

Creating data harmonisation between seven wind farms ...

Wind Power Monthly

Wind farm data management and analysis forum

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Day 2 09:45

Martin Elliott

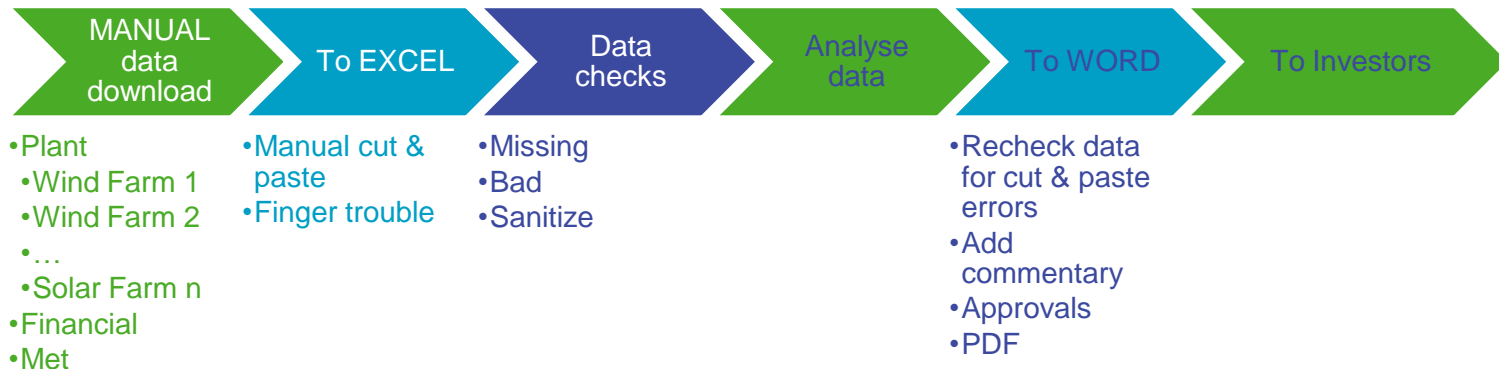
Data: The route from “hands on” to “light touch”

Why change?

• Before

- Too much risk of finger trouble
- Focus on making sure raw data is valid

~8 man days per week



• After

- Data automatically delivered for engineer review
- Focus on the story the data tells

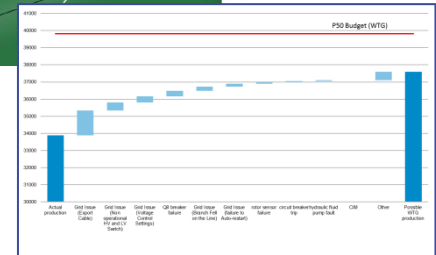
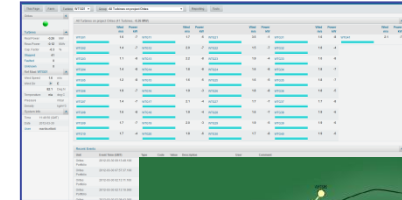
~2 man days per week



Data: The route from “hands on” to “light touch”

How and what to specify?

- **How do I define what I want?**
 - Invest time in getting requirements clear
 - Talk to ALL your stake holders
 - Get buy-in from ALL at specification stage
 - Not during take-over
- **Who knows best?**
 - Answer it yourself - In house knowledge – I’ll specify
 - URS (20 pages) – FDS (150 pages)
 - Ask the Supplier(s) – They’ve done it all before – I’ll trust them
 - Mature product? But is the expertise still in the company?
 - Beware: Bespoke software will cost more than you think
 - Phone a friend – Call in an independent expert
 - Not the cheap option, but often worth the investment



Data: The route from “hands on” to “light touch”

Budgets (1)

- **Examining the costs**
 - How much am I really spending on reporting and analysis?
 - Weekly / monthly reports
 - Incident analysis and report
 - Bad and missing data
 - How much is manual data handling that can be automated?
 - What savings will automation realistically bring?

Data: The route from “hands on” to “light touch”

Budgets (2)

- **CAPEX and OPEX budgets**

- **CAPEX**

- **Software licencing and configuration**
- **Set-up interfaces to existing data**
(Comm’s / VPN / Database access rights)
- **IT Hardware &/or Hosting set-up**
- **Internal: management, definition, validation**

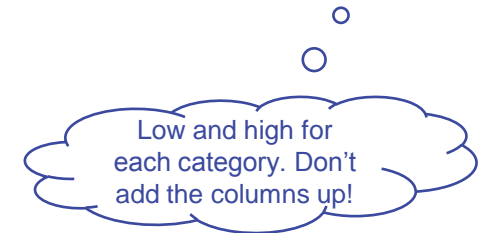
- **OPEX**

- **Software and hardware maintenance**
- **Hosting rental**
- **Dial-up / data**

- **Hidden costs**

- **“Just a tick in a box” can translate to €4k per site**
- **“We’ve connect to this turbine type before” ...**
does not mean that the connection system was robust

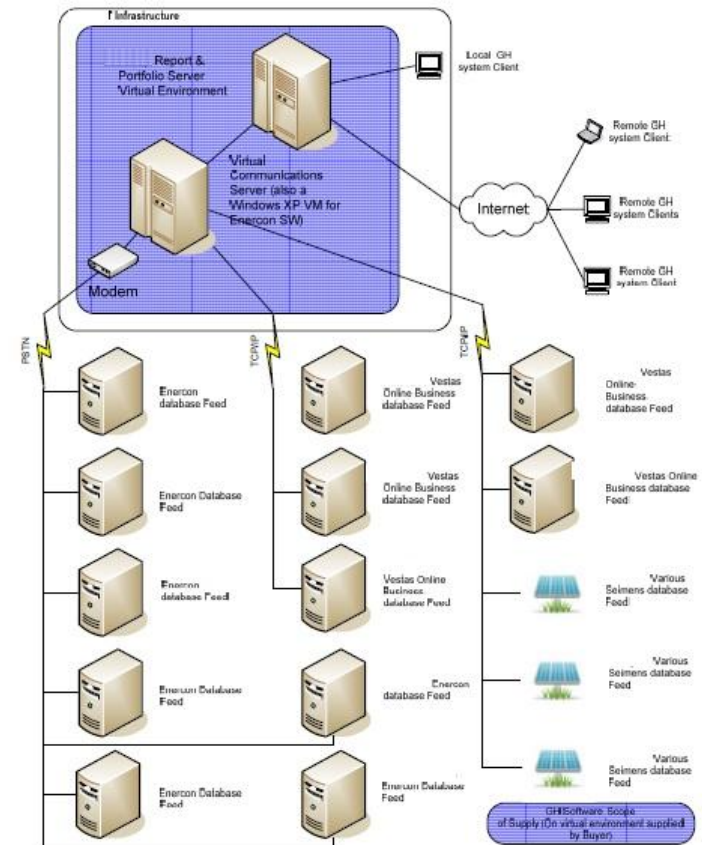
	Low [€k]	High [€k]
CAPEX Budget:	162	405
Reporting Platform:	140	330
Hardware - Data Centre	12	25
Site Interfaces	30	130
Software licences	25	100
Configuration	45	100
Installation and SAT	10	45
Internal Costs:	22	75
Project Management	2	10
Engineering	15	50
Operations	5	15



Data: The route from “hands on” to “light touch”

Access to Data

- **Access to data: understanding the challenges beyond the technical**
 - Where to access the data?
 - Wind turbine – Wind farm - Cloud
 - Who owns the data / data server?
- **Source data availability & reliability**
 - Data “shadow-lands”
 - Edited data
 - By who?
 - Auto-fill
- **Acceptance testing**
 - Agree pre-contract
 - Apples and pears
 - Simulated data or sample data



Data: The route from “hands on” to “light touch”

Light Touch ... How light?

- Challenges post handover:
 - Testing the transparency of routine data processing
 - Spotting exceptions
- Filling in the gaps, the benefits of manual editing compared with auto fill
 - Is the information (eg. wind speed) available to make use of autofill?
- Transitioning from “hands on” to “light touch” approach

WTG01	743.8	437,521	-147,428.50	5.8	18.71	89.28
WTG02	743.2	423,720	-149,689.90	6	18.39	89.89
WTG03	744	458,756	-146,792.10	6.1	20.55	96.49
WTG04	743.8	422,689	-1,351.50	5.9	18.93	89.87
WTG05	744	315,003	-106,289.20	6.3	14.12	85.36
Total	3,718.80	2,097,619	-650,529.20			
Min	743.2	315,003	-149,689.90	5.8	14.12	85.36
Avg	743.8	407,521	-130,145.80	6	18.26	89.18
Max	744					
StdDev	0.3					

Turbine No.	Capacity Factor (%)	Measured Turbine output (kWh)	Turbine Monthly Downtime (hrs)	Wind speed (m/s)	SCADA (comms.) Availability (%)	Actual Availability (%)	Contract Availability (%)
WTG01	18.7	417,531	21.7	5.8	100.0%	97.1%	98.7%
WTG02	19.0	423,720	23.2	6.0	100.0%	96.9%	98.4%

2.1 → Overview

An overview of the performance of the wind turbines and complete wind farm is provided below in Table 5.1

Turbine No.	Capacity Factor (%)	Measured Turbine output (kWh)	Turbine Monthly Downtime (hrs)	Wind speed (m/s)	SCADA (comms.) Availability (%)	Actual Availability (%)	Contract Availability (%)
WTG01	19.6	422,589	283.4	7.2	100.0%	60.6%	62.5%
WTG02	25.5	549,819	12.4	6.6	100.0%	98.3%	100.3%
WTG03	27.7	598,784	8.7	6.8	100.0%	98.8%	100.8%
WTG04	24.3	525,466	7.1	6.4	100.0%	99.0%	101.0%
WTG05	14.2	305,506	297.0	7.0	100.0%	58.7%	61.8%
Average/sum	22.3	2,403,164	608.7	6.8	100.0%	93.1%	85.2%
Equity Budget (P50)	35.5	3,839,014	190.00	8.5	100.0%	94.8%	95.0%
Banking Budget (P75)	32.3	3,485,308	245.00	8.5	100.0%	93.4%	95.0%

Table 5: Summary of monthly production data per turbine

OP-Re-New

Hide / Show Budgets & Configuration

Hide / Show Data & Calculations

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Weekly Report

Reporting Week **46**
 Week Beginning **05-Nov-12**
 Week Ending **11-Nov-12**
 Template Version **1.4**

Author
 Checker
 Approver

Wind Portfolio summary of operations for Week 46

Asset Name	Capacity Factor (%)	Measured Turbine output (kWh)	Turbine Monthly Downtime (hrs)	Wind speed (m/s)	SCADA (comms.) Availability (%)	Actual Availability (%)	Contract Availability (%)
WTG01	18.7	417,531	21.7	5.8	100.0%	97.1%	98.7%
WTG02	19.0	423,720	23.2	6.0	100.0%	96.9%	98.4%
WTG03	27.7	598,784	8.7	6.8	100.0%	98.8%	100.8%
WTG04	24.3	525,466	7.1	6.4	100.0%	99.0%	101.0%
WTG05	14.2	305,506	297.0	7.0	100.0%	58.7%	61.8%
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Was it worth the effort? (1)

- **Benefits**
 - Reporting now generally stress free
 - Weekly data on engineer’s desk on Monday morning – Issued by Noon
 - Effort is now focused on turbine performance not background data
 - Business opportunities – More cost effective service to Clients
- **Surprises**
 - Moving from real computers to virtual hosting was transparent (+)
 - Record keeping and documentation poor in many organisations (-)
 - OEMs – Software / database documentation
 - Developers – Who checked the “As built” files?
- **Disappointments**
 - Cost about 10% over original realistic budget
 - Insufficient early dialogue with key stake-holders
 - Erratic data retrieval from sites on dial-up modems

Data: The route from “hands on” to “light touch”

Was it worth the effort? (2)

- Lessons learned
 - **Specify:**
 - Ask probing questions early
 - Drill through the hype and reputation
 - **Budget:**
 - It's a software project – Be realistic – Think optimistic x Pi
 - Late changes in requirements or core team will cost €€€
 - **Interfaces to data:**
 - Even in this connected world this is still not trivial
 - Beware of legacy turbines and interfaces
 - **Acceptance Testing:**
 - Test Plan
 - Define clearly pre-contract

Data: The route from “hands on” to “light touch”

Thank you!

Questions now ...

... or catch me later.