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# Line Losses

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## Accounting

Electricity Sources = Electricity Uses



True

Electricity Sources = Electricity Billed



Not True

## More Accounting

Electricity Sources = Electricity Uses

Generation + Net Purchases =  
Electricity Billed + Line Losses



Almost

Generation + Net Purchases =  
Electricity Billed + Other/Utility Use + Line Losses



This is it!

## Utility Use

- Utility use can be
  - Metered
  - Estimated
- Depends on utility practice
- Differences from estimated end up in line loss
  - Can be an increase or a decrease to line loss

## Other Use – Street Lighting

- Often not practical to run a separate circuit for streetlights
- Not practical to meter individual streetlights if not on a separate circuit
- Therefore street lighting is usually estimated
- Differences from estimated end up in line loss
  - Can be an increase or a decrease to line loss

## Classic Line Losses

- Wire Resistance
  - All wires convert some electricity to heat
  - Resistance depends on material, current, voltage and other factors
- Transformer losses
  - Changing voltage results in some loss of electricity
- Stray voltage
  - Unintentional tie in to distribution system

## Non Classic Line Losses

- Inaccurate meters
- Responsible party for usage unknown
- Unauthorized use
  - Unintentional
  - Intentional – theft
- Previously mentioned differences from estimated for street lighting and utility use

## Reducing Line Loss

- An exercise in trade-offs
  - May cost more than the actual lost electricity
- Change wire material
- Replace older/inefficient transformers
- Serve largest loads at the highest reasonable voltage
- Quickly investigate and resolve reports of stray voltage



## Reducing Line Loss (cont.)

- Look for electricity usage at locations that do not have authorized service
- Respond quickly to shut-off requests
- Build generation as close to load as reasonably possible

## Reducing Line Loss – Advanced Metering

- Advanced meters are more accurate and provide better usage statistics – often in real time
- Advanced meters can detect tampering and send a signal to the utility
- Advanced meters can be turned off remotely

## Reducing Line Loss – Distributed Generation

- Energy produced and used on-site does not need to be delivered and reduces line loss

## Reducing Line Loss – Efficiency

- Efficiency is often lost in this discussion
- A unit of energy saved is a unit that is not delivered, and therefore reduces line loss
- Efficiency may be the cheapest way to reduce line loss

**Questions?**