

Recommended Practice for Energy Storage Management Systems in Grid Applications

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Overview

- As grid deployment of energy storage systems (ESSs) increases, a well-designed Energy Storage Management System (ESMS) is critical to effectively operate one or more ESSs in grid applications.
- A need exists for recommended practices and standards to inform designers and integrators about the challenges of ESMS development and deployment.
- This document will provide recommendations and best practices to address these challenges. The recommended practice will also assist in the selection between design options by supplying the pros and cons of a range of technical solutions.

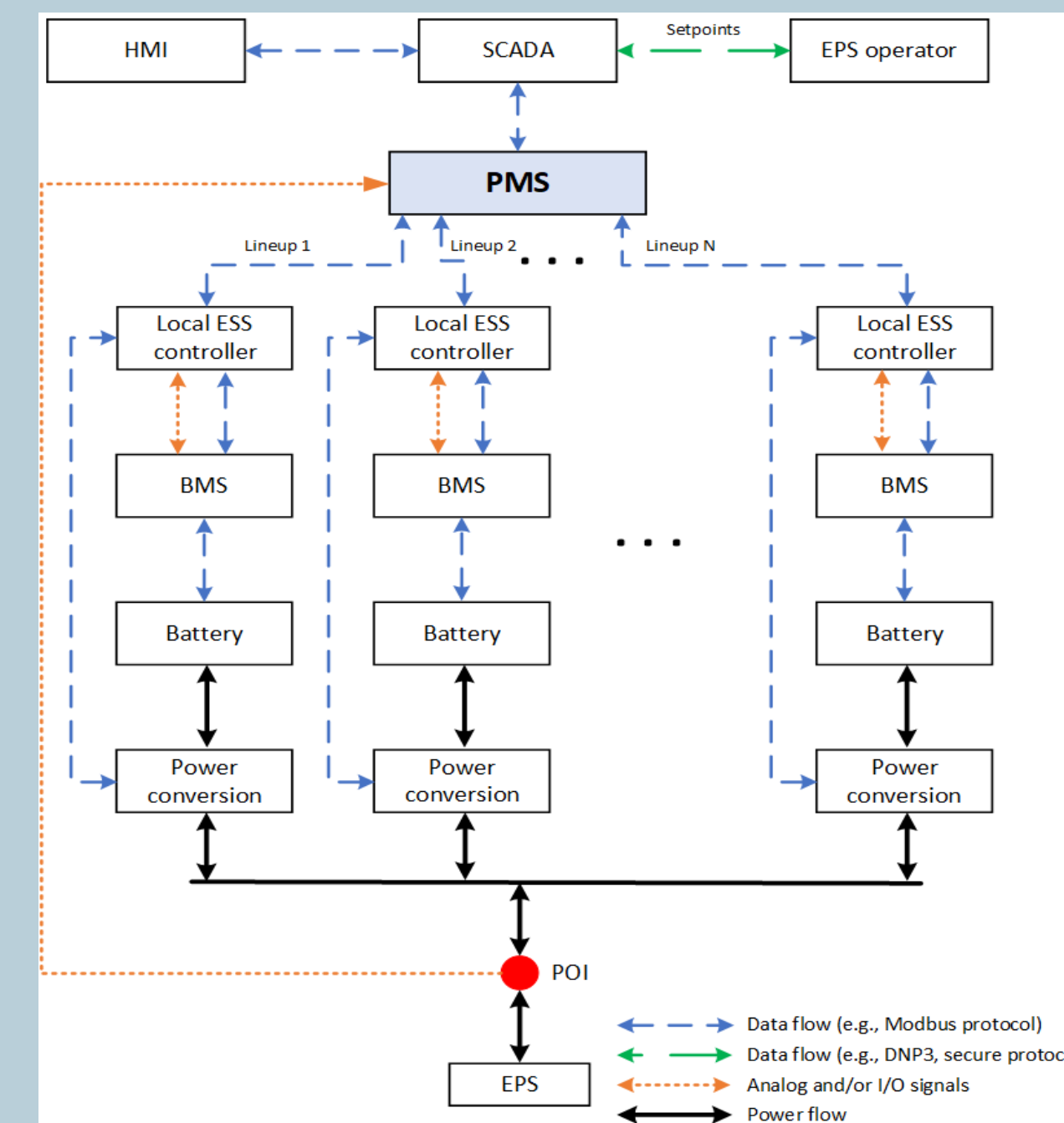
Scope

- This document will cover the development and deployment of ESMS in grid applications.
- ESMS is an umbrella term that includes a range of systems that generally fall into one of several categories:
 - Power management systems (PMS)
 - Power plant controllers (PPC), also known as microgrid or site controllers
 - Energy management systems (EMS)
- For each category, ESMS contains software functions and hardware capabilities to address requirements needed to operate ESSs in supply-side and demand-side applications.
- Out of scope: mobile applications such as electric vehicles; vehicle-to-grid applications, except as it relates to aggregated control of these resources.

Tentative Project Schedule

1. Propose ESMS Project to ESSB – June 2020 ✓
2. Draft PAR, then submit to ESSB – July 2020 ✓
3. PAR Approval from ESSB – August 2020 ✓
4. PAR Approval from SA – Q1 2021 ✓
5. Form Working Group – Q2 2021 ✓
6. Kickoff Monthly ESMS WG meetings – Q3 2021 ✓
7. Draft Recmd Practice – Q3 2021– Q1 2024 (in progress)
8. Ballot the Draft Recmd Practice – Q2 2024
9. Approval and Publication – Q3 2024

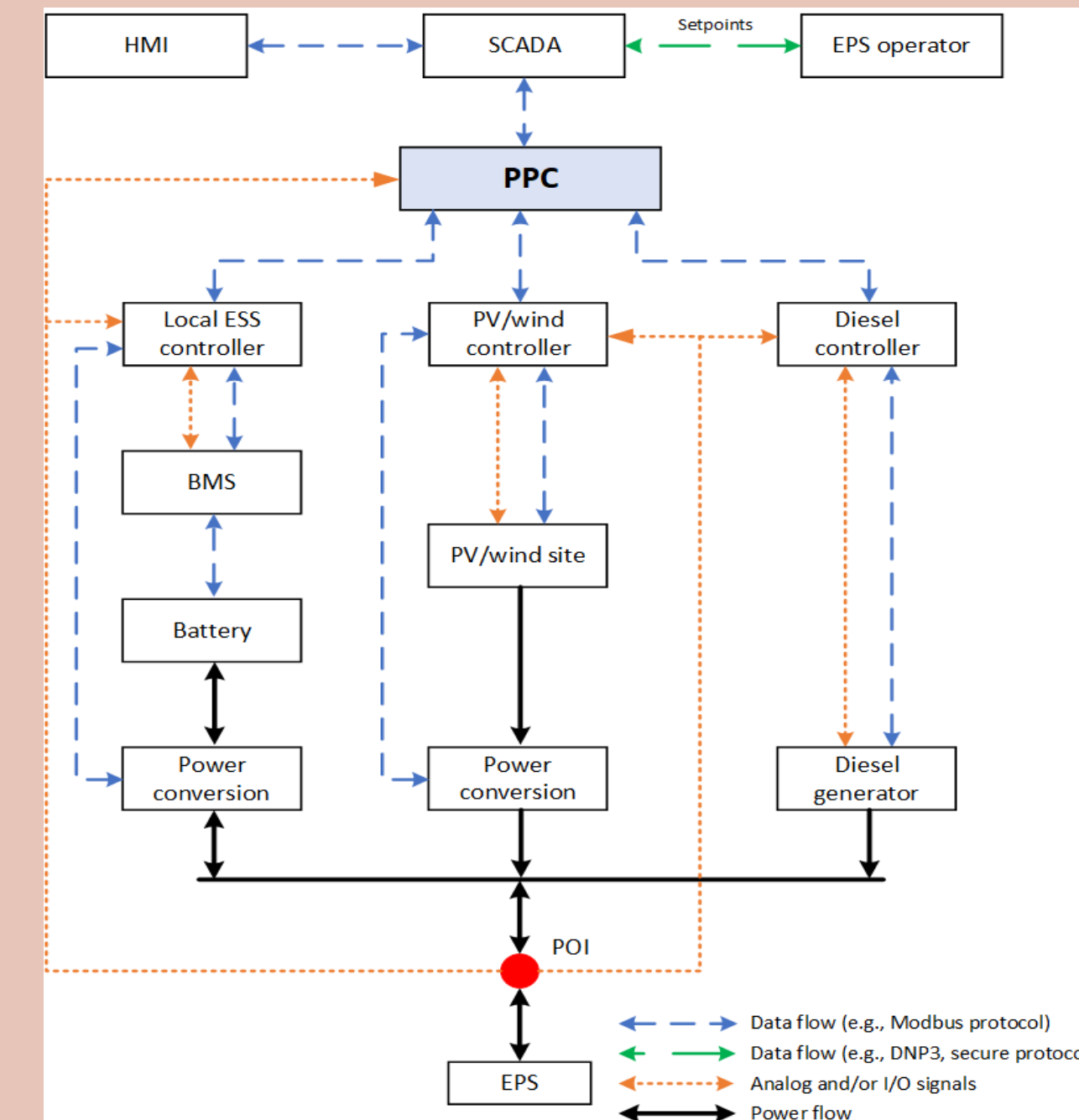
ESMS as a Power Management System (PMS)



Note: Communication within the ESS is typically via Modbus protocol, although the battery system may use CANbus or CANopen protocol.

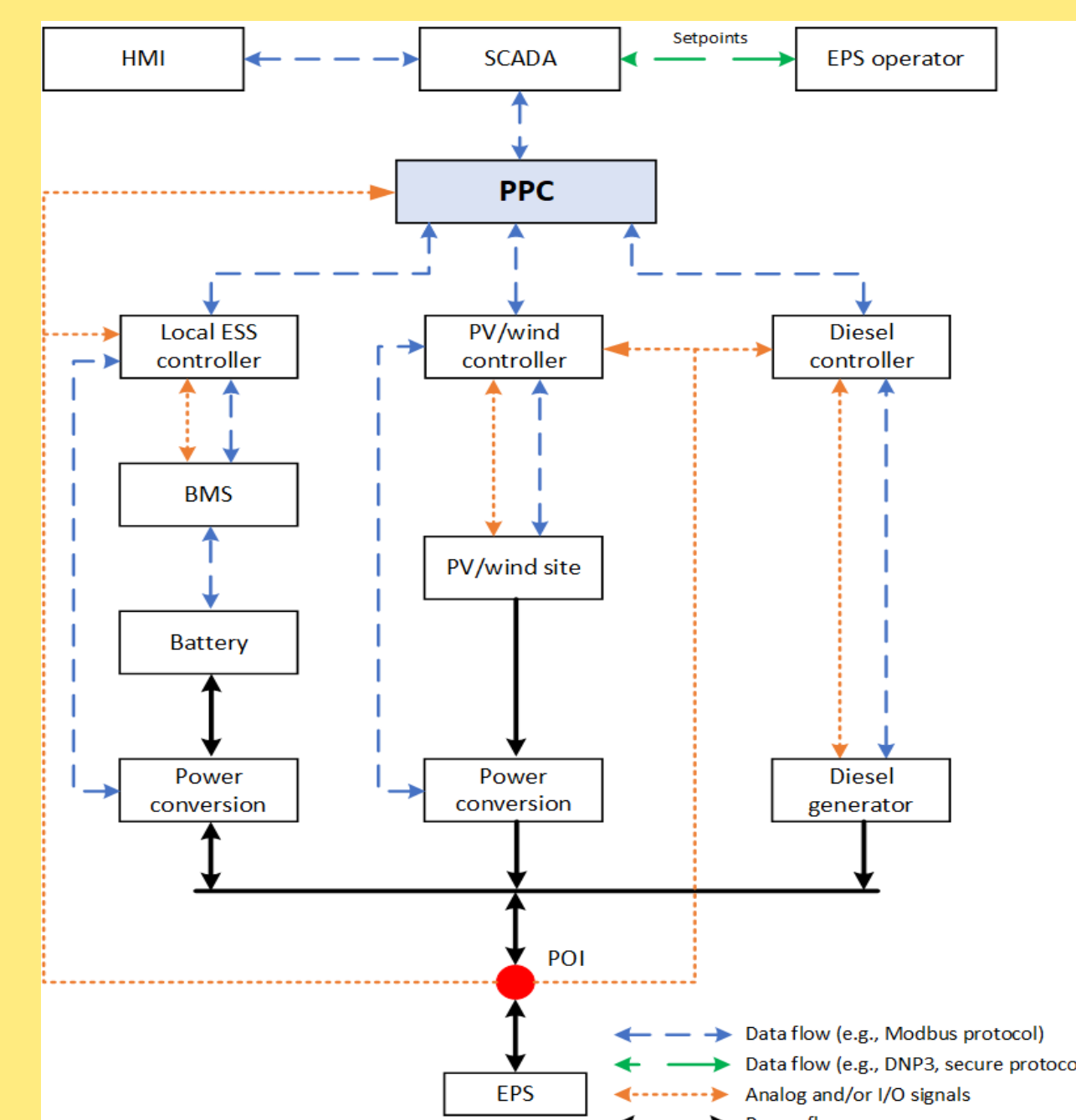
Note: Power conversion is bidirectional and can be a dc-ac converter, a dc-dc converter, or a combination of dc-dc and dc-ac converters.

ESMS as a Power Plant Controller (PPC)



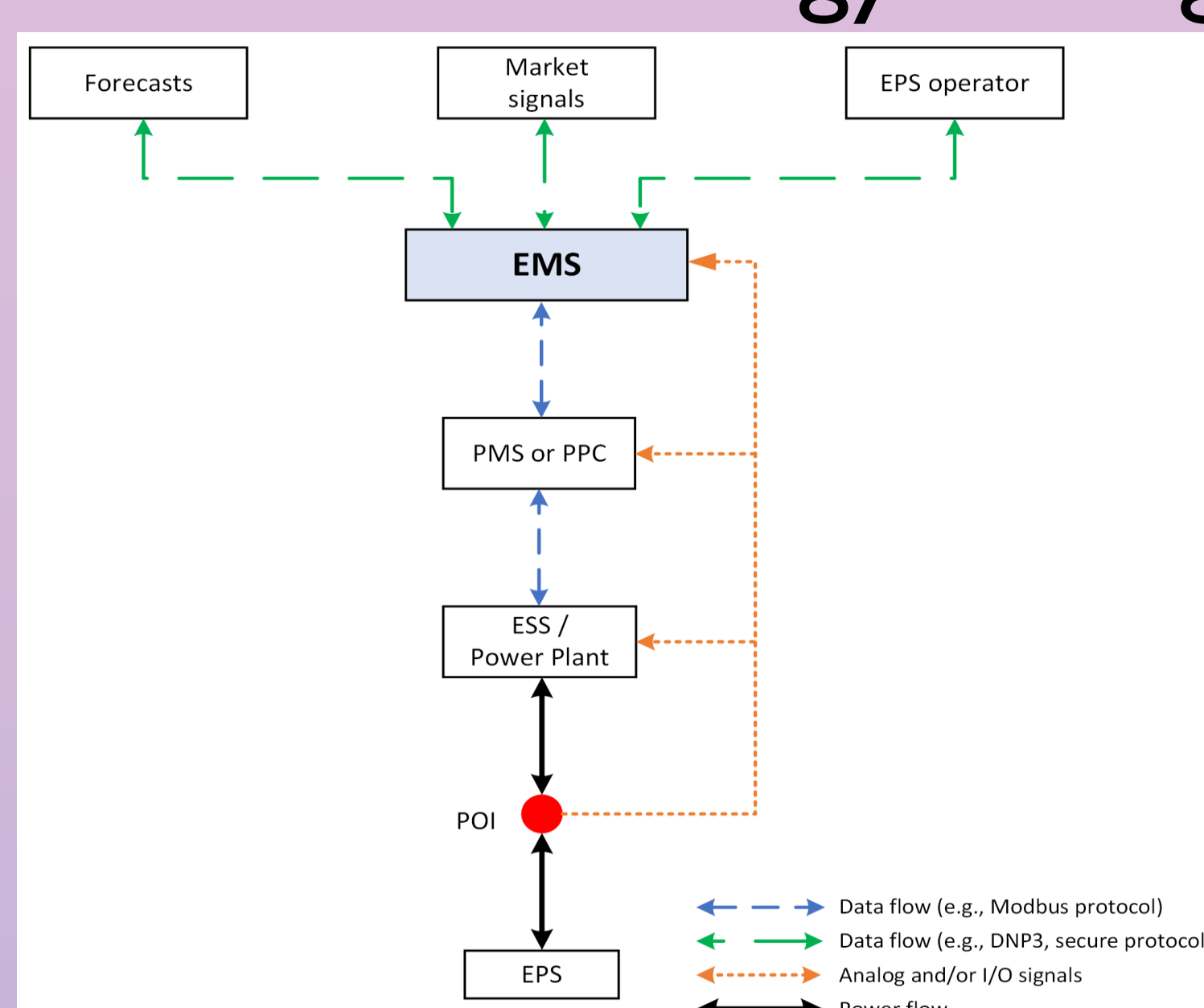
Example PPC with an ac-coupled ESS

ESMS as a Power Plant Controller (PPC)



Example PPC with a dc-coupled ESS

ESMS as an Energy Management System (EMS)



Note: EMS is a high-level controller that may have PMS or PPC functions or may operate in conjunction with a separate PMS or PPC.

Note: EMS is typically a 'smart' device, such as using machine learning to optimize dispatch levels.