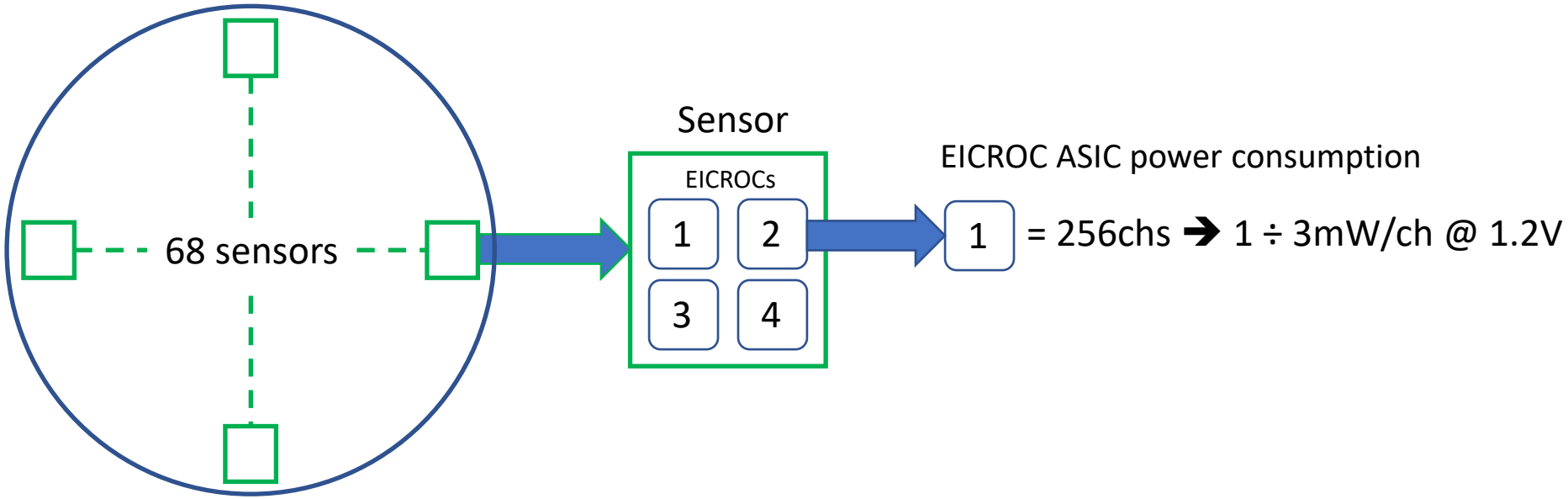
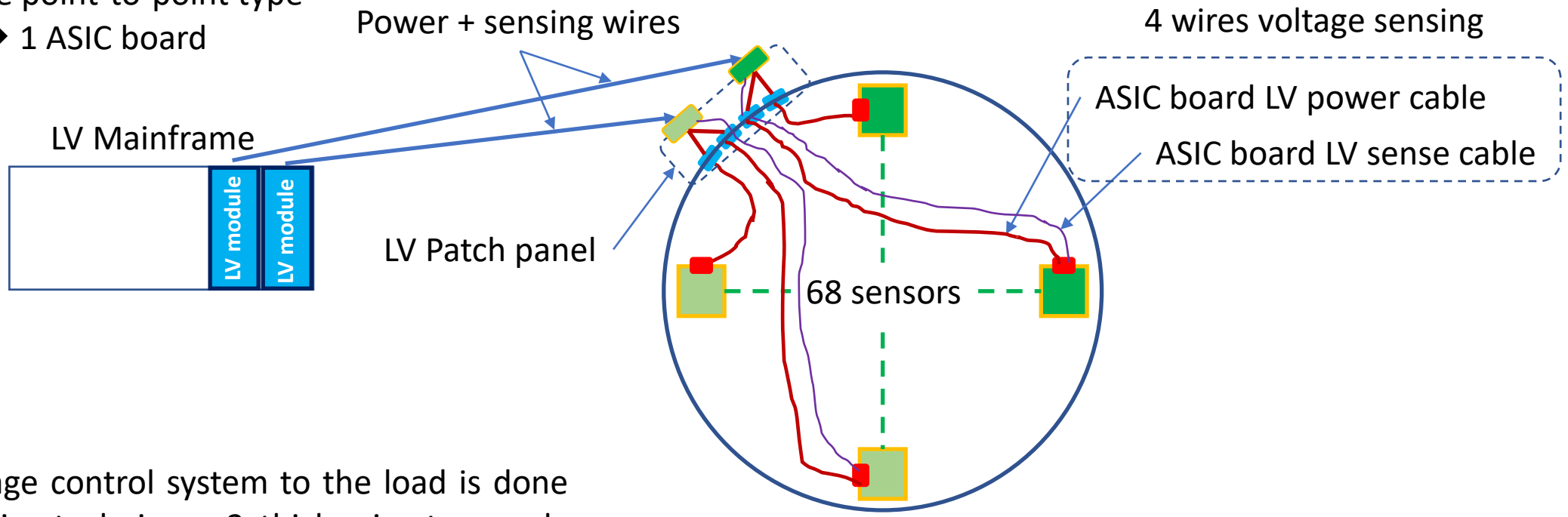
pfRICH LV power (current) budget forecast



- Each Sensor
  - 4EICROCs x 256chs = 1024chs/sensor ➔ @3mW/ch ➔ ~3W/sensor➔2.5A@1.2V
- Whole detector
  - 68sensors x 2.5A ➔ 170A@1.2V ➔ 204W
  - Add 20% extra current for the ancillary electronic components of the ASIC
    - 170A + 20% = 204A@1.2V ➔ 245W
  - Add 20% extra current for safety margin
    - 204A + 20% = **245A@1.2V** ➔ **294W**

LV distribution scheme

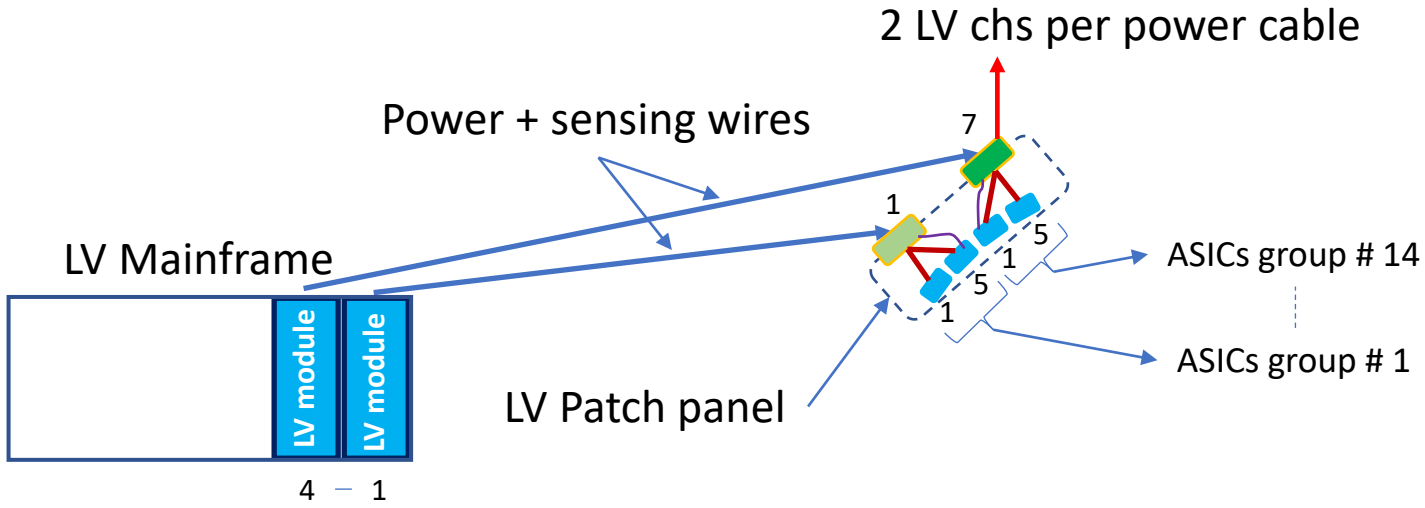
- The proposed scheme is of the distributed type
  - one LV ch ➔ group ASIC board = 5
- rather than the point-to-point type
  - 1 LV ch ➔ 1 ASIC board



- The low voltage control system to the load is done with the 4-wire technique, 2 thick wire to supply the voltage and 2 wire to measure it on the load
  - Feedback voltage measurement is done on the ASIC board most far from the patch panel
- Since the feedback is unique for the group of ASIC boards, the maximum voltage drop-out between the boards could be ~30mV@Imax=3A
  - It can be zeroed if all the supply wires of the ASIC boards have the same length

LV wiring outside the detector (1)

- Assuming a grouping of 5 ASIC boards:
- Number of LV channels = 68/5 ~14



LV Wiener Mpod configuration: ➔ Gran total ~ 17k€ + TVA

- Mainframe Mpod Mini LX LV with controller Mpodc = 5.278,00€
- MPV4008I1: MPOD LV module, 0 ÷ 8V@20A/ch, 4 chs = 2.885,00€
  - 2 x D-Sub 21WA4 connector with 2 LV chs/each = 4chs
- Needed 4 MPV4008I1 modules ➔2.885,00€ x 4 = 11.540,00€

LV wiring outside the detector (2)

Patch panel: ➔ Gran total = 545€ + 1k€ + 2k€ = 3.545,00€ + TVA

- Connectors ➔ total 545€
  - D-Sub type 21WA4 = 11€ x 7 = 77€
  - (68 + 14) x 4€ = 328€
  - Bus bar = 10€ x 14 = 140€
- Patch panel machining = 1k€
- Labor = 2k€

Cabling, estimated 15m long: ➔ Gran total = 267€ x 7 +2k€ = 3.869,00€ + TVA

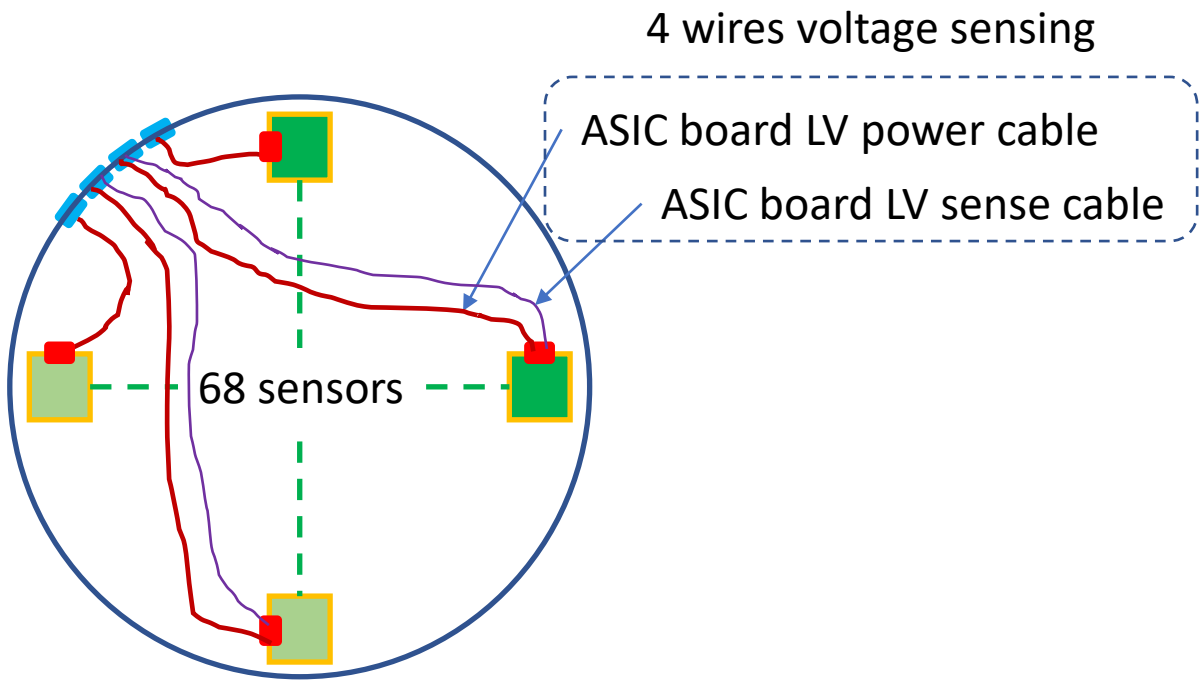
- Shielded Power cable: ➔ total = 267€
  - Complete D-Sub type 21W4= 2 x 11€ + 2 x 10€ (metallic shell) = 42€
  - Cable 4 x 6mm^2 (10AWG): 10€ x 15m =150€
  - Sense cable 8 x 0.5mm^2 (20AWG): 5€ x 15m = 75€
- Labor = 2k€

External detector cables
Global cost = **7.414,00€ + TVA**

LV wiring inside the detector.

Cabling, estimated 1m long: ➔ Gran total = 3.820,00€

- Connectors ➔ total 820€
  - Cable (68 + 14) x 2 x 1mm^2 (18AWG): 2€ x 82 = 164€
  - 2 x (68 + 14) x 4€ = 656€
- Labor = 3k€



LV wiring outside the detector (spare slide CAEN)

CAEN has an LV system (SY8800) in production, which costs about 1/3 of the Wiener one but:

- since the lowest current module is 100A, it forces to group 23 ASIC boards instead of 5 (if you fail the LV channel, you lose 1/3 detector)
- the voltage range is 2V to 7V, they should modify it ad hoc (ASIC board needs 1.2V), assuming it is possible and costs nothing, the question is whether the channel performance is maintained
- In general, Wiener's LV channel performs better in terms of ripple and resolution in both current and voltage.

The infrastructure and wiring part can be considered the same for both Wiener and CAEN.