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Perpetual motion machines: Advance your monitoring with energy harvesting sensors

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- Create superior sensing solutions by avoiding battery power limits.
- Higher ROI by eliminating the costs of fixed installation and wiring.
- Deploy sensing solutions in places hard to reach locations “Only visit once.”

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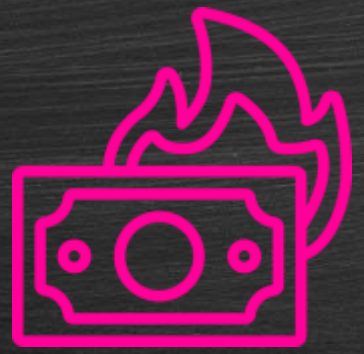
Limitations with batteries

Finite and need replacing

Less data, or loss of data

High capacity batteries are expensive



Changing a battery is a poor use of your time

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Limitations of fixed-power

Cost of professional installation

Long wait times for installation

Long cable runs add to cost

Hard to reach some equipment

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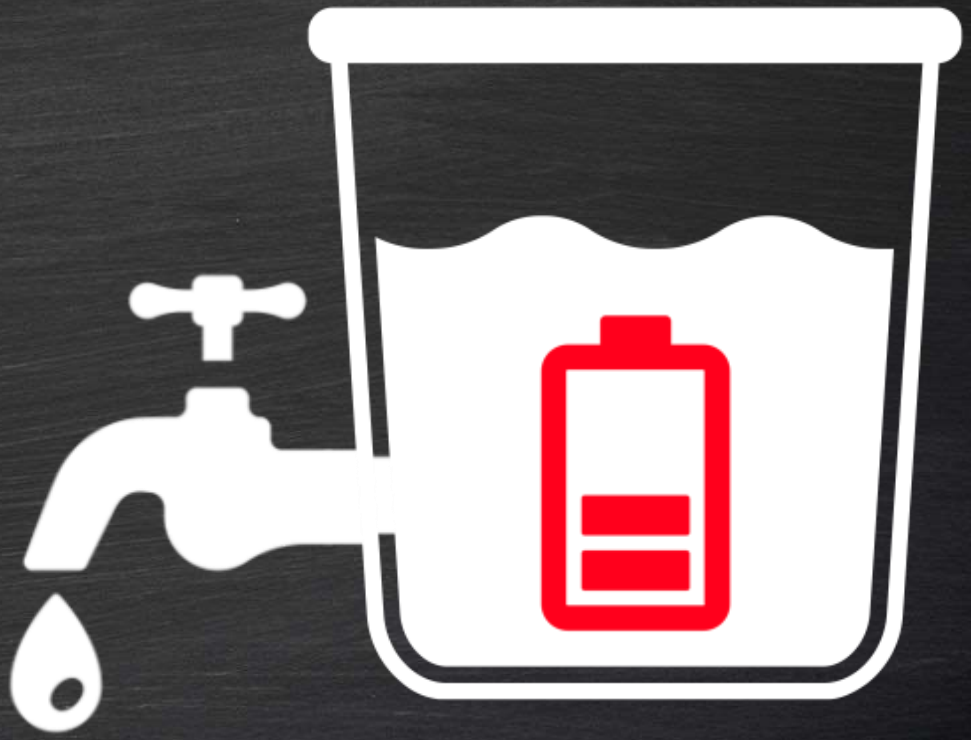
A battery is a bucket of energy

Battery-powered sensors rely on a bucket of energy …

… and that bucket will never be refilled.



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How much is in the bucket?

Alkaline AA cell

2000mAh

1.5V

~ 3000mWh

~ 10,800 Joules

Lithium Thionyl Chloride (Li-SOCL2)

1200mAh

3.6V

~ 4320mWh

~ 15,552 Joules

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A better bucket is a pipe

Energy harvesting tops up that bucket constantly …

… refilling the bucket with energy from another source.

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How much harvesting is enough?

Source	1s	30s	1m	30m	1h	1d
0.1mW	0.1mW	3mW	6mW	180mW	360mW	8.64 W
1mW	1mW	30mW	60mW	1.8 W	3.6 W	86.4 W
10mW	10mW	300mW	600mW	18 W	36 W	864 W
50mW	50mW	1.5 W	3 W	90 W	180 W	4,320 W
100mW	100mW	3 W	6 W	180 W	360 W	8,640 W

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Which energy harvesting source?

Temperature differential

Natural & artificial light

Electrical energy

Vibration & motion

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Thermoelectric harvesting

- Generate electrical energy from temperature differentials
- Particularly good in factories with high temperature processes (e.g. steam)

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Solar harvesting

- Small solar panels on the sensing units covert light into electricity
- Ideal for equipment with exposure to outdoor light
- But still usable with indoor lighting

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Electromagnetic harvesting

- Utilise electromagnetic induction from cabling for electrical equipment
- Non-contact - current transformer (CT) clips around the cable
- CT can provide metrics and analysis as well as being a source of energy

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Vibration harvester

- Utilise the movement of plant and equipment
- Needs to be matched to the characteristics of the equipment
- High-power sources are specialised – e.g. trains

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Energy harvesting sensors

Truly wireless equipment sensors harness power from energy found in their surroundings.

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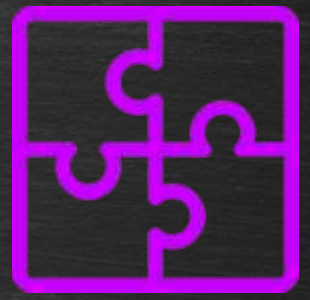
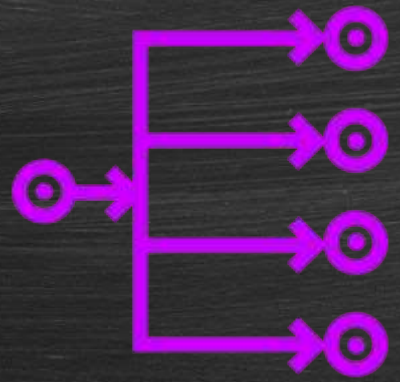
Include equipment & assets

More frequent reporting

More complete datasets



Monitor more metrics in combination



Lower lifetime costs mean faster ROI

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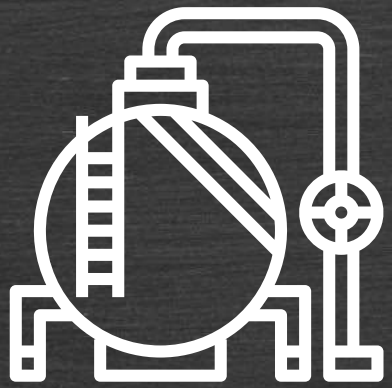
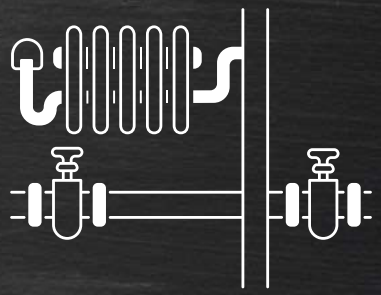
Extend your monitoring

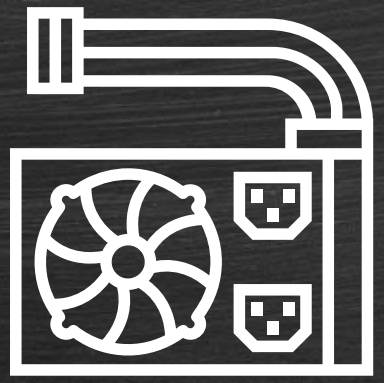
Steam boilers & traps



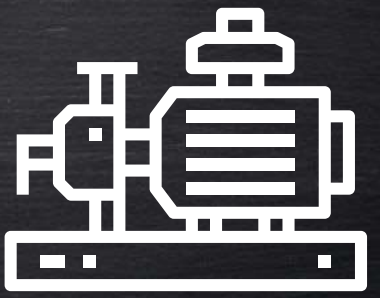
Pipe networks & valves

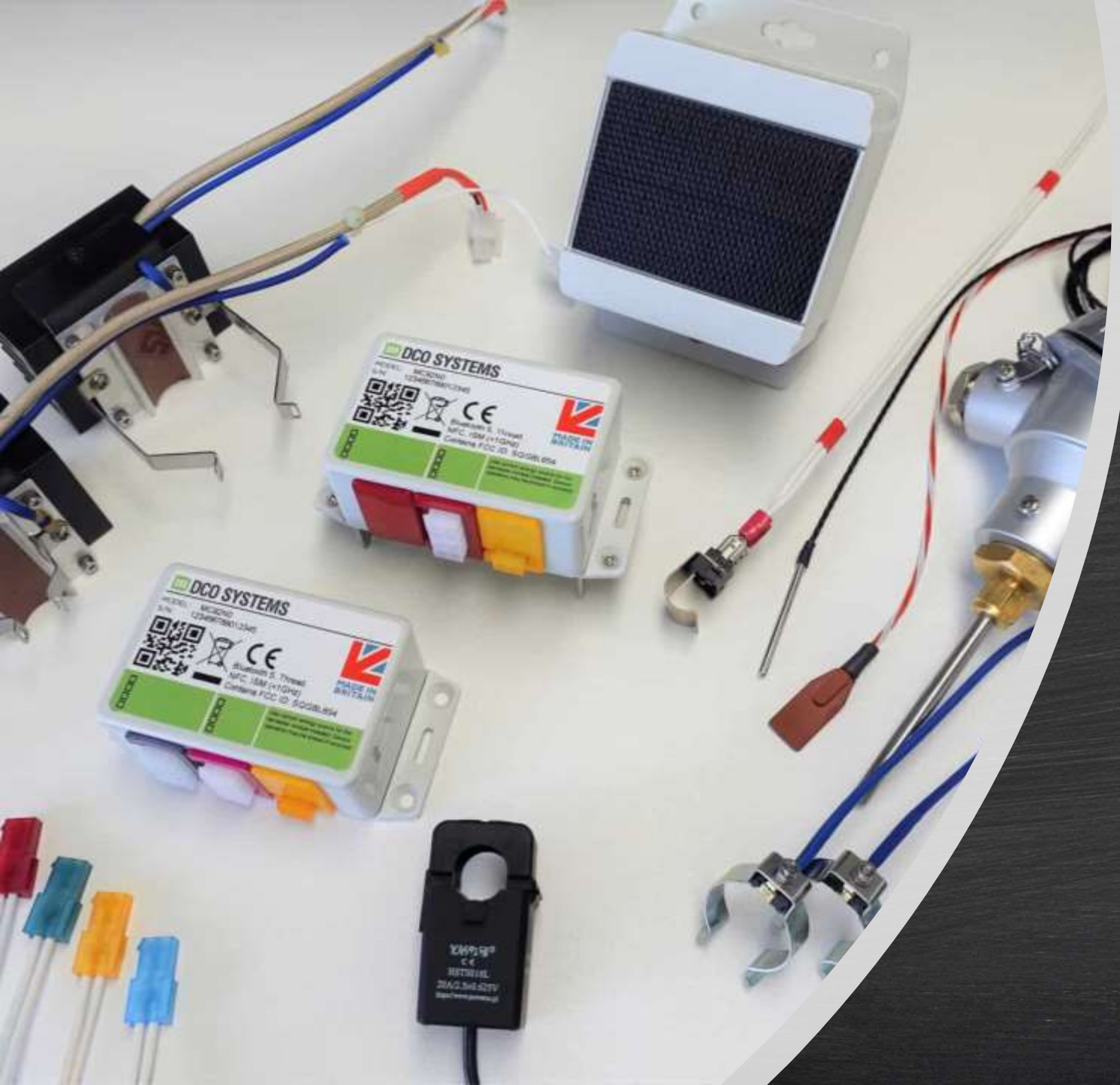


Air handlers & heat exchangers



Motors & drive systems





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Get in touch!

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