

# Town of Vulcan

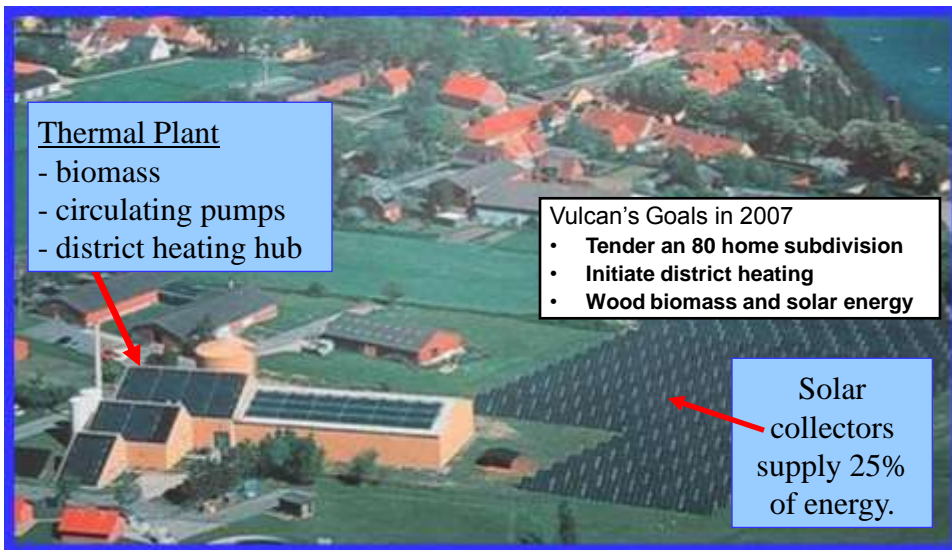
## Vulcan Community Energy

“Building a warm future”  
with a conserved energy and renewable fuel  
hot water district heating system

April 2007

19-Apr-07

### This image is possible in Vulcan



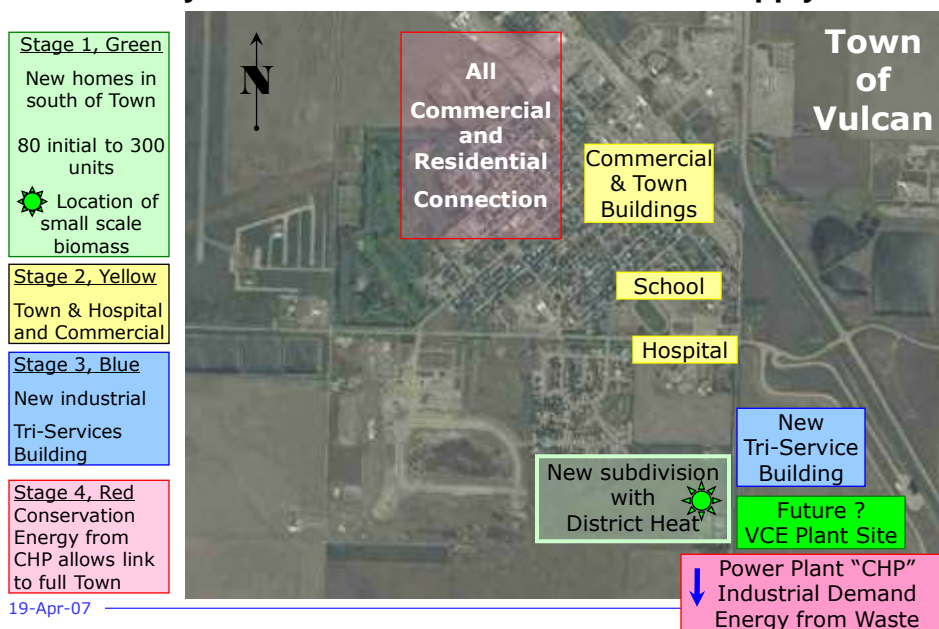
19-Apr-07 Image: Photo of Aeroskoberg Solar Collectors, courtesy of Arcon Solvarme A/S, Denmark, a town of 1,000 people.

## Vulcan's District Heating Plan: Stages

- **1: New subdivision in 2007 - 2008**
  - Tender for new 80 home subdivision will include district heating
  - Link to commercial customer to level thermal supply
  - Expand district heating to full 300 units in new subdivision
- **2: Expansion in 2008 and 2009**
  - Link to additional municipal, commercial and nearby residential
- **3: Prepare for full Town expansion in 2009**
  - Link district heat to commercial customers
- **4: Conserve heat from CHP plant**
  - Negotiations in 2007 to connect to plant in 2010
  - Discussions with a combined heat and power generator
    - to locate near Vulcan,
    - conserve waste heat by using it to heat Vulcan,
    - and conserve "waste" steam through use in an industrial process

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## Preliminary location of Thermal Demand and Supply



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## Stage 1: New subdivision with District Heat

- **80 home installation**
  - Town is working with CMHC advisors to optimize design
- **Tender process will request option on**
  - district heating pipe from home to main
  - main line construction by developer
  - tie in to Town operated thermal plant
- **Thermal plant will be located close to homes**
  - Solar collector field and wood waste biomass boilers
- **Operation**
  - Town owned utility
  - Operated by current municipal operations staff
- **Future**
  - boilers can be redeployed as peaking boilers in the full scale operation

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## Small Scale Biomass Boiler example

- **Cost is approximately \$ 300,000 per 1.25 MW of thermal capacity**



19-Apr-07 Image: Photo and image from KOB boiler manufacturer.

## Small scale biomass examples

- Vulcan is looking for a unobtrusive facility that fits the community.

**School heated with wood biomass**

**Office building**

**Boiler house for school**

**Wood chip loading & storage**

**Boiler room**

Image Source: A Guide For Institutional and Commercial Biomass Installations, Timothy M. Maker, Revised by Biomass Energy Resource Center, Montpelier, Vermont, With funding from the U.S. Forest Service, 2004  
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## Close up of industrial scale solar collector field

**Side view**

**Collectors rest on concrete blocks**

**Front view**

19-Apr-07 Photos taken at Marstal Solar Collector Field, Marstal Denmark

## Stage 1 Economics: Residential with a “Flex” customer

- **80 home initial construction**
  - 16,000 GJ per year based on 180 GJ/year per home
  - Peak rate in December – January
- **Stage 1: Vulcan Community Energy**
  - Revenue
 

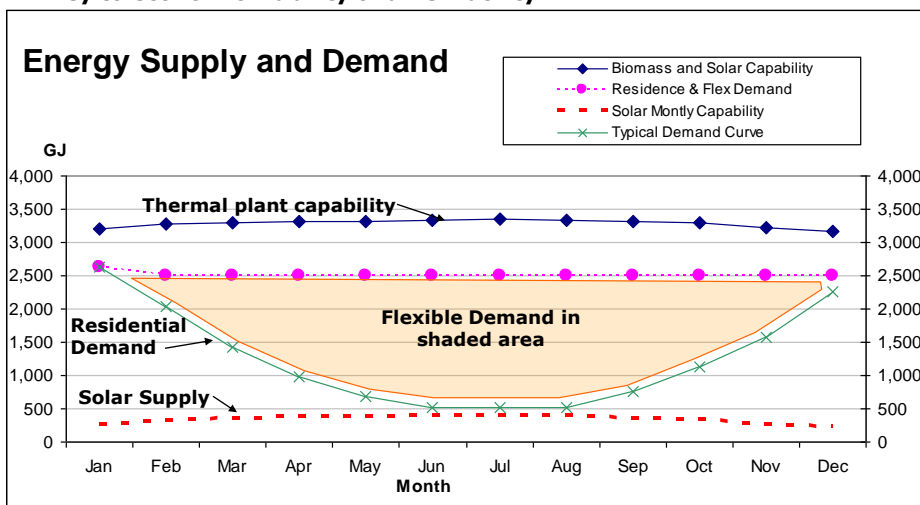
➢ Residential sales	204,700
➢ Flex customer sales (Hospital or Town)	179,700
➢ Total revenue	<u>\$ 384,400</u>
  - Expenses, input fuel, fixed labour and maintenance ( 216,000)
  - Cash flow \$ 168,400
  
  - Capital cost, scoping quality
 

➢ Land and building	200,000
➢ Wood biomass boiler (1.25 MW) & gas backup	320,000
➢ Solar collectors, 1,500 m <sup>2</sup> at \$300/m <sup>2</sup> ,	450,000
➢ District heating pipe	<u>400,000</u>
➢ Total	\$ 1,370,000
• 20% escalation factor	
➢ Total	\$ 1,644,000
  
  - Annual principal and interest charge, 7%, 25 year term (\$141,000)
  
  - Internal rate of return, 9%, first positive cash flow in year 11

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## Energy customers: 80 homes & flexible demand customers

- **A mix of residential demand and flexible high demand customers are key to economic viability of a new utility.**



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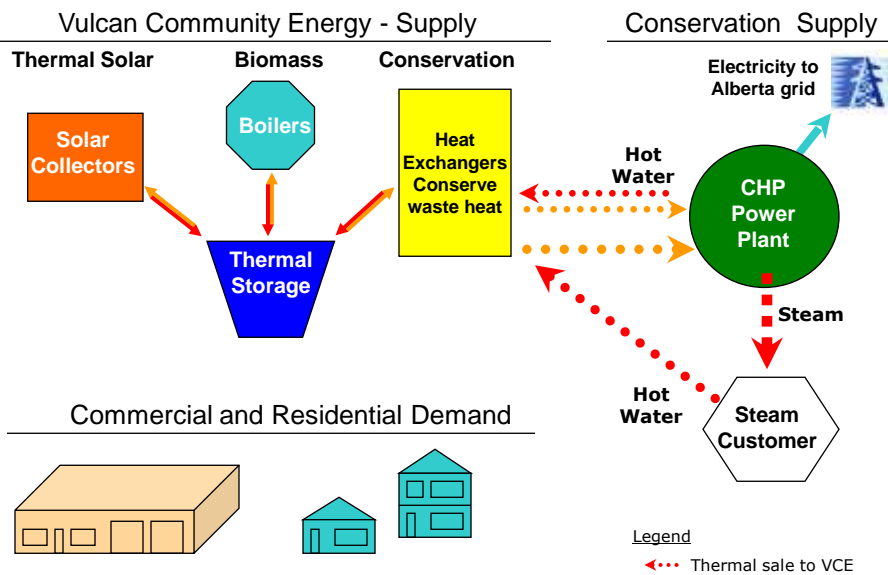
## Trunk Lines used in hot water distribution of energy

- will be required for future large scale system in Vulcan



19-Apr-07 Photos taken at Skorping Denmark , October 2001

## Stage 4: Full Town district heating linked to energy conservation



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## Inside view of a straw biomass plant

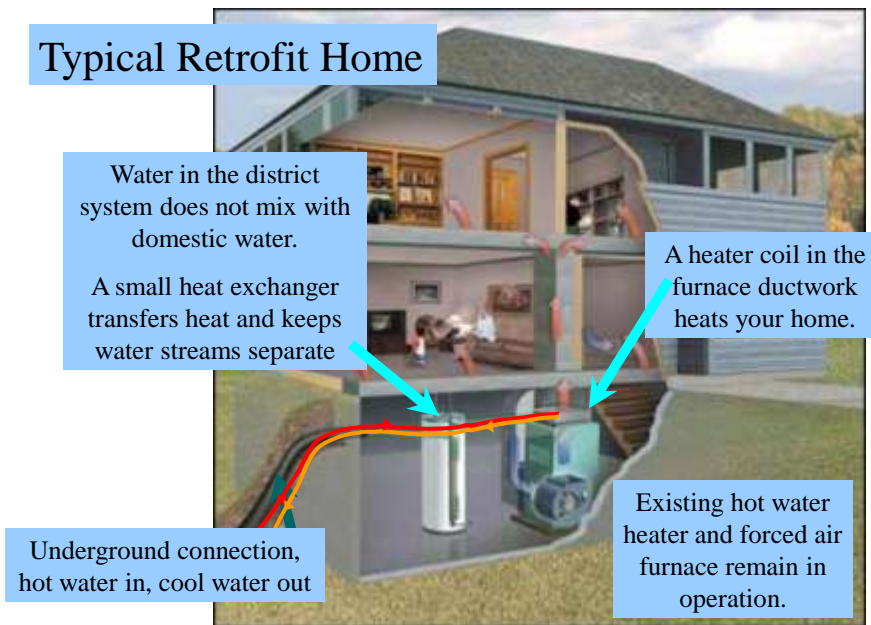
- Considered for future full scale thermal plant in Vulcan



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Images: Aeroskoking straw combustion that contributes ~75% of thermal energy, solar collectors contribute remaining 25%.

## Typical Retrofit Home



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Note: 1) Image source is centralboiler.com, modified to reflect proposed installation in Town of Vulcan..

