The Solutions Emerged from the Modelling Simulations: Valle D'Aosta Region Case

17.09.2019 | Project Meeting

WPT5 modelling simulations

BB-CLEAN | ARPA | Giordano Pession

FARM model

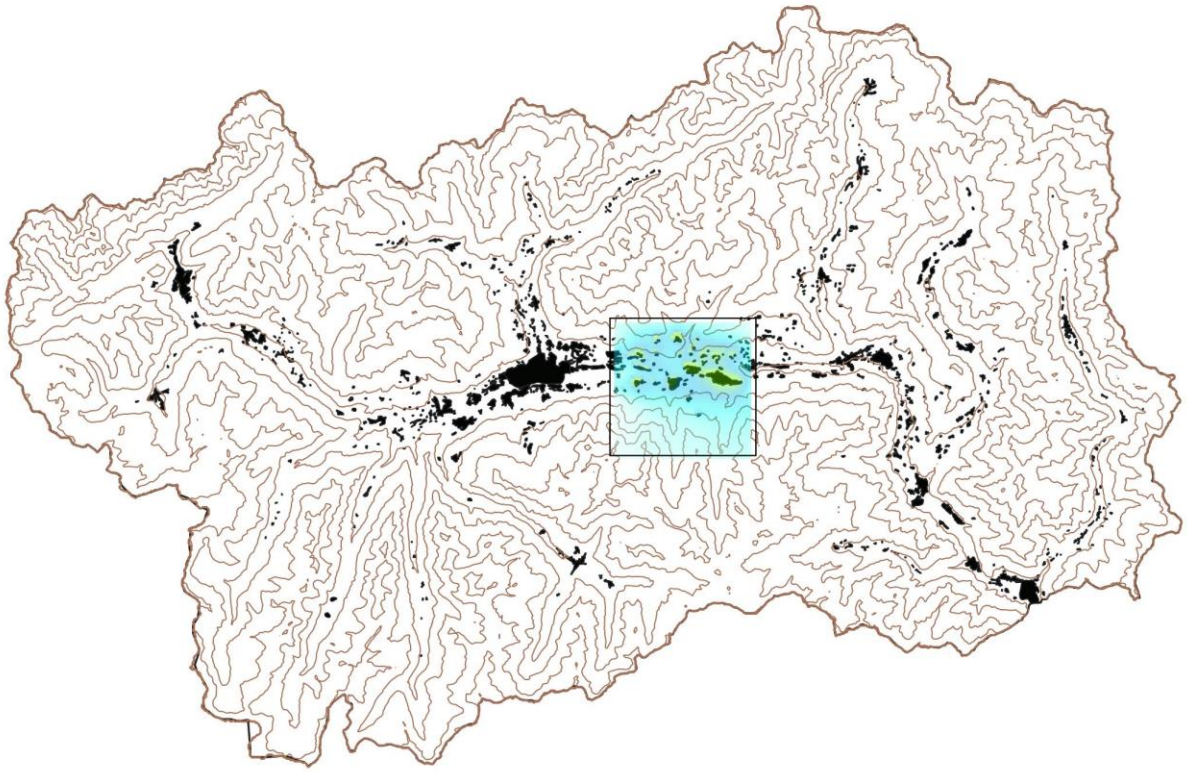
«Flexible Air quality Regional Model»

FARM is an Eulerian grid photochemical model able to reproducing also secondary pollutants (ozone and secondary particulate).

This model is used for the annual simulation of air quality, for the daily forecast and for the scenarios assessment for environmental planning.

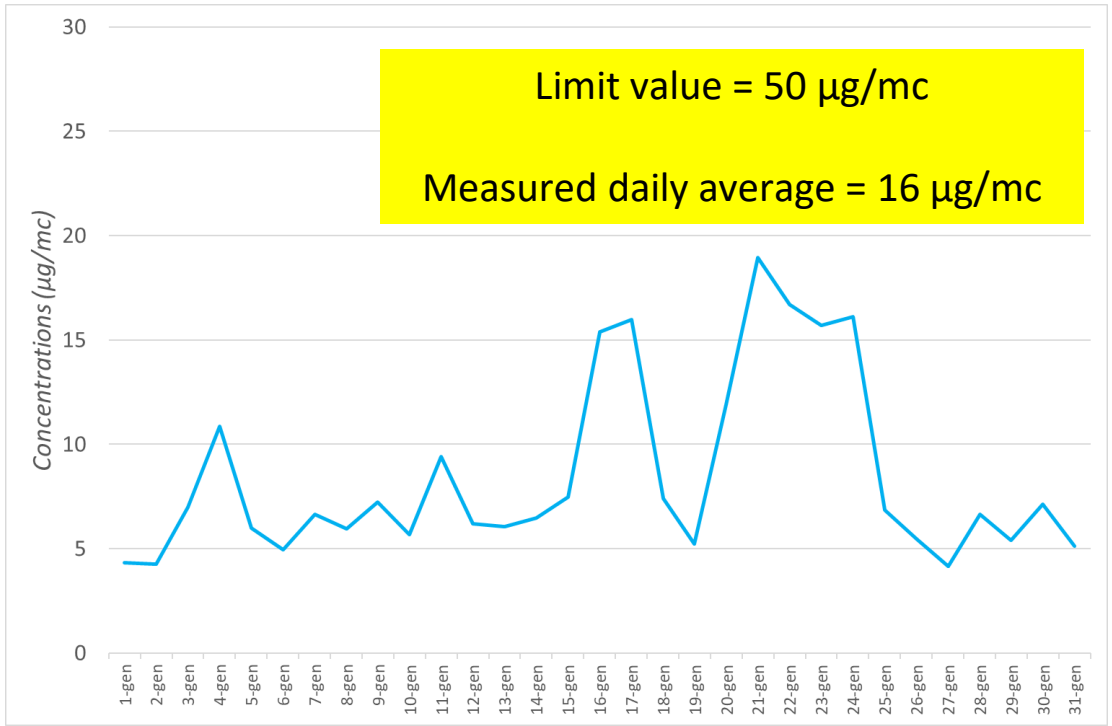
The model simulation showed here was processed in a domain of 10 x 10 km with a grid step of 250 m and 1 month in duration (January 2019).

The boundary conditions were taken by the Air Quality regional simulation of 2019.

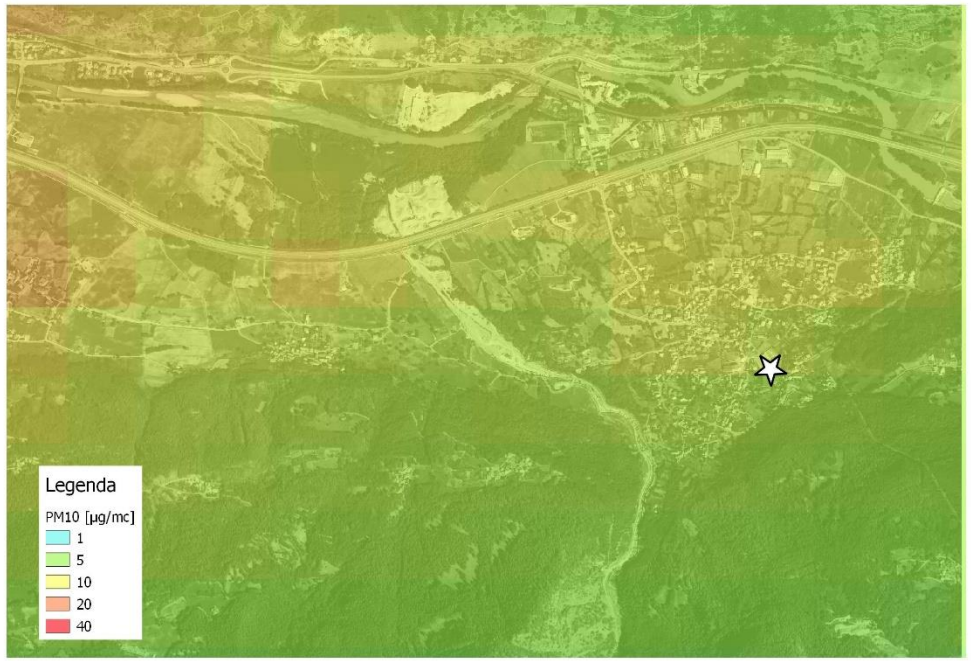


SAINT MARCEL CASE STUDY: Status quo

Daily average concentrations in January 2019



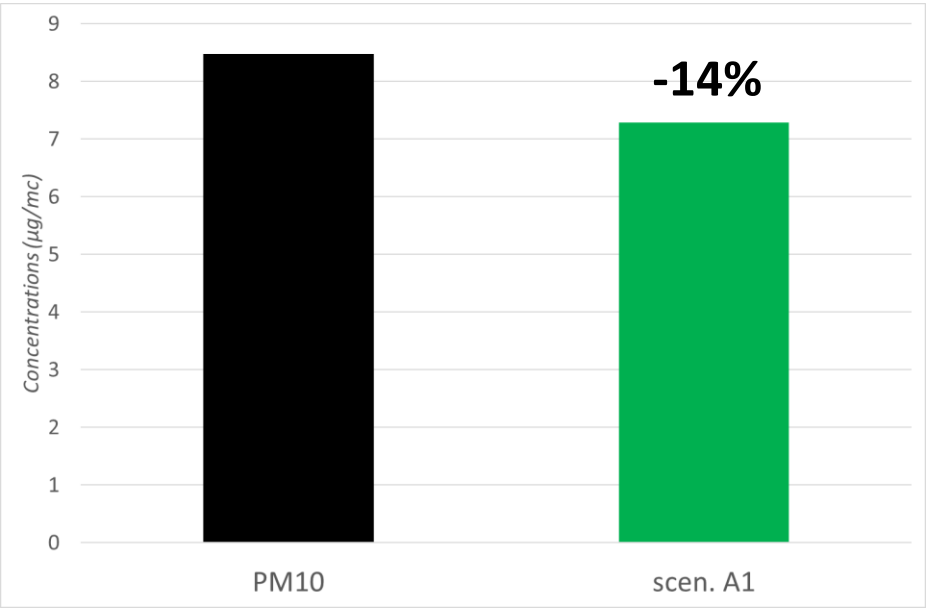
Monthly average concentrations in January 2019



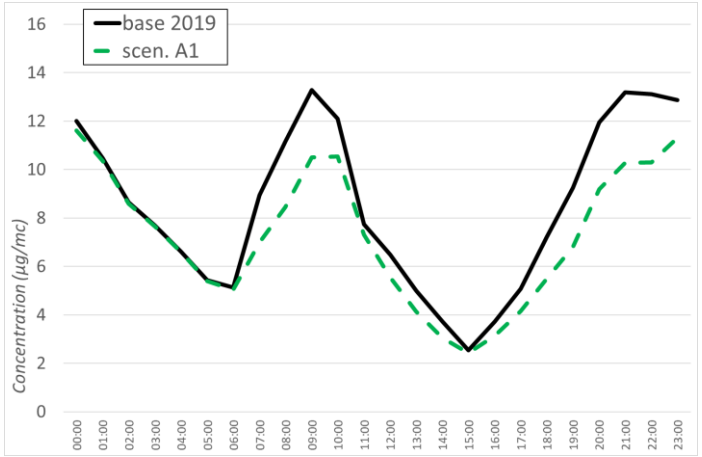
A1 Scenario
Replacement of 50% of old wood burning stoves/boilers with latest pellet stoves/boilers

Percentage variation map

Average concentration



Hourly daily cycle



CO2 flux (municipality)

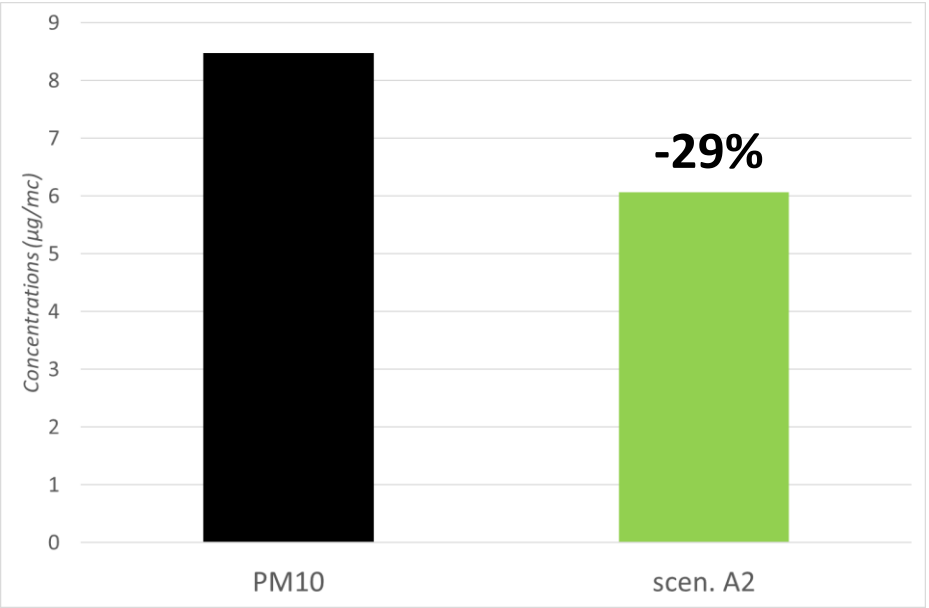
+0%
neutral

A2 Scenario

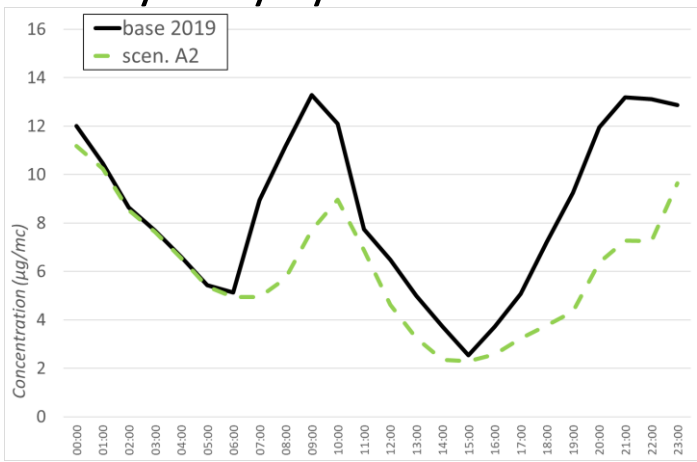
Replacement of 100% of old wood burning stoves/boilers with latest pellet stoves/boilers

Percentage variation map

Average concentration



Hourly daily cycle



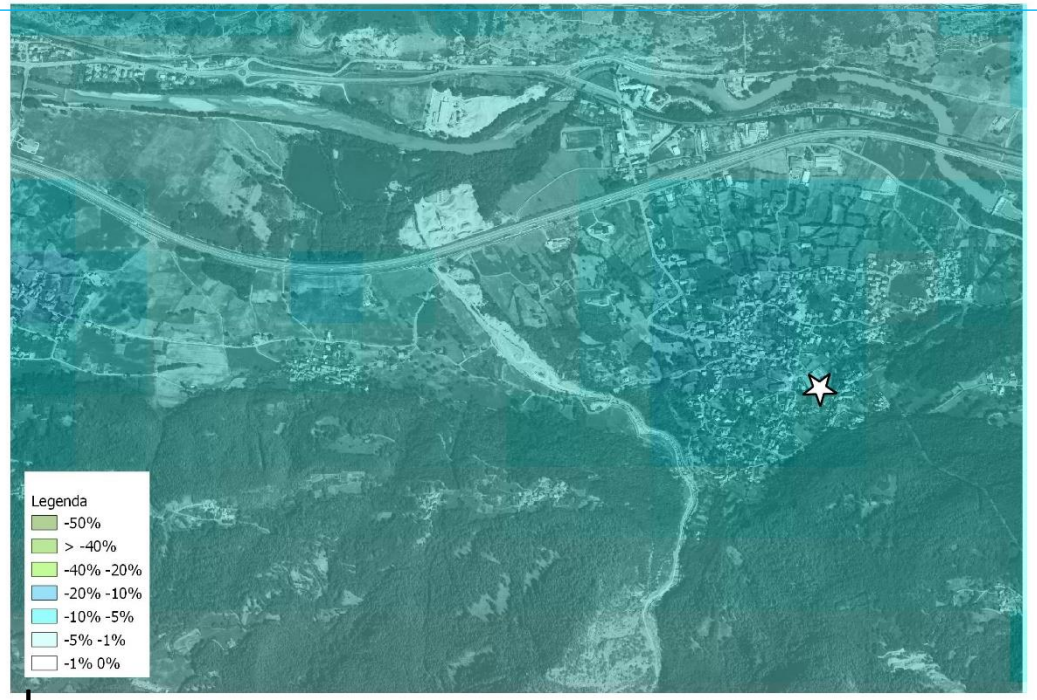
CO2 flux (municipality)

neutral

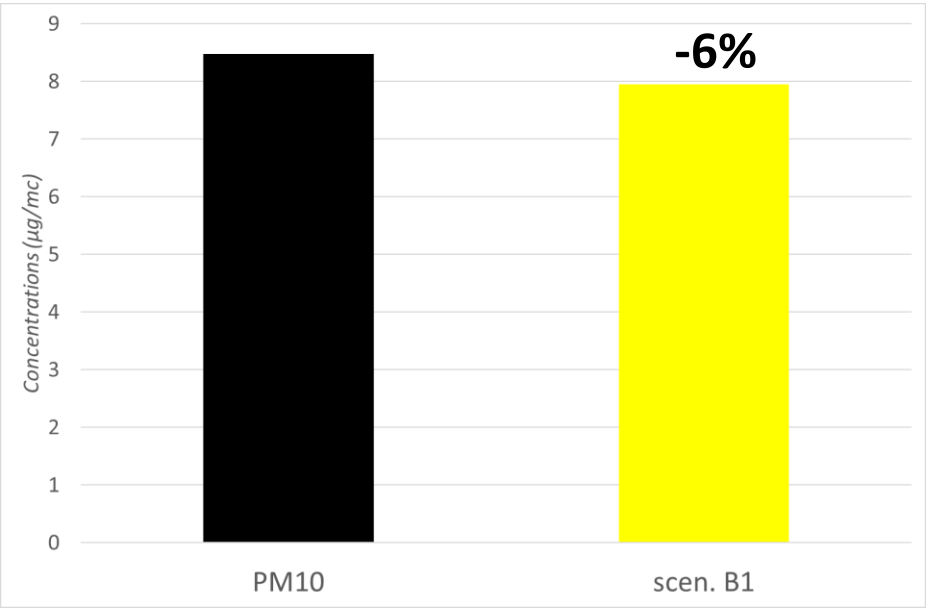
B1 Scenario

Best practices for domestic BB causes 20% drop in emissions from all wood biomass appliances

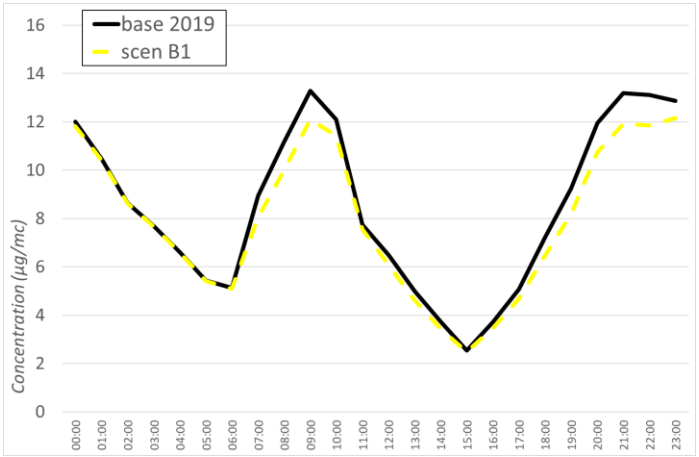
Percentage variation map



Average concentration



Hourly daily cycle



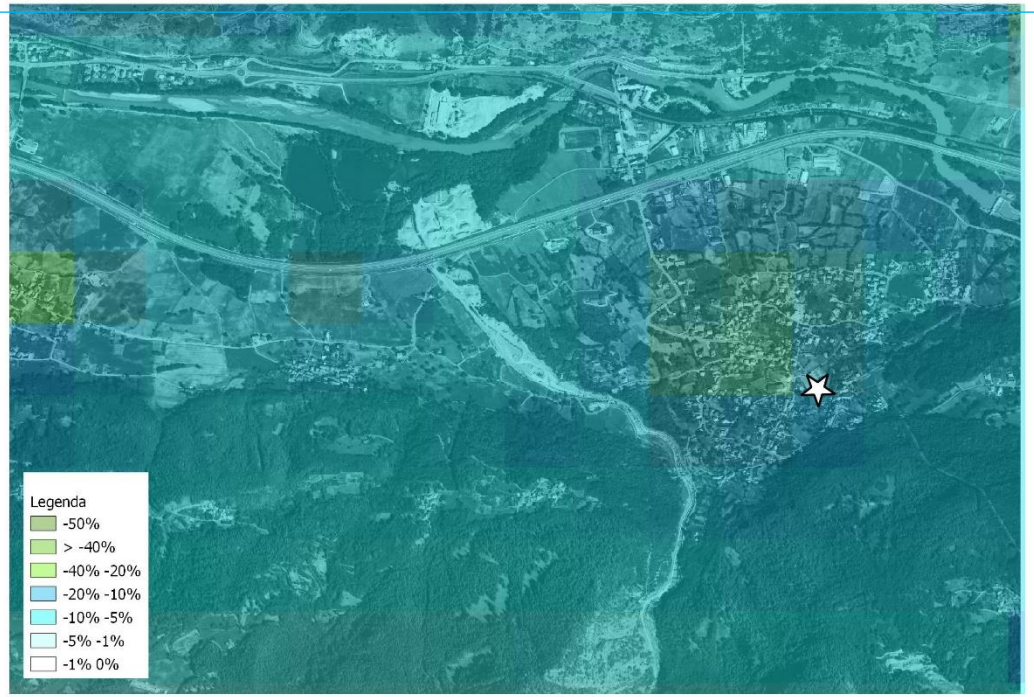
CO2 flux (municipality)

neutral

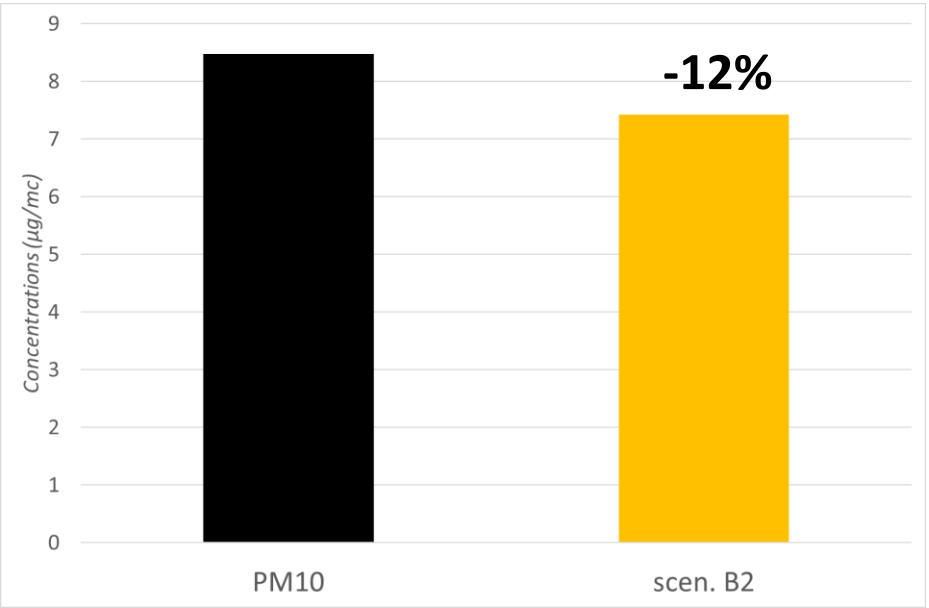
B2 Scenario

Best practices for domestic BB causes 40% drop in emissions from all wood biomass appliances

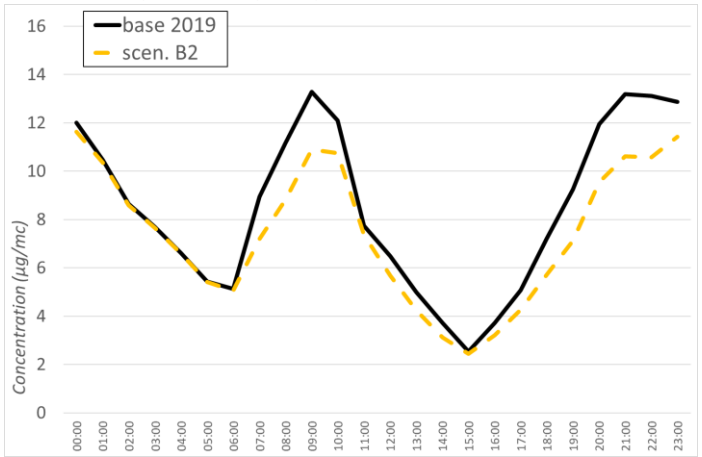
Percentage variation map



Average concentration



Hourly daily cycle



CO2 flux (municipality)

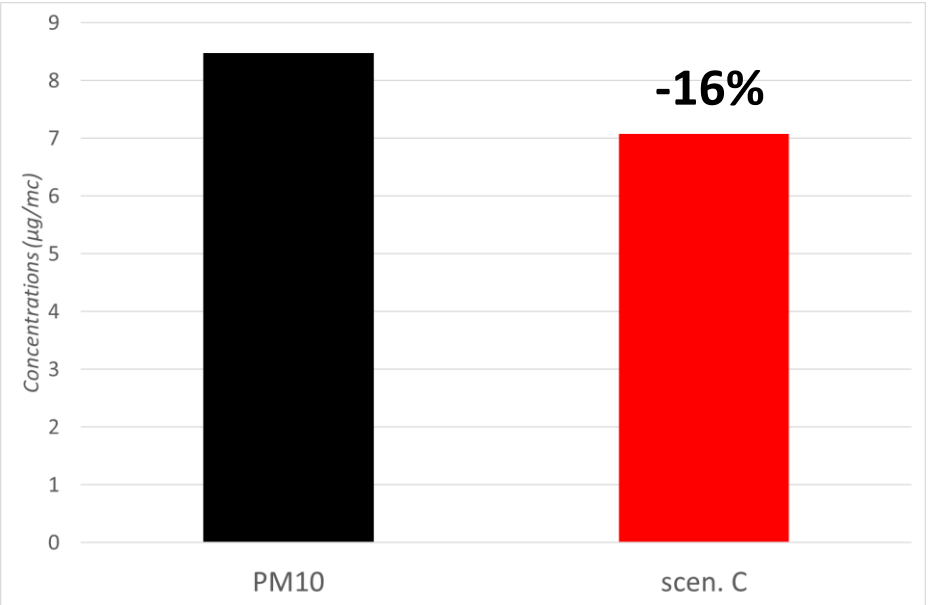
neutral

Percentage variation map

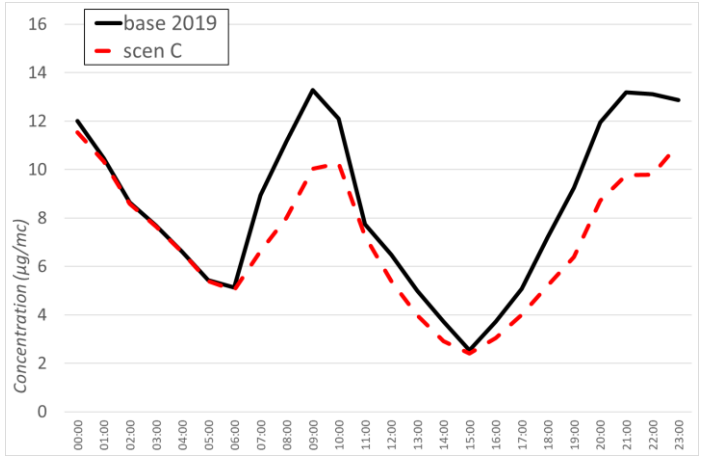
C Scenario

Replacement of 100% of old primary wood burning heating systems with latest pellet boilers with ESP

Average concentration



Hourly daily cycle



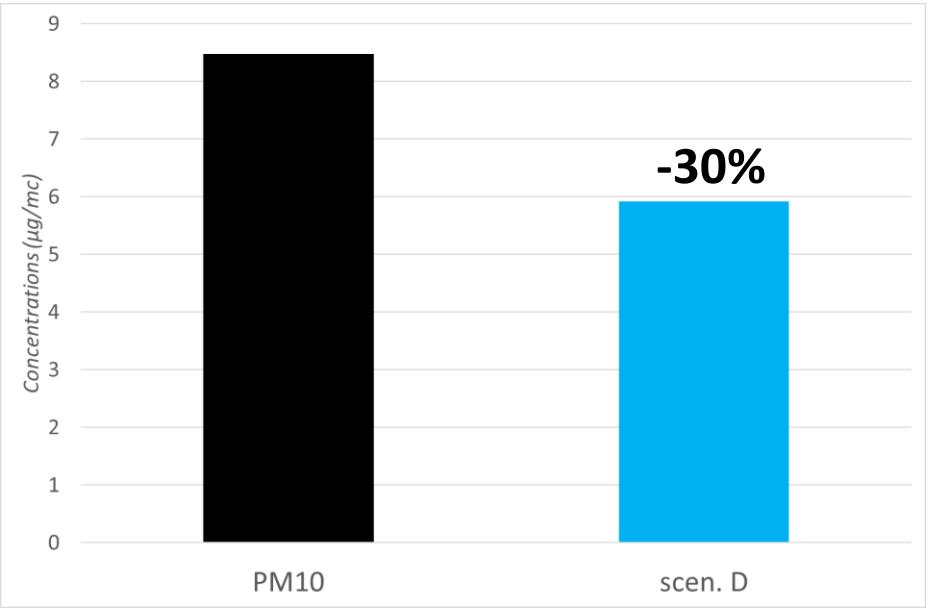
CO2 flux (municipality)

neutral

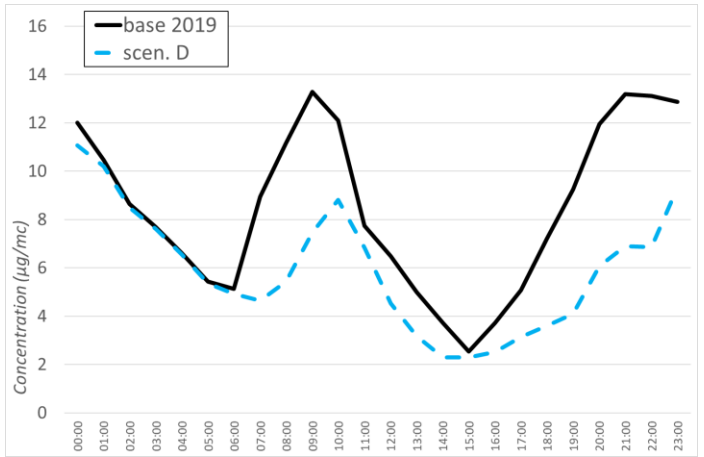
D Scenario
Transition of all wood biomass appliances
to natural gas boilers

Percentage variation map

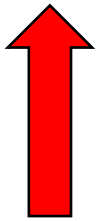
Average concentration



Hourly daily cycle



CO2 flux (municipality)

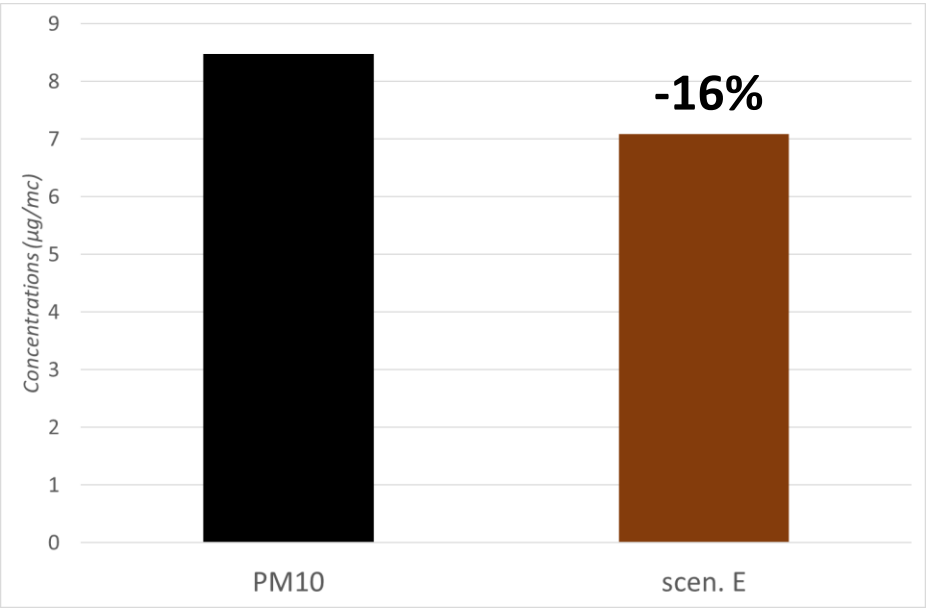


+38%

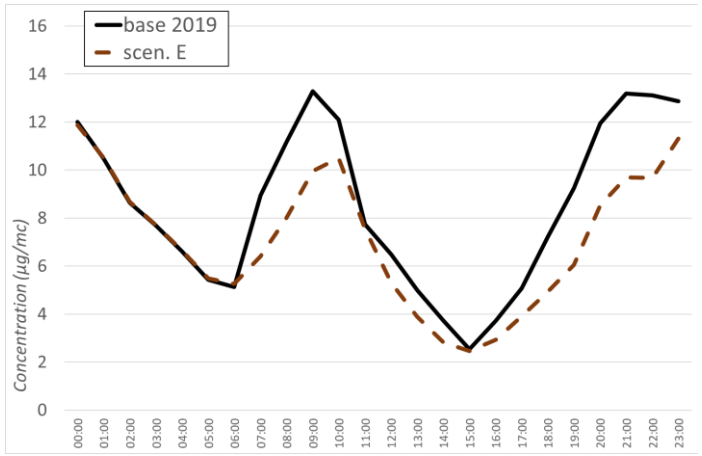
E Scenario
Realization of a centralized biomass plant district heating

Percentage variation map

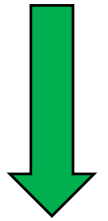
Average concentration



Hourly daily cycle



CO2 flux (municipality)

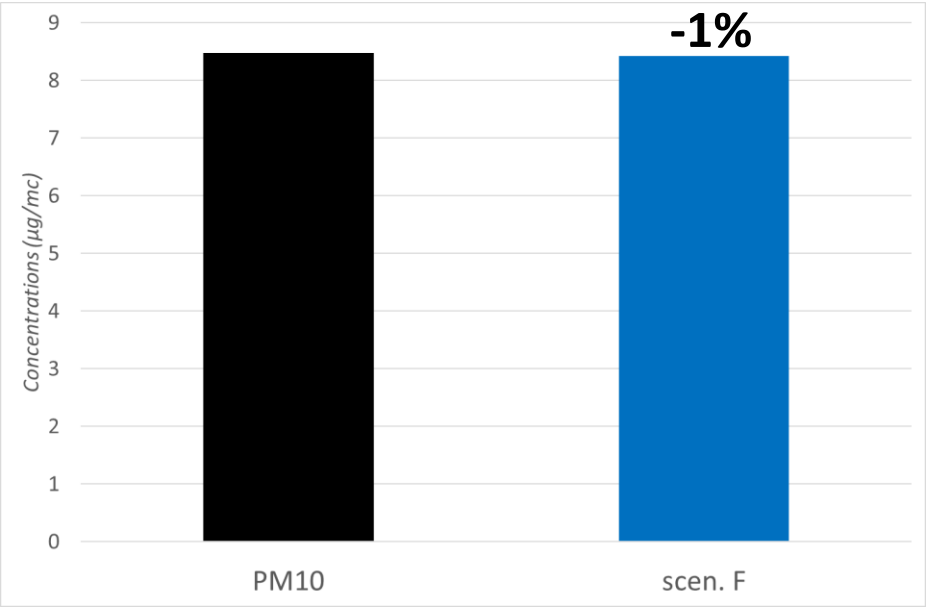


-70%

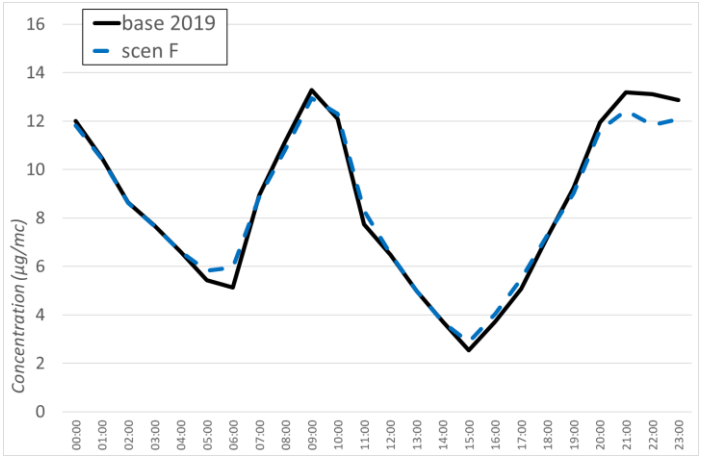
F Scenario
30% of people with secondary heating systems follows the BB-CLEAN mobile app indications

Percentage variation map

Average concentration



Hourly daily cycle



CO2 flux (municipality)

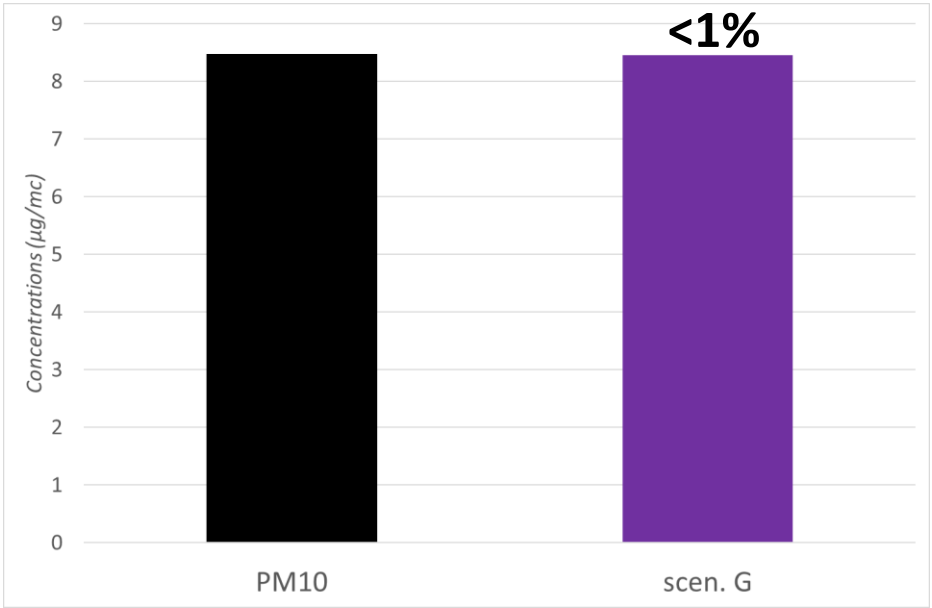
neutral

G Scenario

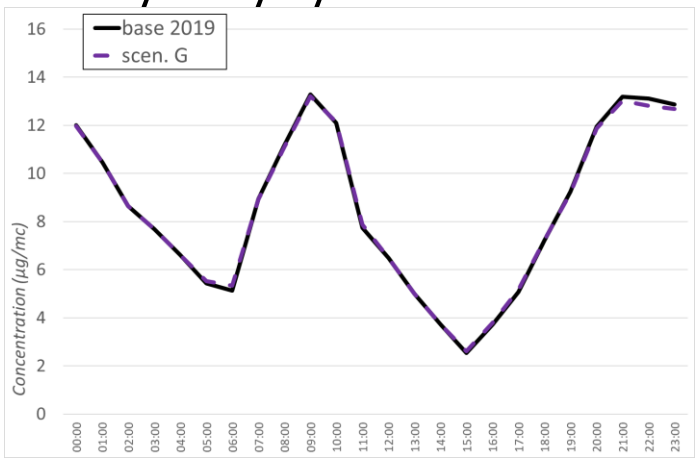
Change of the operational hours of biomass appliances with heat storage systems

Percentage variation map

Average concentration



Hourly daily cycle

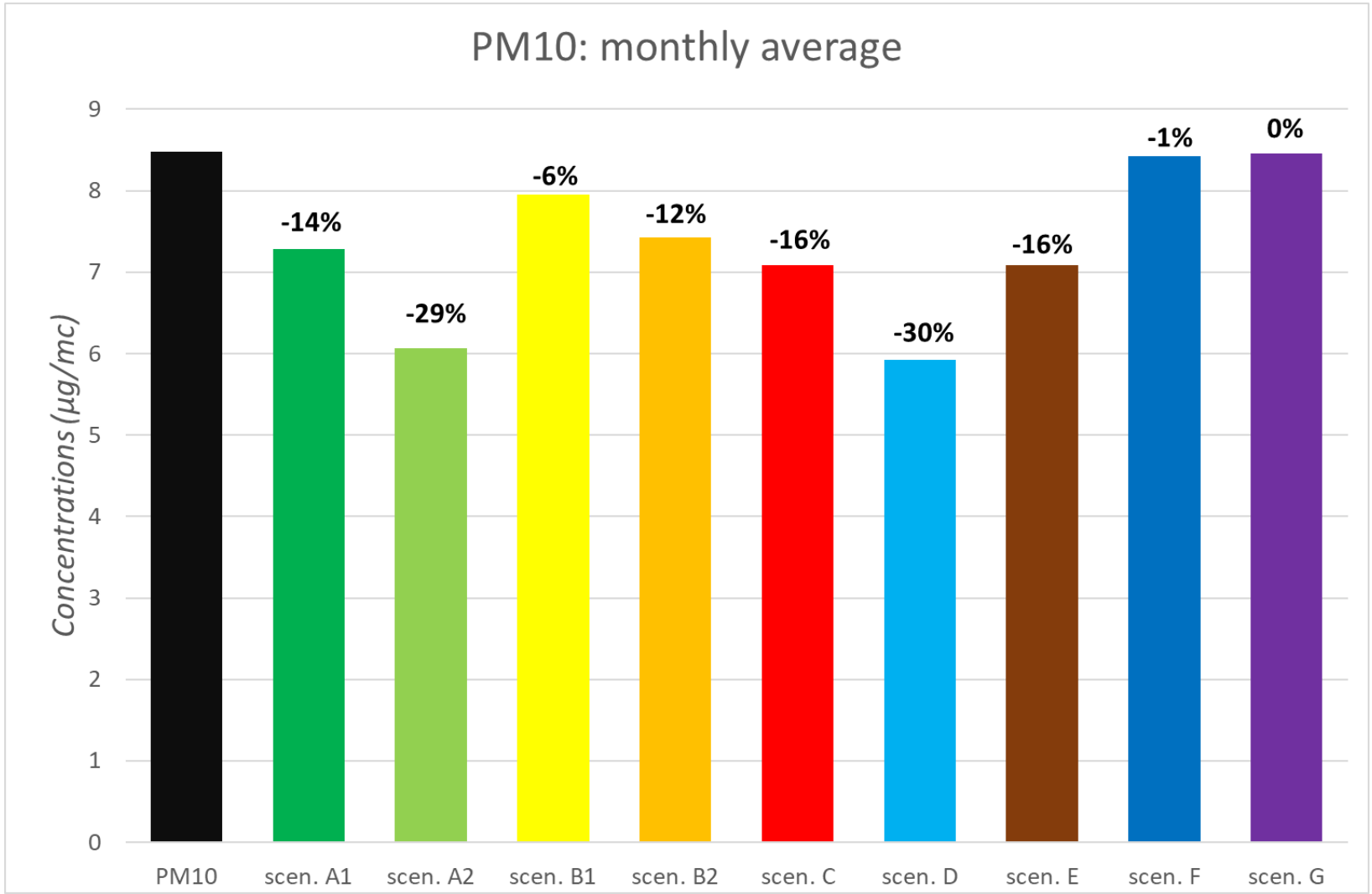


CO2 flux (municipality)

neutral

SAINT MARCEL CASE STUDY: Scenario Summary

Comparison of modelling results in Saint Marcel monitoring station point



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