Asset Management in Geothermal Plants

– what it is and isn´t

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First, few basic questions

- What is Asset Management all about?

  "To secure the infrastructure, that is anything that can be destroyed in an action movie"

- Is Asset Management sexy?

  NO !

- Is Asset Management important?

  YES !

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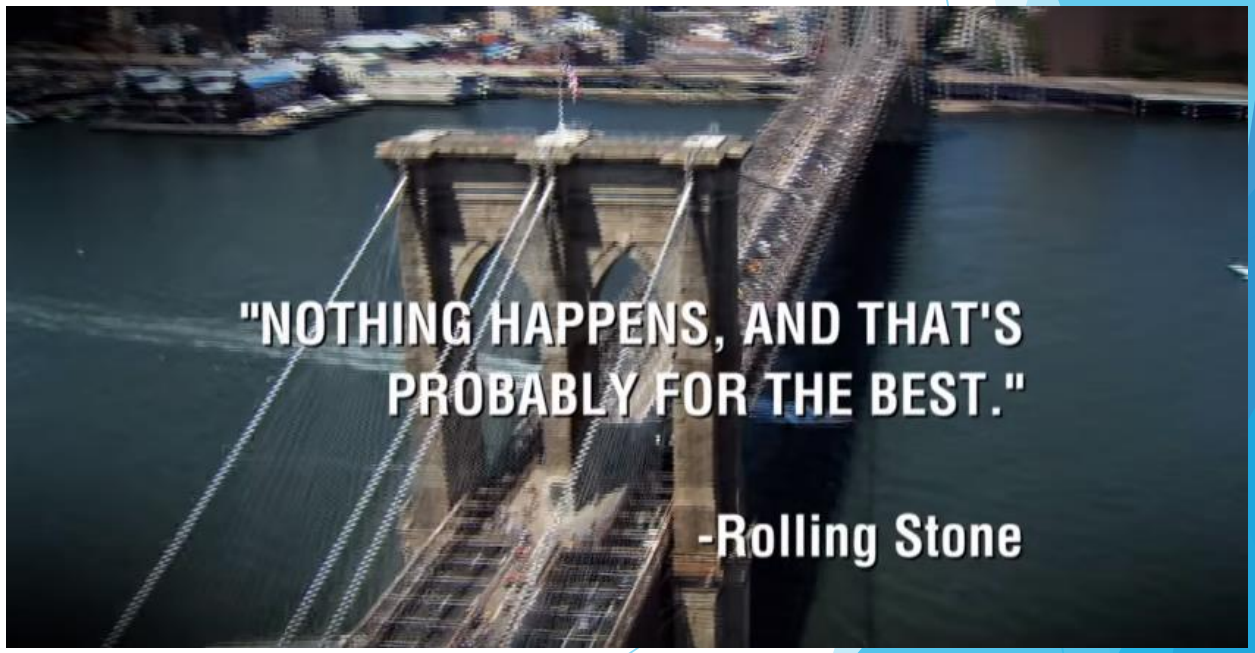
How about JIT disaster condoms?

- There are no Just-In-Time disaster condoms
- But everyone agrees that infrastructure is important
  - … for the public
  - … for (long term) investors
  - … for the manager … who likes his job

Asset Management

bad

- Is to make sure that nothing | happens



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Asset Management - Platforms

- ISO 55000
- TPM – Lean management
- RCM
- “Home made” platforms, based on common sense and common knowledge
- …

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Asset Management – Basic elements

Most Asset Management platforms have the following basic elements in common:

- Planning & Scheduling
- Execution
- Maintenance Engineering
  - Evaluate Preventive Maintenance effectiveness
  - Develop Predictive Maintenance techniques/Procedures
  - Analyze PM and PdM data for optimizing Maintenance
  - Reliability Engineering
  - Root Cause Analysis
  - Maintenance training and coaching progams
  - FMEA for selected elements

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TPM – Total Productive Maintenance

- TPM dates back to 1952
- TPM is an important part of lean management
- The “mother and child” approach
  - Mother – Operator/Maintainer
  - Child – Physical assets
  - Doctor – Maintenance professionals

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TPM - pillars

- Planned maintenance
  - Active preventive and predictive program
  - Visual control (standard work, whiteboards, …)
  - Failure resolution system
  - Metrics like OEE and MTBF
- Kaizen (continuous improvement)
- Mother – Child
- Technical training, continuously improving operators and others
- Enriching people

ISO 55000

- ISO 55000, international standard on Asset Management
- First published January 2014
- Three standards
  - ISO 55000 Overview, principles and terminology
  - ISO 55001 Requirements
  - ISO 55002 Guidelines on the application of ISO55001
- Asset Management matters from the cradle to the grave

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ISO 55000 – basic defintions

- **Asset**
  - item, thing or entity that has potential or actual value to an organisation
- **Asset management**
  - coordinated activity of an organisation to realize value from an asset
- **Asset management system**
  - management system for asset management whose function is to establish the asset management policy and asset management objectives ... as a part of the strategic asset management plan (SAMP)

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Asset management, how to get started / better

- Asset management policy
- Integration with other management systems, such as ISO 9001
- Gap analysis
  - Processes in place – Processes missing
  - Technical gaps – Possible solutions
- Competence mapping
  - Current competences
  - Missing competences
  - Provision of training and mentoring
- Plan for improvements – filling the gaps
- Execute improvements and new/improved processes
- Check the results
- Continuous improvement

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Asset Management …

- … is not a rocket science looking at one piece at a time, but
- … it is a **real challenge !**, because it involves:
  - numerous equipments
  - numerous routine work procedures constantly being changed and improved
  - numerous anomalies / deviations that must be attended to
  - numerous registrations tasks
  - numerous risk management duties
  - numerous employees and managers !
- … and therefore requires
  - disciplined AND flexible approach every day every hour
  - IT system
  - **massive support** from top and middle managers

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Asset Management IT system, main elements

- Asset registration
- Spare parts inventory
- Standardized work description and checklists
- Storage for Operation and Maintenance Manuals and other “central” documents
- Preventive Maintenance (including inspections) and Condition Monitoring routine Work Orders
- Borehole data collection and other quality control data collection
- Corrective maintenance Work Orders
- Asset anomalies filtered out, handled and treated
- Planning Work Orders for next months and years
- Scheduling / Dispatching Work Orders for the next week to employees and contractors

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… continued

- Safety procedures, before work execution
- Work execution – Data entered into Work Orders
- Time accounting
- Failure registry
- Units unavailability incidents registry
- Green bookkeeping
- Available man hours vs. Planned man hours
- Cost of asset management – Connections to financial IT systems
- Reports, to name a few:
  - Units availability
  - Borehole reports, including use of natural resources
  - Use of man power
  - Anomalies entered and responded to

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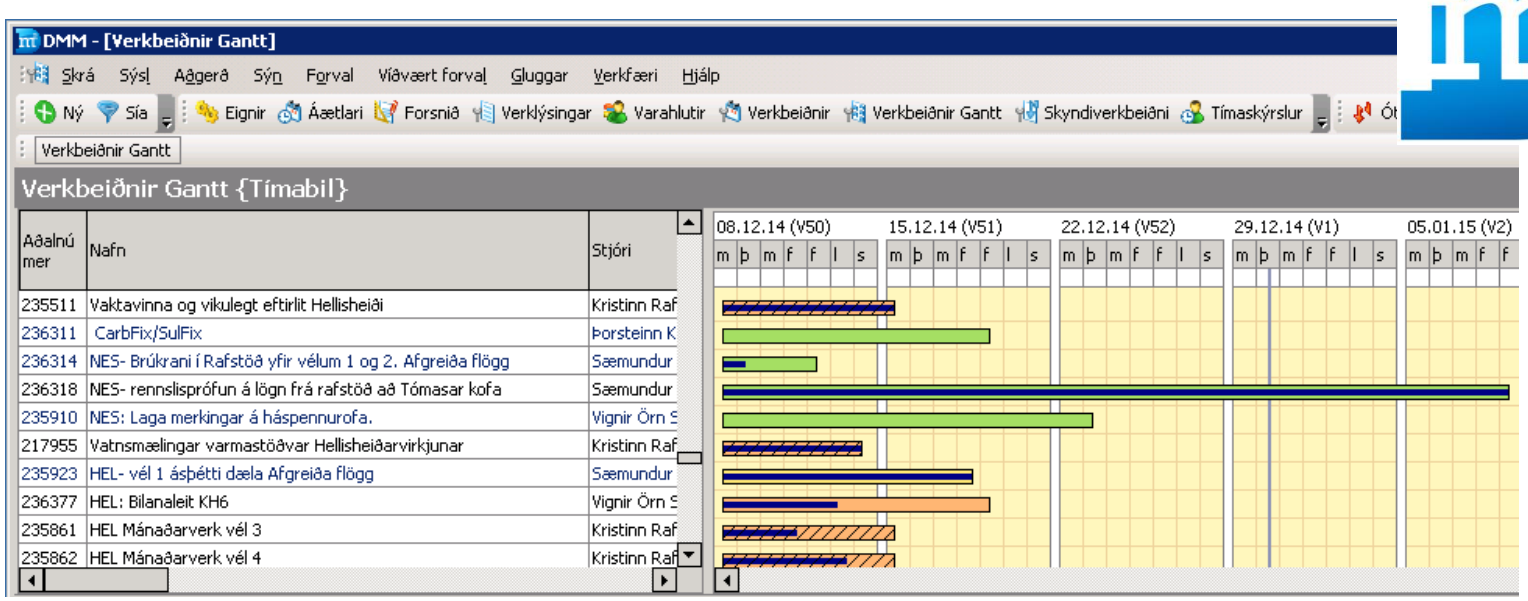
Asset Management IT system, snapshots



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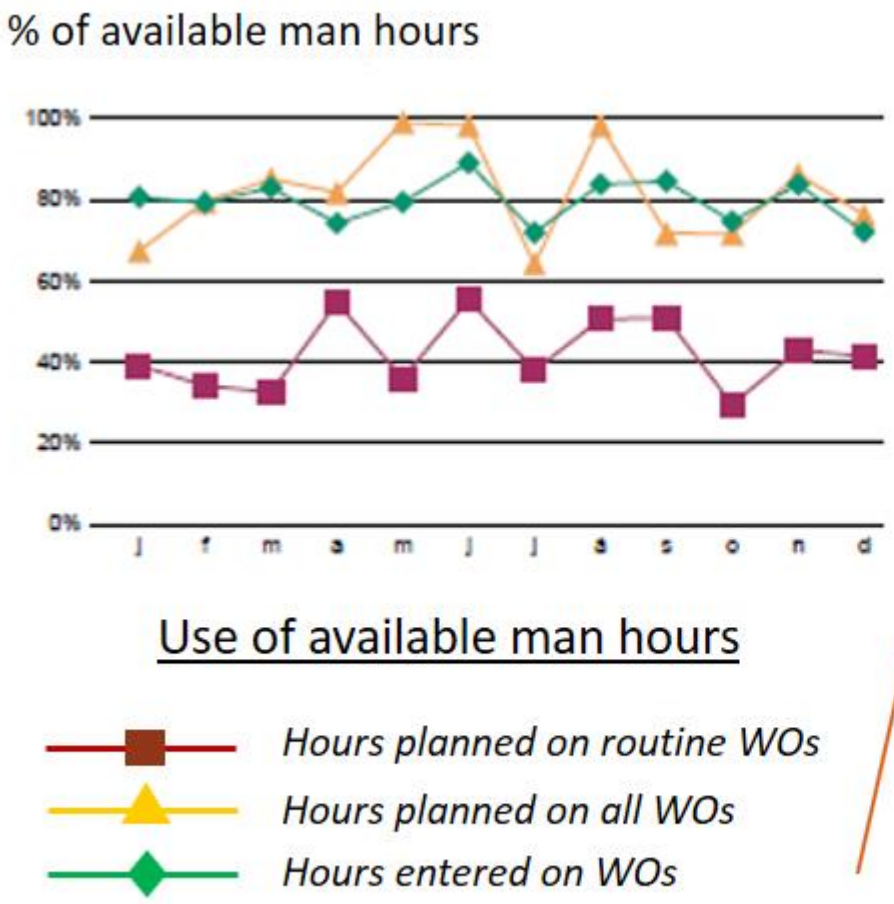
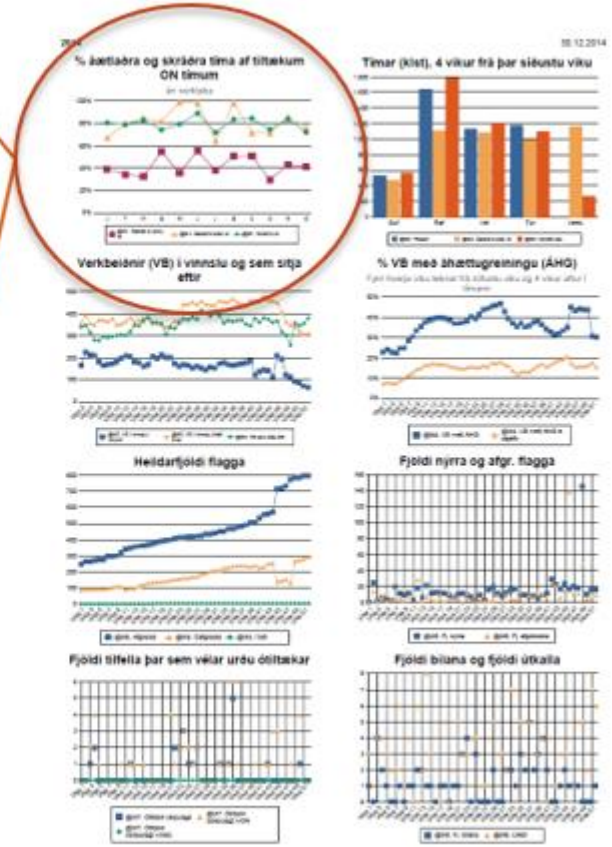
IT snapshots, standard reports for weekly meetings





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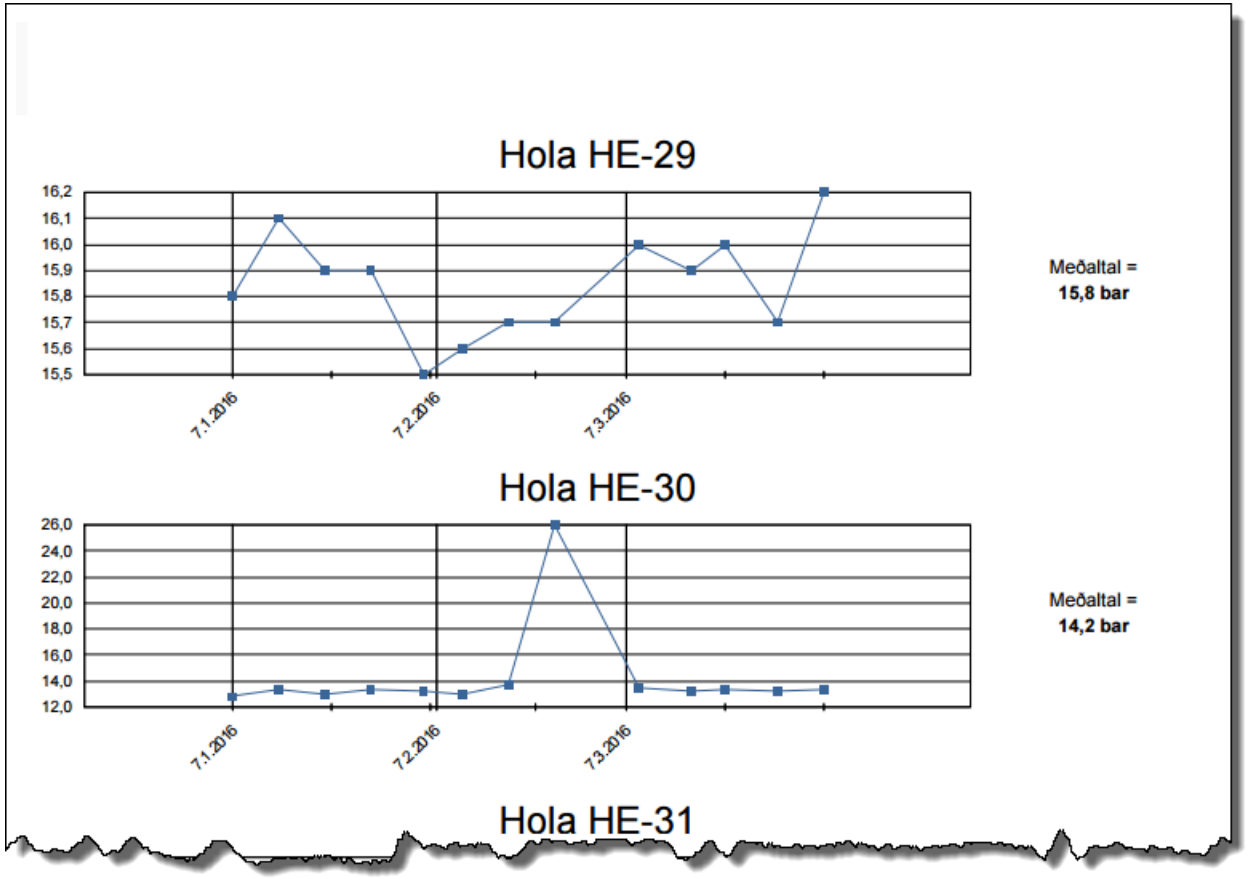
IT snapshots, borehole pressure



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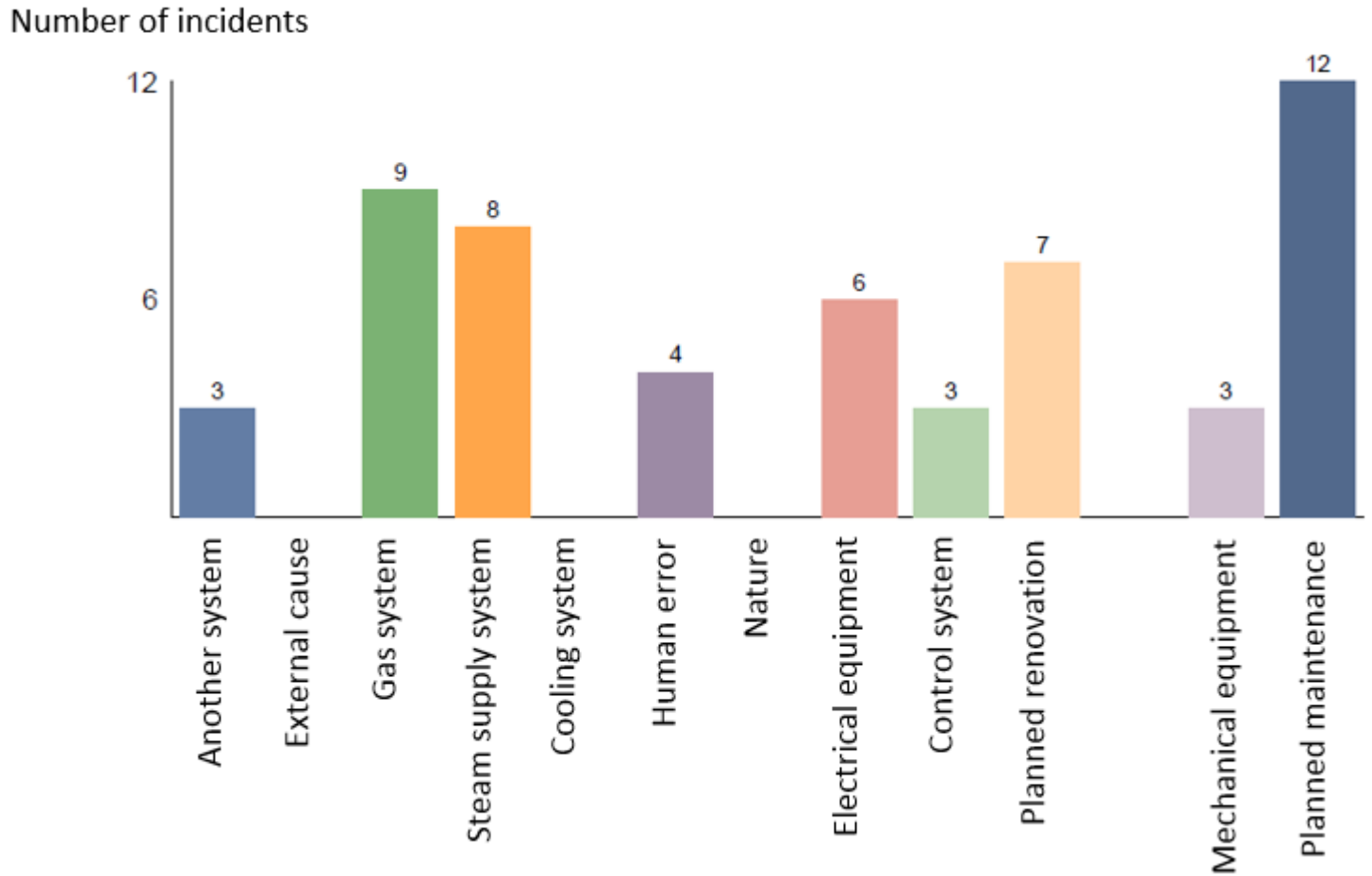
IT snapshots, unit unavailability – causes



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Summary

The conference main focus in on the advantages of utilising geothermal energy and how they will benefit us. The utilisation of geothermal energy is steadily increasing thanks to innovative people and companies around the globe. In order to explore brilliant ideas through experimentations we need capital and in order to start operation we need more capital for machinery and facilities. Whilst the utilisation of geothermal energy with the needed physical assets and infrastructure has deservedly been gaining increased focus, management of these same assets and infrastructure has gained lesser interest. But still, ***asset management is a key variable determining****:*

- *personal safety*
- *environmental safety*
- *the longevity of physical assets*
- *operational reliability*
- *profitability of the overall investment*

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Thank you

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