Comparing policy options: Methodology and conclusions derived from Invert

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- How can public money be spent most efficiently?

- Which RES&RUE penetration and CO_2-reductions can be achieved by certain promotion schemes?

Crucial question in policy making: Comparison of policy options

- Which technologies should be supported?
- Which promotion instrument should be chosen?
- How should these instruments be designed?
- Which level of financial incentive is required / appropriate in order to reach a certain target?
- Which dynamic path of promotion should be chosen?
- Which stakeholders should be included at which stage of policy implementation?
- …

Crucial parameters for evaluating policy options

- Public expenses (transfer costs) due to financial support schemes
- Public income due to CO_2-taxes etc.
- Reduction of CO_2-emissions
- Reduction of energy demand
- Others (emissions, employment, macro-economic indicators, social acceptability, political pressure, …)

Comparing promotion schemes:

1) Promotion scheme efficiency

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$$PSE = \frac{\sum_{i=1}^{n} \Delta CO_2 Emissions_{\,i}}{\sum_{i=1}^{n} \Delta TransferCosts_{\,i}}$$

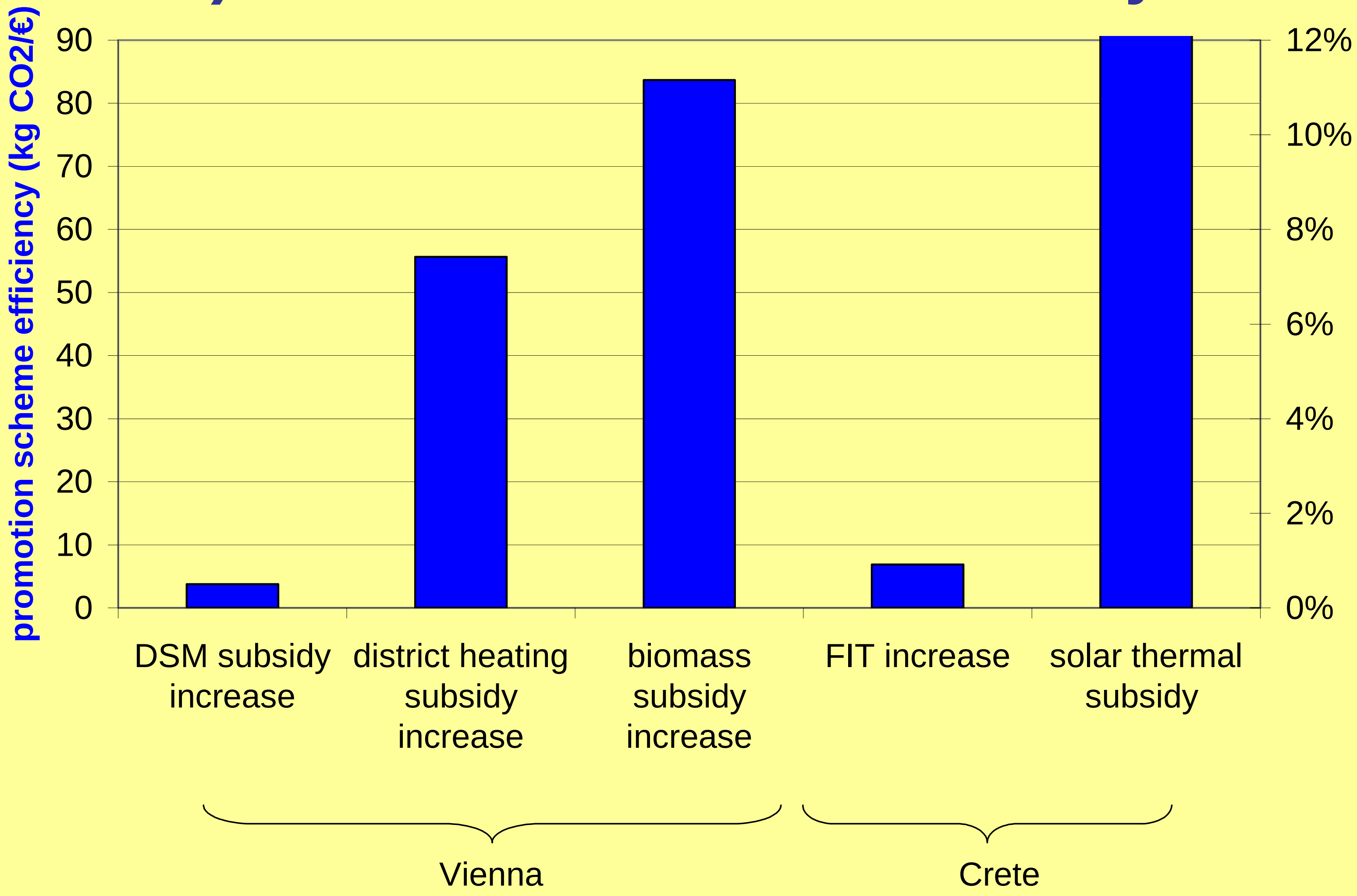
PSE … Promotion scheme efficiency

ΔCO2 Emissions … Change in CO2 emissions compared to a reference scenario

ΔTransfer Costs … Change in Transfer Costs compared to a reference scenario

Comparing promotion schemes:

1) Promotion scheme efficiency



Promotion scheme efficiency:

Doesn't tell anything about the actual achievable CO2-reduction of a policy!

Comparing promotion schemes:

2) Achievable CO_2-reduction

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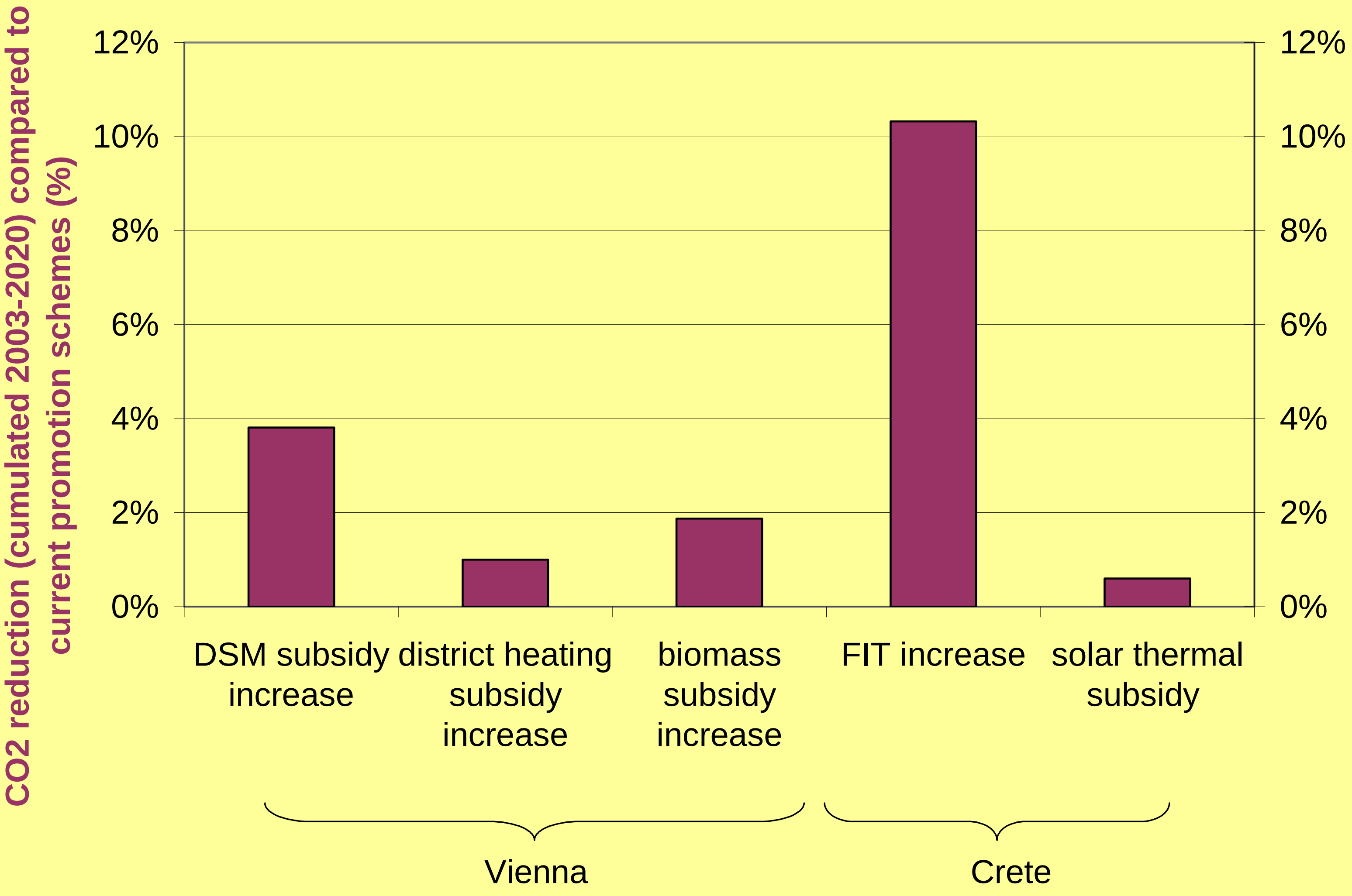

Comparing promotion schemes:

3) Promotion scheme efficiency & achievable CO_2-reduction

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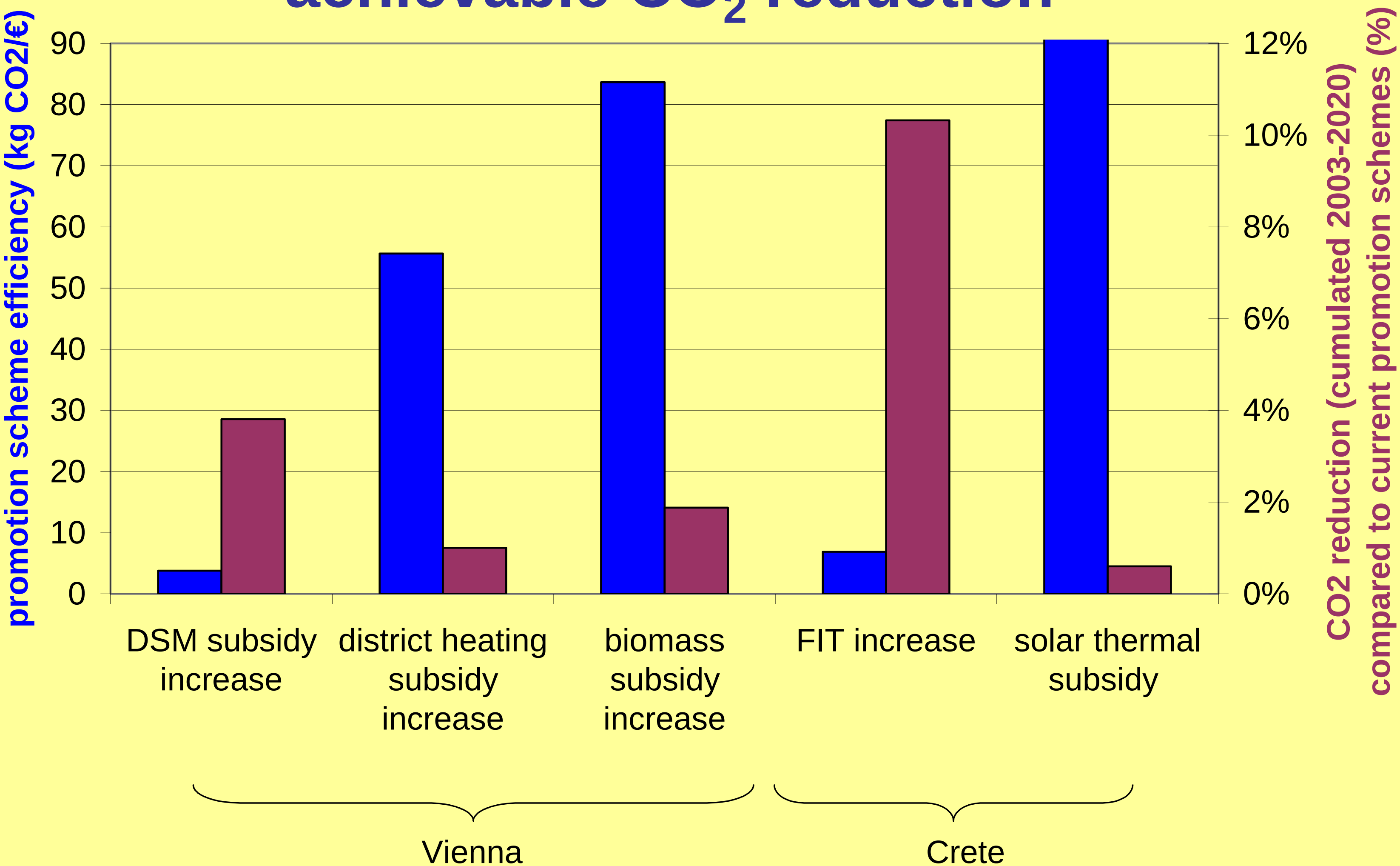
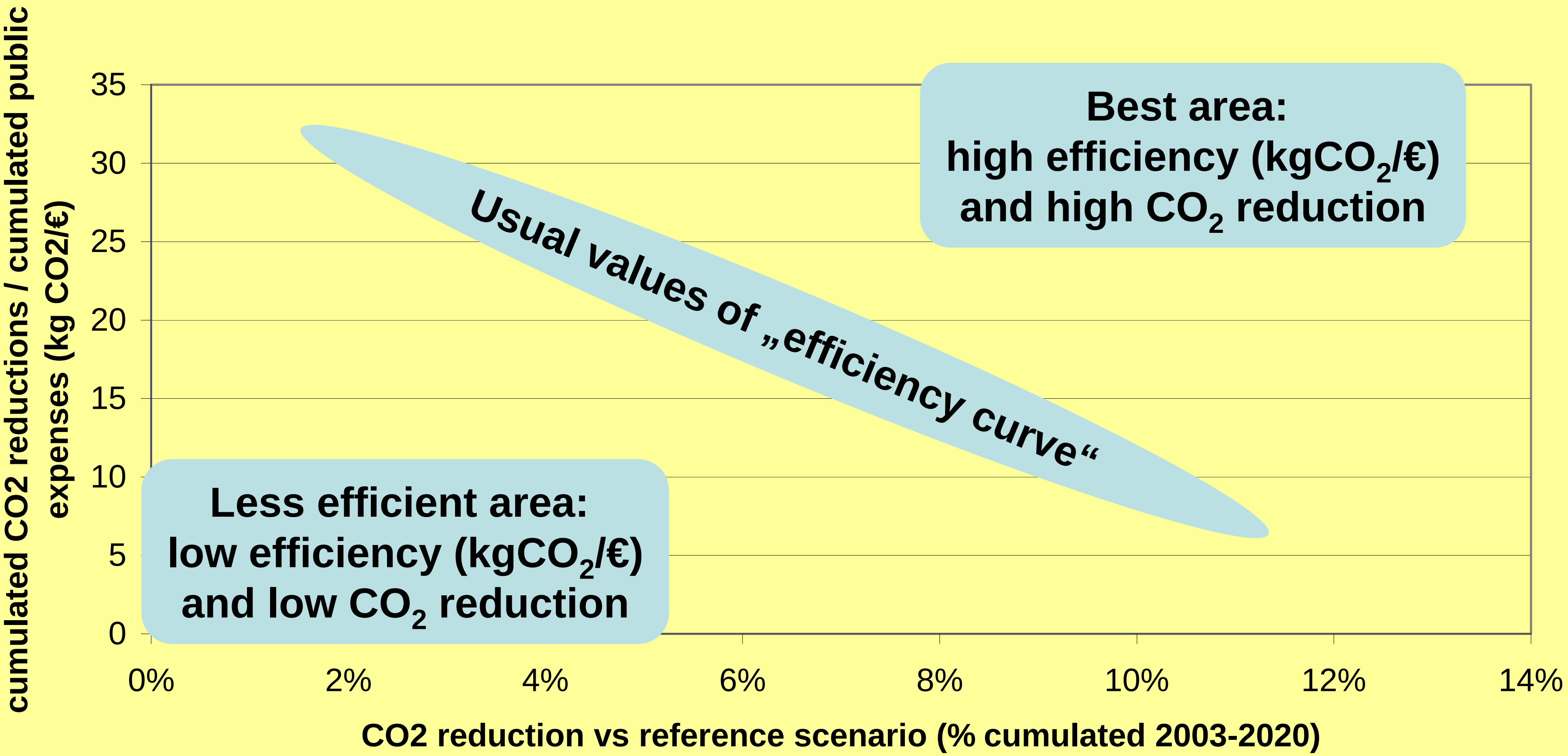


Comparing promotion schemes:

4) Promotion scheme efficiency & CO_2-reduction: the Efficiency-CO_2 graph

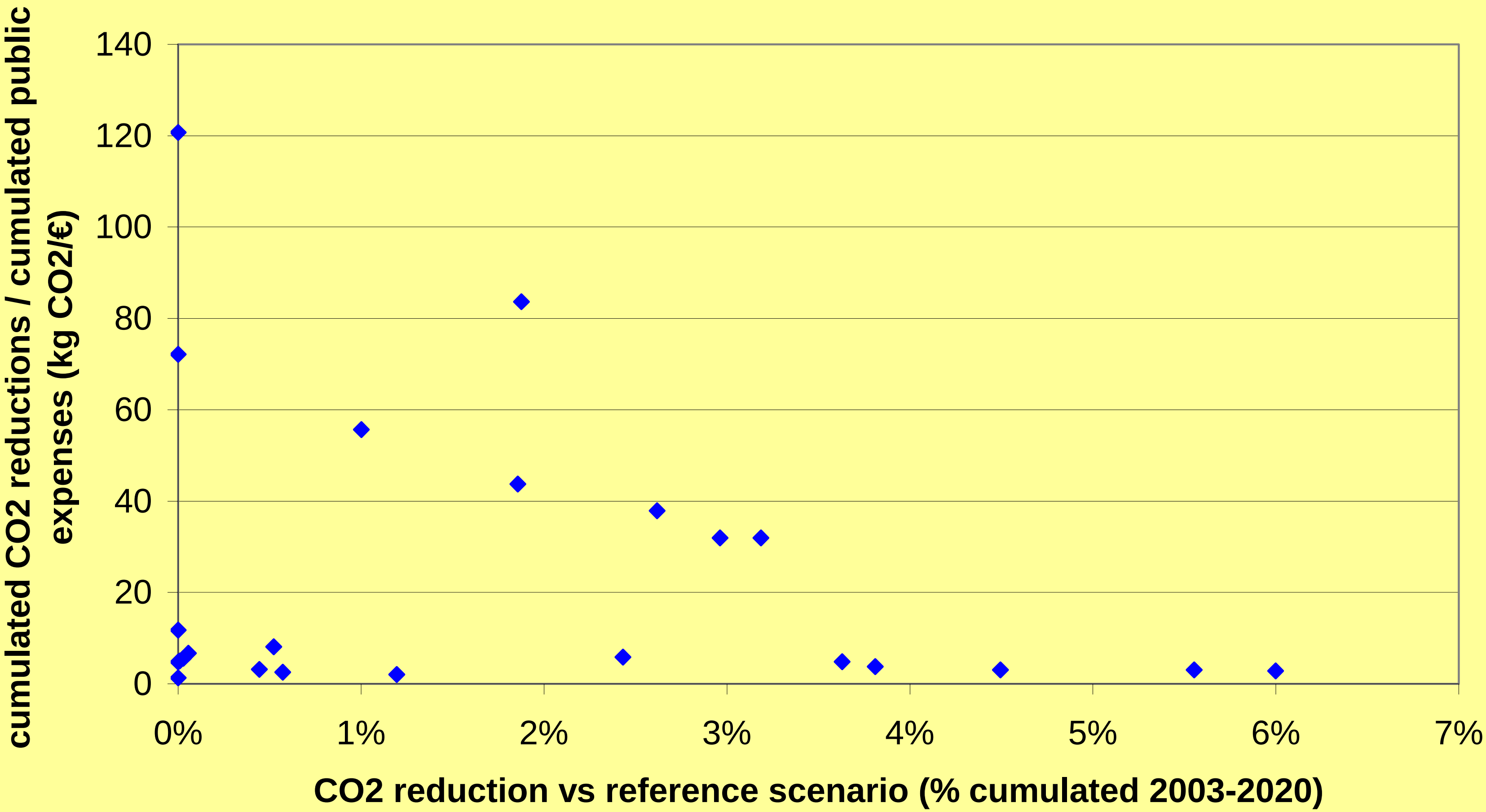
Comparing promotion schemes:

Efficiency-CO_2-graph



Comparing promotion schemes:

Efficiency-CO_2-graph



Comparing promotion schemes:

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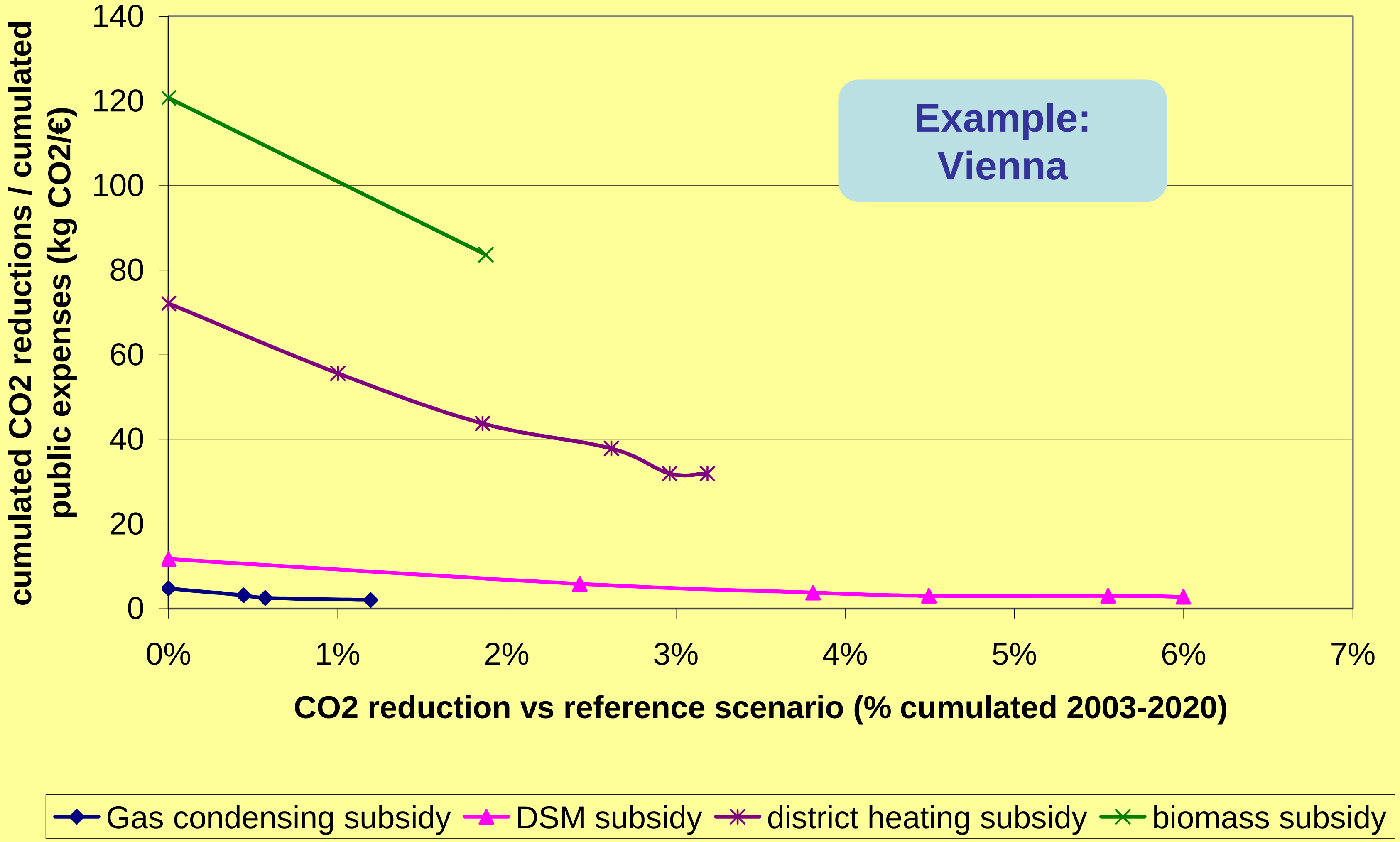
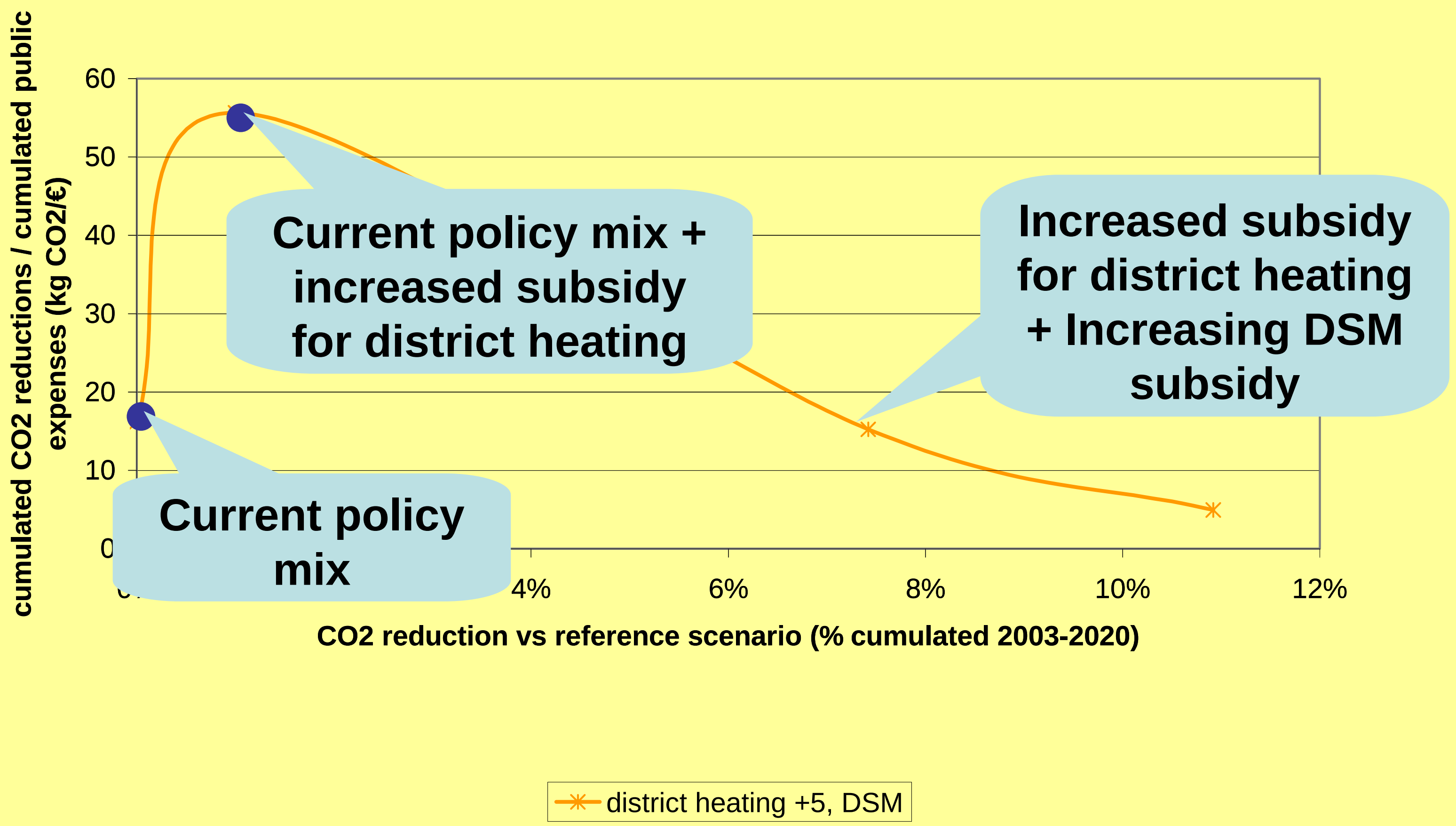


Comparing promotion schemes:

Efficiency-CO_2-graph

(increasing district heating and DSM subsidy – Vienna)



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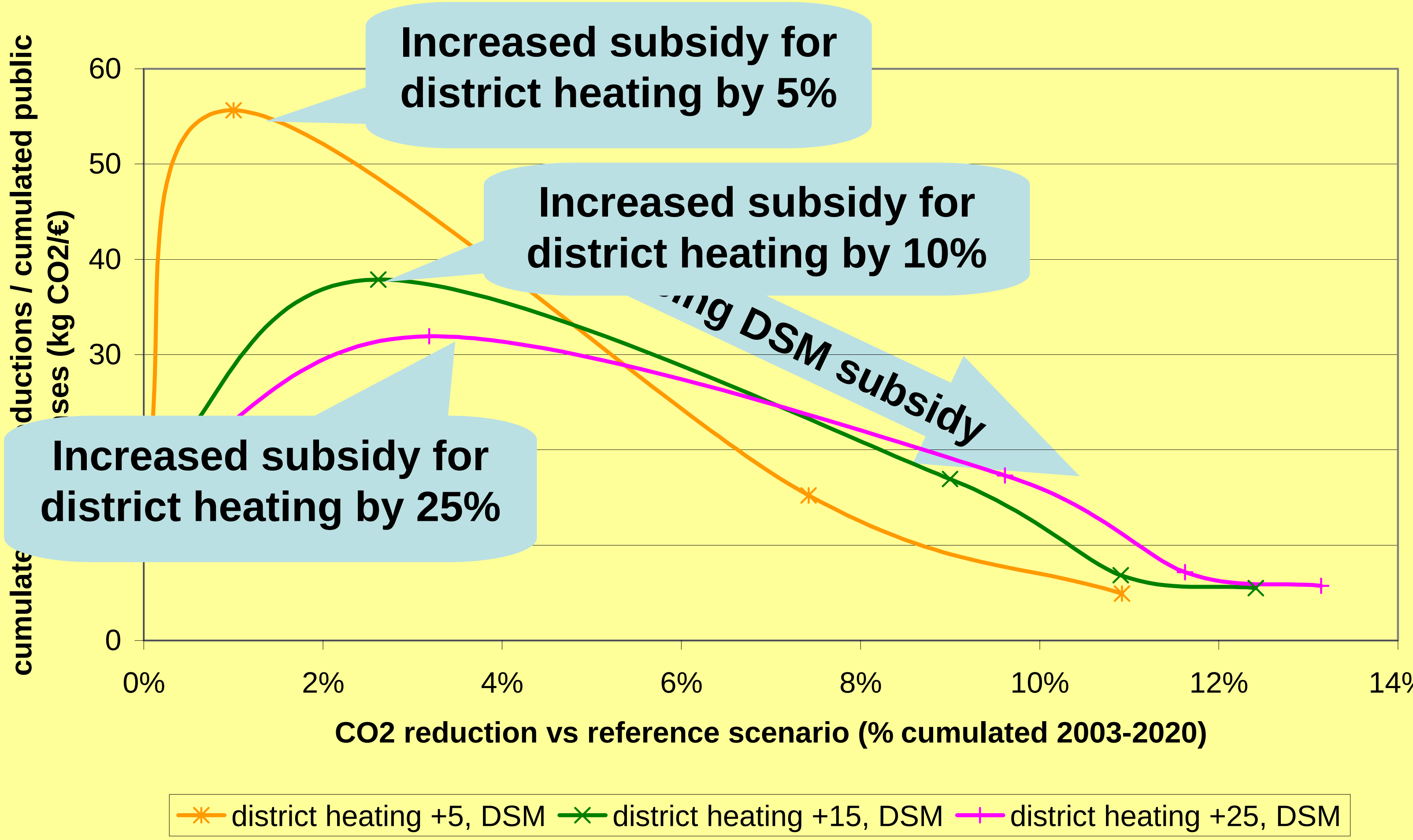
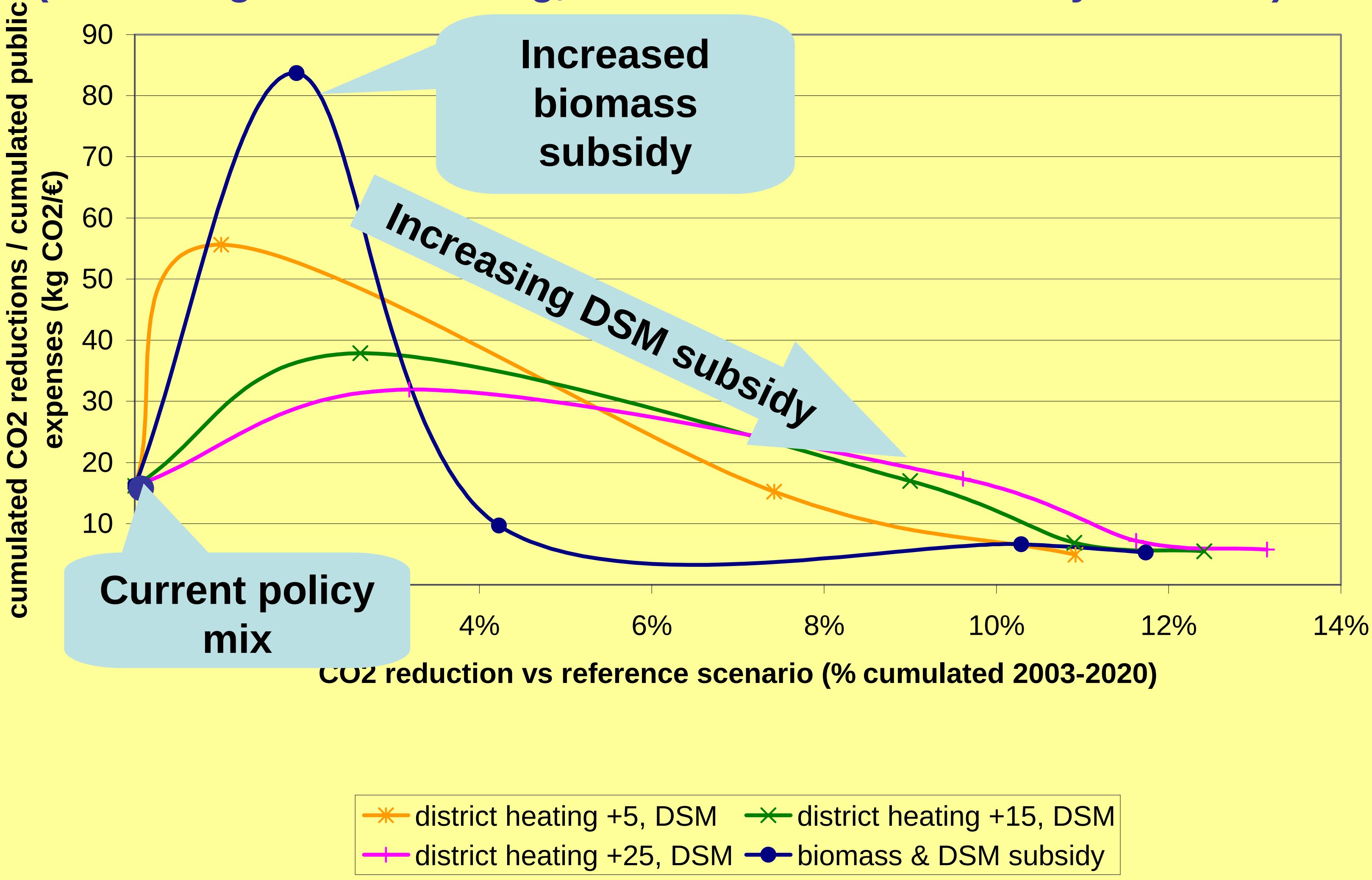


Comparing promotion schemes:

Efficiency-CO_2-graph

(increasing district heating, biomass and DSM subsidy – Vienna)



Comparing promotion schemes:

Efficiency-CO_2-graph

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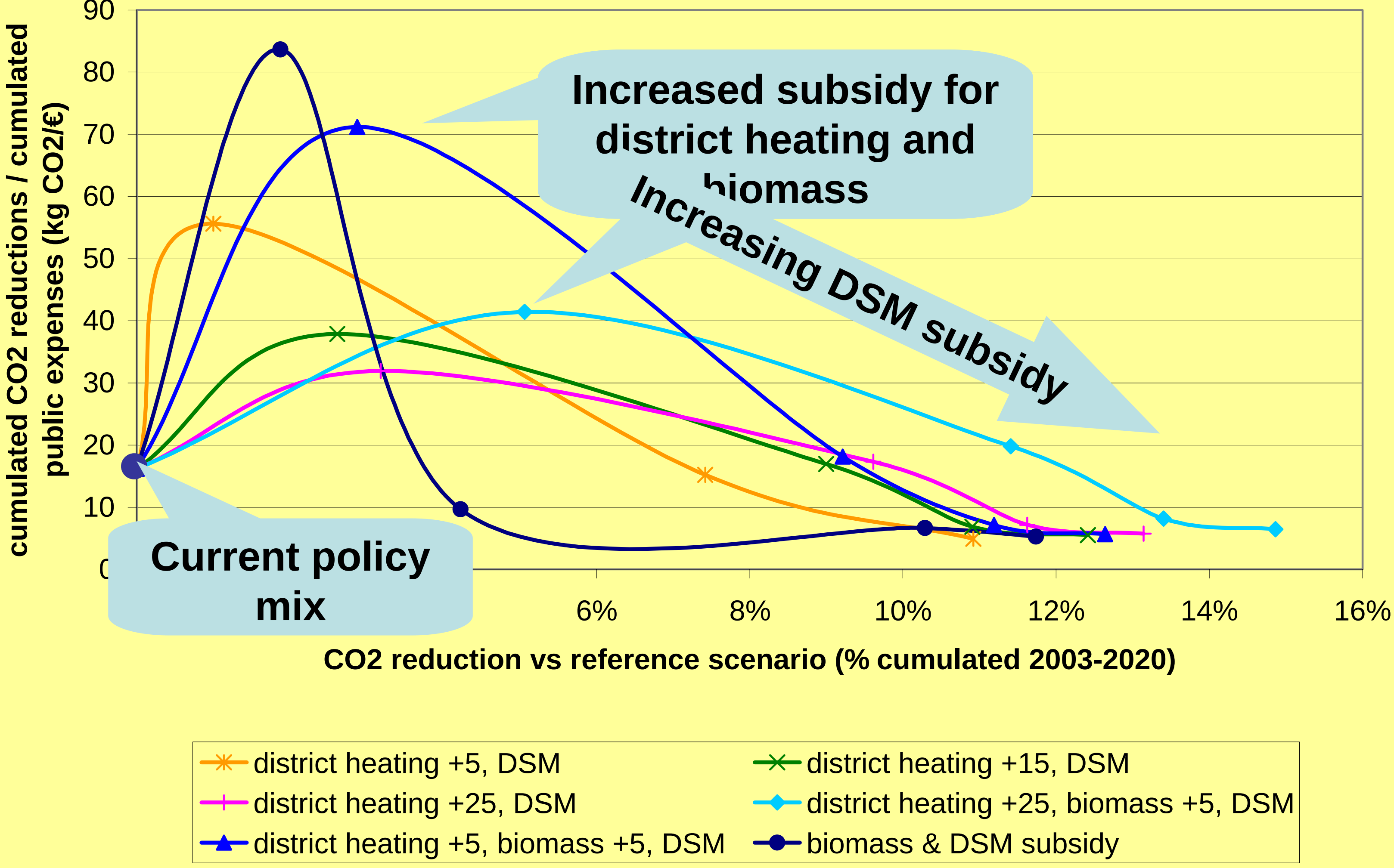
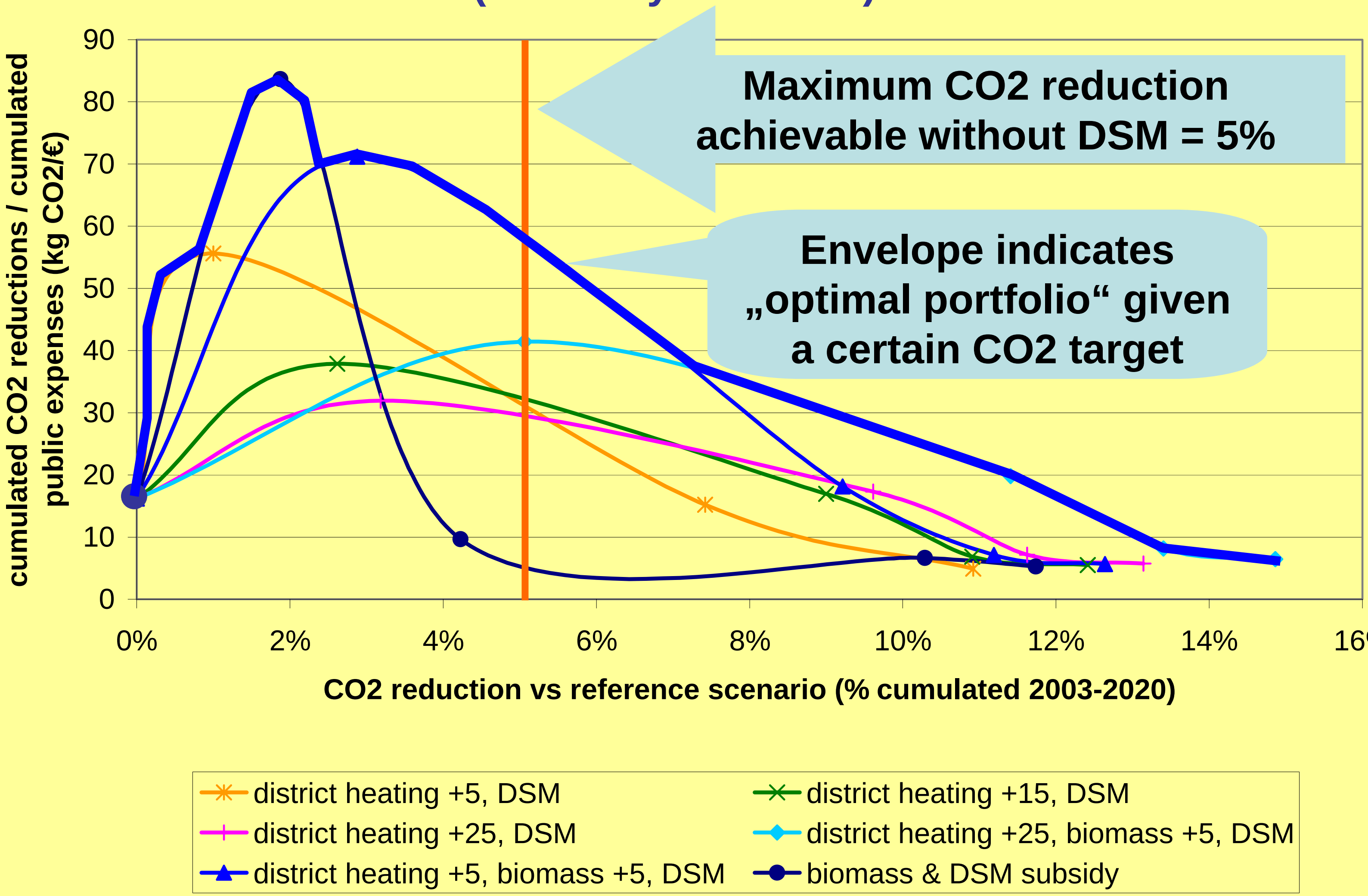


Comparing promotion schemes:

Efficiency-CO_2-graph

(summary – Vienna)



Conclusions:
key drivers for results (1)

- Existing promotion schemes:
  - the higher the efficiency of current promotion schemes, the more difficult to raise the efficiency
  - the higher the CO_2 reduction of current promotion schemes, the more difficult to achieve high efficiencies
- Existing energy systems (building quality, energy carriers)
- Existing potentials for RES
- Achieved potentials for RES

Conclusions:
key drivers for results (2)

- Climate conditions
- Barriers and willingness to pay
- Cost structure:
    - Energy price scenarios
    - Cost structure: relative difference between technologies

Conclusions:
Policy Making (1)

- Promotion of competing systems leads to inefficiencies
- Reduce free-rider effect:
  - Differentiation among consumer types
  - Differentiation among technologies (and efficiency level of technologies)
  - Differentiation among efficiency levels of DSM
- Incentive compatibility: well targeted incentives
  - e.g. basis for subsidies: Investment costs
    => leads to higher costs
  - e.g. basis for subsidies: Power
    => leads to overestimation of plant sizes

Conclusions:

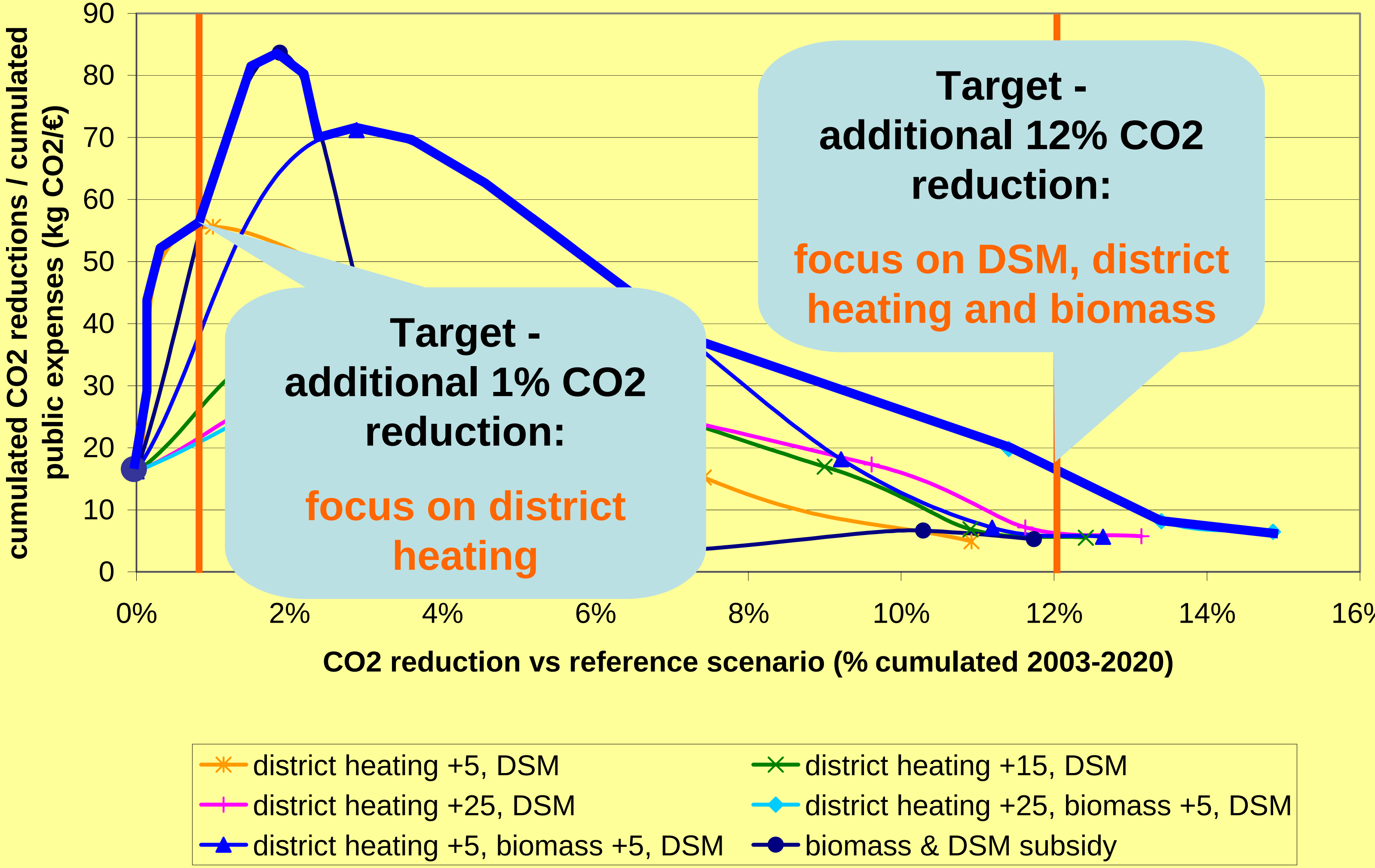
Policy Making (2)

- Different system inertia in the building sector, RES-E, RES-CHP, biofuels
- Interactions:
  - between RUE and (RES-)CHP
  - between RES/RUE
- Cost efficiency has to be considered combined with CO_2 reduction potential (and other factors like emissions, energy demand reduction, employment …)
  - ⇨ Focus only on most cost efficient technologies is not always feasible
- Optimum policy depends on the target (CO_2-reduction, energy demand reduction)

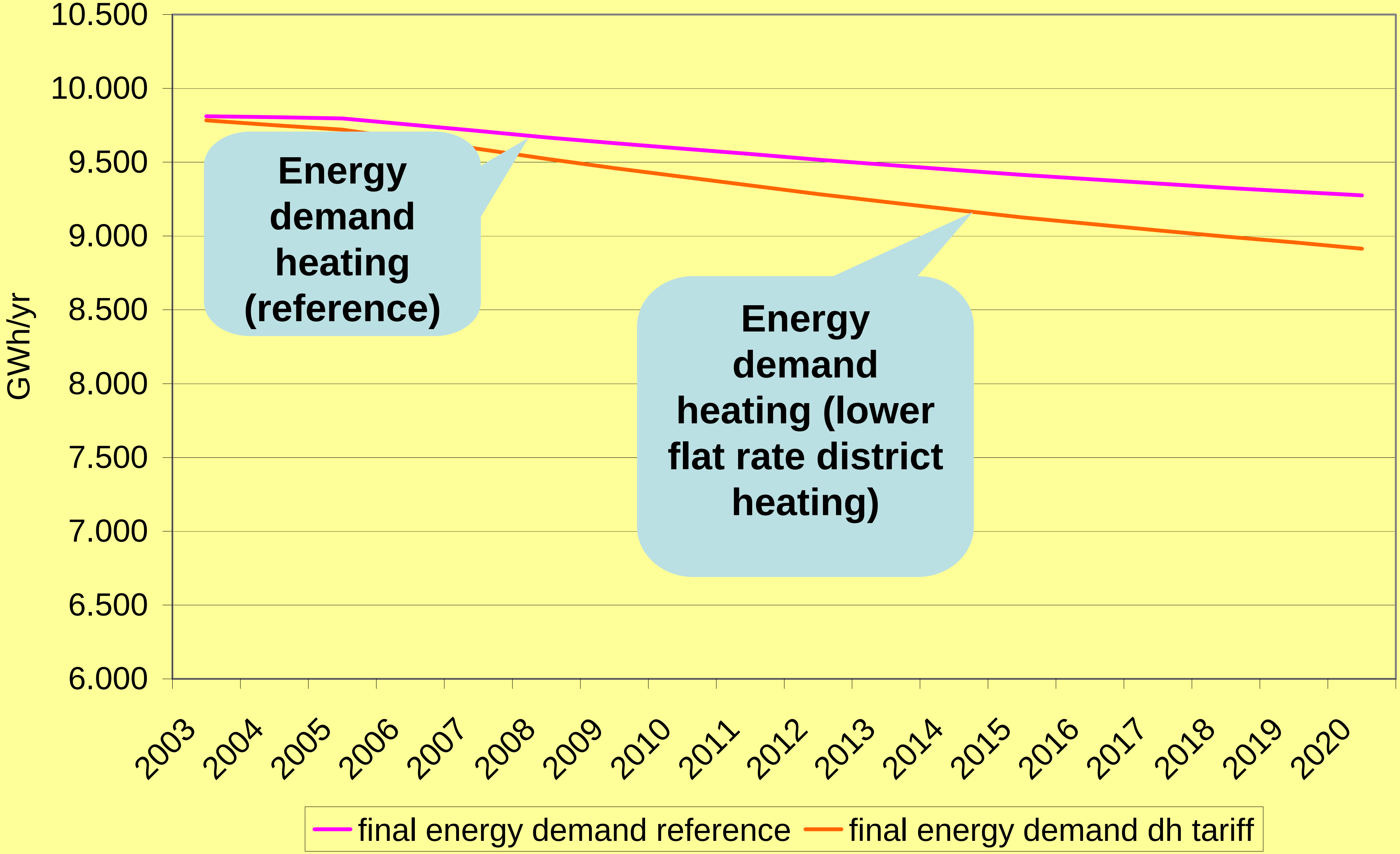
Comparing promotion schemes:

Efficiency-CO_2-graph

(summary – Vienna)



Scenario: impact of changed tariff structure of district heating on energy demand



Impact of increased DSM subsidy