



RoCoF Alternative/Complementary Solutions Phase 1

DS3 RoCoF Alternative/Complimentary Solutions Workshop
8th July 2015, Dundalk



Agenda

Item	Time	Speaker
Tea/Coffee	09:30	
General Update	10:00	Robbie Aherne
Phase 1 Overview		David Cashman
Consultant's Presentation of their Report	10:40	Willem Uijlings (DNV GL)
TSOs' View on Phase One	11:20	David Cashman
Phase Two / Next Steps		
Close	12:00	

RoCoF Project Overview

Robbie Aherne

8th July 2015



RoCoF Project Overview

Generator Studies
Project

Can synchronous
generators ride
through a high RoCoF
event?

Great Island GI4 ✓

TSO-DSO
Implementation
Project

Can DSOs protect
against islanding using
different settings or
measures to RoCoF?

Can embedded
synchronous generators
ride through a high
RoCoF event?

Alternative /
Complementary
Solutions Project

Investigate and, if
appropriate,
propose
alternatives

Complements
requirements for
System Services

Generator Studies Project

- All phase 1 Generators have commenced project
- CER and SONI quarterly updates published
 - Ireland: 24 Green status and 6 Amber
 - Northern Ireland: 4 Green status and 2 Amber
- Currently all phase 1 generators in IE and NI have indicated they are on track to conclude by May 2016
- One generator (GI4) has declared compliance to the new standard
- Meetings with generators and OEMs held in June

TSO-DSO Implementation Project

- Managed through existing TSO-DSO governance structure
- Ongoing bi-lateral TSO-DSO meetings taking place
- Loss of Mains (LoM) protection setting change process initiated by DSOs



TSO-DSO Project: Ireland

- Frequency injection bench testing of RoCoF relays complete
- Settings change requests issued to generators
- Engagement with embedded generators on RoCoF withstand capability through DCRP
- Database of distribution connected settings currently being compiled

TSO-DSO Project: Northern Ireland

- RoCoF project timelines revised based on NIE projections
- Current plan is to assess the impact of G59 rev 3 setting changes in advance of implementing 1 Hz/s settings
- Database of settings for wind generation has been compiled
- Currently obtaining embedded generation settings and volumes
- Modification of Distribution Code for RoCoF requirements for embedded generators > 100 kW approved

RoCoF Alternative/Complementary Solutions Project

Phase 1

- Range of theoretical options assessed at a high level via weighted scoring matrix approach
- Viable options selected for Phase 2 analysis

Phase 2

- More detailed review of the viable options from Phase 1
- Analysis focused on technical and economic aspects of each option

RoCoF Alternatives Project

- Phase 1:
 - Assessment of non-synchronous device capability
 - RoCoF detection methodologies and response times of devices
 - High level appraisals via 'Faceplate' templates

Feedback by Friday
17th July 2015



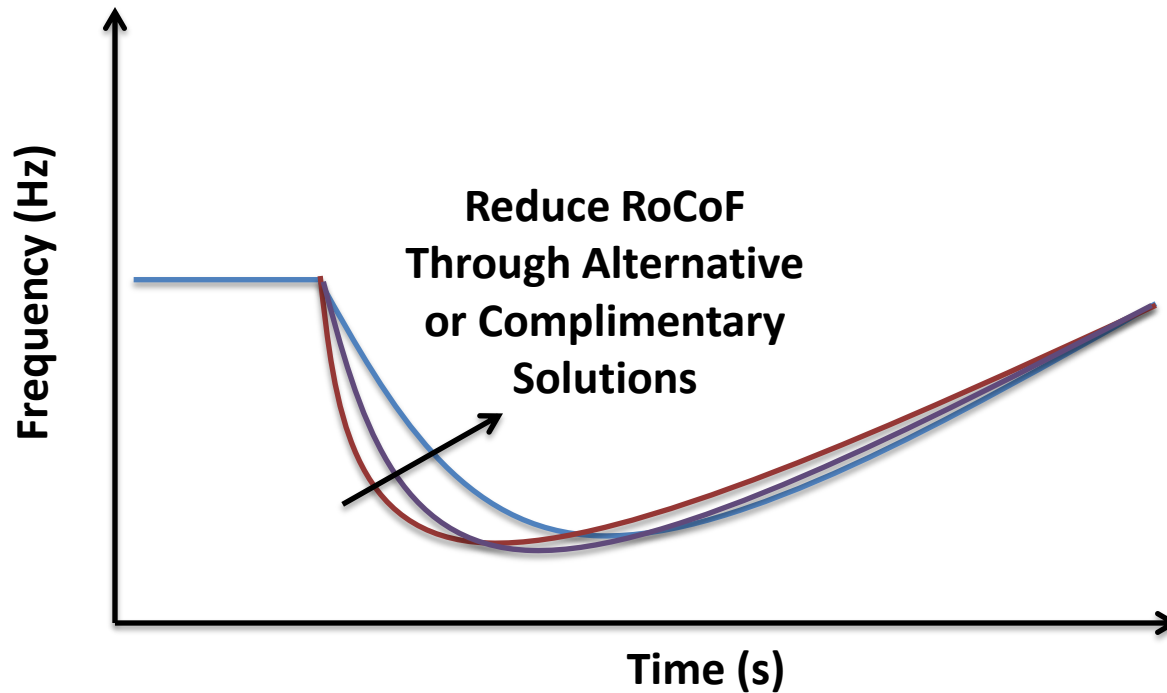
RoCoF Alternative/Complementary Solutions Project Phase 1 Overview

David Cashman

8th July 2015



Project Objective



Phase 1 Technologies

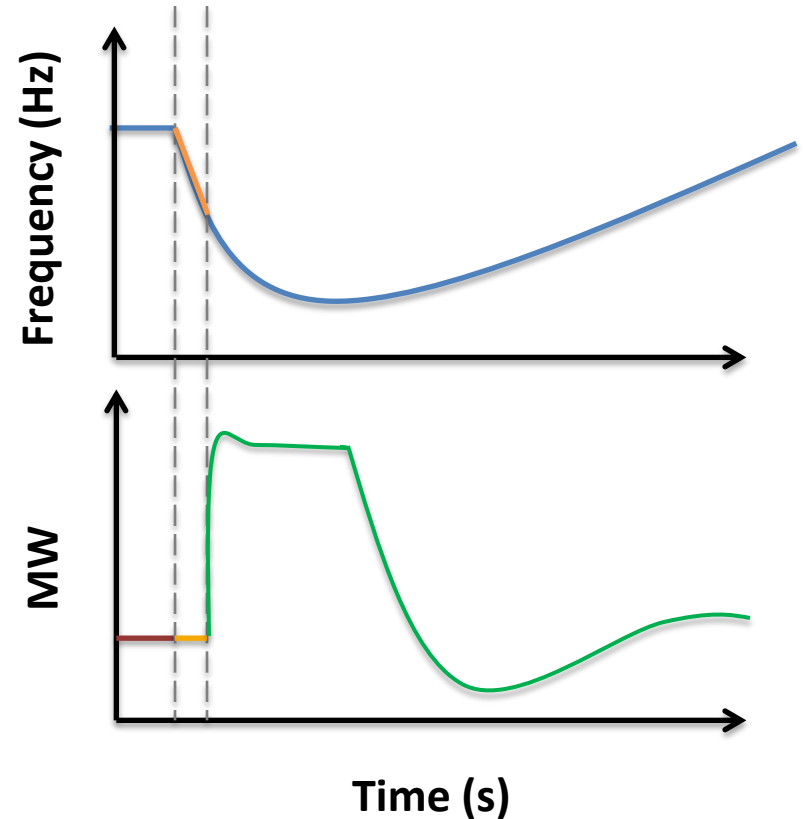
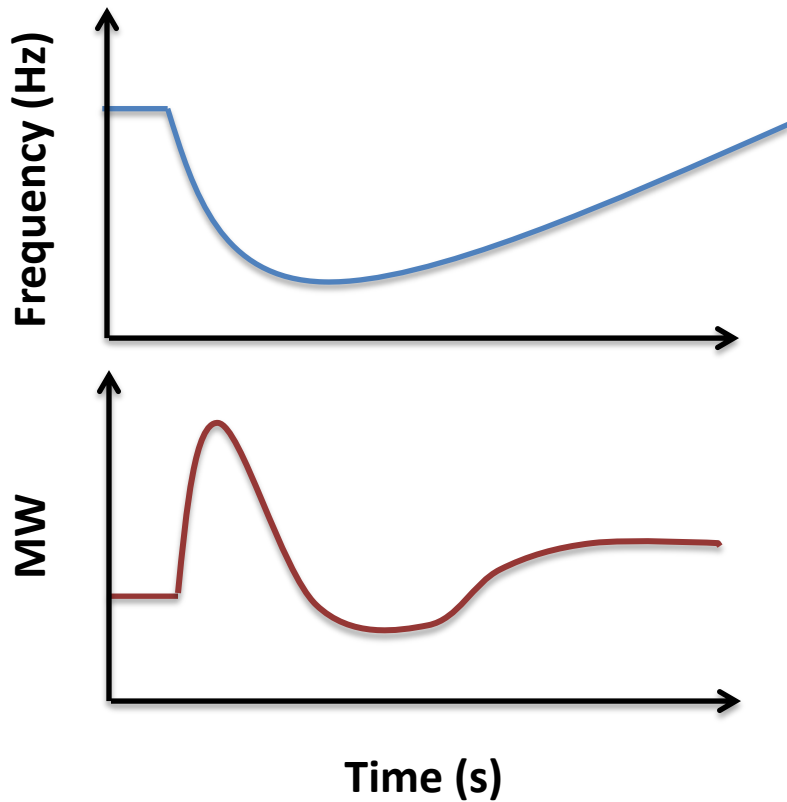
Synchronous Devices	Non-Synchronous Devices
1. Synchronous Compensators	9. HVDC Interconnectors
2. Rotating Stabilisers	10. Battery Technologies
3. Pumped Hydro	11. Flywheels
4. Compressed Air Energy Storage	12. Wind Turbines
5. “Parking of Conventional Units”	13. *Demand Side Management
6. Reduction of Minimum Generation	
7. Flexible Thermal Plant	
8. *AC Interconnection	

Phase 1 Assessment Criteria

- Weighted Scoring Matrix Assessments

Effectiveness	4
Technology Maturity	3
Lead Time	3
Additional Syst. Serv.	2
Geo. Flex.	1

Synchronous and Synthetic Inertia



Phase 1 Project Scope

- Investigate the capabilities of non-synchronous devices for RoCoF events
- Conduct high-level analysis of 13 technologies
- Provide Cost information in assessments but not considered as part of Scoring Matrix
- DNV GL appointed by TSOs to conduct Phase 1 analysis

Questions?



Willem Uijlings



TSO's Views on Phase 1 Report

David Cashman

8th July 2015



Report Highlights

- Both Synchronous and Non-synchronous devices have capability to prevent high RoCoF events
- Timely event detection is key for Non-synchronous devices
- Scoring Matrix results do not favour any specific solution
- A combination of devices is likely to be required to resolve the RoCoF issue

EirGrid and SONI Views

- Seeking further views from industry
 - Event Detection Methodologies
 - Scoring Matrix Outcomes
 - Faceplate Assessments
- All technologies to be considered in Phase 2
 - AC Interconnection not considered



Next Steps and Timelines

25th Jun

- Publication of RoCoF Alternatives Report and associated documents

8th July

- Industry workshop on Phase 1 report

17th July

- Receive comments from industry on Phase 1 results

31st July

- Close out report of Phase 1 with industry views
- Commence Phase 2 Studies

RoCoF Alternative Solutions Phase 2



Phase 2 Overview

Phase 2

- More Detailed technical analysis of selected technology solutions
- Technical and Techno-economic assessment of solutions
- All solutions with exception of AC Interconnection to be considered
- Not initial stages of a procurement exercise

Phase 2 Approach

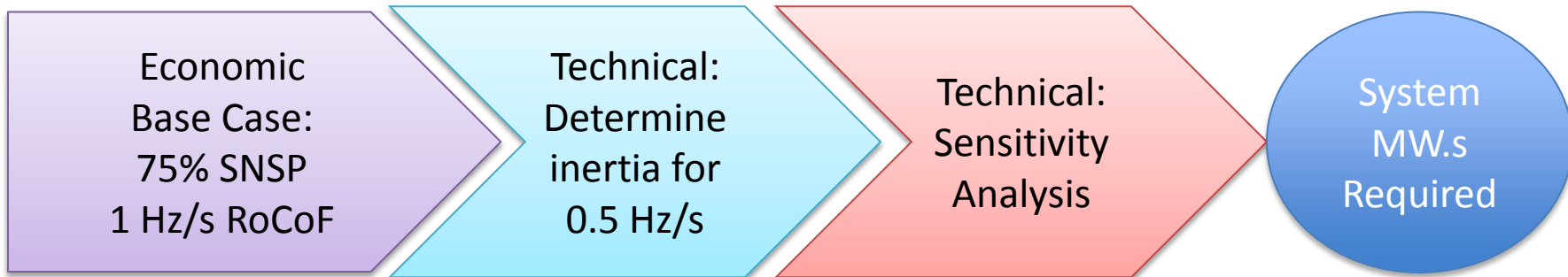
- Consider two scenarios:
 - Synchronous Inertia Solution
 - Non-synchronous Inertia Solution
- Broad-brush approach rather than considering 12 technologies independently
- Develop characteristic inertial response for synchronous and non-synchronous devices

Phase 2 Objectives

- Perform studies to determine inertia (MW.s) to reduce RoCoF from 1Hz/s to 0.5Hz/s in 2016 'base case'.
- Determine inertia volume requirements for 2 Cases:
 - Case 1: Required volume of Synchronous inertia
 - Case 2: Required volume of Non-synchronous Inertia
- Sensitivity analysis of response time for Non-Synchronous devices

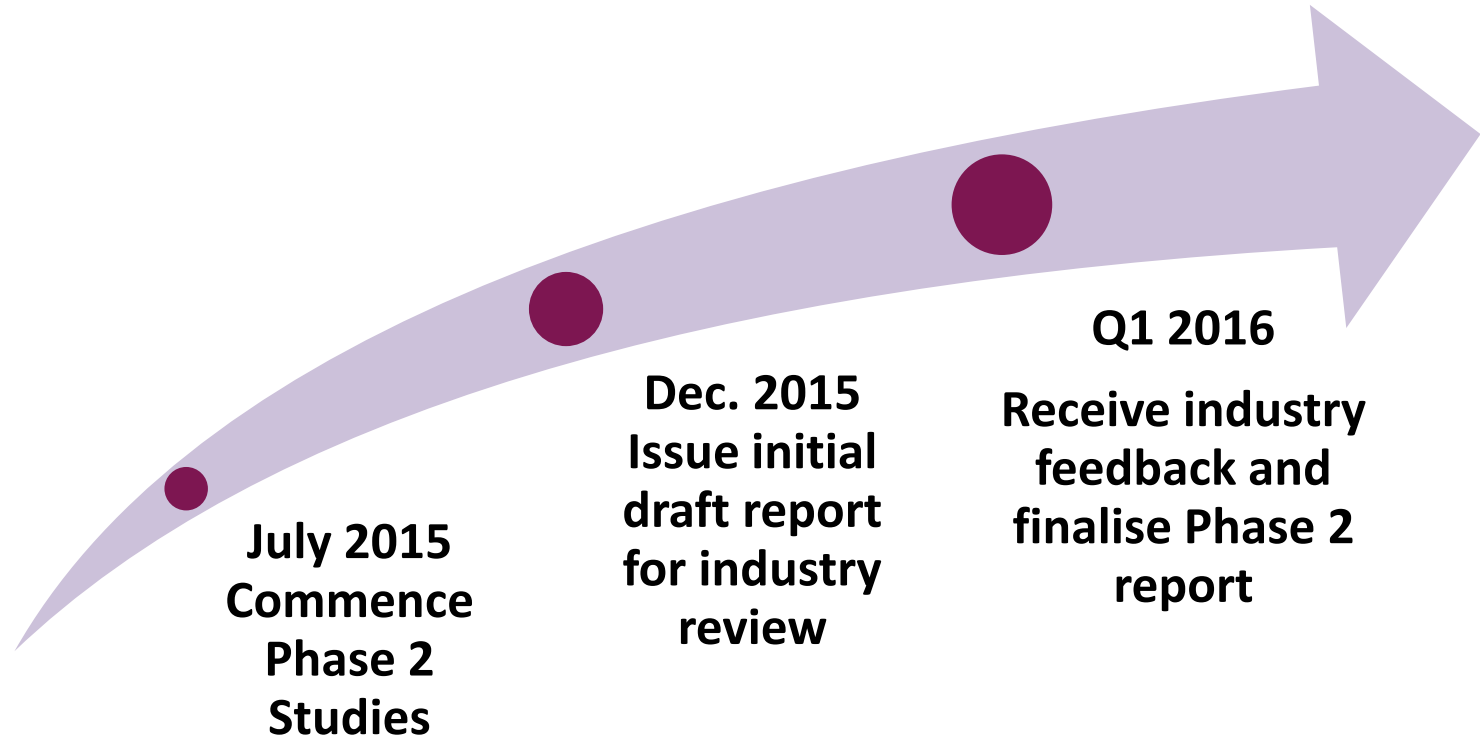
Phase 2 Study Outline

- Techno-economic and Technical studies to be performed
- Iterations of studies are likely to determine suitable solution



- Studies consider business as usual portfolio
- System Services volumes are outside of scope

Phase 2 Timelines



Summary

- Phase 2 to consider more detailed studies of possible synchronous and non-synchronous solutions
- Technical and Techno-economic studies will be performed to determine the inertia volumes
- Seeking industry feedback on proposed approach and methodology
- Studies are **NOT** aimed at determining System Services volumes or act as beginning of procurement process

RoCoF Project Overview

Generator Studies
Project

Can synchronous
generators ride
through a high RoCoF
event?

Great Island GI4 ✓

TSO-DSO
Implementation
Project

Can DSOs protect
against islanding using
different settings or
measures to RoCoF?

Can embedded
synchronous generators
ride through a high
RoCoF event?

Alternative /
Complementary
Solutions Project

Investigate and, if
appropriate,
propose
alternatives

Complements
requirements for
System Services

Questions?

