



Network Losses and Energy Efficiency

Community Energy Forum

19th November 2020

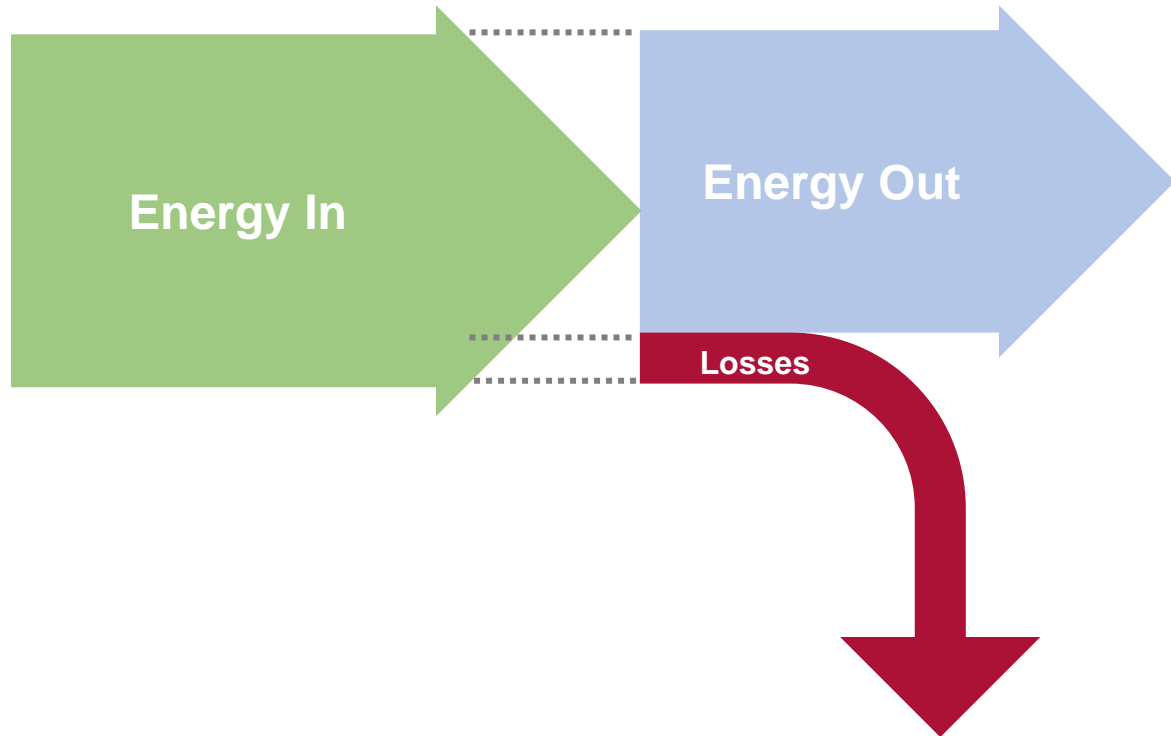
Mark Callum

Purpose of engagement

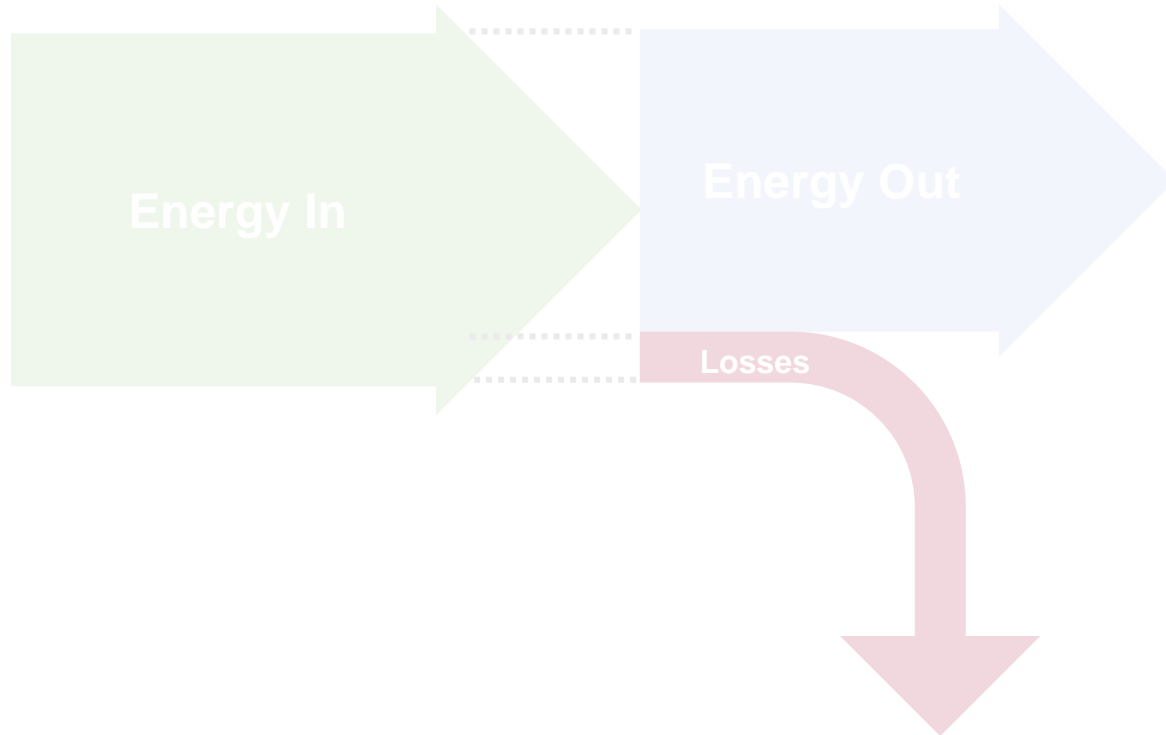
1. Explain the link between network losses and energy efficiency
2. Explain our future strategy
3. Gain your feedback
4. ...Improve our future strategy



What are losses?

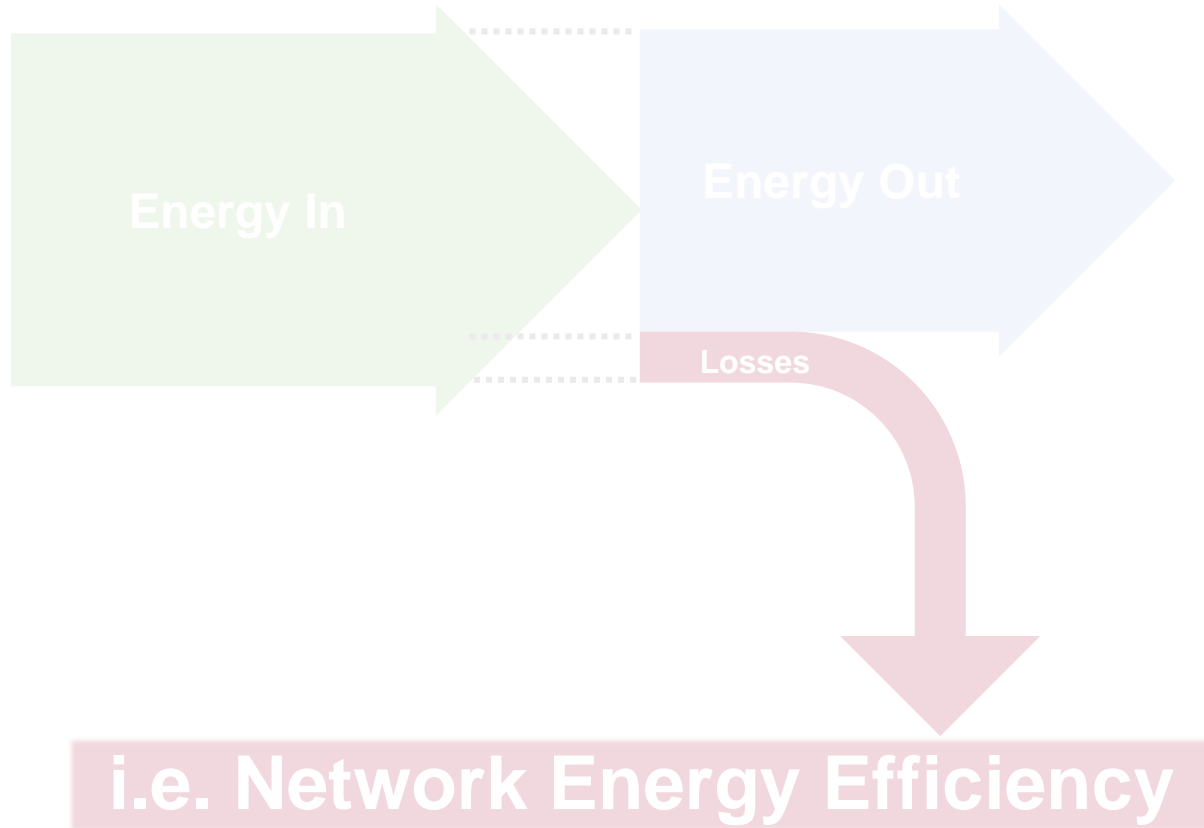


What are losses?



i.e. Network Energy Efficiency

What are losses?



In a nutshell:

1. 6% losses, each year:

- a) 2 TWh or 174 kWh for avg. bill
- b) £100m or £8.70 for avg. bill
- c) 400 tCO₂e or 35 kgCO₂e for avg. bill

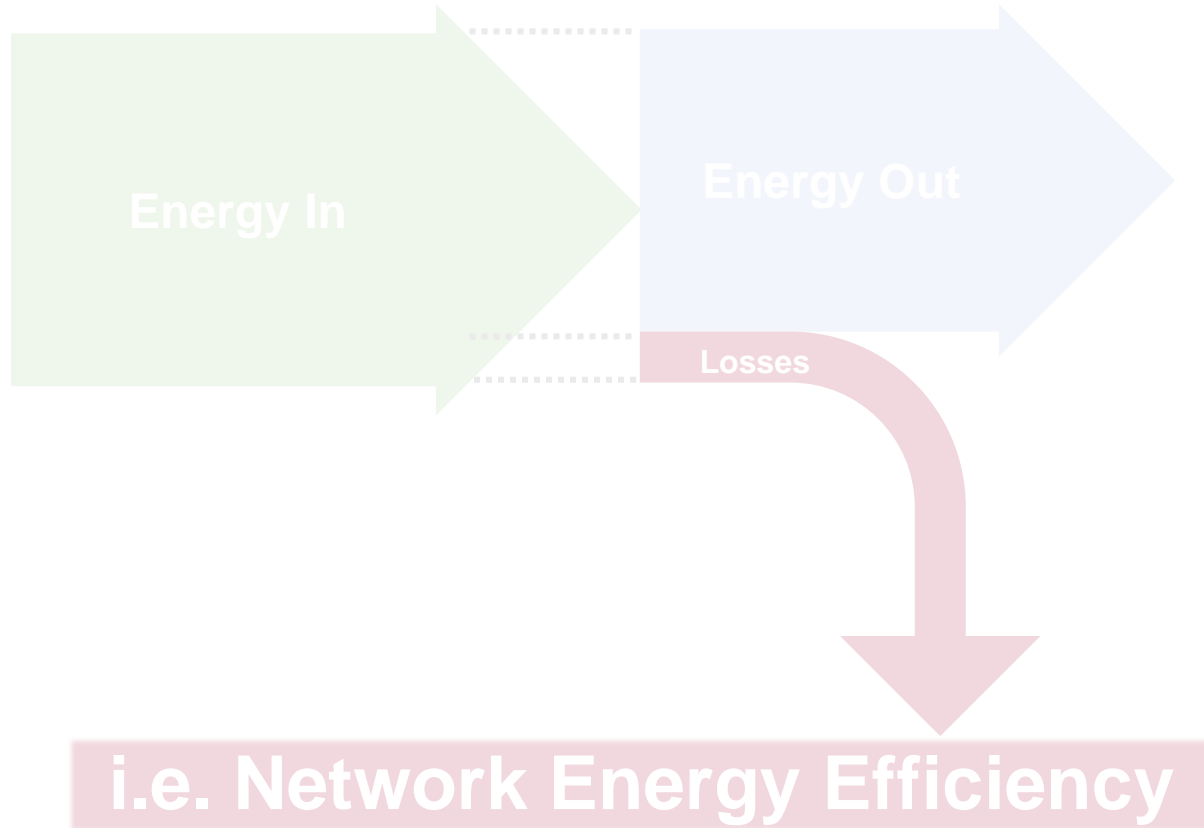
2. Losses are expected to **increase*** as we decarbonise (*but become lower carbon*)

3. We undertake many initiatives to optimise our network energy efficiency

4. We are innovating to improve our customers' energy efficiency

5. We think our customers can help...

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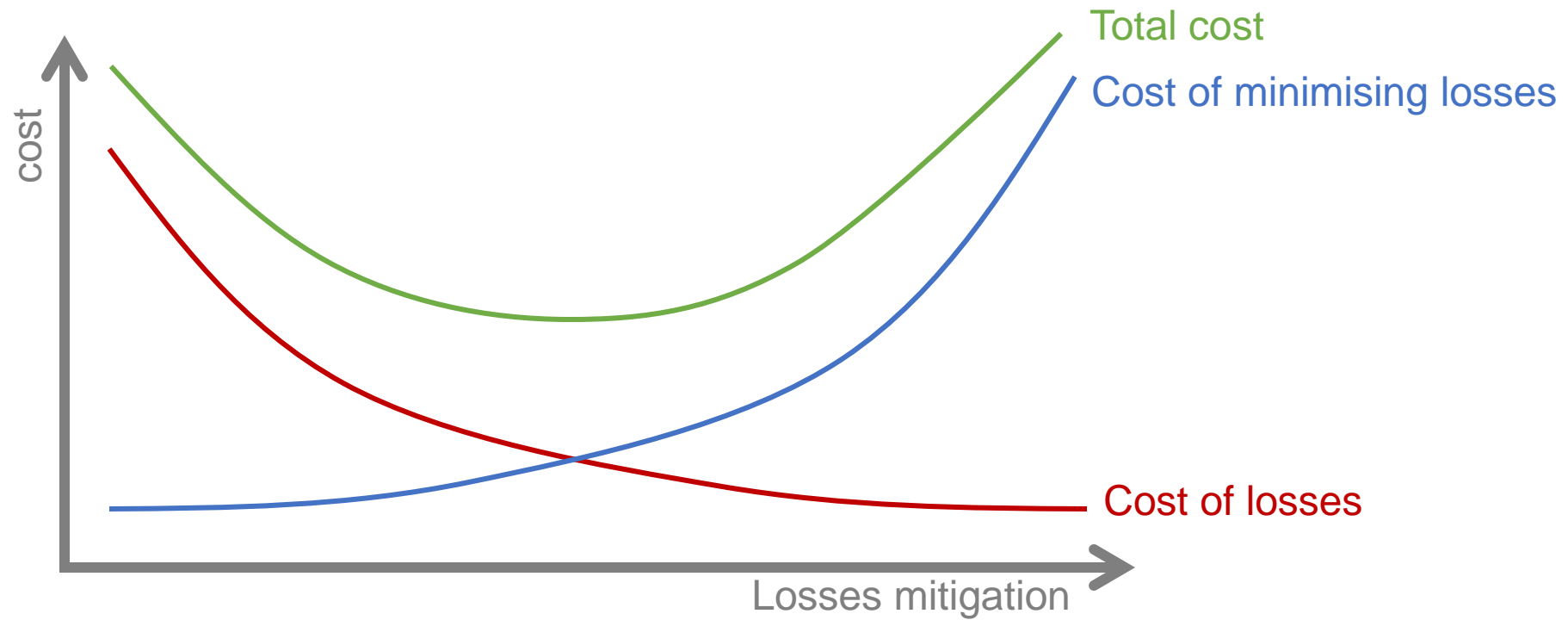
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Strategy in a nutshell

Optimising whole system losses whilst facilitating decarbonisation.

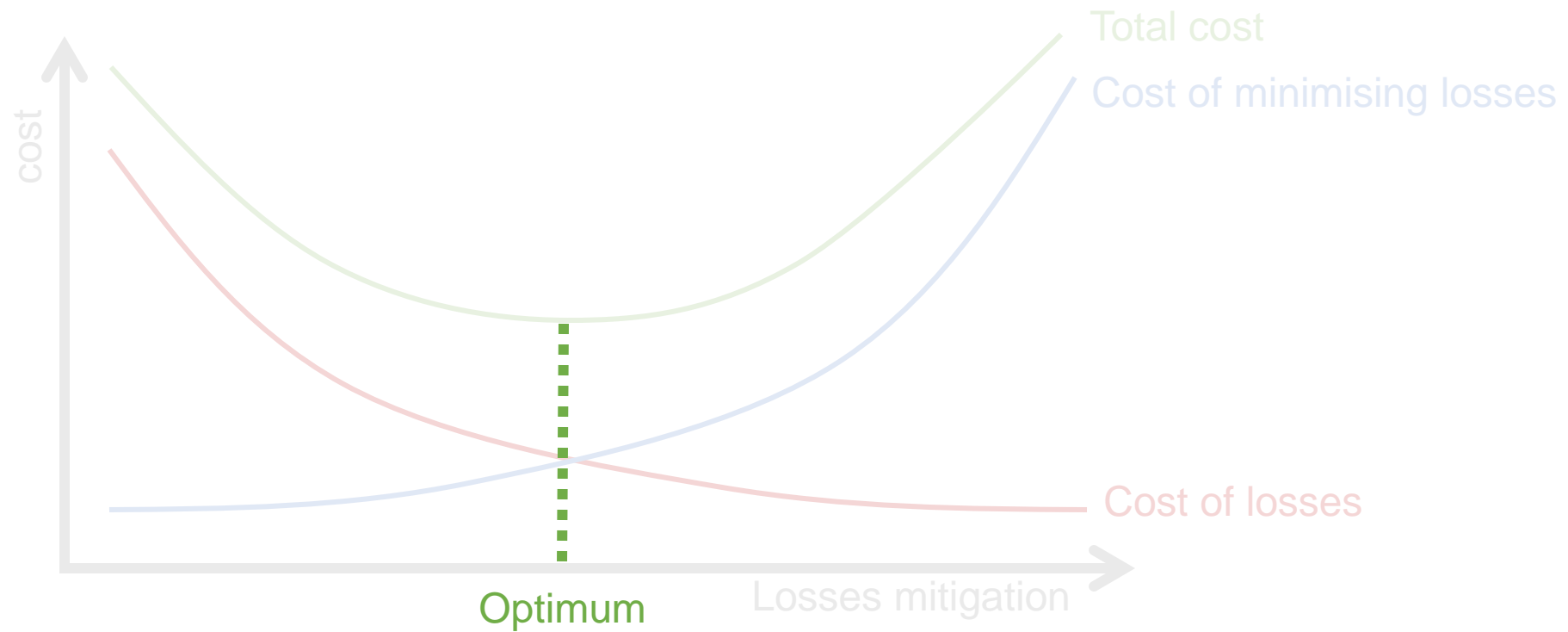
Strategy in a nutshell

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Northern Powergrid Actions

1. Asset replacement synergies

- Replace **high-loss assets** with low-loss assets
- **Upgrade networks**; e.g. split-phase, unbalanced, or 6 kV networks
- **Targeted network reinforcement** (e.g. network bottlenecks)

2. Design policy

- Review of **service connections** (e.g. single phase vs. three phase)
- **Optimised asset sizing**, taking into account future load growth (net zero)
- Explore **innovative technology/techniques for whole system optimisation**

3. Asset specification

- Investigate **novel technologies**, e.g. power electronic transformers, superconducting materials etc.
- Progress **continuous improvement of existing technology/specifications**; e.g. amorphous core transformers

4. Network operation

- **Voltage optimisation**
- Active network management
- Assess flexibility use for losses benefit
- **Multi-objective optimisation (using new data and tools)**

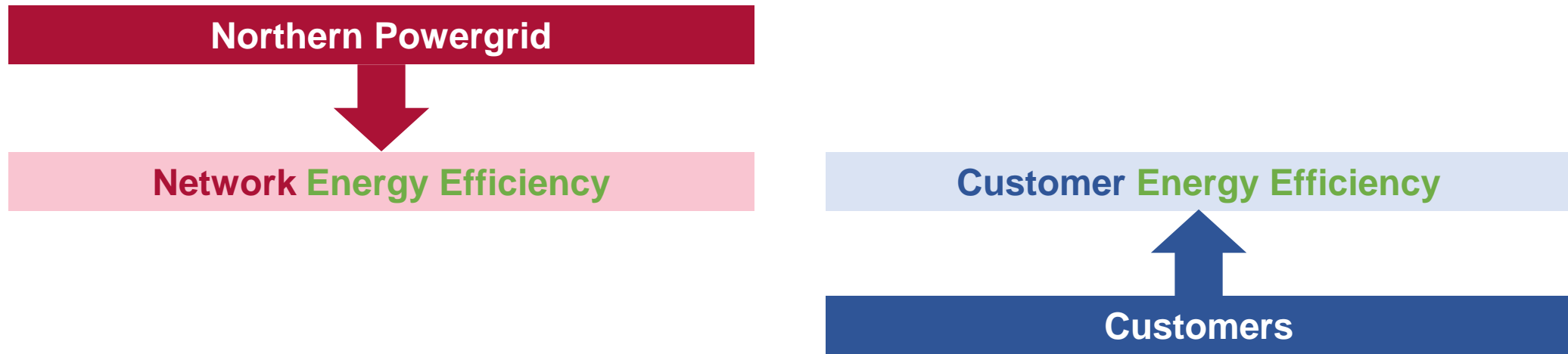
5. Data

- Continue **increasing data availability** across network (inc. smart meters)
- **Analyse data** using new techniques and tools to optimise planning and operation

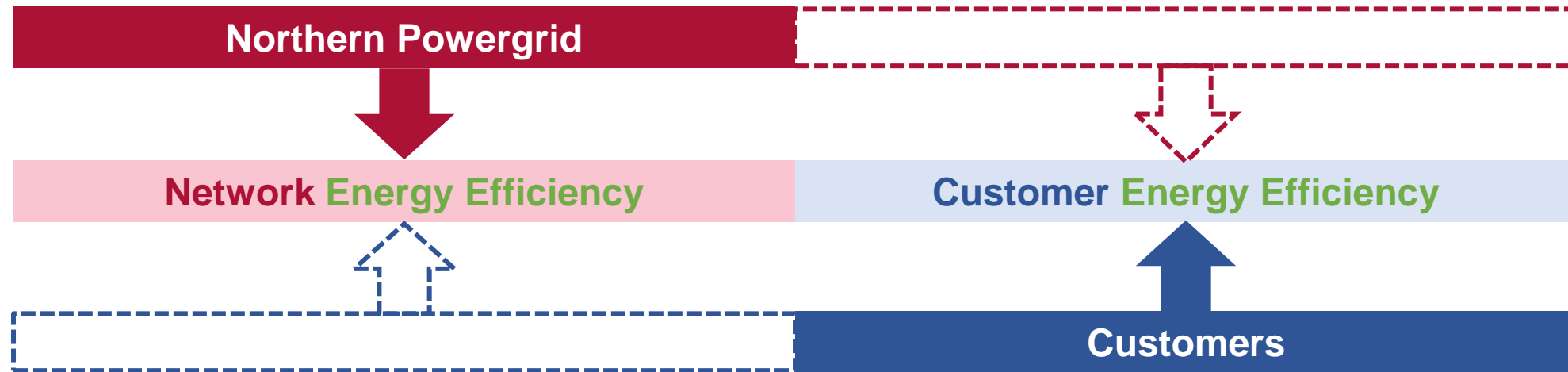
6. Non-technical initiatives

- **Energy efficient substations**
- Using data (inc. smart meters) to **better manage non-technical losses** (inc. theft)

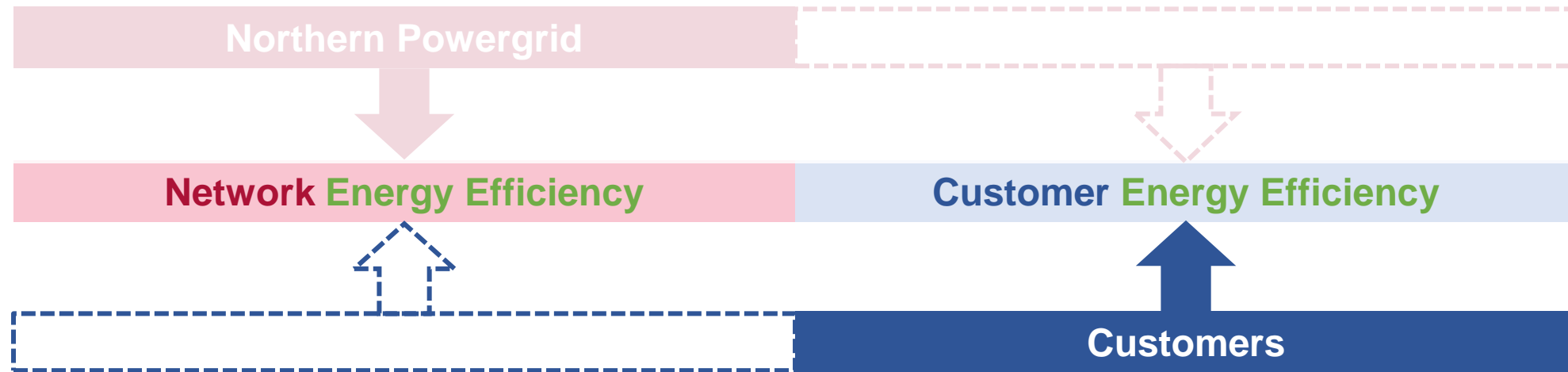
Whole System Optimisation



Whole System Optimisation



Customers... and the whole system



Customers... and the whole system

1. Energy efficiency (reduce demand)

Reduced energy consumption...

Saves customers money

Reduces carbon emissions

Reduces losses

2. Demand shifting (to off-peak times)

Using off peak electricity...

Could save customers money

Reduces carbon emissions

Reduces losses



<https://carbonintensity.org.uk/>

Customers... and the whole system

0. Education

- Our customers all play a major role in decarbonising the whole system
- Education is a critical enabler

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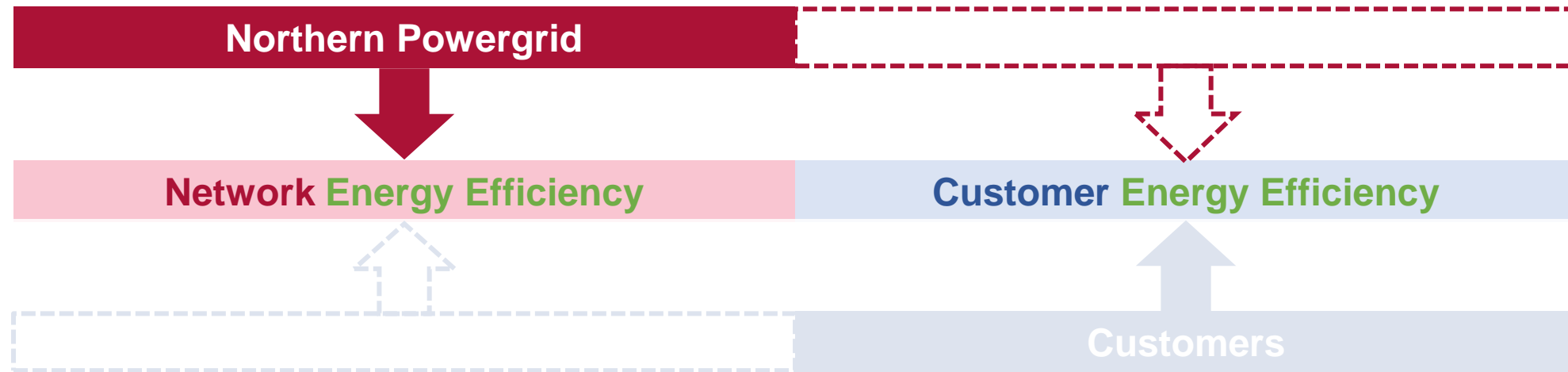
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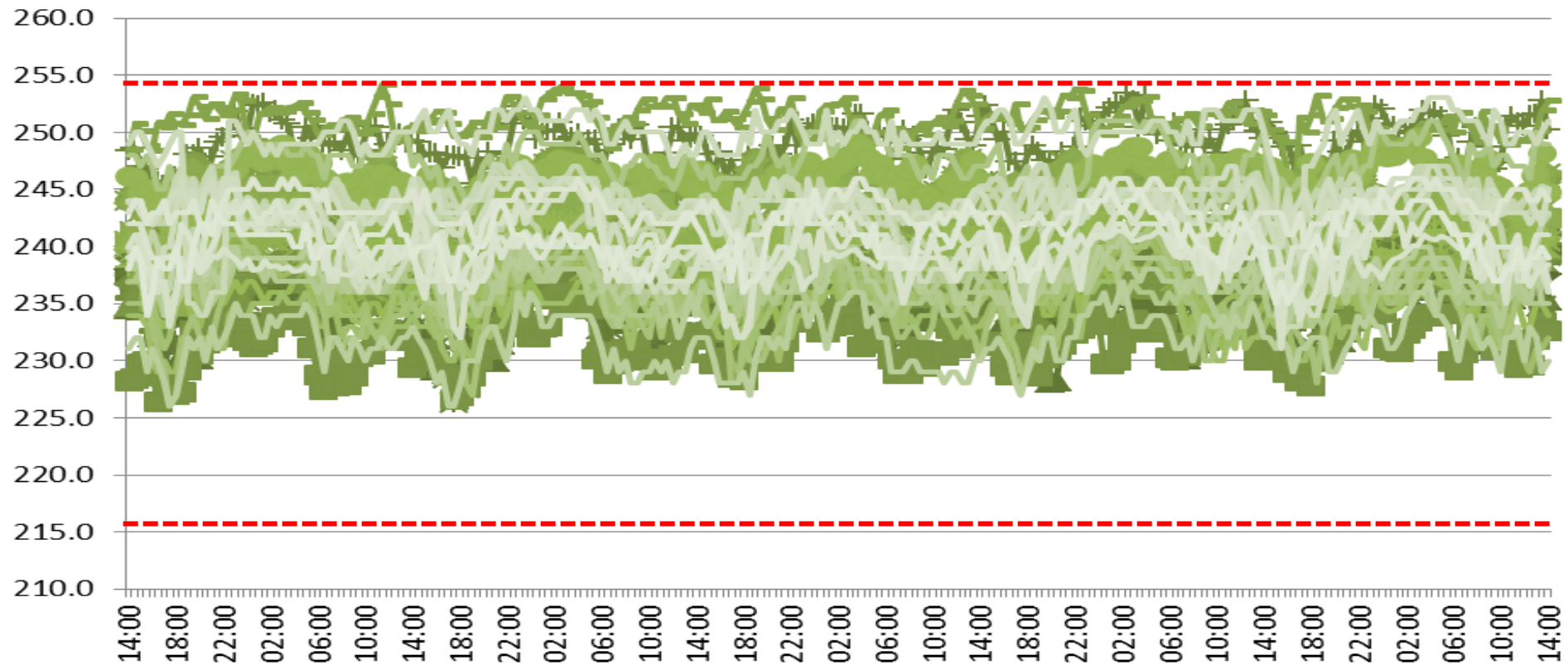
Northern Powergrid... and the whole system



Northern Powergrid... and the whole system

B O S T  N S P A
energy efficiency trial

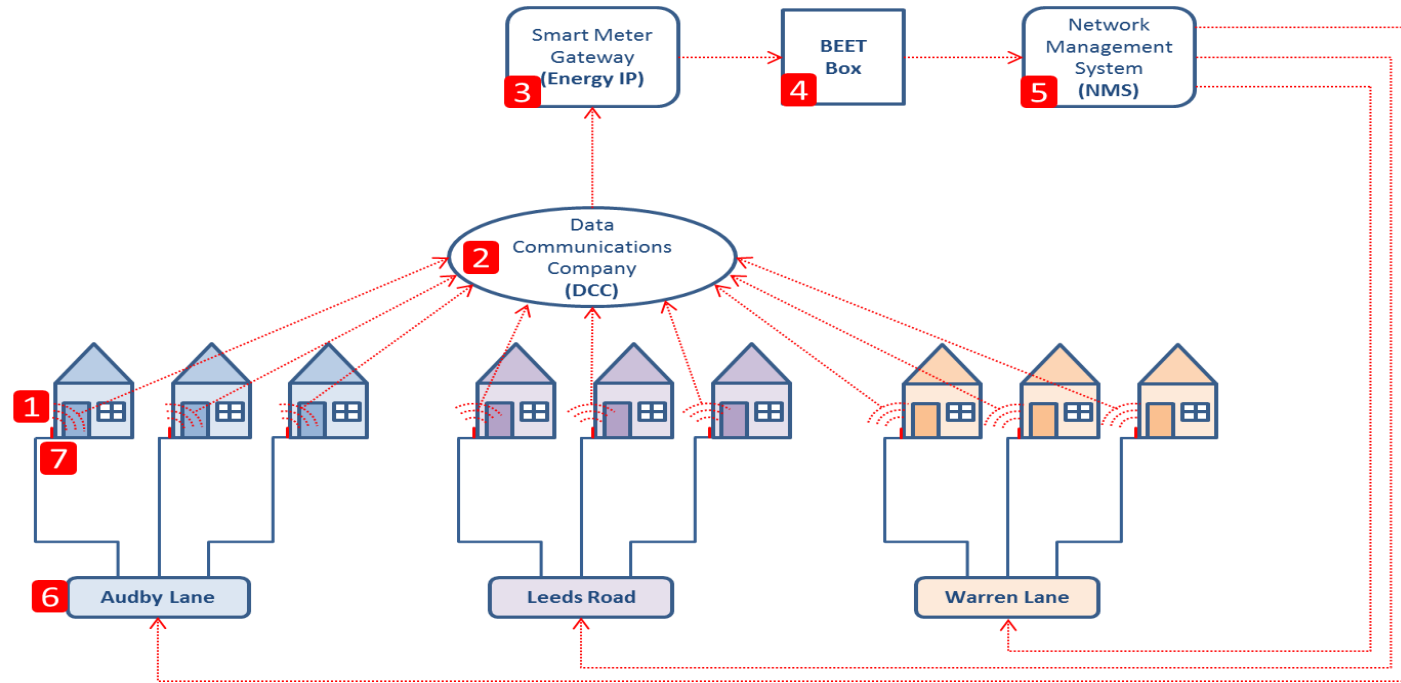
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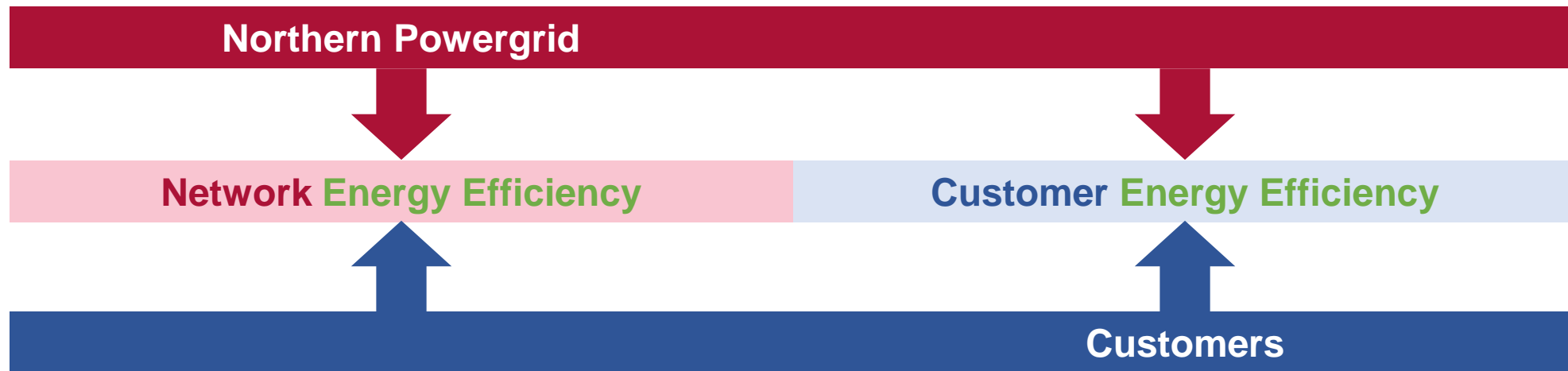


BEET = Boston Spa Energy Efficiency Trial

Northern Powergrid... and the whole system

Customer Level	Unit	Potential Annual Benefit (for given percentage voltage optimisation)					
		1%	2%	3%	4%	5%	6%
Typical Domestic	kWh	30	60	90	120	150	180
	£	5	9	14	18	23	27
	kgCO2e	9	18	27	36	45	54
BEET Trial Area (15,000 customers)	MWh	450	900	1,350	1,800	2,250	2,700
	£k	68	135	203	270	338	405
	tCO2e	135	270	405	540	675	810
Northern Powergrid (3.9m customers)	GWh	117	234	351	468	585	702
	£m	18	35	53	70	88	105
	ktCO2e	35	70	105	140	176	211
Great Britain (28.5m customers)	GWh	855	1,710	2,565	3,420	4,275	5,130
	£m	128	257	385	513	641	770
	ktCO2e	257	513	770	1,026	1,283	1,539

Northern Powergrid... and the whole system



Thank you

losses@northernpowergrid.com

<https://www.northernpowergrid.com/losses>