



The Norwegian Research Centre  
for Solar Cell Technology



# The Norwegian Research Centre for Solar Cell Technology

Erik Stensrud Marstein  
Senterleder





E. Munch/UiO

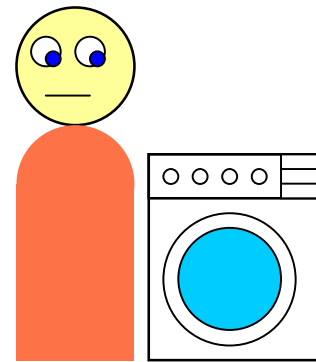


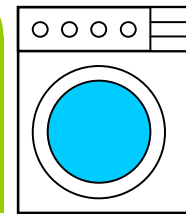
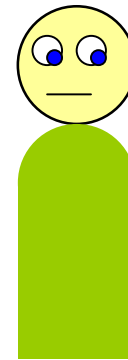
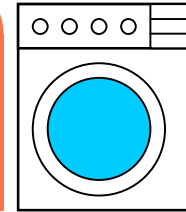
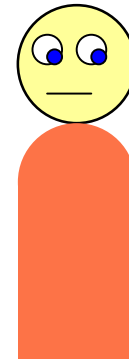
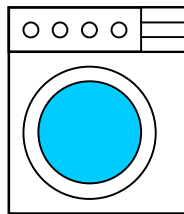
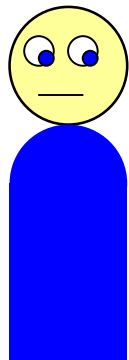
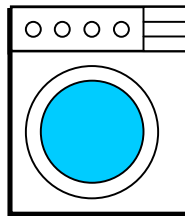
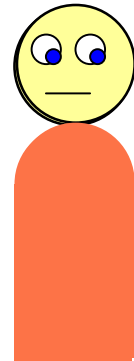
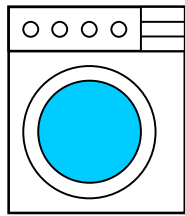
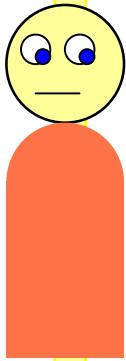
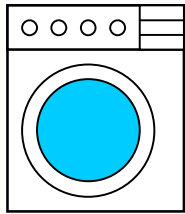
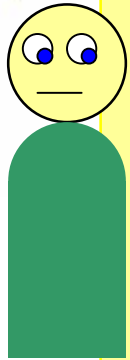
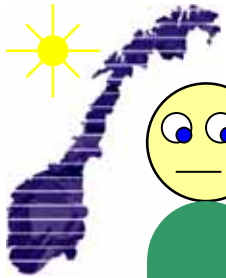
# Oversikt

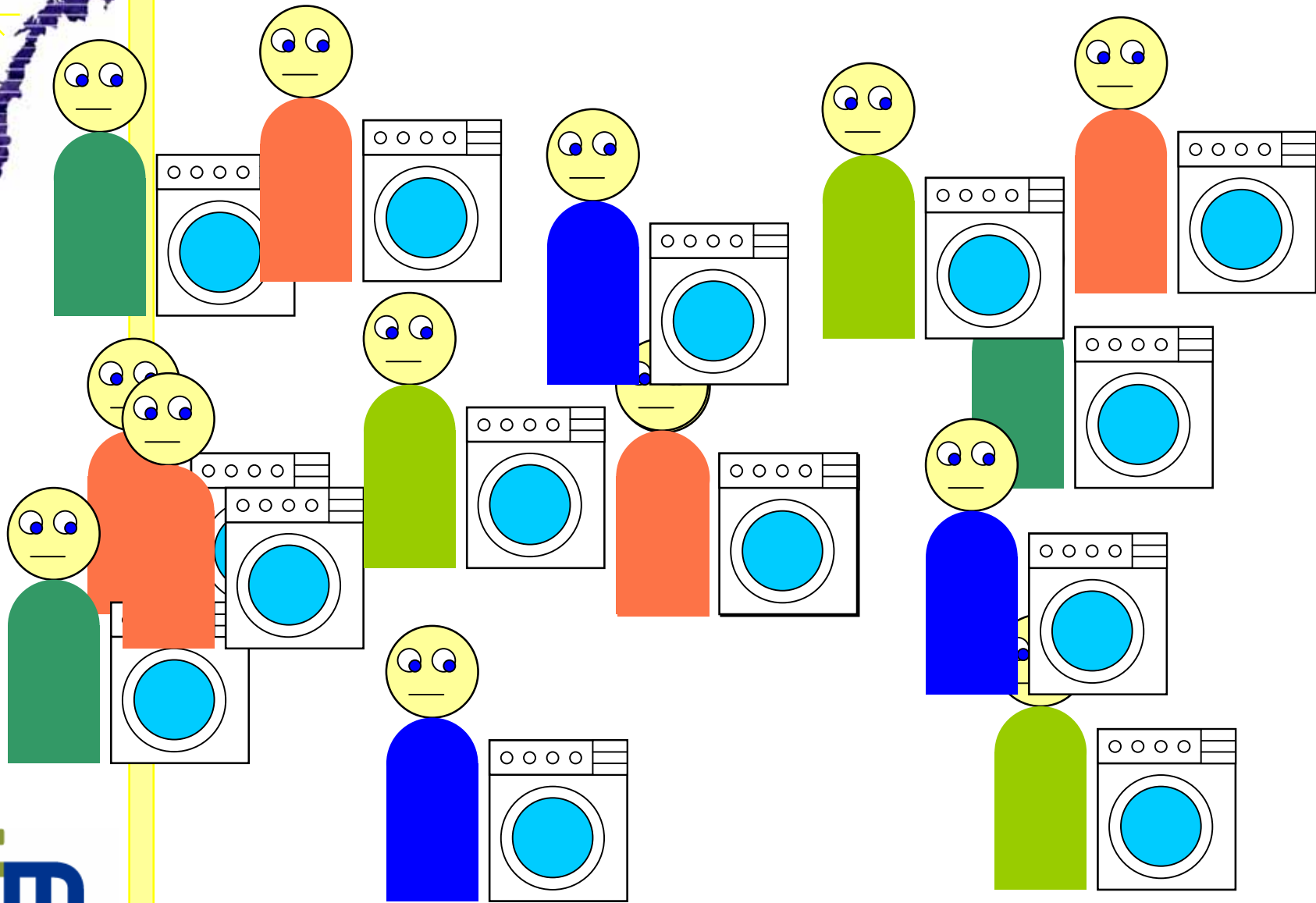
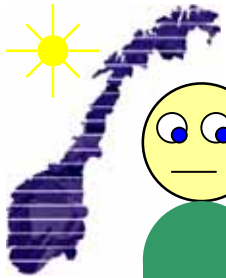
- Hvorfor solceller?
- Hvorfor solceller i Norge?
- The Norwegian Research Centre for Solar Cell Technology
- Hvorfor lage solceller av krystallinsk silisium?
- Hvordan lage solceller av krystallinsk silisium?
- Trådsamling



# Hvorfor solceller?

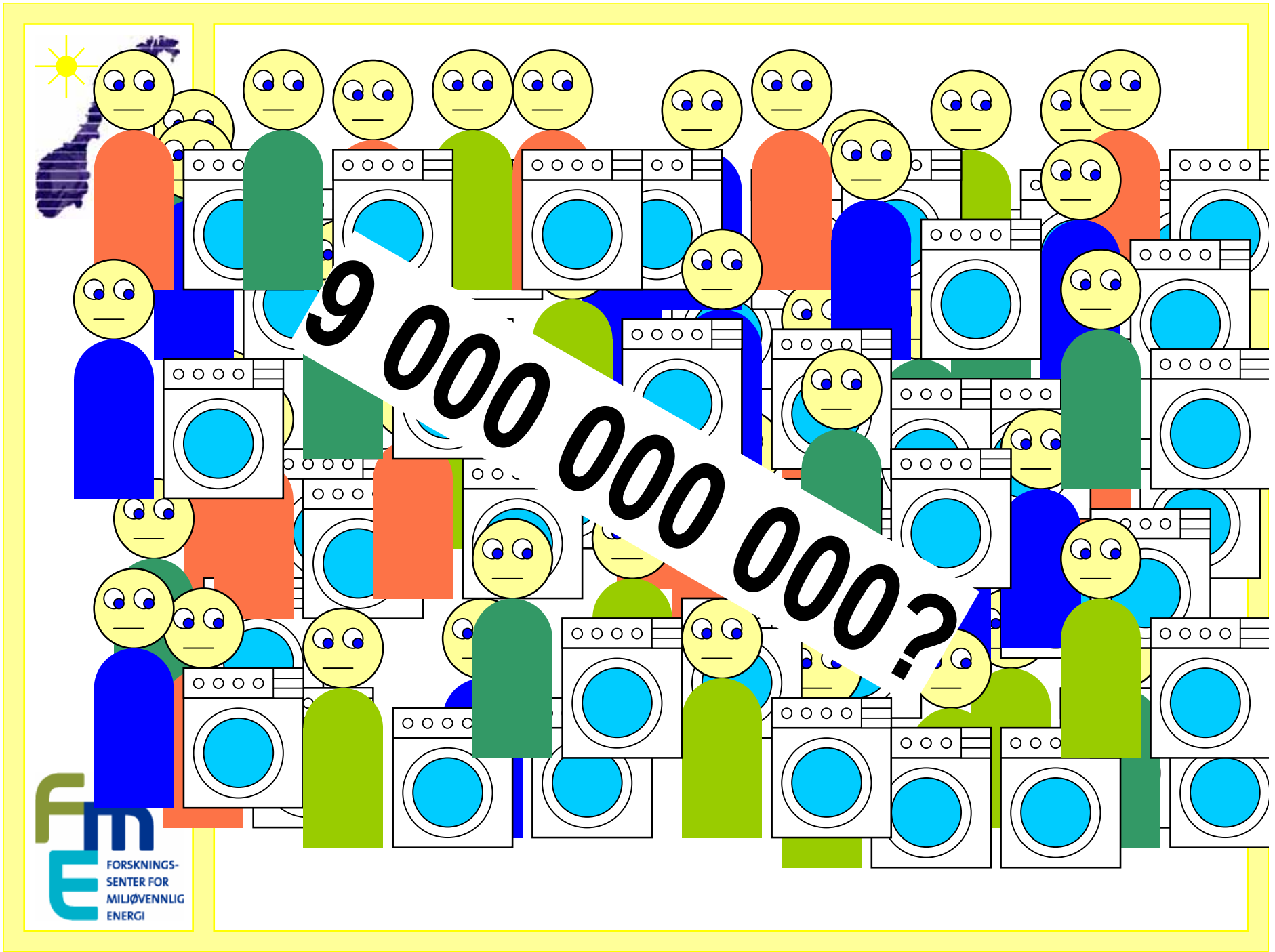






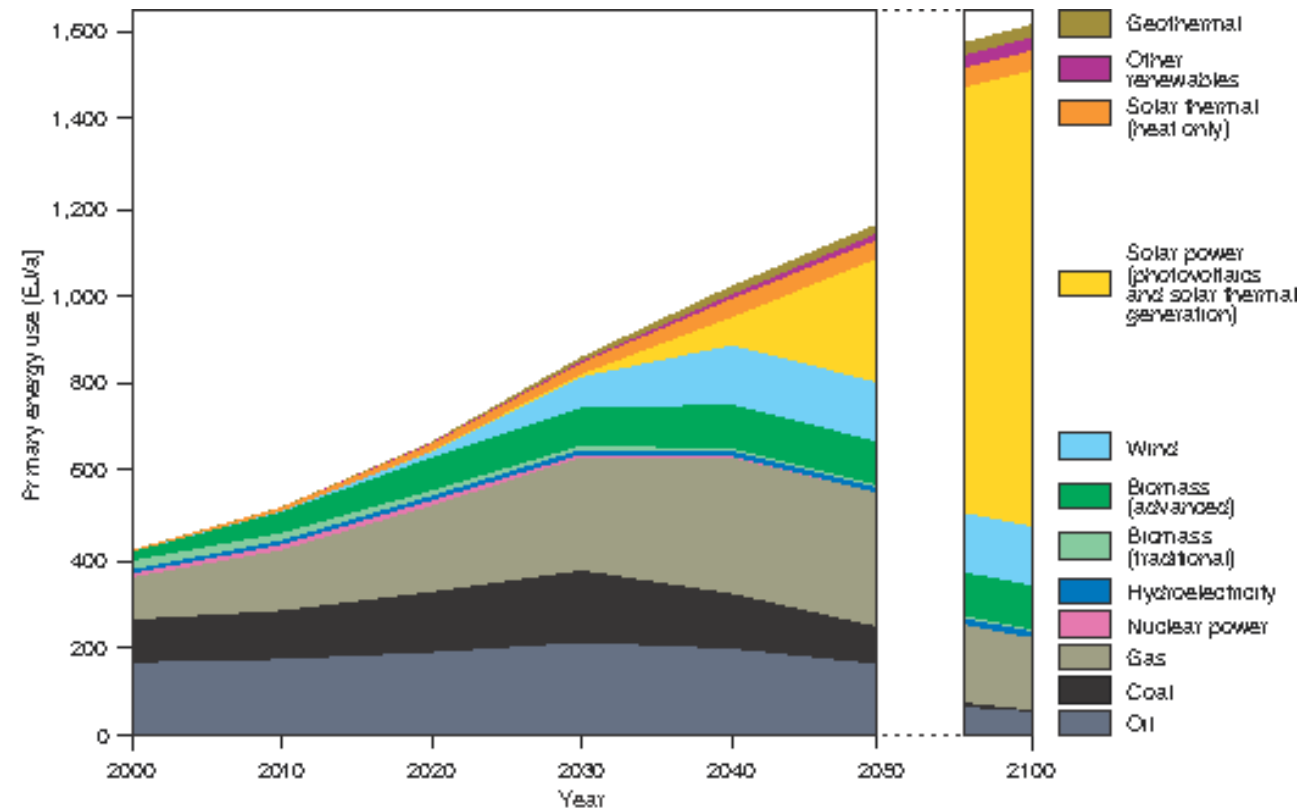


9 000 000 000?





# Utfordringen

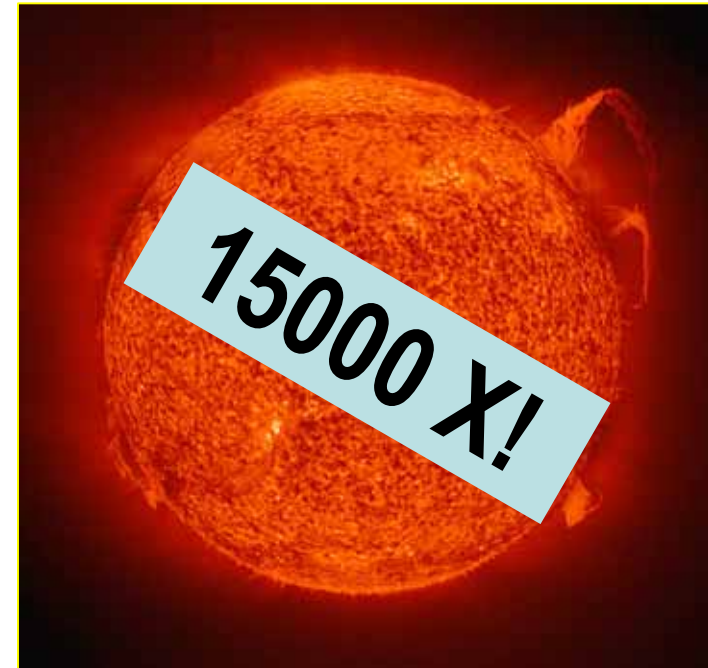




# Vår venn solen

## – Fakta om Solen:

R	$6,96 \cdot 10^8$ m
V	$1,41 \cdot 10^{27}$ m <sup>3</sup>
m	$1,99 \cdot 10^{30}$ kg
$\rho$	$1,41 \cdot 10^3$ kg/m <sup>3</sup>
T <sub>surface</sub>	$5,76 \cdot 10^3$ K
T <sub>interior</sub>	$13,6 \cdot 10^6$ K

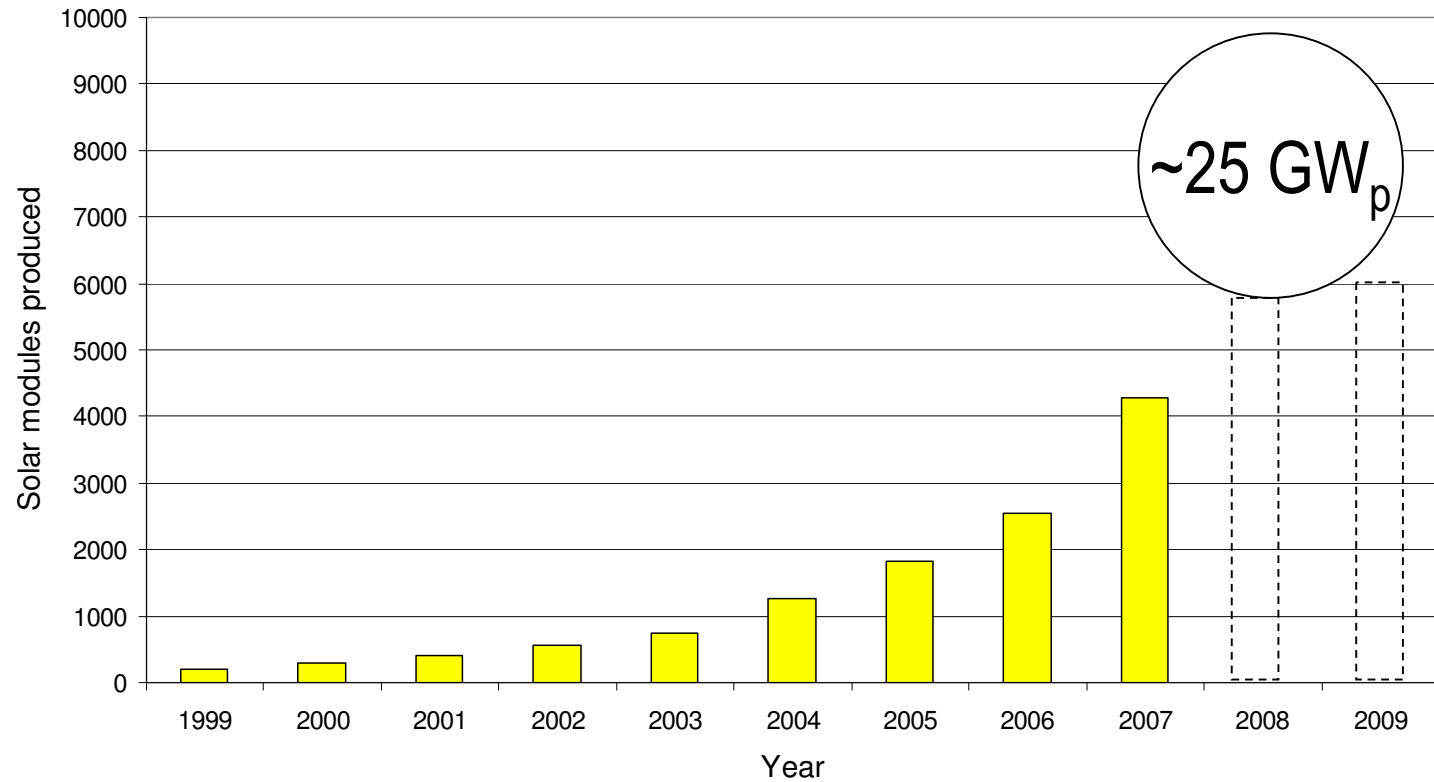


– ... og enda mer interessant:

– Solen er et **ENORMT** kraftverk!



# Solceller blir stadig mer brukt



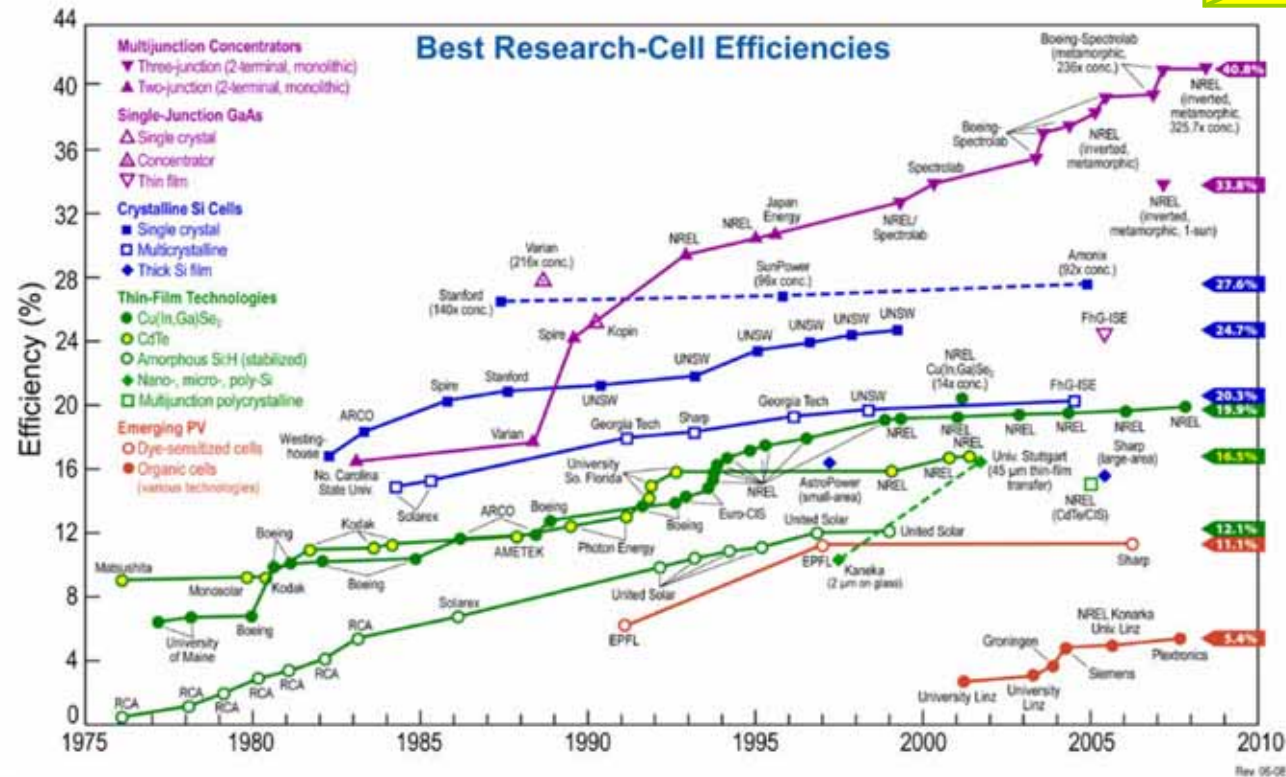


# Solceller blir stadig mer effektive

43 %?

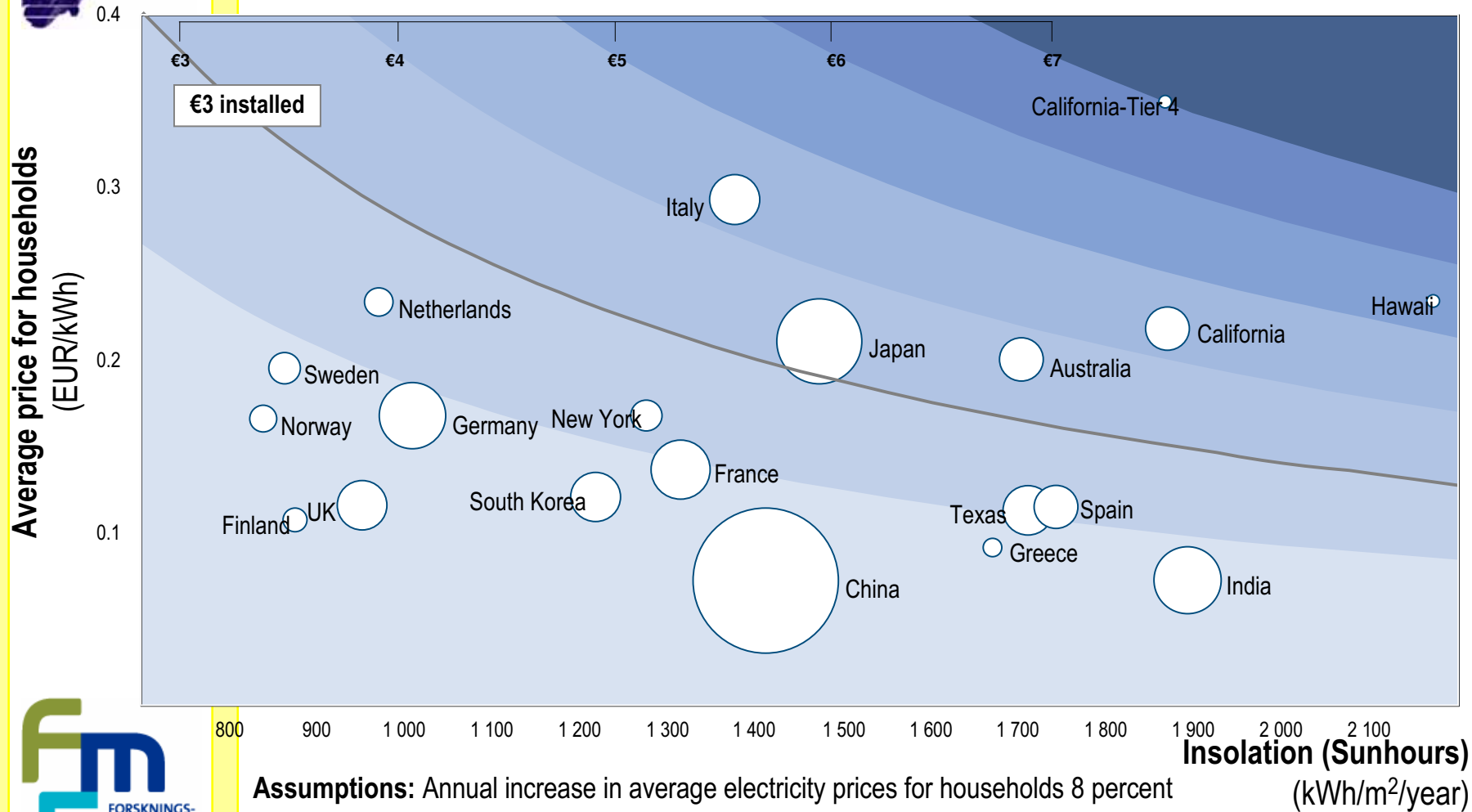
~~42 %?~~

~~41.1 %~~





# Solstrøm blir stadig billigere



Eurostat, PV Policy group, PG&E, CIA country files, Public policy Institute New York; McKinsey&Company, REC



# Den norske solcelleindustrien

Artech  
Crusin  
Elkem Solar  
Fesil Sunergy  
Hydro  
Innotech Solar  
Metallkraft  
Norsun  
Norsk solkraft  
Prediktor  
REC  
Saint Gobain  
Scatec/Scatec Solar  
Statkraft Solar  
Tordivel Solar  
Tronrud Engineering  
Umoe Solar  
Vetro Solar  
Washington Mills





# Forskningsmiljøer i Norge

Institutt for energiteknikk (IFE)

NTNU

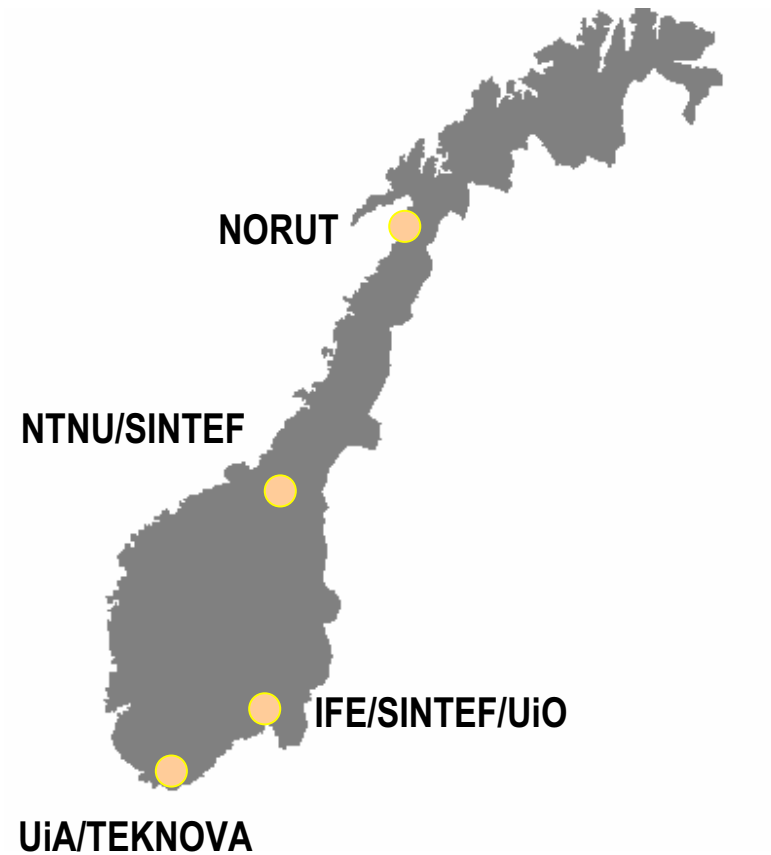
SINTEF

Universitet i Oslo (UiO)

NORUT

Teknova

Universitet i Agder





# The Norwegian Research Centre for Solar Cell Technology



Senteret





# "Solar United"



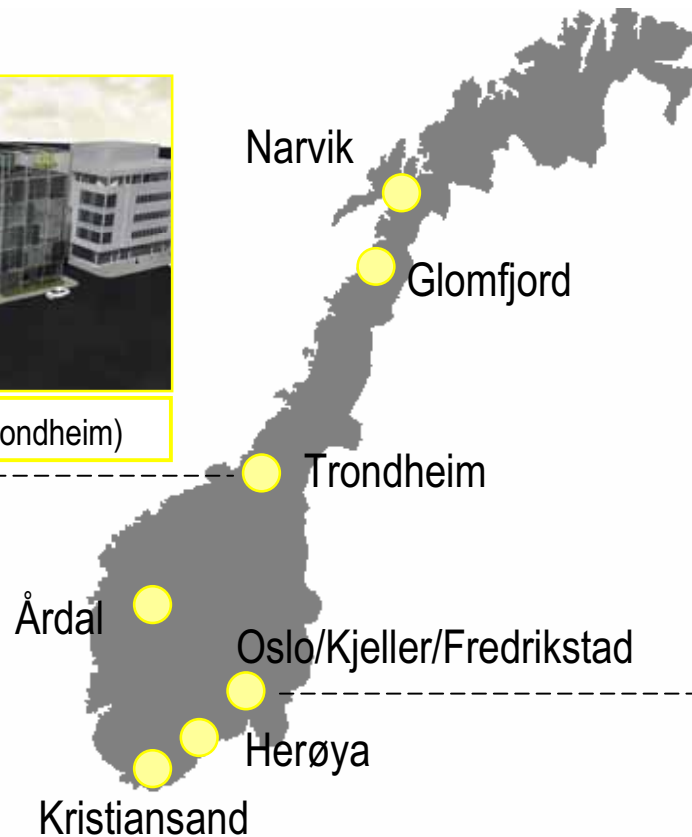
Solbygg (Trondheim)



MiNaLab (Oslo)



Solbygg (Kjeller)



Forskningspartnere: IFE, NTNU, SINTEF og UiO

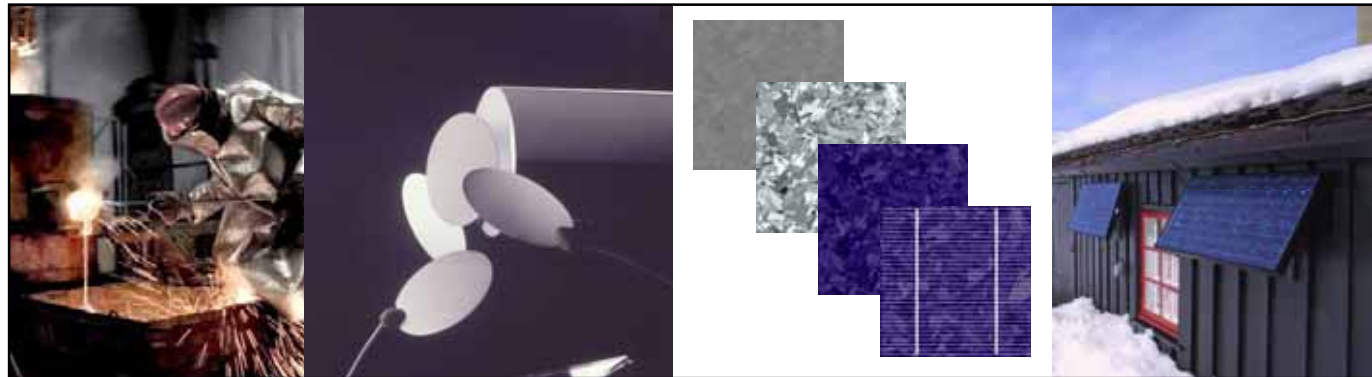
Industripartnere: Elkem Solar, Fesil Sunergy, Hydro, Innotech Solar, Norsun, Prediktor, REC, Scatec og Umoe Solar

Tilknyttede miljøer: NORUT og UiA

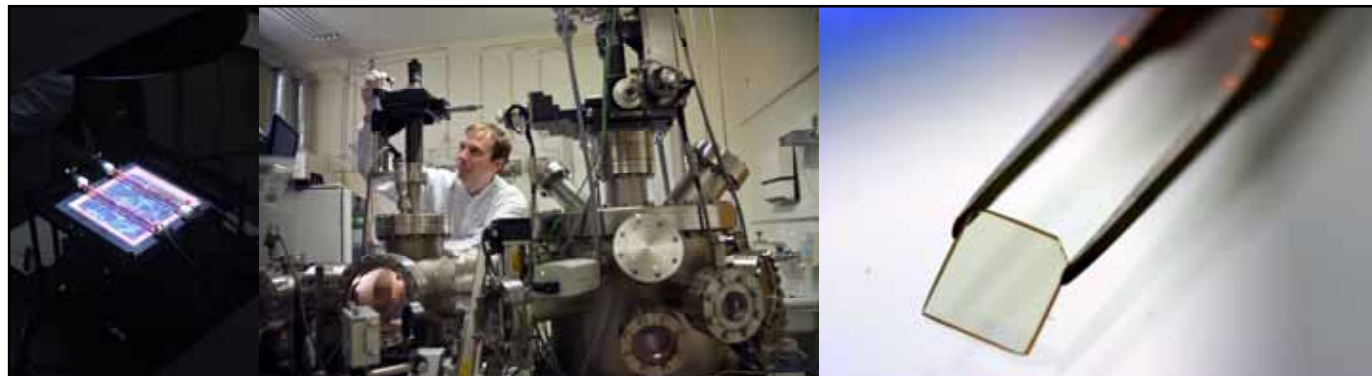
IFE, NTNU, SINTEF, UiO



# Et fremtidsrettet verdikjedeprosjekt



Fra silisium til solceller og solcellepaneler



Fra dagens til morgendagens solceller og solcellematerialer



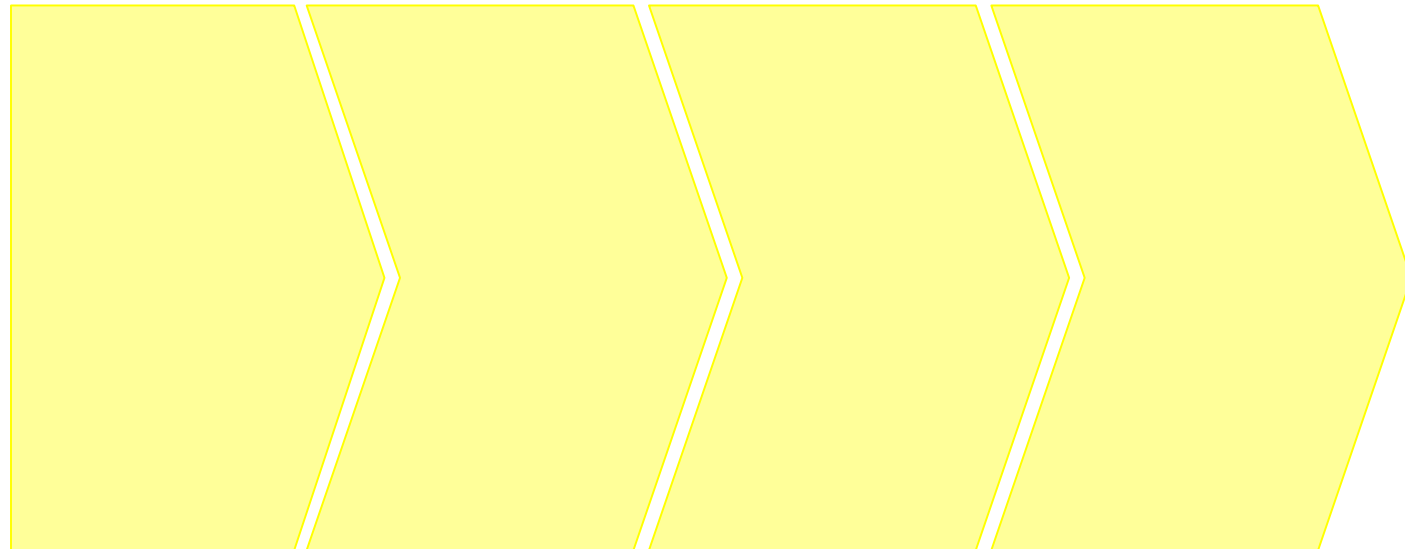
# Silisiumbaserte solceller - verdikjeden

**Silisium  
feedstock**

**Krystallisering  
og saging**

**Solceller og  
solcellepaneler**

**Solenergi-  
systemer**





# Silisiumbaserte solceller - verdikjeden

**Silisium  
feedstock**

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**Solceller og  
solcellepaneler**

**Solenergi-  
systemer**

**Elkem Solar  
Fesil Sunergy  
Hydro  
REC  
Umoe Solar**

**Norsun  
REC**

**Innotech Solar  
REC**

**Scatec Solar  
Statkraft Solar**





# Silisiumbaserte solceller - verdikjeden

**Silisium  
feedstock**

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og saging**

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solcellepaneler**

**Solenergi-  
systemer**

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Fesil Sunergy  
Hydro  
REC  
Umoe Solar

Norsun  
REC

Innotech Solar  
REC

Scatec Solar  
Statkraft Solar

**> 2500 ansatte i Norge!**

## Underleverandørindustrien:

Crusin, Innotec Solar, Metallkraft, Prediktor, Saint Gobain,  
Tronrud Engineering, Vetro Solar, Washington Mills ...



# Forskningen i senteret

Silisium  
feedstock

Krystallisering  
og saging

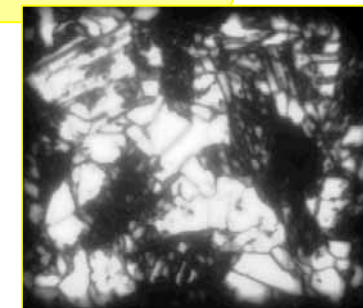
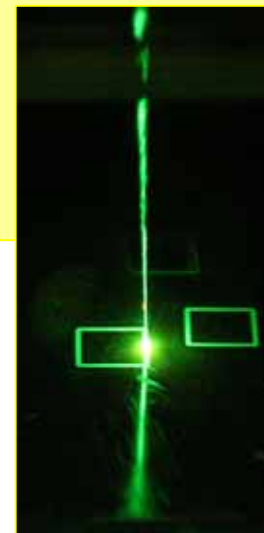
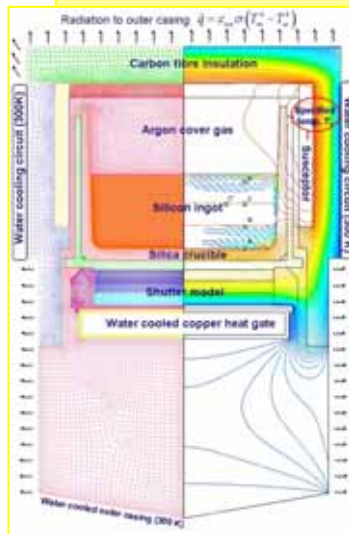
Solceller og  
solcellepaneler

Solenergi-  
systemer

Prosess-  
modellering

Mono og  
multikrystallinsk  
silisium

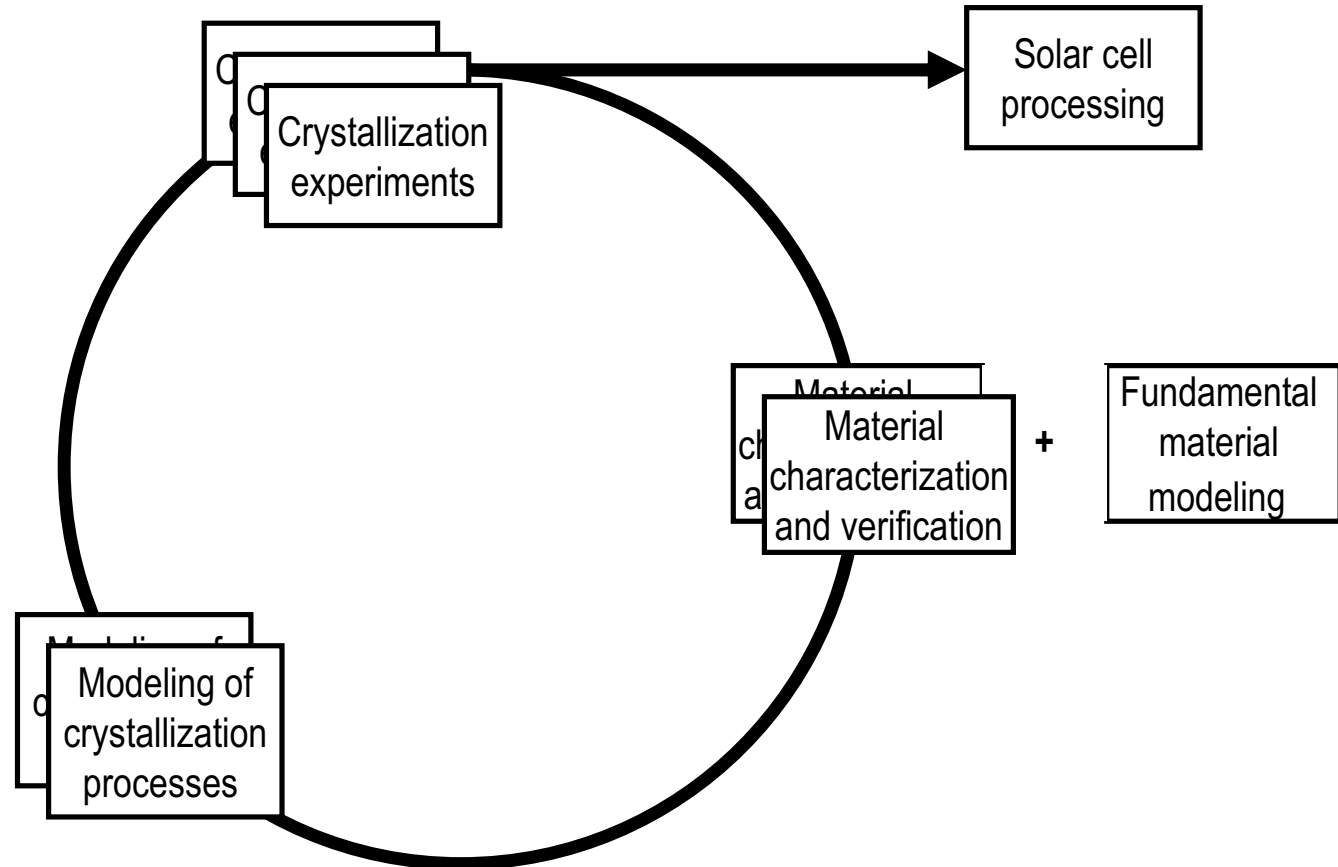
Solceller og  
solcellepaneler



Nye målemetoder

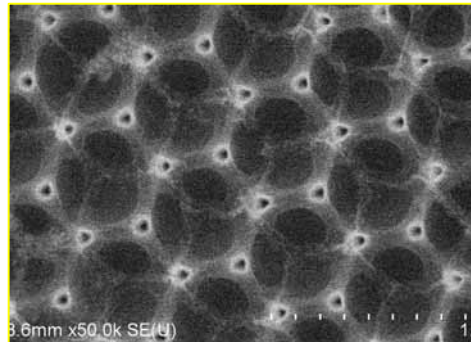


# Tilgang til hele verdikjeden

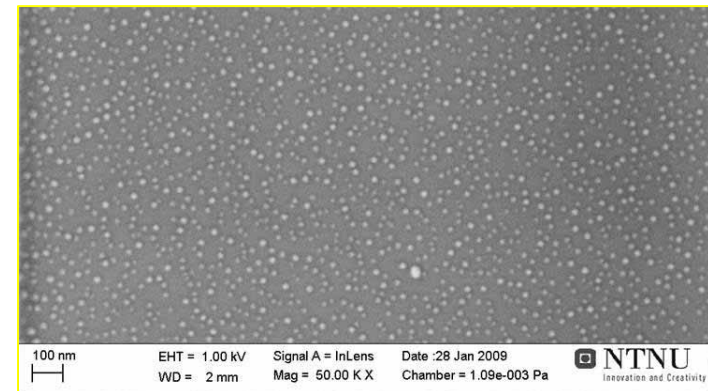
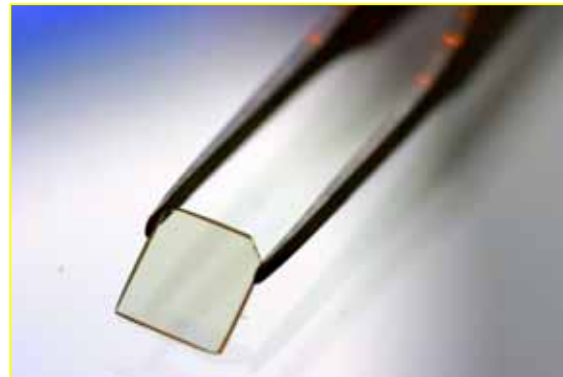




# Nye materialer i senteret



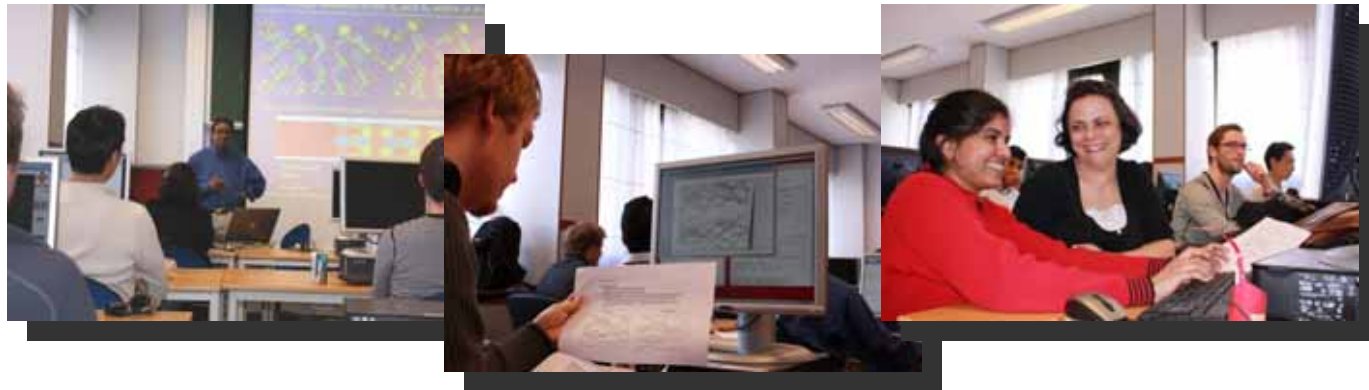
- Nye absorbermaterialer
- Lyshøsting
- Nye materialer til neste generasjons silisiumsolceller





# Utdanning

- 44 PhD og post.doc Vil bli utdannet innenfor senteret
- En forskerskole er opprettet i samarbeid mellom UiO og NTNU





## Siste ord

- Prisen på solstrøm synker dramatisk
- Solstrøm spiller en stadig viktigere rolle
- Store muligheter for norsk industri
- The best is yet to come!



# Tusen takk for oppmerksomheten

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### OUR NEWSLETTER

## About us

The Norwegian Research Centre for Solar Cell Technology joins the major Norwegian scientific and industrial players in the field of photovoltaic technology. The Centre aims at further developing the strong, Norwegian photovoltaic industry and substantially contributing towards making solar energy a significant renewable energy source. The Centre partners are IFE, NTNU, SINTEF, the University of Oslo, Elkem Solar, Fesil Sunergy, Hydro, Innotech Solar, Norsun, Prediktor, REC, Scatec Solar and Umoe Solar.

The main objective of the Centre is to give current and future companies in the Norwegian photovoltaic industry access to world leading technological and scientific expertise, thereby enabling this industry to

