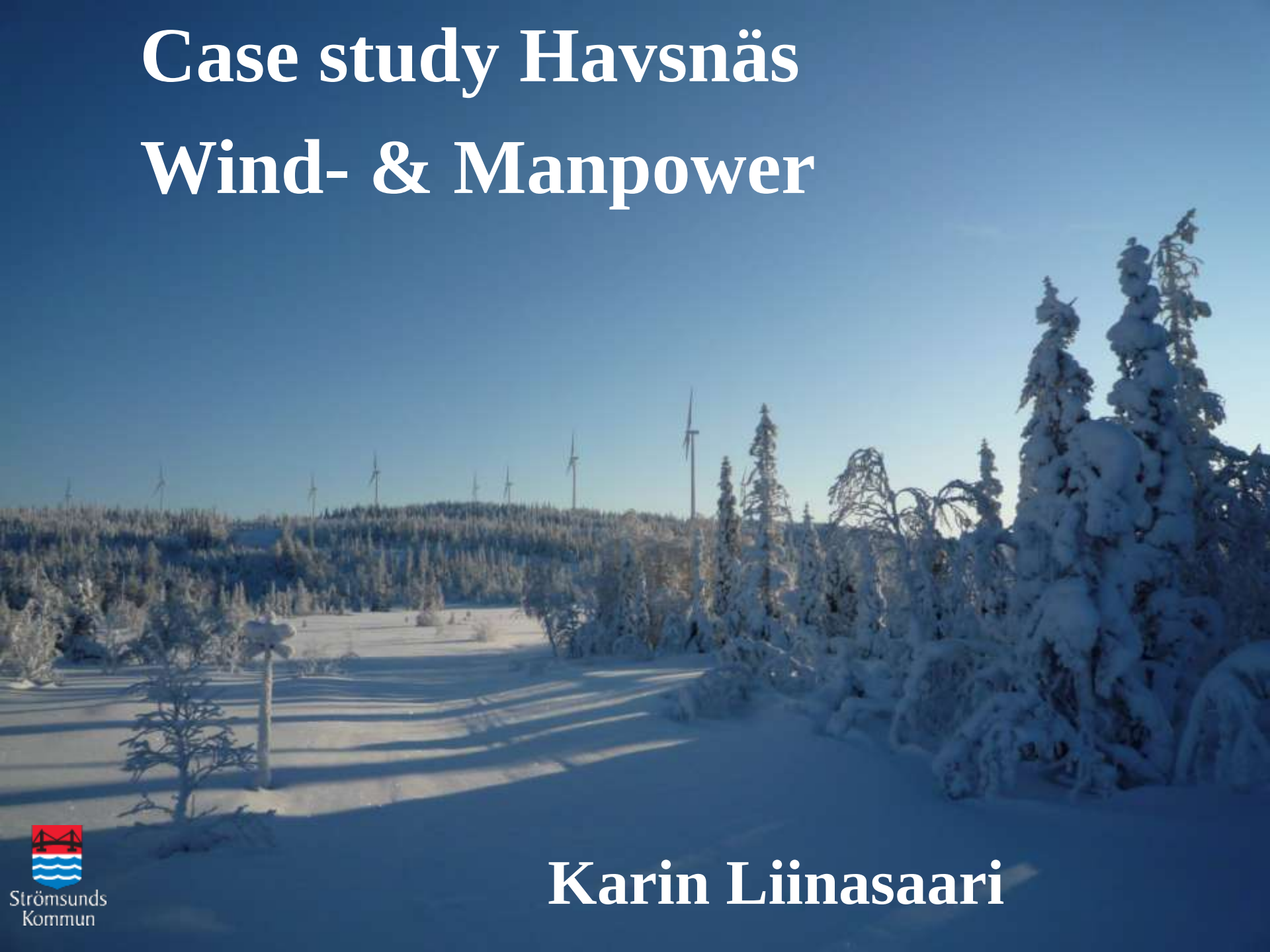
# Case study Havsnäs
# Wind- & Manpower



Karin Liinasaari

Strömsunds Kommun

# County Jämtland

# Municipality Strömsund


# Qualified Higher Vocational Education Windpower Technician

VIND
Hjalmar Strömerskolan
Strömsund

# Vindkrafttekniker

www.stromsund.se

www.hjalmar.nu

# The Energy Agency has designated four main nodes

REGIONFÖRBUNDET I KALMAR LÄN

**Enterprise and business development**

Högskolan på Gotland
Gotland University

**Training and qualification issues**

LÄNSSTYRELSEN
HALLANDS LÄN

**Planning and licensing issues**

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**Labour supply, operation and maintenance**

**www.natverketforvindbruk.se**

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**Strömsund is well known for it´s wilderness with many wild animals, a high-density of bears and big mooses and many lakes with fish like trout and char.**

**Havsnäs Windfarm is Sweden's largest wind farm onshore with 48 turbines.  Havsnäs Windfarm is located 30 kilometre north of Strömsund**

# Labour supply, operation and maintenance

**Report:**
**Swedish Wind Energy (Svensk Vindenergi )**
**- Jobb i medvind**

**Report:**
**EWEA**
**- Wind at work.**

**Case study:**
**Strömsund Municipality**
**- Fallstudien Havsnäs**

# Svensk Vindenergi / Swedish Wind Energy - Jobb i medvind

**From 2000 jobs to 14 000 (2020).**

**110 000 man-years, from 2009 - 2020**

# Swedish Wind Energy – Jobb i medvind

**Employment Effects - From concept to park:**
**Examples: wind farm 25 wind turbines à 2 MW**

| | Man-years per MW: | Ex. 50 MW |
|---|---|---|
| Turbine & Generator | 4.5 | 225 |
| Tower & foundation | 5.1 | 75 |
| Assembly (montering) | 2.0 | 100 |
| Other effects, roads ... | 1.5 | 75 |
| Effects in the next step (subcontracting) | 2.5 | 125 |
| Multiplier | 3.0 | 150 |
| Total man-years | 15.0 | 750 |

**Local/Regional employment potential 3-5 års.arb per MW**
**=> 150-250 man-years**
**(Including start-up phase: self assessment- vårt antagande)**

# Swedish Wind Energy – Jobb i medvind

**Employment Effects - Operation & Maintenance (Drift och underhåll)**
**(Total= Direct, indirect and induced).**

| | Examples: wind farm 25 wind turbines à 2 MW<br>man-years per MW | Ex. 50 MW<br>under 1 year | <br>20 years |
|---|---|---|---|
| U.S. Energy Dep.: | 0.5 | 25 | 500 |
| EWEA:<br>(Land Based) | 0.4 | 20 | 400 |
| Sv. Wind Energy:<br>(Large-scale expansion.) | 0.35 | 17.5 | 350 |
| Self assessment<br>(Land Based) | 0.3 | 15 | 300 |

**Skilled local / regional labor demand/**
**Kompetent lokal/regional arbetskraft efterfrågas**

# Projects in Havsnäs wind farm

**Guided tours**

**Tourist Film**

**Training Film**

**Case Study**

**Energy Agency funding**

# Case Study - Havsnäs Wind farm

**The study has been designed to identify the companies involved and scale in personnel time has been spent. Time is summed to man-years. 1 man-year = 1670 hours**

**Utilize labor (nyttjad arbetskraft )**

**( multiplier effect (**multiplikatoreffekt) **as the study – jobb i medvind)**

| | **man-years direct** | **man-years inkl multiplier effects** |
|---|---|---|
| **Project- Phase ( Projektfas)** | **36** | **50** |
| **Superstructure ( Byggfas) Construction** | **692** | **964** |
| **Operational phase ( Driftfas)** | **summed after some uptime (summeras efter viss drifttid)** | |

## Strömsund Municipality (kommun)

## The case study - Wind Farm Havsnäs ( Fallstudien Havsnäs)

**Employment Effects - From concept to Wind Farm:**

**Wind farm 48 turbines, 95.4 MW.**

| Study Havsnäs | Man-years per installed MW: |
|---|---|
| Turbine & Generator | 3.0 |
| Tower & foundation (Torn & fundament) | 1.0 |
| Installation (montering) | 1.0 |
| Other effects, roads ... | 1.0 |
| Effects of the next point (subcontracting) /(underentreprenörer) | 2.0 |
| Multiplier (multiplikatoreffekt) | 3.0 |
| Total man-years : | 11.0 |

**Local/Regional employment 2,7 man-years (25%) per MW**

# The case study - Wind Farm Havsnäs

## Working years by main activities (Arbetsår per huvudaktiviteter)

| Projekteringsfas | Antal arbetsår |
|---|---|
| **Huvudaktiviteter** | |
| Förprojektering, Vindmätning, MKB | 36 |
| | |
| **Byggfas** | **Antal arbetsår** |
| **Huvudaktiviteter** | |
| Ledning, styrning, Design, Kvalité | 117 |
| Bygg och anläggning, vägar, fundament, servicebyggnad | 73 |
| Infrastruktur 33 kV, markläggning kabel, friledning 33 kV | 48 |
| Teknikbyggnad turbinbrytare, ställverk, mätning/övervakningssystem | 50 |
| Mottagningsstation (220 / 33 kV), Ställverk, kontrollrumsbygg, inst transformator | 17 |
| Transformator (220 / 33 kV), Tillverkning, transport, installation | 9 |
| Vindkraftsverk, Tillverkning, transport, montering, drifttagning | 325 |
| Anpassning elnätsanslutning | 18 |
| Kommunikationslösning (bredband) | 18 |
| Övrigt direkt arbeten under byggfas | 17 |
| | |
| **Driftsfas** | **Antal arbetsår OBS! löpande** |
| **Huvudaktiviteter** | |
| Service vindkraftsverk | 7 |
| Drift vindkraftspark | 3 |
| Drift elgenerering | 2 |
| Vägunderhåll | ? |
| Snöröjning | ? |
| Fastighetsskötsel | ? |

# Local-regional employment impact (sysselsättningseffekt)

## Local-regional employment = living within 300 km radius

## Examples of some regional companies involved

Classes Maskintransport
Cramo
EIAB
Ekorrit
Elverum Åkeri
Hammerdals Betongjuteri
Karl-Erik Nilsson Maskin & Entreprenad
Kjin Schakt
Hotell Nordica
Nils Gustav Winther
Nordisk Vindkraft
Norrlandskranar
Prevent Bevakning
Reaxcer
Skanska
Stenger & Ibsen Construction Sverige
Terramover
OK /Q8, Strömsund

## Local-Regional labor in project phase and construction phase (byggfas) :

**180 Man-year, excluding multiplier (exkl multiplikatoreffekt)**

**250 Man-year, including multiplier effect (inkl multiplikatoreffekt)**

# Project: Labour, skills and facilities (Arbetskraft,kompetenser och faciliteter)

**County Västernorrland**
**Strömsund Municipality**

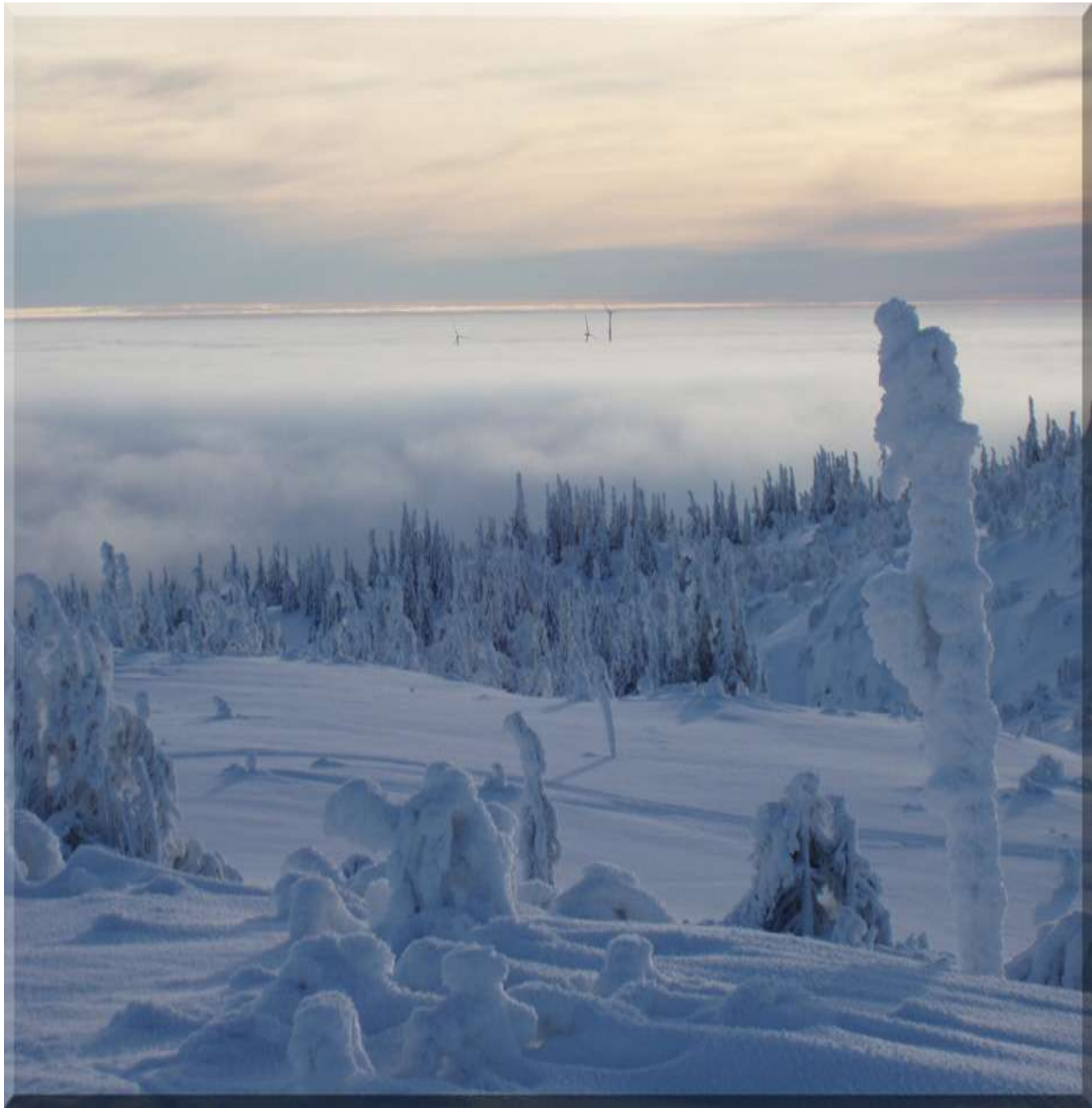
**Case study Havsnäs**

**Mapping of actors, works, machinery and time (man-year-weeks).**

**Forecasting tools for large wind farms (Prognosverktyg för stora vindkraftparker)**

**Part - Accounting Winterwind2011**

**Energy Agency funding**

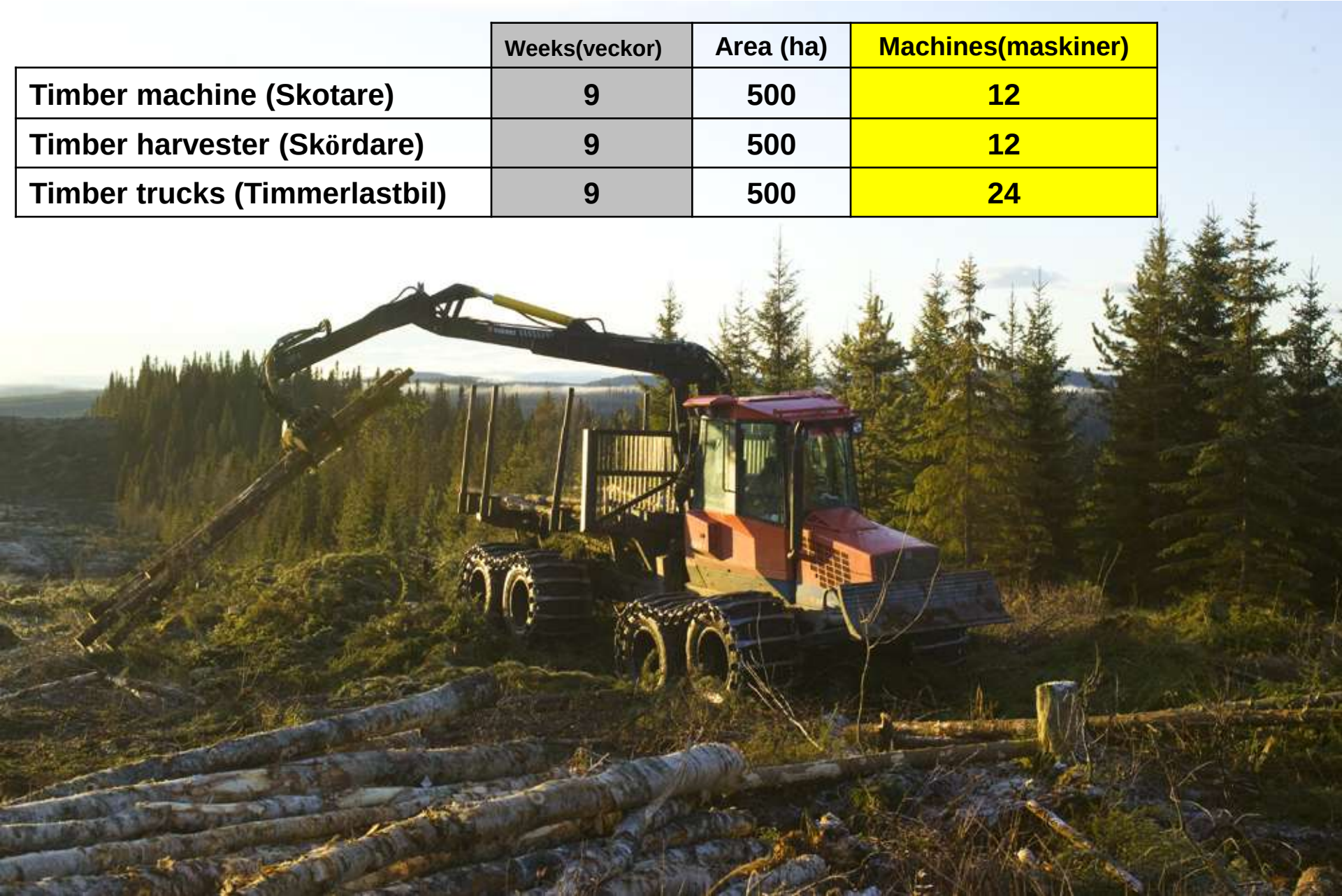


# Forecasting tools for large wind farms, based on Case Study Havsnäs

| 48 Wind turbines and 95,4 MW | Man-years | |
|---|---|---|
| Preplanning, wind measurement, EIA, (Planering, vindmätning, MKB) | 50 | |
| Command, control, design, quality (Ledning, styrning, design, kvalité) | 164 | |
| Building, construction, road, foundations, service building (Byggnad, väg och anläggning, fundament) | 102 | |
| Infrastructure 33kv, ground cable laying, overhead line (markläggning kabel, friledning) | 67 | |
| Buildings, turbine circuit breakers, switchgear, metering (Teknikbyggnad, turbinbrytare, ställverk, mätning) | 70 | |
| Reception Station | 23 | |
| Transformer | 12 | |
| Wind power stations, manufacturing, transportation, assembly (vindkraftverk tillverkning, transport, montering) | 455 | |
| Adaptation, powerline, (anpassning elnät) | 24 | |
| IT Communications | 24 | |
| Other, buildings, etc | 23 | |
| Total | 1014 | |

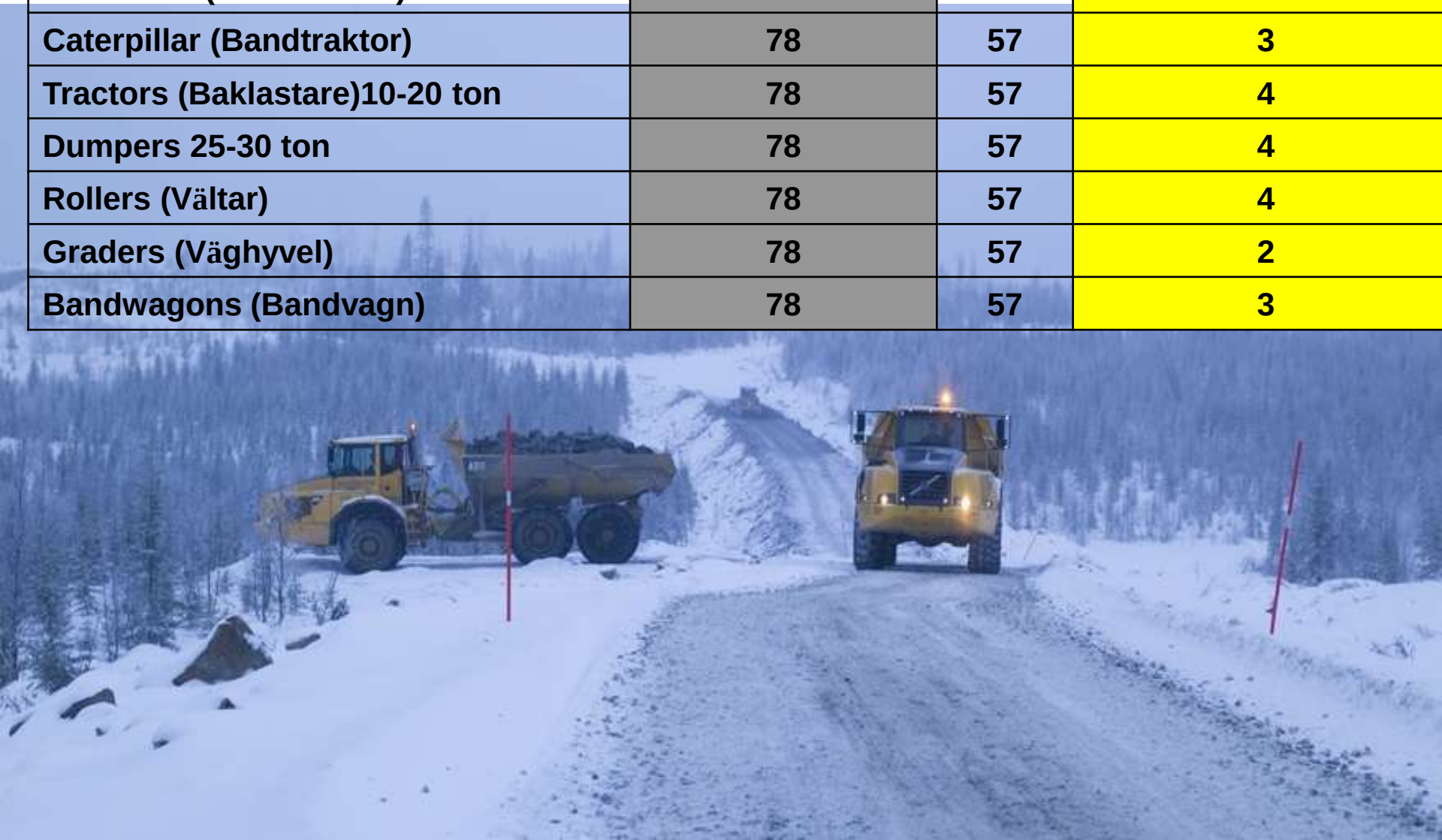
# Logging machines - Havsnäs

| | Weeks(veckor) | Area (ha) | Machines(maskiner) |
|---|---|---|---|
| Timber machine (Skotare) | 9 | 500 | 12 |
| Timber harvester (Skördare) | 9 | 500 | 12 |
| Timber trucks (Timmerlastbil) | 9 | 500 | 24 |



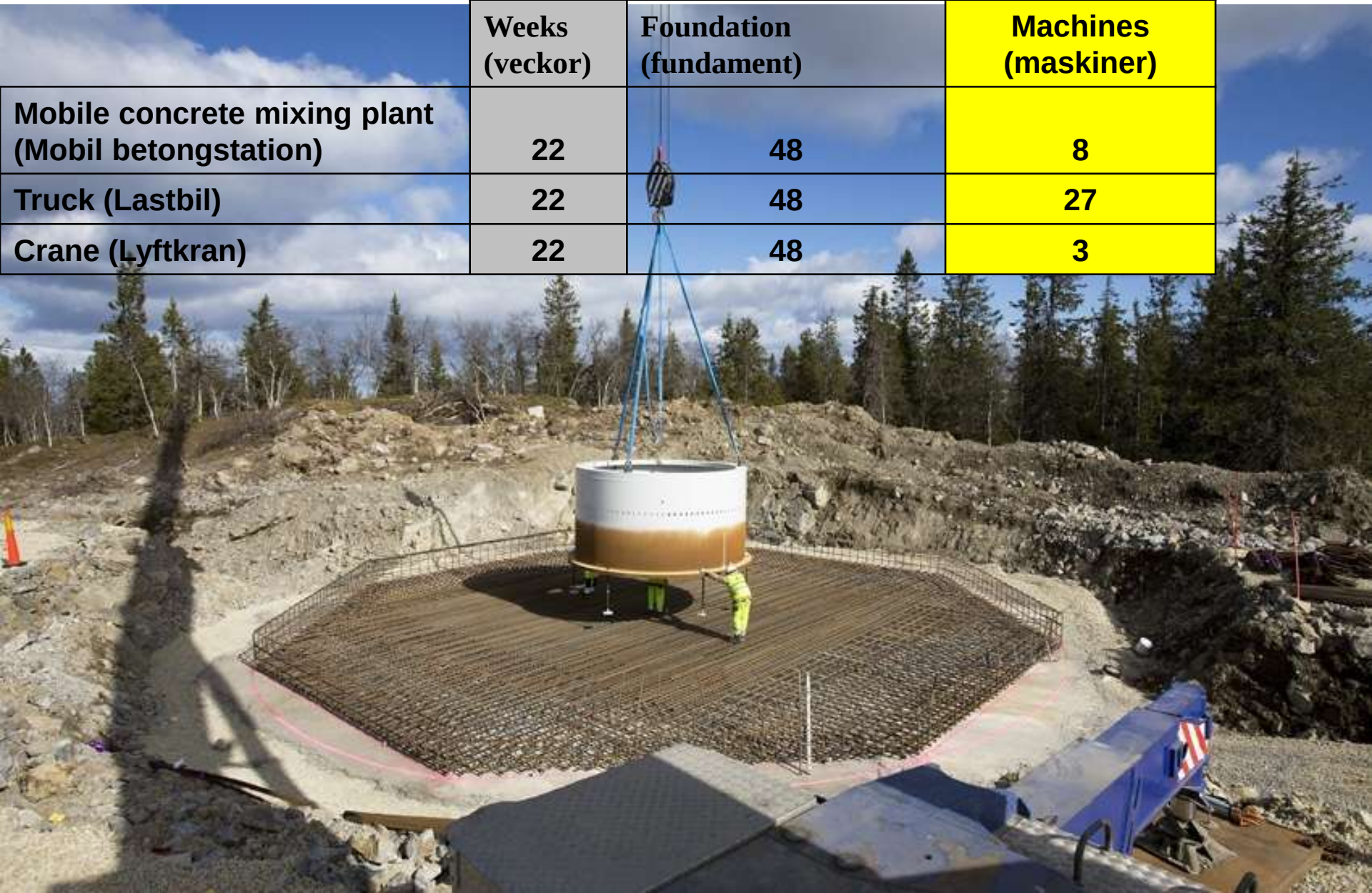
# Roadworks - Havsnäs

| | Weeks (veckor) | km | Machines(maskiner) |
|---|---|---|---|
| Excavator (Grävmaskin)10-80 ton | 78 | 57 | 8 |
| Caterpillar (Bandtraktor) | 78 | 57 | 3 |
| Tractors (Baklastare)10-20 ton | 78 | 57 | 4 |
| Dumpers 25-30 ton | 78 | 57 | 4 |
| Rollers (Váltar) | 78 | 57 | 4 |
| Graders (Väghyvel) | 78 | 57 | 2 |
| Bandwagons (Bandvagn) | 78 | 57 | 3 |



# Gravity foundation - Havsnäs

| | Weeks (veckor) | Foundation (fundament) | Machines (maskiner) |
|---|---|---|---|
| Mobile concrete mixing plant (Mobil betongstation) | 22 | 48 | 8 |
| Truck (Lastbil) | 22 | 48 | 27 |
| Crane (Lyftkran) | 22 | 48 | 3 |



# Transport of Wind turbines- Havsnäs

| | Weeks (veckor) | Wind turbines | Machines(maskiner) |
|---|---|---|---|
| Trucks (Lastbilar) 20/verk | 22 | 48 | 960 |
| Tractor on steep slopes<br>Traktor vid branta backar | 22 | 48 | 1 |

# Installation of towers- Havsnäs

| | Weeks (veckor ) | Towers (torn) | Machines (maskiner) |
|---|---|---|---|
| Main Crane (Huvudlyftkran) 800 ton | 22 | 48 | 1 |
| Service Crane (Kran ) 300 ton | 22 | 48 | 5 |
| Tractor ( Baklastare) | 22 | 48 | 2 |

# Exempel

| Piteå | Antal verk | Årsarbeten |
|---|---|---|
| Förprojektering | 1101 | **1147** |
| Ledning, styrning | 1101 | **3762** |
| Bygg och anläggning | 1101 | **2340** |
| Infrastruktur | 1101 | **1537** |
| Teknikbyggnad | 1101 | **1606** |
| Mottagningsstation | 1101 | **528** |
| Transformator | 1101 | **275** |
| Vindkraftsverk | 1101 | **10437** |
| Anpassning | 1101 | **551** |
| Kommunikation | 1101 | **551** |
| Övrigt | 1101 | **528** |
| Totalt | 1101 | **23259** |

| SSVAB | Antal verk | Årsarbeten |
|---|---|---|
| Förprojektering | 360 | **375** |
| Ledning, styrning | 360 | **1230** |
| Bygg o anläggning | 360 | **765** |
| Infrastruktur | 360 | **503** |
| Teknikbyggnad | 360 | **525** |
| Mottagningsstation | 360 | **173** |
| Transformator | 360 | **90** |
| Vindkraftsverk | 360 | **3413** |
| Anpassning | 360 | **180** |
| Kommunikation | 360 | **180** |
| Övrigt | 360 | **173** |
| **Totalt** | **360** | **7605** |

| Sverige 2020 | Antal verk | Årsarbeten |
|---|---|---|
| Förprojektering | 4800 | **5000** |
| Ledning, styrning | 4800 | **16400** |
| Bygg och anläggning | 4800 | **10200** |
| Infrastruktur | 4800 | **6700** |
| Teknikbyggnad | 4800 | **7000** |
| Mottagningsstation | 4800 | **2300** |
| Transformator | 4800 | **1200** |
| Vindkraftsverk | 4800 | **45500** |
| Anpassning | 4800 | **2400** |
| Kommunikation | 4800 | **2400** |
| Övrigt | 4800 | **2300** |
| Totalt | 4800 | **101400** |

Strömsunds Kommun

# Thanks!

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