The status quo: Traditional reinforcement of the electricity network

Solution description:

DNOs typically adopt a traditional approach to expanding electricity networks to meet additional demand requirements and the short-term peaks that require additional capacity.

Expanding electricity infrastructure this way is known as **'network reinforcement'** and involves investing in ***more overhead lines, underground cables and substations***.

When and if this is ever needed, it can be a costly, lengthy and disruptive undertaking. It does however ensure that there are always sufficient margins to cope with the worst case supply and demand scenarios.

If 'reinforcement' work was ever needed in my local area, what potentially, would I notice?

- **Urban areas** - Extensive works to replace/install more underground cables and equipment. This involves disruptive excavation work, which typically lasts around a week. It can cause noise and inconvenience to customers living or working in the immediate vicinity of substations. Road works/barriers, road closures and heavy lifting equipment can disrupt traffic flow, parking and impact the trade of local businesses
- **Rural areas** - The impact of installing new overhead poles, lines and equipment is different but can be equally as disruptive to the local community
- Reinforcement raises overall operating costs, which are reflected in increases in all customers' bills to cover the required investment.

What are the benefits?

✓ The network can meet increased demand

✓ No restrictions on electricity usage and to some degree, a customers ability to generate electricity

£ £ £ £ £

Typically between £15,000 and £25,000 per site

TECHNIQUE : FANS/HEAT EXCHANGE EK

Heat exchange and air conditioning solutions

Solution description:
A substation could be cooled using fans, pumps or an extractor unit, in the substation compound/building. This system is controlled automatically by thermostats.

Additional vents are also required in the substation building (or the metal/plastic housing) to allow air flow, to remove heat from the substation and cool-the equipment inside it.

What am I likely to have noticed?

- A change in the appearance of the substation
- Potential audible difference

What are the benefits?

- ✓ ***Long term network and customer benefits from removing thermal constraints on equipment***
- ✓ Minimal impact, relative to the size of the substation
- ✓ Minimal customer disruption during installation
- ✓ No supply interruption occurred during installation

Cost to implement relative to traditional reinforcement:

£ £ £ £ £

Traditional reinforcement between x2 and x3 the cost of this technique to implement

TECHNIQUE : FANS/HEAT EXCHANGE PA

Heat exchange and air conditioning solutions

Solution description:
A substation could be cooled using fans, pumps or an extractor unit, in the substation compound. These are strategically placed in secure cabinets, fitted to the substation building. This system is controlled automatically by thermostats.

Additional vents are also required in the substation building (or the metal/plastic housing) to allow air flow, to remove heat from the substation and cool-the equipment inside it.

What am I likely to have noticed?

- A change in the appearance of the substation
- Potential audible difference

What are the benefits?

- ✓ ***Long term network and customer benefits from removing thermal constraints on equipment***
- ✓ Minimal impact, relative to the size of the substation
- ✓ Minimal customer disruption during installation
- ✓ No supply interruption occurred during installation

Cost to implement relative to traditional reinforcement:

£ £ £ £ £

Traditional reinforcement between x2 and x3 the cost of this technique to implement

TECHNIQUE : SHADING

Shading substations to shield them from direct sunlight

Solution description:

Shading could be fitted over the top of substation equipment to absorb or reflect heat/solar radiation, to prevent equipment from overheating.

What am I likely to notice?

- A change in the appearance of the substation

What are the benefits?

✓ ***Long term network and customer benefits from removing thermal constraints on equipment***

✓An effective solution in locations where solar heat gain is significant
✓ No audible impact on customers
✓ Minimal customer impact to install, which does not interrupt supply

Cost to implement relative to traditional reinforcement:

£ £ £ £ £

Traditional reinforcement between x15 and x25 the cost of this technique to implement

TECHNIQUE : PAINT
Solar reflective paint

Solution description:

Painting substations and substation equipment with reflective paint to deflect solar radiation. This can reduce the impact of the sun in raising the temperature of equipment.

Less heat is absorbed from the sun (sometimes called ‘solar radiation’).

What am I likely to have noticed?

- A change in the colour of the substation equipment ~~to white or~~
- Painting either the entire structure or just the roof of the substation building. **In each instance, the colour is most likely to be white.**

What are the benefits?

✓ ***Long term network and customer benefits from removing thermal constraints on equipment***
✓ Minimal customer impact during installation
✓ Easy to apply and widely available
✓ No impact in terms of noise
✓ Can be applied without any interruption to electricity supply
✓ An effective solution in locations where solar heat gain is significant

Cost to implement relative to traditional reinforcement:

£ £ £ £ £

Traditional reinforcement between x15 and x25 the cost of this technique to implement

TECHNIQUE : VENTS ONLY

Vents installed on the substation structure

Solution description:

Vents in substations can be repositioned and/or additional vents could be installed. This can improve the flow of air inside the substation, to remove heat, helping to cool the equipment inside it.

What am I likely to have noticed?

- A small change in the appearance of the substation

What are the benefits?

✓Long term network and customer benefits from removing thermal constraints on equipment

- ✓ Minimal visual impact / minimal audible impact
- ✓ Minimal customer disruption during installation
- ✓ No supply interruption occurs during installation

Cost to implement relative to traditional reinforcement:

£ £ £ £ £

Traditional reinforcement between x15 and x25 the cost of this technique to implement

TECHNIQUE : VENTS AND PAINTED ROOF

Vents installed on the substation structure and the roof of the grounded substation painted

Solution description:
Vents in substations can be repositioned and/or additional vents could be installed. This can improve the flow of air inside the substation, to remove heat, helping to cool the equipment inside it.

In addition, the roof of the substations could be painted with reflective paint to deflect solar radiation and reduce the impact of the sun in raising the temperature of the equipment inside it. Less heat will be absorbed from the sun, while internal heat is being emitted.

What am I likely to have noticed?

- A small change in the appearance of the substation
- A change in the colour of the roof of the substation

What are the benefits?

✓Long term network and customer benefits from removing thermal constraints on equipment

- ✓ Easy to implement and widely available
- ✓ No impact in terms of noise
- ✓ Minimal visual impact
- ✓ No supply interruption would occur during installation
- ✓ An effective solution in locations where solar heat gain is significant

Cost to implement relative to traditional reinforcement:

£ £ £ £ £

Traditional reinforcement between x15 and x25 the cost of this technique to implement

TECHNIQUE OVERVIEW

Shading over the substation

Impact:
Changed the appearance of the substation

Benefit:
Little customer impact
Minimal customer disruption during installation
An effective solution in locations where solar heat gain is significant

Painting the substation

Impact:
Changed the appearance of the substation

Benefit:
Little customer impact
Minimal customer disruption during application
An effective solution in locations where solar heat gain is significant

Fan/heat exchange system – internal

Impact:
Small change in appearance on the substation, and a potential audible difference

Benefit:
Minimal impact on the customer
Minimal customer disruption during installation

Vents

Impact:
Small change in the appearance of the substation

Benefit:
Minimal customer disruption during installation
Minimal impact on the customer

Vents and painted roof

Impact:
Small change in the appearance of the substation

Benefit:
An effective solution in locations where solar heat gain is significant
Minimal impact on the customer

Fan/heat exchange system – external

Impact:
Small change in appearance with equipment attached on or next to the substation, and a potential audible difference

Benefit:
Minimal impact on the customer
Minimal customer disruption during installation