

# Windstroom en werkgelegenheid

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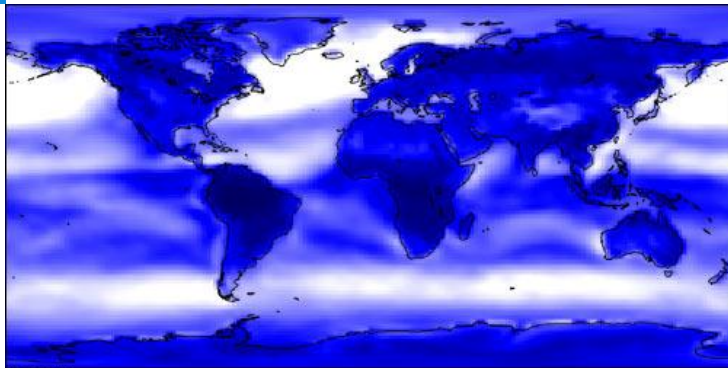
TU Delft, leerstoel windenergie

11 april 2013

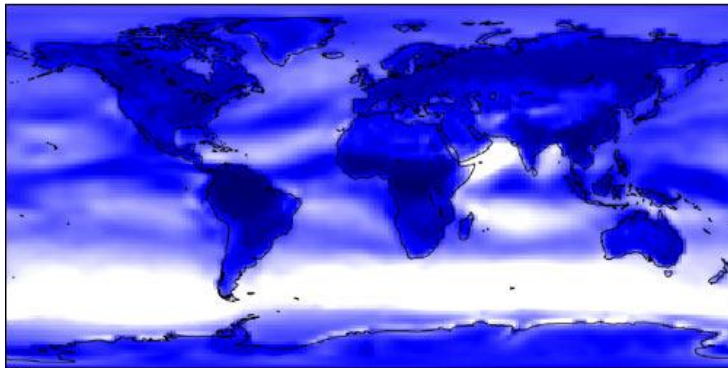


# Wind waait....

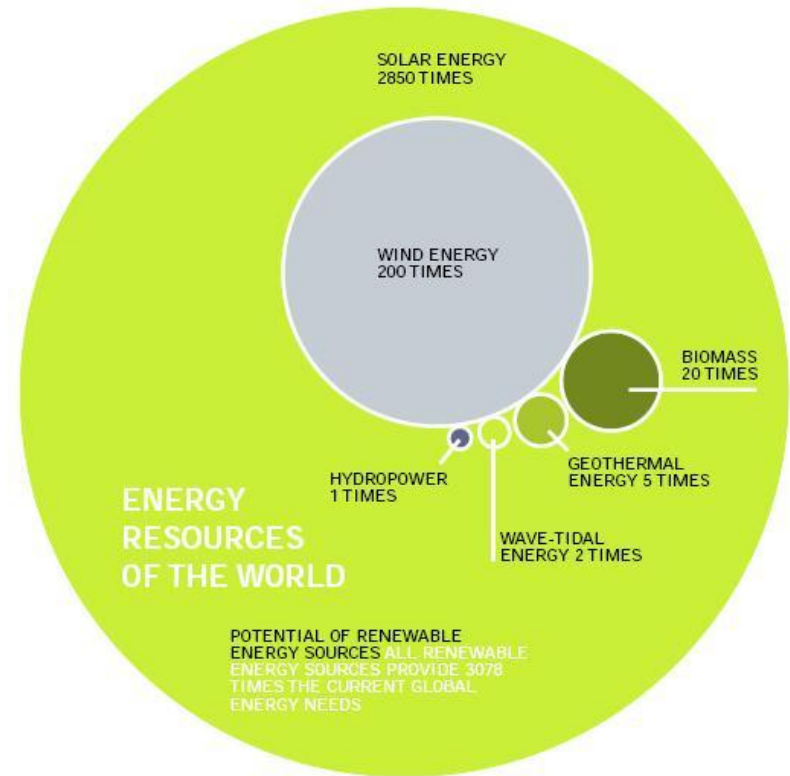
- 200 x meer windenergie dan het huidige energieverbruik
- meer dan 40 x het huidige elektriciteitsverbruik (Harvard 2009)



January



July



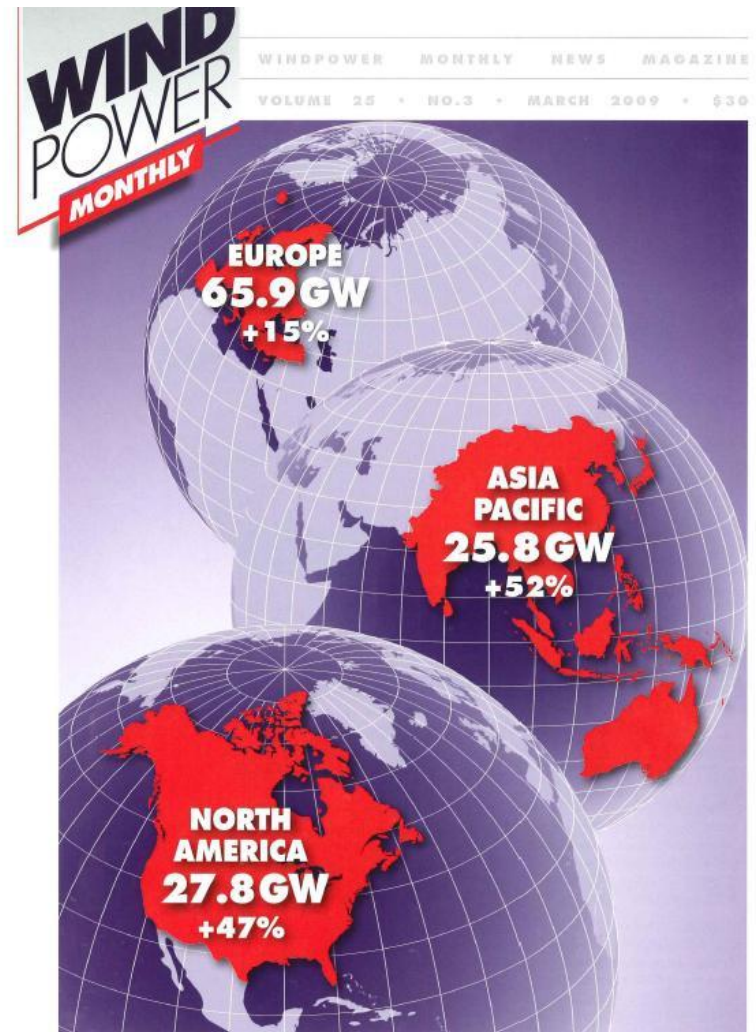
source WBGU

# Wind Werkt.....

Geïnstalleerd Vermogen  
begin 2009:

- Europa 66 GW
- Asia Pacific 26 GW
- Noord Amerika 28 GW
- Rest vd wereld 1 GW

Totaal 121 GW



**ANNUAL OVERVIEW**  
**GLOBAL WIND MARKET STATUS**  
**2009**

# Wind Werkt.....

## Geïnstalleerd Vermogen begin 2011:

- Europa 86 GW
- Asia Pacific 60 GW
- Noord Amerika 44 GW
- Rest vd wereld 3 GW

Totaal 193 GW

**(+59% t.o.v. 2009)**



# Wind Werkt.....

## Geïnstalleerd Vermogen begin 2013:

- Europa 109 GW
- Asia Pacific 83 GW
- N+Z Amerika 71 GW
- Rest vd wereld 1 GW

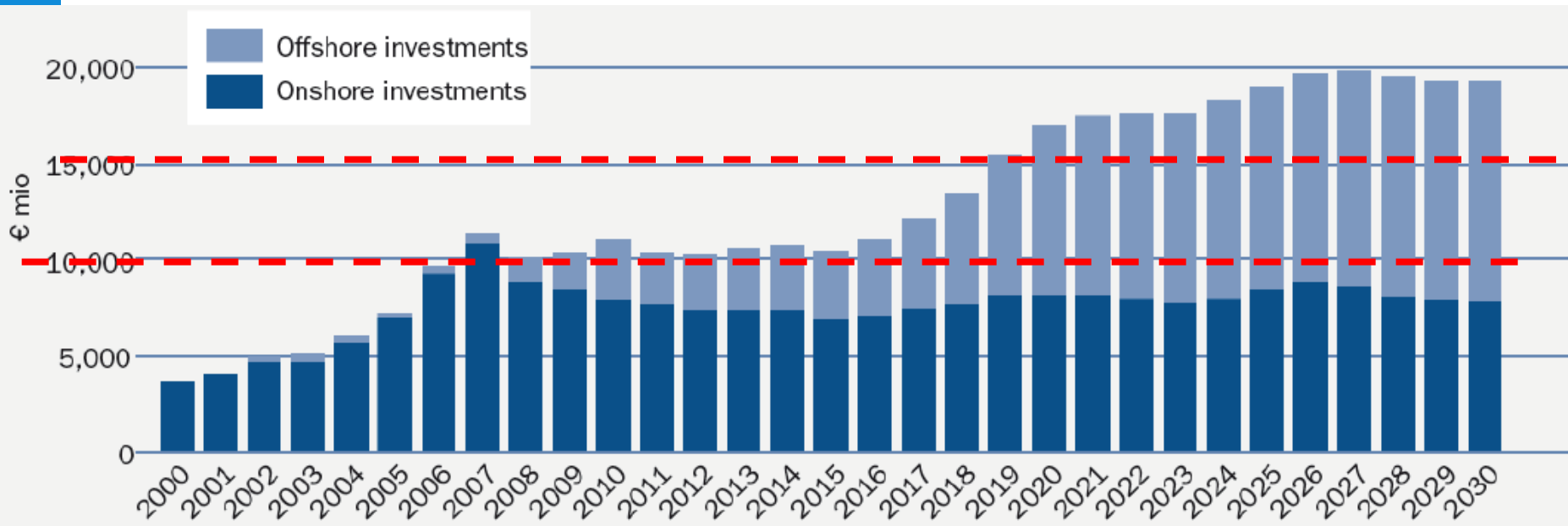
Totaal 264 GW

(+118% t.o.v. 2009)

**Dus nog steeds 30% groei per jaar!!**



# Investerings in windenergie per jaar in de EU



Bron:  EWEA 2010

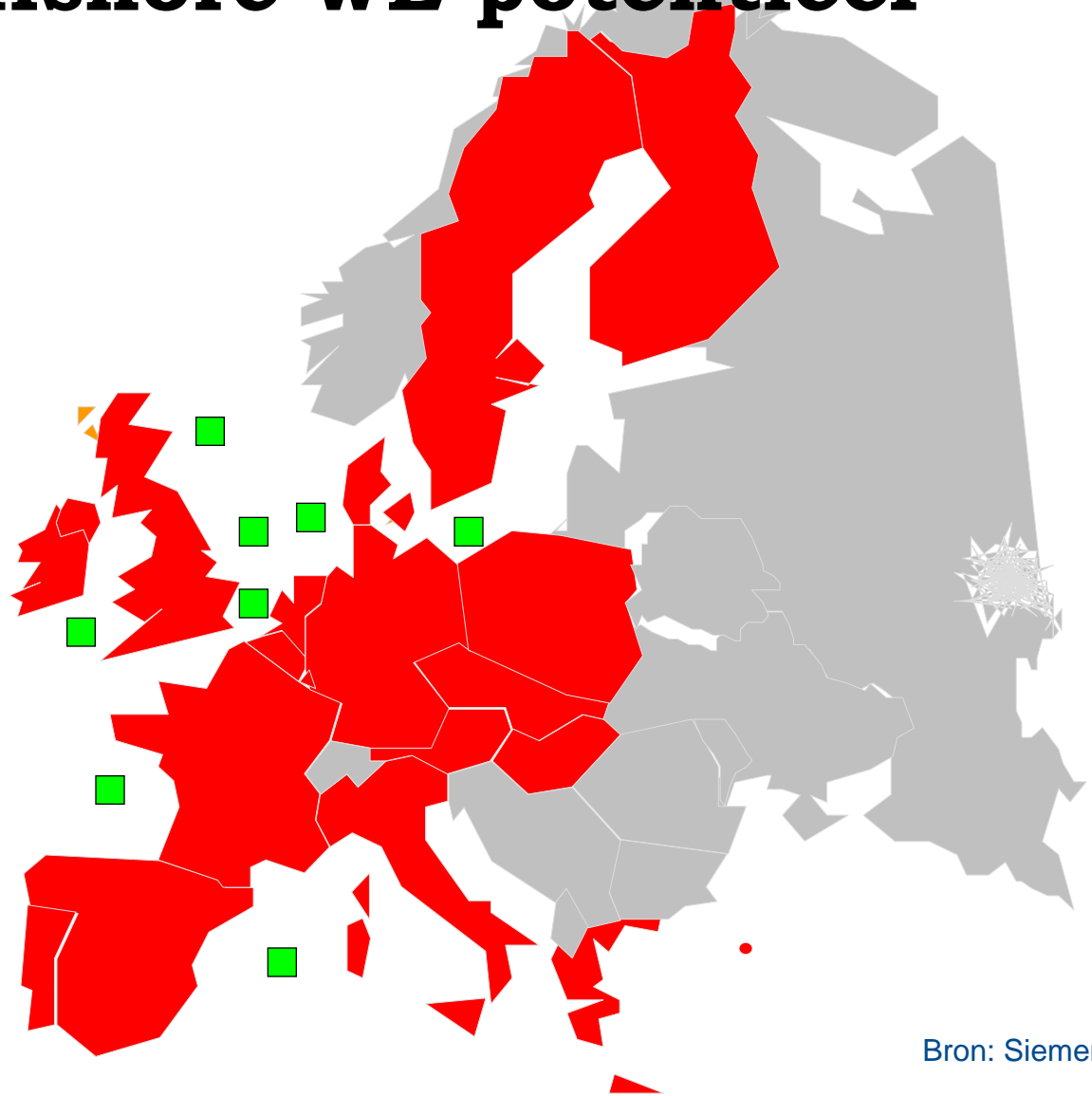
Nu zo'n 10 miljard Euro per jaar  
Stijgt naar 15 miljard Euro per jaar in 2020

# Europa's offshore WE potentieel

Acht 100x100 km  
offshore windparken  
produceren 3,000  
TWh per jaar

=

Gelijk aan de gehele  
huidige gebruik van  
elektriciteit in de EU



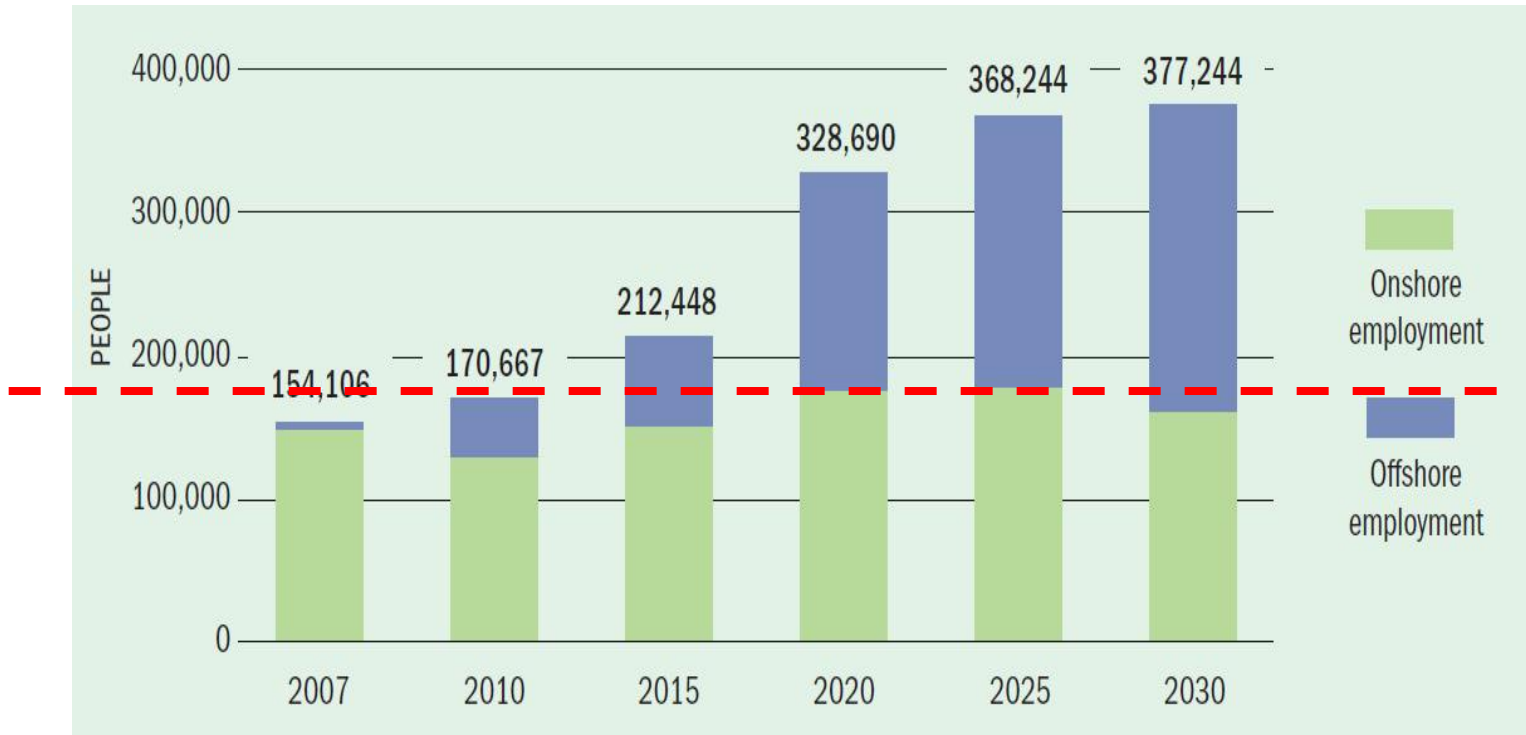
Bron: Siemens

# Wind en Werkgelegenheid

- Hoeveel mensen nodig in EU an NL ?
- Welk onderwijs en welke training ?
- Huidig academisch, HBO VMBO en VBO onderwijs
- Acties nodig ?



# Gekwalificeerd personeel is hard nodig!



EWEA "Wind at Work" 2009

Er werken nu al ~ 185.000 mensen in de wind in de EU

# Gekwalificeerd personeel is hard nodig!



EWEA "Wind at Work" 2009

En dat zullen er 350.000- 400.000 zijn in 2030

# Gekwalificeerd personeel is hard nodig!

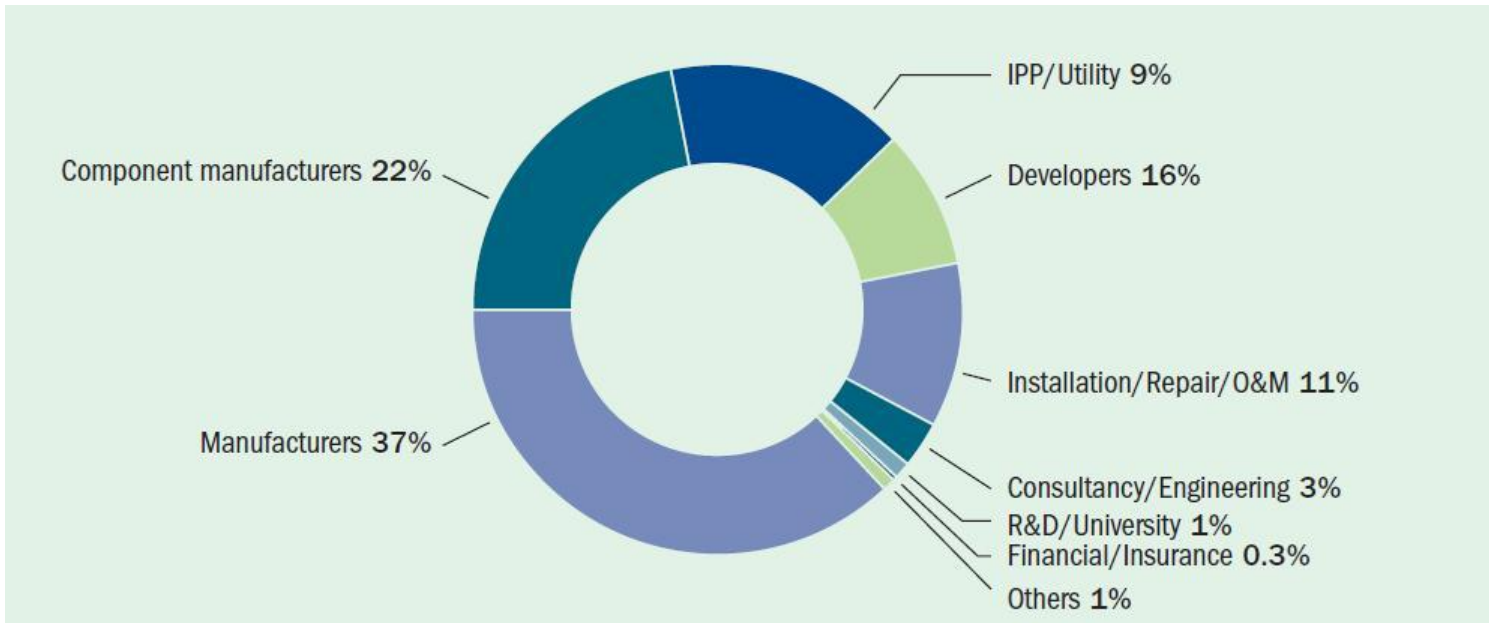


EWEA "Wind at Work" 2009

En dat zullen er 350.000- 400.000 zijn in 2030

~ 200,000 **nieuwe banen** offshore!!

# Welke kwalificaties zijn nodig?

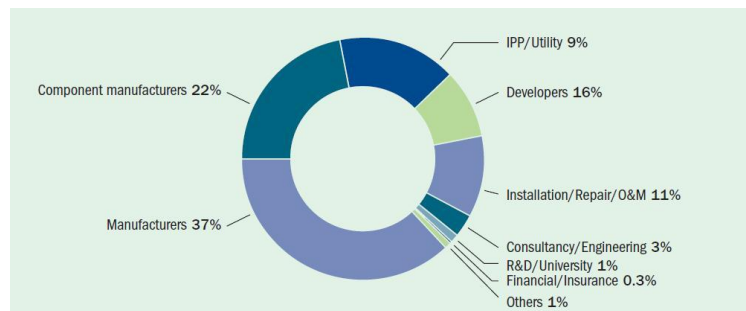


EWEA "Wind at Work" 2009



<b>Academics:</b>	EQF levels 6-8: R&D, Engineering, Developers, Others	~ 5 - 10%
<b>Engineers:</b>	EQF levels 4-6: Manufacturing, Installation, O&M etc	~ 30 %
<b>Technicians:</b>	EQF levels 3-5: Manufacturing, Installation, O&M etc	~ 30 - 35 %
<b>“Un”skilled:</b>	EQF levels 1-2: Support: assistance, production, transport	~ 20 %
<b>Rest:</b>	EQF levels 3-8: Management, Finance/insurance, Developer, IPP/Utility	~ 10 %

# En hoeveel mensen?



## In aantallen:

## Totaal

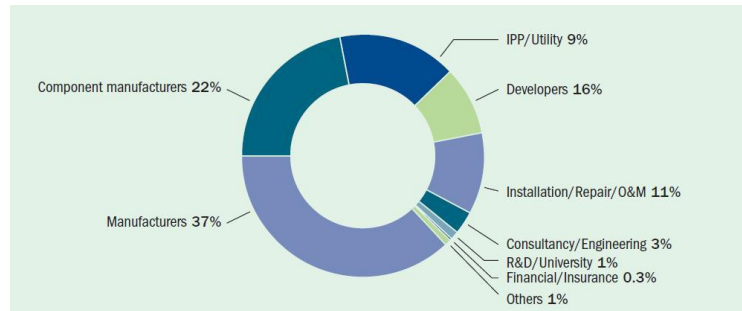
## Gemiddeld/jaar

<b>Academics:</b>	EQF levels 6-8:	35.000	1.750
<b>Engineers:</b>	EQF levels 4-6:	120.000	6.000
<b>Technicians:</b>	EQF levels 3-5:	150.000	7.500
<b>“Un”skilled:</b>	EQF levels 1-2:	60.000	3.000
<b>Rest:</b>	EQF levels 3-8:	35.000	1.750

**20.000**

**Nieuwe mensen per jaar!!**

# En hoeveel mensen?



## Gemiddelde vraag naar Offshore Wind personeel in de EU per jaar:

Type:	Level:	Total
<b>Academics:</b>	EQF levels 6-8	1.250
Administrative/Management	EQF levels 3-6	750
<b>Engineers/technicians</b>	EQF levels 3-6:	<b>7.000</b>
<b>Unskilled</b>	EQF levels 1-2:	1.000

# Hoeveel nieuwe mensen moeten we opleiden in NL?

- **Aanname:** 12.000 MW offshore windvermogen gerealiseerd in 2020 in NW Europa (nu ~ 4.000 MW)
- Dan is het **Nederlandse aandeel** gelijk aan 7.800 nieuwe banen!!



Sources: WE@Sea, TU Delft, POWER Interreg III

# Veel opleidingscapaciteit nodig!

## Windopleidingen

academic



vocational



Area of education	Academic (BSc & MSc)	Higher education (incl.poly- technics)	MBO (BOL & BBL)	VMBO & VBO
<b>Site development and legislation</b>	<b>xx</b>	<b>xx</b>		
<b>Financing and insurance</b>	<b>x</b>	<b>xx</b>		
<b>Logistics</b>	<b>x</b>	<b>xx</b>	<b>x</b>	
<b>Production and assembly</b>		<b>x</b>	<b>xx</b>	<b>xx</b>
<b>Transport and installation</b>		<b>xx</b>	<b>xxx</b>	<b>xx</b>
<b>Maintenance and repair</b>		<b>xx</b>	<b>xx</b>	<b>xxx</b>
<b>Monitoring and operation</b>	<b>x</b>	<b>xx</b>	<b>xx</b>	
<b>Safety and risk analysis</b>	<b>xx</b>	<b>xx</b>		
<b>Production and sales</b>	<b>x</b>	<b>xx</b>		





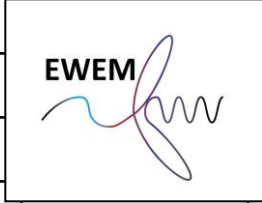
← foundation degree

Source WE@Sea, POWER Interreg III



# Veel opleidingscapaciteit nodig!

## Windopleidingen

Area of education	academic		vocational	
	Academic (BSc & MSc)	Higher education (incl. polytechnics)	MBO (BOL & BBL)	VMBO & VBO
Site development and legislation		XX		
Financing and insurance		XX		
Logistics		XX	X	
Production and assembly		X	XX	XX
Transport and installation		XX	XXX	XX
Maintenance and repair		XX	XX	XXX
Monitoring and operation		XX	XX	
Safety and risk analysis	XX	XX		
Production and sales	X	XX		



← foundation degree

Source WE@Sea, POWER Interreg III

# Veel opleidingscapaciteit nodig!

## Windopleidingen

Area of education	academic		vocational	
	Academic (BSc & MSc)	Higher NHL HOGESCHOOL	MBO (BOL & BBL)	VMBO & VBO
Site development and legislation	x			
Financing and insurance				
Logistics	x	xx	x	
Production and assembly			xx	xx
Transport and installation			xxx	xx
Maintenance and repair		xx	xx	xxx
Monitoring and operation	x	xx	xx	
Safety and risk analysis	xx	xx		
Production and sales	x	xx		








← foundation degree

Source WE@Sea, POWER Interreg III

# Veel opleidingscapaciteit nodig!

## Windopleidingen

Area of education	academic		vocational	
	Academic (BSc & MSc)	Higher education (technic)	MBO (BOL & EBL)	VMBO & VBO
		<b>Minors</b>		
Site development and legislation	xx			
Financing and insurance	x			
Logistics	x		x	
Production and assembly			xx	xx
Transport and installation			xxx	xx
Maintenance and repair			xx	xxx
Monitoring and operation	x		xx	
Safety and risk analysis	xx			
Production and sales	x	xx		







foundation degree

Source WE@Sea, POWER Interreg III

# Veel opleidingscapaciteit nodig!

## Windopleidingen

academic ↔ vocational

Area of education	Academic (BSc & MSc)	Higher education (incl. poly-technic)	MBO (BOL & VBO)	VMBO & VBO
Site development and legislation	xx	xx		
Financing and insurance	x	xx		
Logistics	x	xx		
Production and assembly		x		
Transport and installation		xx		
Maintenance and repair		xx		
Monitoring and operation	x	xx		
Safety and risk analysis	xx	xx		
Production and sales	x	xx		

foundation degree



Source WE@Sea, POWER Interreg III

# Veel opleidingscapaciteit nodig!

## SET/RES opleidingen

Area of education	academic		vocational	
	Academic 3TU	Higher education (incl. poly- EUROPEAN MASTER IN SUSTAINABLE ENERGY	MBO (BOL & BBL)	VMBO & VBO
Site development and legislation	3TU MSc in Sustainable Energy Technology			
Financing and insurance				
Logistics	TU Delft	XX	X	
Production and assembly		X	XX	XX
Transport and installation	TU/e	XX	XXX	XX
Maintenance and repair		XX	XX	XXX
Monitoring and operation	University of Twente	XX	XX	
Safety and risk analysis		XX		
Production and sales		XX		



foundation degree

Source WE@Sea, POWER Interreg III

# Stel: NL zorgt voor 10% van de opleidingscapaciteit nodig in EU:

- **175 PhD MSc/jaar (nu ~30)**
- **600 HBO (BSc)/jr (nu ~10)**
- **750 MBO+VMBO/jr (nu 25?)**

- **We zitten pas op 4,5% van de nodige capaciteit!**
- **Gaat heen en onderwijst!!!**

# Wat maakt offshore wind zo fascinerend?

- **Het potentieel**
- **De technologie**

# Opleiden alleen is niet voldoende!!

## Awareness:

- op academisch niveau aanwezig
- veel voorlichting nodig aan scholieren en hun **ouders**
- TKI Wind op Zee neemt actie!!



Energy Academy **Europe**



Home Energy Club Events Education Career Projects & Initiatives



Energy Education Assignments Energy Books Submit an assignment Delft Energy Initiative



# Hartelijk dank voor uw aandacht

## Vragen?