

# GRIDSTOR

ENERGY

## Recommended Practice on grid-connected energy storage

STALLION-STABALID End Seminar 10 March 2015

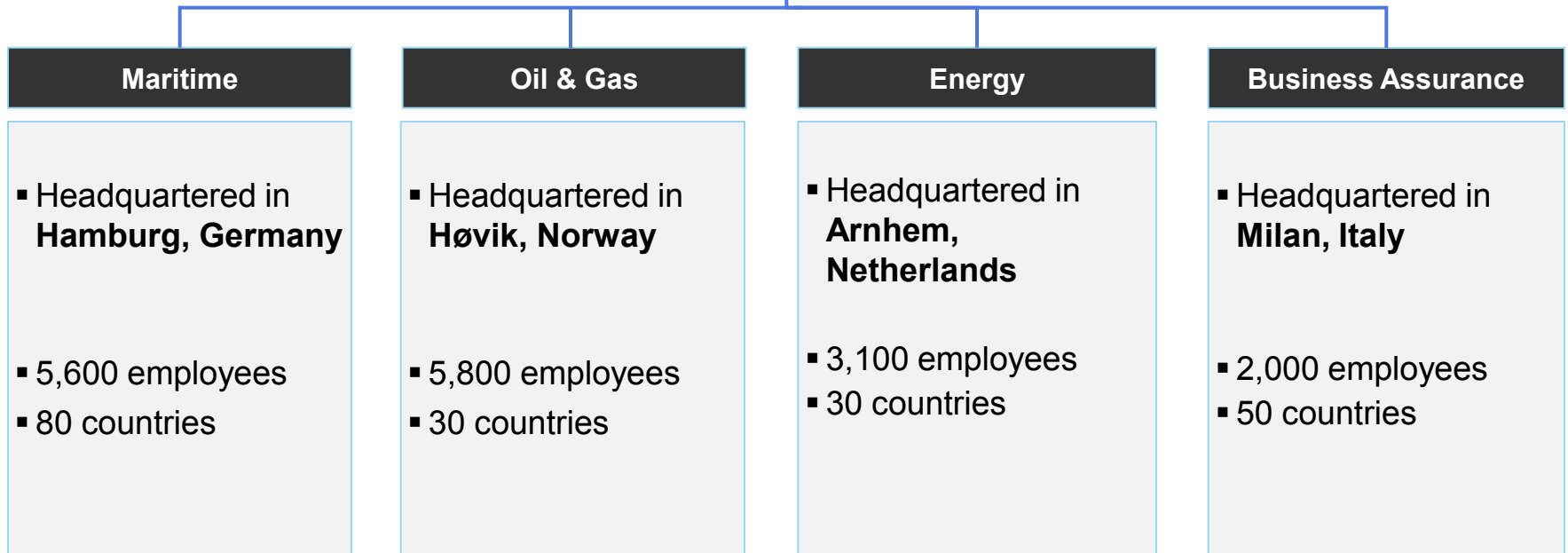
# Content

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1. Who are we
2. Energy Storage – the need for standardization
3. GRIDSTOR
  1. Concept of Recommended Practices
  2. Scope and structure
  3. Invitation to join
4. GRIDSTOR and other international activities

# Introduction of DNV GL

## DNV GL Group Headquarter: Oslo, Norway



# Combined strength to support Energy customers



GL Garrad Hassan



GL Renewables Certification



PWR Solutions  
A GL GROUP COMPANY

3000 energy experts help customers throughout the electrical power industry realise efficient, reliable and clean energy for today and the future

January 2013



\*Renewables Certification services are offered separate from remaining services to ensure impartiality and to fulfil accreditation requirements of DIN EN ISO IEC 17065:2013



## Impact

- Technology and Market assessment
- Business case analysis
- (Grid) Modelling
- Due Diligence
- Technology selection

## Performance

- Modelling
- Testing
- Power Failure Investigation
- Prototype development
- Inspection

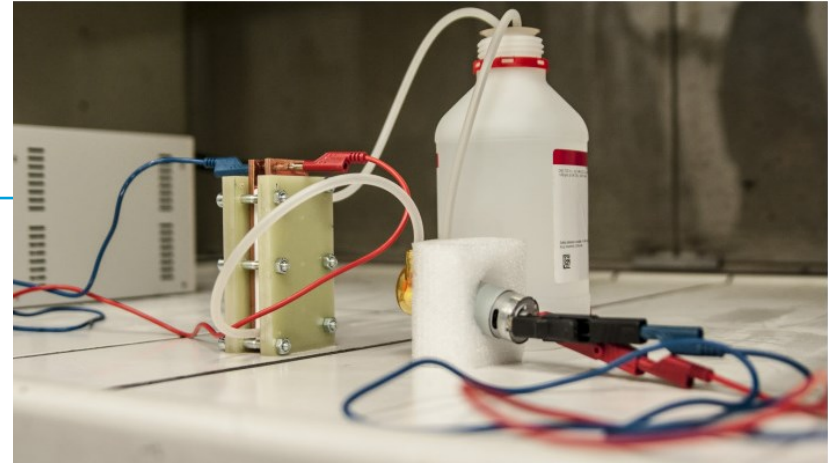
## Implementation

- Owners engineer
- Bankability assessment
- Procurement and commissioning support.
- Acceptance test

## Our laboratories

### Arnhem's Energy Storage Lab

- Battery testing capabilities
- Ranging from micro-Amps to hundreds of Amp
- Customized performance tests



### BEST Test & Commercialization Center

- Collaboration between DNV GL and NY BEST
- \$23 million public-private investment
- From single cells to complete systems with cycle capacities up to 240 kW
- Systems up to 2 MW can be tested in conjunction with the KEMA Powertest lab in Chalfont, Pennsylvania
- NY BEST is a consortium of more than 125 manufacturers, suppliers, universities, utilities and engineering firms



# Content

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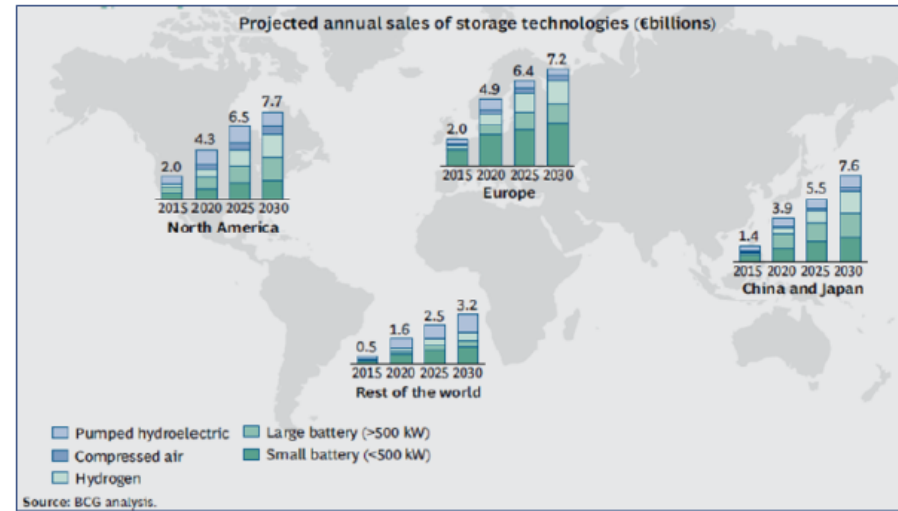
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# The need for standardization

## ■ Present situation:

- Increasing demand for Grid-Connected Energy Storage Systems
- Increasing attention to safety, operation and performance
- Mainly project-based market

- **Survey** in 2014 amongst electric utilities, storage vendors and other stakeholders. Outcome survey: “Lack of clarity on applicable standards for grid-connected energy storage systems”
  - Difficulty proving the validity of a system
  - Risk for sector as a whole



## ■ Global activities: e.g.

- IEC TC 120
- DOE / Sandia
- ...





## Existing standards

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*"There are already many standards, and together they cover all relevant aspects of grid-connected energy storage."*

*Well...No:*

- *No single standard* that comprehensively covers and links all aspects relevant for grid-connected energy storage (fragmentation)
- Unclear or *impossible to combine* ~100 standards into 1 comprehensive standard
  - Wildly differing scopes
  - Difficult to read/understand
  - Difficult to get overview, know and choose from all standards
- A standard may *address* an aspect ("X"), but may not *cover it completely*
- A standard may *address* an aspect ("X"), but may have a *low quality* for it
- *Gaps* exist: some aspects are not or insufficiently covered

# Need assessment

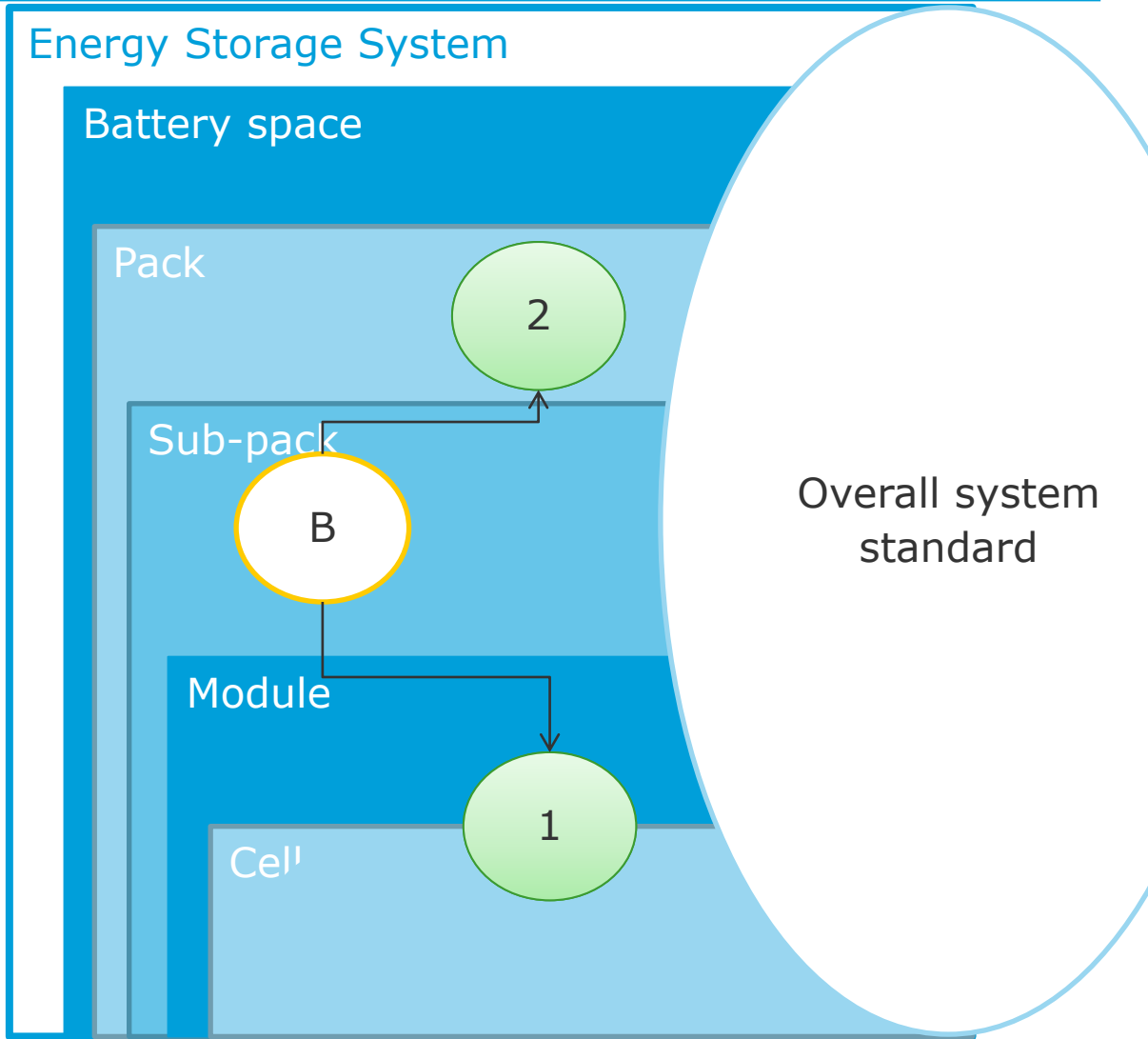
Existing standards

Gaps in standards

Non-relevant standards

Interrelations missing

→ Overall system standard



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- **DNV GL** setting up & coordinating an publically available **Joint Industry Project (JIP)** to facilitate / stimulate optimal and safe implementation of Energy Storage
- JIP consortium of approx. 10 to 15 participants
  - End-users (DSO, TSO, utilities etc)
  - Energy Storage system integrators, suppliers
  - Regulators
- Deliverables: *Recommended Practice(s) on grid-connected energy storage*
  - guidelines and methods to evaluate, assess and test safety, operation and performance
  - taking into account worldwide accepted regulations and best practices like ISO, IEC and IEEE standards
  - Outcomes of projects such as Stallion and Stabalid
- Global approach: US, EU, APAC and ME



# Example Recommended Practice

SAFER, SMARTER, GREENER

DNV·GL



DNV GL GUIDELINE FOR LARGE  
MARITIME BATTERY SYSTEMS

# Example Recommended Practice

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# DNV GL Recommended Practices

DNV Service Docs x

exchange.dnv.com/servicedocuments/dnv

**DNV service documents** Help To se

Current as of: 2015 ▾ 01 ▾

**DNV Recommended Practices**  
2015-01

		<b>Edition</b>	<b>Amended</b>	<b>History</b>
<a href="#">Changes</a>	<a href="#">Summary of changes</a>	2014-11	Rev.	+
<a href="#">DNV-RP-A201</a>	<a href="#">Plan Approval Documentation Types - Definitions</a>	2014-07		+
<a href="#">DNV-RP-A203</a>	<a href="#">Technology Qualification</a>	2013-07		+
<a href="#">DNV-RP-A204</a>	<a href="#">Quality Survey Plan (QSP) for Offshore Class New-building Surveys</a>	2011-09		+
<a href="#">DNV-RP-A205</a>	<a href="#">Offshore Classification Projects - Testing and Commissioning</a>	2013-10		+
<a href="#">DNV-RP-B101</a>	<a href="#">Corrosion Protection of Floating Production and Storage Units</a>	2007-04		+
<a href="#">DNV-RP-B401</a>	<a href="#">Cathodic Protection Design</a>	2010-10	2011-04	+
<a href="#">DNV-RP-C101</a>	<a href="#">Thickness Diminution for Mobile Offshore Units</a>	2014-05		+
<a href="#">DNV-RP-C102</a>	<a href="#">Structural Design of Offshore Ships</a>	2002-02		+
<a href="#">DNV-RP-C103</a>	<a href="#">Column-Stabilised Units</a>	2012-04		+
<a href="#">DNV-RP-C104</a>	<a href="#">Self-elevating Units</a>	2012-11		+
<a href="#">DNV-RP-C201</a>	<a href="#">Buckling Strength of Plated Structures</a>	2010-10		+
<a href="#">DNV-RP-C202</a>	<a href="#">Buckling Strength of Shells</a>	2013-01		+
<a href="#">DNV-RP-C203</a>	<a href="#">Fatigue Design of Offshore Steel Structures</a>	Replaced by DNVGL-RP-0005	2014-06	+
<a href="#">DNV-RP-C204</a>	<a href="#">Design against Accidental Loads</a>	2010-10		+



## Suggested Scope



- Based on feedback key players
- Final scope to be approved by consortium

# Benefits

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- Benefits of participating in the **Joint Industry Project**

- unique opportunity to influence development of a global industry-wide recommended practice for grid-connected energy storage systems
- ensuring the RP takes into account the applications or energy storage types relevant to your organisation
- “Join the club”: enter a network of users and producers, sharing data, best practices and lessons learned

- Benefits of the **Recommended Practice**

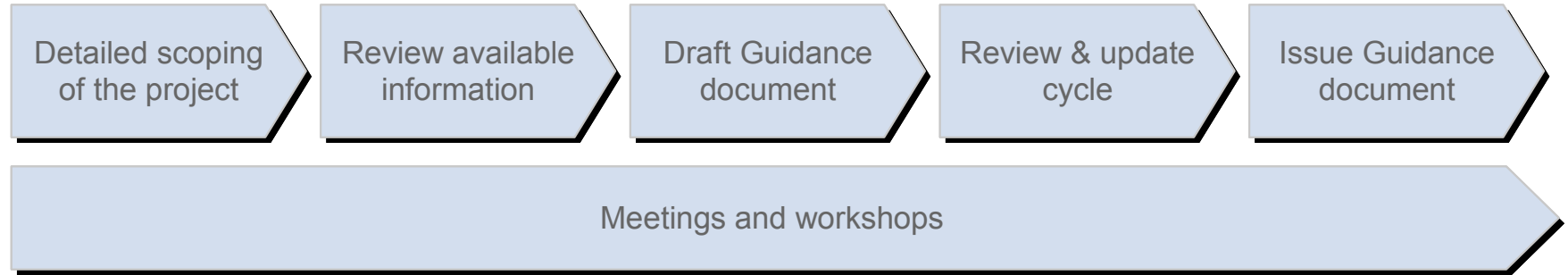
- qualification of your technology that you can show to your customers
- reduced standards list you can use to begin testing your product
- pro-active scope in order to meet upcoming regulations
- focused on end-users as well as manufacturers / system integrators
- fast introduction: filling the time gap between officially committee adopted standards and the market pace

## End result of GRIDSTOR

- Main results of Recommended Practice:
  - Recommended configuration method
  - Recommended risk evaluation method
  - Recommended life cycle assessment method (economics, environment)
  - Recommended performance test suite
  - Recommended safety test suite
- Defining building blocks for an open competitive market place
- Overall layer over local standards and regulations
- Continuous updates following technology development & end-user applications
- What GRIDSTOR is not: value assessment / markets & regulations



# Project Structure GRIDSTOR



- Timeline: Kick-off Feb 2015
- Recommended Practice finished: Dec 2015
- Approach: core group develops standards by expansion and combination
  - extensive feedback and revision by partners
- Project organisation:
  - Partners will have a representative in the steering committee of the JIP
  - managed by DNV GL

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# Linking developments in ES recomm. practices / standards (1)

*Exceptional service in the national interest*



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120/44/DC

2014-06-06

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TECHNICAL COMMITTEE NO.120: ELECTRICAL ENERGY STORAGE (EES) SYSTEMS



## Energy Storage Safety

DOE OE Energy Storage Peer Review  
September 17, 2014

SNL thanks Dr. Imre Gyuk for his decades of support of the SNL Energy Storage Program.

Sean J. Hearne

Manager, Energy Storage Technology & Systems



12 September 2014

Media Contact: John Grimes on 0400 102 396

Energy Storage Peak Body Launched

Today the Australian Energy Storage Council – the new peak body for the energy storage industry – has been formally launched, opening up exciting new opportunities for the sector in Australia.

Pacific Northwest  
NATIONAL LABORATORY  
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### Overview of Development and Deployment of Codes, Standards and Regulations Affecting Energy Storage System Safety in the United States

## GRIDSTOR & US developments

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- Close ties with DOE and various standardisation committees
- DNV GL to organise workshop series in 2015
  - Key participants, such as Sandia, DoE
  - Goal: create US guidance document on implementation and selection of existing standards on grid-connected energy storage by late 2015
  - Strong exchange with GRIDSTOR (frequent updates, sharing personnel etc.)

## GRIDSTOR & IEC TC 120

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### GRIDSTOR RP

- RP delivered in 2015
- Max. 15 participants
- Flexible after launch
- RP new in energy sector, coordinator well established
- Project contribution 5k€-20k€, free RP

### IEC TC 120

- Main deliverables end 2017
- <100 members from 17 countries
- Rigid after launch
- Standards and organisation well established in energy sector
- No contribution, fee for using standard



Opportunity

**GRIDSTOR**





## Summary

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- Perceived need to move from project-based to product-based sector
- Many standards exist, none yet on systems level
- GRIDSTOR Joint Industry Project to create Industry Recommended Practices
- Scope: safety, operation, performance
- Tuned with international developments
- Already kicked-off but limited number of seats left

# GRIDSTOR – Safe and sound implementation of grid-connected energy storage systems

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