CH4rLiE

Analysis of the Measurement

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Meeting 09/04/2025
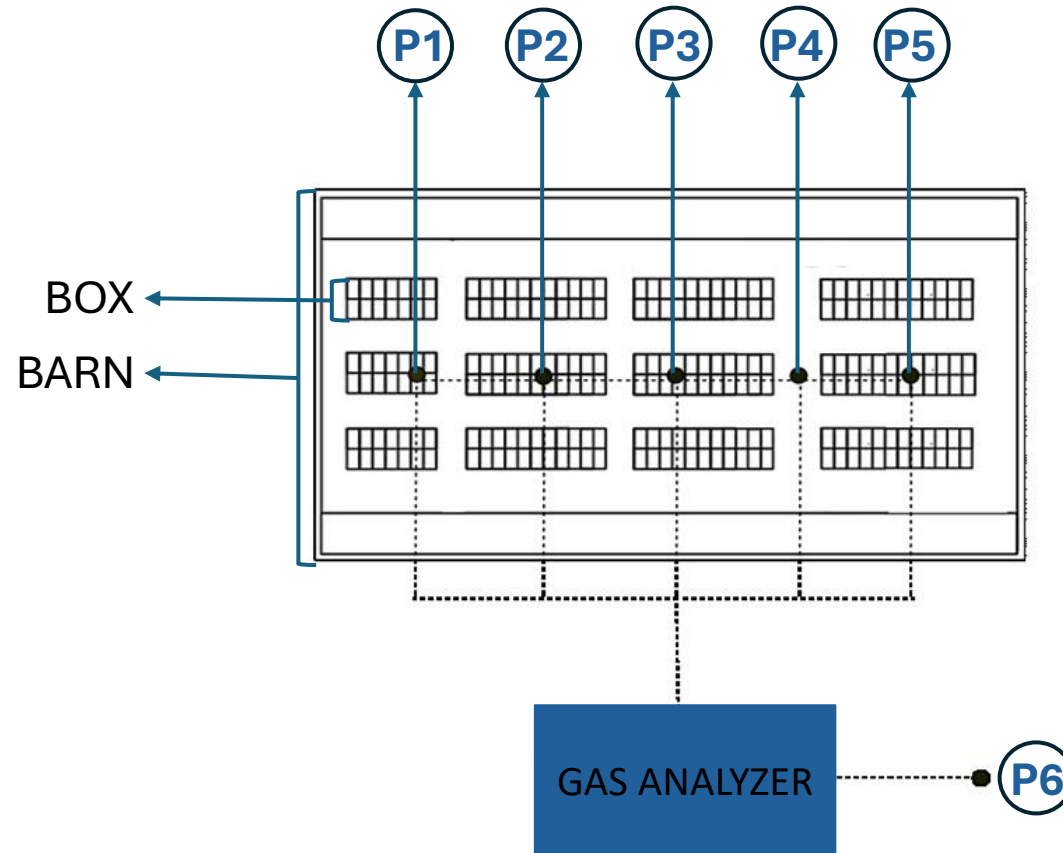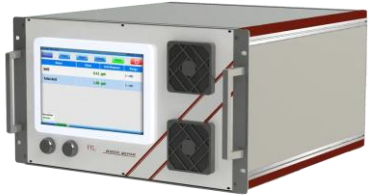
GASEOUS MEASURING APPROACH INSIDE THE BARN

University of Turin measurament:

- External sampling point (h 5 meters): **P6 <u>NOT CONSIDERED</u>**

- Internal sampling points (h 5 meters): **P1 - P2 – P3 – P4 – P5**

MEASUREMENT FREQUENCY

P1 10 min → 7/8 measurement → 7/8 values of CH_4 concentration (ppm)
P2 ...
P3 ...
P4 ...
P5 ...

One cycle of measurement

The sum of the cycles makes up the 24 hour measurement	❗ **Time revelation and duration of the measurements**
Each measurement session consists of 24h of continuous analysis	❗ **High variability**

DISAFA
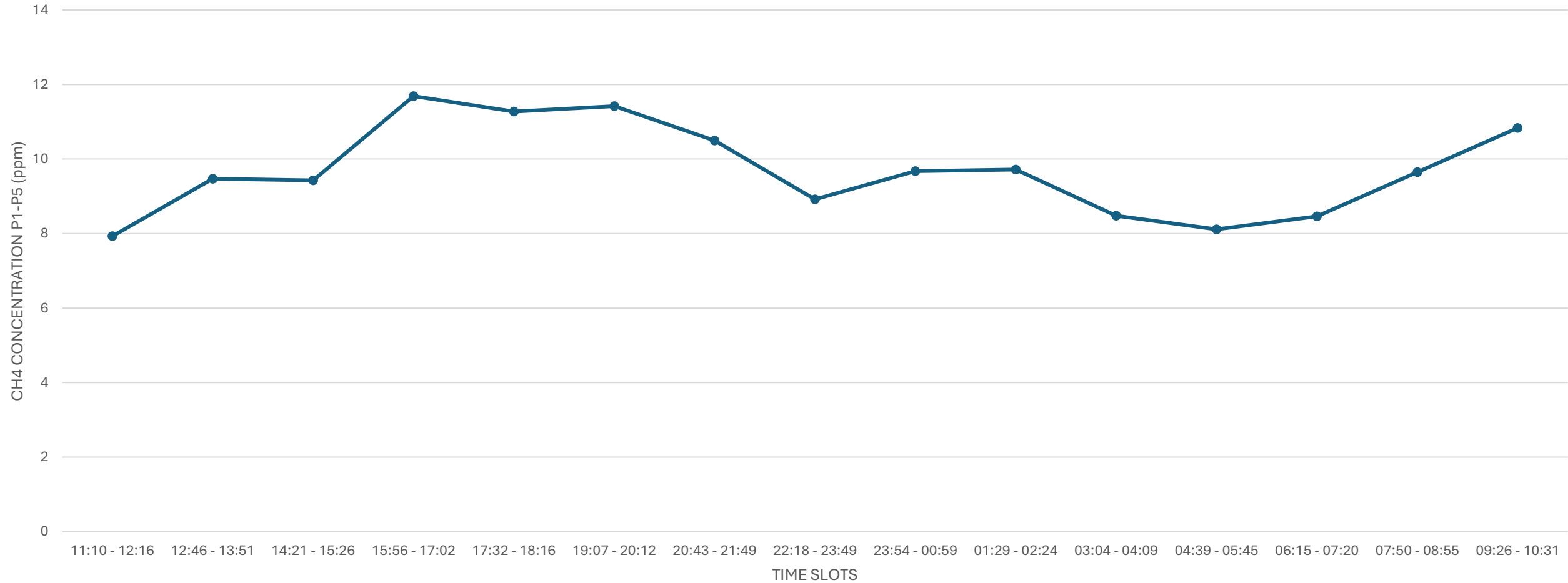Università degli studi di Torino

INFN

DATA ANALYSIS

From all the 24-hour final tables, it's possible to produce the global graph:

1) Grouping each cycle in a single time slot → Take the average of all values from all points (**P1** to **P5**)
2) All the data must be collected in a sigle table → Mach all time slot with a maximum difference of 10/15 minutes.
3) Average all methane concentration to obtain a global value for the barn.
4) Split the data to generate seasonal graphs.

TIME SLOT	CH$_4$ CONCENTRATION P1-P5 (ppm)					AVERAGE
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	
12:46 - 13:51	VALUE OF CH$_4$ PPM	VALUE OF CH$_4$ PPM	VALUE OF CH$_4$ PPM	VALUE OF CH$_4$ PPM	VALUE OF CH$_4$ PPM	**AVERAGE VALUE OF CH$_4$ PPM**
14:21 - 15:26	...	...	...	...	...	...
15:56 - 17:02	...	...	...	...	...	...
17:32 - 18:16	...	...	...	...	...	...
19:07 - 20:12	...	...	...	...	...	...
20:43 - 21:49	...	...	...	...	...	...
22:18 - 23:49	...	...	...	...	...	...
23:54 - 00:59	...	...	...	...	...	...
01:29 - 02:24	...	...	...	...	...	...
03:04 - 04:09	...	...	...	...	...	...
04:39 - 05:45	...	...	...	...	...	...
06:15 - 07:20	...	...	...	...	...	...
07:50 - 08:55	...	...	...	...	...	...
09:26 - 10:31	...	...	...	...	...	...

METHANE CONCENTRATION INSIDE THE BARN

SEASONAL AVERAGE TREND OF METHANE CONCENTRATION INSIDE THE BARN
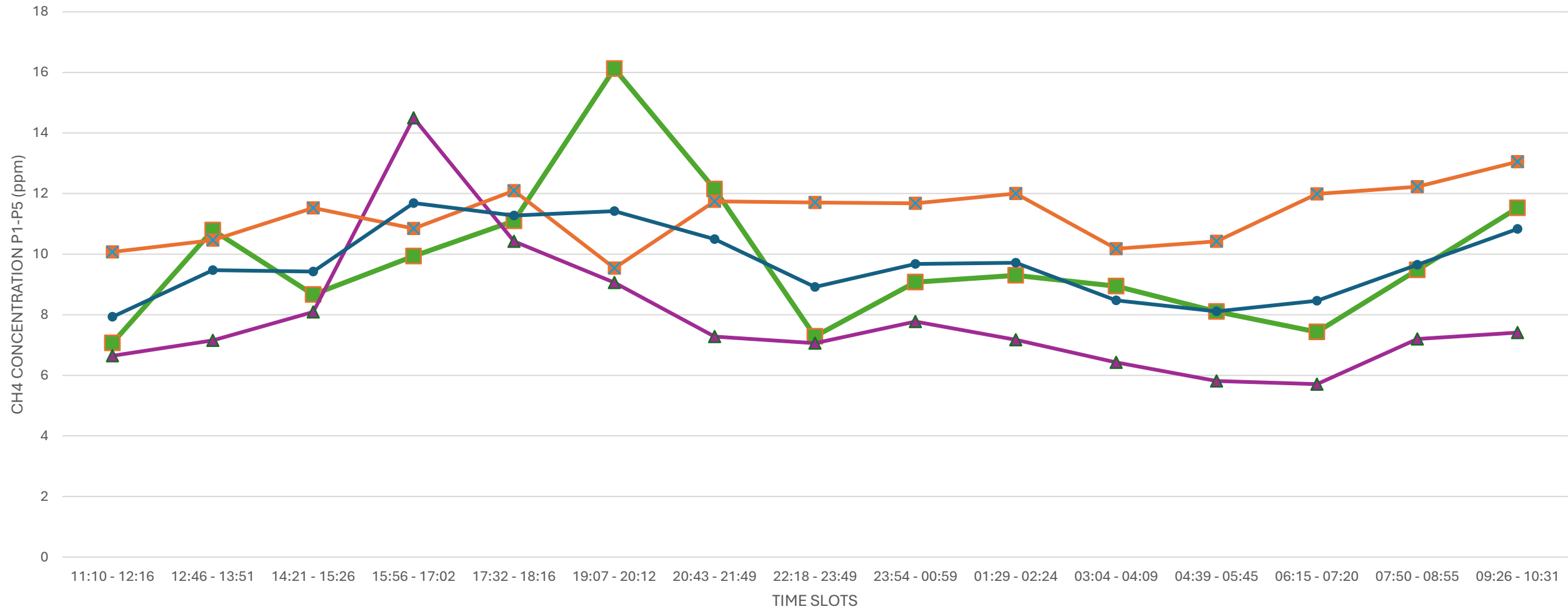
RESULTS AND INFORMATIONS:

- The cows are fed by the farmer at 8:00 am → increase in methane concentration.
- Summer shows a higher average concentration than the other season.
- The Autumn measurements are included in the Summer data.
- The methane concentration values is concentrated in a narrow range.

NEXT STEPS:

- Reformulate the graph to centre the 8:00 am time slot.
- Analyze the data for each individual point (P1 – P5)
- COMSOL simulation (version 4.3) → currently in standby due to a simulation error.