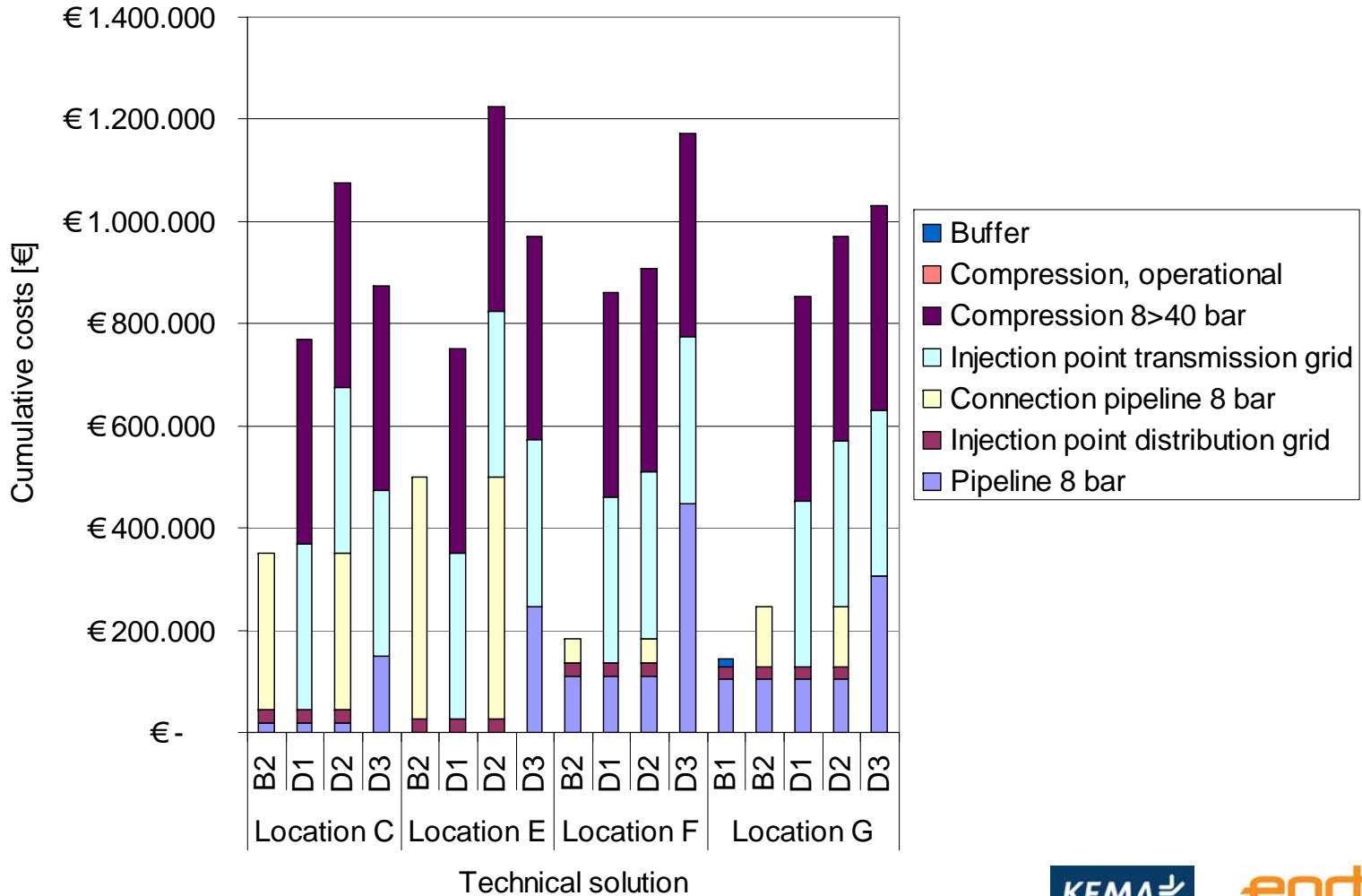
Overproduction on distribution level



# Grid investment costs - individual solutions

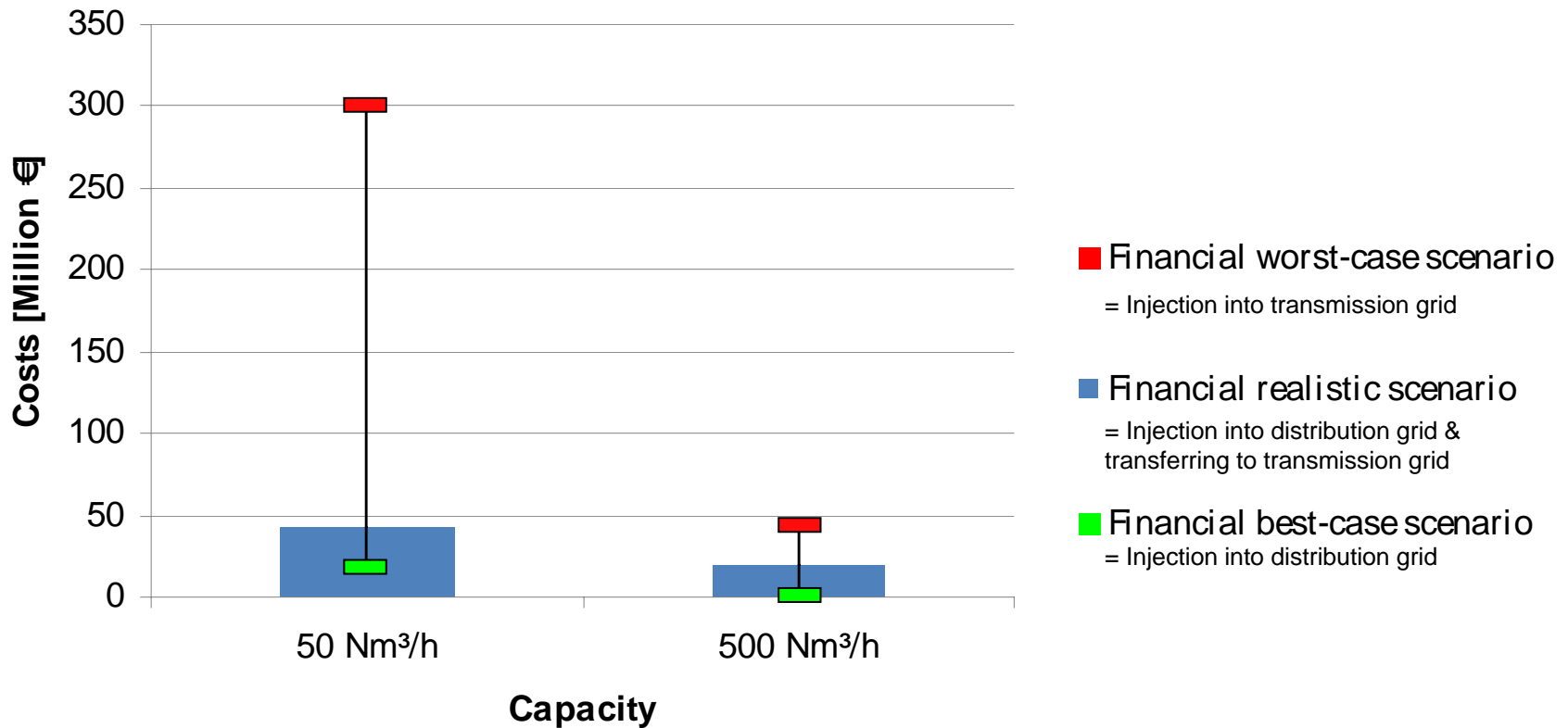


# Grid investment costs – individual solutions





# Grid investment costs – 12% natural gas replacement



## Conclusions

- Potential: 12% natural gas replacement by Green Gas
- Summer: demand < production capacity
- Particularly demand distribution grid < production capacity: use of transmission grid is necessary
- Several technical solutions to facilitate Green Gas injection
- Costs injection distribution grid << injection transmission grid
- Minimal capacity scale necessary for injection to be cost effective
- Preferable solution injection distribution grid and transferring to transmission grid

# Questions