KRAFTMARKEDET OG DE LANGE LINJENE – BLIR DET EN LØNNSOMREISE MOT 2030?
In order to assess profitability one has to look at both income and cost.

What exactly do we mean with profitability? Which levels? "Profitable" for existing generation or new investments?
Future power prices – a number of important market and political drivers to consider

Power prices: we can calculate them but how good are we at predicting them long-term?
Do forward prices give the answer?
The ”Market” is always right/wrong – forward prices for electricity (for the year 2016) January 2010-2015

A belief in economic recovery in the near future
Electricity forecasts pointing up, oil- and CO2-prices high

The economic recovery comes “the next year”
More cautious long-term demand forecasts, coal- and CO2-prices begin to fall.

Increased understanding of a potential sideway movement of electricity prices
Cautious demand forecasts, Coal- and CO2-prices continue to fall.

Increased understanding of a potential long-term sideway movement of electricity prices, excess capacity on the Continent do not appear to be eliminated; Cautious demand forecasts, Coal- and CO2-prices on a low level.

The assumption of a long-term sideway movement of power prices becomes mainstream; excess capacity on the Continent do not appear to be eliminated; very cautious electricity demand forecasts, Coal- and CO2-prices continue at a low level, the strong Nordic hydrology from 2015 also dominates the view well into 2016

Is the “bottom nådd”?
Economic conditions for power production – looking at sensitivities
Quantification of the most price driving factors towards 2020

- Kolpris + 50 USD/t
- Gaspris + 13 EUR/MWh
- CO2 pris (plus 10 EUR/t)
- Elanvändning (-10 TWh Nordics)
- RES-E utbyggnad Sverige (-2 TWh)
- Ökad effekt kärnkraft Sverige (+ 3 reaktorer)
- Transmissionskapacitet (-1400 MW Norge-Tyskland)
- Transmissionskapacitet (låg tillgänglighet Sverige-Tyskland)
- Dålig vindår och torrår
- Bra vindår och våtår

SOURCE: SWECO
Price formation for certificates is complex too, in real life
The principle is simple, but real life is much more difficult…

Cert prices: we can calculate them but *how good are we at predicting them* long-term?
Are we too static in our interpretation?

- Large potential in terms of volume and cost reductions in the certificate market (Hydro and wind power)
- The potential is much larger than what is needed until 2020 => Great competition
- New turbines, larger generators and larger rotor blades at higher hub heights lowers LCOE => reduce the need for high certificate prices
- In theory the certificate price should cover the difference between LCOE and the power price, "Investor behaviour" and lower rate of return "disturbs" the picture

- Earlier "chicken race" for Swedish projects – against Norway
- New investors with lower rate of return has increasingly entered the market and copes with lower certificate prices
- 1% lower rate of return roughly means 3 öre/kWh lower cost of production
- Lot of capital "needs" to be invested

Necessary long-term profitability

Build-out or not?

Certificate surplus

Changes in the quota curve

The supply curve

Technological development

Market-driven
Politically influenced

+ weather factors

NPV (income from power market)

NPV (income from certificate market)
"The future is always bright" – price formation in the certificate market more complex than one might think but forecasts too simplistic
As if it wasn’t complex enough already…

Power and Cert prices: we can calculate them but **how good are we really at predicting them long-term?**
Example Swedish taxes: even cost base is ”dynamic”

Higher margins from EU-ETS have been used as argument for increased taxes several times.

"Regeringen anser att de elprishöjningar som den under året inledda utsläppshandeln orsakar har bidragit till icke obetydliga intäktsökningar för kärnkraftsproducenterna."

"Senare års ökande elpris har inte motsvarats av ökade produktionskostnader inom vattenkraften. Handel med utsläppsriter har också bidragit till höjda elpriser och har därmed ökat företagens vinster… Genom en höjd fastighetsskatt på vattenkraftverk beskattas dessa extravinster."

"Det är lämpligt att beskatta de extravinster som uppkommer hos kärnkraftsproducenterna till följd av s.k. marginalkostnadsprissättning inom elproduktionen och finns skattehöjningen väl avvägd."

"Lämpligt att skattesatserna justeras med hänsyn till den allmänna prisutvecklingen. Beträffande skatten på termisk effekt höjs denna också för att skapa ytterligare finansiell utrymme."

"Höga vinster görs i dag på vattenkraftsproducerad el, eftersom andra, och dyrare, produktionstekniker svarar för marginalproduktionen av el. Systemet med handel med utsläppsriter har också bidragit till höjda elpriser och därmed ökat företagens vinster. Genom höjd fastighetsskatt beskattas dessa extravinster."
It’s not only a question about income - what about costs?
Side-kick Swedish nuclear - Forsmark BAU (including nuclear tax)

Profitable? Nope.
It’s not only a question about income - what about costs?
Side-kick Swedish nuclear - Forsmark no nuclear tax post 2018

Profitable now?
That depends.
Technology (cost) development will be important
Understanding resource and technology cost development is important for evaluation of future profitability

Illustrative example

Norway
- Complex terrain
- Low hub heights
- Sector management

Low and medium wind
- Large forest sites
- Moving from south to north - cold climate and icing

Denmark
- Flat terrain
- High and medium wind
- Low towers

Low wind
- High tower concepts
- Latest generation of wind turbines

Sweden

Finland

- Norway
- Sweden
- Denmark
- Finland
Onshore wind cost has without doubt developed quickly, but is it all just "technology development"?

- It’s not only technology development
- It’s also project development
- The general economic climate
- …and different actors entering the market

- Which effects are permanent, which are just temporary?
Summary – be prepared!

• Income
  – A considerable number of main price drivers hinges or will be influenced by political decisions, from EU ETS over renewable targets to thermal capacity regulation
  – What your neighbouring countries do matters
  – Support schemes will still matter for the foreseeable future
  – Hard to watch (and even harder to forecast) all developments, but monitoring the most important ones is never wrong!

• Cost
  – Technology cost development expected to continue strongly for less mature technologies
  – However, other cost developments are harder to predict: they might simply be heavily politically influenced, e.g. property taxes, nuclear taxes, grunnrenteskatt etc.

• Profitability
  – Profitability doesn’t just fall from heaven
  – Market factors and politics influence heavily – some directions are harder to predict than others- watch
  – Timing of investment matters
  – What about investors views in an otherwise sluggish European economy?
  – Hard to watch all cost and income driving developments, but monitoring the most important ones is never wrong!
  – Power prices alone will likely not be sufficient to trigger RES-E investments shortly after 2020 without support scheme

No support for hours with low or zero power prices?

Carry more of your own costs
Alignment of producer taxes in the Nordics?

So, is there no final answer to your question.

Sorry.
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RES-E policy evolution – where are we in the Nordics?

Certificate scheme

Premium - fixed

Premium - sliding

FiT

Investment risk

Revolutionary policy path

Certificate market

Certificate scheme

Premium - fixed

Premium - sliding

FiT

Evolutionary policy path

Market orientation

"Electricity market without additional support"

Norway

Sweden

Finland

Denmark

Obligation to sell to market

Obligation to sell to market

Obligation to sell to market

Obligation to sell to market

Price forecasts needed

Price forecasts needed

Competition for support between projects

Competition for support between projects

Price forecasts needed

Price forecasts needed

FiT

Administra-tively set fixed premium

DK- onshore

Administra-tively set sliding premium

DK- onshore

Auction-based fixed premium

Auction-based sliding premium

DK- offshore

DK- biomass

DK- onshore

DK- offshore

Administra-tively set FiT

SOURCE: SWECO
RES-E policy options for the Nordics beyond 2020

The State Aid Guidelines require the introduction of competitive allocation mechanisms, which limits the choice of policy options.

As variable renewables can hardly adopt to market signals, the debate is ongoing to what extent, if at all, the introduction of fixed premiums provides the right incentives and decreases overall cost.

“Electricity market without additional support”

Certificate scheme
- Certificate market
  - Auction-based fixed premium
  - Auction-based sliding premium

Premium - fixed
- Obligation to sell to market
- Price forecasts needed

Premium - sliding
- Obligation to sell to market
- Competition for support between projects
- Price forecasts needed

FiT
- Obligation to sell to market
- Competition for support between projects
- Price forecasts needed

Evolutionary policy path

Investment risk

Market orientation

SOURCE: MWME, SWECO

18 2016-06-16
Different support schemes and support levels for the same technology in the Nordics

- Resource conditions differ across the Nordic countries
- Most countries use a mix of a main support scheme and supporting measures
- Both national and joint schemes are used
- For mature technologies, all Nordic countries use aid during operation over investment aid
- The Nordic schemes differ considerably in terms of degree of market integration and investor risk
- Financing differs, policy costs are increasing but capped in principle (either by duration, level or both)

**Norway**
- Investment support until 2011
- All eligible technologies (technology-neutral)

**Sweden**
- All eligible technologies (technology-neutral)

**Denmark**
- Onshore wind premium
- Power price monthly

**Finland**
- Onshore wind premium
- Power price 3 month average

Source: SWECO
Talking about RES-E support schemes
What about policy path options for Nordic RES-E support?

Joint Certificate Market 2012-2035 (2012-2020)

Premium tariffs Technology-specific, admin. set

Offshore wind - auction-based feed-in premium
- Selected investment aid
- Additional secondary measures

Let the market work now!
Electricity market alone

Let the market work

2015 2020 2025 2030 2035 2040 2045 2050

SOURCE: SWECO
Sweco - Economic conditions for power production (2016)

Customer
Swedish Energy Commission

Overview
- Analysis of costs for different forms of power production vs different price scenarios
- Pedagogic analysis and visualization of different market conditions and political decisions

Added value of Apollo
- Quantitative power price scenarios
- Sensitivity analysis of various 2020 and 2030 (focus on politically influenced effects)

Key observations
- Investment challenges ahead for Swedish nuclear, but also considerable re-investment needs for Swedish hydro
- Nuclear tax decisive for safety upgrade decisions and therefore potential short-term nuclear phase-out

http://www.energikommissionen.se
http://www.energikommissionen.se/aktuellt/rapport-fran-sweco-om-de-ekonomiska-forutsattningarna-for-befintlig-svensk-elproduktion/