

PTA DAN PENGEMBANGAN TEKNOLOGI ENERGI SURYA FOTOVOLTAIK

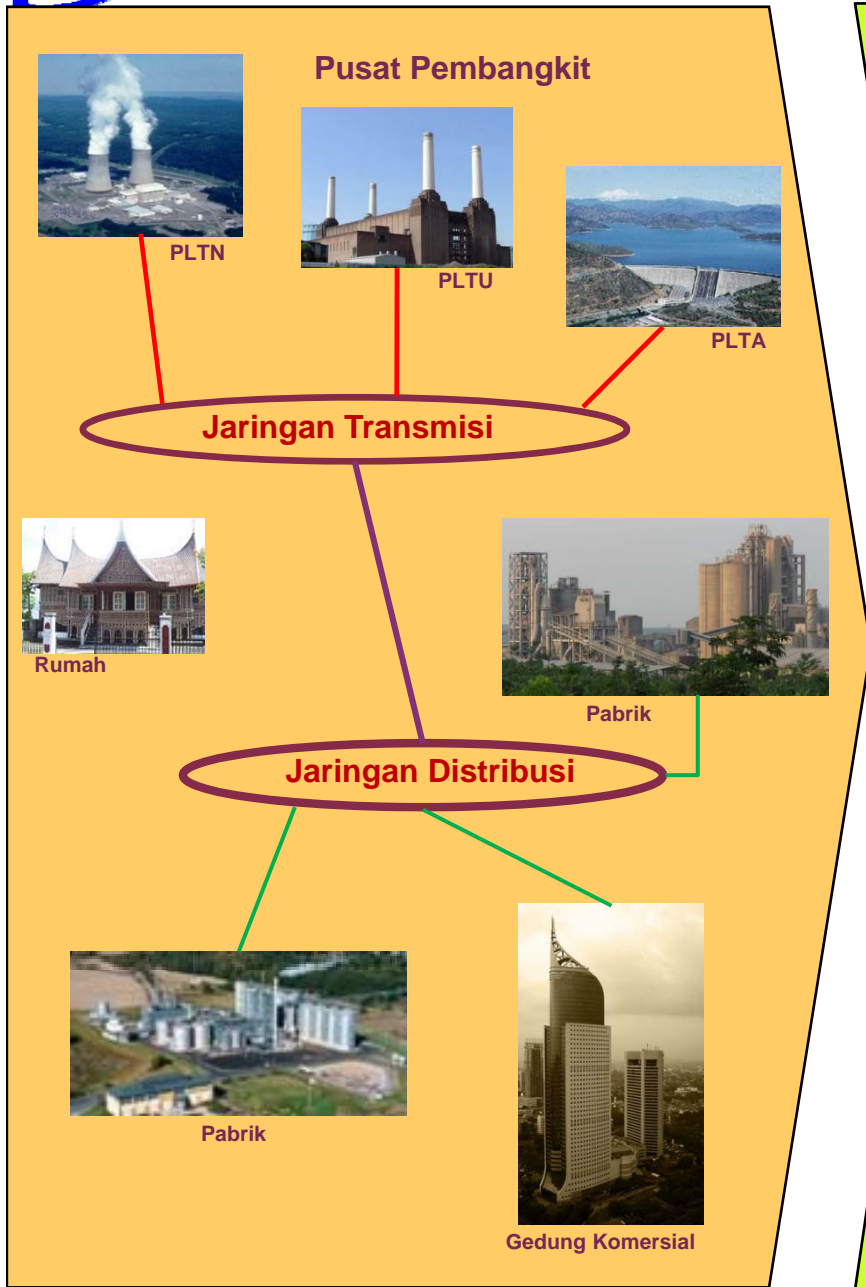


Deputi Kepala BPPT Bidang TIEM

Juli 2008



Sistem Saat Ini

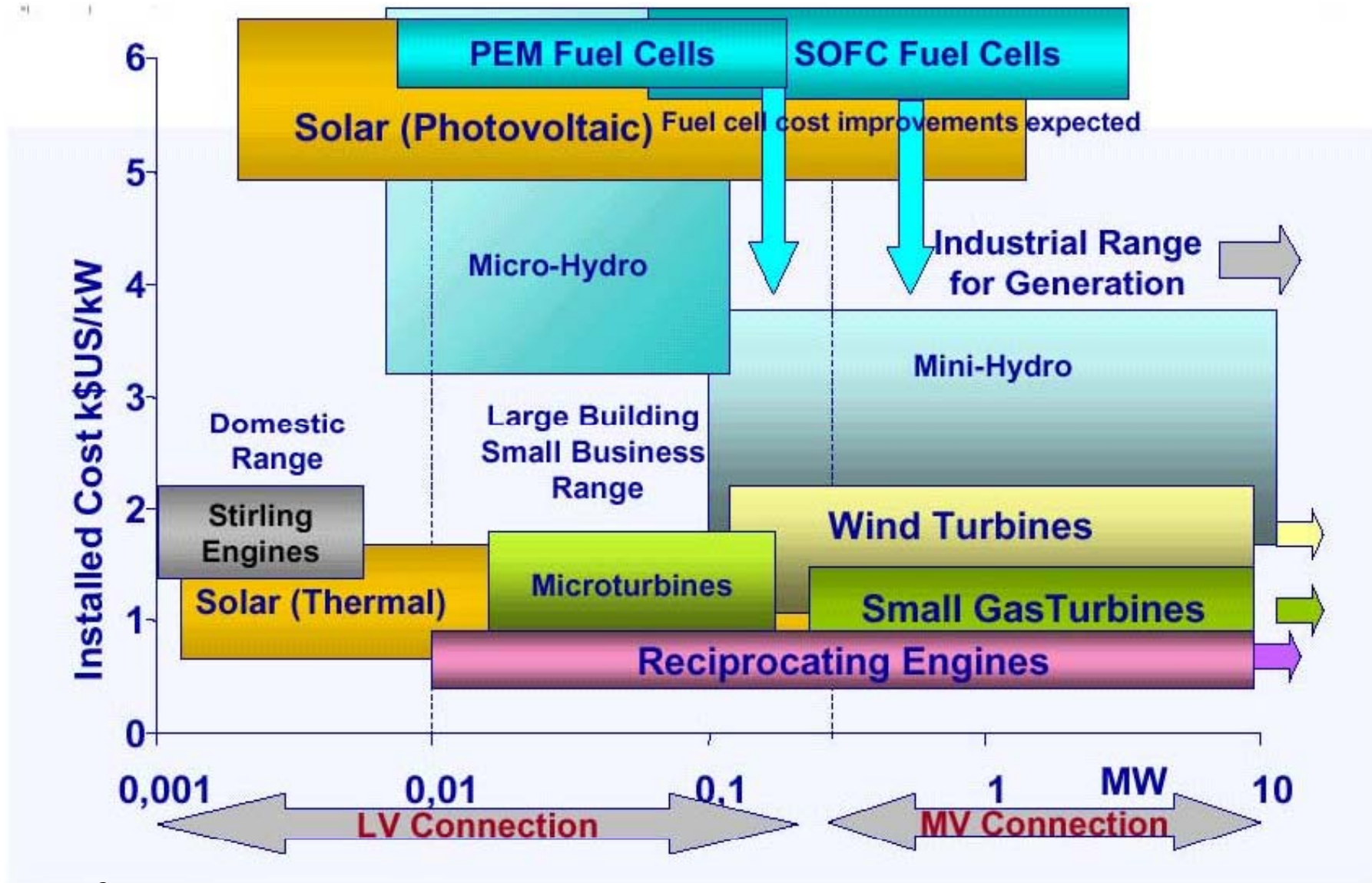


Masa Depan :

Pembangkit Terdistribusi Integrated Network Management



DG Technologies



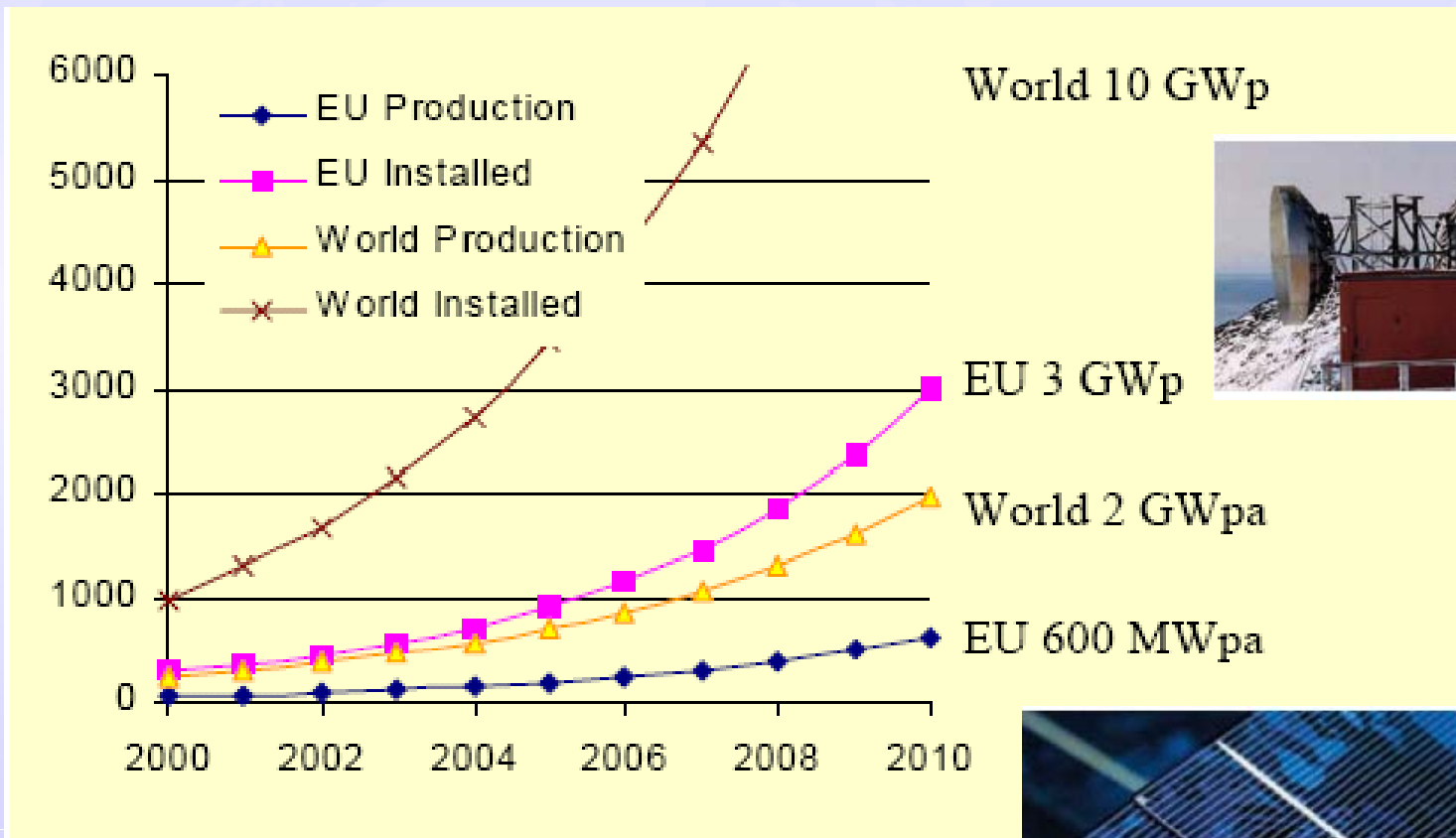
Source:

Roadmap Industri Solar Cell Europa 2010 dan 2020

- Skala Industri solar cell Europa akan di set pada tahun 2010 dan 2020 dgn roadmap :
 - 20 % dan 22 % masing-masing utk CZ silicon
 - 18 % dan 20 % masing-masing utk multi crystalin silicon
 - 17 % dan 19 % masing-masing utk ribbon silicon



Scenario for the development of PV until 2010 based on the EU target of 3GWp





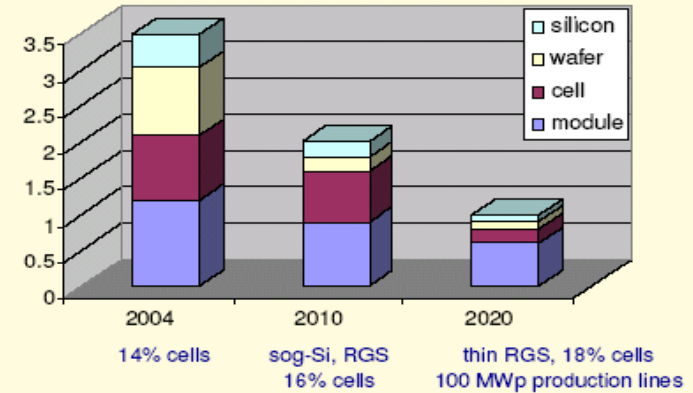
Holland Solar's vision on PV in 2050

- 0.06 €/kWh (~avoided generation costs)
- On all new buildings/retrofit and many existing buildings
- Large ground-based power plants
- 60,000 jobs
- 75 GWp installed
- 25% of electricity
- Small- & large-scale storage
- Further growth possible



Price reduction potential x-Si modules

module selling price (€/Wp)

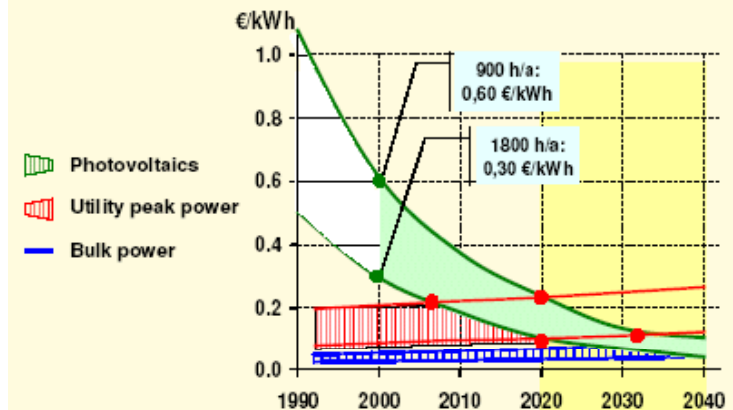


From silicon to wafer

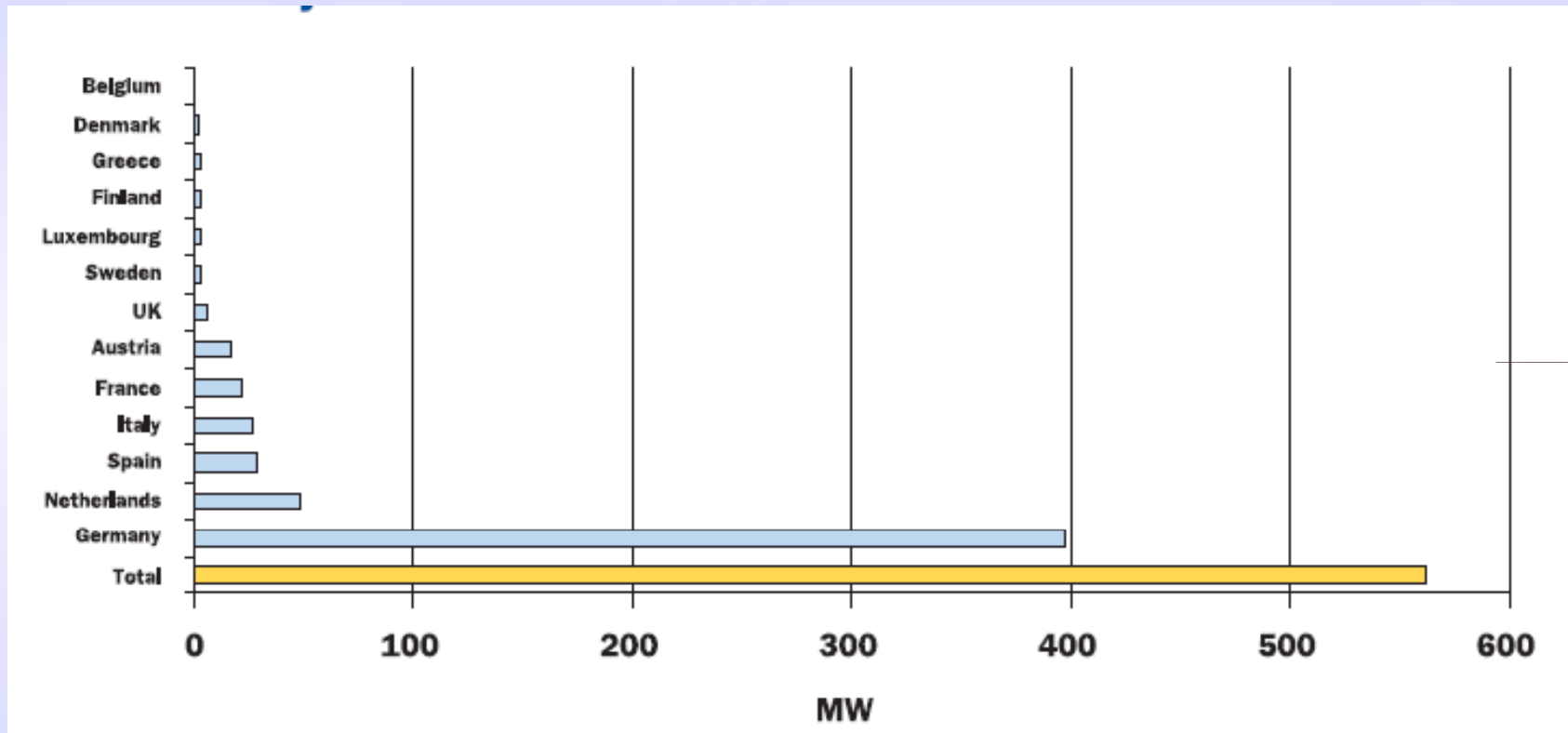


Paul Wyers
ECN Solar Energy

Electricity generating costs for PV and utility prices



Sebagian PV masih didatangkan dari luar komunitas Eropa

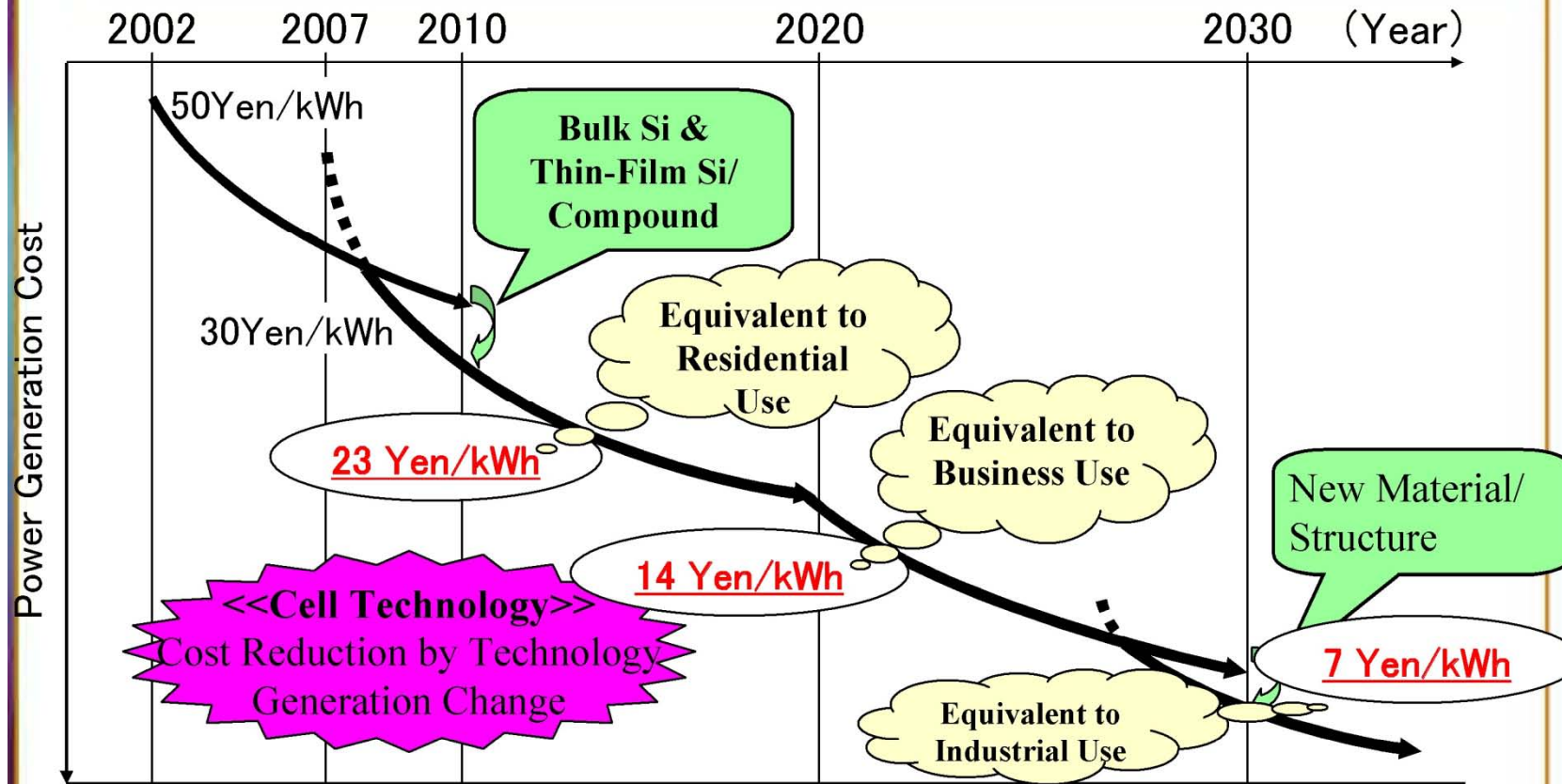


Total PV installed power in selected European countries by the end 2003⁹.



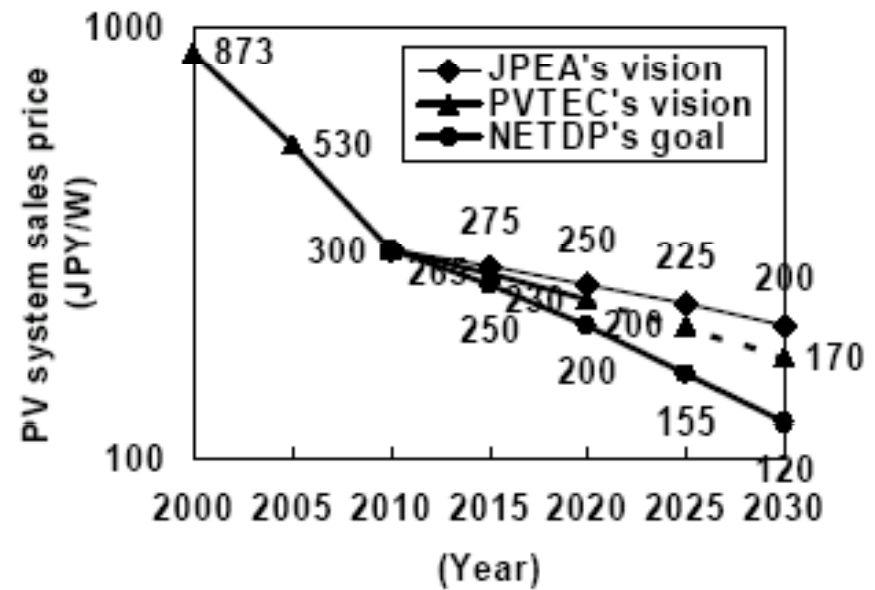
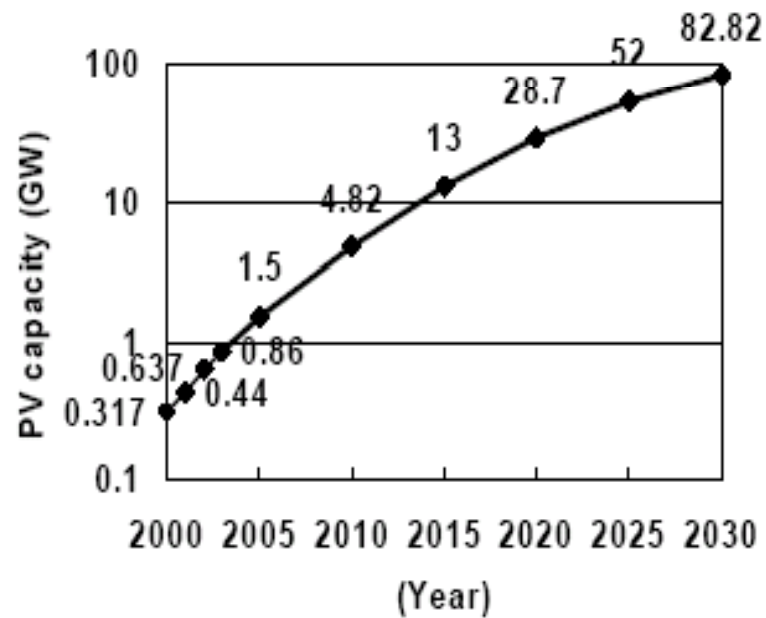
JAPAN ROADMAP PV DEVELOPMENT

PV Roadmap Toward 2030 (PV2030)



Source: NEDO "PV Roadmap Toward 2030" (PV2030)

Scenario for the development of PV until 2030, Japan



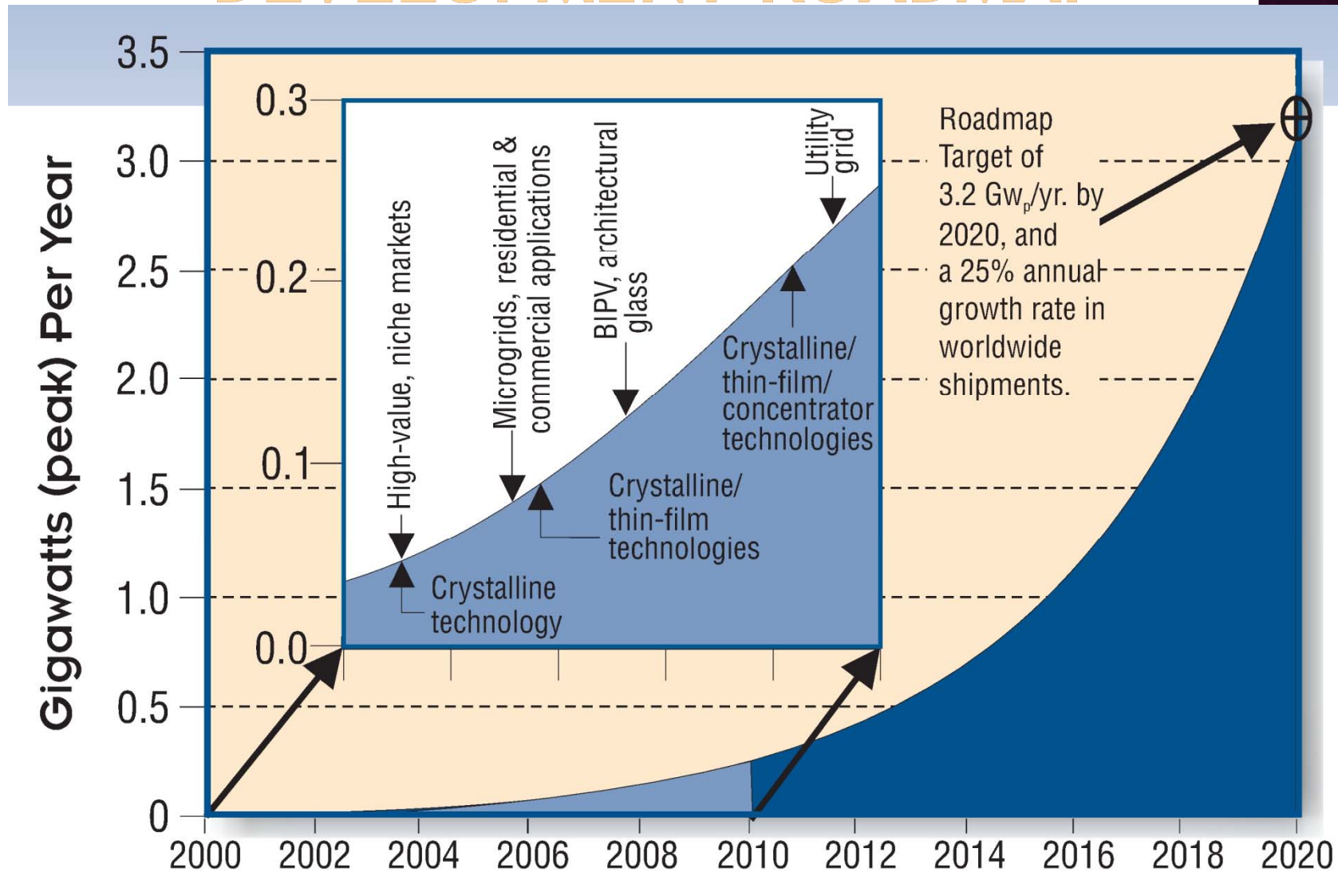
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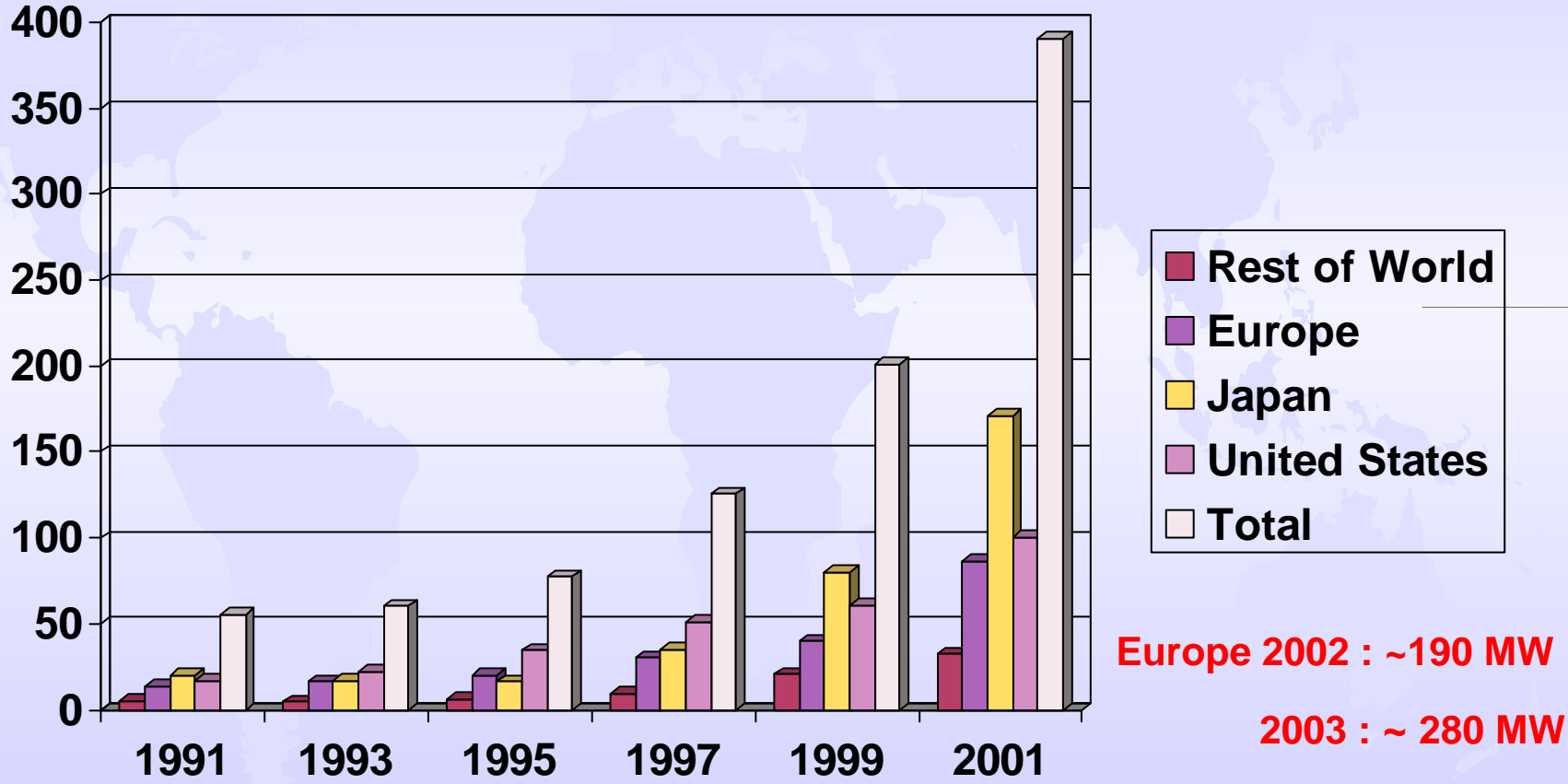


US PV PRODUCTION TARGET AND DEVELOPMENT ROADMAP

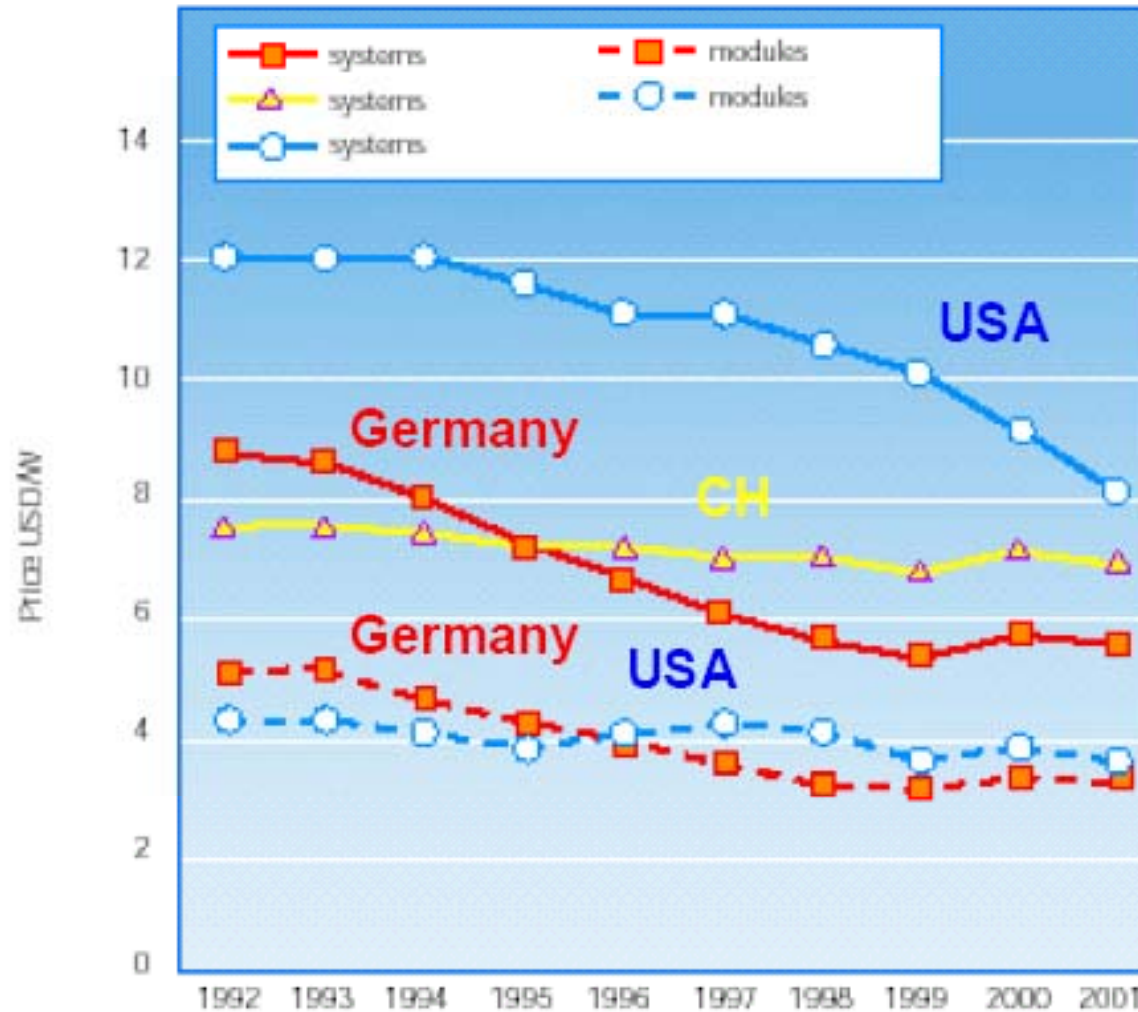


Source: The US PV Industry Roadmap, Energetic Inc. Sandia National Laboratory, US 2001

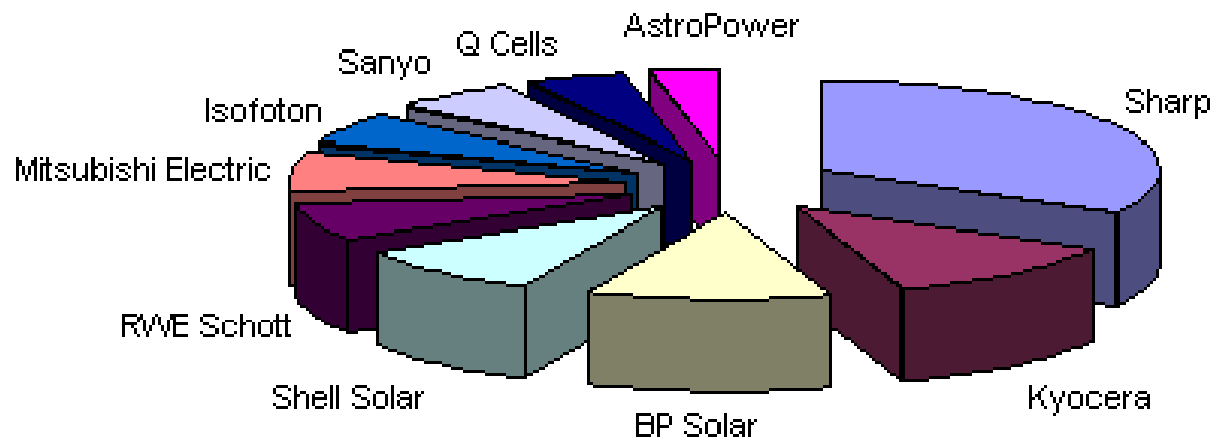
World PV Production (Megawatts)



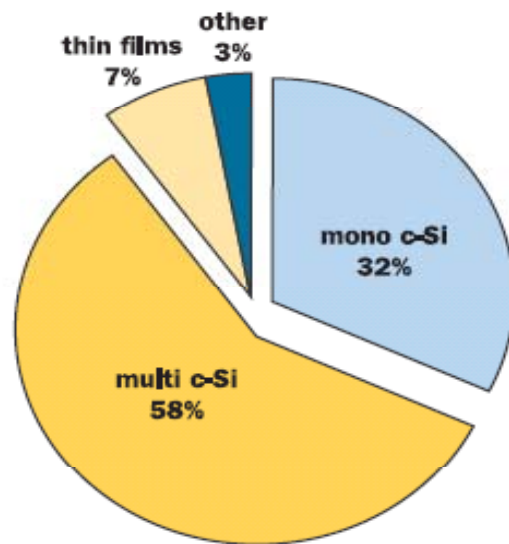
PV Module and System Price Trends



Top 10 Solar Cell Manufacturer Production (2003) In Megawatts



Source: Solarbuzz Inc



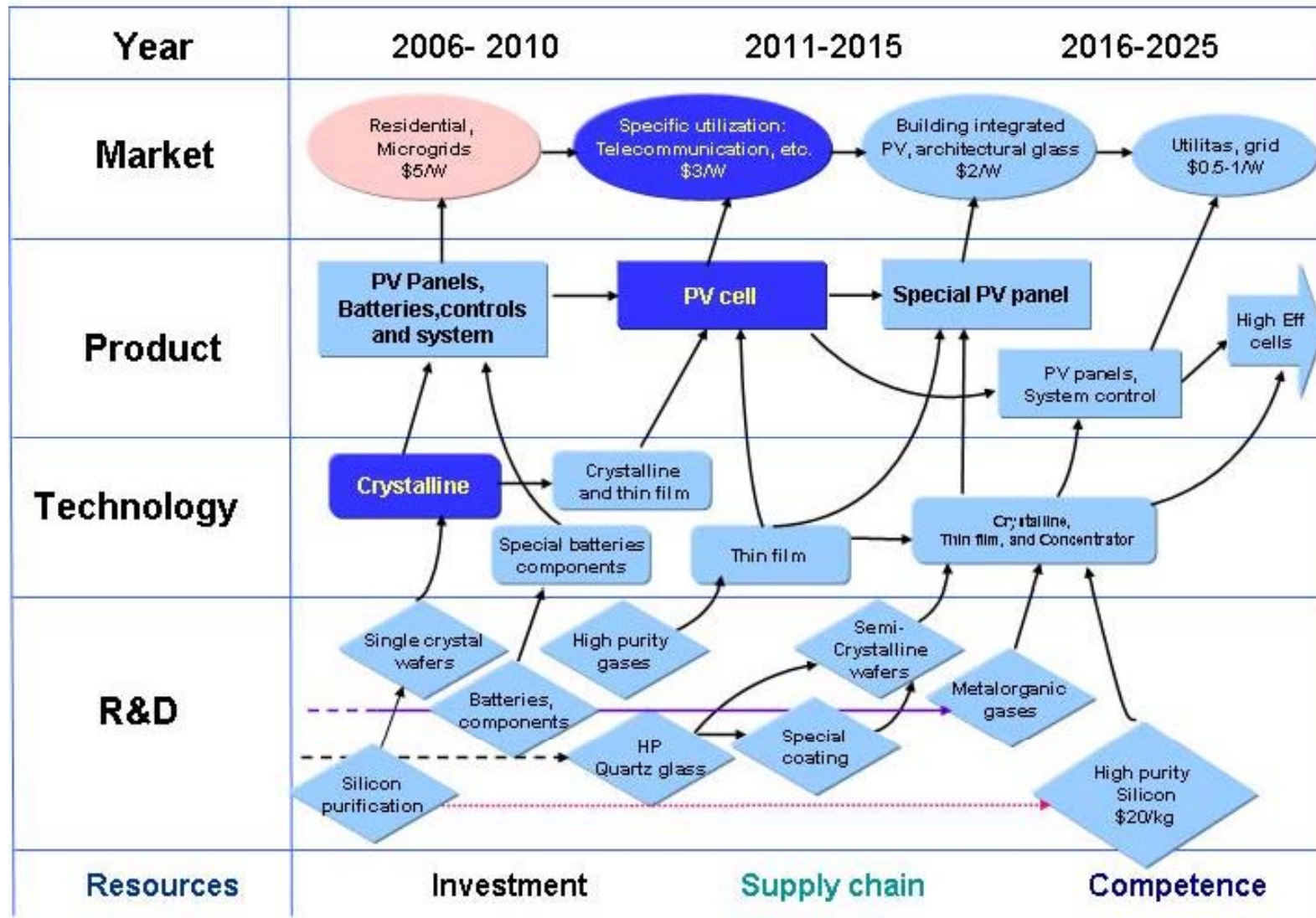
Summary of the Status, Achievement and Goals of EUREC

	Status 1995	Goal 2000	Achieved 2000	Goal for 2005	Goal for 2010
Solar Cell c-silicon laboratory production :mono multi	23 % 12-15 %	24% 16-18%	24.7 % 15-17% 13-15%	25% 16-18% 14-16%	26% >20%
Modul Efficiency Life time Price €/ Wp	11-13%	>20 Y < 2.5	13% 25 Y < 4.0	15% 30 Y < 2.5	30 Y < 1.5
Inverter Efficiency 100% load Efficiency 10% load Price €/Wp 1-5 kW	95 % 85% 1.0	>97% >90%	96% 90% 0.5	97% 92% 0.3	>98% >95% 0.3
System Price €/Wp Stand alone Grid connected 1-3 kW	8-12	<5.0 <4.0	< 6.0 4.0 – 5.0	< 5.0 < 3.5	< 3





PV ROADMAP NASIONAL





Program Pembangkit Listrik Tenaga Surya PV - BPPT

Tahun	2007-2009	2010-2014
Pasar	Sektor Perumahan Kota, Swasta, PEMDA	Sektor Perumahan Kota, Swasta, Real Estate Developer, PEMDA
Produk Kereyakasaan	<ul style="list-style-type: none"> - Pilot Plant PV Grid Connected di Perumahan Perkotaan - Prototipe Sistem Power Conditioning and Balance of System - Rekomendasi Tarif Feed-in PV Grid - Standar Nasional Sistem Hybrid 	<ul style="list-style-type: none"> • Pilot Plant PV Grid Connected Skala Besar 1 MWp • Standar Nasional Interkoneksi Sistem PV Grid
Rekayasa / Rancangbagun /Teknologi	<p style="text-align: center;">Sertifikasi produk</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> • Rancang bangun Sistem PV Grid Connected dengan <i>energy storage</i> • Design Electronics Power Conditioning and Balance of System for Hybrid and Grid Connected </div> <div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> • Teknologi Sistem PV Grid Connected dengan <i>energy storage</i> • Electronics Power Conditioning and Balance of System for Hybrid and Grid Connected </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> • Rancangbangun Pilot Plant PV Grid 1 MWp • Teknologi PV Grid BIPV </div>
R & D	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Basic Desain s/d Final Desain Prototipe Sistem</p> <ul style="list-style-type: none"> • Kajian Inovatif Elektronik Sistem Inverter • Kajian Keandalan Sistem • Kajian Grid Connected dg Storage </div> <div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> • Analisis Tarif Feed-in • Perumusan Standar Nasional Sistem Hybrid </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> • Basic Desain s/d Final Desain Pilot Plant PV Grid 1 MW • Perumusan Standar Nasional </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> • Kajian Penerapan PV Grid Skala Besar 1 MW • Kajian Standar Nasional Interkoneksi • Kajian Integrasi PV-Bangunan (BIPV) </div>
Sumberdaya	<ul style="list-style-type: none"> •Dana: Rp. 4.000.000.000 (akumulasi & Estimasi) •SDM: 15 org (1 Ka. Prog, 1CE, 1 PM, 9 Peneliti) •Sarana: Lab. PV, CAD/CAM(Catia), Bengkel, Lab. Material •Mitra: PTKKE, B2TE, PTIK, MEPPPO, LAGG, LAPAN, IKM/UKM, Industri, dll.. 	<ul style="list-style-type: none"> •Dana: Rp. 33.000.000.000 (akumulasi & Estimasi) •SDM: 17 org (1 Ka. Prog, 1CE, 1 PM, 12 Peneliti) •Sarana: Lab. PV, CAD/CAM(Catia), Bengkel, Lab. Material •Mitra: PTKKE, B2TE, PTIK, MEPPPO, LAGG, LAPAN, IKM/UKM, Industri, dll.
Keahlian	<ul style="list-style-type: none"> •T. Mesin (1), T Elektro (4), T.Kimia (2), T. Material (1), Fisika(2), T Sipil (1), STM/Teknisi (4) 	<ul style="list-style-type: none"> •T. Mesin (2), T. Fisika (2), T Elektro (2), T. Kontrol(1),T.Kimia (3), T. Material (1), Arsitek (1), T Sipil (1), STM/Teknisi (4)

KESIMPULAN

- ◉ PV kedepan akan menjadi semakin penting utk memenuhi keperluan energi dunia
- ◉ Proyeksi perkembangan produksi PV sangat signifikan
- ◉ Hingga 20 tahun kedepan c-Si dan m-Si masih merupakan semikonduktor penting dlm pembuatan sel PV.
- ◉ Indonesia masih mempunyai peluang cukup besar utk memanfaatkan teknologi PV yg berbasis pada c-Si dan m-Si, khususnya keperluan utk sekitar 17000 pulau-pulau kecil yg tersebar.

Saran- saran

- Kembangkan terus Roadmap PV yg telah ada
- Analisis situasi dan buat proyeksi yg realistik kedepan
- Identifikasi perkembangan Teknologi dan Pasar
- Defenisikan tujuan dan sasaran dlm jangka pendek, menengah, dan jangka panjang.
- Defenisikan dan realisasikan target dan milestone
- Bantu untuk membuat kerjasama diantara industri-industri yang terkait dengan fabrikasi/manufaktur PV.