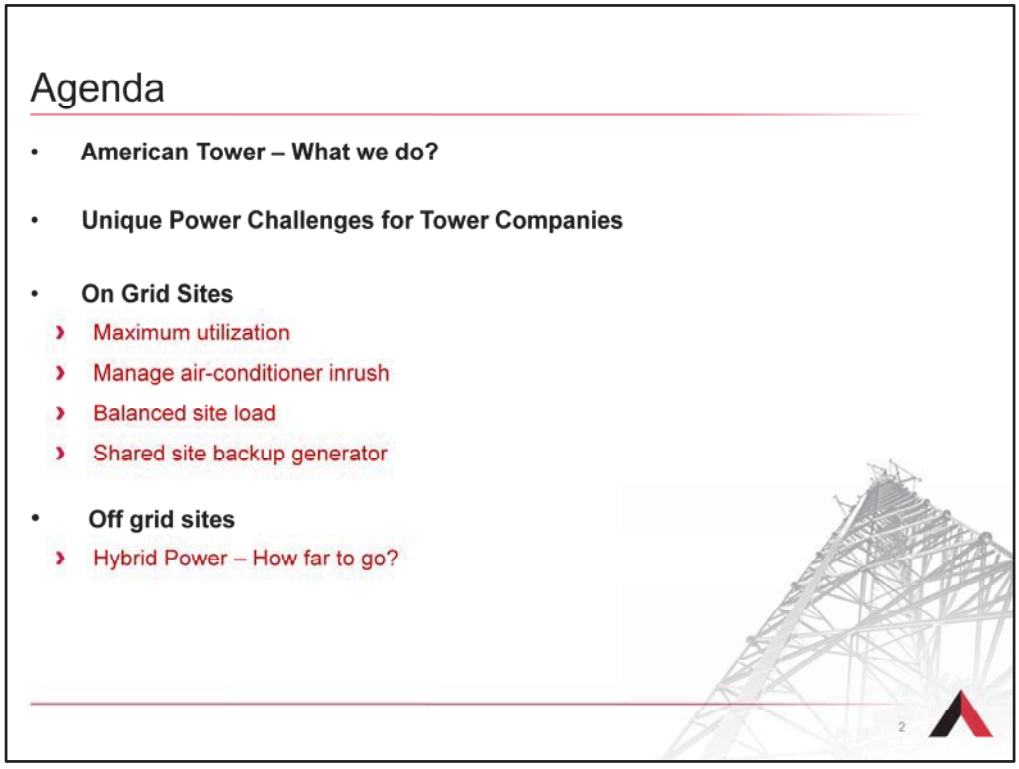


GSMA: Green Power for Mobile (GPM) Working Group

AMERICAN TOWER®

7 – 8 November 2011

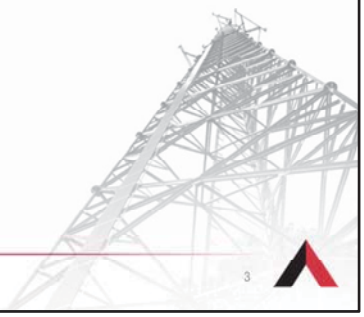


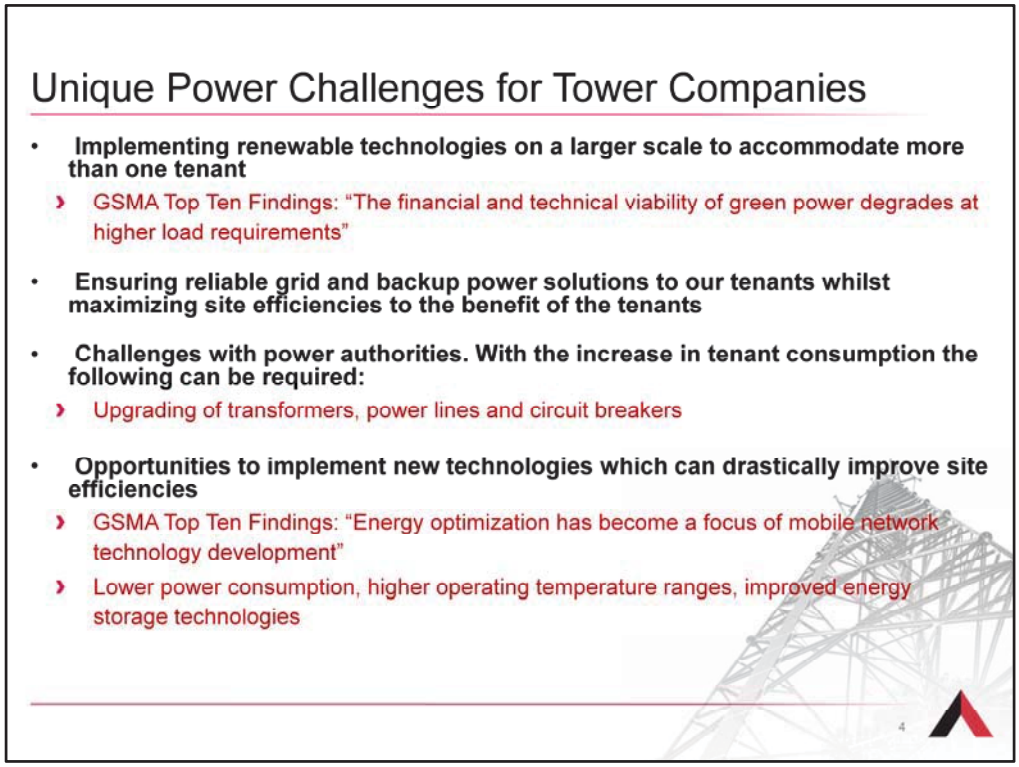
This slide describes the agenda of what we will be presenting.

We will do a brief explanation of what ATC does and how we fit into the market place. Following that we will describe the unique challenges that we face as a tower company from a power perspective. This then leads on to how we intend on tackling power problems for on and off grid scenarios.

American Tower - What we do?

- American Tower is a leading owner and operator of communications sites for the wireless and broadcast industries.
- Our global solutions include over 37,000 towers, more than 2,300 managed rooftops, in-building and outdoor Distributed Antenna System (DAS) networks, and a suite of services that speed up network deployment.
- A centre of excellence is being established in our South African office from where we will specifically focus on implementing specific power solutions which meet the requirements and needs of the regional African operations.

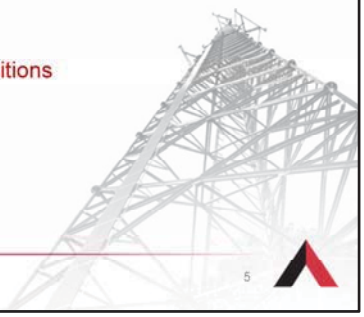




A brief overview of the challenges faced as a tower company. There are some extracts from GSMA articles included here.

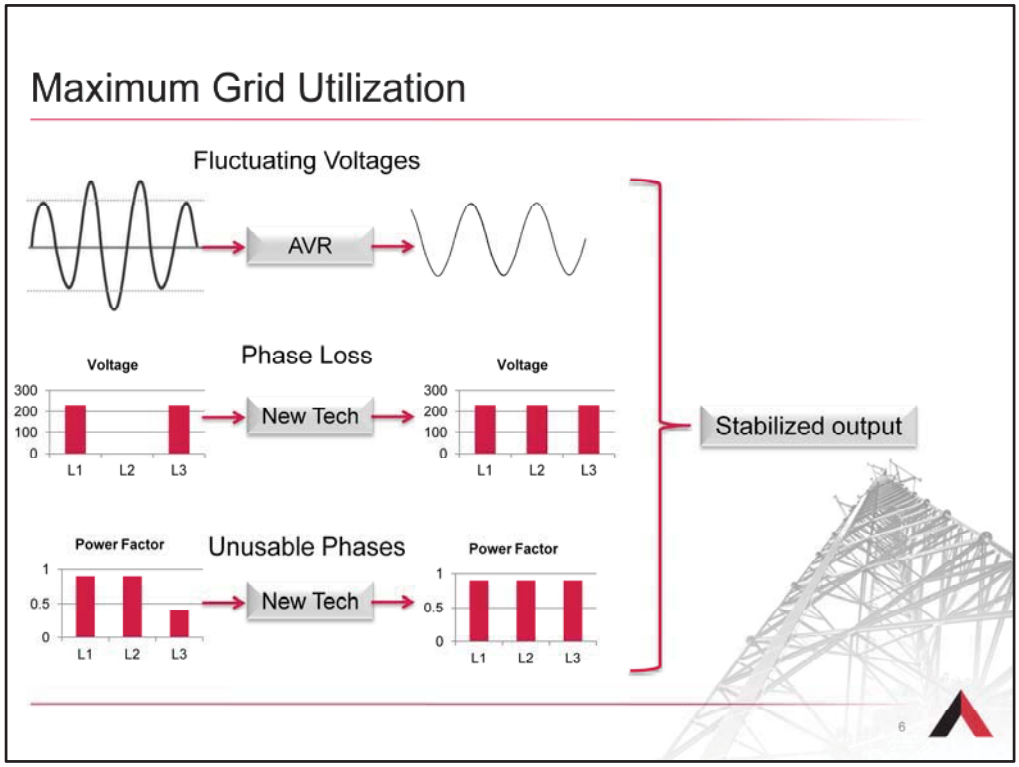
On Grid Sites

- **Maximum Grid Utilization with:**
  - Fluctuating voltages
  - Phase loss
  - Unusable phases
- **Managing Air-conditioner Inrush**
  - Understanding air conditioner inrush with multiple tenants
- **Balancing Site Loads**
  - Managing overloaded phases under reliable supply conditions

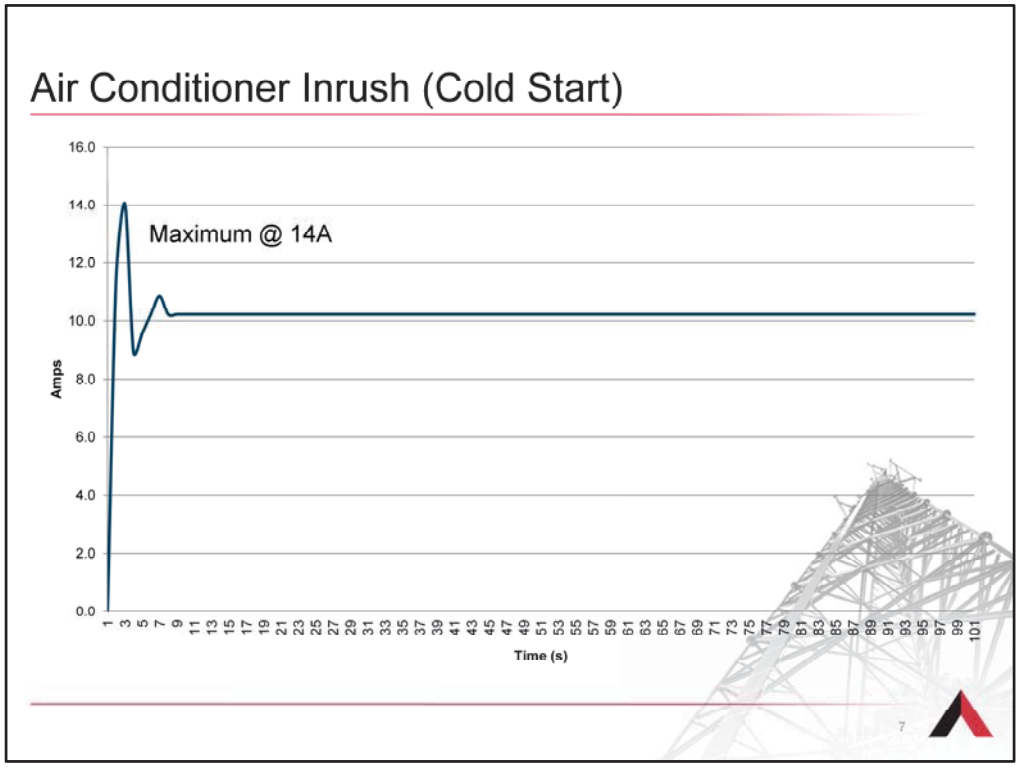


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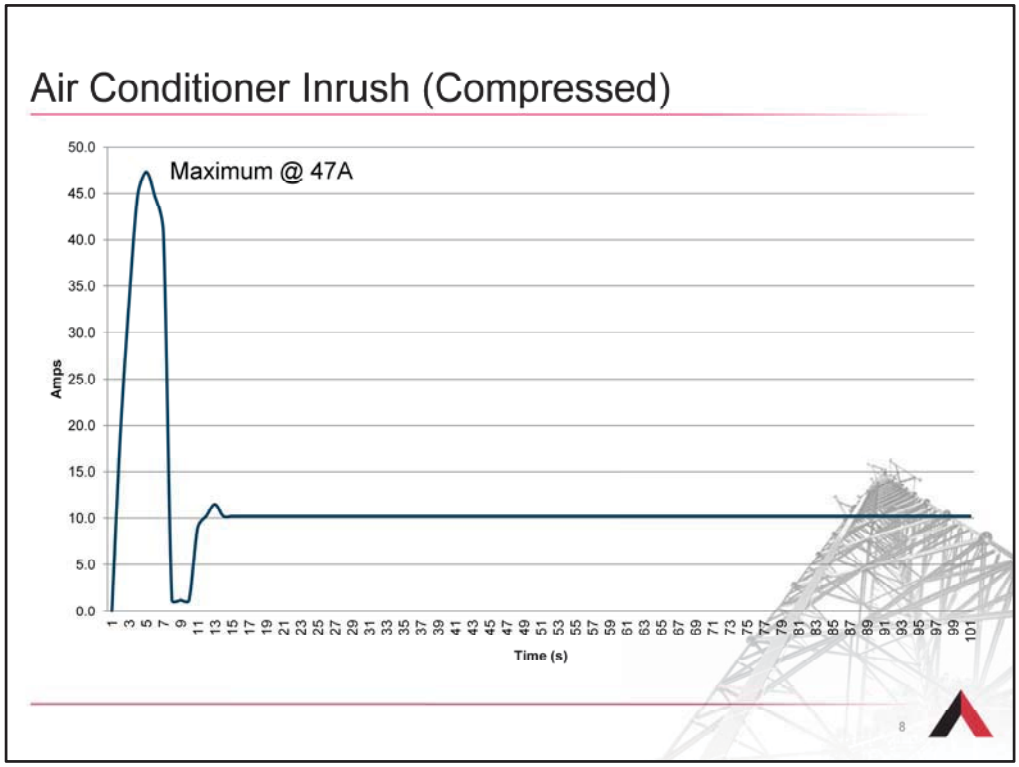
For on grid sites, these are the most prevalent issues that we experience.



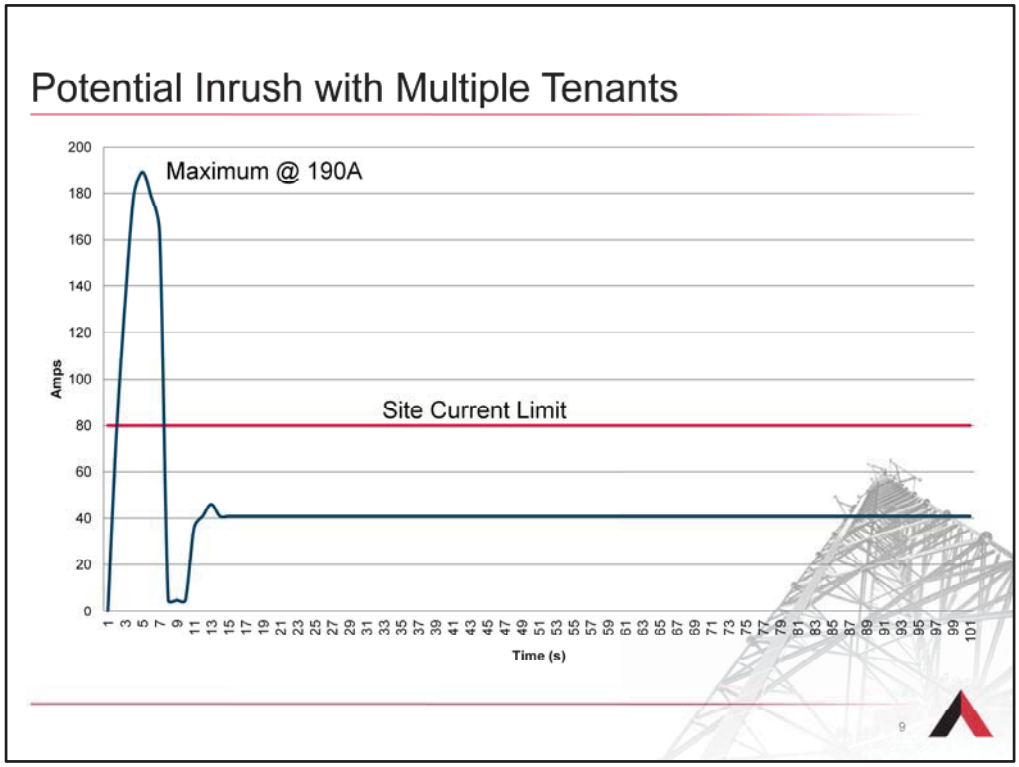
The three main aspects of power quality (when available) are detailed in this slide. The significant savings that can be generated by implemented the latest technologies are described here.



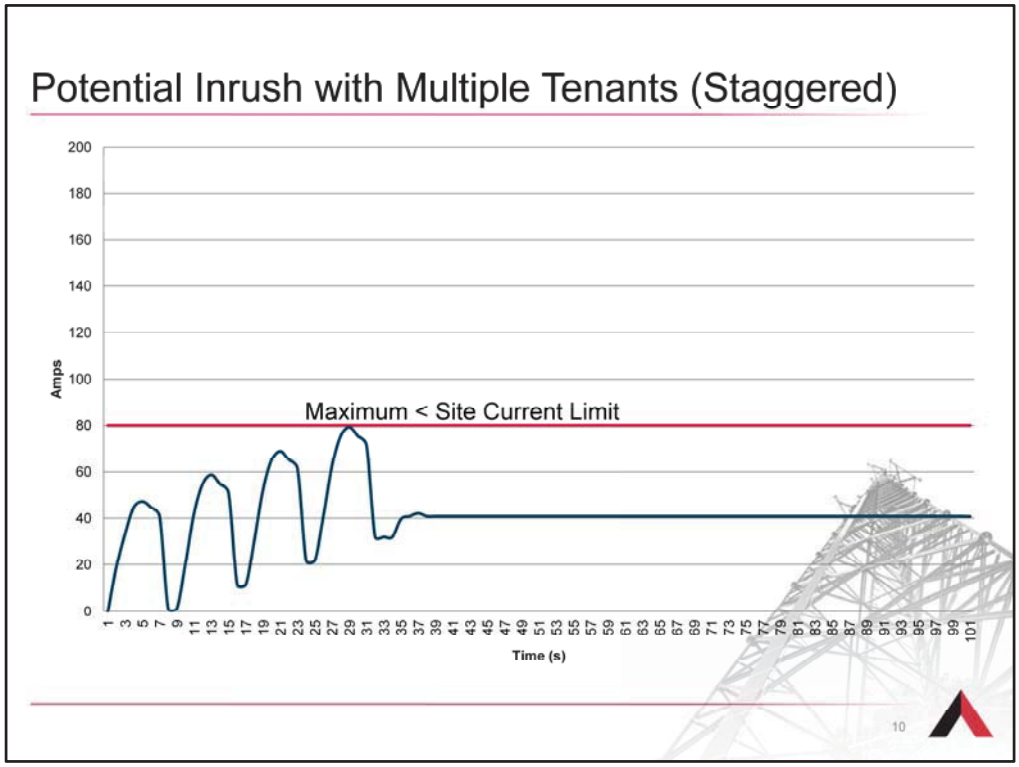
This graph demonstrates the inrush current of a 23000BTU air conditioner starting from a cold start. Note that the inrush spike is relatively low.



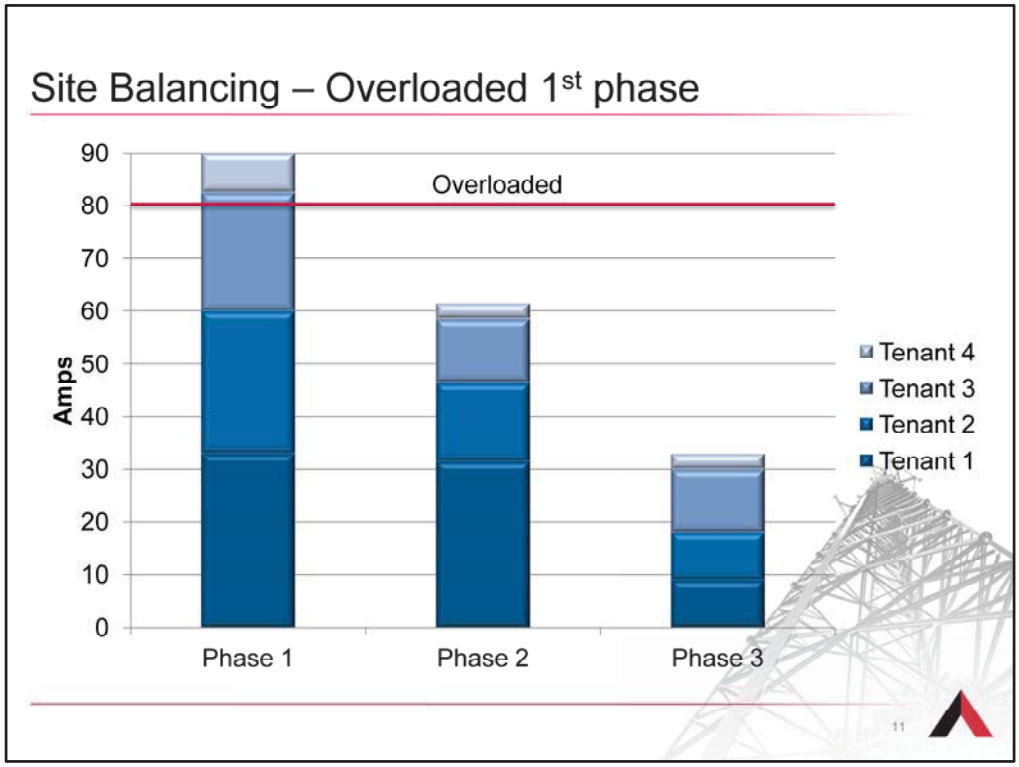
This graph demonstrats the inrush current of a 23000BTU air conditioner starting from a short rest and thus under compression. Note that the inrush spike is very large compared to the running current.



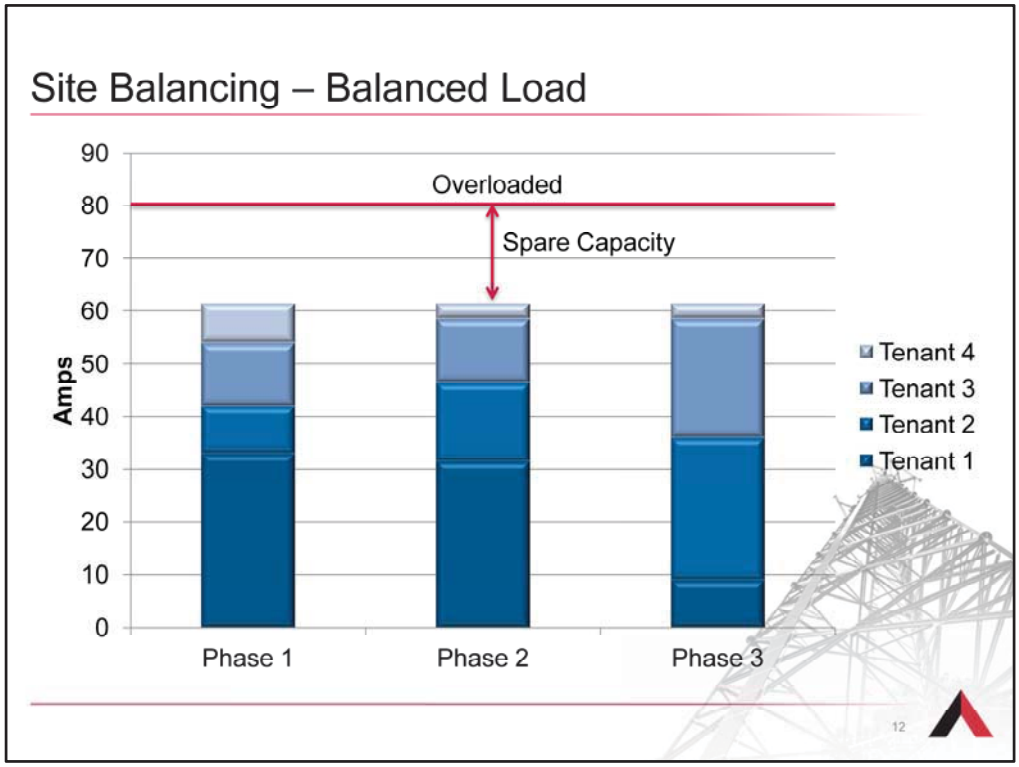
Extrapolating the information from the previous graph, the problem of an inrush current on a multiple tenant site is amplified. Under such circumstances it is common for the mains supply circuit breaker to trip or the generator to stall. Traditionally the solution to this issue has been to upgrade the mains supply or increase the size of the generator. This results in an decrease in system efficiencies.



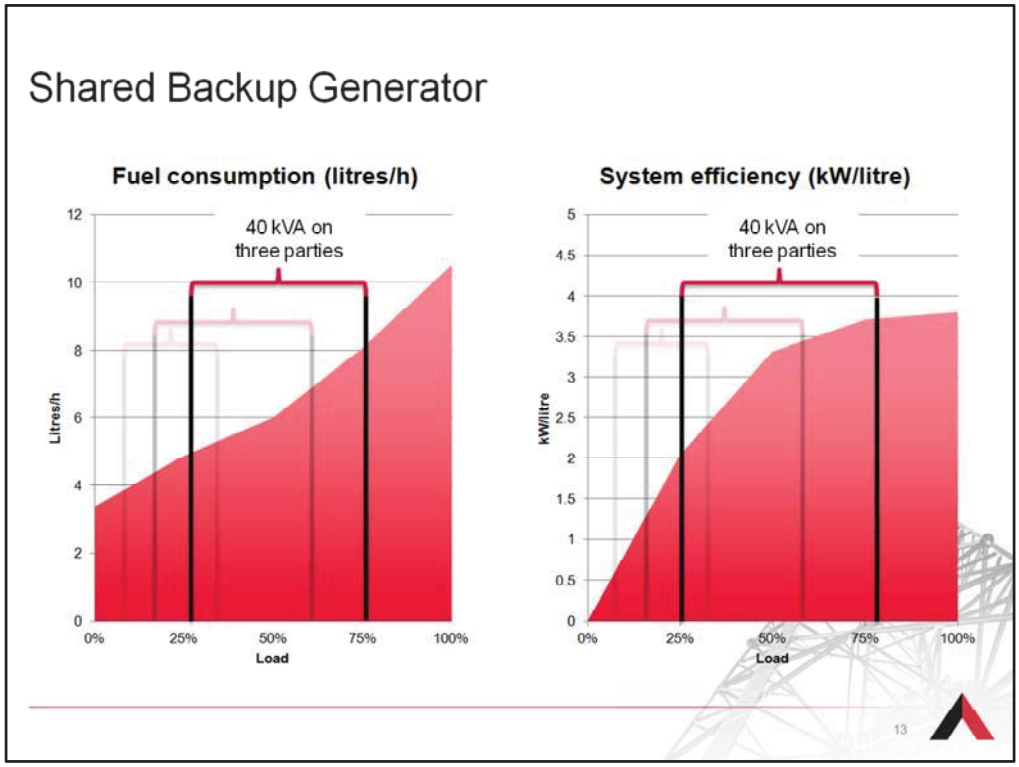
A solution to the issue of system inrush currents is to stagger the supply connection to tenants in such a way that the next tenant is only connected to the mains/generator supply after the inrush spike from the current tenant has stabilized. Using this technique, we can avoid costly upgrades.



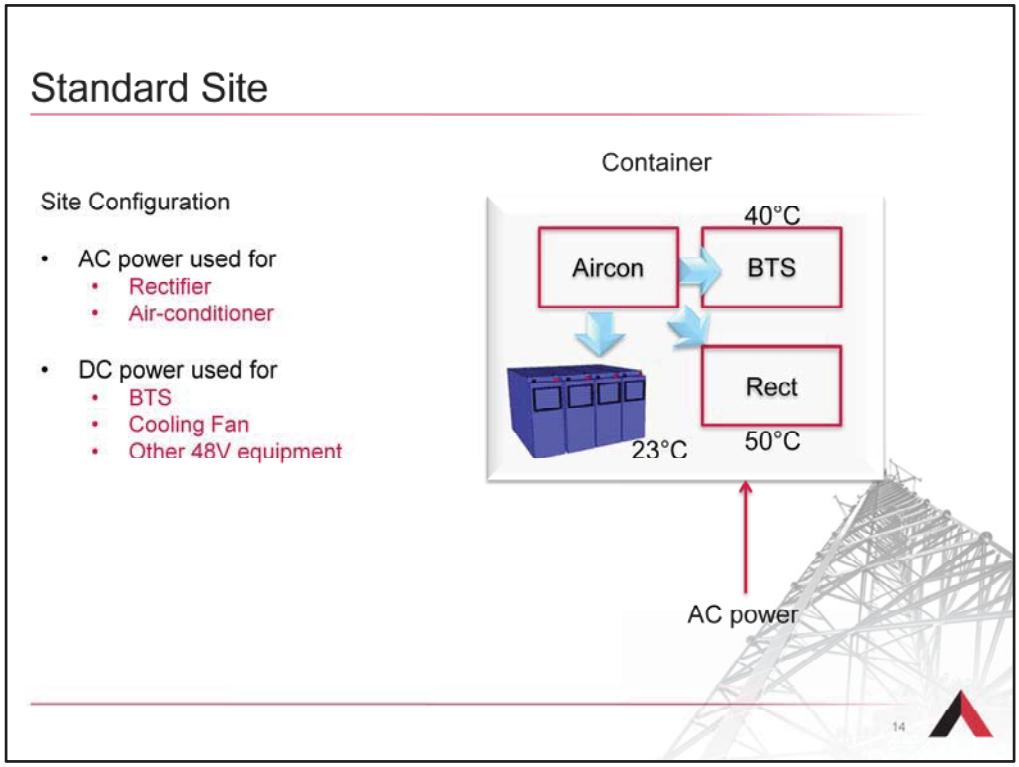
This bar graph indicates a typical site current usage under heavy load conditions. It is very common for the larger power consuming items in a tenants shelter to be placed on the 1st (red) phase of the site. This results in significantly higher current usage on the 1st phase compared to the others. The result is that site often experiences a nuisance trip due to an overload on that phase. If the grid power in this region is relatively stable, connecting equipment in this way represents an inefficient use of the resources available as there is spare capacity on the other two phases.



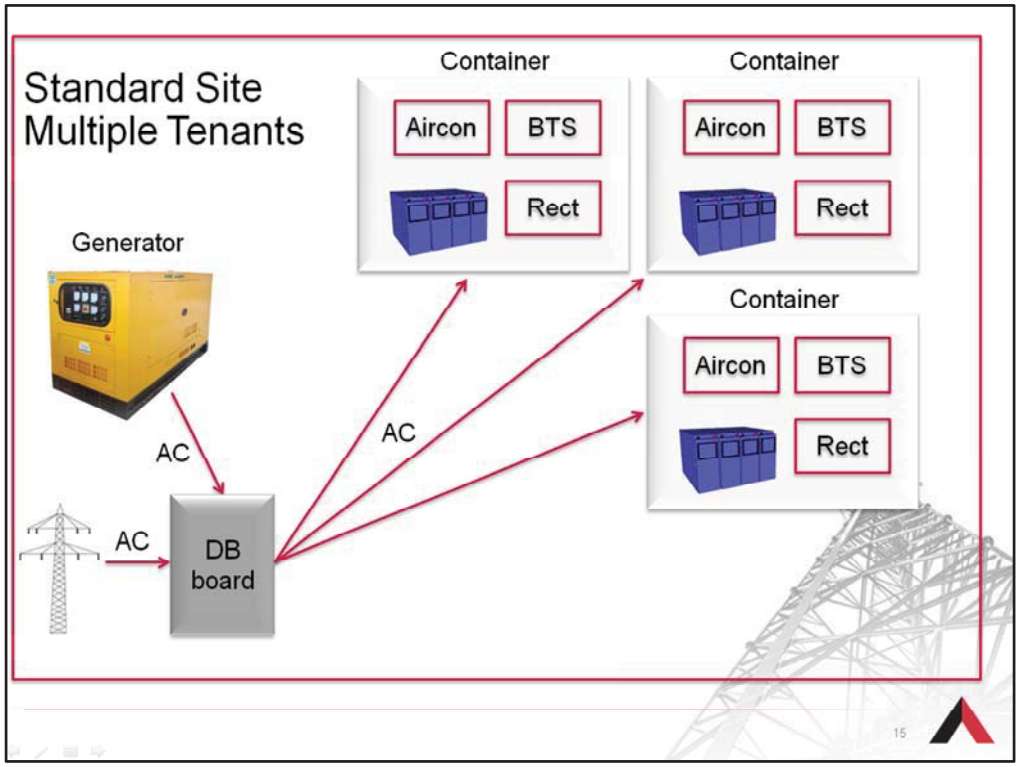
A solution to this issue which can be easily implemented as a tower company is to balance the entire site by moving individual tenant phases around in a manner that generates a more balanced solution. The result is that under the same overload conditions the current usage is balanced and due to the available spare capacity, nuisance tripping from overloading is minimized.



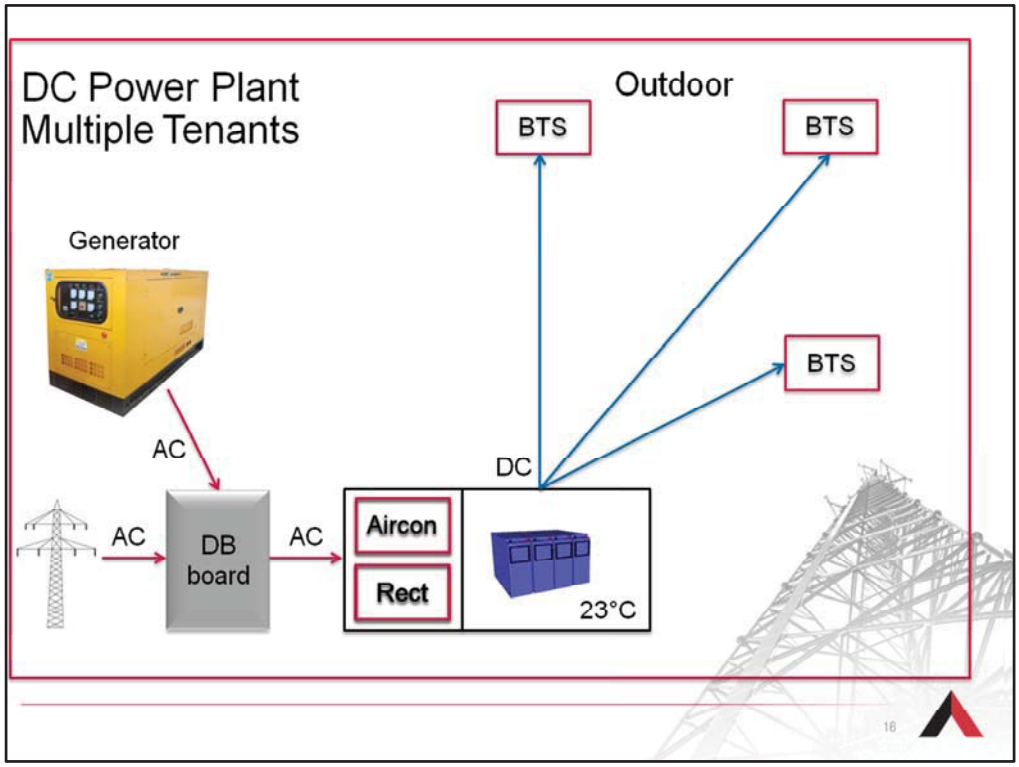
This graph illustrates the benefits of using a generator closer to its optimal operating load. As a tower company we are in a position to offer solutions which will push the generator higher into its optimal operating range. The graph illustrates the difference between running 1,2 and 3 parties on a 40kVA generator.



In this site we begin to introduce the concept of a DC power plant. A typical site is depicted in the graphic which clearly demonstrates how MNO's cool a site to the limiting factor which in this case is the batteries in a container. Cooling the rectifier and BTS to 23 degrees offers little benefit from an operational standpoint.



When extrapolated to a site with multiple tenants it becomes clear that the duplication of air conditioners, rectifiers and batteries is not necessary.



By removing the Batteries, Rectifier and air conditioner units from the MNO containers the operator has the opportunity to move to outdoor BTS units. For the total site this can represent significant savings in power consumption as well as space utilization on the site.

DC Power Plant

Advantages

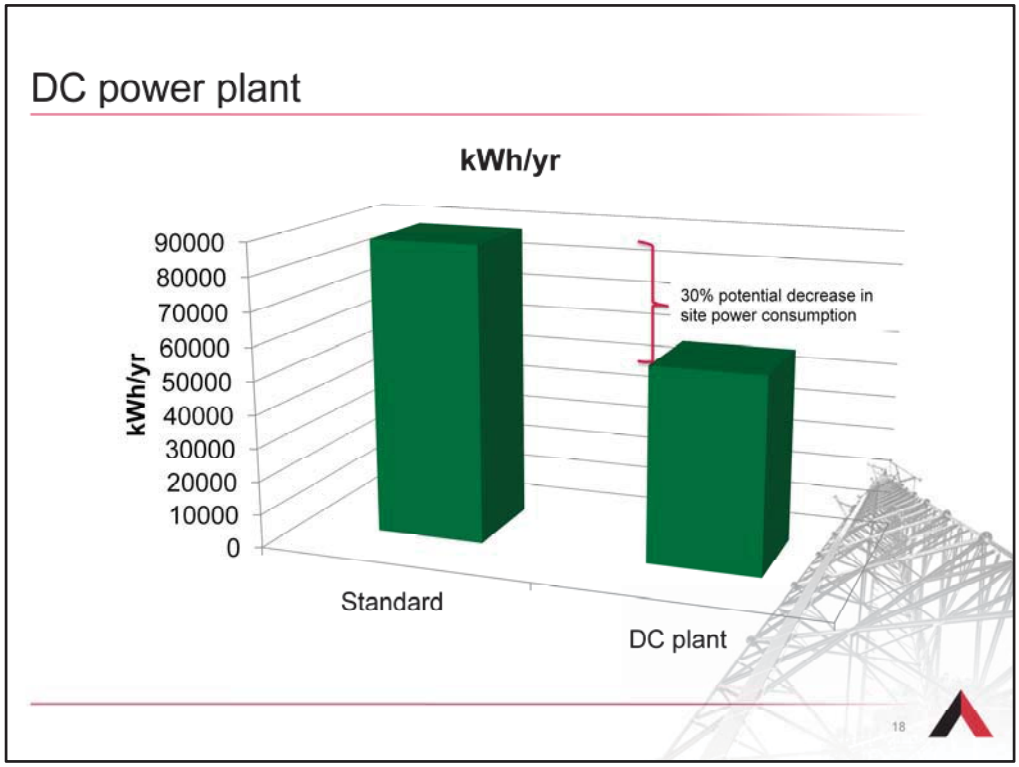
- Reduced power consumption
- Improved system efficiencies
- Reduced tenant space requirements
- Provides opportunity to implement outdoor BTS's
- Improved usage of poor grid

Disadvantages

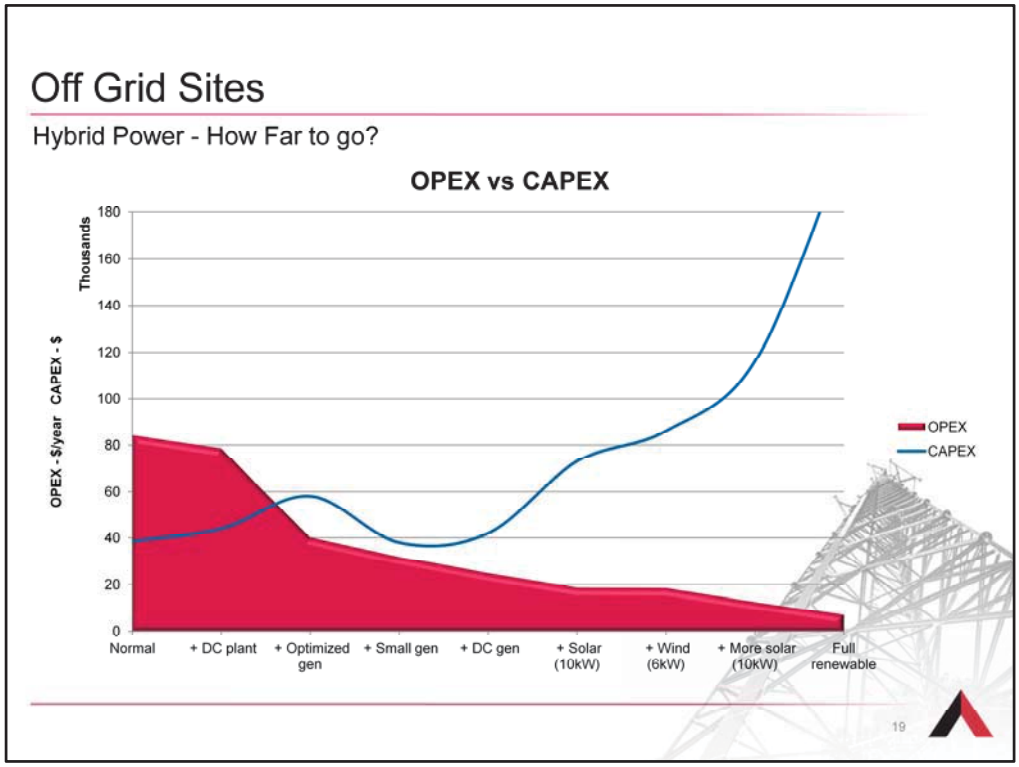
- Larger cables required
- DC surge protection is more expensive
- AC equipment on site requires an inverter
- The system needs to cater for 48V and 24V connections



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This graph indicates the potential savings one can generate from a DC power plant when compared to a standard multi tenant site configuration



The graph indicates our experience of implementing a hybrid system from both a OPEX and CAPEX point of view. The intention is to spark the debate of how far one should go in terms of implementing green technologies.



Questions?

Thank you

ATC SOUTH AFRICA

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