



This presentation is from Ampt's participation in a panel discussion at:
Solar Asset Management – North America

Session 7A – Repowering: What Is It and How Does It Impact the Bottom Line?



13-14 March 2018 - San Francisco



Innovative DC Power Management

Lower cost and higher performing PV systems



Optimize PV Systems



Repower PV Systems



DC-Coupled Storage



Monitoring and O&M

Repowering and the emerging role of Solar Asset Management

Traditional Role

Monitor

Activities

- Alert setup / response
- Data analysis / insights
- Issue identification
- Reporting
- Forecasting

Knowledge management

Maintain

- Site upkeep (routine)
- Repairs
- Replacements
- Warranty management
- Contracting

Operational management

Optimization Focus

Decisions

Cost



Challenges & Constraints for Repowering

- Limited visibility
- Lack of granular control

- Equipment availability
- Component compatibility

Repowering and the emerging role of Solar Asset Management

Traditional Role

Emerging Role

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Maintain

Revenue Engine

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Operational management

- Asset divestitures
- Asset acquisitions
- Performance enhancement
- System expansion
- New business models

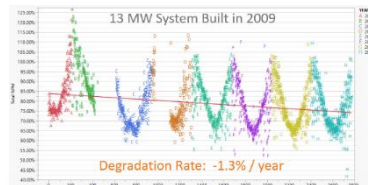
Portfolio management

Optimization Focus

Decisions

Cost

Production



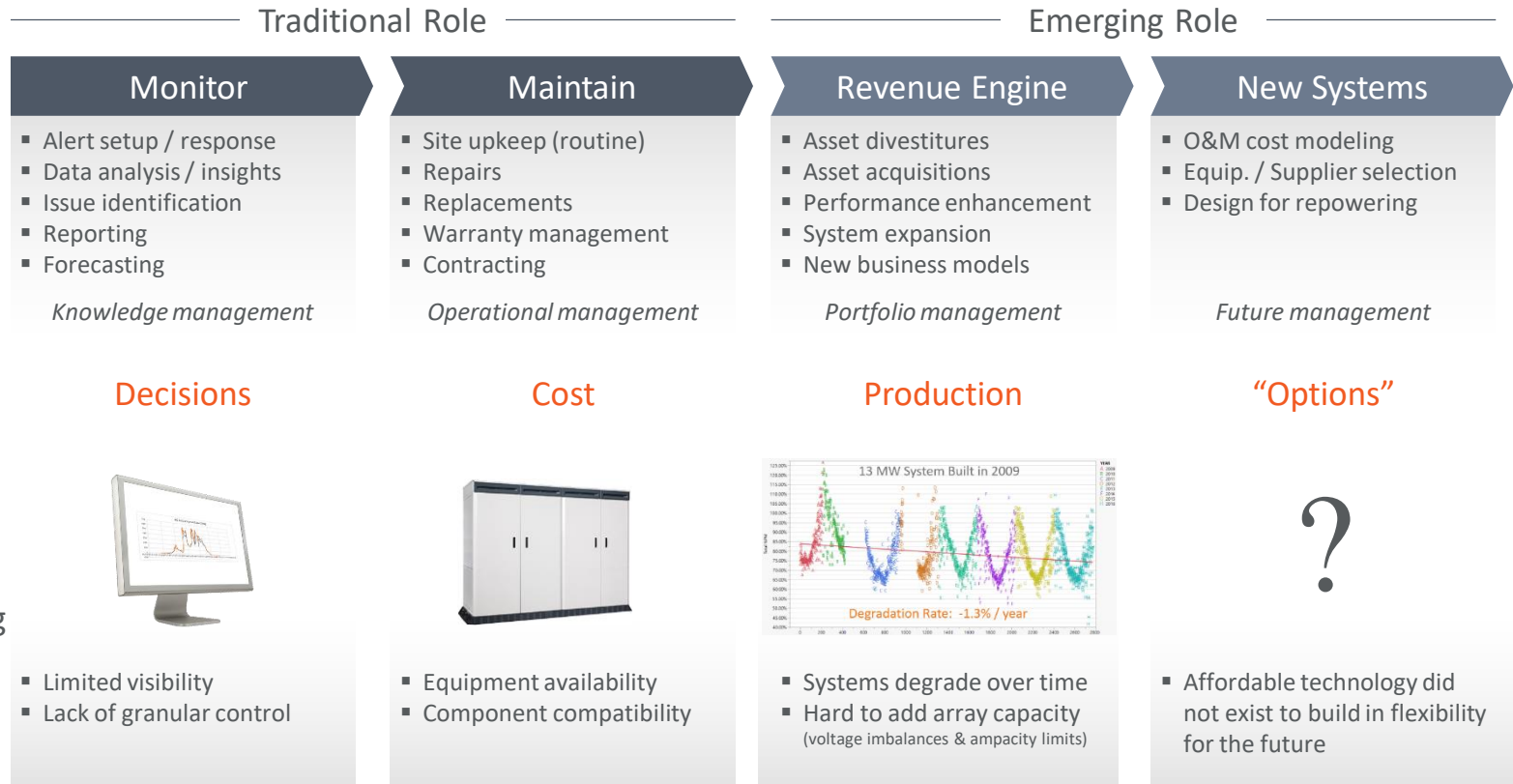
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- Limited visibility
- Lack of granular control

- Equipment availability
- Component compatibility

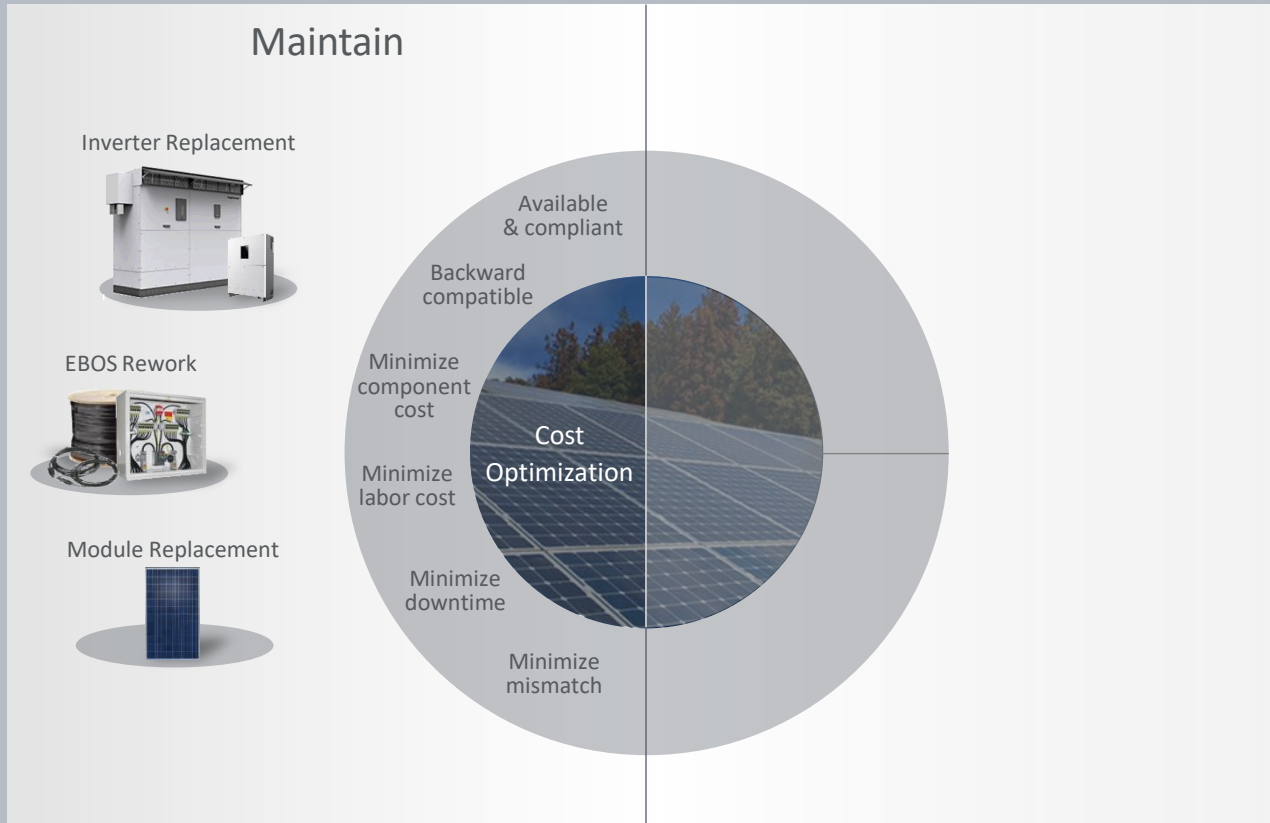
- Systems degrade over time
- Hard to add array capacity (voltage imbalances & ampacity limits)

Repowering and the emerging role of Solar Asset Management

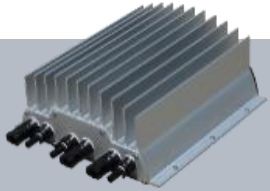


Technology is evolving to meet emerging Repowering opportunities

Repowering advantages using DC Power Management



Repowering advantages using DC Power Management



Maintain

Use modern inverters:

- Lower cost/W; more efficient
- 1000V inverters in 600V systems
- 1500V inverters in 1000V systems
- Use central inverters
- Use string inverters as “virtual centrals”

Inverter Replacement



Leverage existing EBOS

- Use existing DC cables
- Use existing combiners
- No retrenching

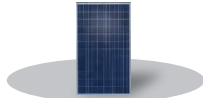
EBOS Rework



MPPT on every string

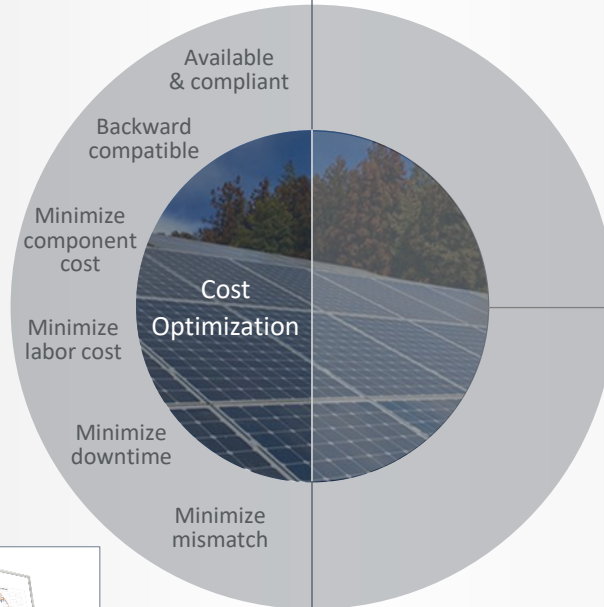
- Mix old & new strings
- Flexible inventory

Module Replacement

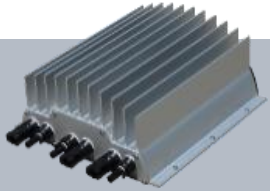


String-level communication

- Improved O&M
- Programmable outputs (future-proofing)



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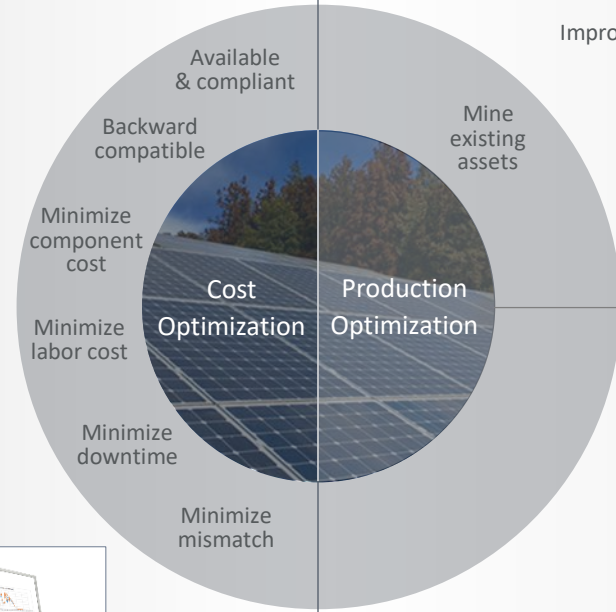


String-level communication

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Revenue Engine



Improve performance

Mine existing assets

Prep system for sale

Cost Optimization

Production Optimization

Minimize component cost

Minimize labor cost

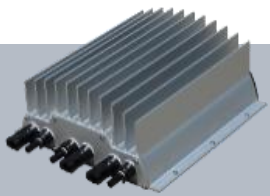
Minimize downtime

Minimize mismatch

Available & compliant

Backward compatible

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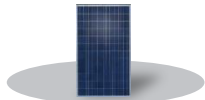
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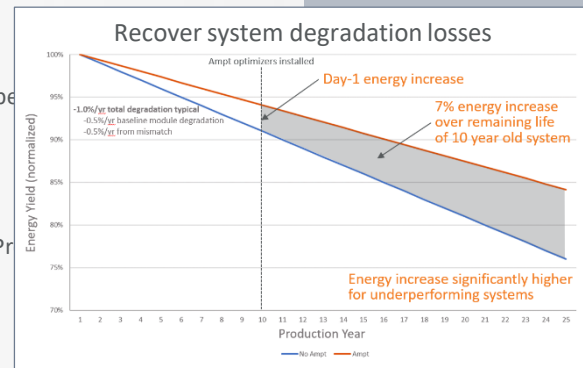
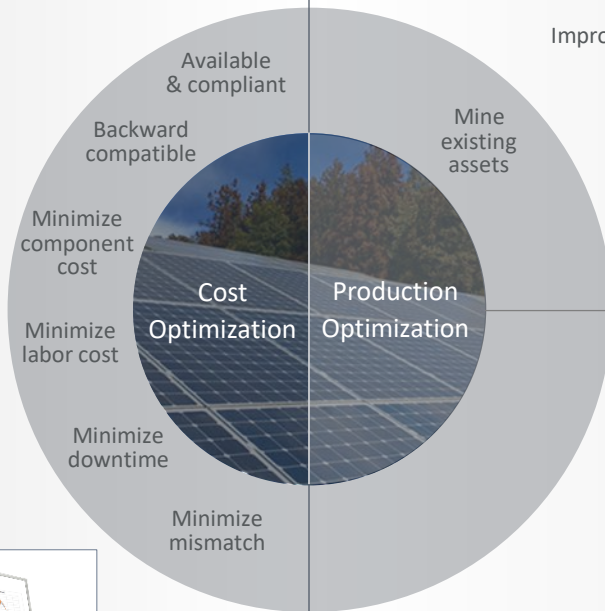


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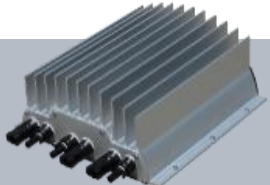
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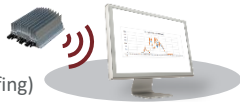
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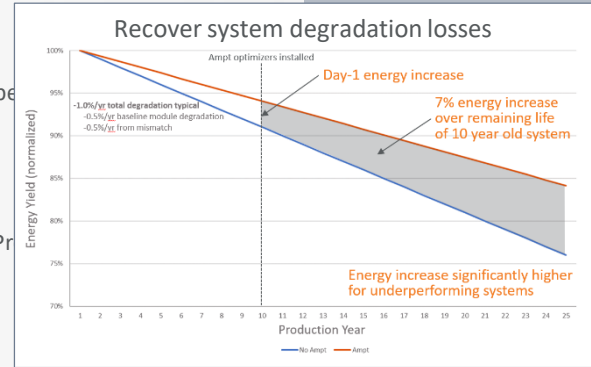
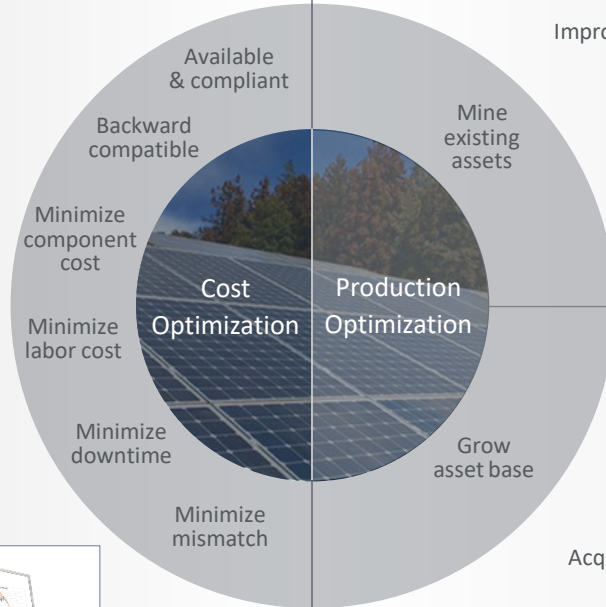


String-level communication

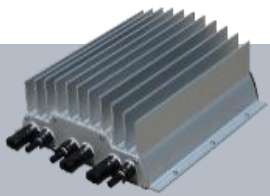
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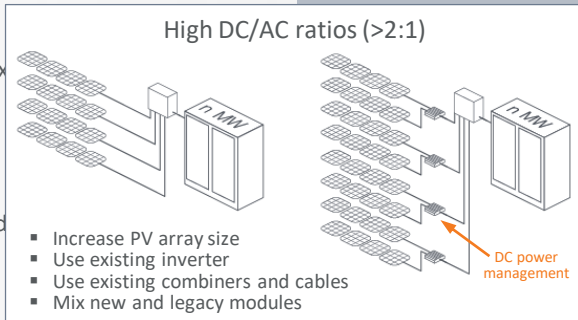
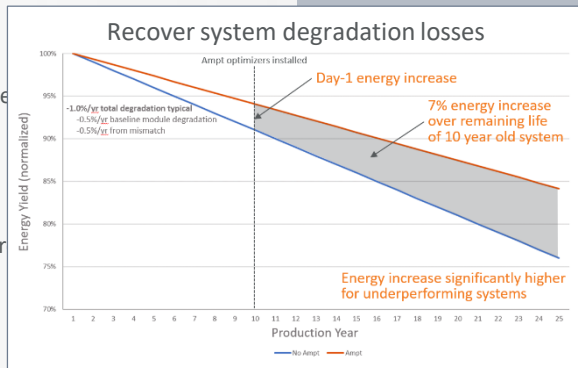
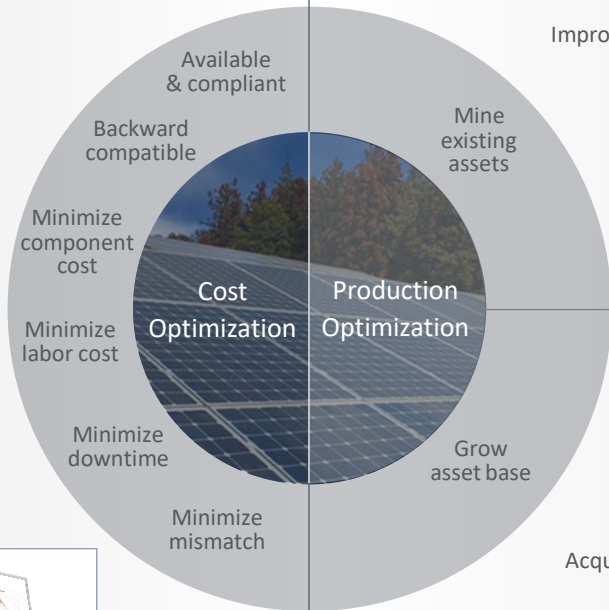


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Revenue Engine



Repowering: What is it and how does it impact the bottom line?

- The roles of SAMs and repowering are expanding
- Innovative technology is enabling new opportunities
- Repowering has emerged as a revenue engine (vs. cost)
- Develop a vision for “Portfolio” and “Future” management
- Build in flexibility – options have value
- New systems can be designed for repowering while lowering upfront system cost using DC power management

