

Schlussbericht PV Forschung, DIS 39949 / 79765, September 2003

# Langzeitverhalten von netzgekoppelten Photovoltaikanlagen 2 (LZPV2)

## Anhang 2: Normierte Monatsstatistiken

ausgearbeitet durch:  
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*Forschungsprogramm Photovoltaik*

# Langzeitverhalten von netzgekoppelten Photovoltaikanlagen 2

## *Anhang 2: Normierte Monatsstatistiken der Anlagen mit Feinmessung*



Verfasst von:

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Ausgearbeitet im Auftrag folgender Institutionen und Firmen:

**Bundesamt für Energie (BFE)**

**Gesellschaft Mont Soleil (GMS)**

**Localnet AG, Burgdorf**

**Elektra Baselland Liestal (EBL)**



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## Definition und Bedeutung der normierten Erträge und Verluste

Symbol	Bezeichnung	Bedeutung / Erklärung / Ursache	Einheit	
$Y_r$	Strahlungsertrag, Referenzertrag (Reference Yield)	$Y_r = H_l / G_0$ . $Y_r$ entspricht der Zeit, während der die Sonne mit $G_0 = 1\text{ kW/m}^2$ scheinen müsste, um die Energie $H_l$ auf den Solargenerator einzustrahlen.	$\frac{\text{kWh/m}^2}{\text{d} \cdot 1\text{ kW/m}^2}$	[h/d]
$L_c$	Generatorverluste Feldverluste (Capture Losses)	<b>Temperaturbedingte Verluste L<sub>CT</sub> :</b> Verluste, weil Zellentemperatur meist $> 25^\circ\text{C}$ . <b>Übrige, nicht temperaturbedingte Verluste L<sub>CM</sub> :</b> <ul style="list-style-type: none"> <li>- Verdrahtung, Strangdioden, kleine Einstrahlung.</li> <li>- Teilabschattung, Verschmutzung, Schneebedeckung, Strahlungsinhomogenitäten, Mismatch.</li> <li>- Maximum-Power-Tracking-Fehler, Nichtabnahme der verfügbaren Generatorleistung wegen Wechselrichterausfällen oder bei vollem Akku (bei Inselanlagen).</li> <li>- Fehler bei Strahlungsmessung.</li> <li>- Bei Pyranometer-Strahlungsmessung: Spektrale Verluste, Glasreflexionsverluste.</li> </ul>	$\frac{\text{kWh}}{\text{d} \cdot \text{kWp}}$	[h/d]
$Y_a$	Generator-Ertrag (Array Yield)	$Y_a = E_A / P_0$ . $Y_a$ entspricht der Zeit, während der die Anlage mit Solargenerator-Nennleistung $P_0$ arbeiten müsste, um die Generator-DC-Energie $E_A$ zu erzeugen	$\frac{\text{kWh}}{\text{d} \cdot \text{kWp}}$	[h/d]
$L_s$	Systemverluste (System Losses)	Wechselrichter-Umwandlungsverluste DC-AC, Speicher-verluste des Akkus bei Inselanlagen.	$\frac{\text{kWh}}{\text{d} \cdot \text{kWp}}$	[h/d]
$Y_f$	Endertrag (Final Yield)	$Y_f = E_{\text{nutz}} / P_0$ . $Y_f$ entspricht der Zeit, während der die Anlage mit Generator-Nennleistung $P_0$ arbeiten müsste, um die gleiche Nutzenergie $E_{\text{nutz}}$ zu produzieren. Bei Netzverbundanlagen ist $E_{\text{nutz}} = E_{\text{ac}}$ .	$\frac{\text{kWh}}{\text{d} \cdot \text{kWp}}$	[h/d]
$PR$	Performanz, Nutzungsziffer, (Performance Ratio)	$PR = Y_f / Y_r$ . PR ist das Verhältnis zwischen der effektiv genutzten Energie $E_{\text{nutz}}$ zur Energie, die eine verlustlose, ideale PV-Anlage mit Solargeneratortemperatur $25^\circ\text{C}$ bei gleicher Einstrahlung produziert.		[1]
$k_T$	Temperatur- Korrekturfaktor	$k_T = Y_T / Y_r$		[%]
$k_G$	Generator- Korrekturfaktor	$k_G = Y_a / Y_T$		[%]
$n_I$	Wechselrichter- Nutzungsgrad	$n_I = Y_f / Y_a$		[%]
$Y_r \xrightarrow{-L_c} Y_a \xrightarrow{-L_s} Y_f$		$Y_r \xrightarrow{-L_{CT}} Y_T \xrightarrow{-L_{CM}} Y_a \xrightarrow{-L_s} Y_f$		

## zu 6.1 Jungfraujoch

**Ort:** Hochalpine Forschungsstation, 3801 Jungfraujoch; 3454 m.ü.M.  
**Inbetriebnahme:** 27.10.1993

## Solargenerator:

**Module:** Siemens M75 (24 Stück)

**Feldleistung:** 1152 Wp (nom.) / 1130 Wp (eff.)

**Bruttofläche:** 9,65 m<sup>2</sup>

**Neigung:** 90° (Fassade)

**Ausrichtung:** 12° / 27° West

## Wechselrichter:

ASP TopClass 1800

ASP TopClass 2500/4 Grid III

vom 29.10.93 bis 16.07.96

seit 16.07.96

## Messgrößen:

- Sonneneinstrahlung in beide Modulebenen (2 Pyranometer und 2 Referenzzellen)
  - Umgebungstemperatur und Modultemperatur
  - Gleichströme (Ströme der beiden Arrays werden separat gemessen)
  - Gleichspannung
  - Eingespeiste Wechselstrom-Wirkleistung
  - Netzspannung



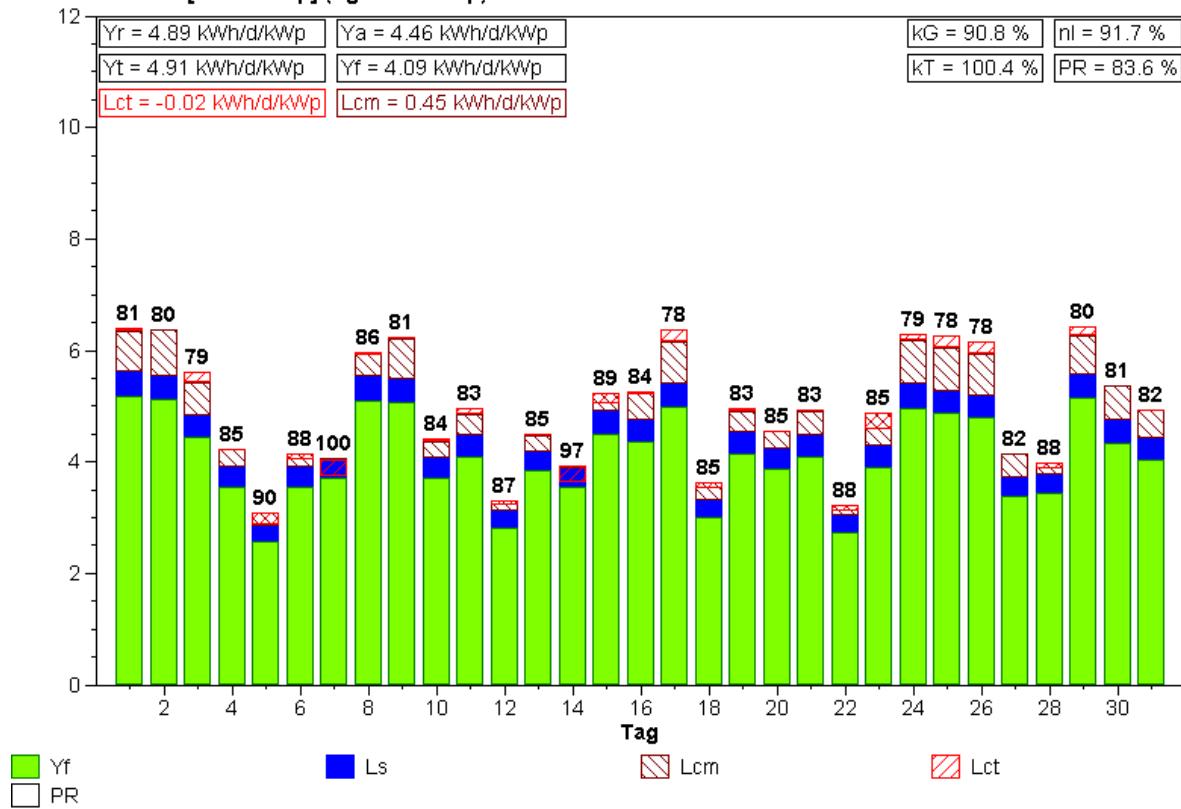
## **Besondere Betriebsereignisse:**

18.09.1999 – 11.10.1999	Teilverschattung des Ost-Solargenerators durch Baugerüst
18.08.2000 – 05.09.2000	Teilverschattung des West-Solargenerators durch Baugerüst
30.08.2000	Betriebsunterbruch auf Grund von Fassadenarbeiten
22.08.2001 – 13.09.2001	Teilverschattung des Ost-Solargenerators durch Baugerüst
19.09.2001	Austausch von 2 defekten Modulen

Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 7.1999

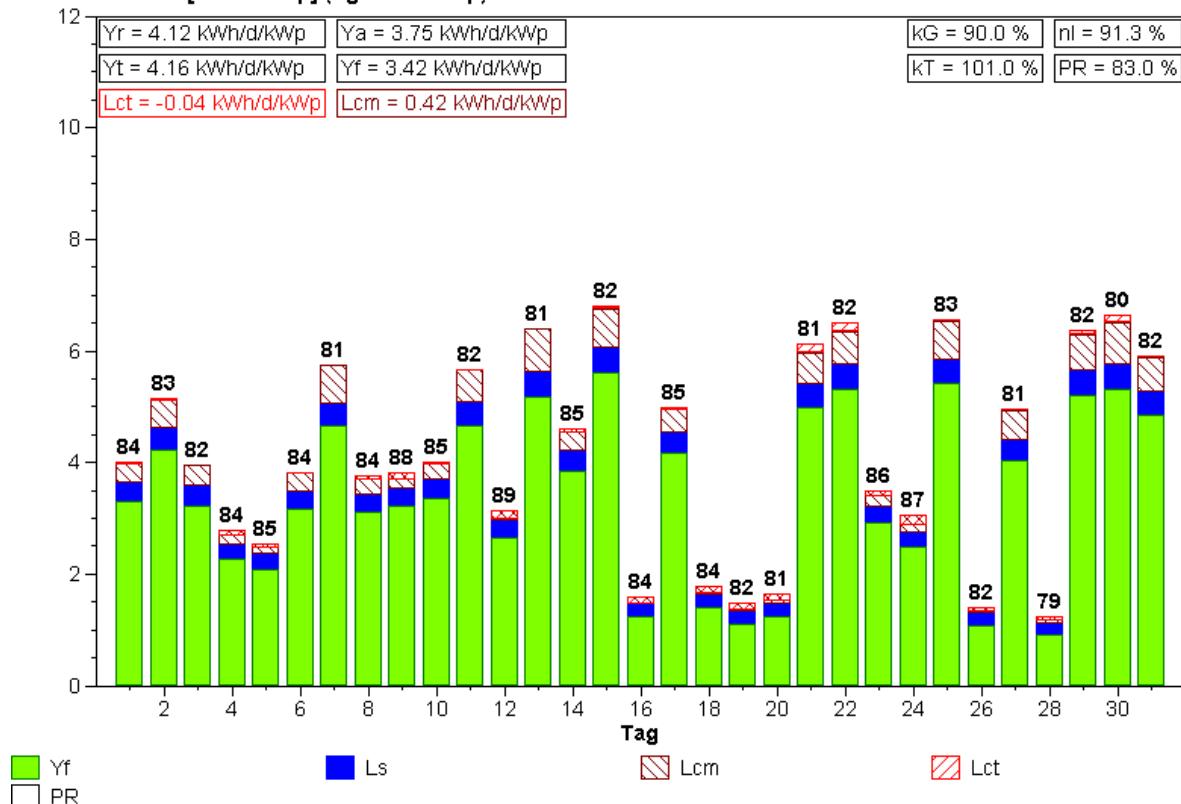
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 8.1999

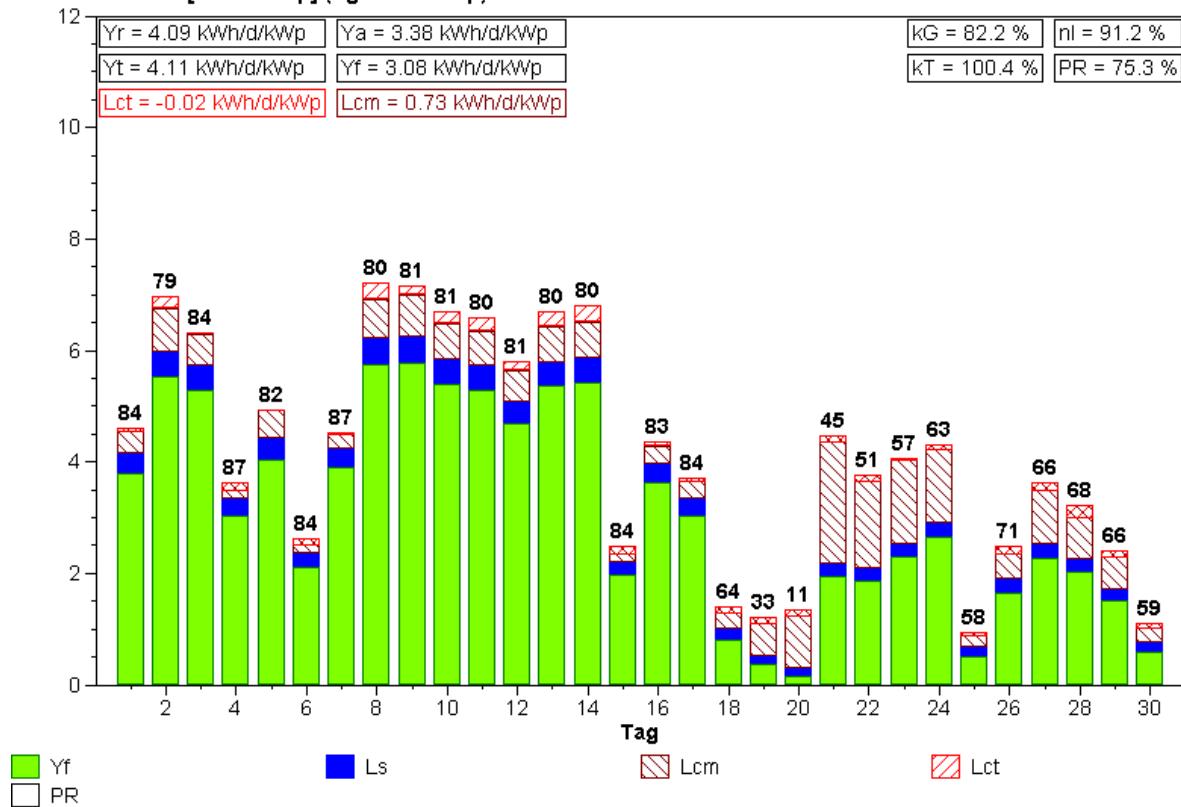
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 9.1999

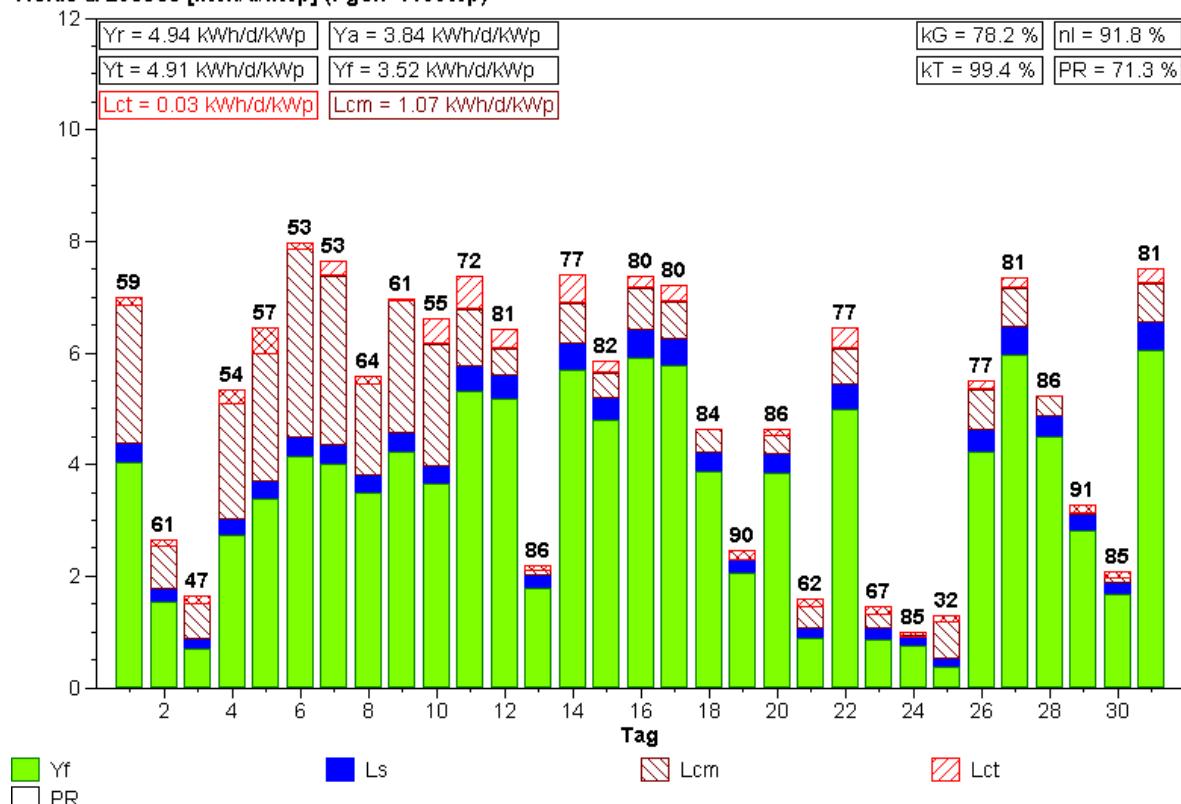
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 10.1999

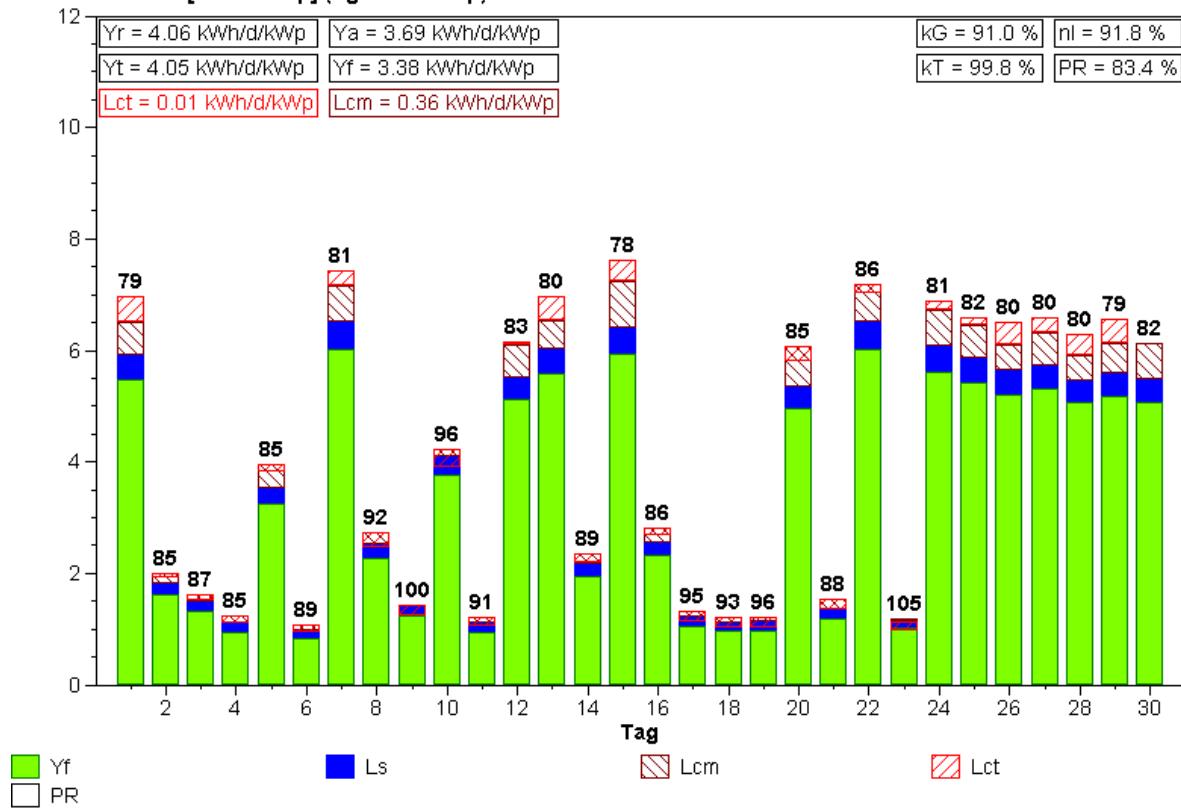
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 11.1999

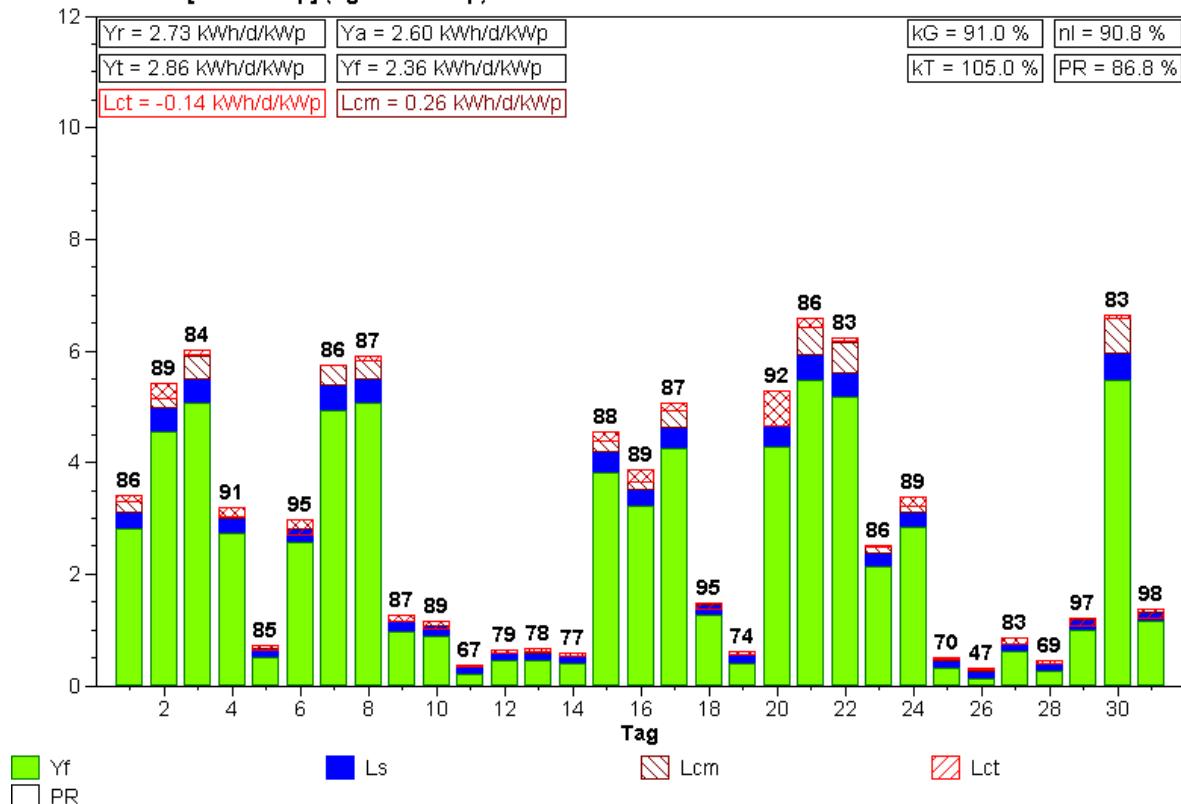
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 12.1999

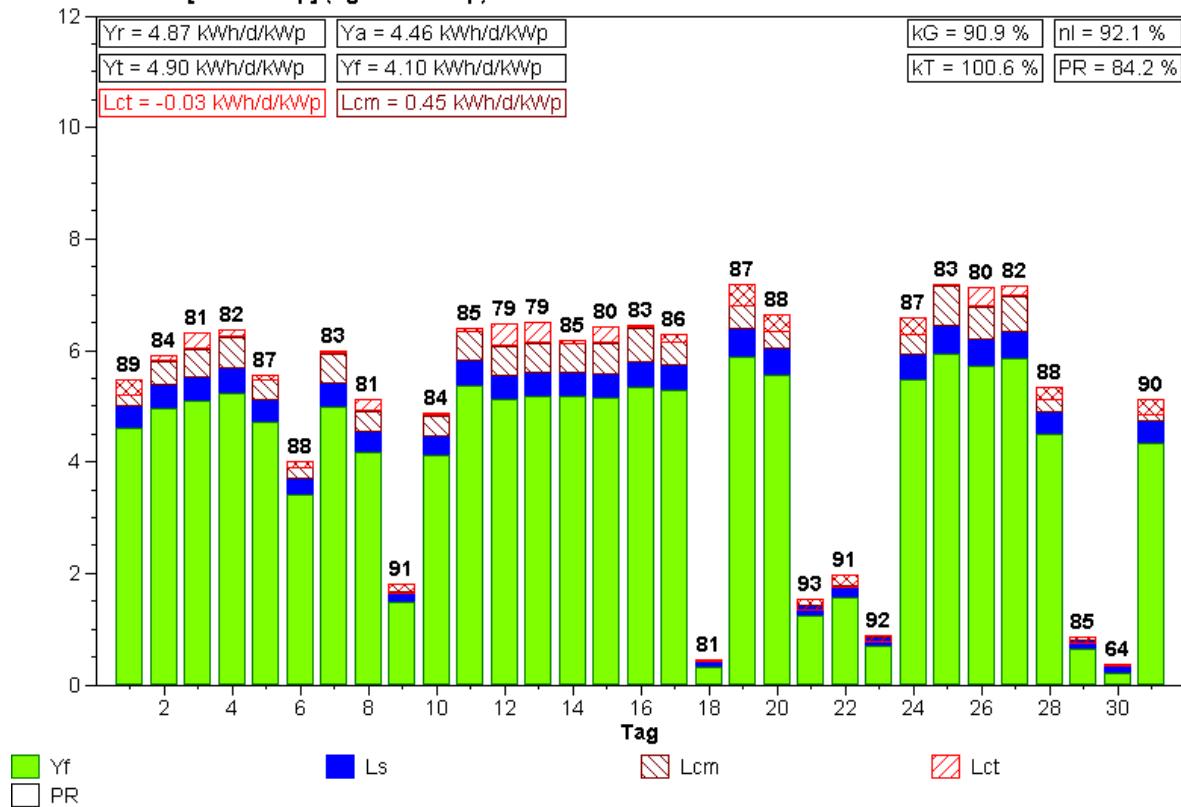
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 1.2000

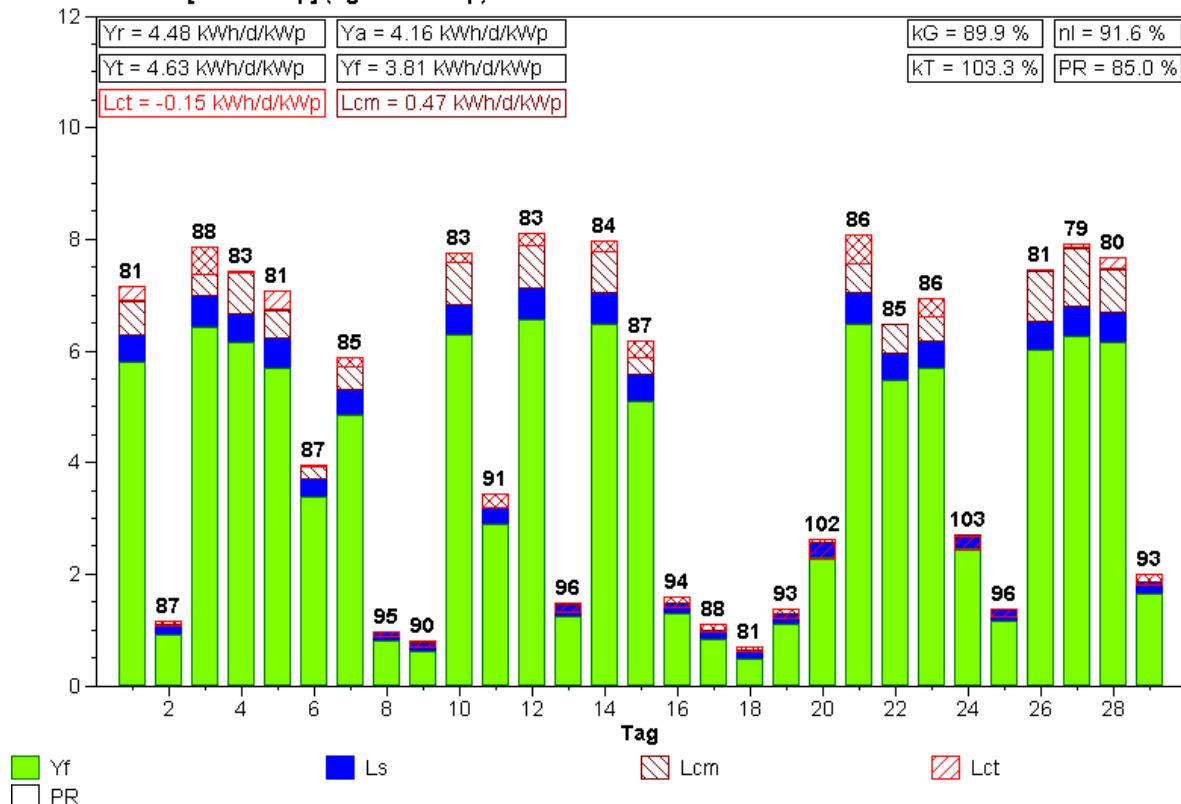
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 2.2000

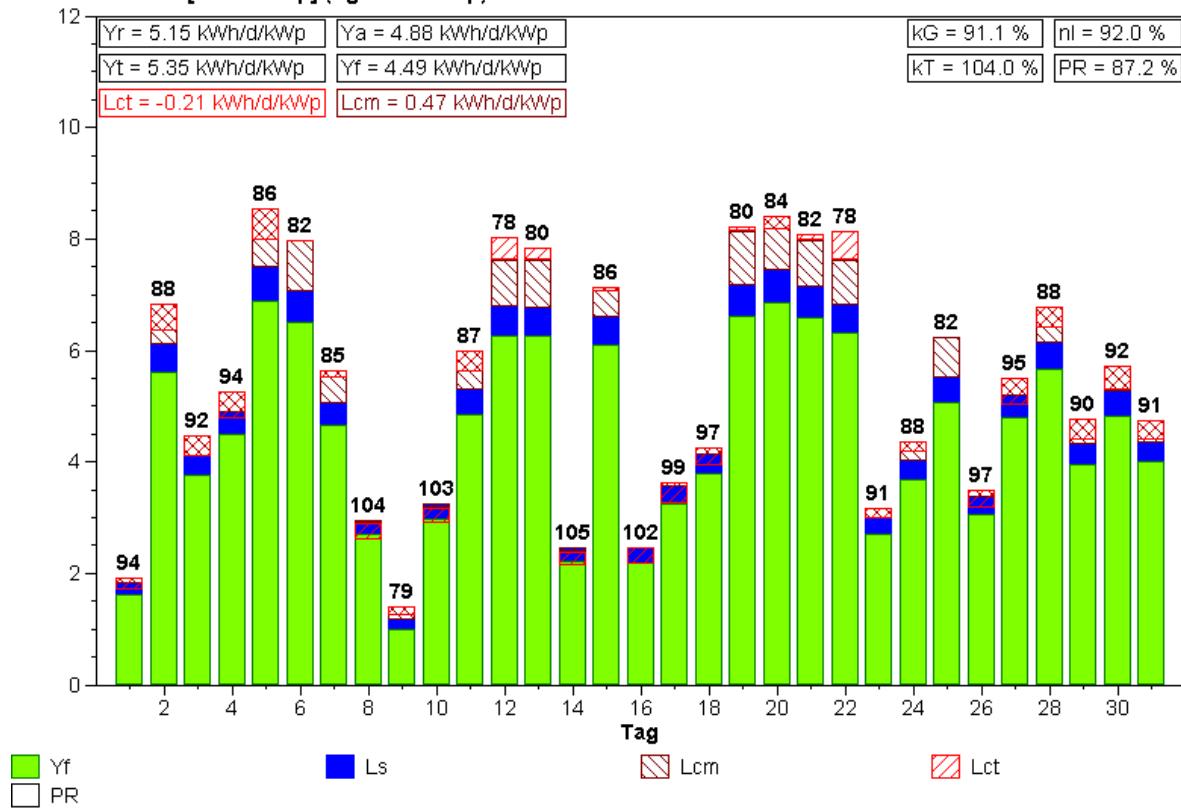
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 3.2000

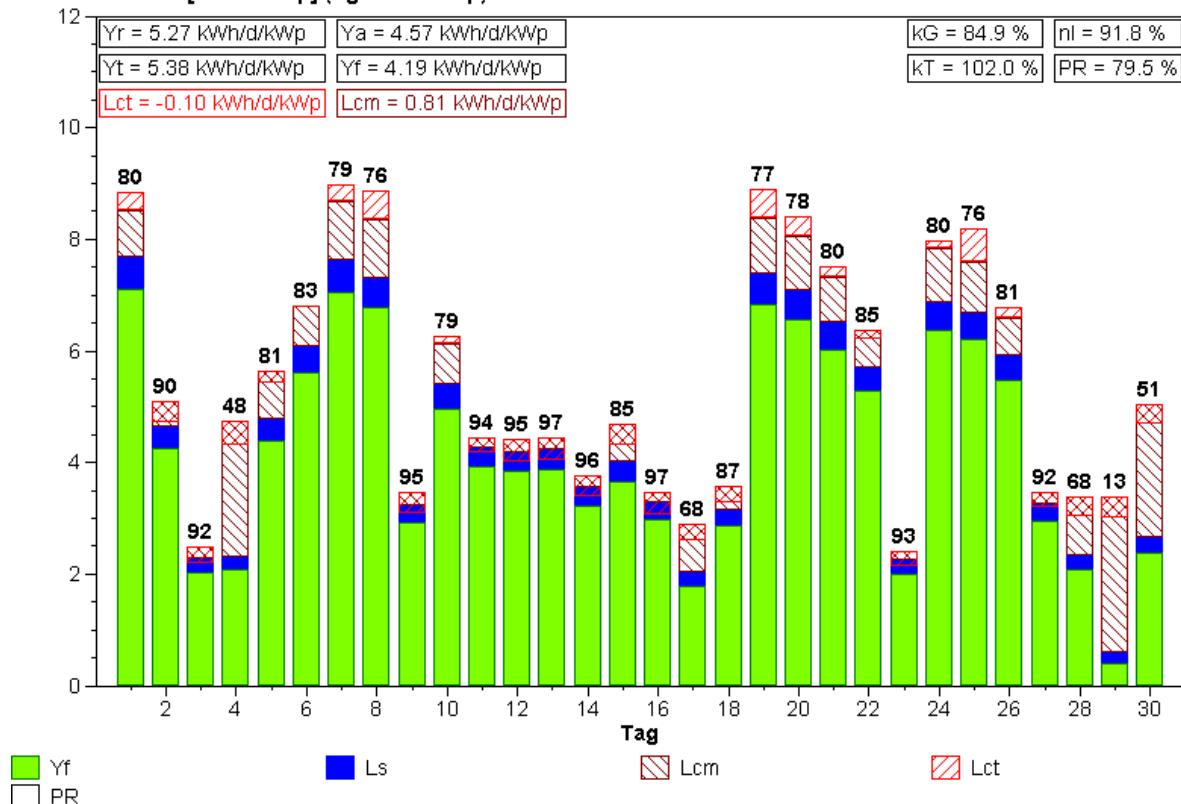
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 4.2000

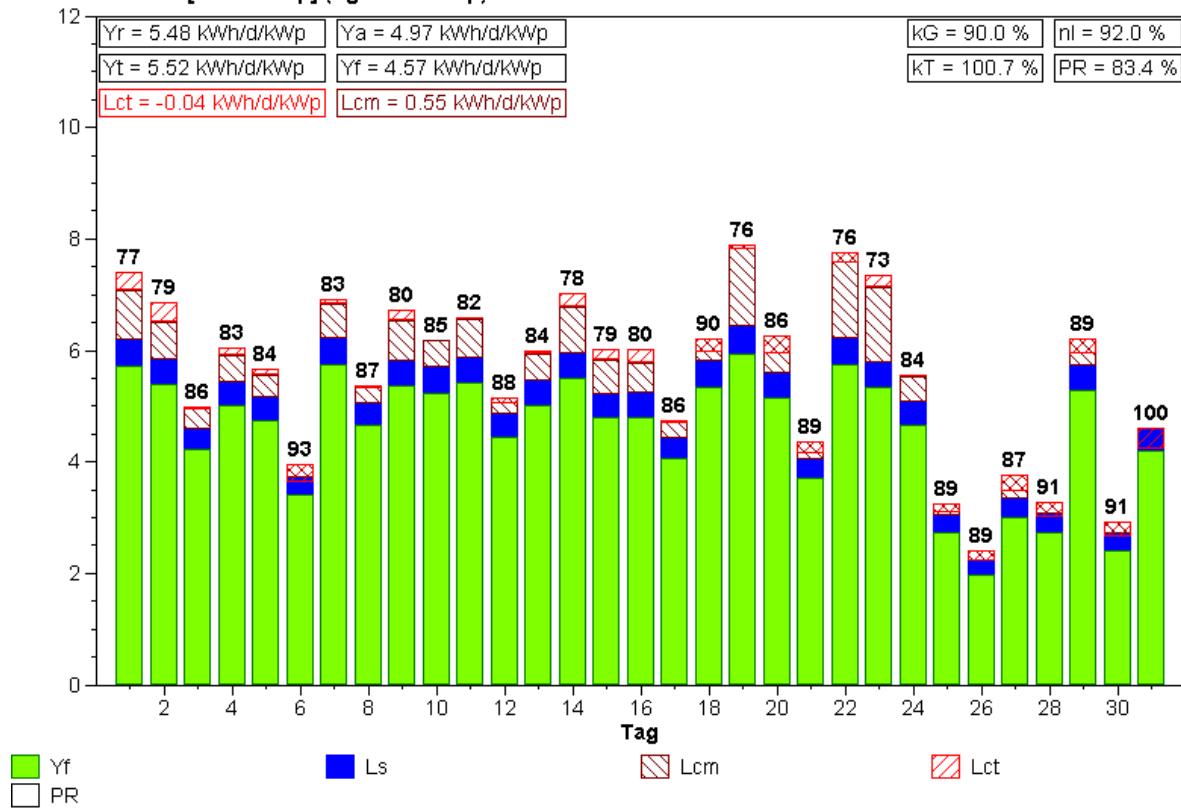
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 5.2000

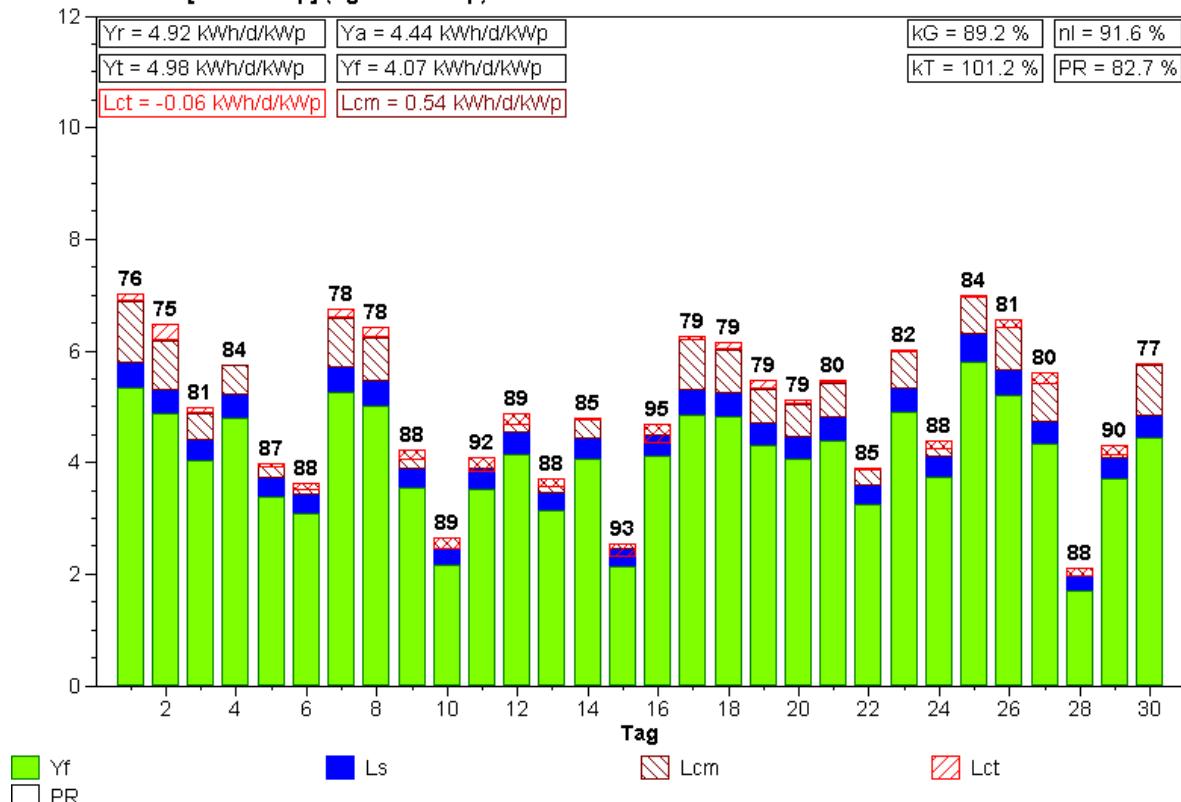
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 6.2000

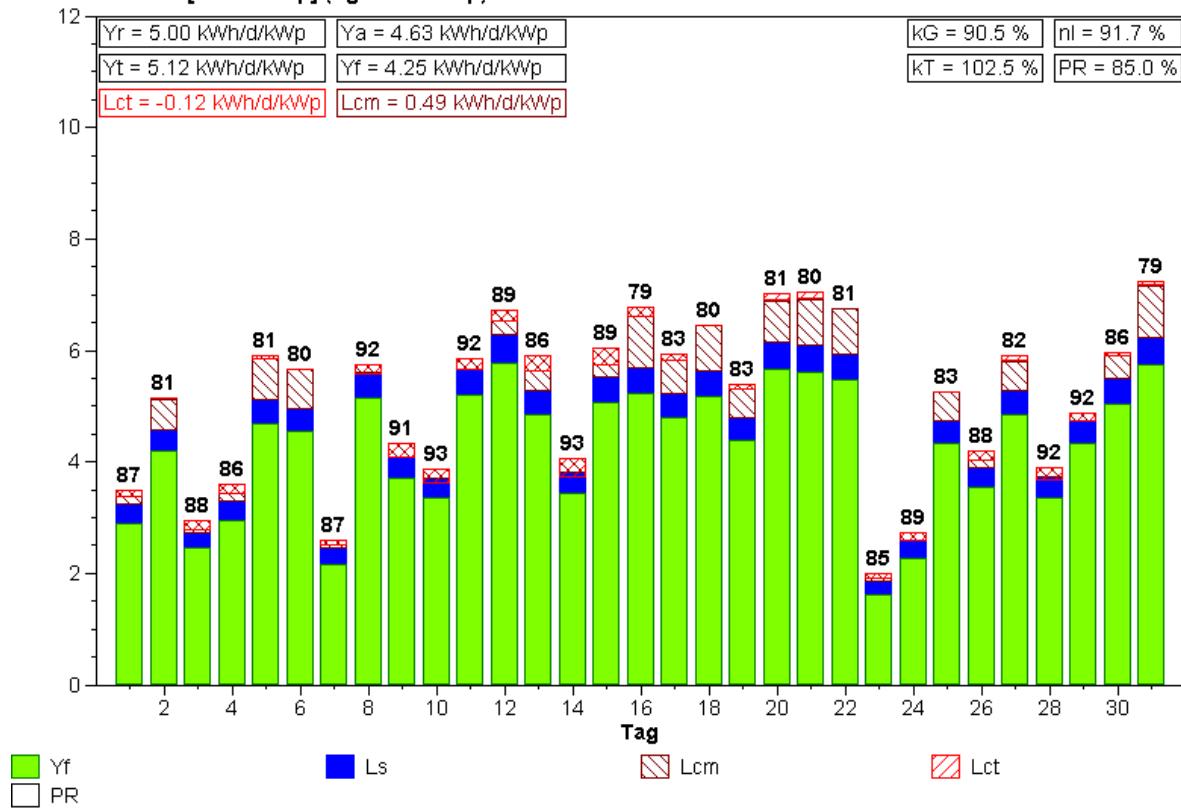
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 7.2000

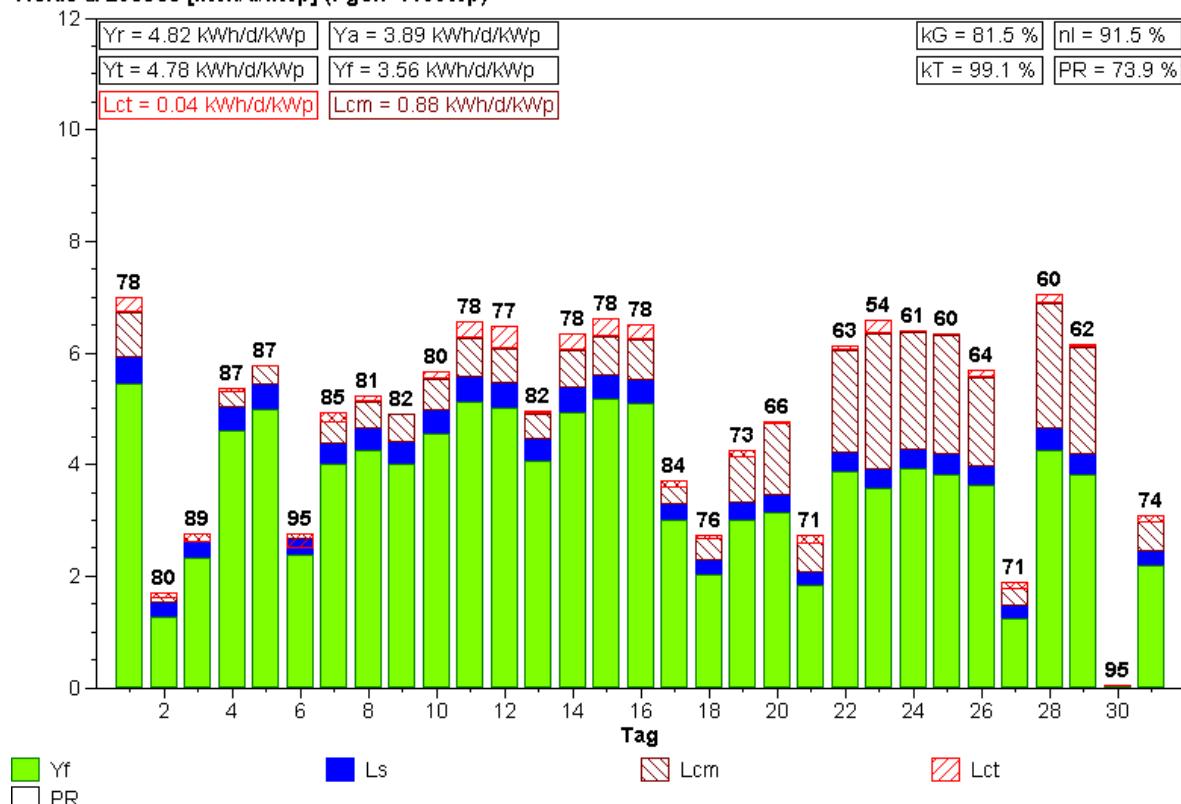
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 8.2000

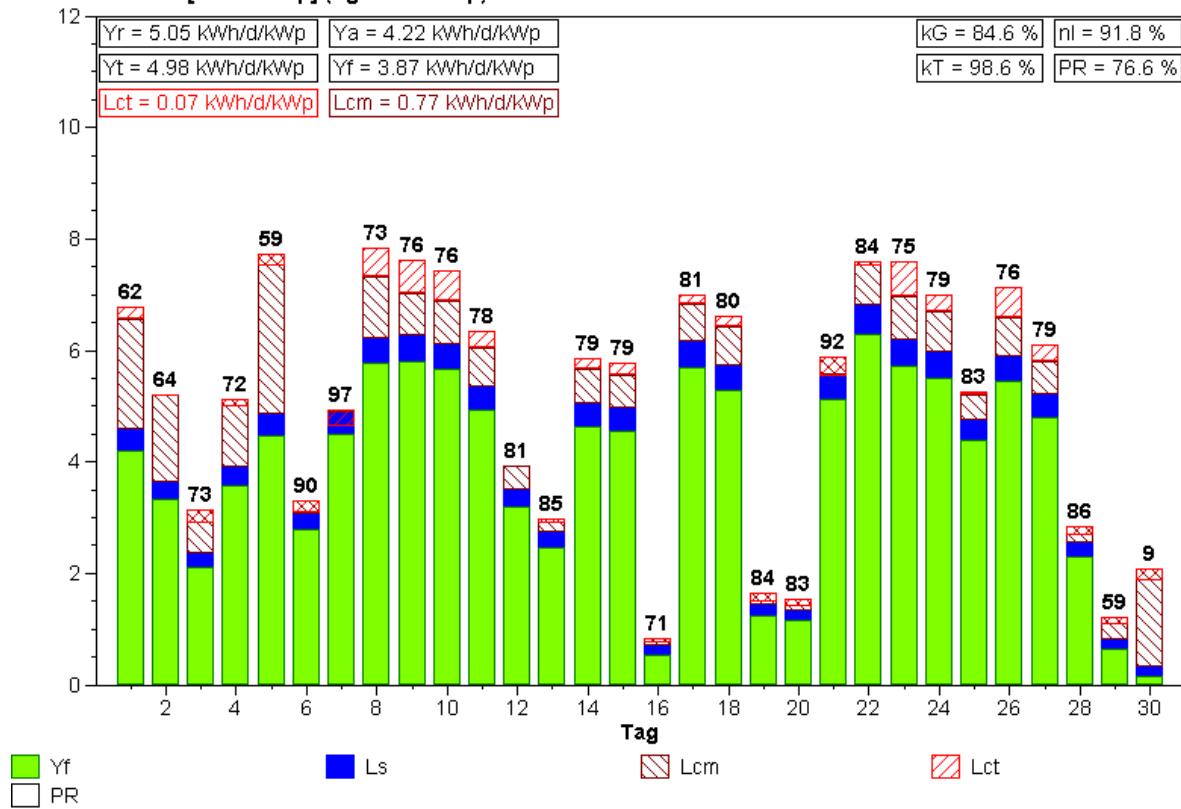
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 9.2000

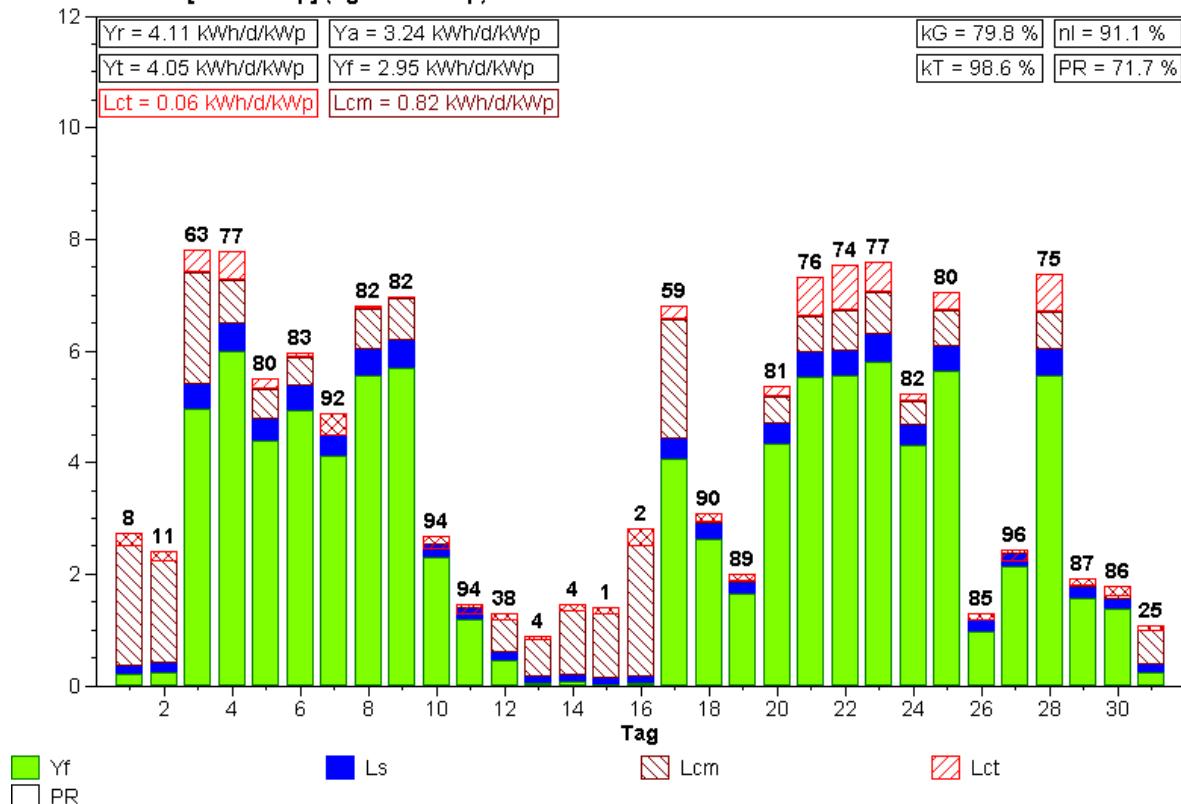
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 10.2000

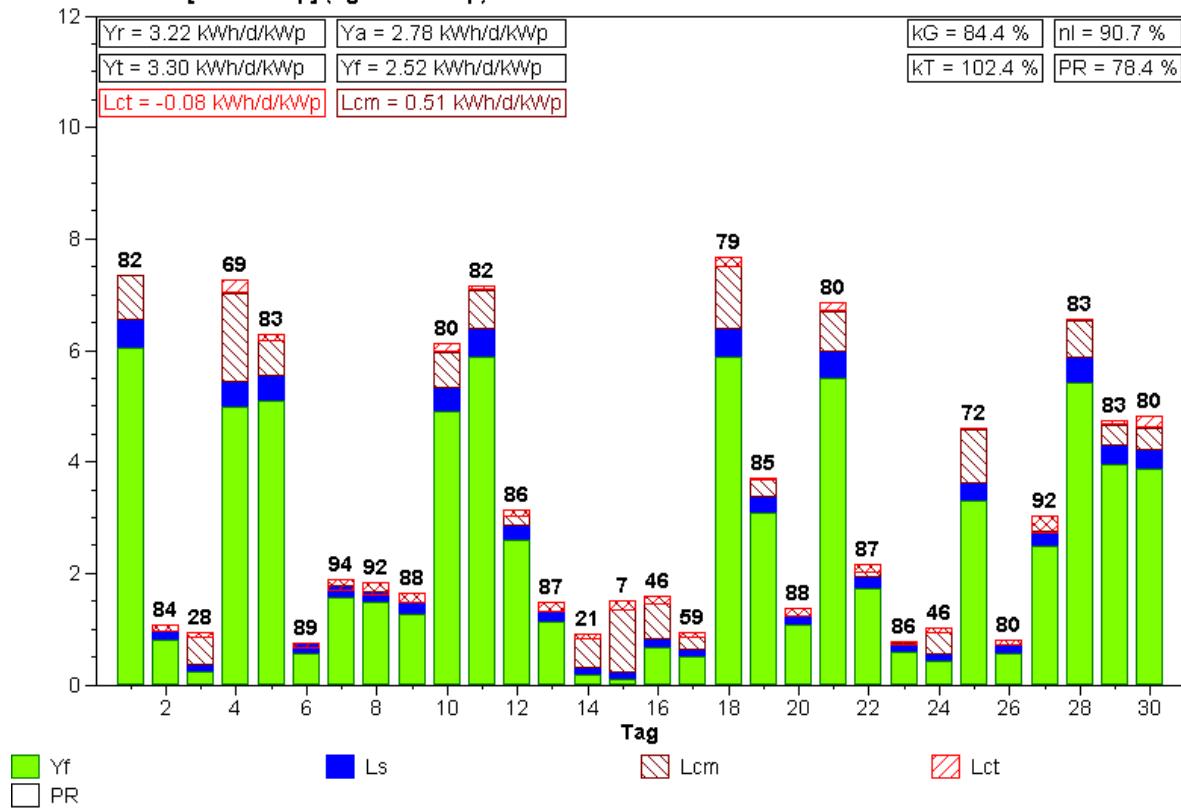
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 11.2000

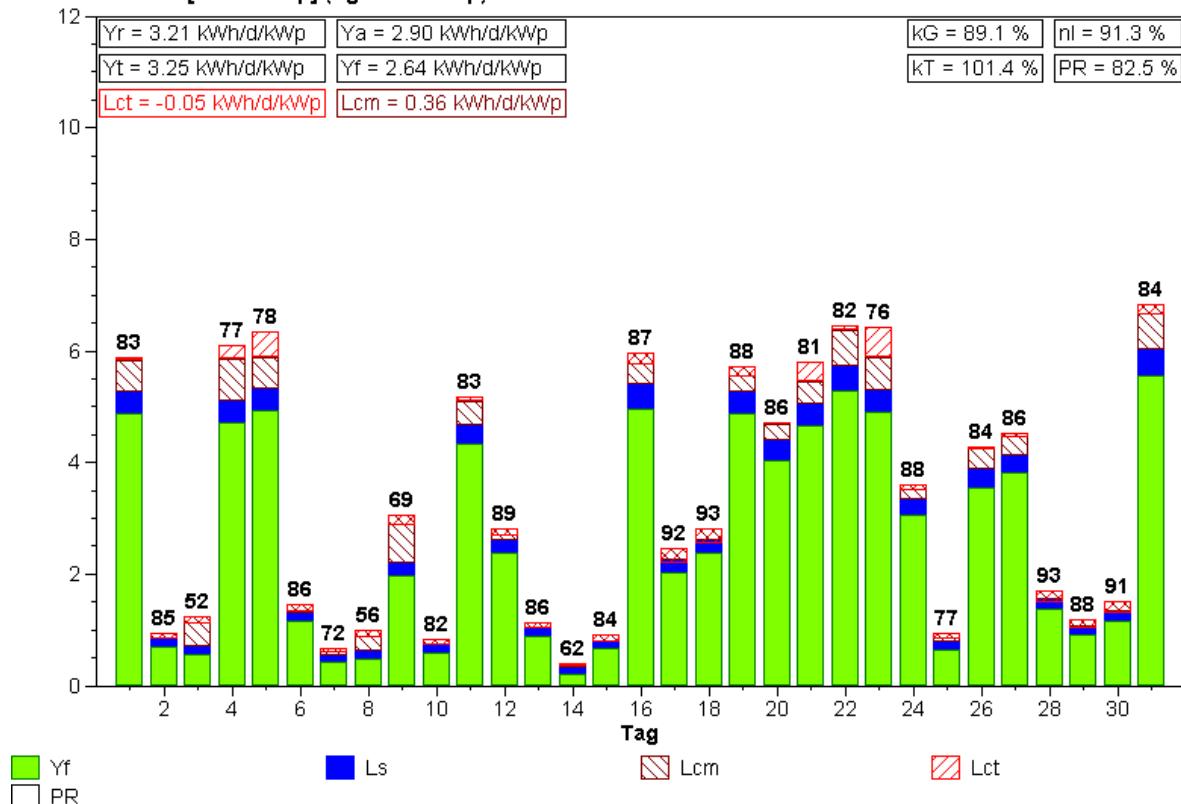
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 12.2000

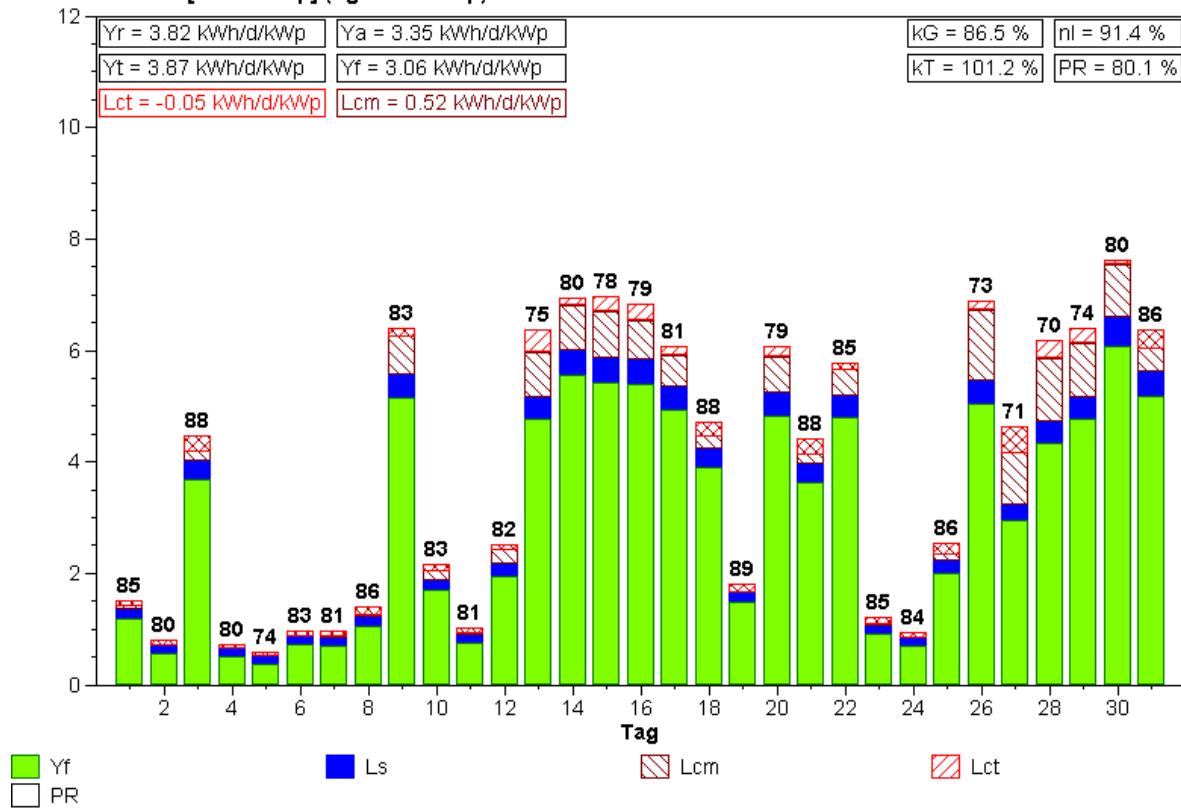
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 1.2001

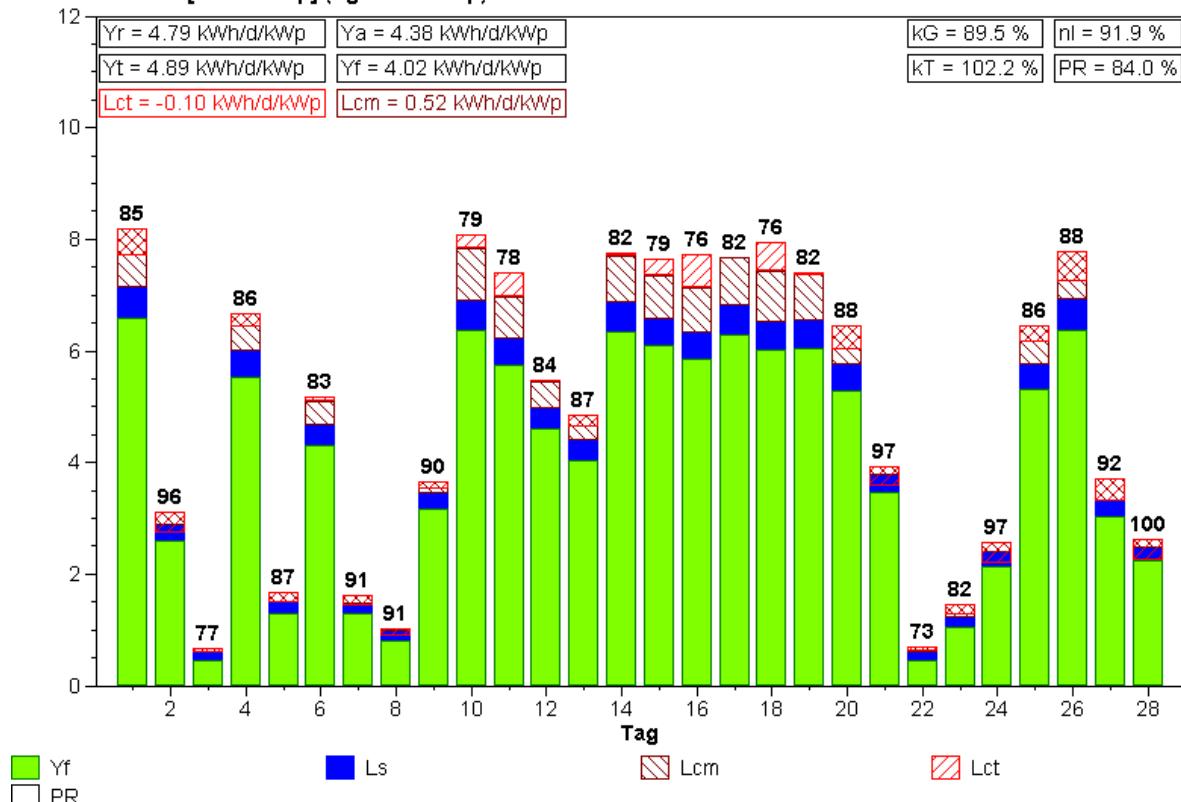
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 2.2001

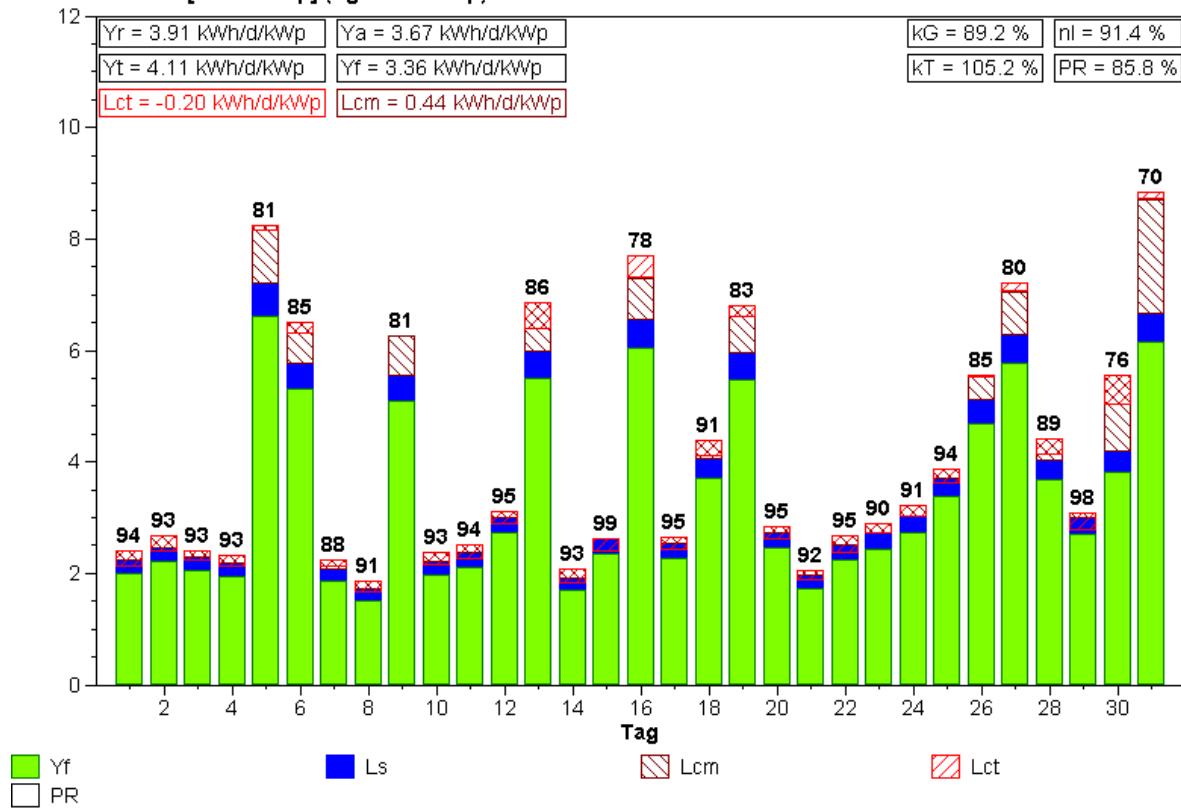
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 3.2001

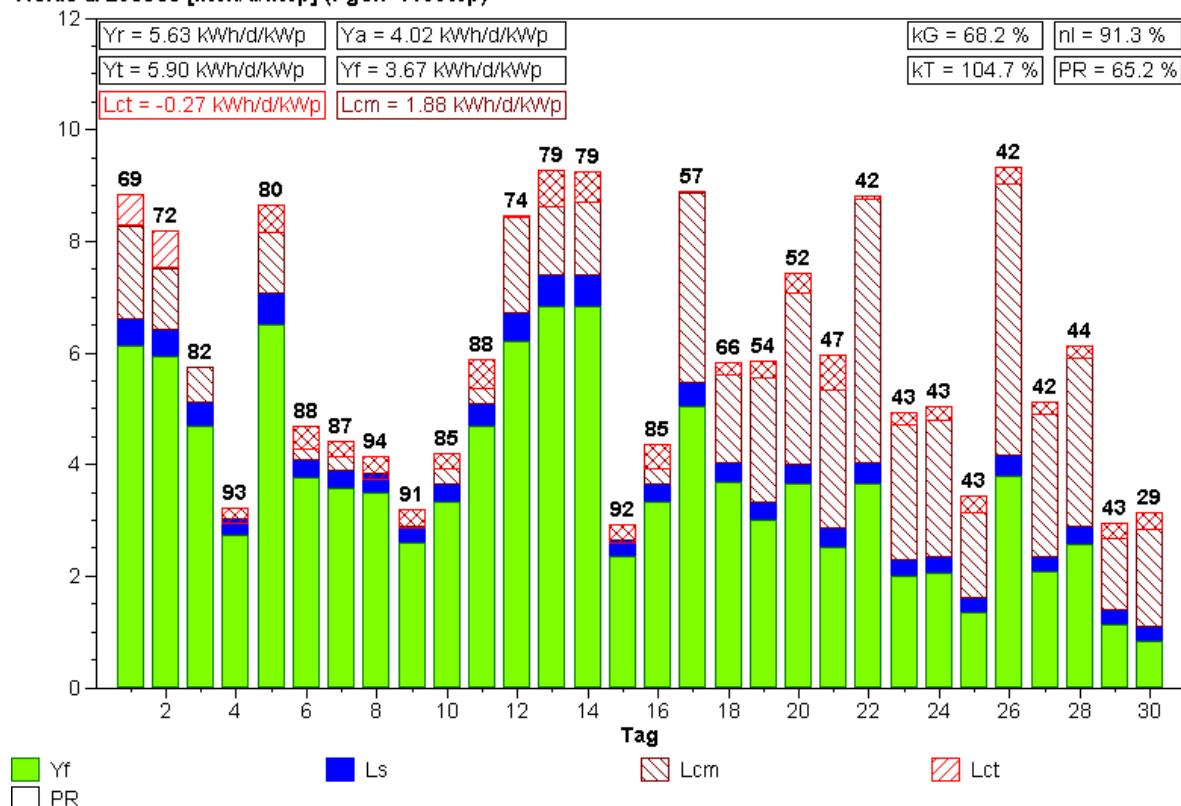
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 4.2001

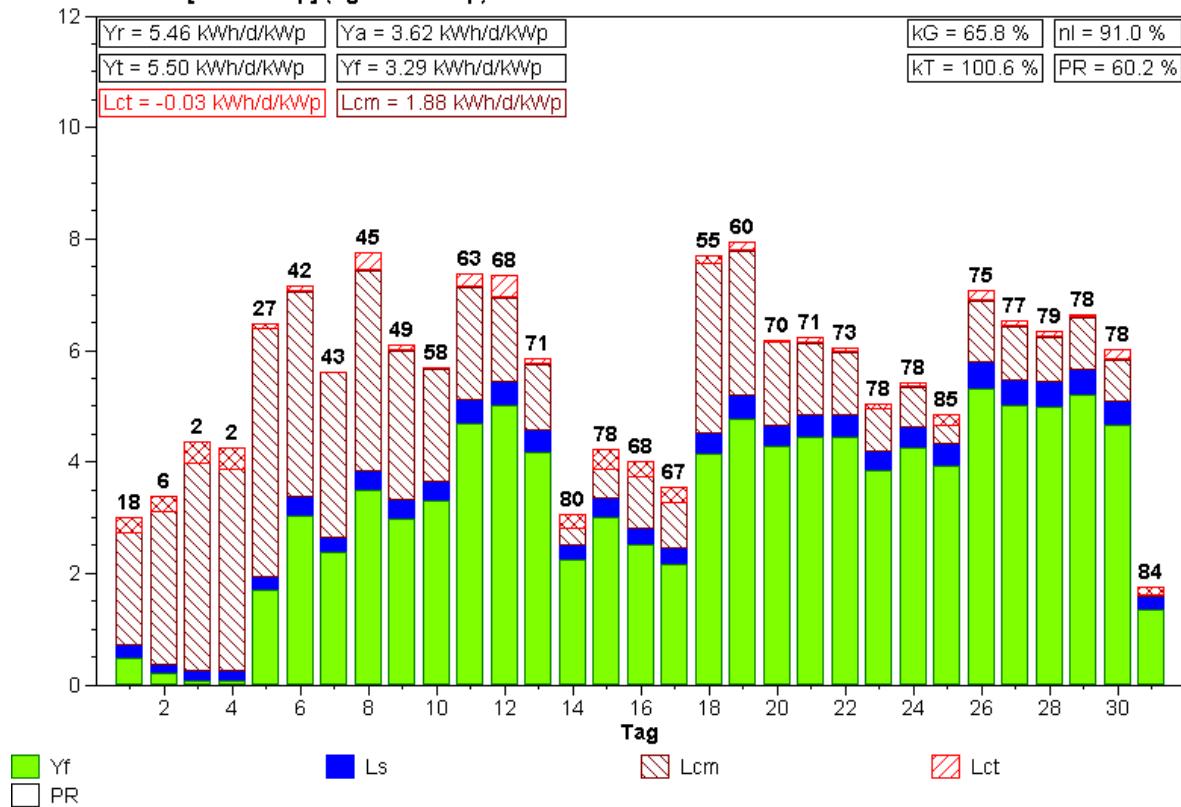
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 5.2001

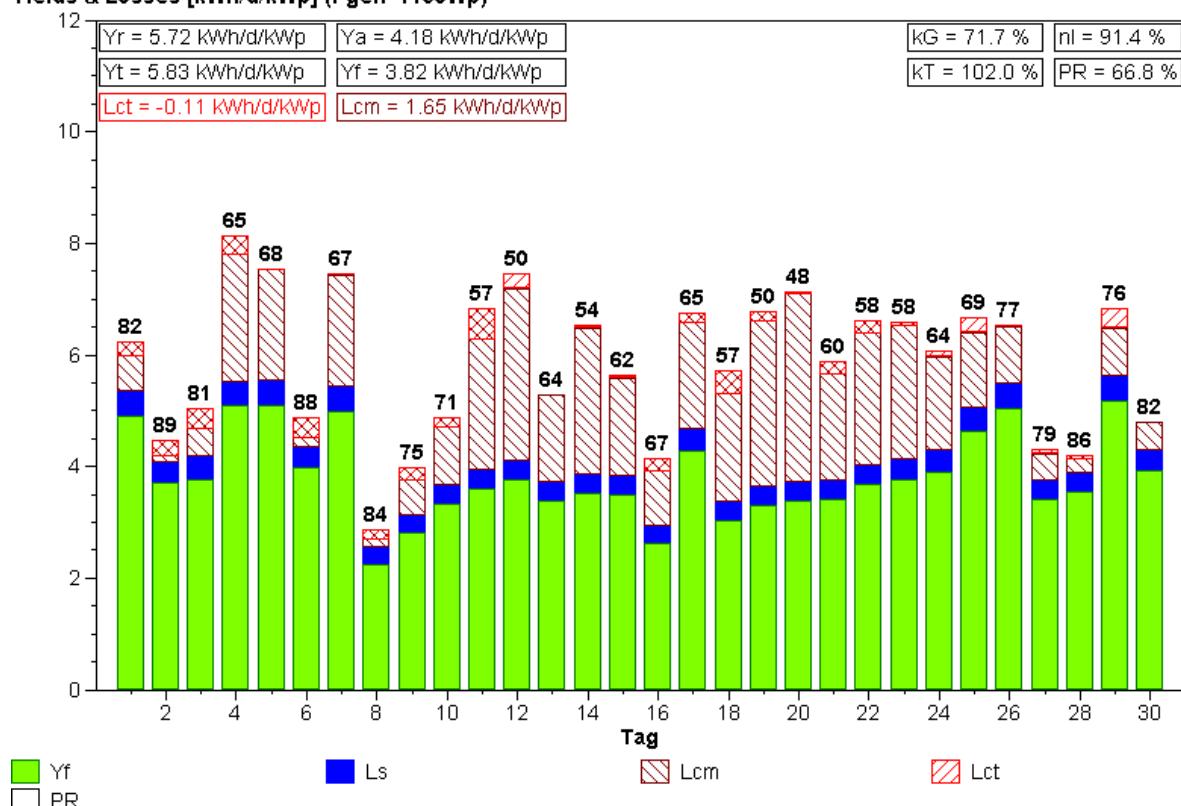
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 6.2001

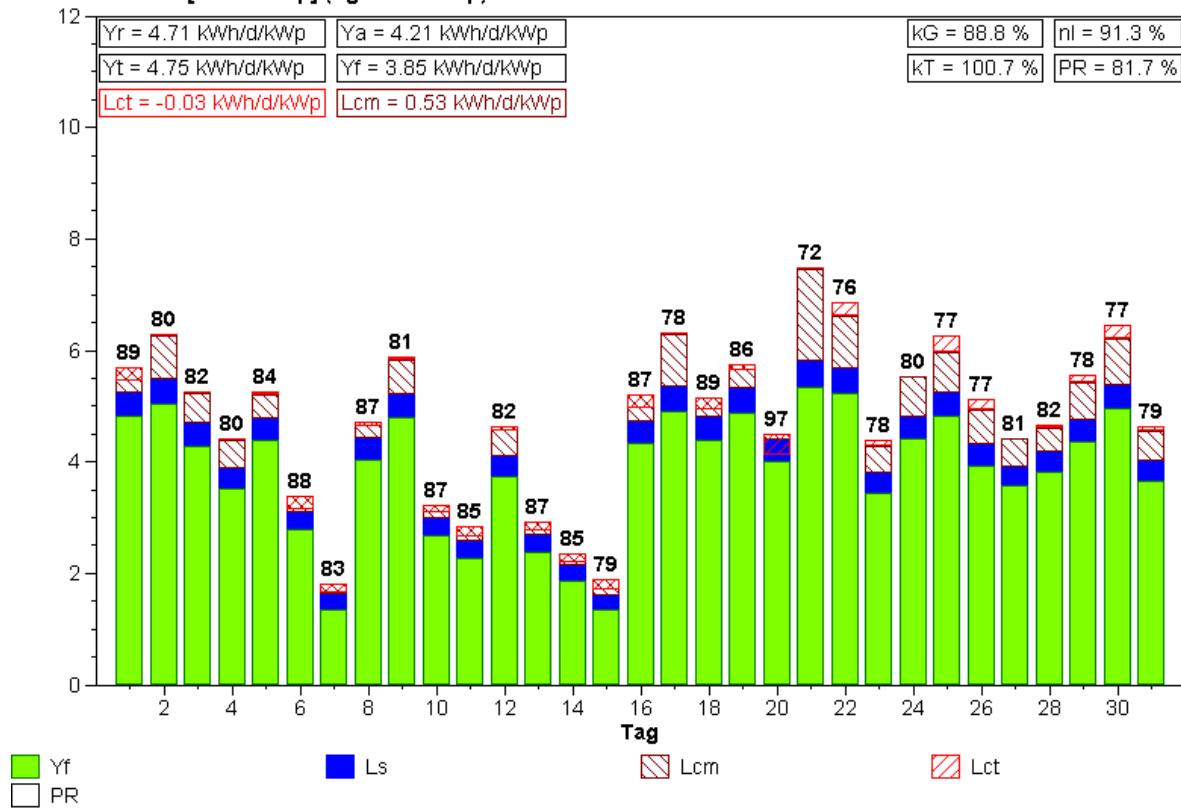
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 7.2001

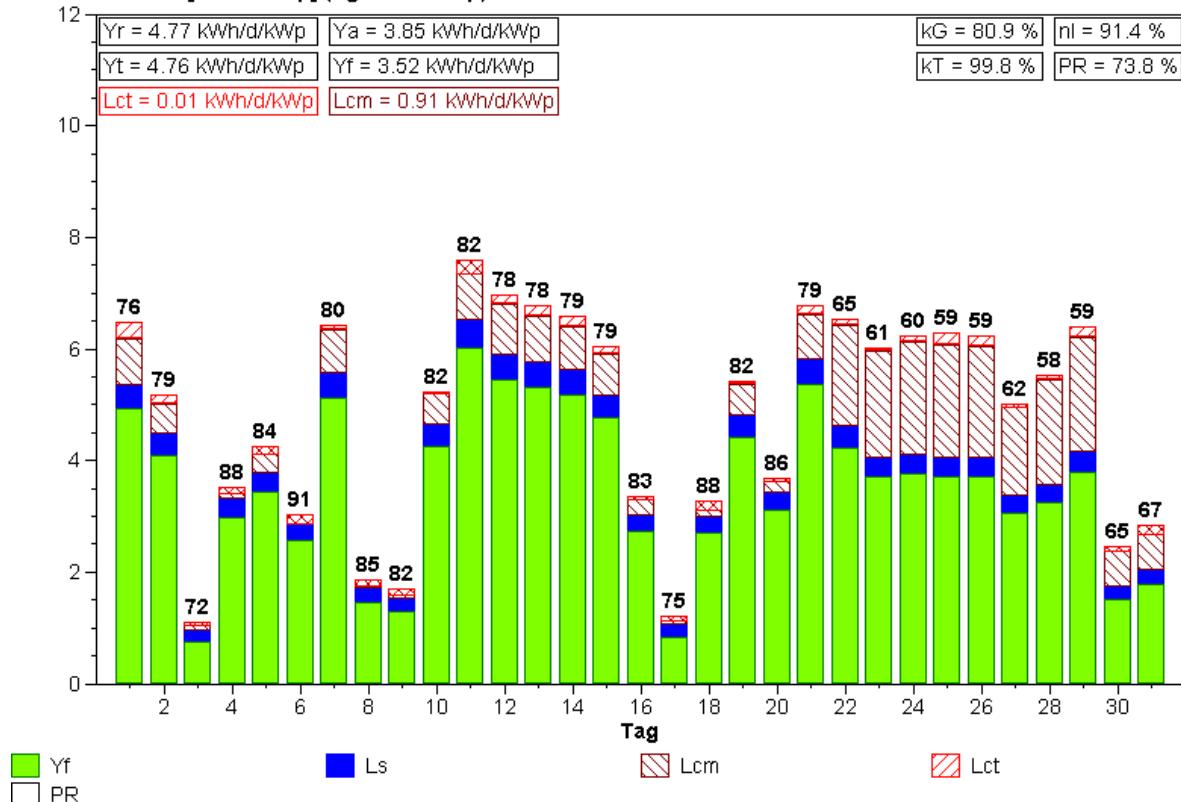
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 8.2001

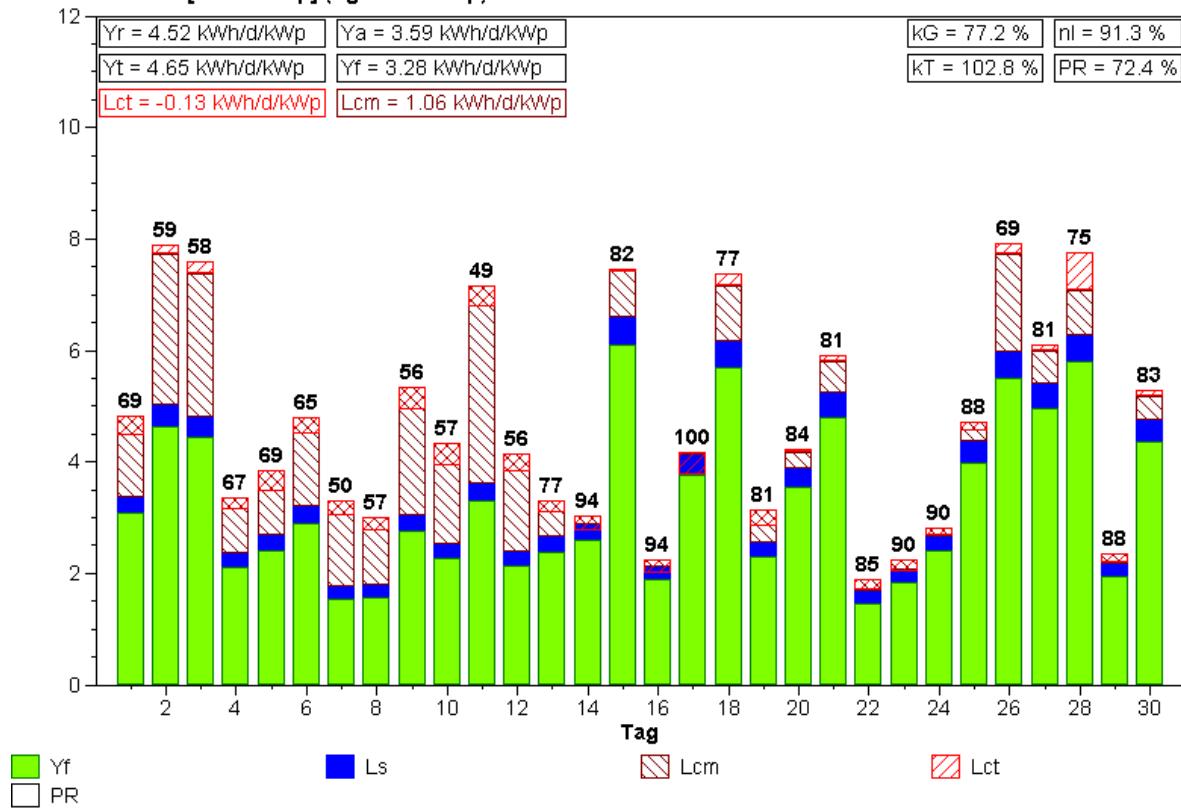
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 9.2001

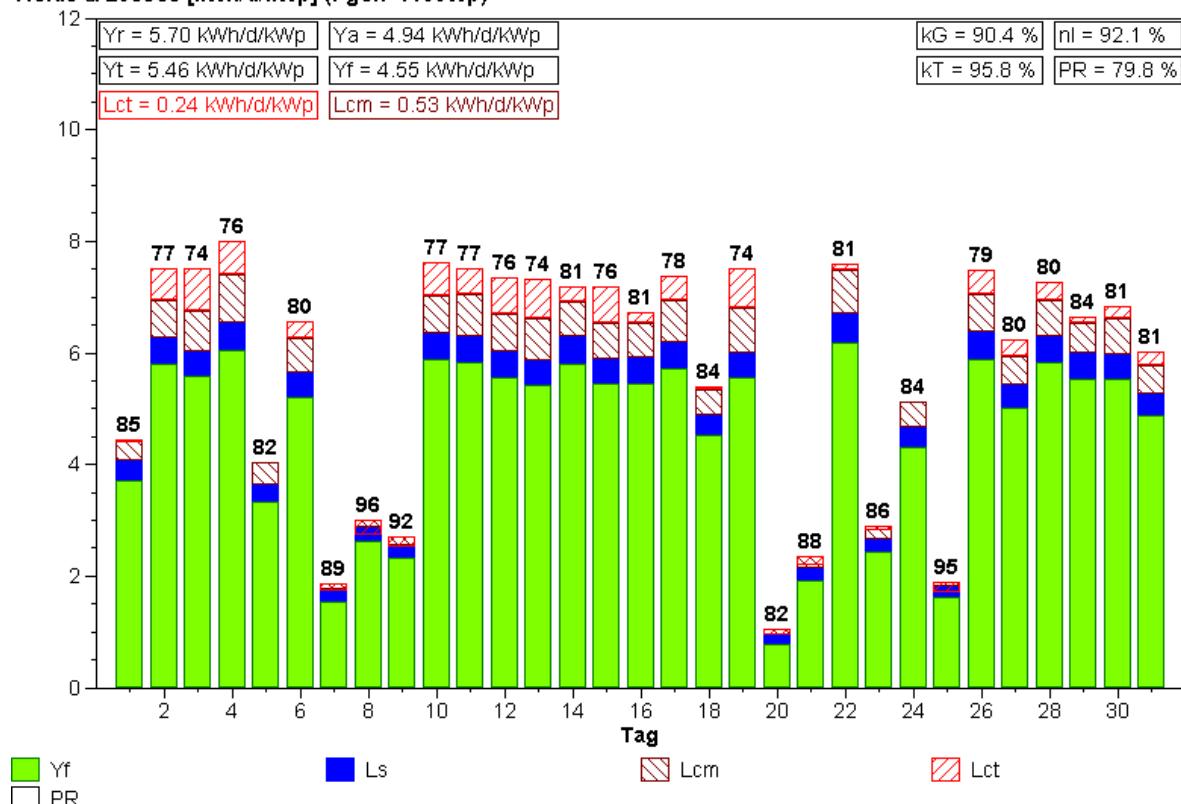
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 10.2001

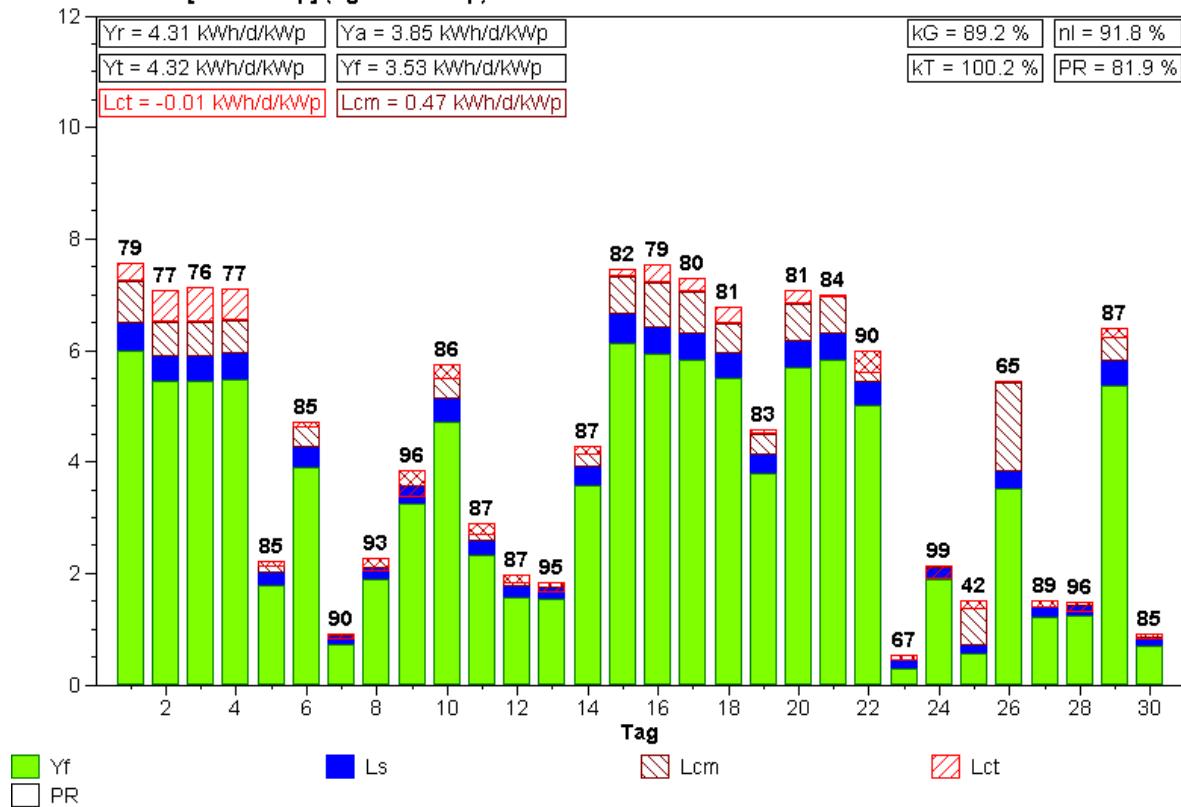
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 11.2001

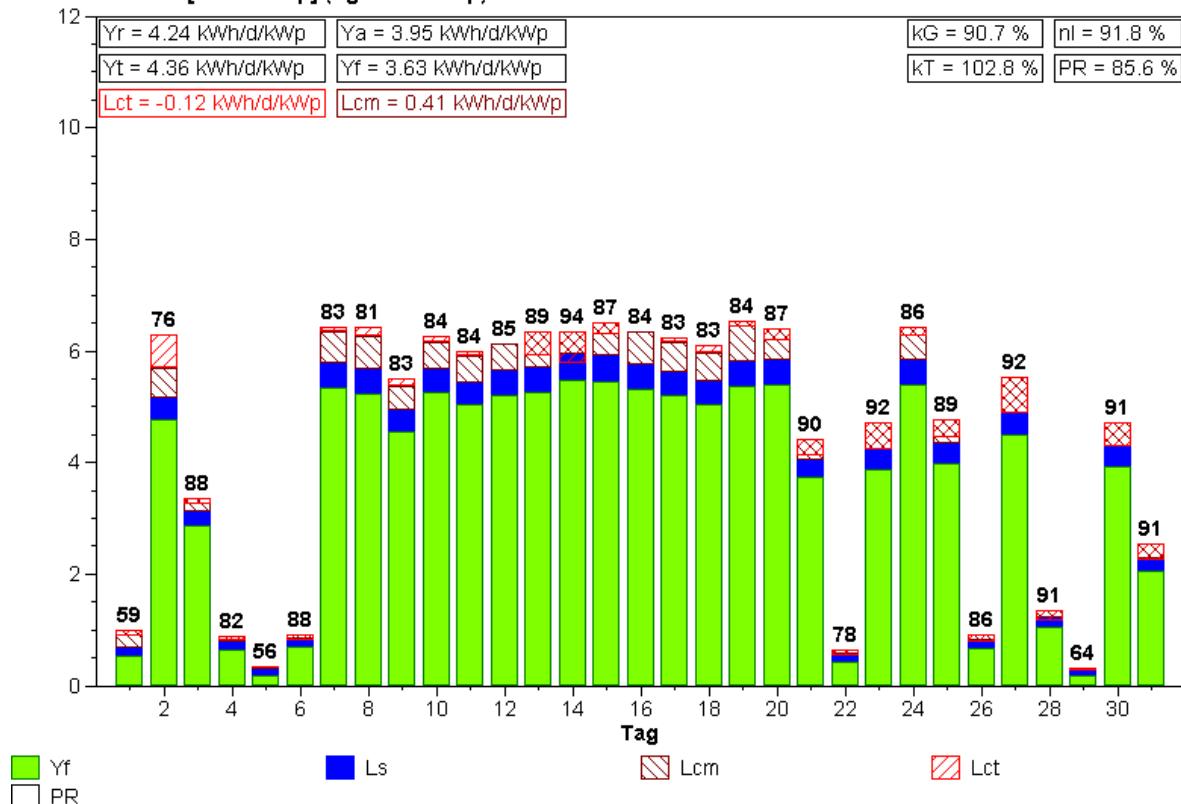
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 12.2001

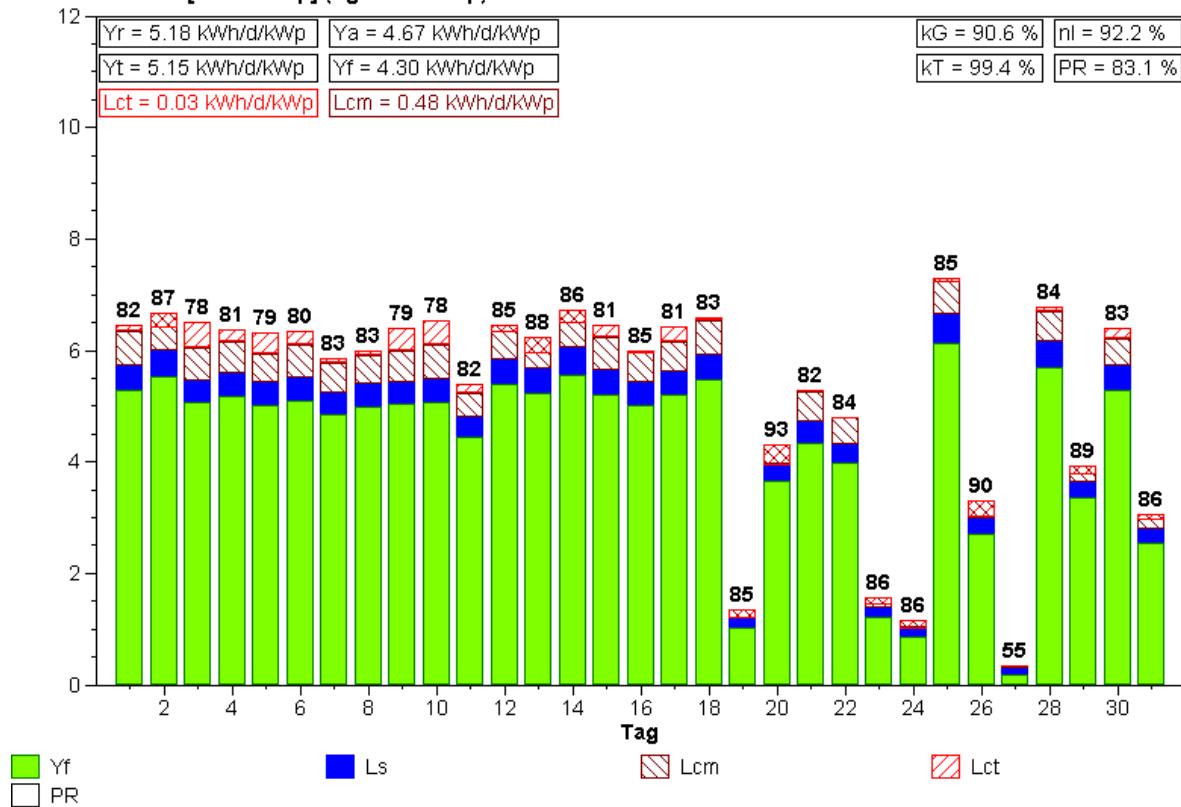
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 1.2002

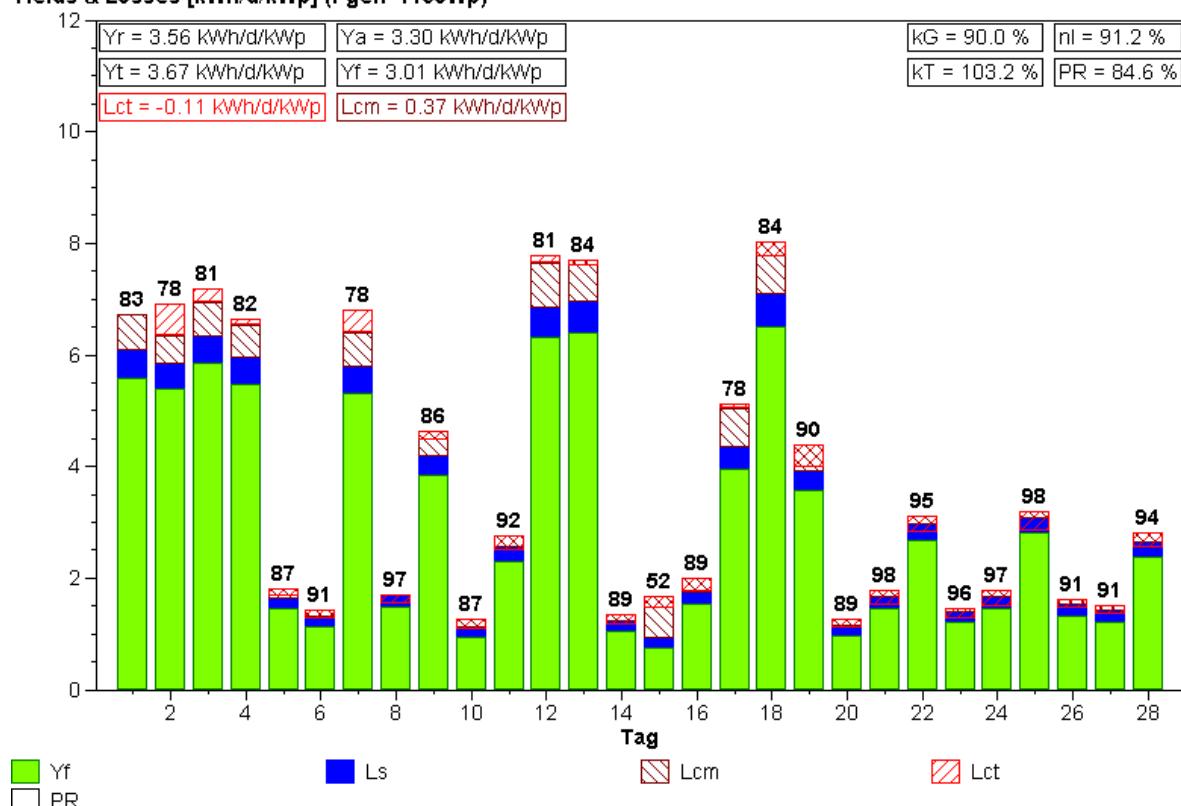
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 2.2002

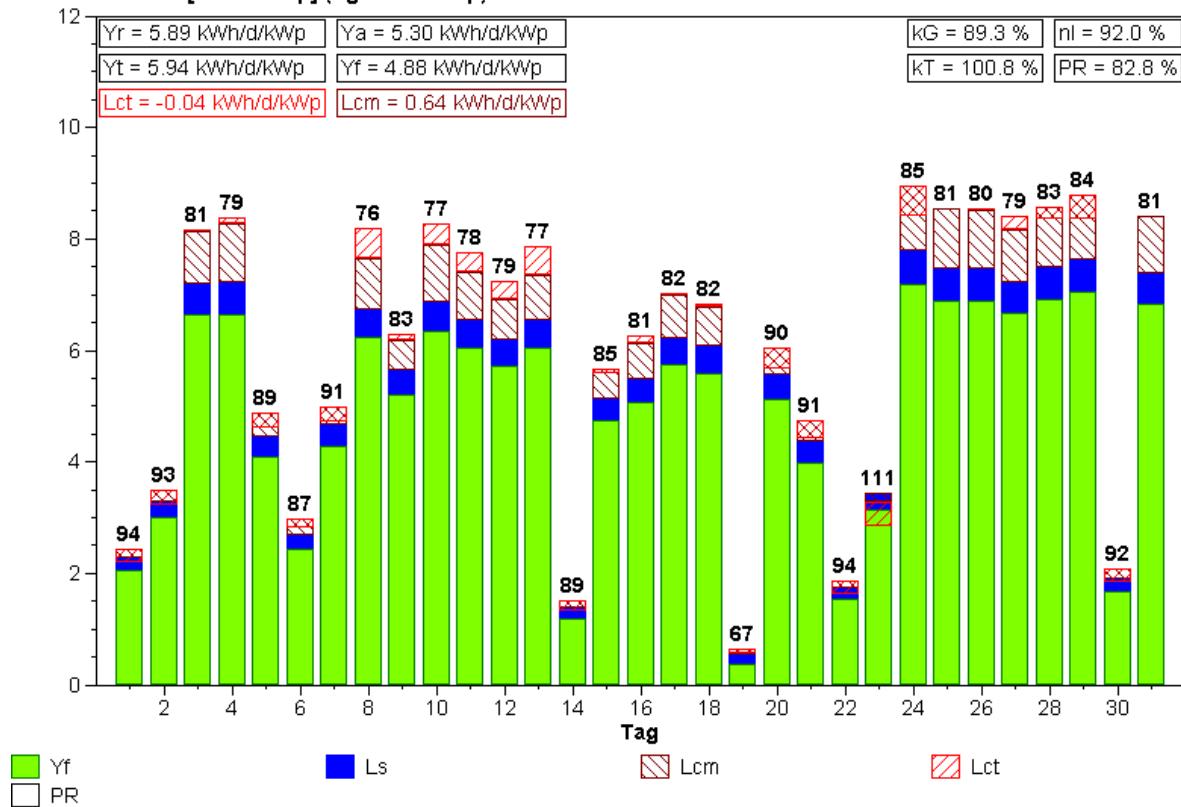
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 3.2002

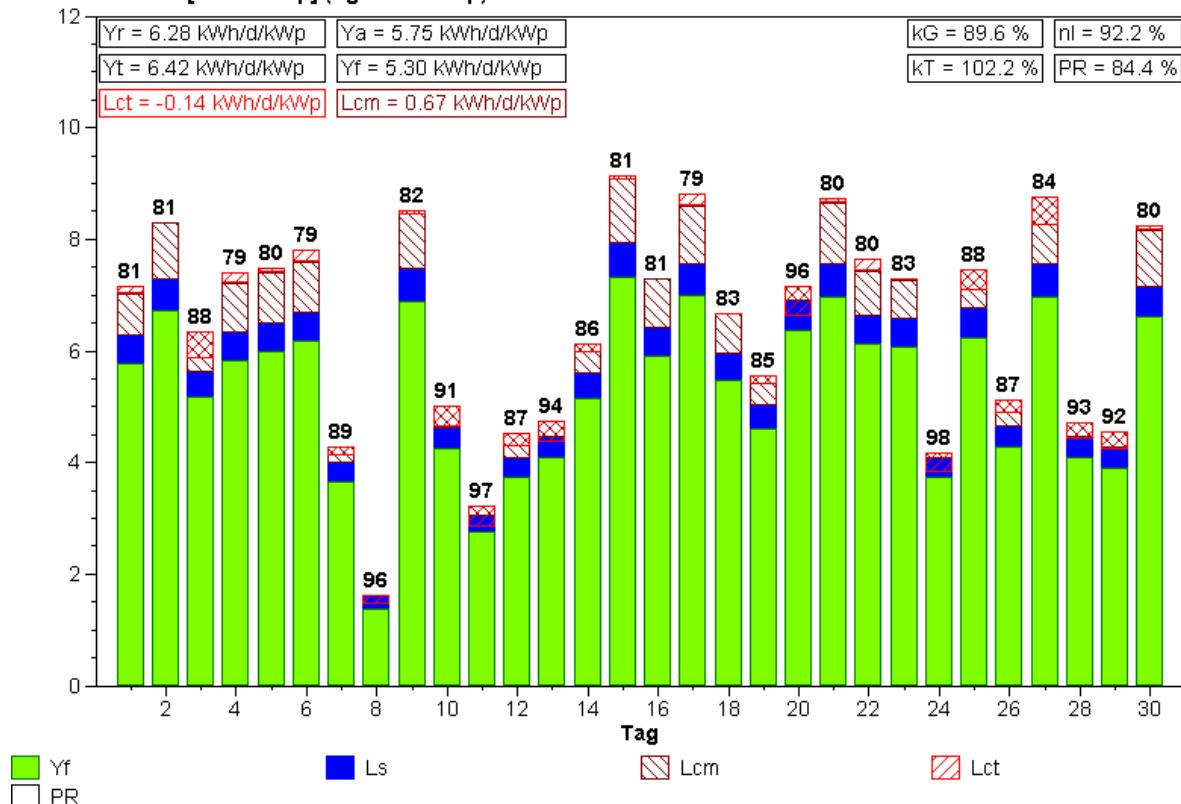
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 4.2002

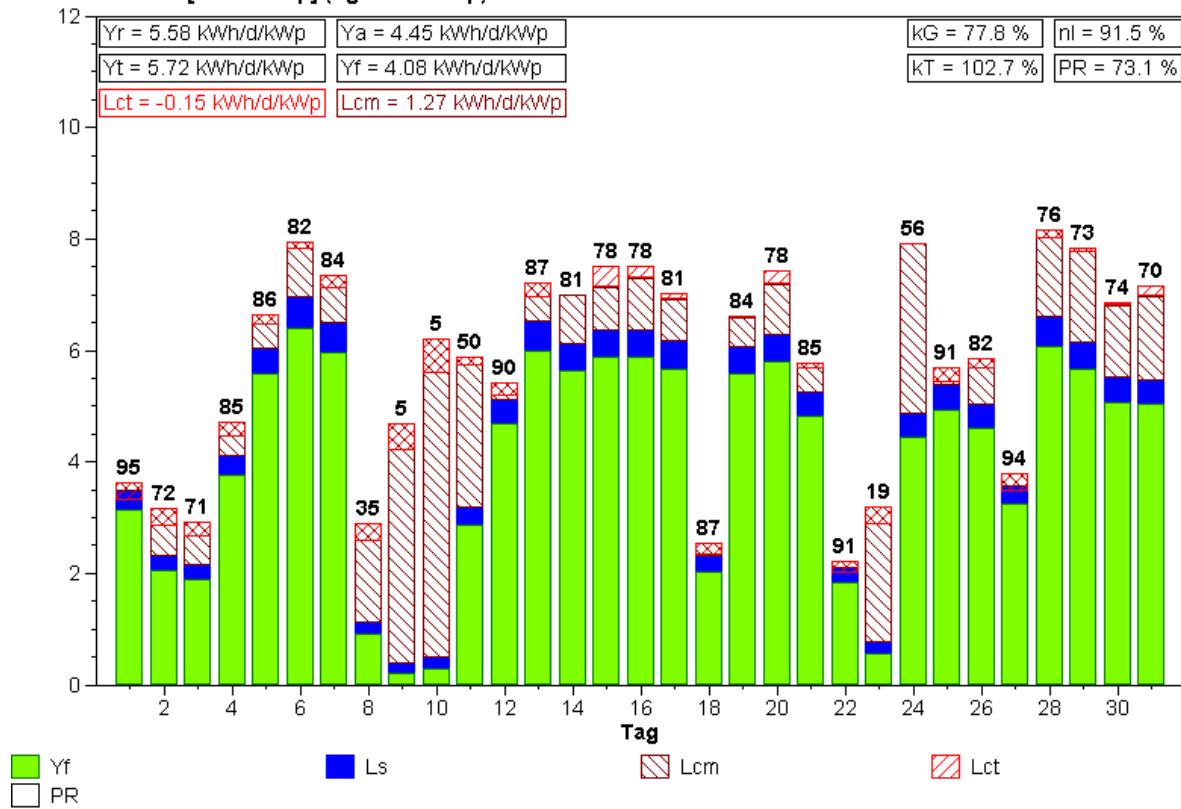
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 5.2002

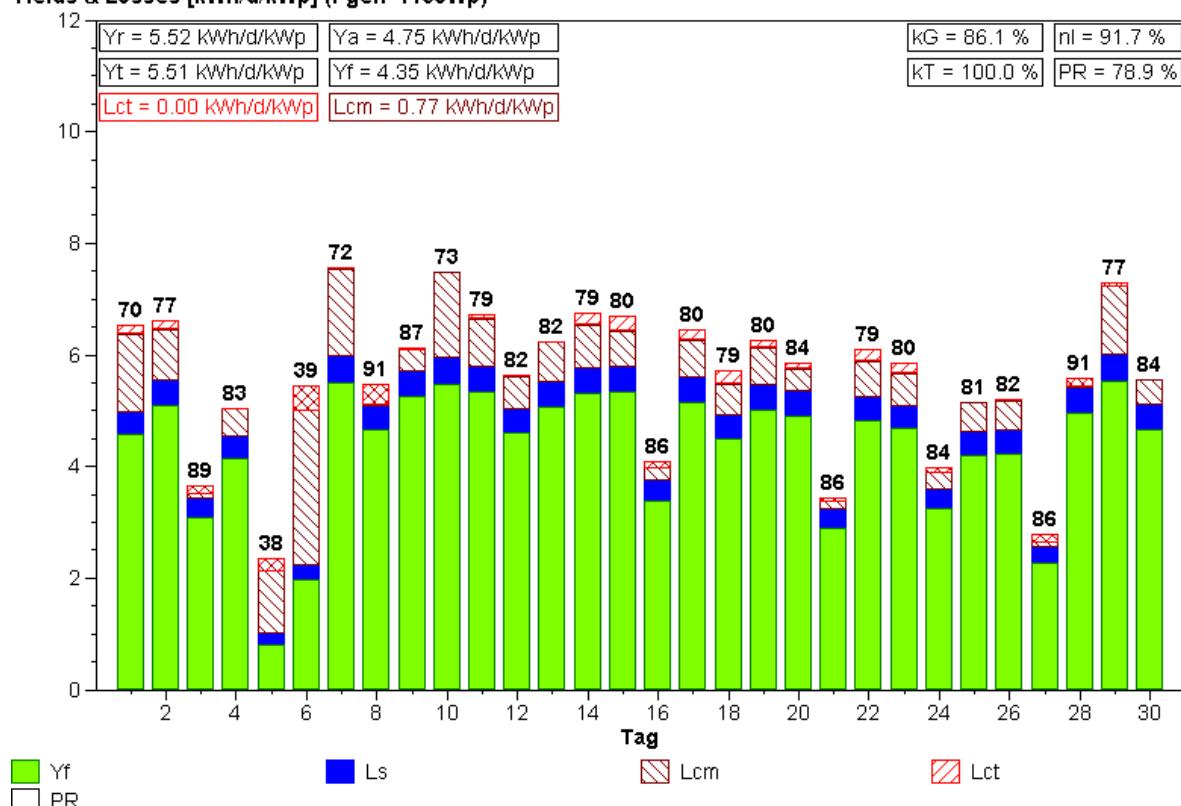
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 6.2002

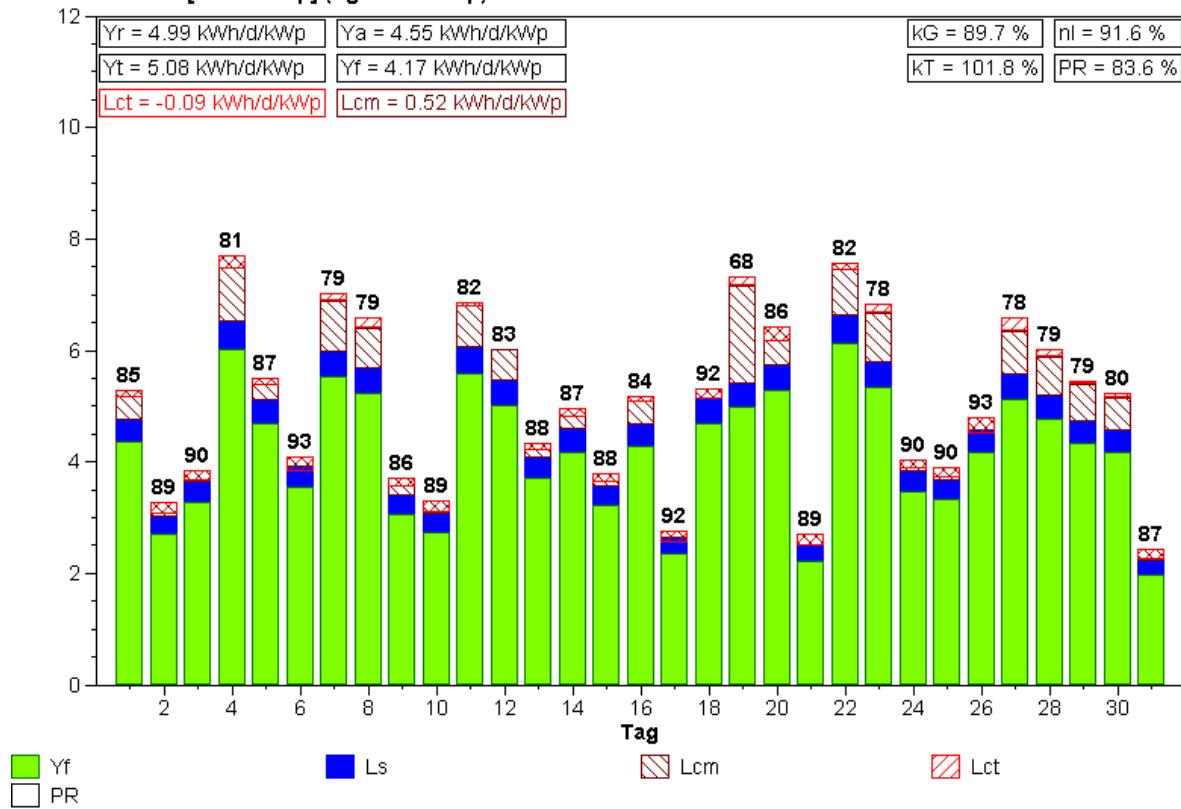
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 7.2002

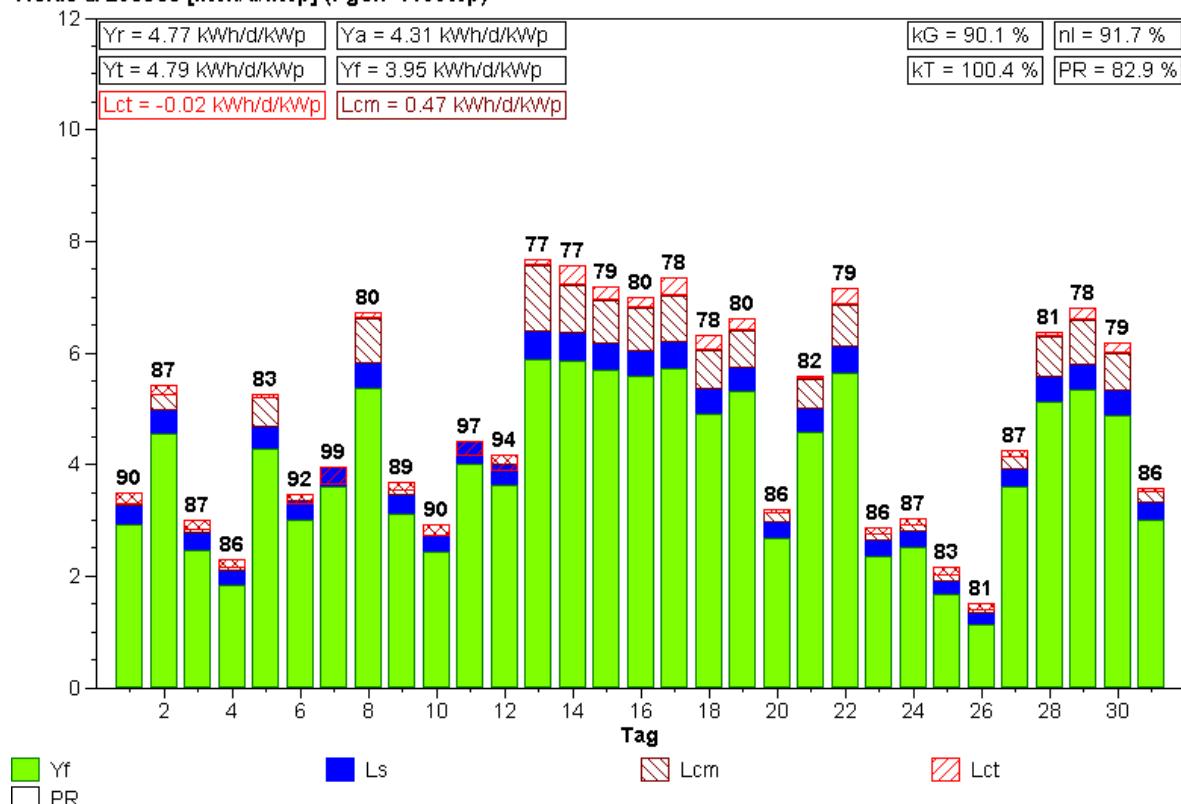
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 8.2002

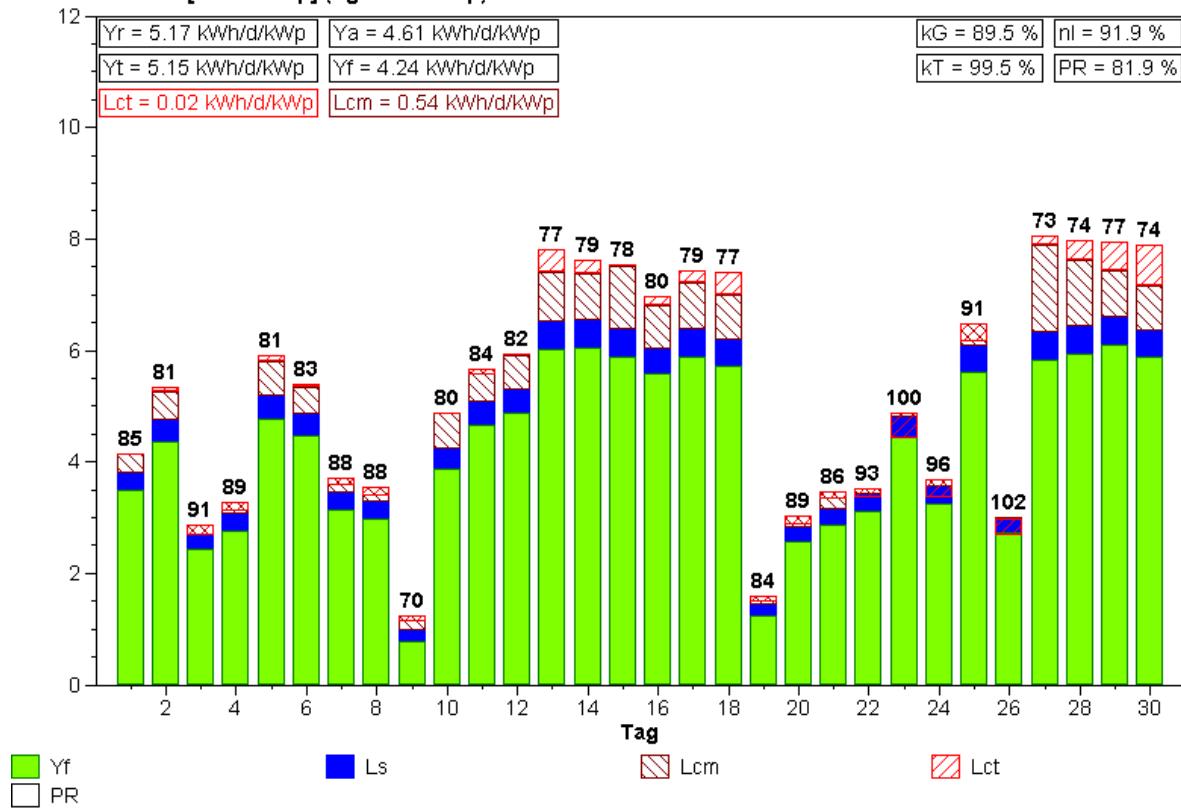
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 9.2002

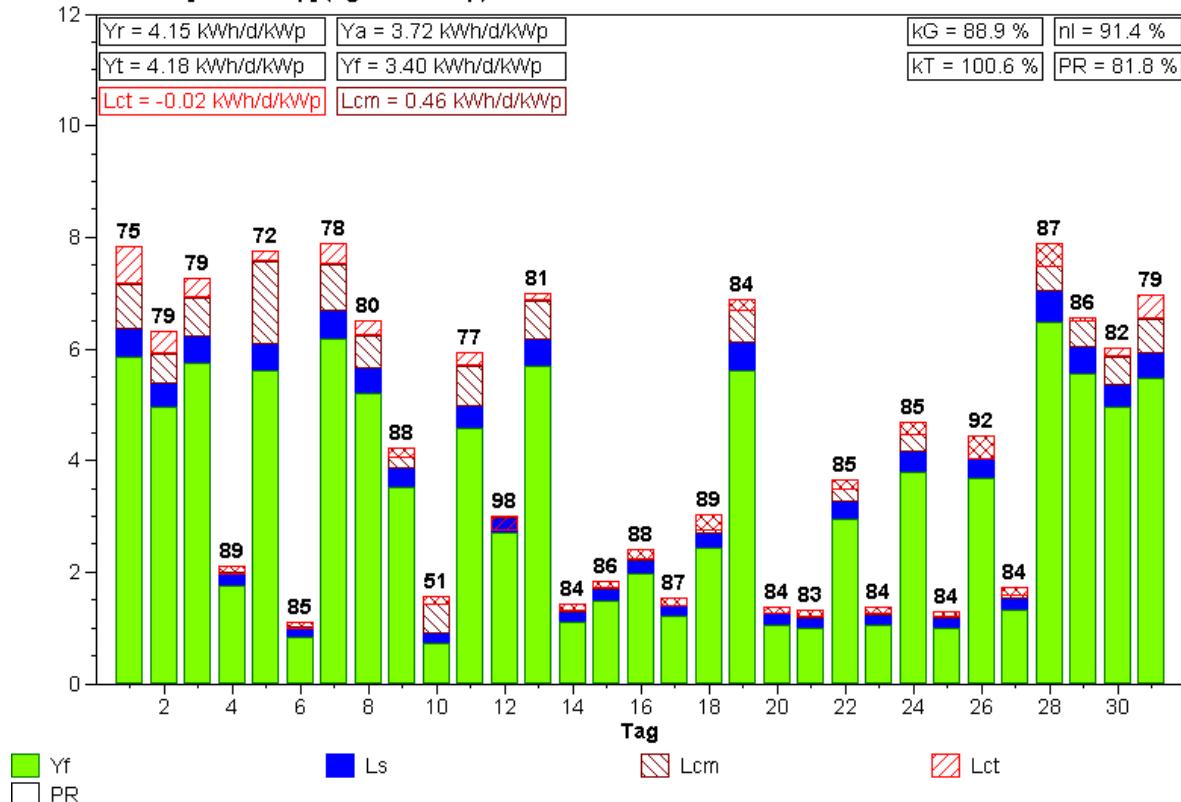
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 10.2002

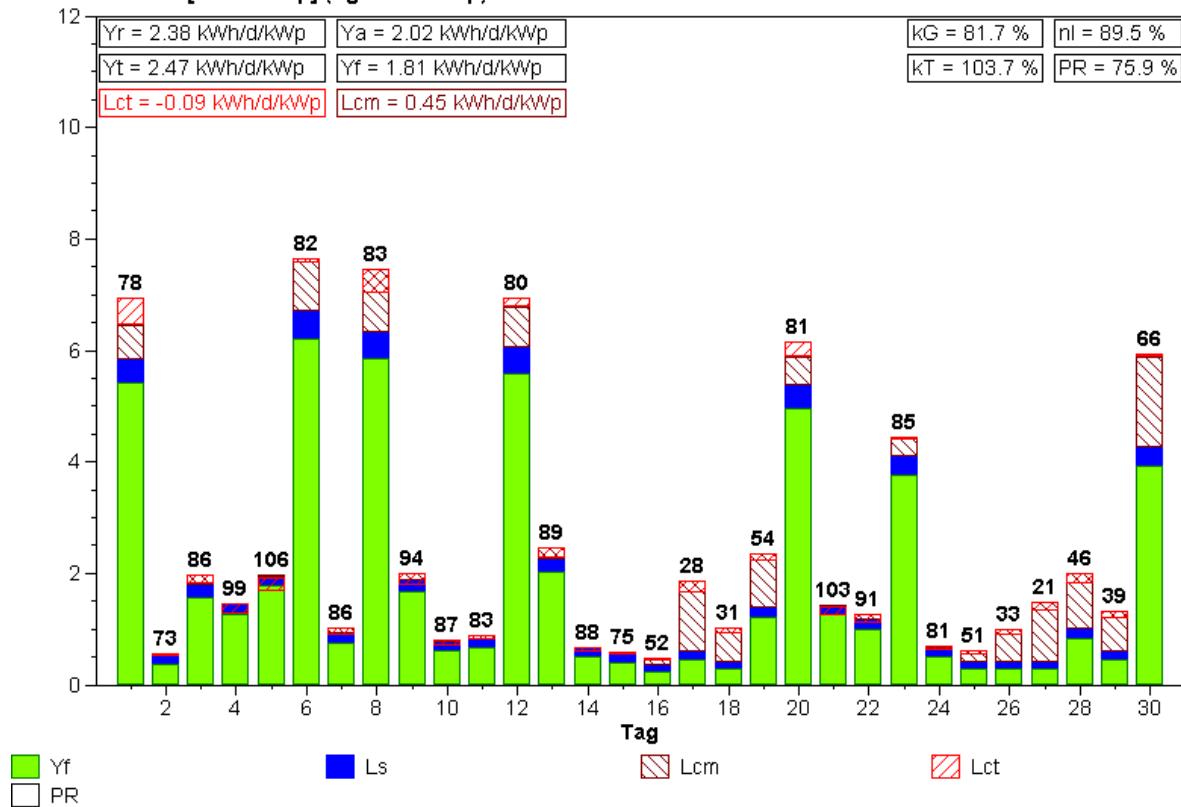
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 11.2002

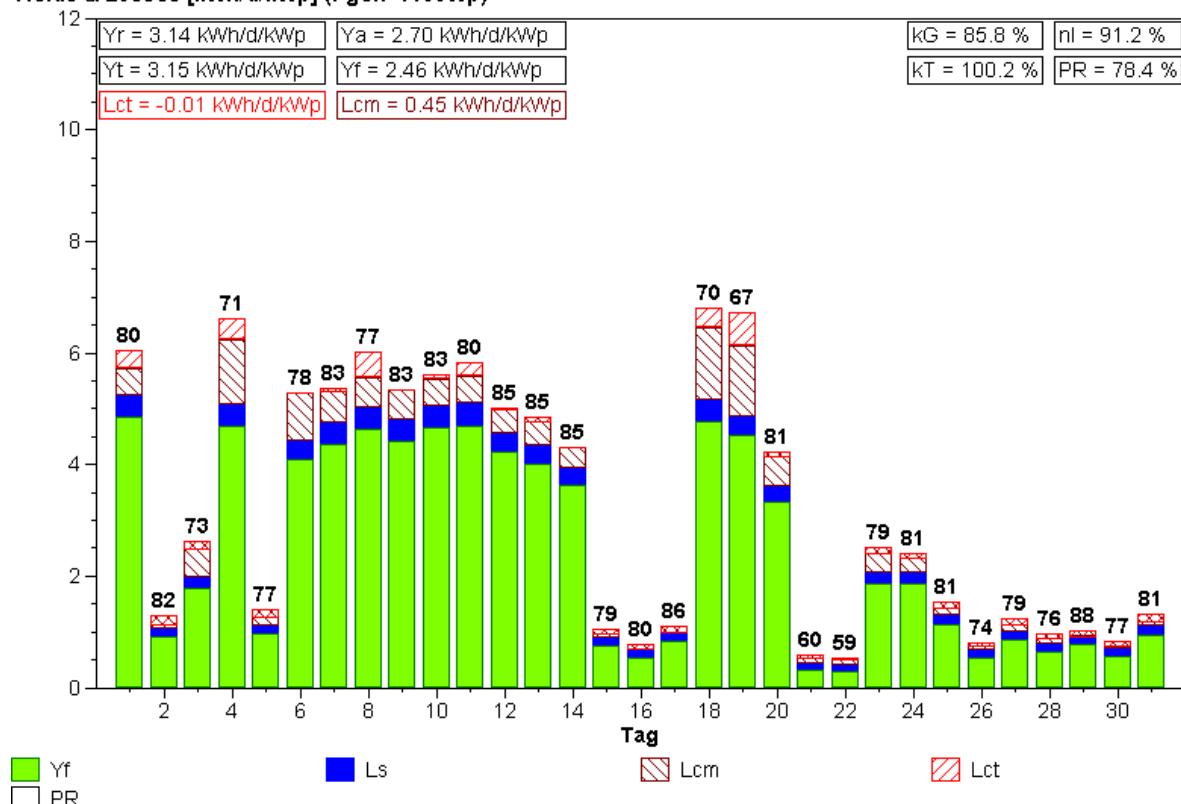
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 12.2002

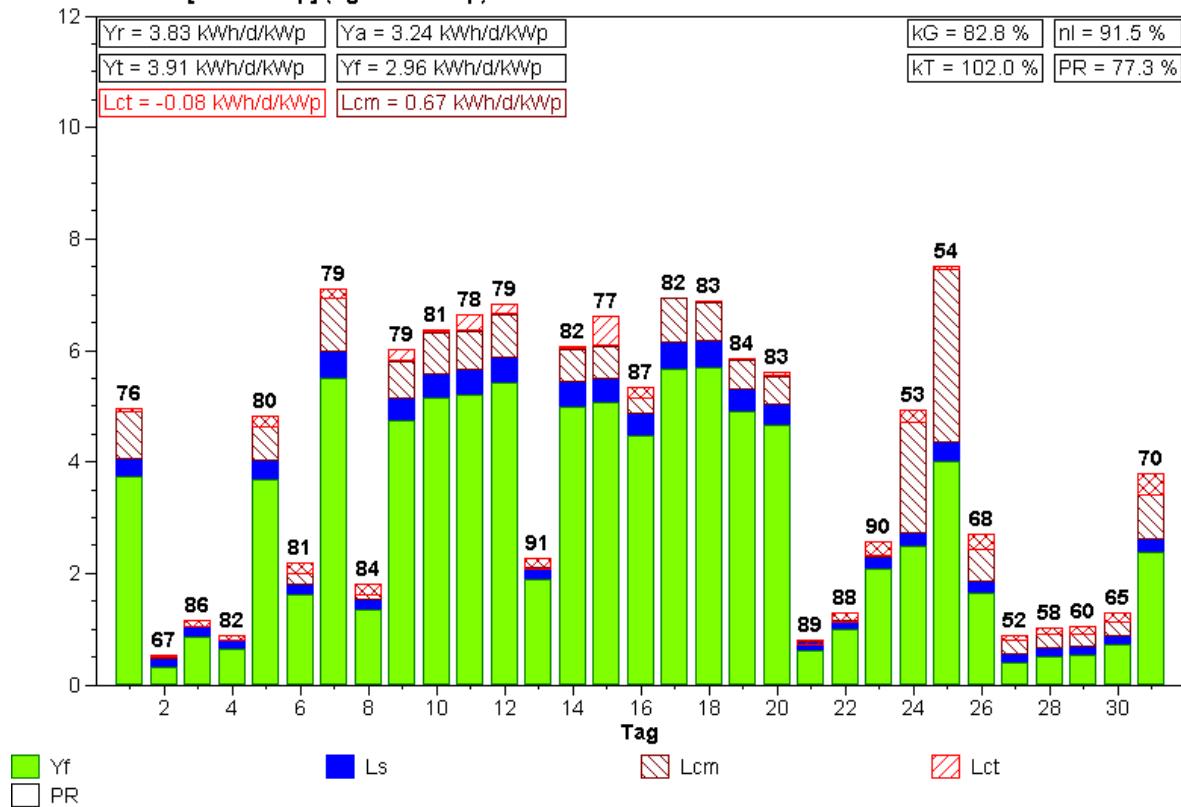
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 1.2003

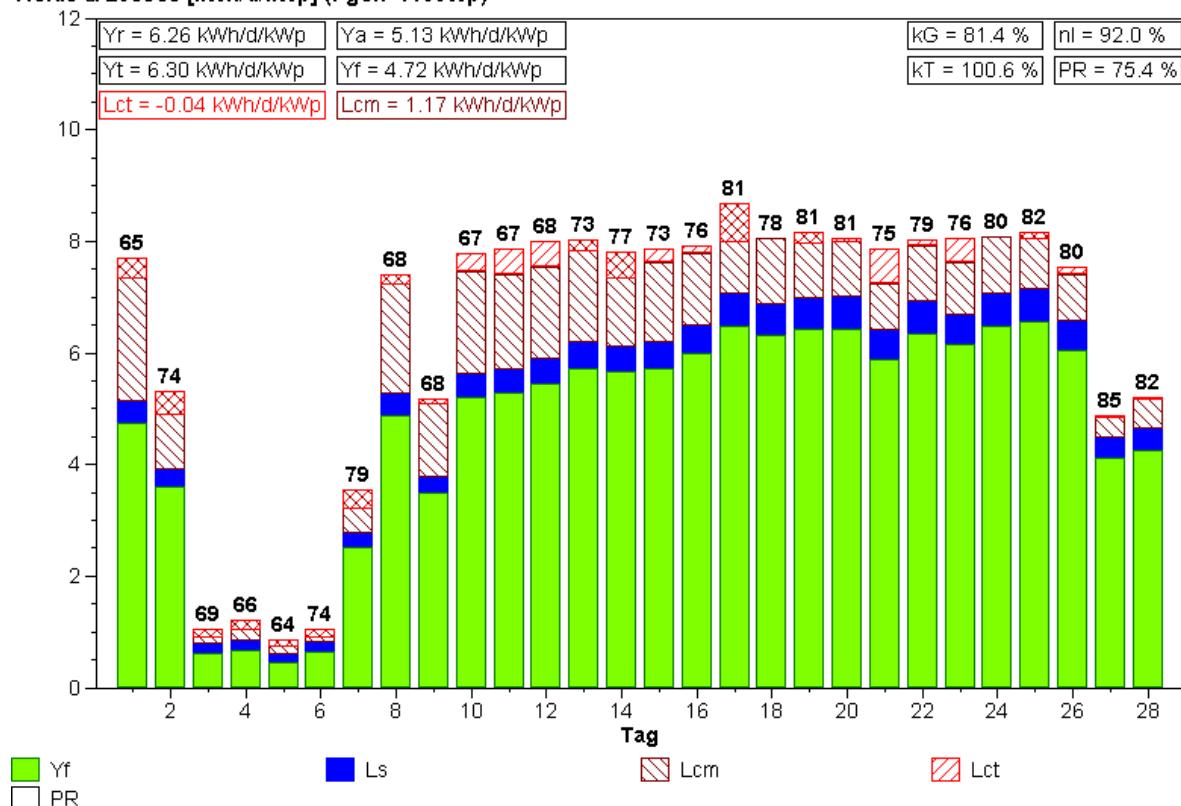
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 2.2003

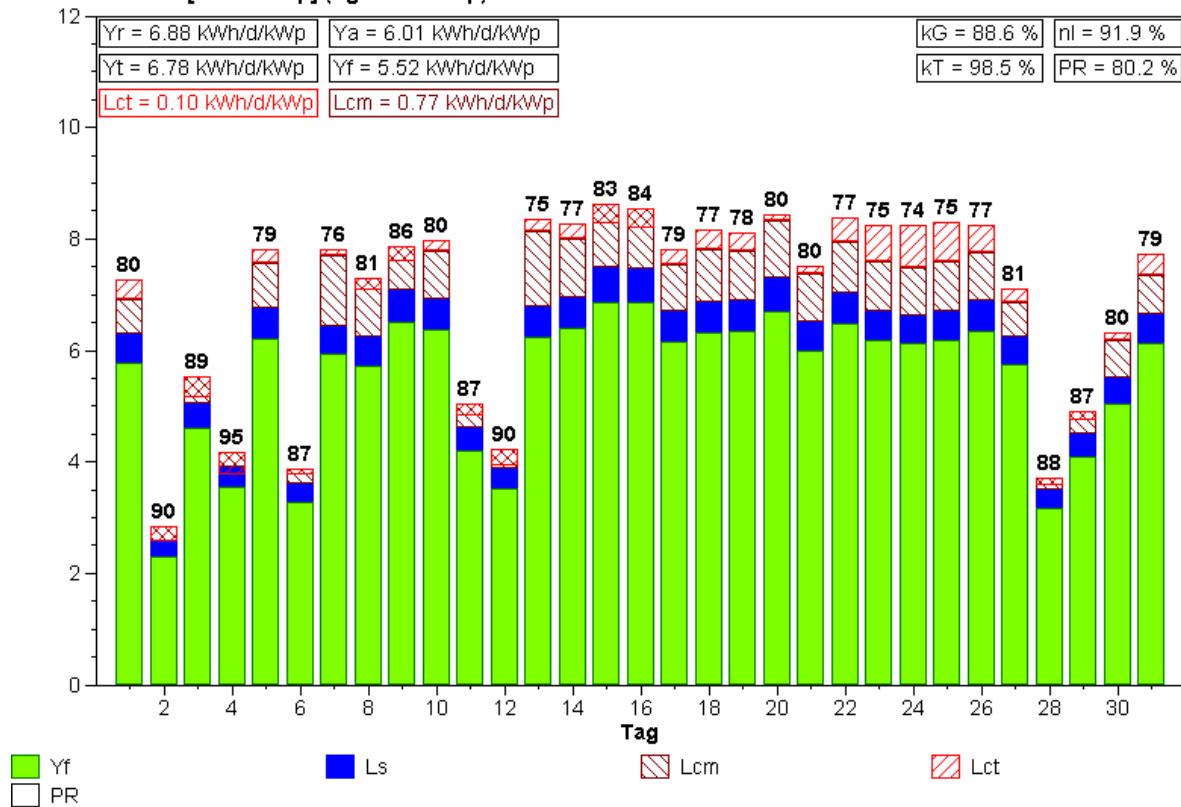
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 3.2003

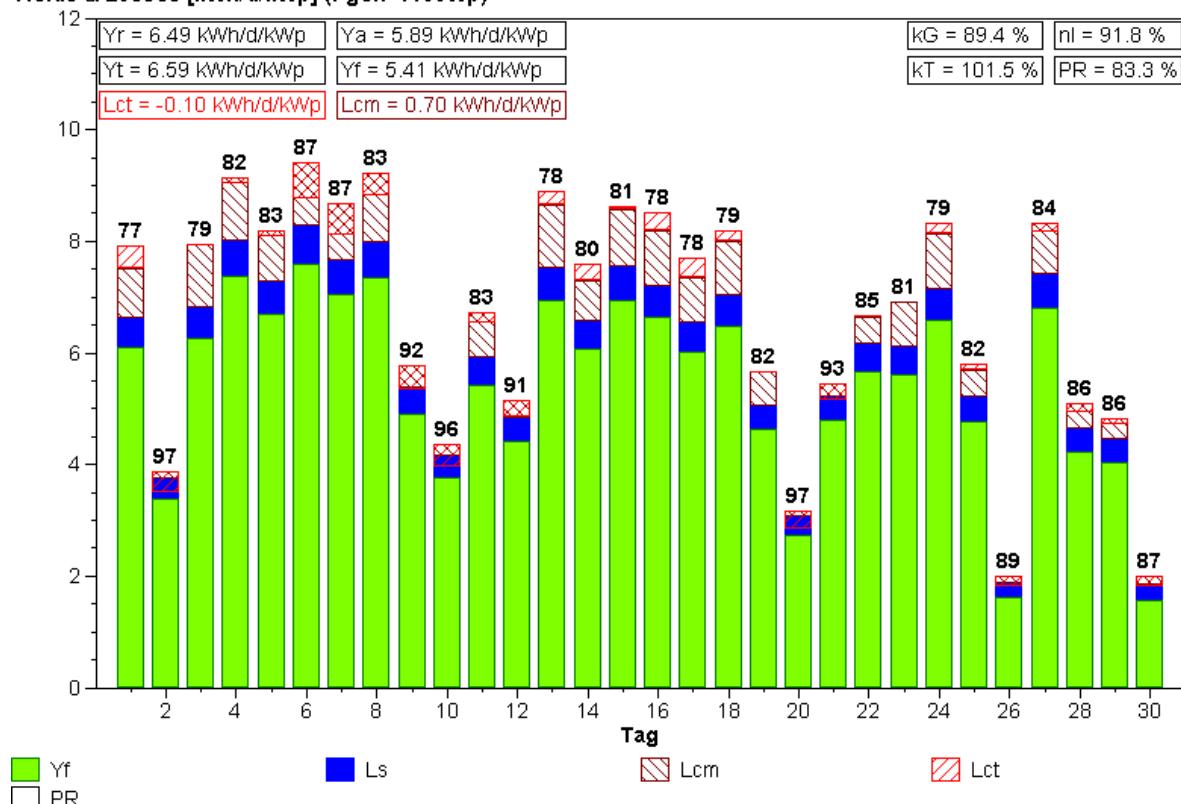
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 4.2003

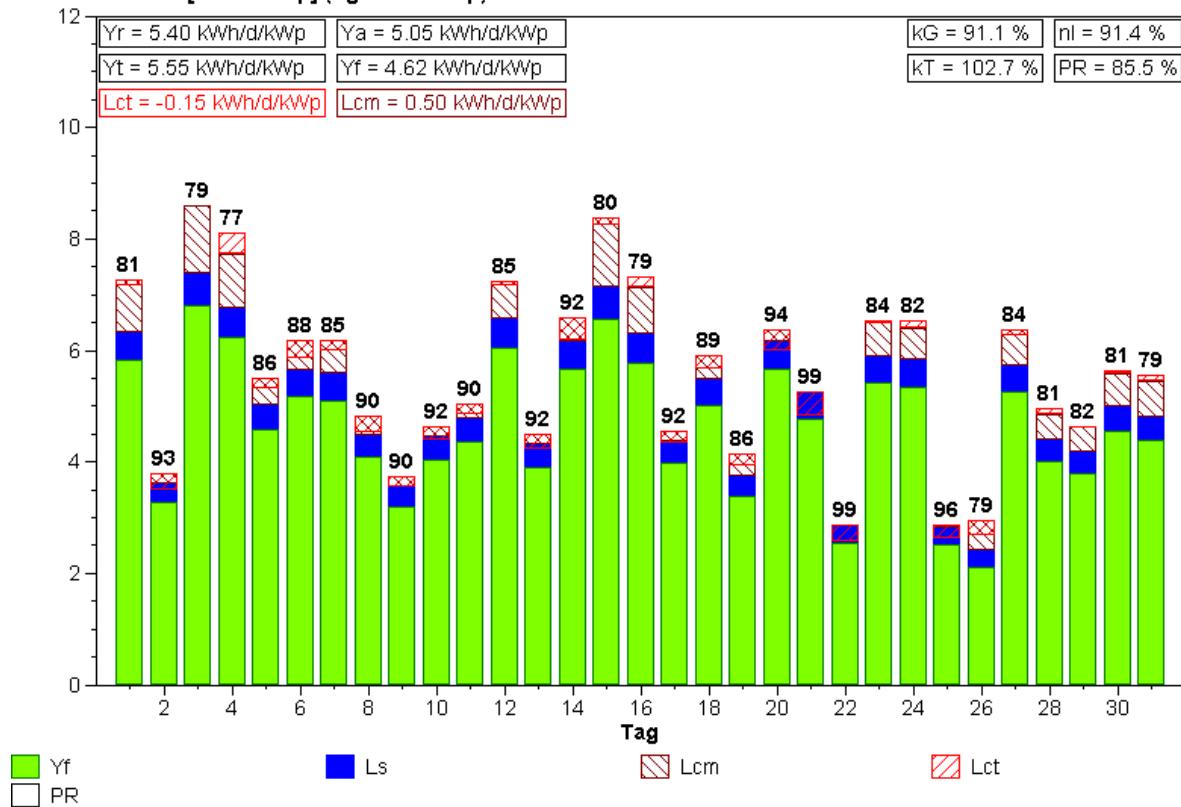
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 5.2003

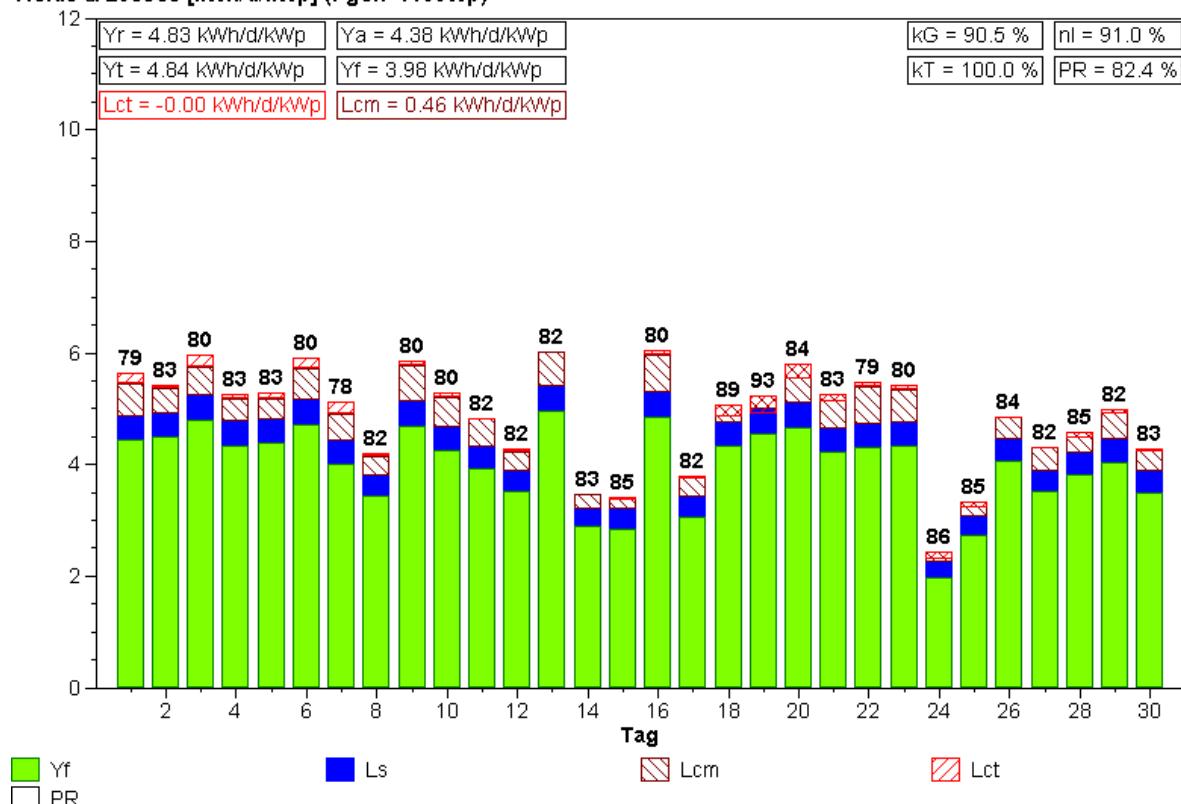
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 6.2003

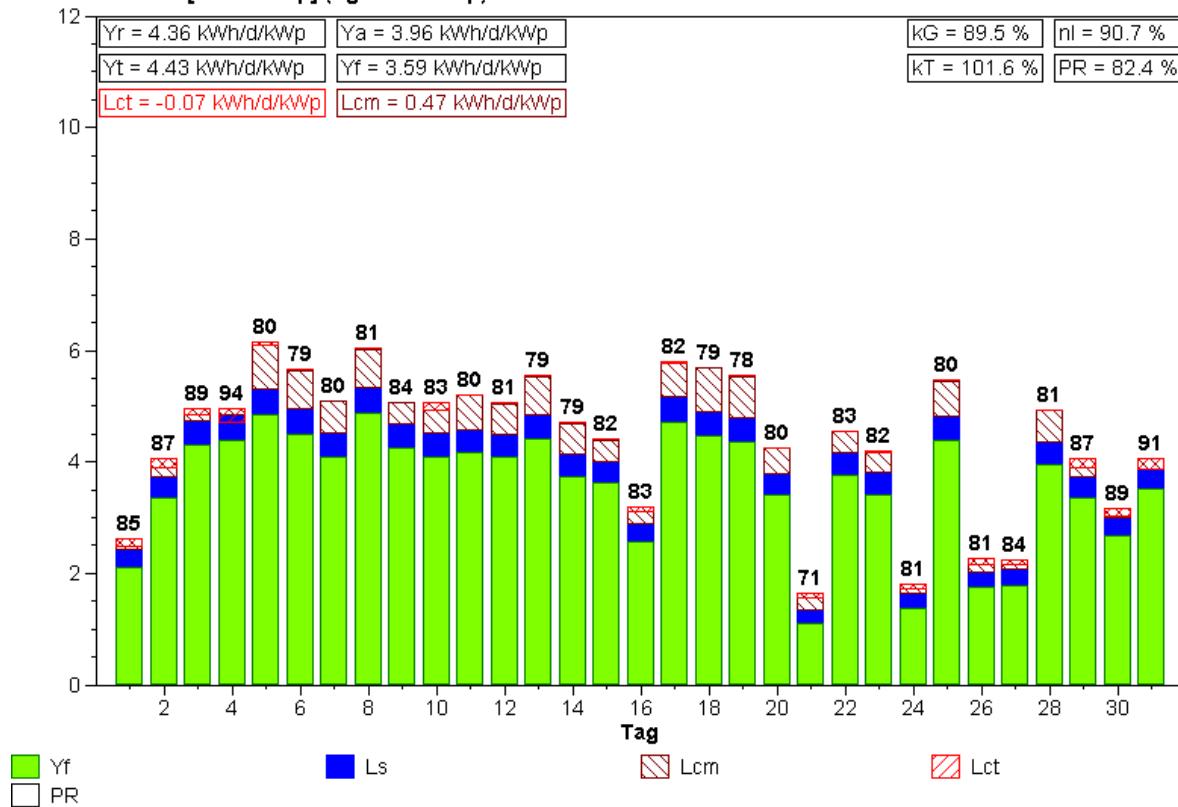
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 7.2003

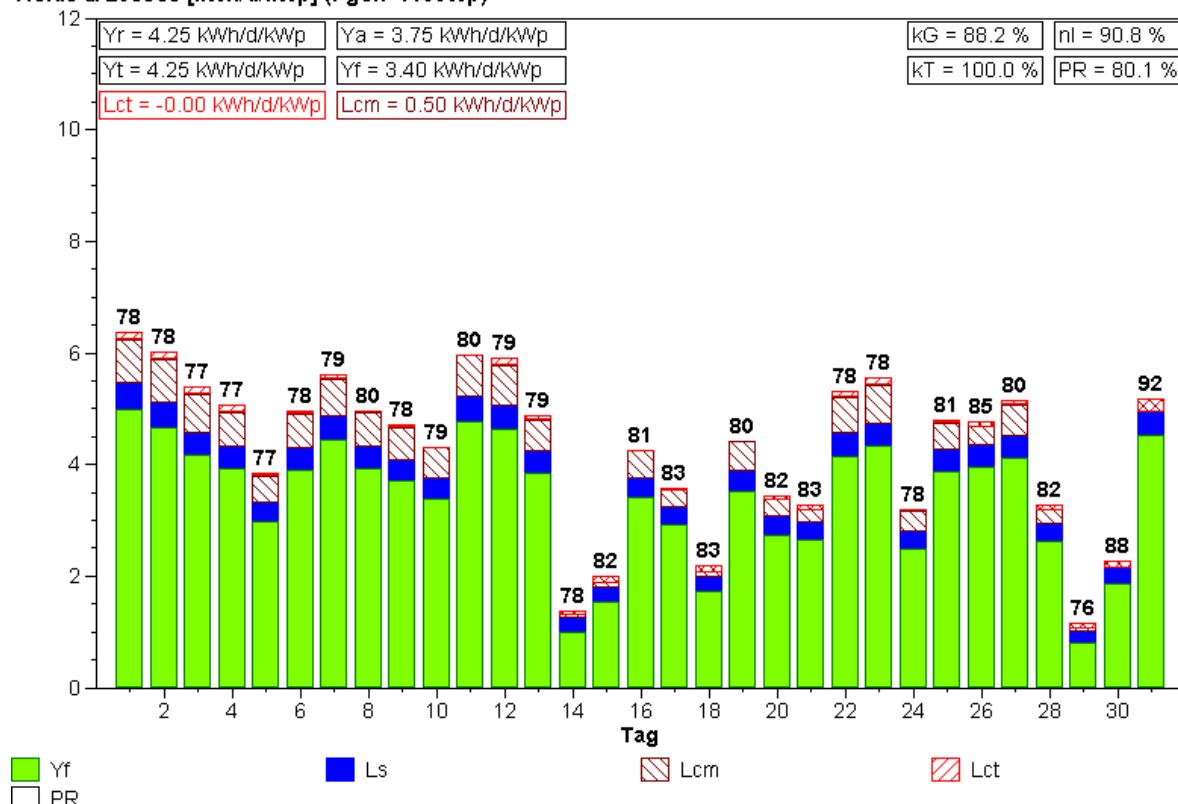
Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Jungfraujoch Monat: 8.2003

Yields & Losses [kWh/d/kWp] (Pgen=1130Wp)





## zu 6.2 Birg, Mürren

**Ort:** Mittelstation Birg der Schilthornbahn, 3825 Mürren; 2677 m.ü.M.  
**Inbetriebnahme:** 21.12.1992

**Solargenerator:**

**Module:** Siemens M55 (78 Stück)  
**Feldleistung:** 4134 Wp (nominell)  
**Bruttofläche:** 33,3 m<sup>2</sup>

**Neigung:** 90° (Fassade)  
**Ausrichtung:** 5° West

**Wechselrichter:** Solcon 3400HE vom 21.12.92 bis 25.01.03  
ASP TopClass 4000/6 Grid III seit 21.02.03

**Messgrössen:**

- Sonneneinstrahlung in Modulebene mit Pyranometer
- Umgebungstemperatur und Modultemperatur
- Gleichstrom und Gleichspannung
- Eingespeiste Wechselstrom-Wirkleistung
- Netzspannung



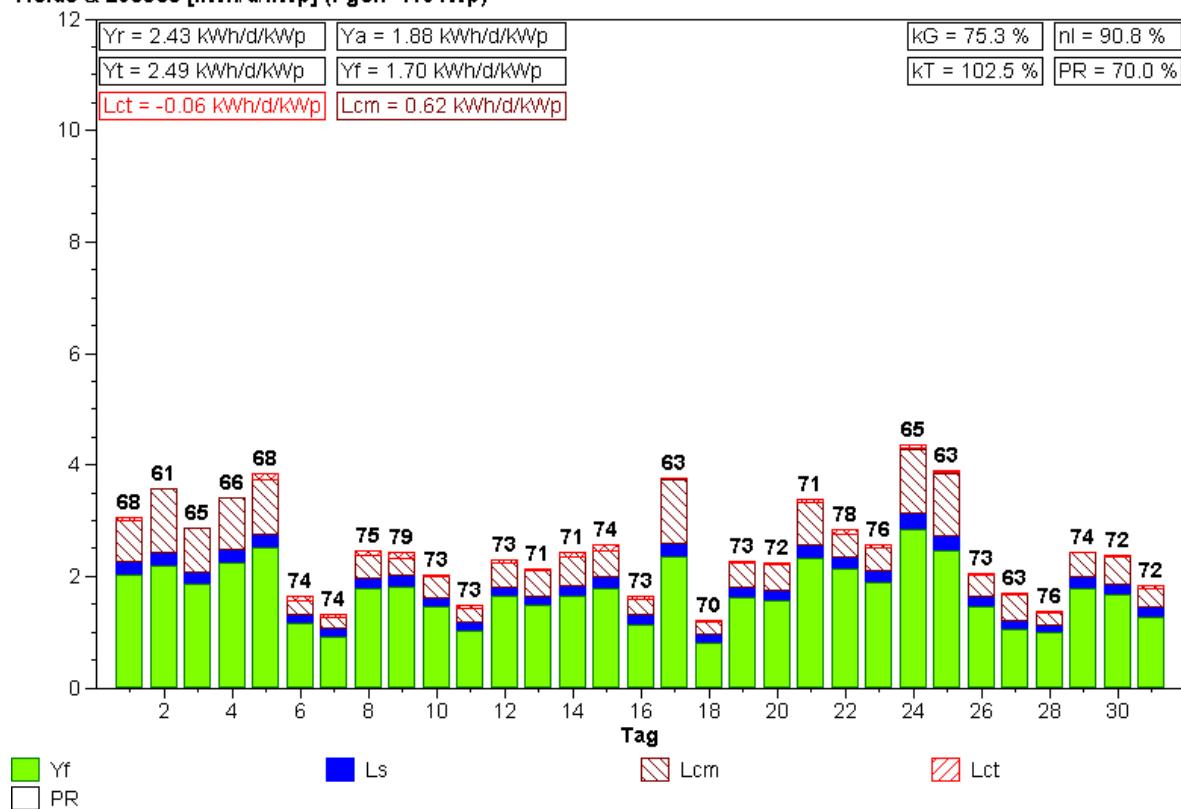
**Besondere Betriebsereignisse:**

26.12.1999	Netzunterbruch durch Sturm „Lothar“
05.12.2002	Netzabschaltung wegen Bauarbeiten
19.01.2003 – 25.01.2003	Wechselrichterdefekt, Gerät funktionierte nur noch im Teillastbereich
25.01.2003	Demontage des defekten Geräts
21.02.2003	Inbetriebnahme eines neuen Wechselrichters

Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 7.1999

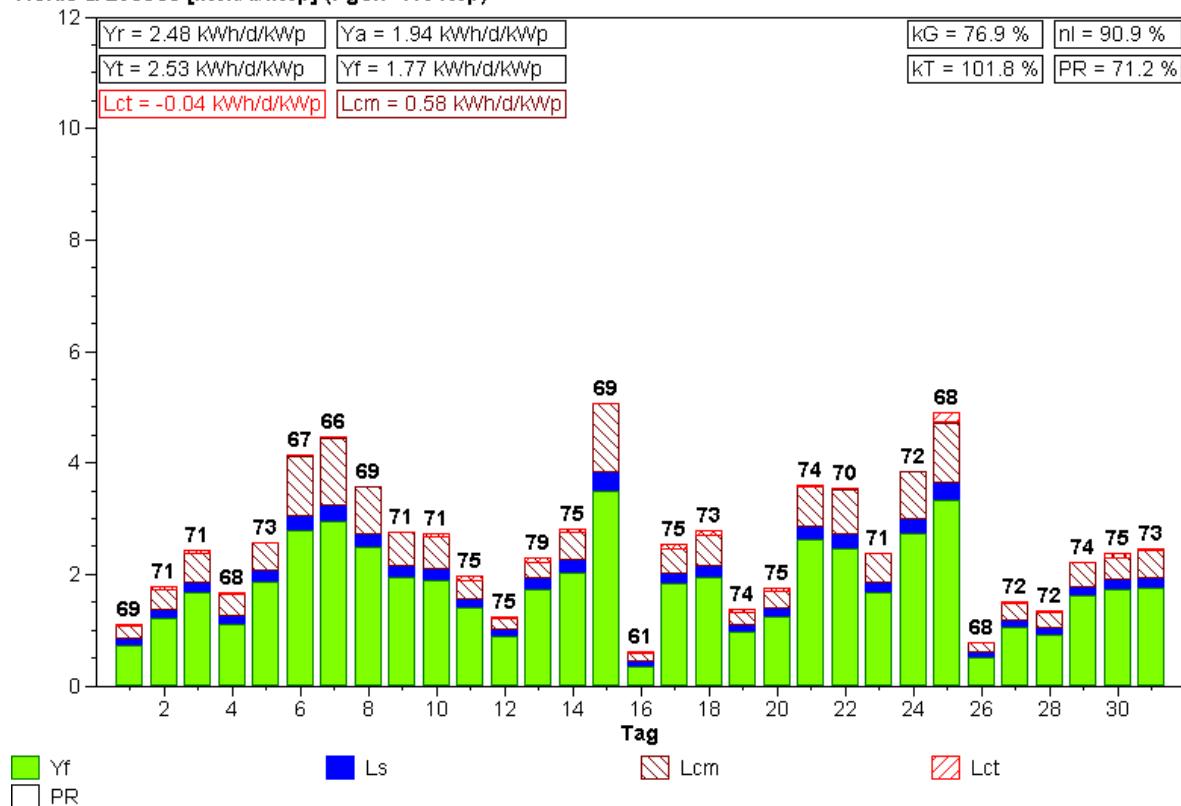
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 8.1999

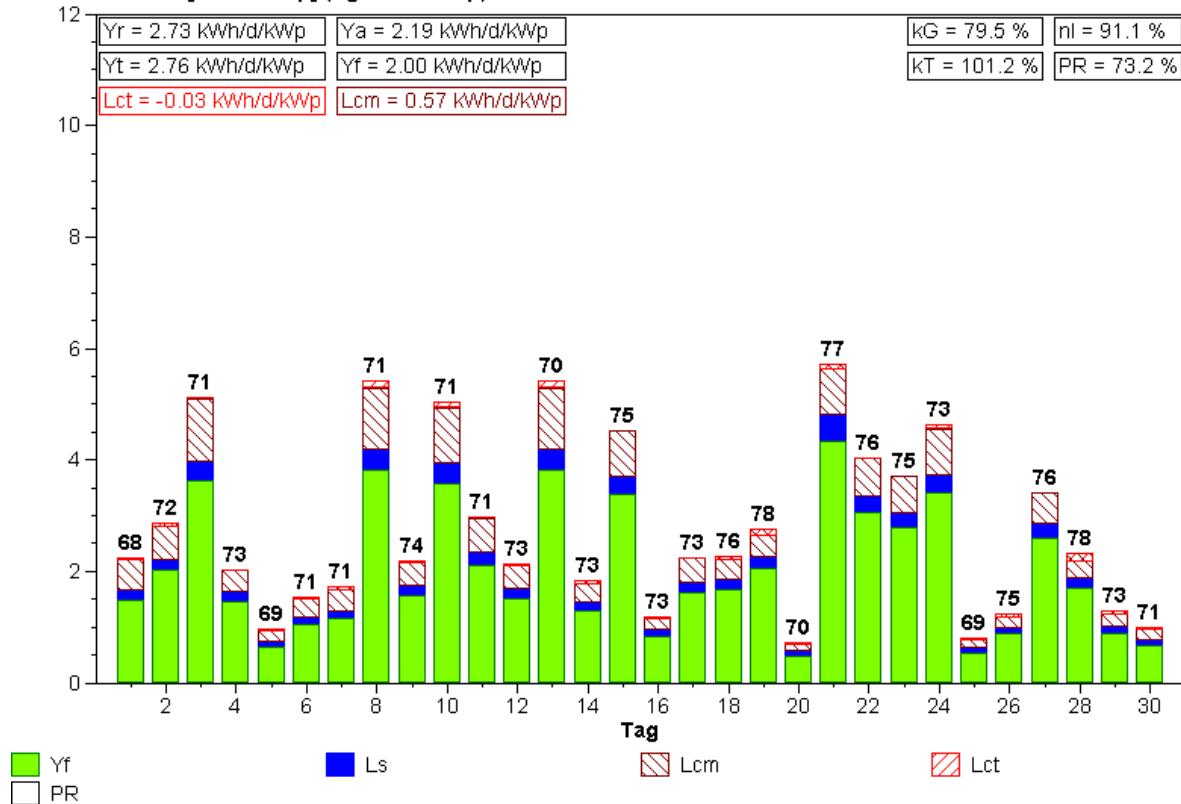
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 9.1999

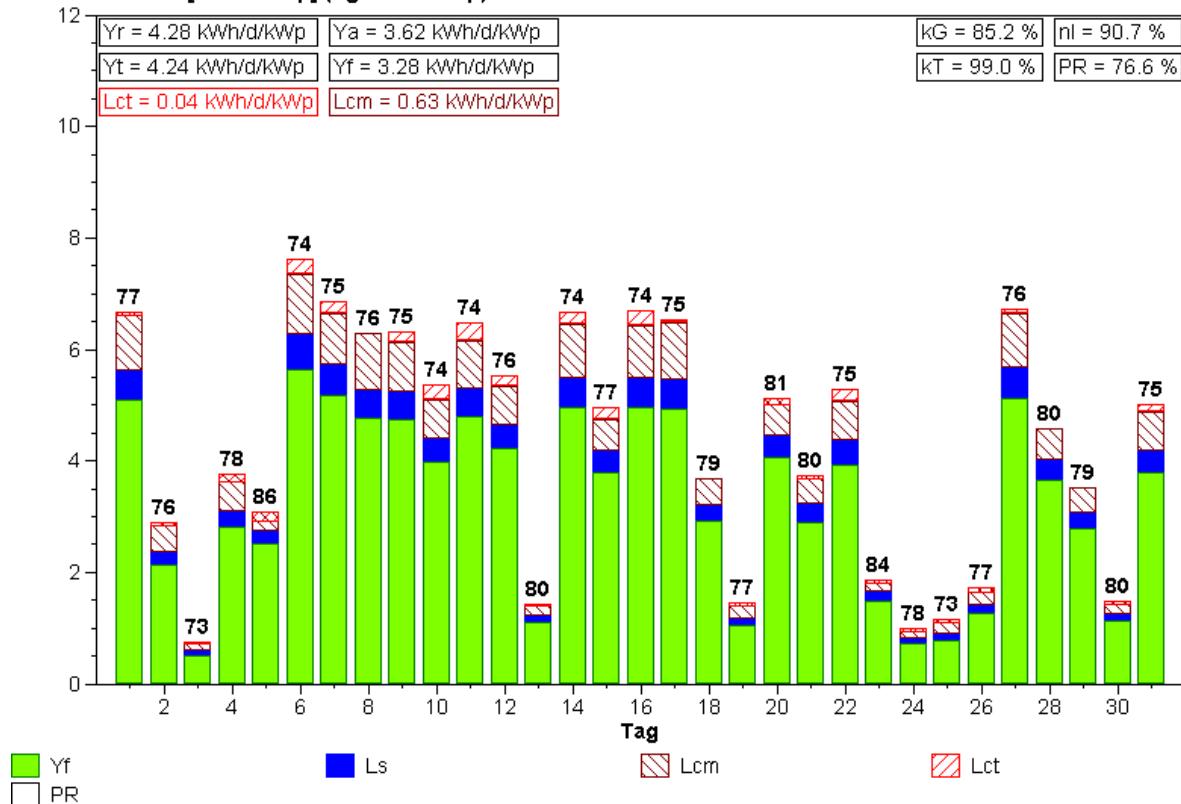
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

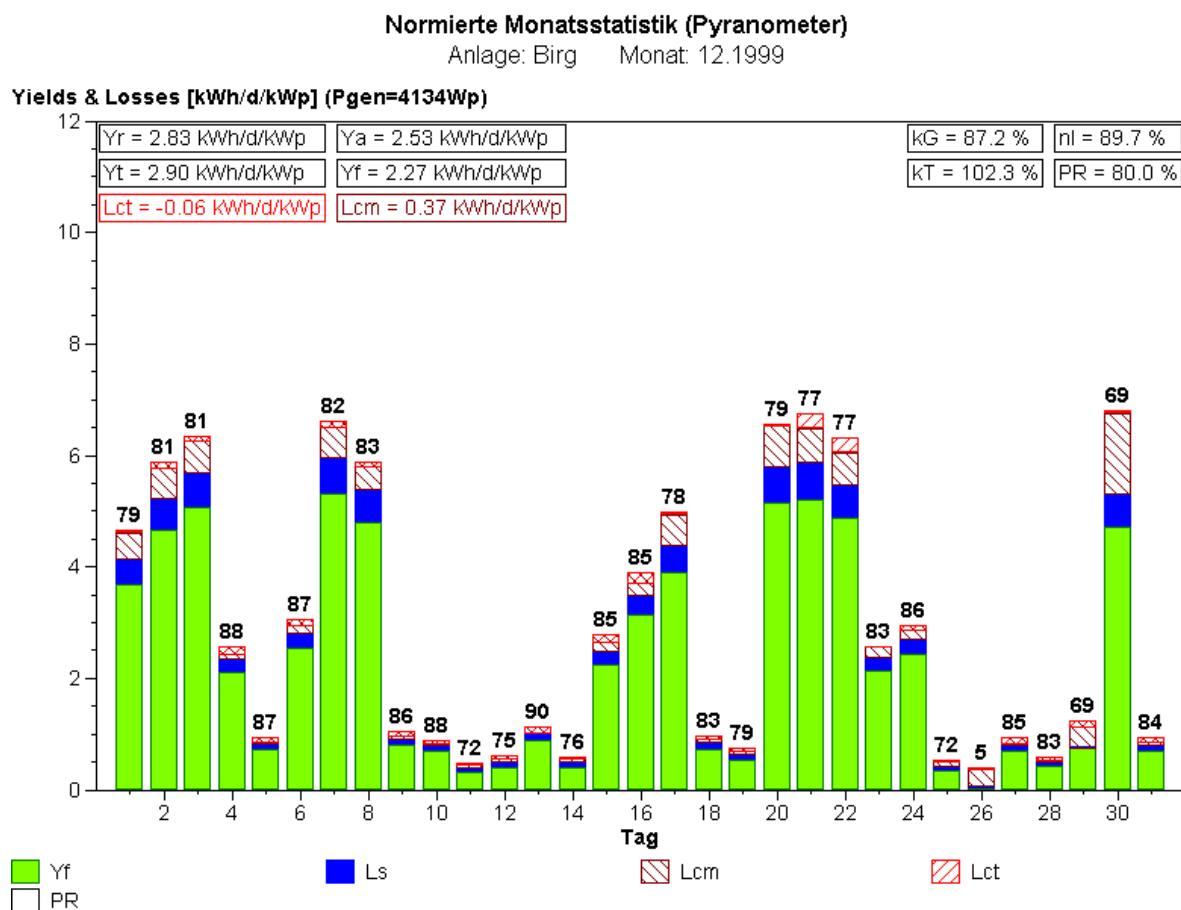
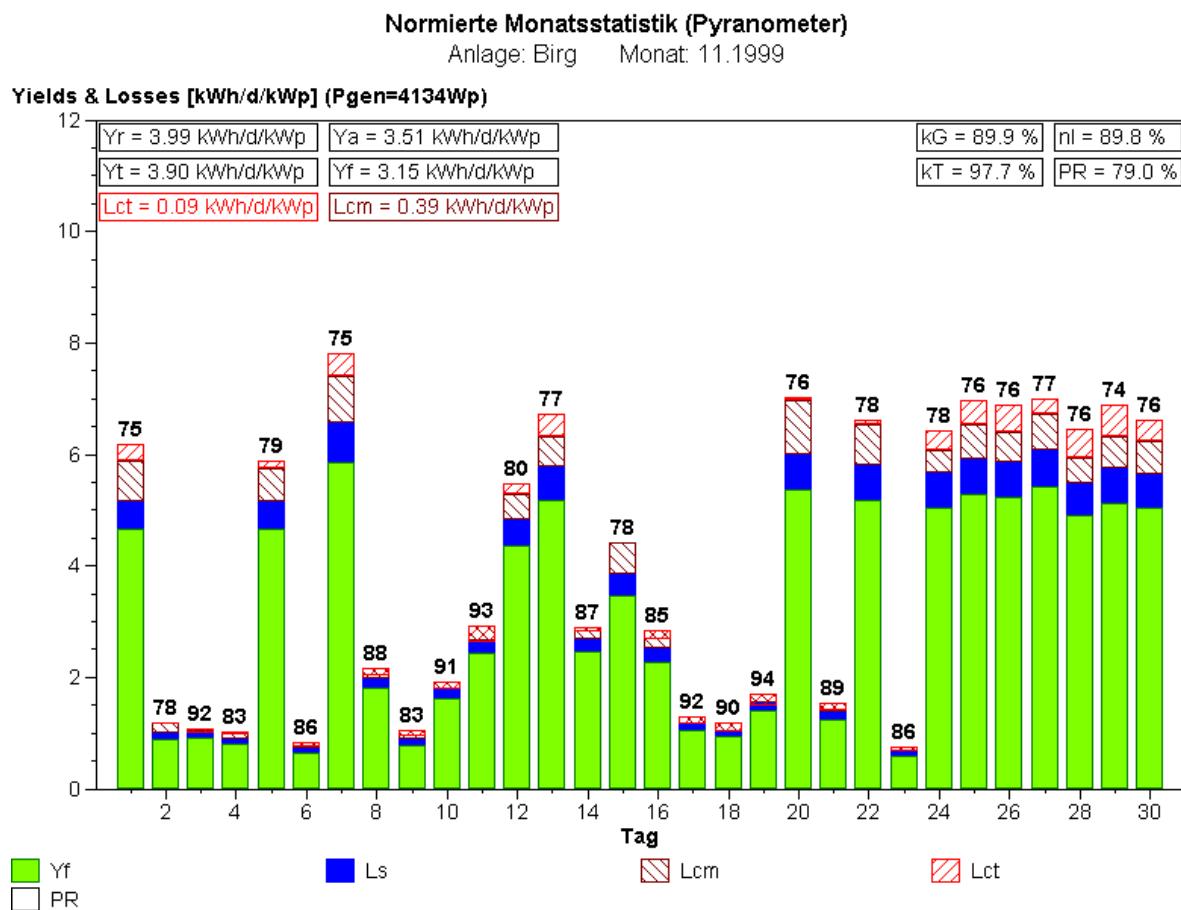


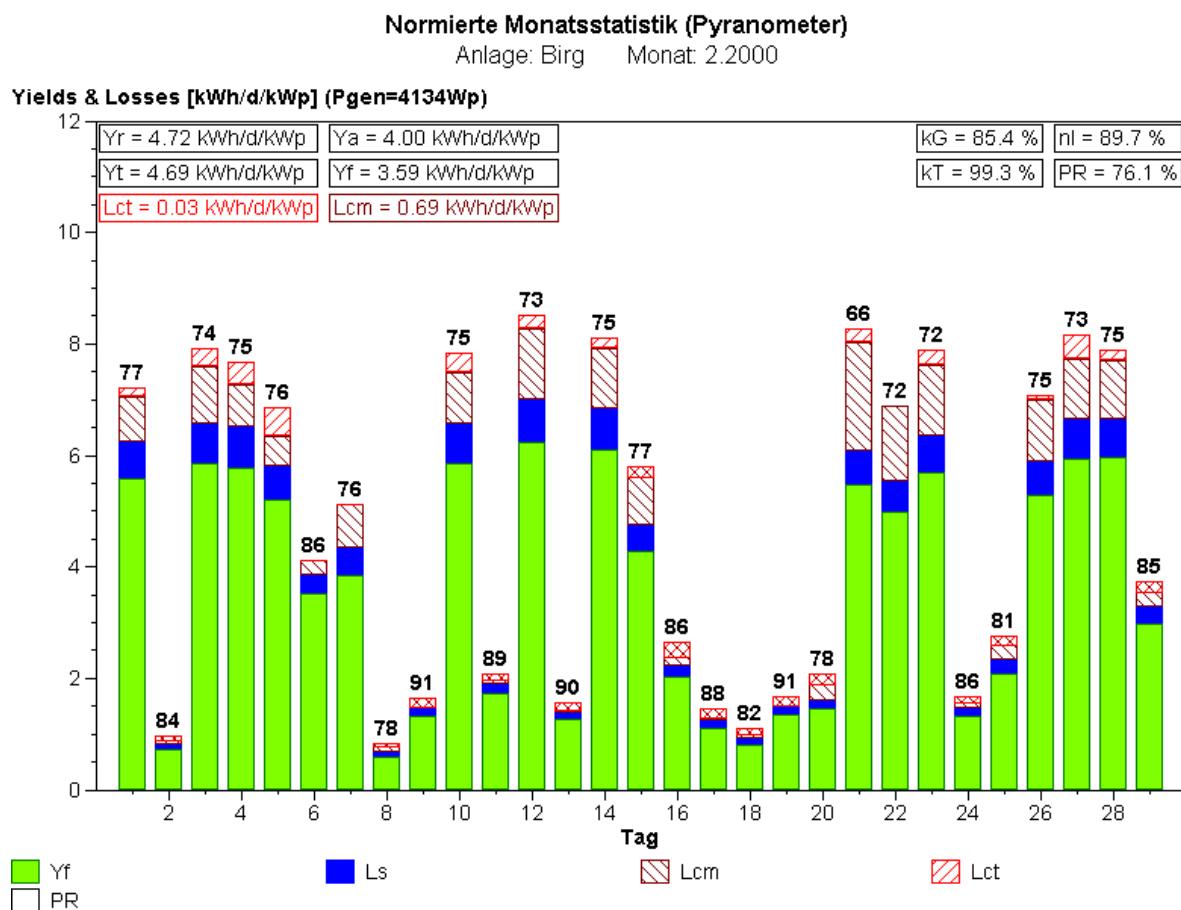
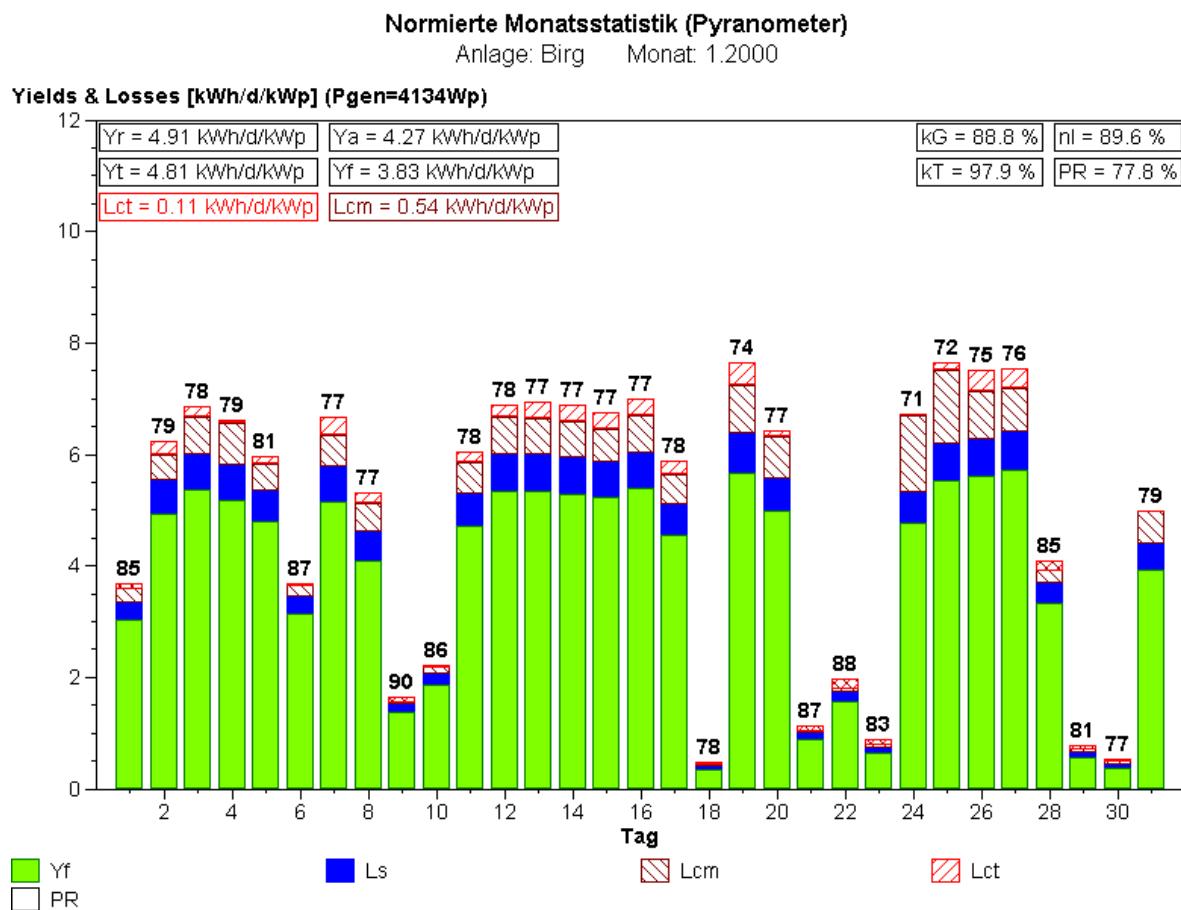
Normierte Monatsstatistik (Pyranometer)

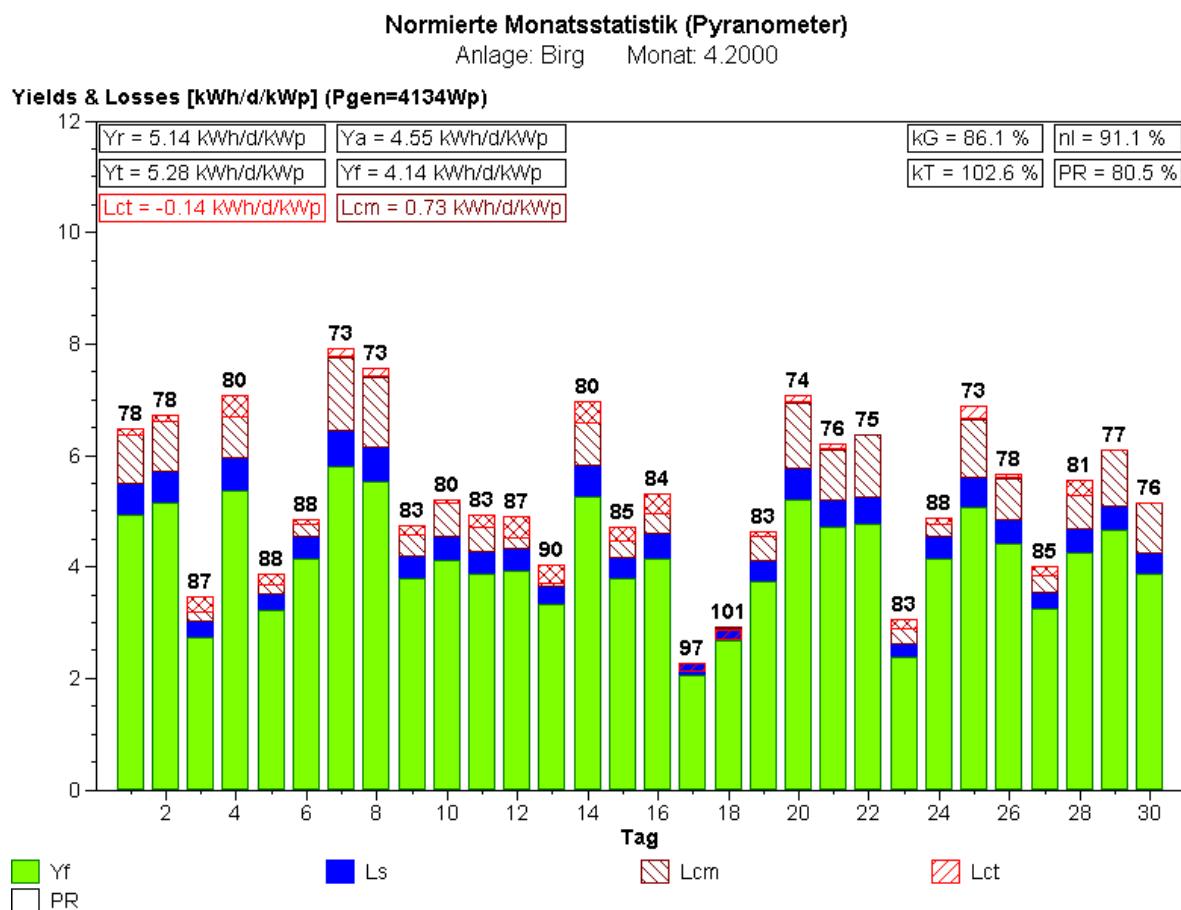
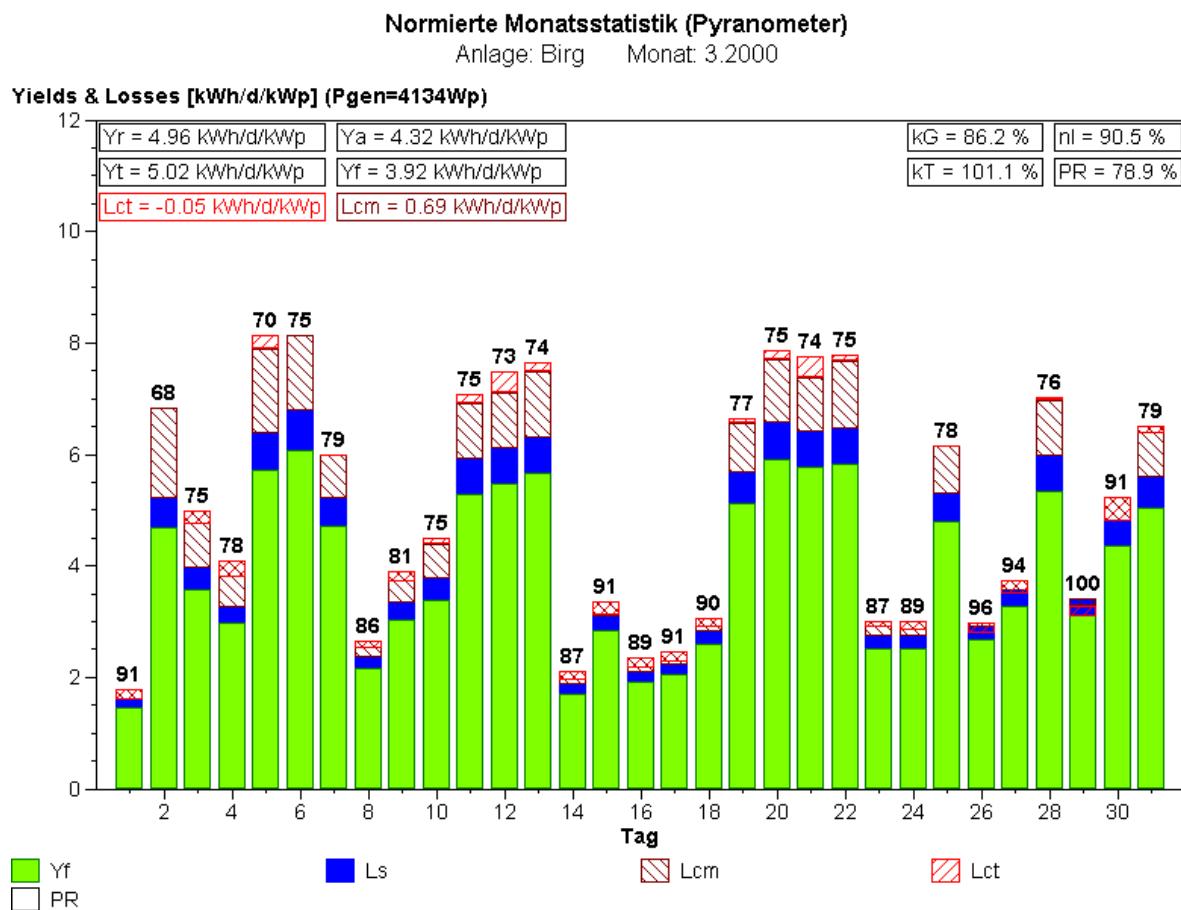
Anlage: Birg Monat: 10.1999

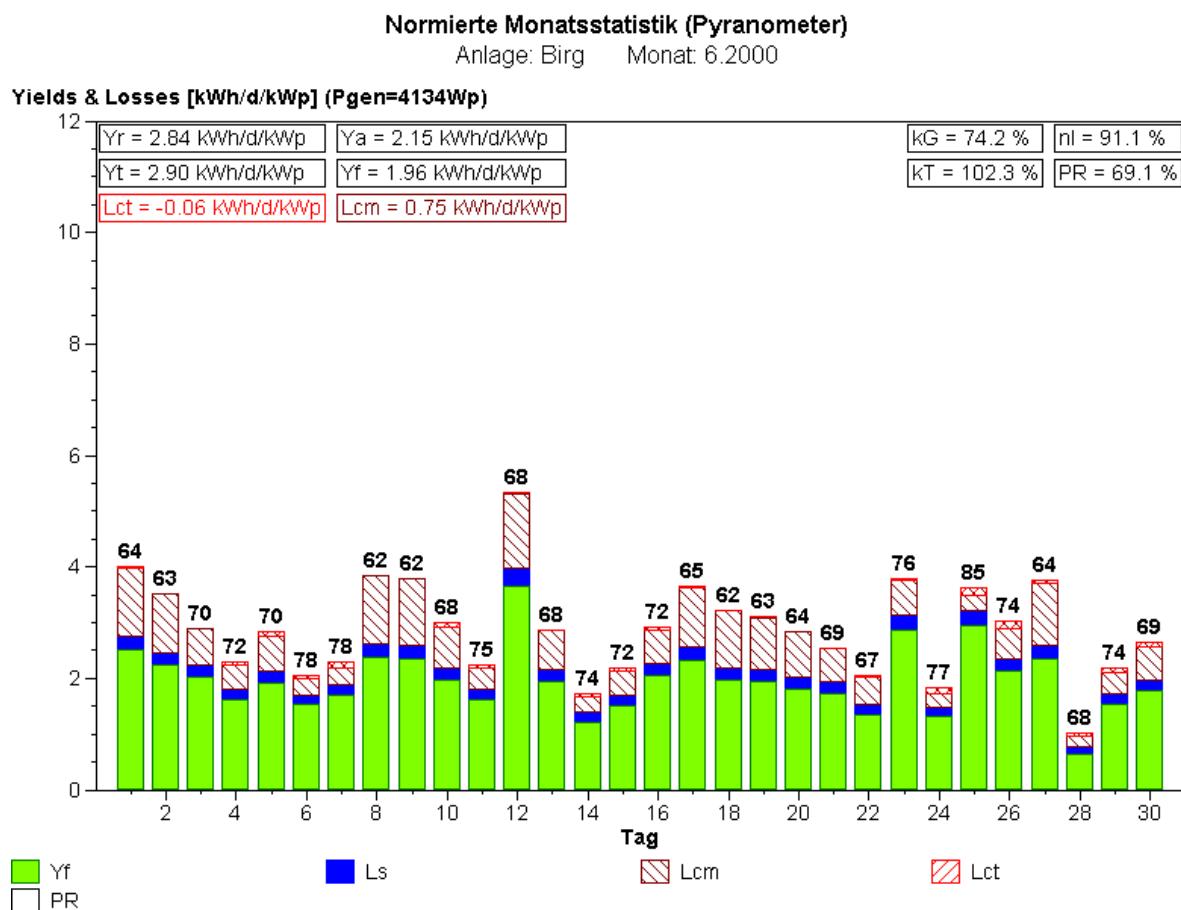
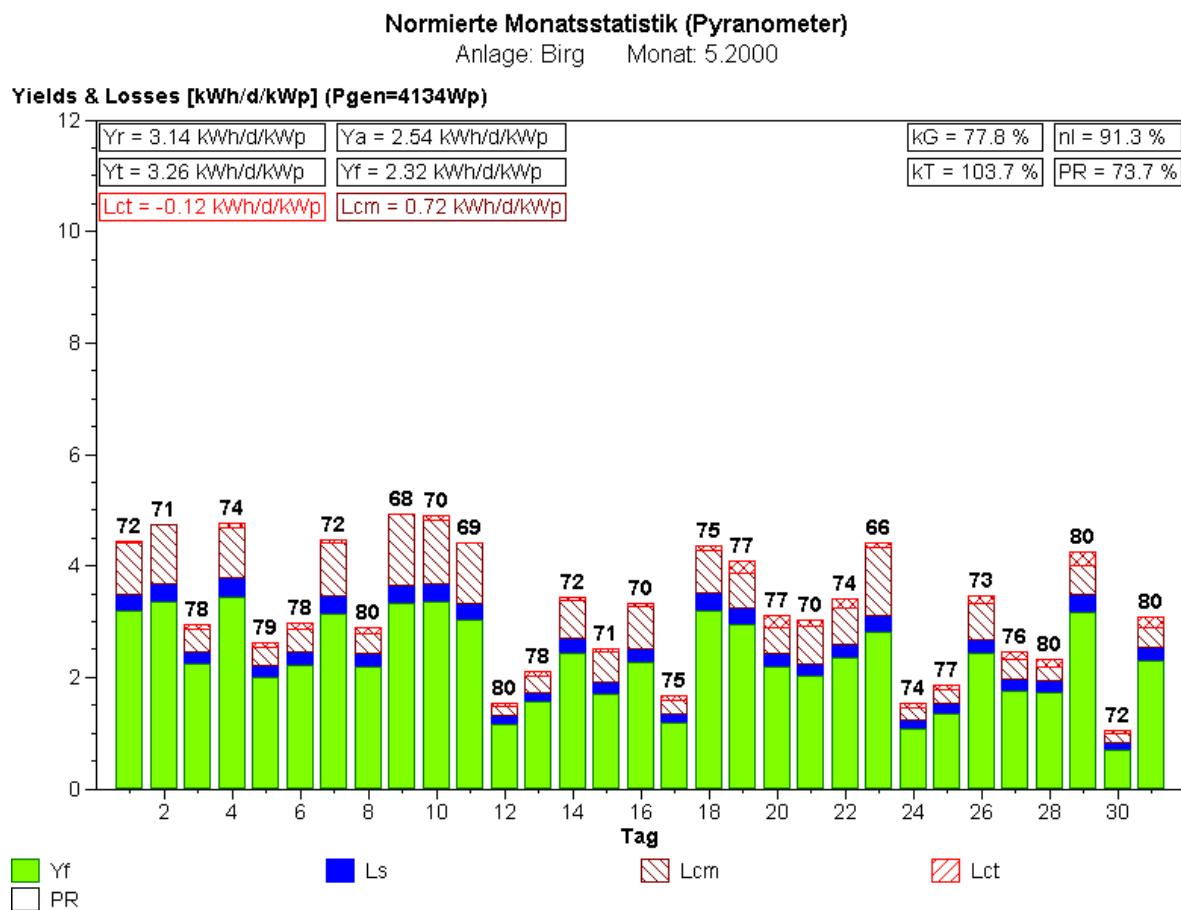
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)







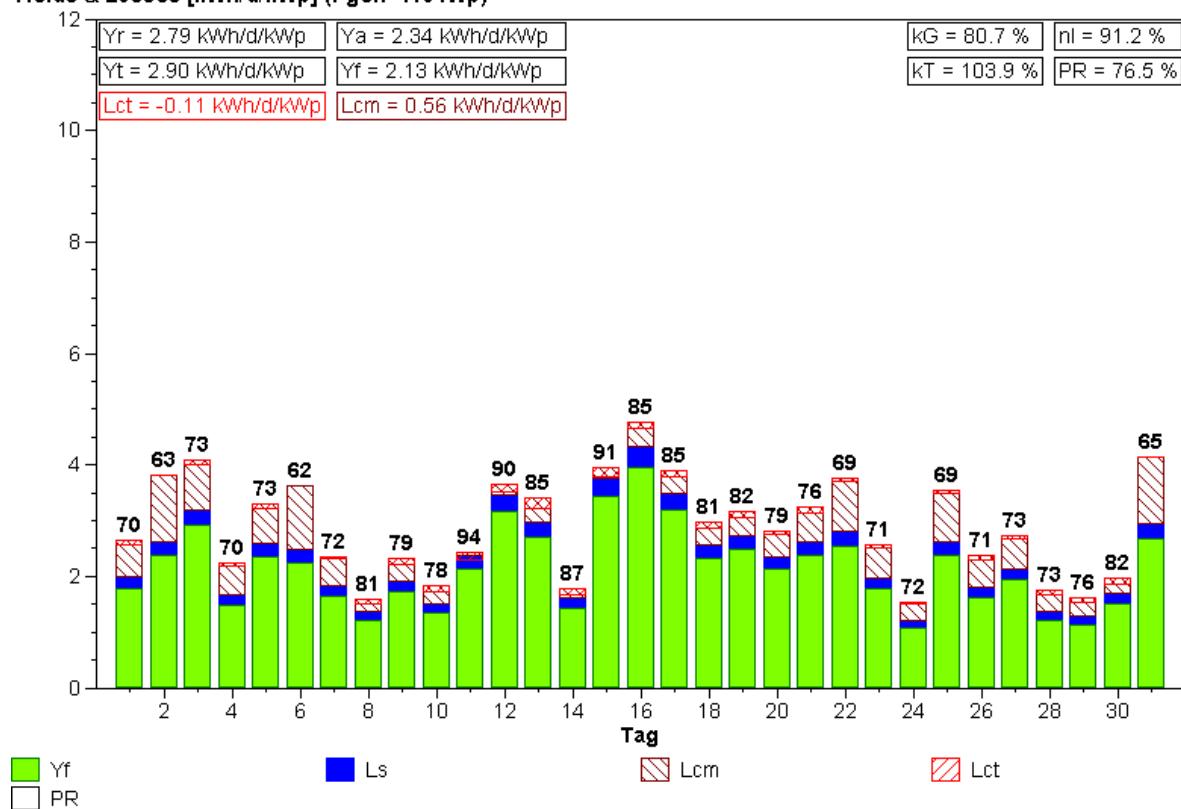




Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 7.2000

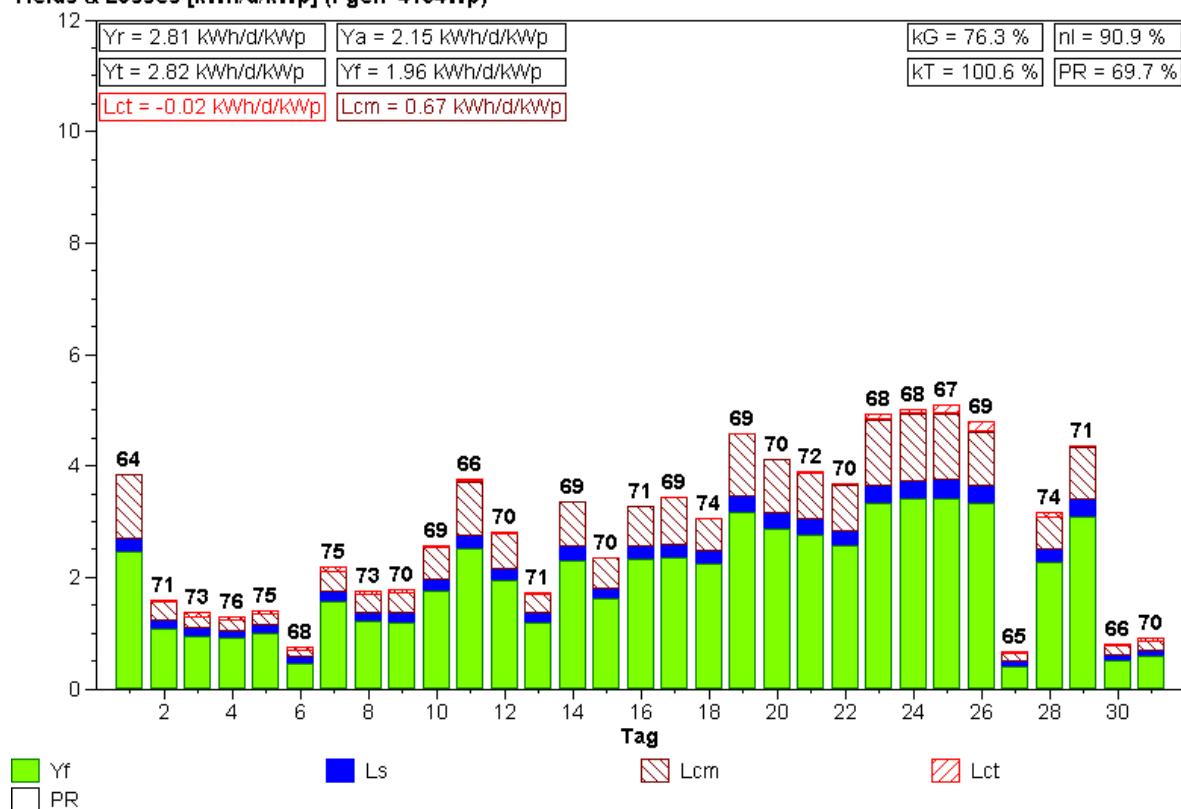
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 8.2000

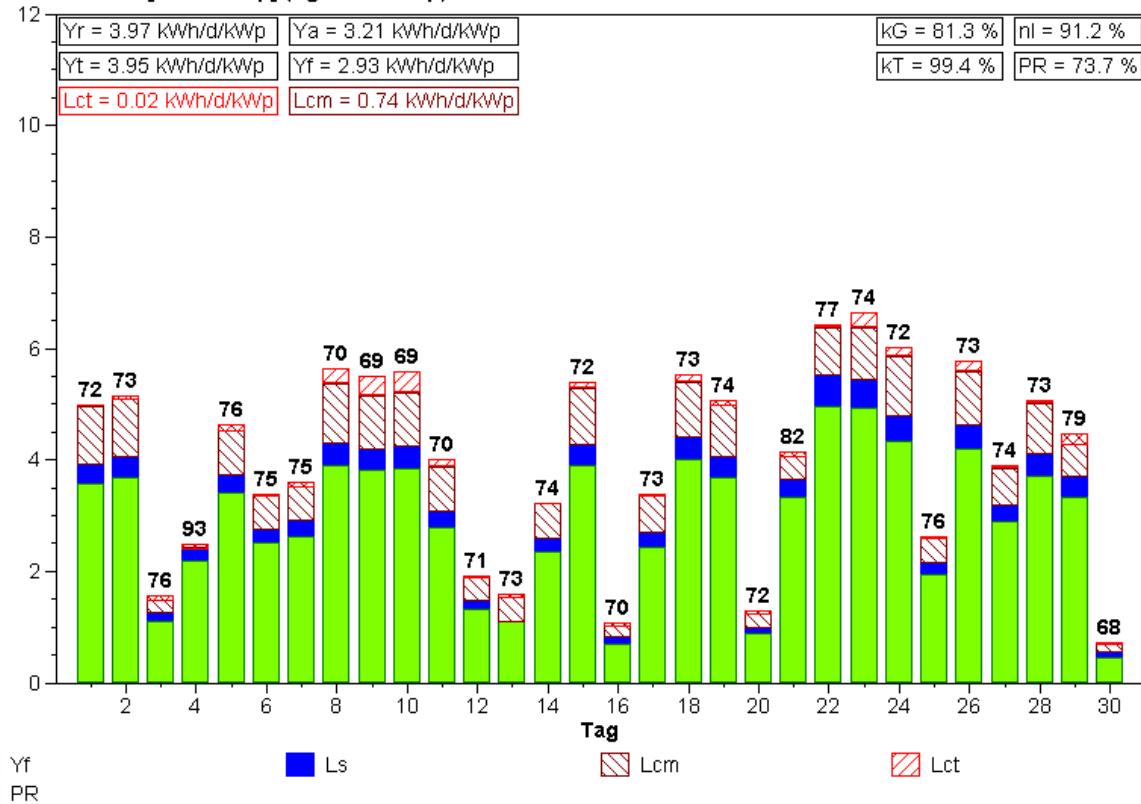
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 9.2000

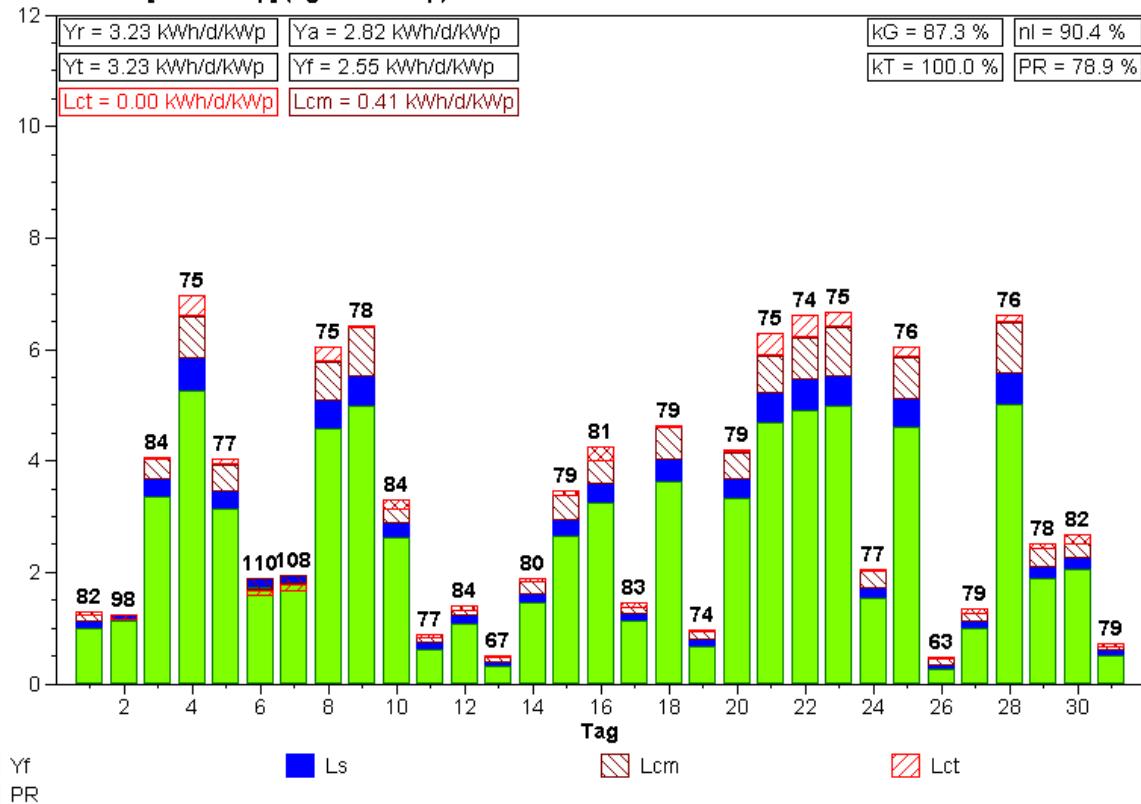
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 10.2000

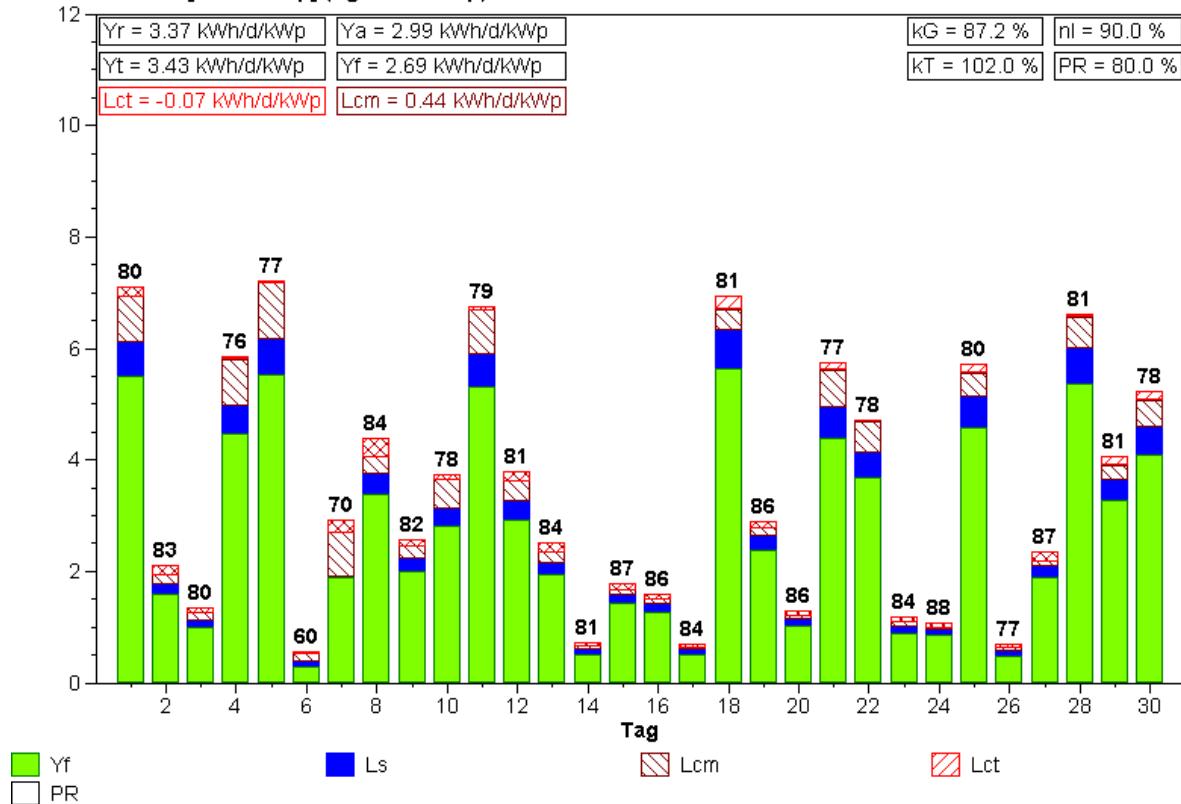
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 11.2000

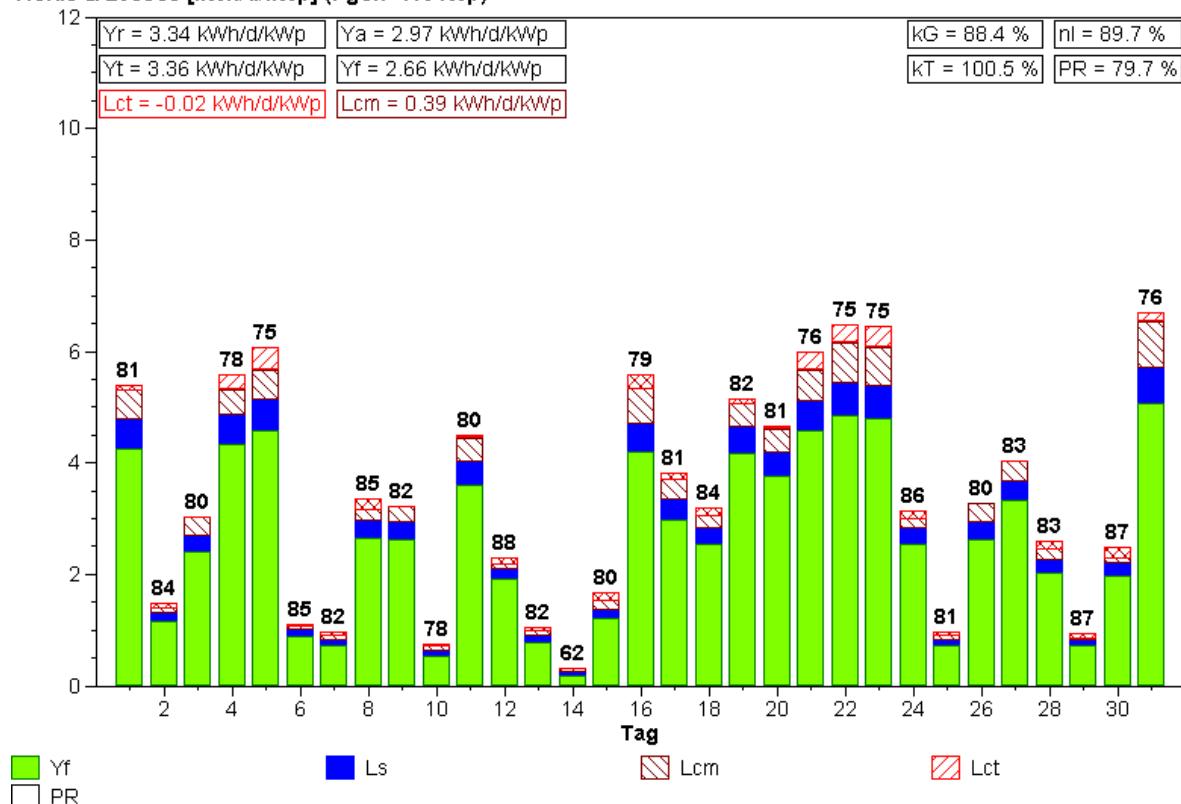
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 12.2000

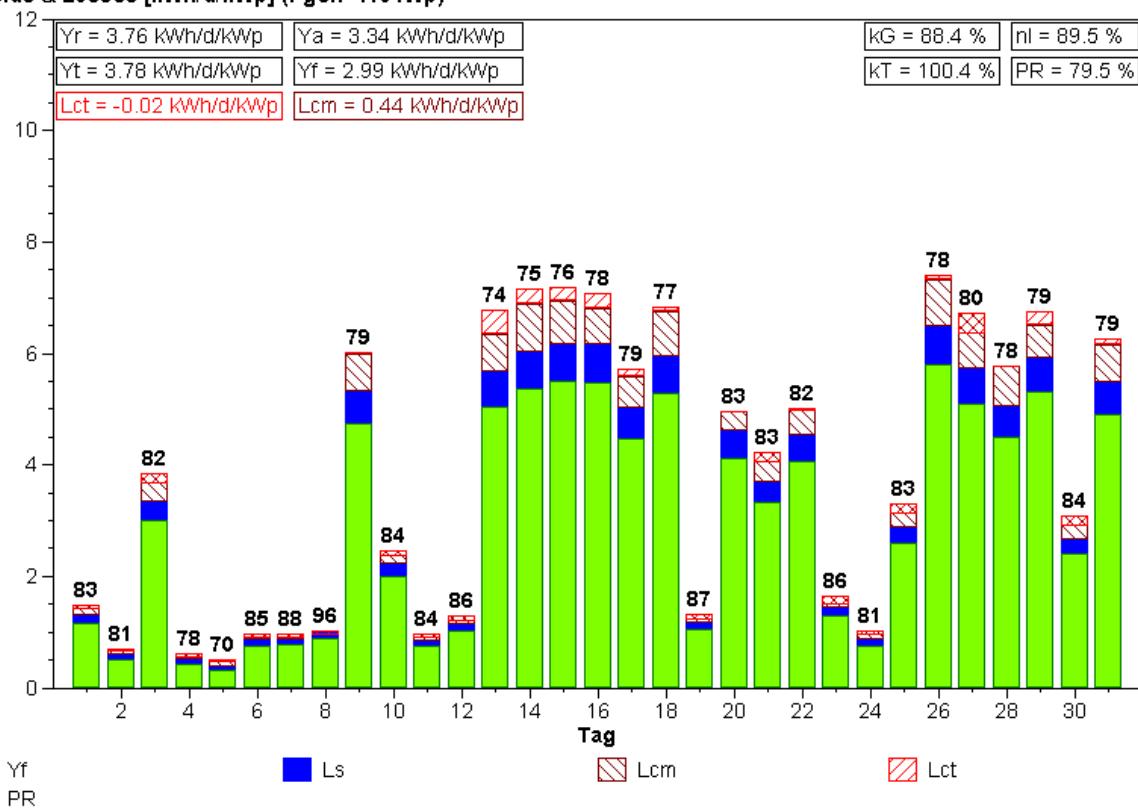
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 1.2001

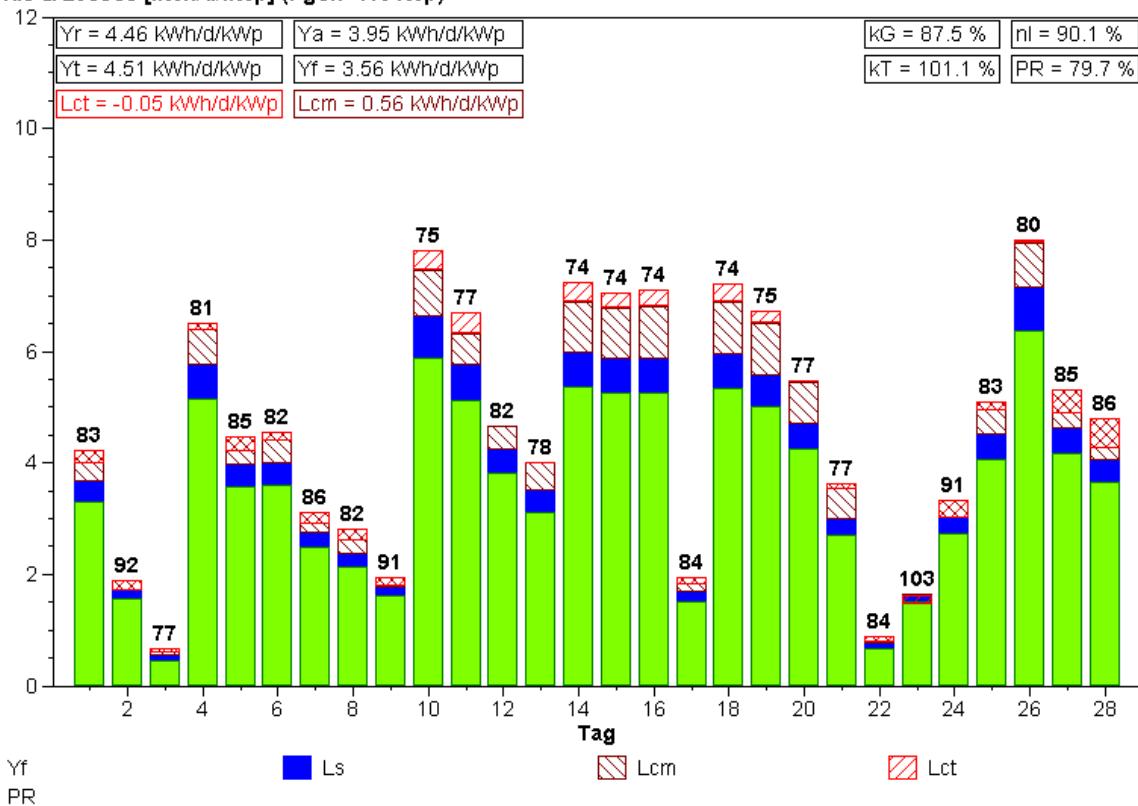
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 2.2001

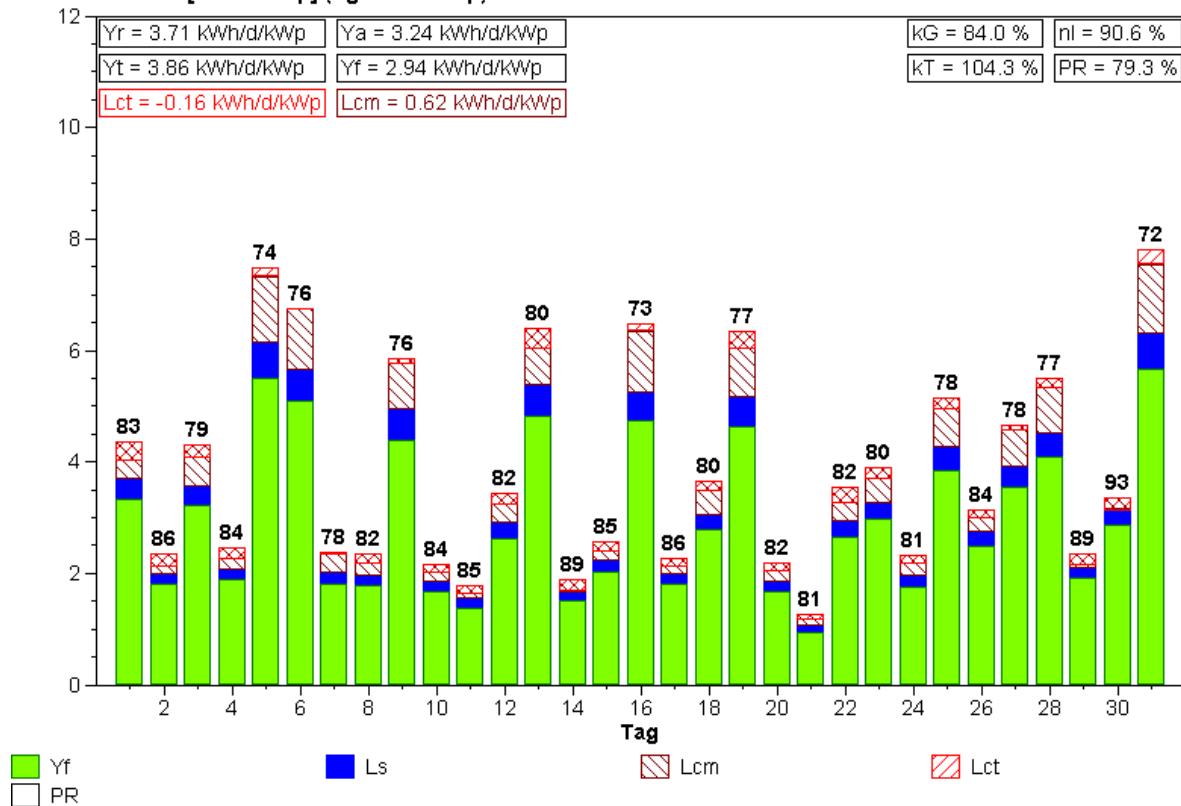
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 3.2001

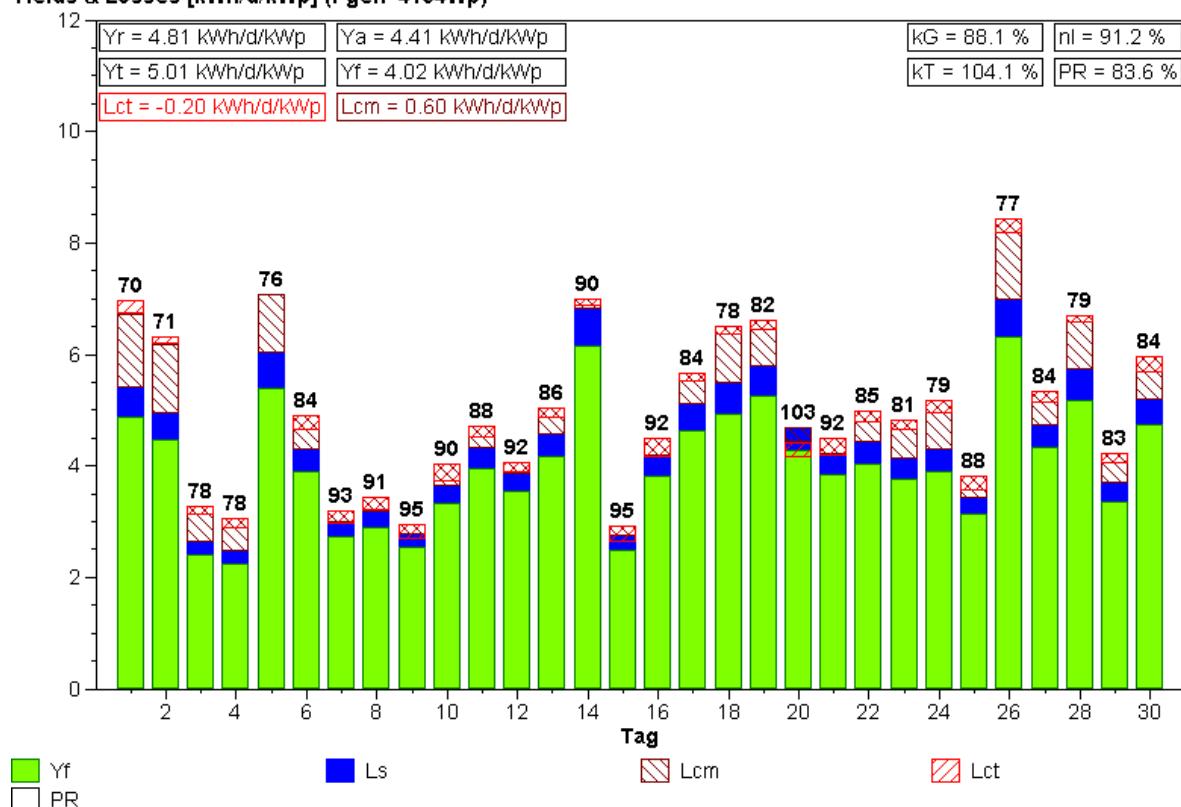
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 4.2001

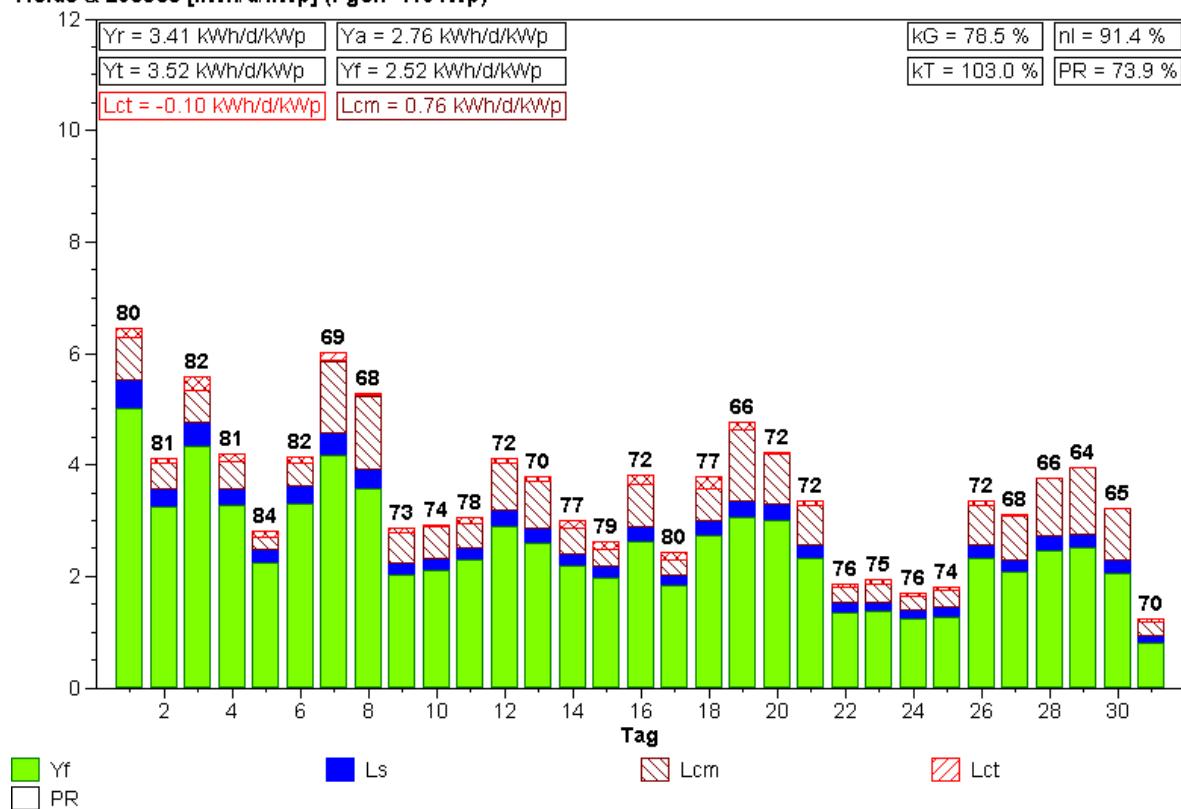
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 5.2001

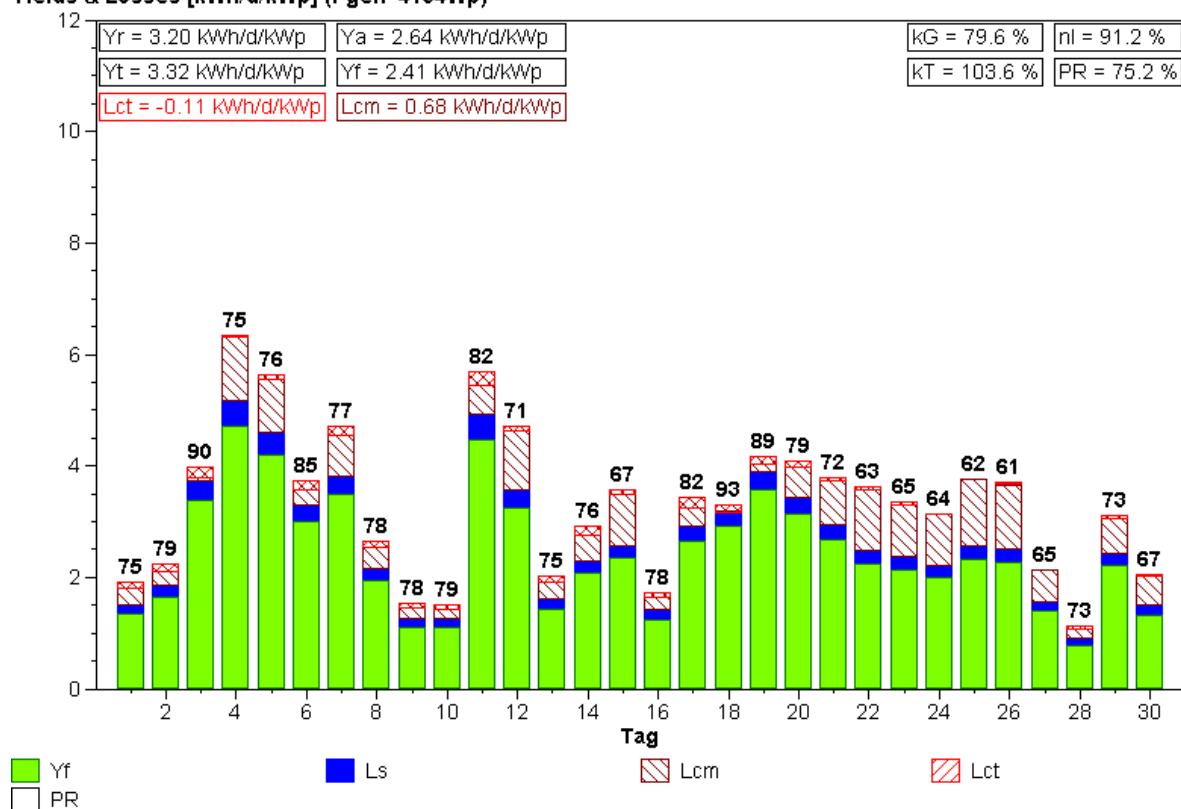
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

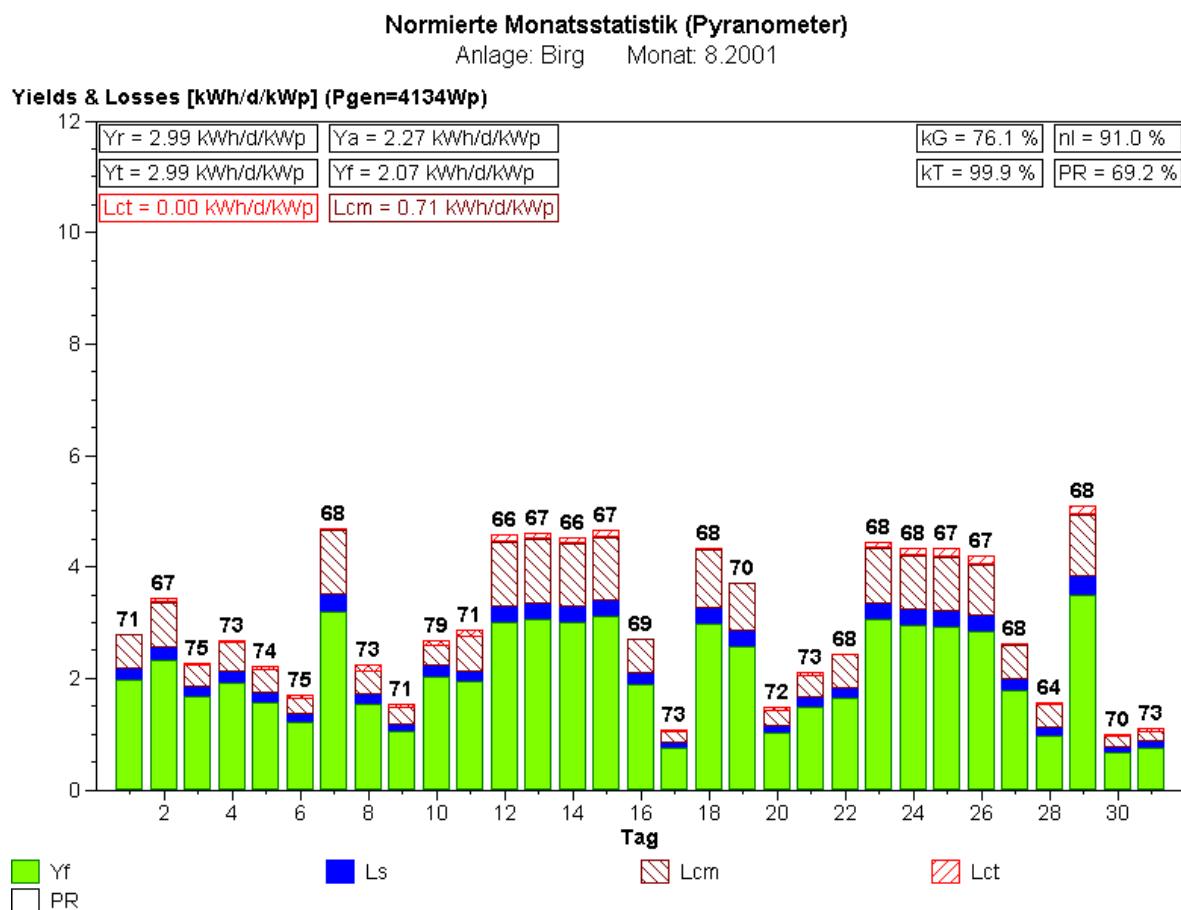
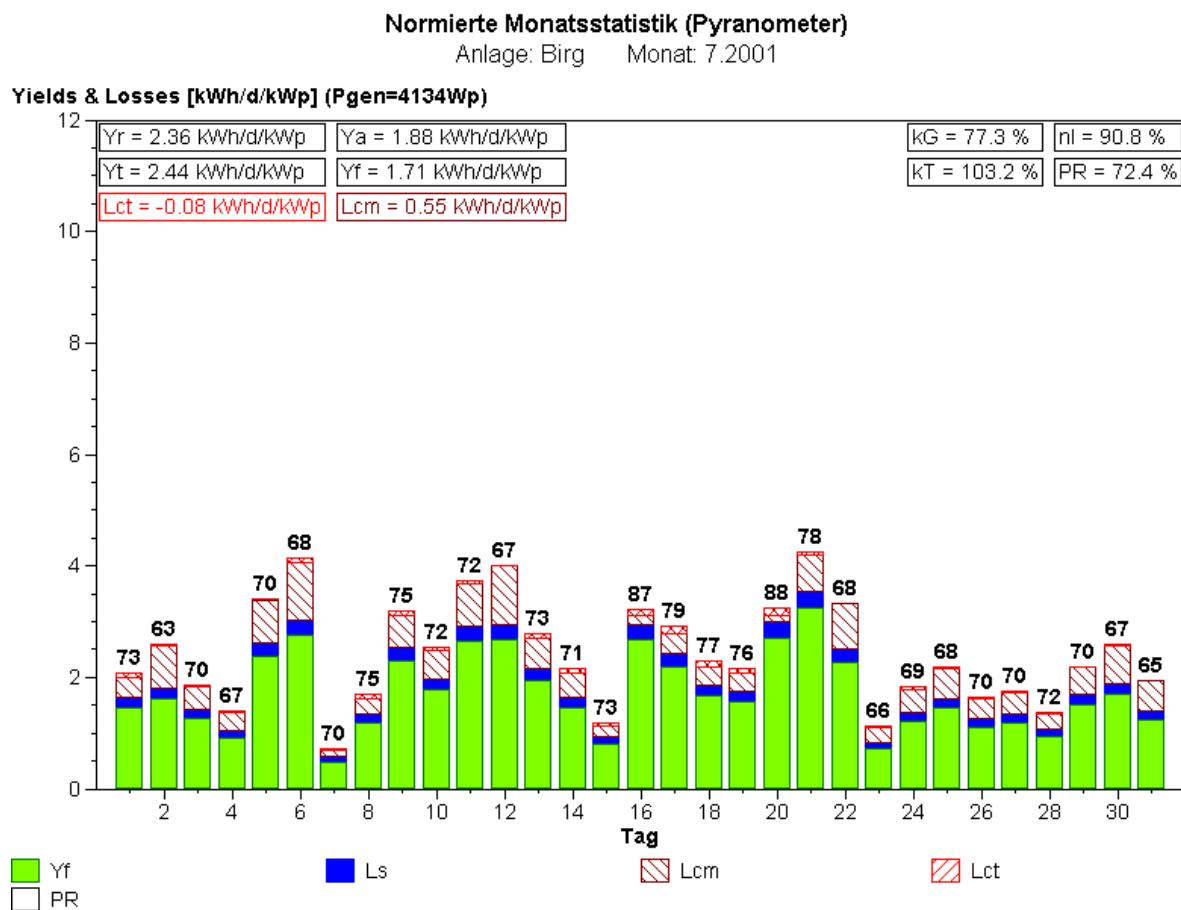


Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 6.2001

Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

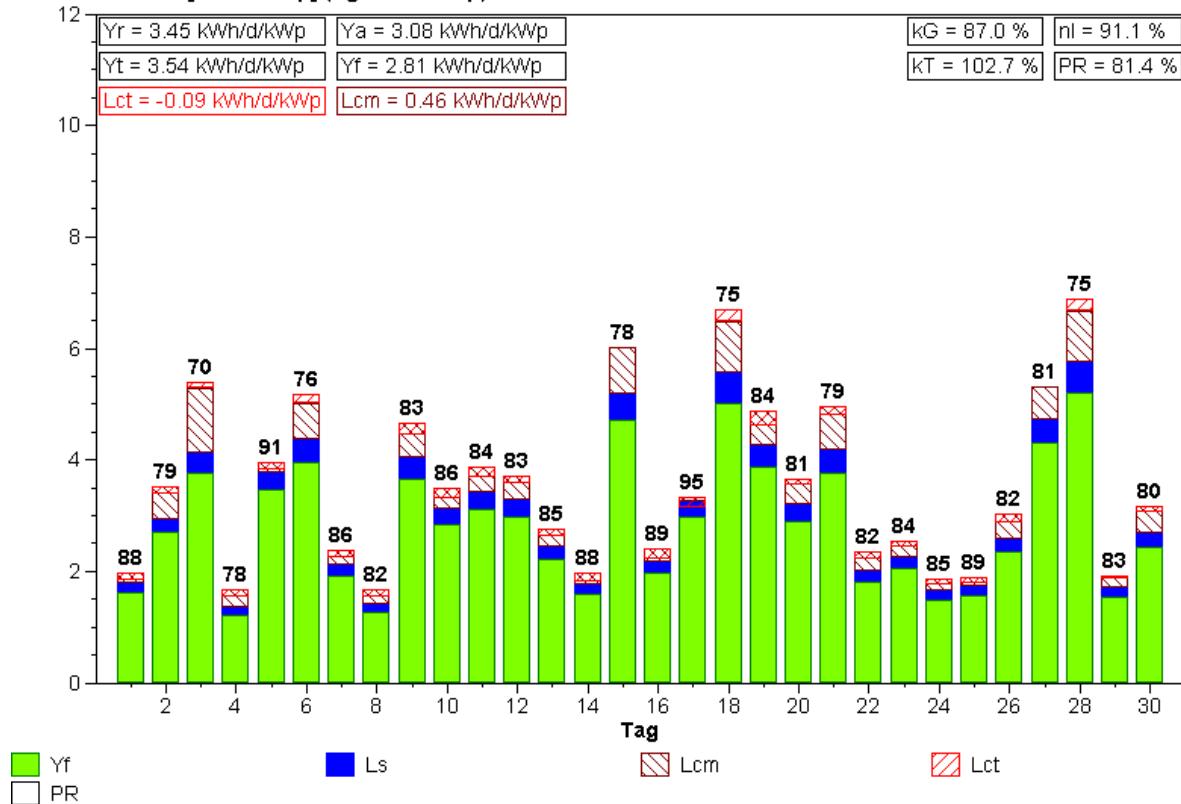




Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 9.2001

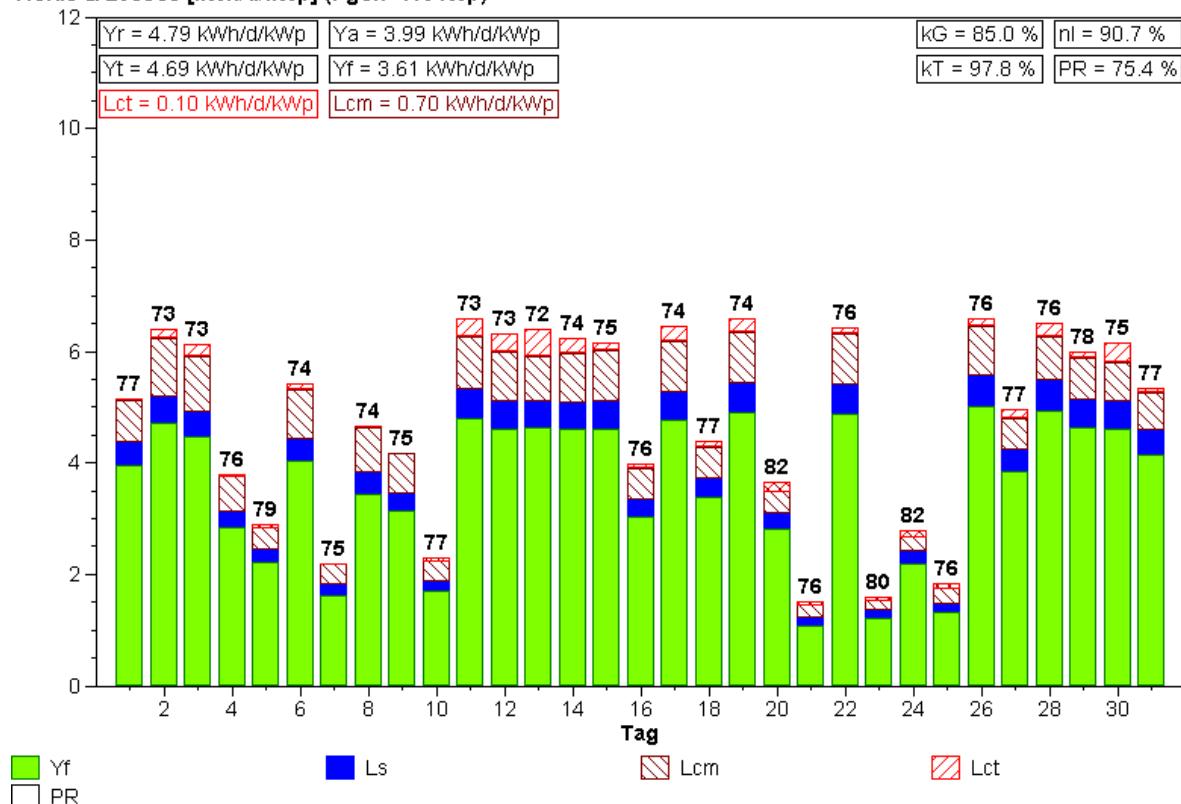
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 10.2001

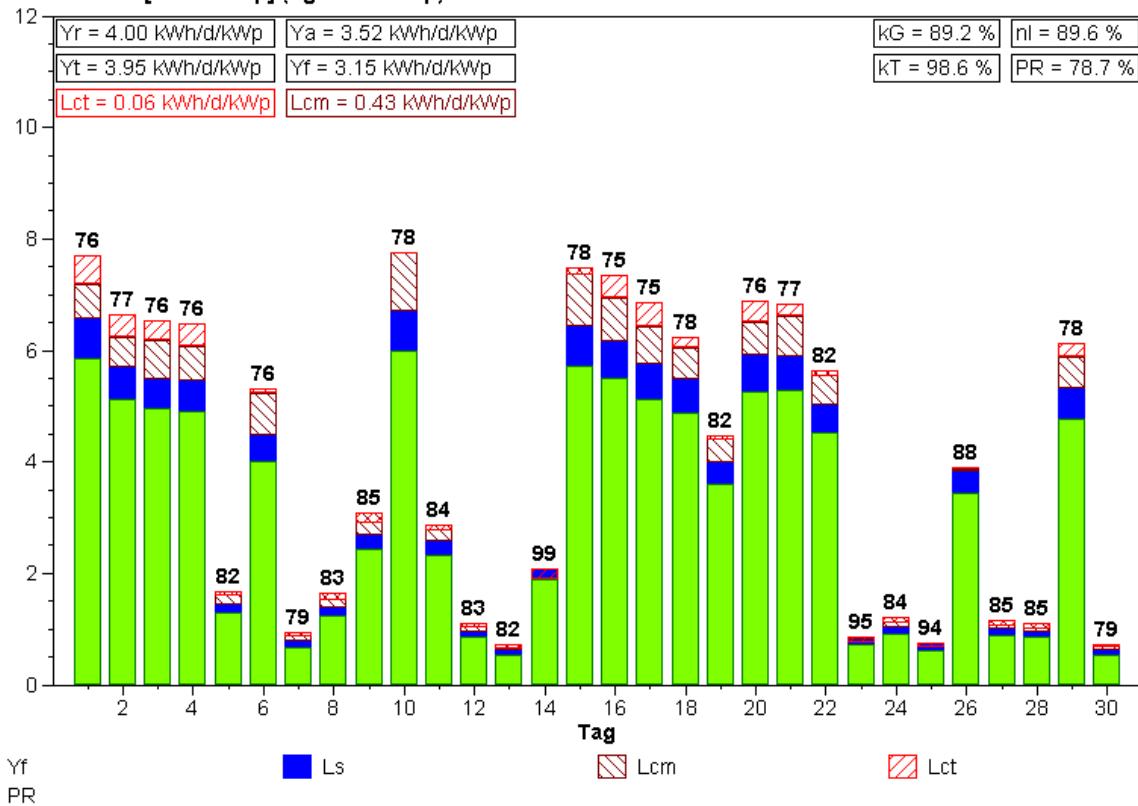
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 11.2001

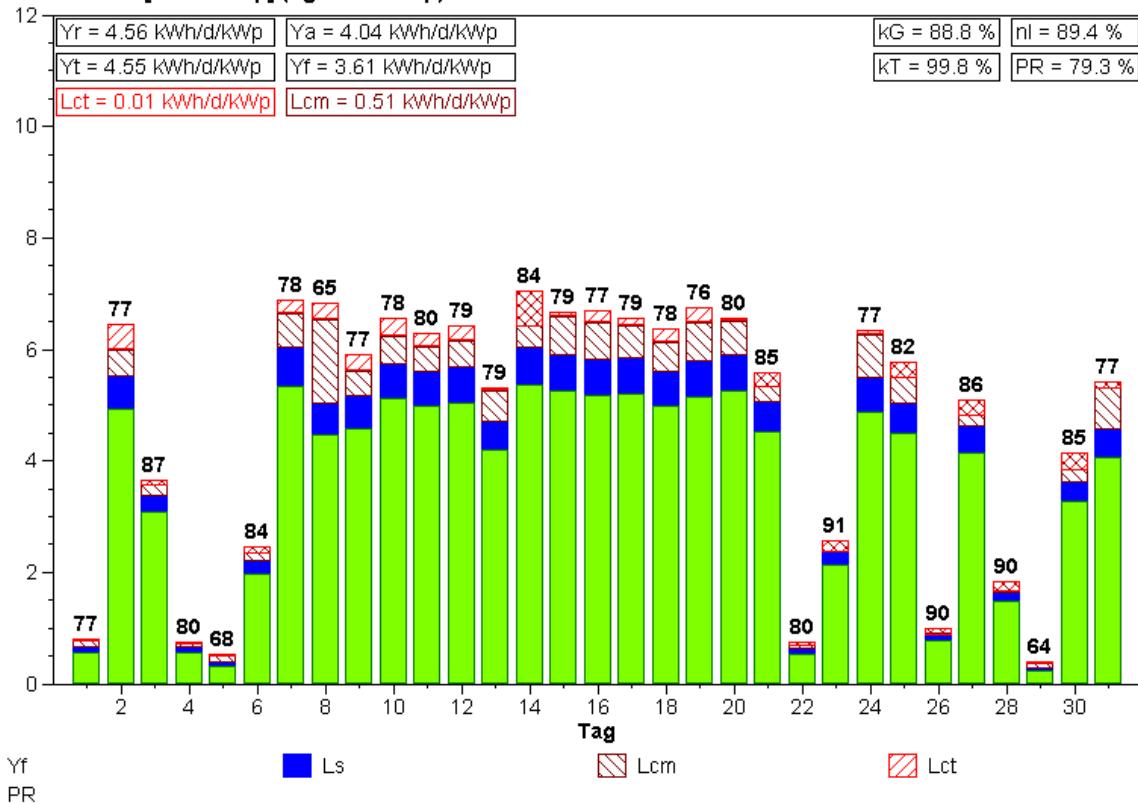
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 12.2001

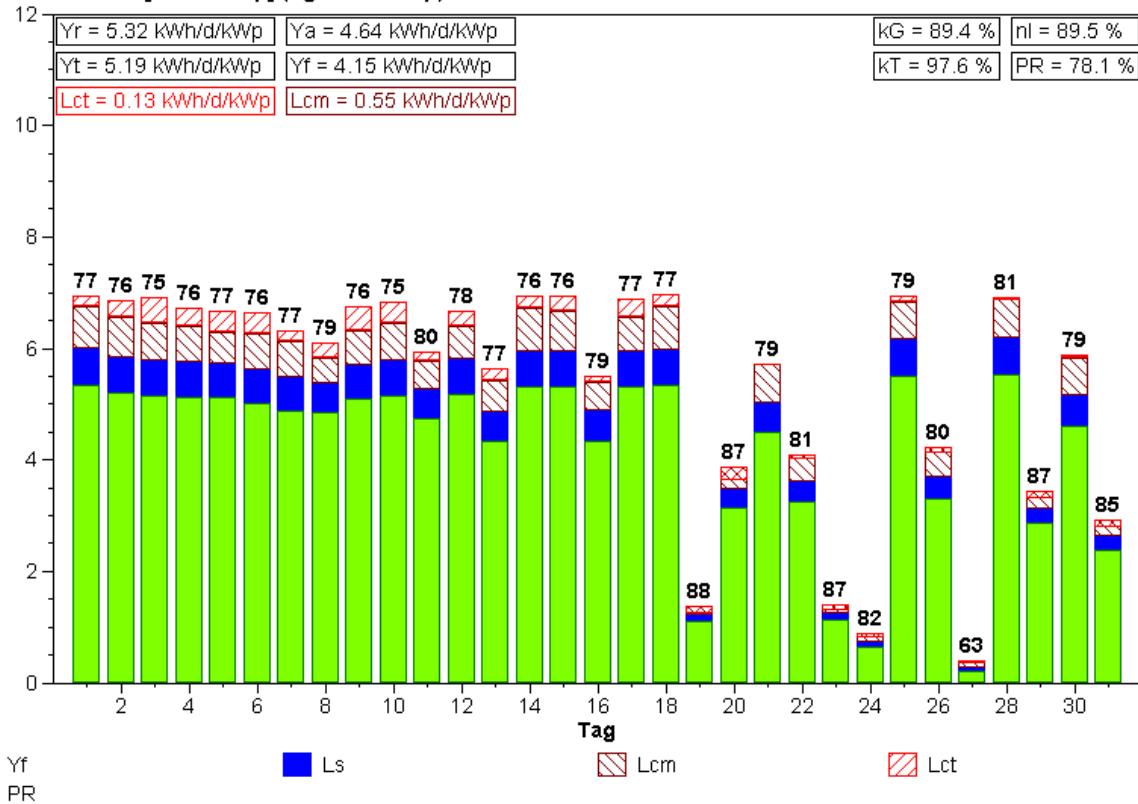
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 1.2002

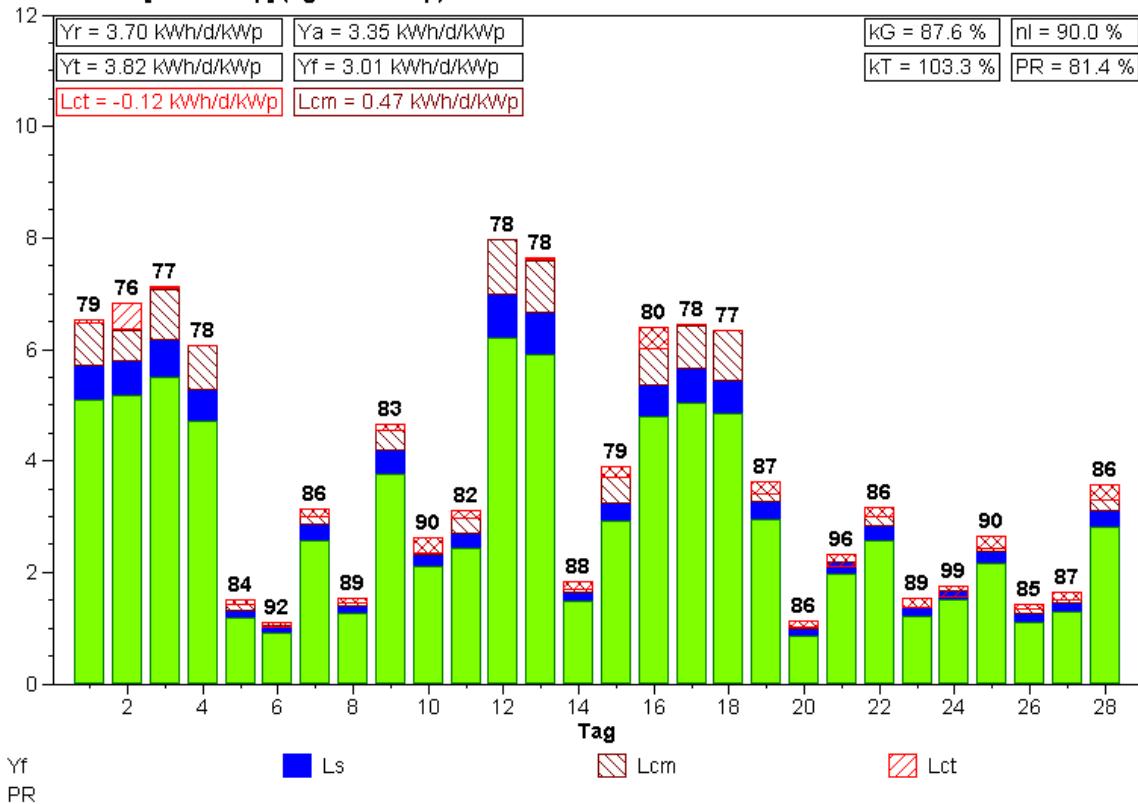
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 2.2002

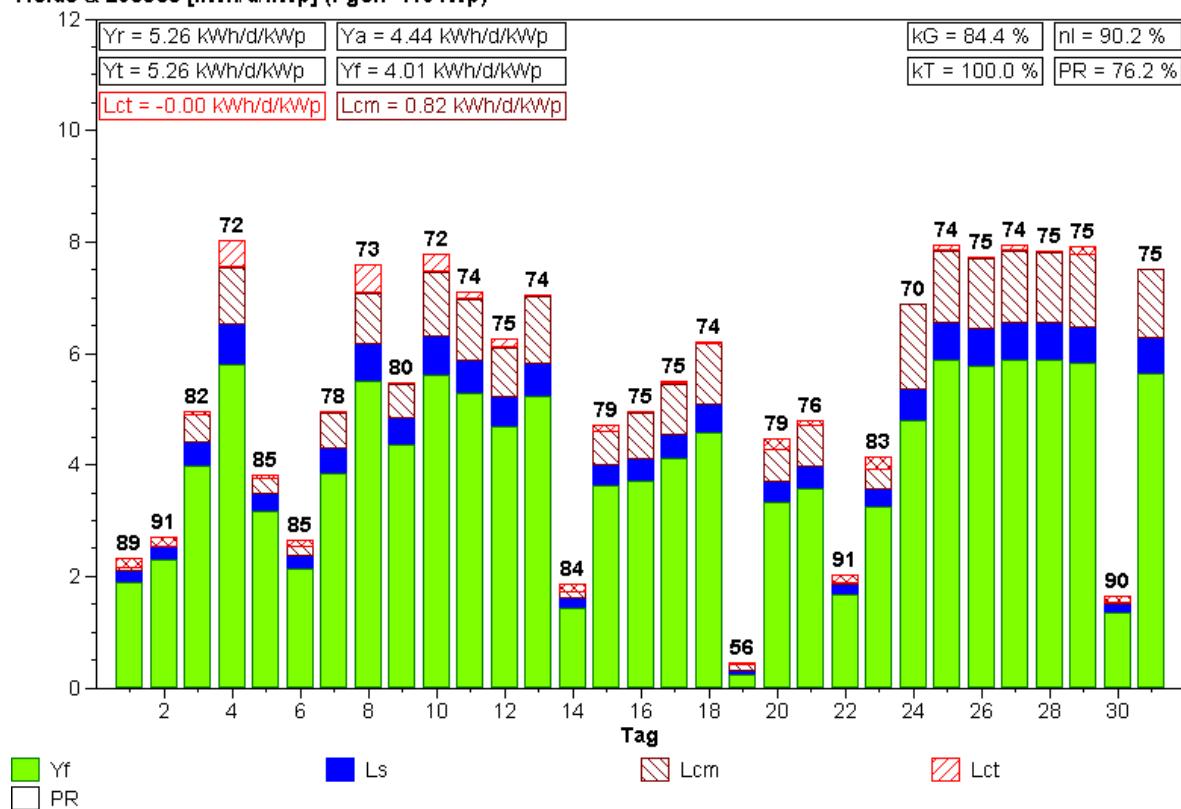
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 3.2002

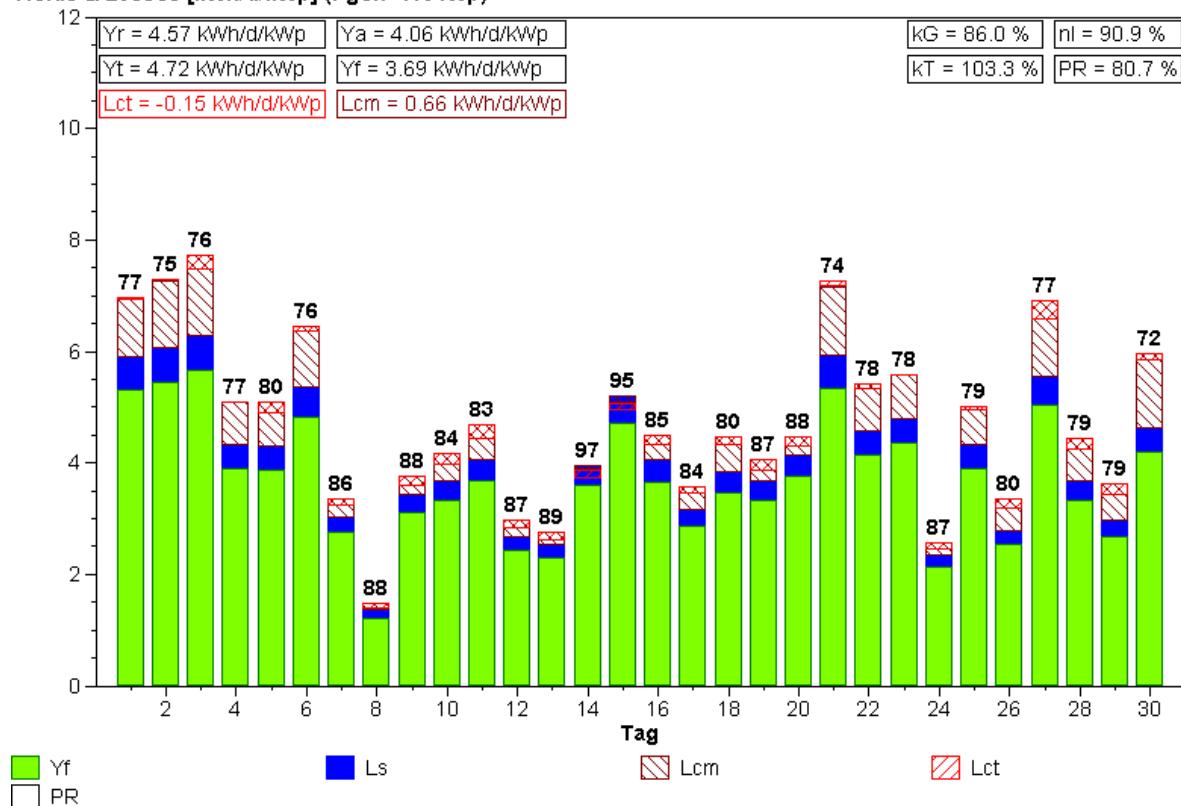
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

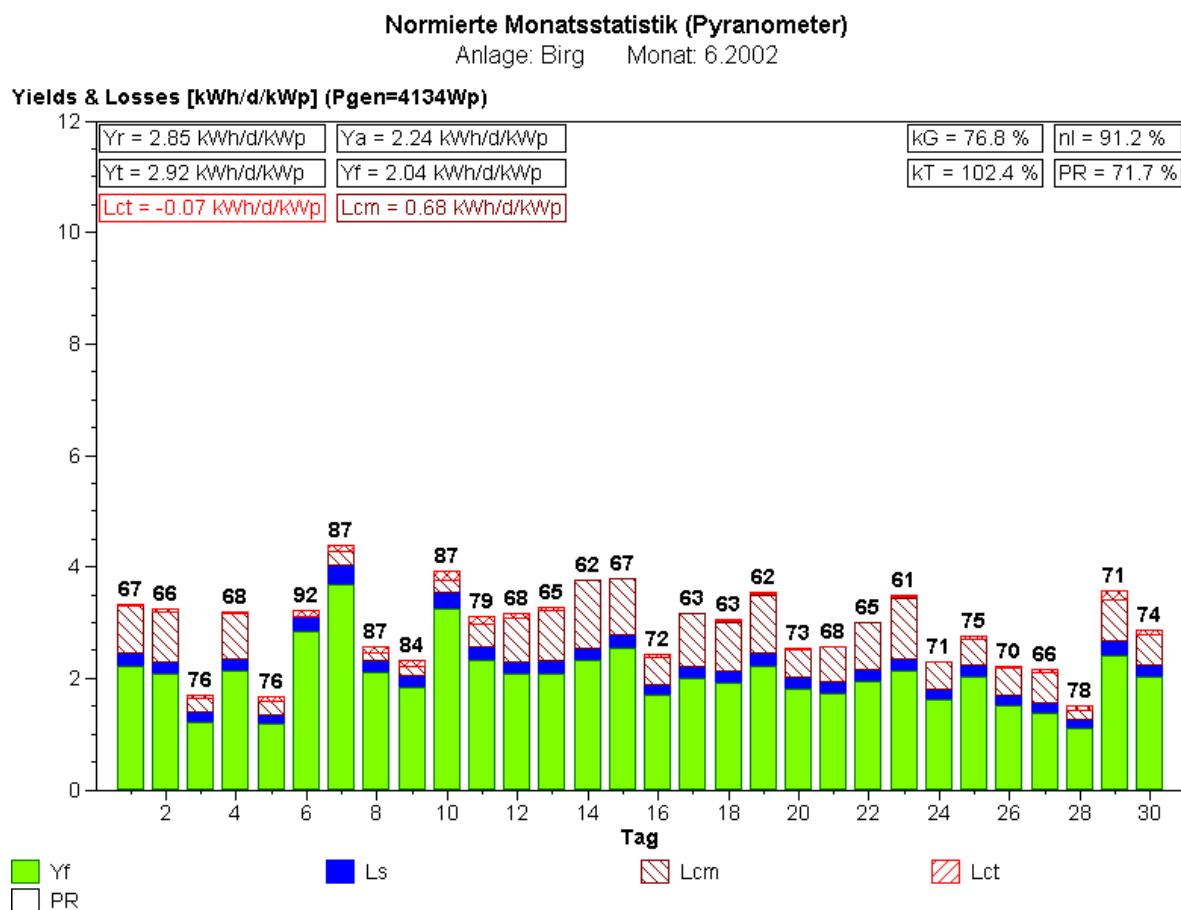
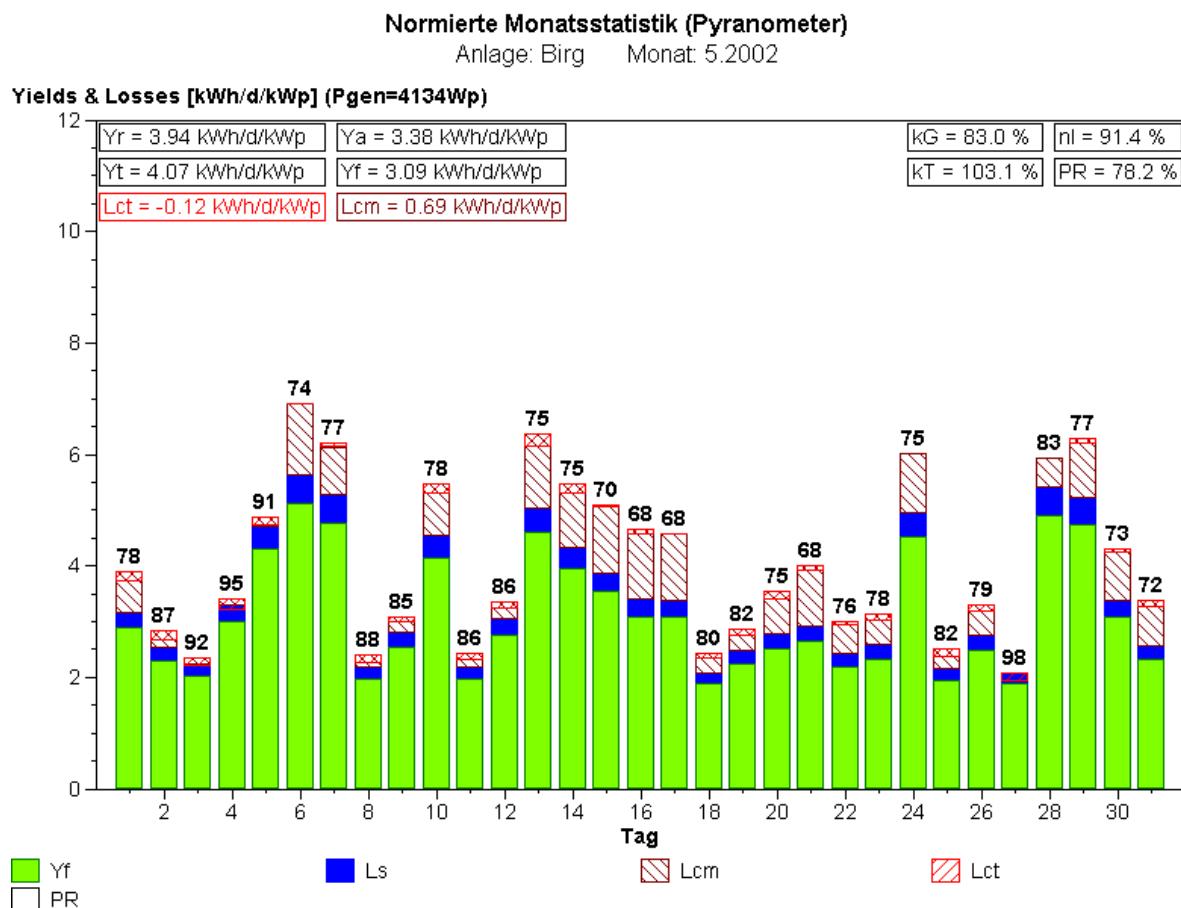


Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 4.2002

Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

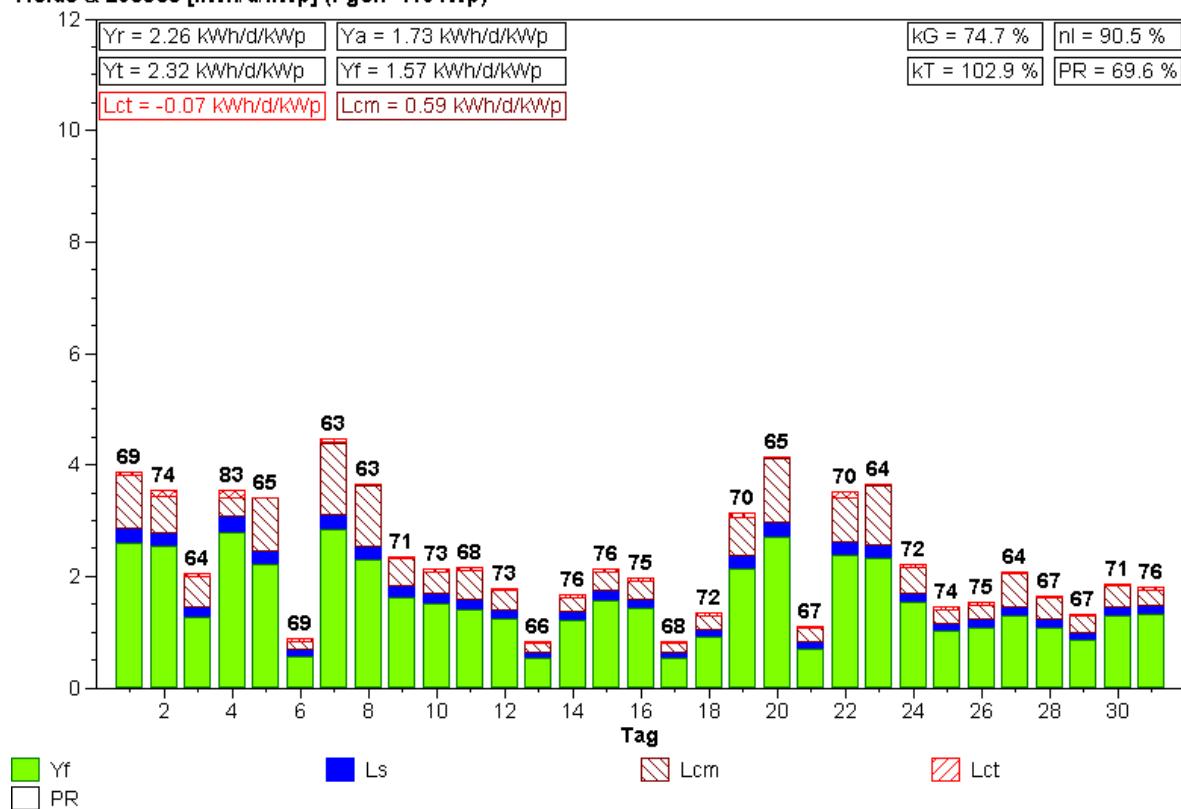




Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 7.2002

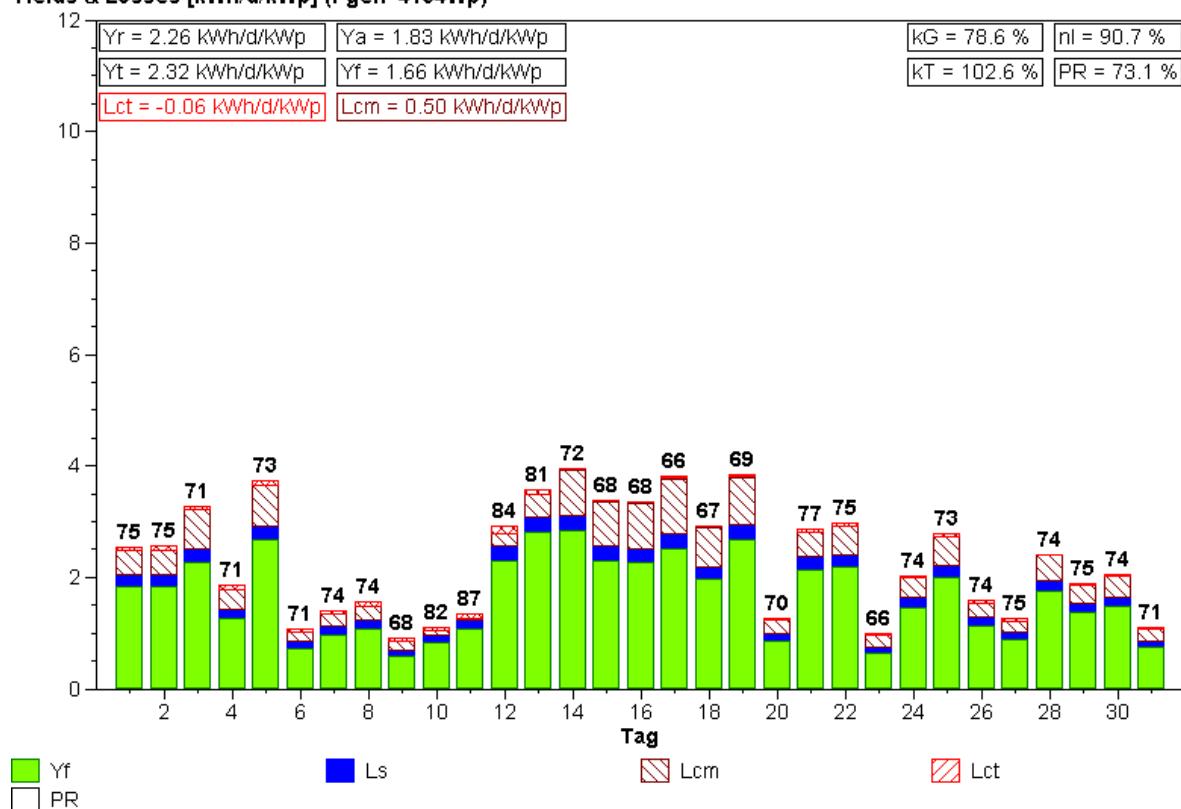
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

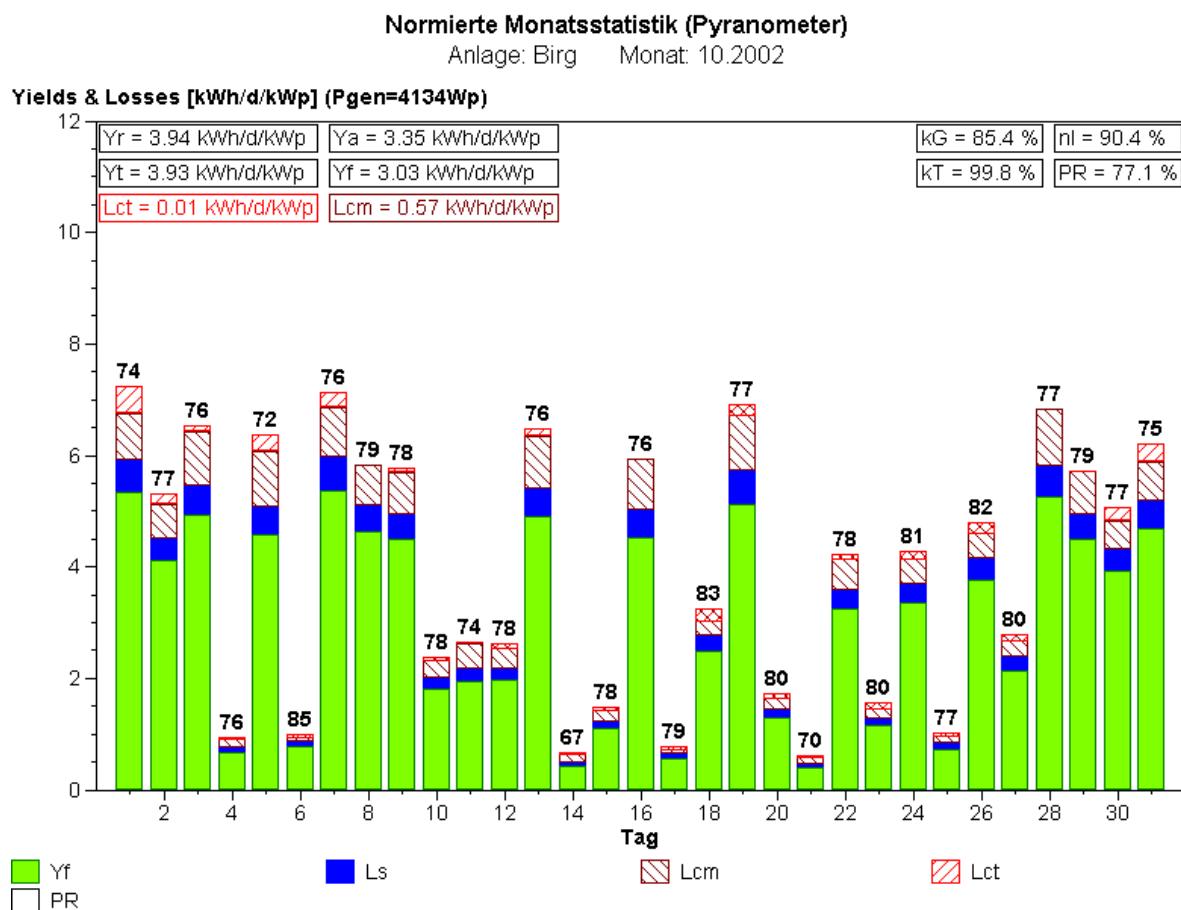
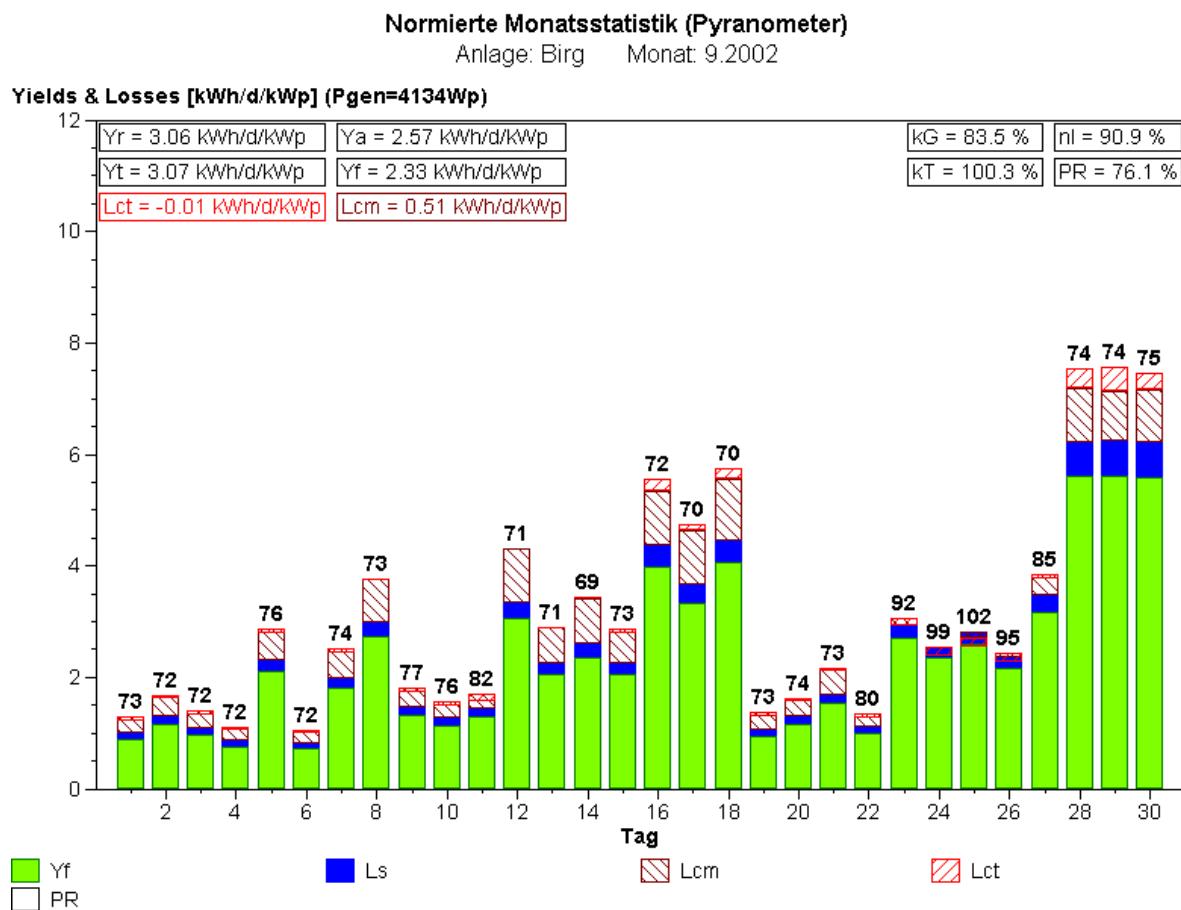


Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 8.2002

Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

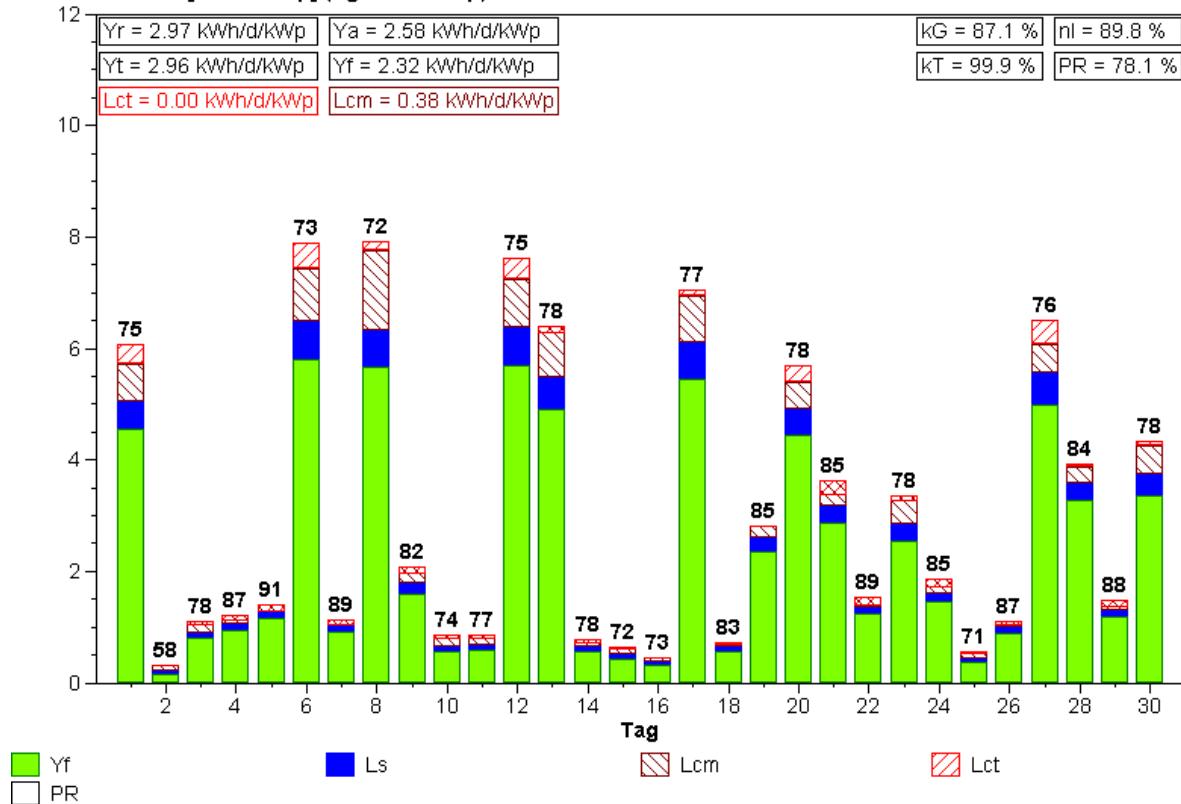




Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 11.2002

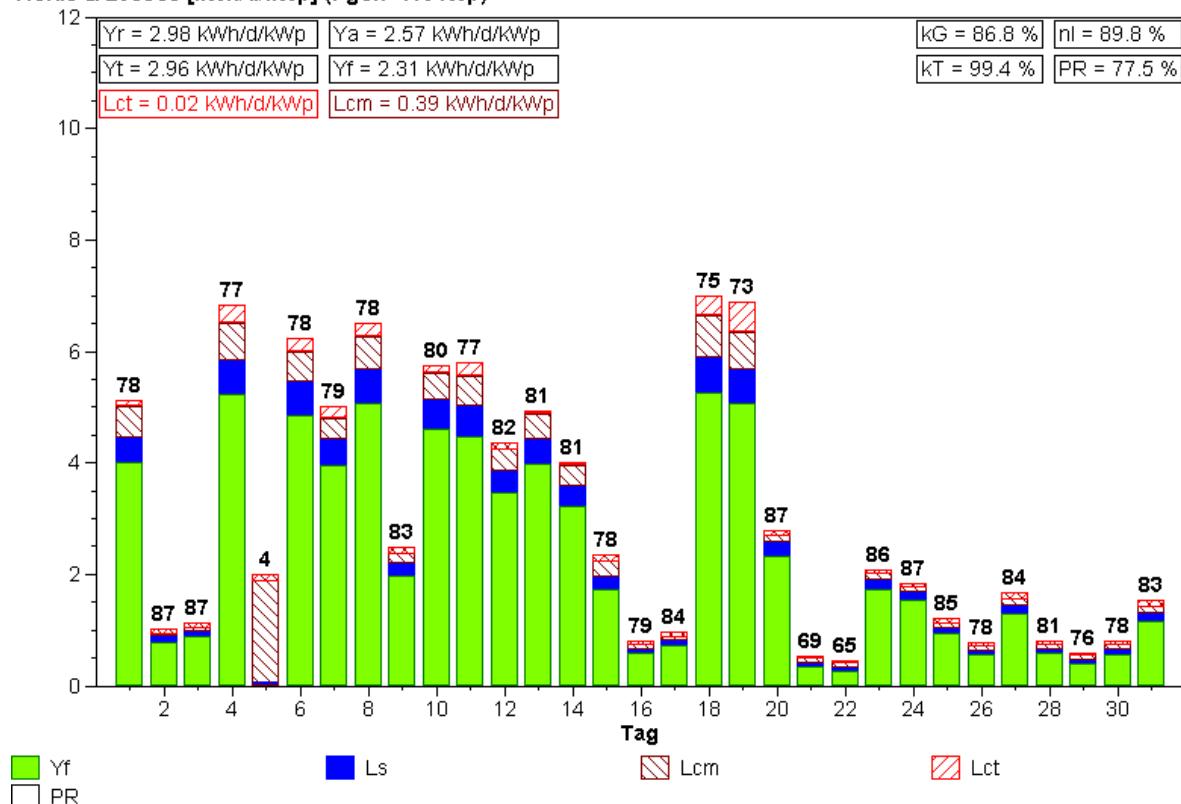
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)

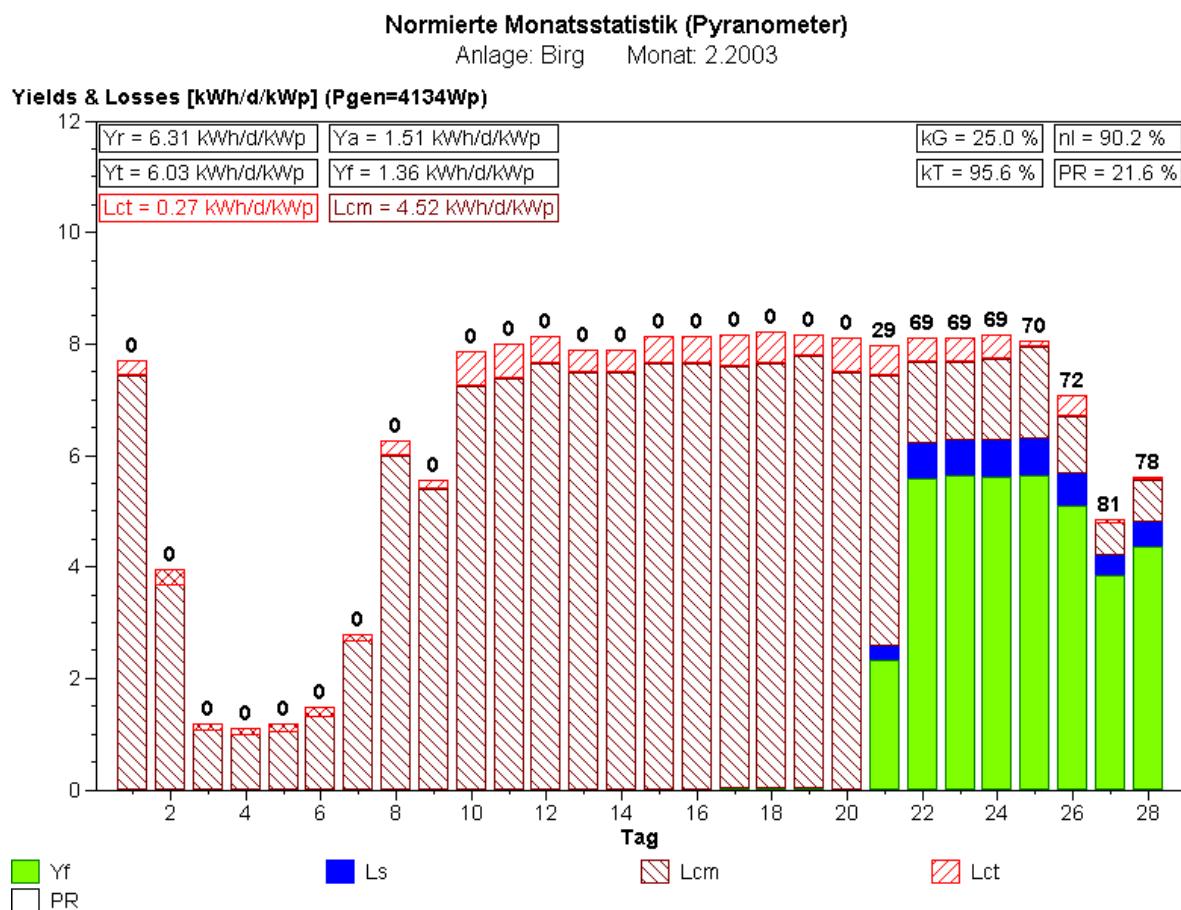
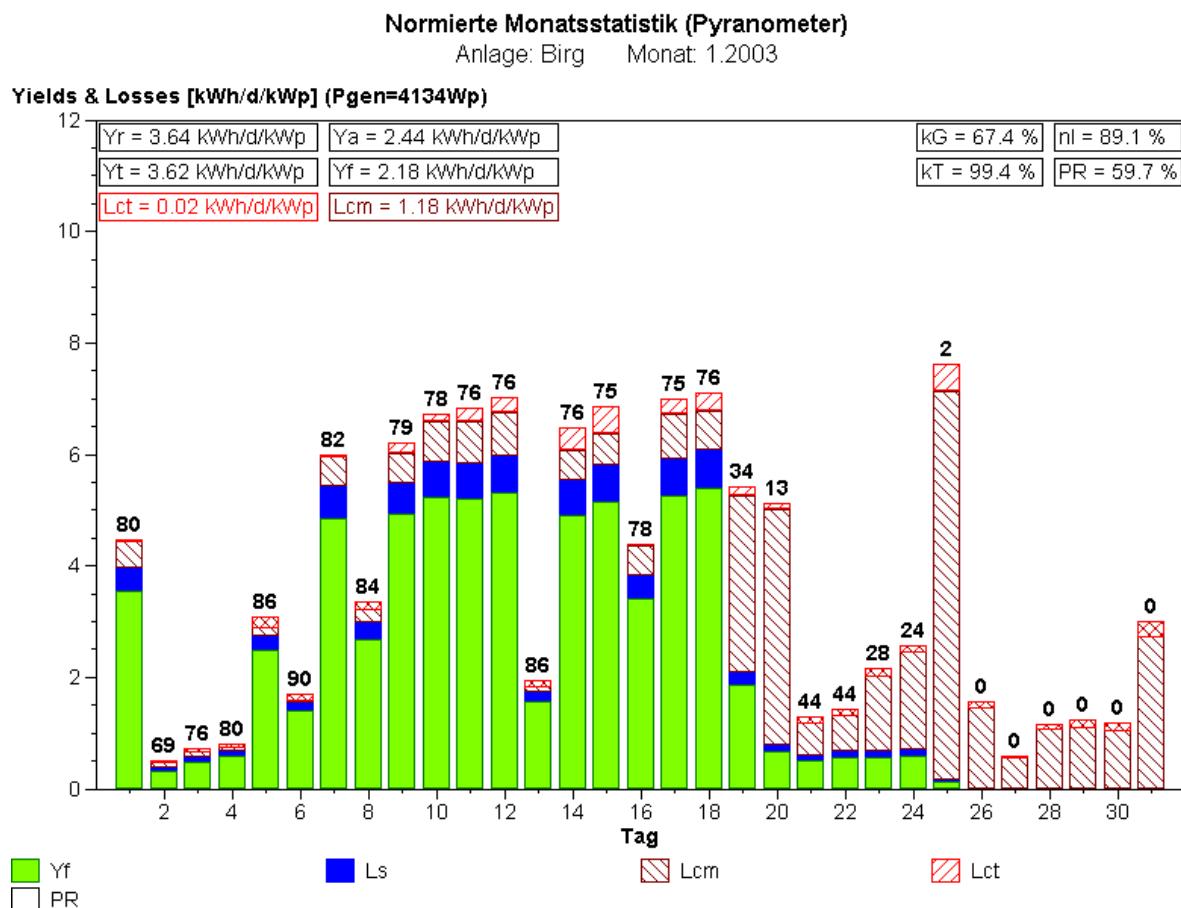


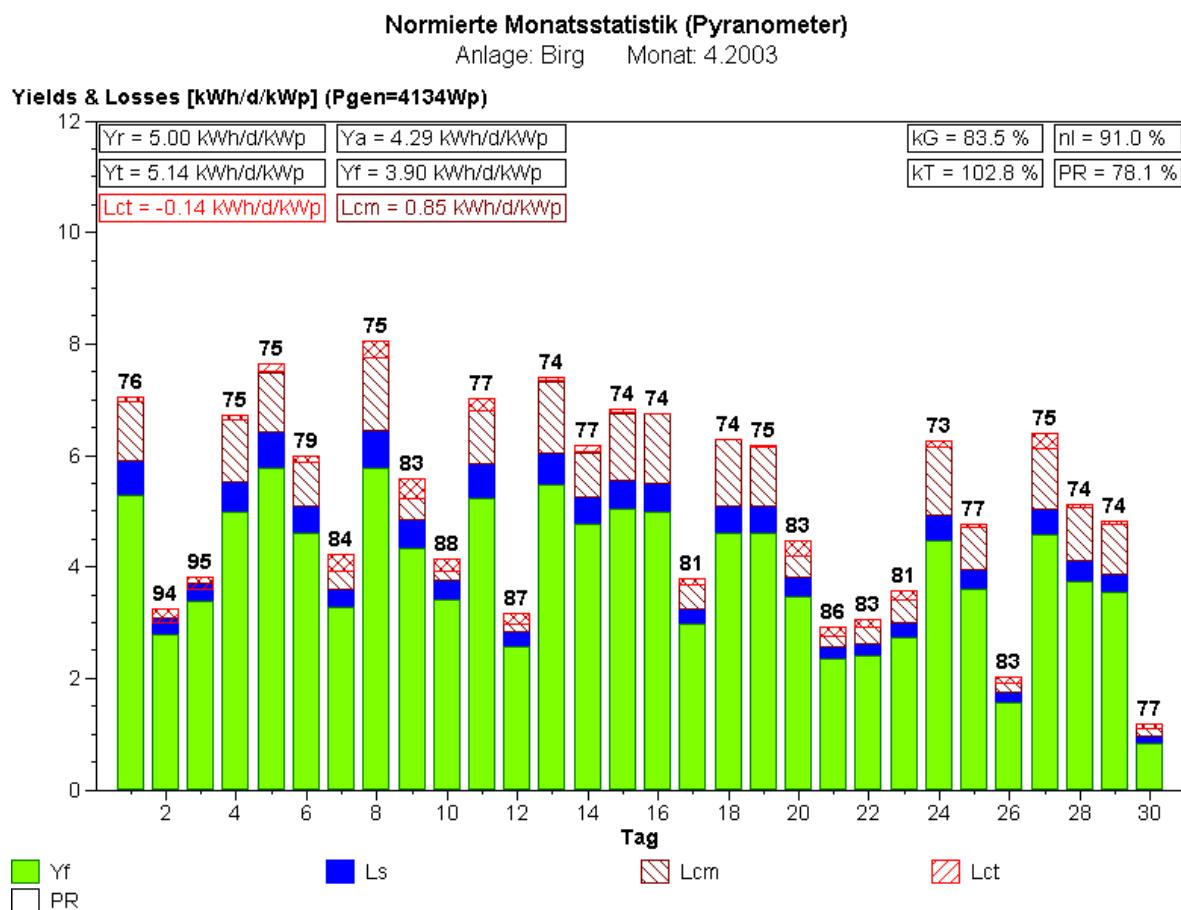
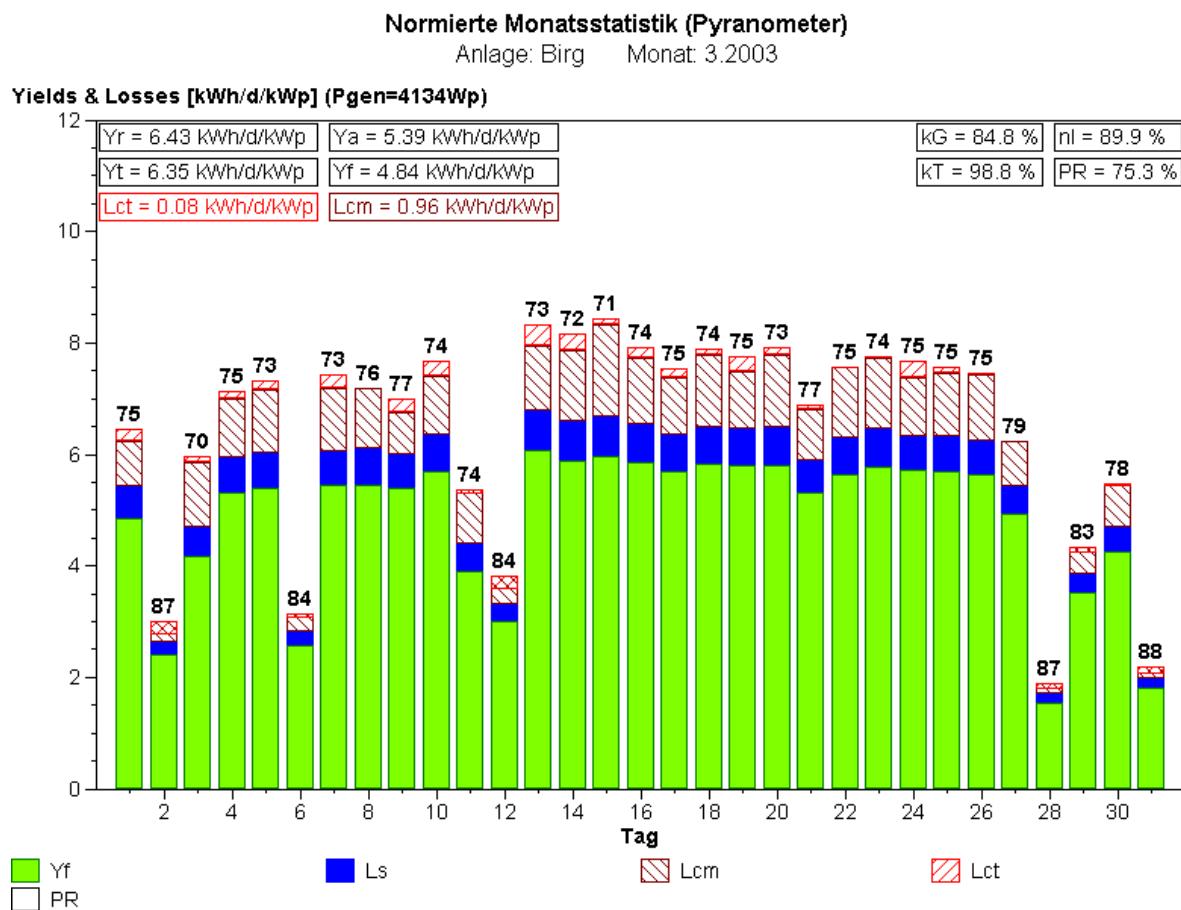
Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 12.2002

Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



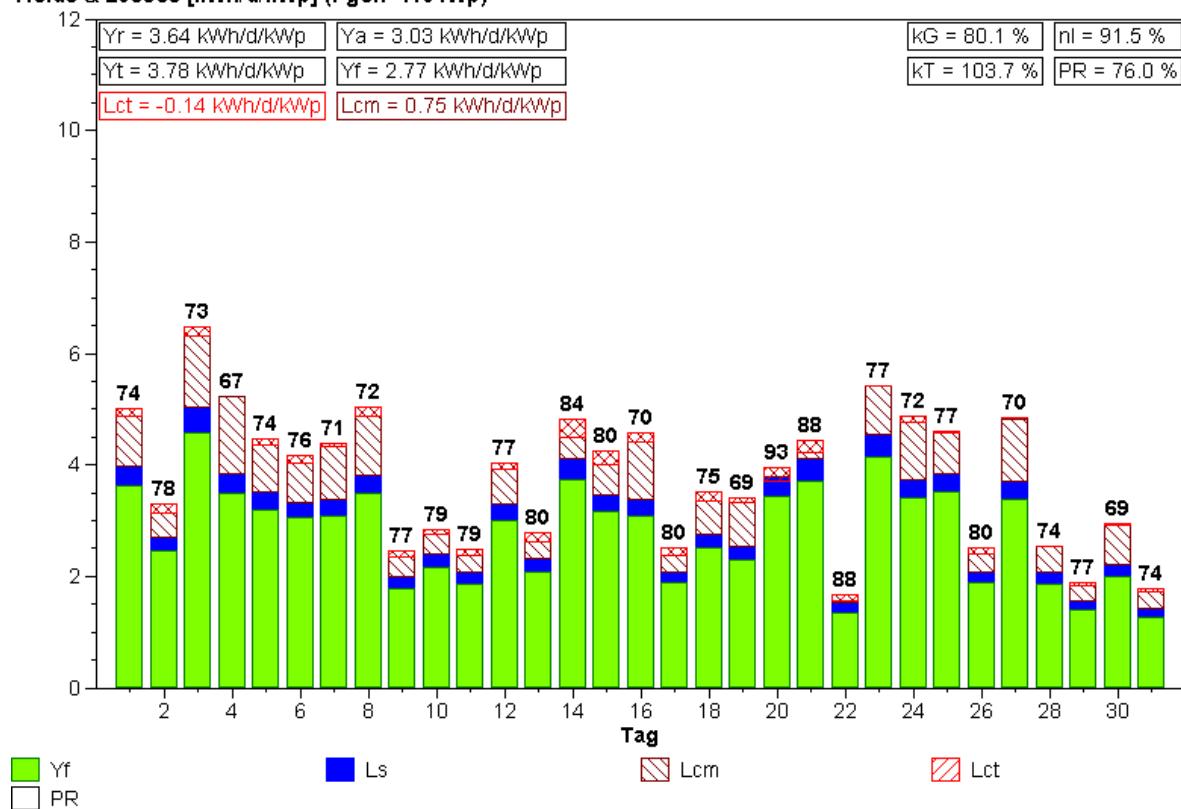




Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 5.2003

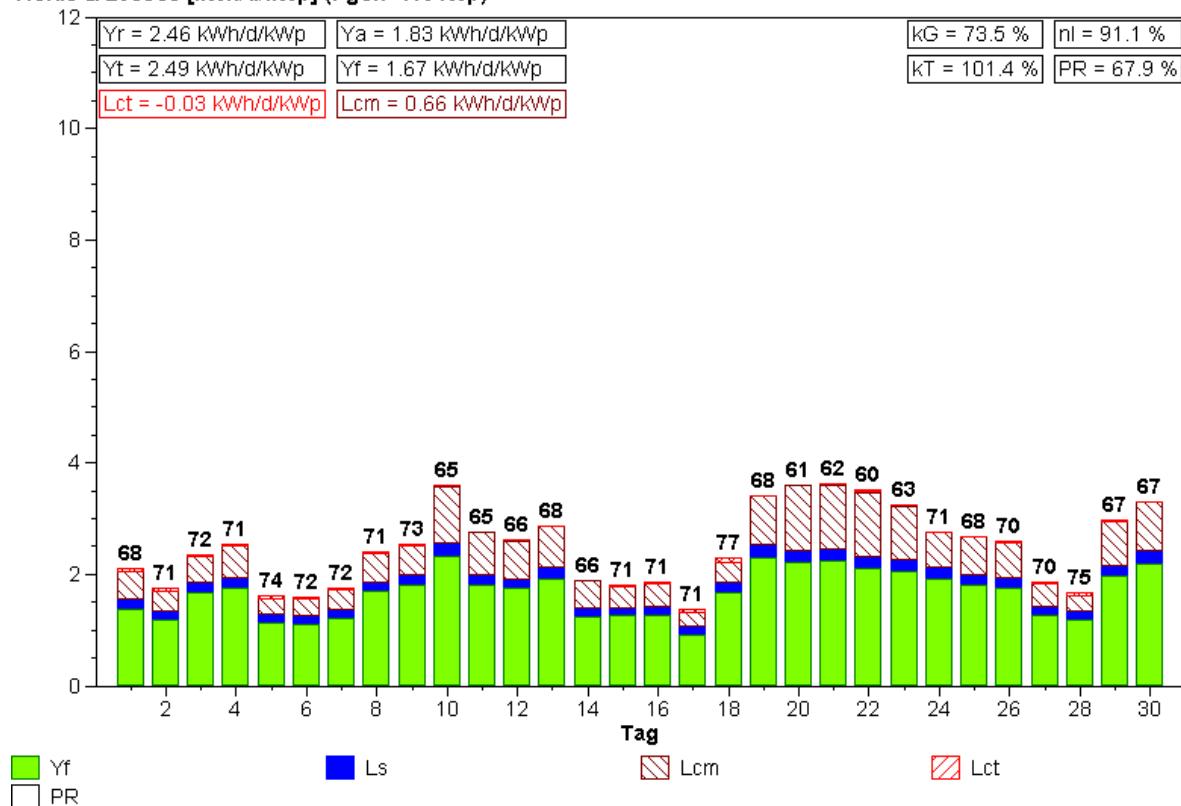
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 6.2003

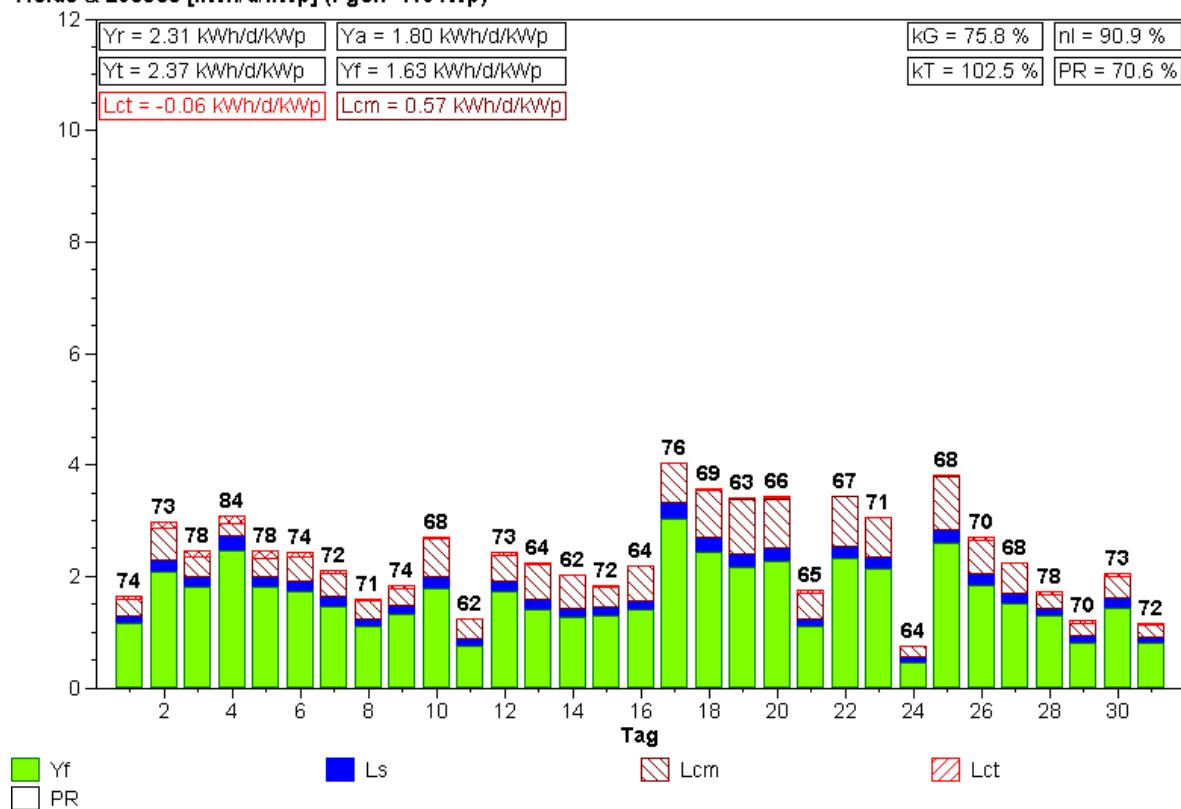
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 7.2003

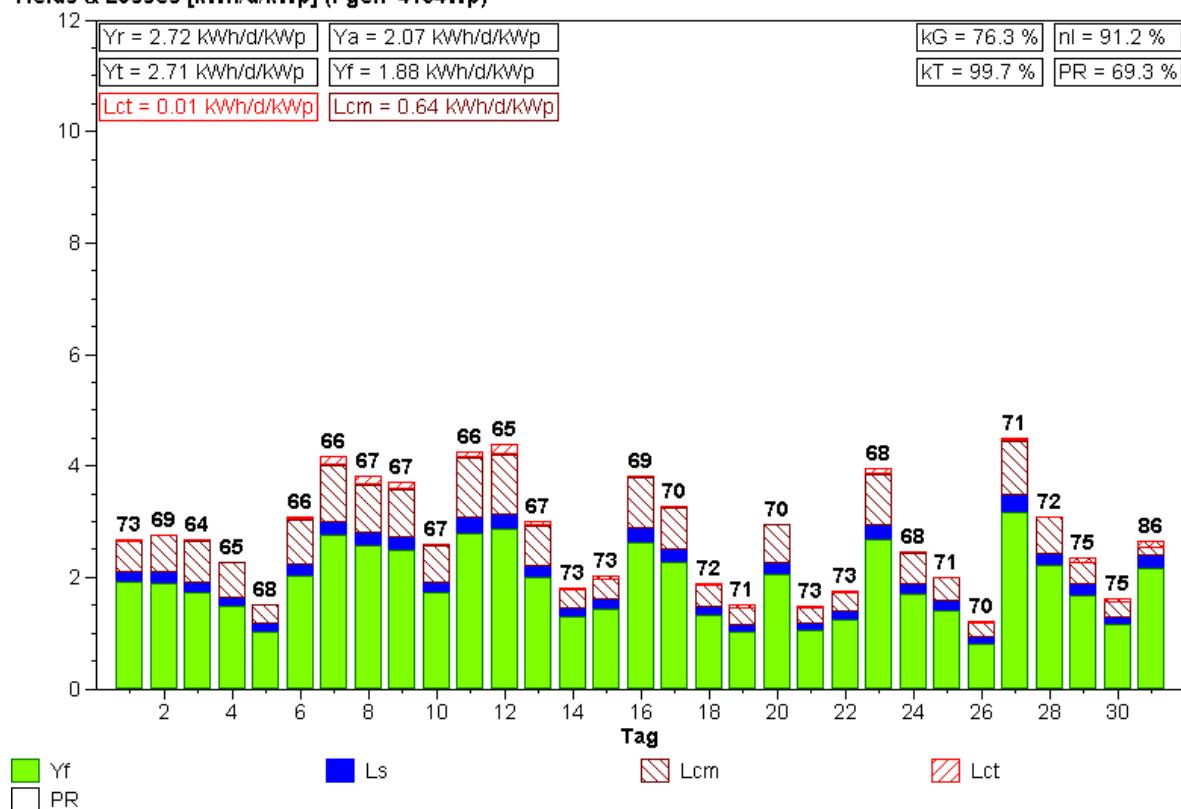
Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Birg Monat: 8.2003

Yields & Losses [kWh/d/kWp] (Pgen=4134Wp)



## zu 6.3 Mont Soleil

**Ort:** Mont Soleil, 2610 Mont Soleil; 1270 m.ü.M.  
**Inbetriebnahme:** 19.02.1992  
01.06.2001 Inbetriebnahme der Messtechnik der HTA Burgdorf

<b>Solargenerator:</b>	Siemens M55 (10464 Stück)
<b>Module:</b>	Siemens M55 (10464 Stück)
<b>Feldleistung:</b>	554,592 kWp (nom.)
<b>Bruttofläche:</b>	4464,88 m <sup>2</sup>
<b>Neigung:</b>	50°
<b>Ausrichtung:</b>	20° / 35° Ost

**Wechselrichter:** ABB 500kW Ausgangsleistung  
Einspeisung 16kV-Mittelspannungsebene

## Messgrößen:

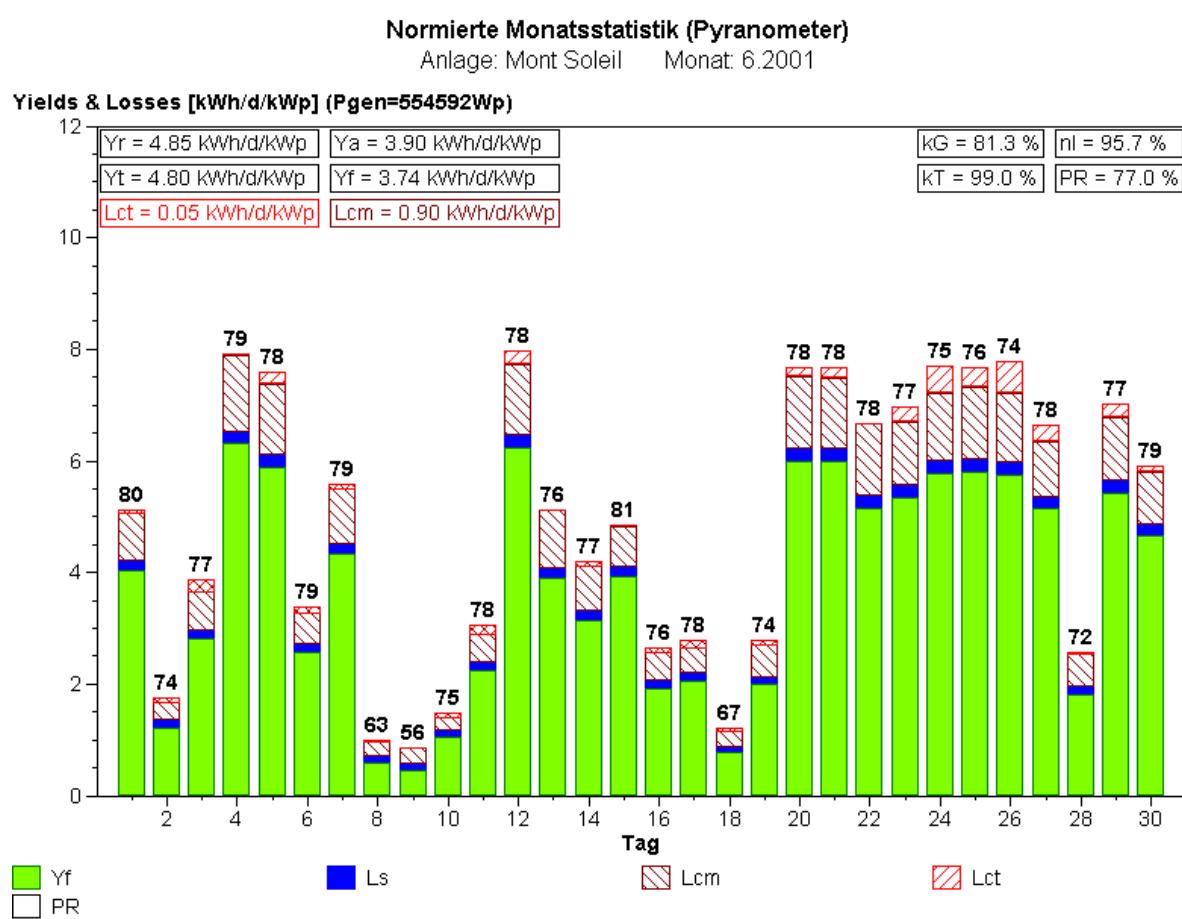
- Sonneneinstrahlung in Modulebene mit Pyranometer CM21 (beheizt)
  - Sonneneinstrahlung in Horizontalebene mit Pyranometer CM11 (beheizt)
  - Sonneneinstrahlung in Modulebene mit Referenzzelle M1R
  - Solarzellentemperatur des Referenzmoduls M1R
  - Umgebungstemperatur PT100
  - Gleichspannung
  - Gleichstrom (gesamt)
  - Eigenverbrauch des Wechselrichters
  - ins Netz eingespeiste Wirkleistung
  - Netzspannung





**Besondere Betriebsereignisse:**

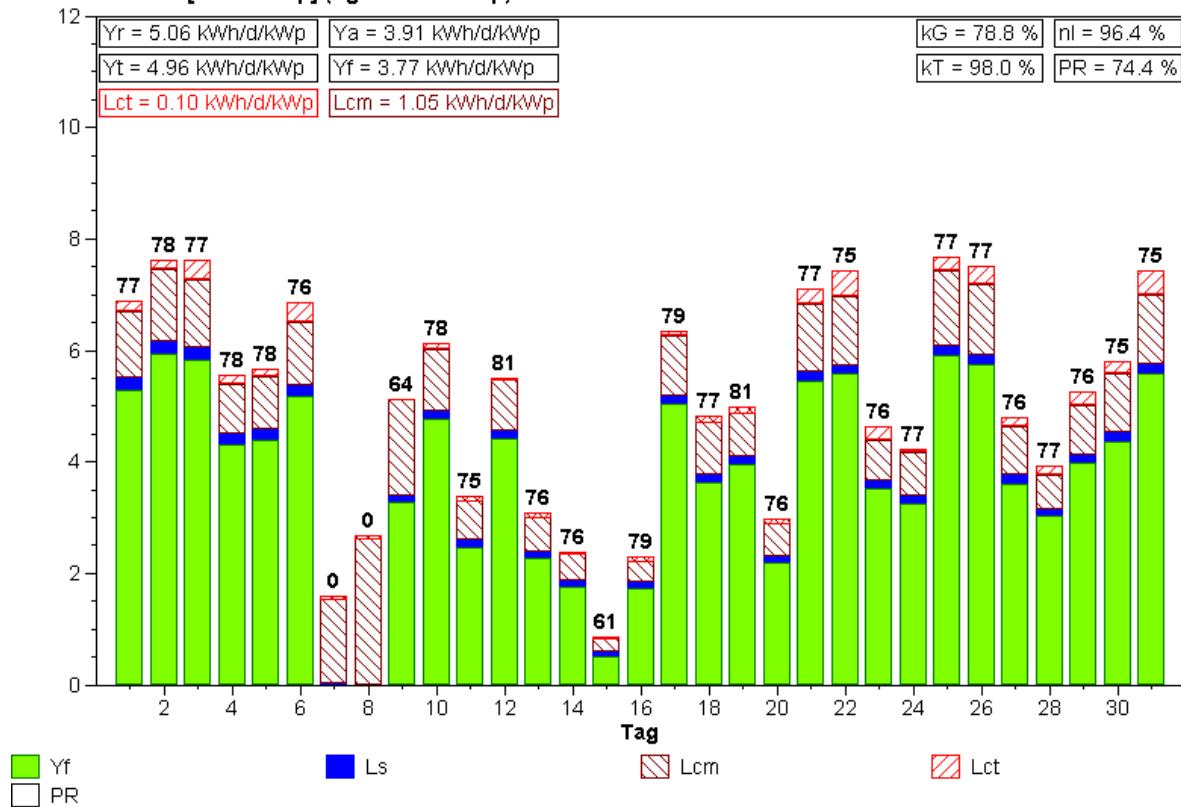
07.07.2001 – 08.07.2001	Störung des Anlagenbetriebs durch Dritte
26.09.2001 – 02.10.2001	Ausfall von einem Teilstück des Solargenerators
15.11.2001 – 19.11.2001	Wechselrichter startete nicht automatisch und Ausfall von einem Teilstück des Solargenerators
30.12.2001 – 03.01.2002	Wechselrichter startete nicht automatisch
08.03.2002	Netzunterbruch
10.04.2002 – 19.04.2002	Ausfall von einem Teilstück des Solargenerators
02.06.2002	Betriebsunterbruch der Anlage, manueller Neustart
20.06.2002	Betriebsunterbruch der Anlage, manueller Neustart
24.06.2002 – 25.06.2002	Wechselrichter startete nicht automatisch und Ausfall von einem Teilstück des Solargenerators
11.07.2002	Betriebsunterbruch der Anlage, manueller Neustart
11.08.2002 – 12.08.2002	Wechselrichter startete nicht automatisch
20.08.2002 – 21.08.2002	Betriebsunterbruch der Anlage (Gewitter!), manueller Neustart
04.09.2002	Betriebsunterbruch der Anlage (Gewitter!), manueller Neustart
16.09.2002 – 24.09.2002	Ausfall von einem Teilstück des Solargenerators
05.02.2003 – 08.02.2003	Wechselrichter startete nicht automatisch
22.02.2003 – 24.02.2003	Wechselrichter startete nicht automatisch
24.02.2003 – 14.03.2003	Ausfall von einem Teilstück des Solargenerators
08.03.2003	Netzunterbruch
20.03.2003	Kurzzeitige Ausserbetriebnahme der Anlage
19.04.2003 – 23.04.2003	Ausfall von mehreren Teilstücken des Solargenerators
12.06.2003	Betriebsunterbruch der Anlage (Gewitter!), manueller Neustart
01.07.2003 – 02.07.2003	Betriebsunterbruch der Anlage, manueller Neustart
09.07.2003	Kurzzeitige Ausserbetriebnahme der Anlage
18.07.2003	Kurzzeitige Ausserbetriebnahme der Anlage



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 7.2001

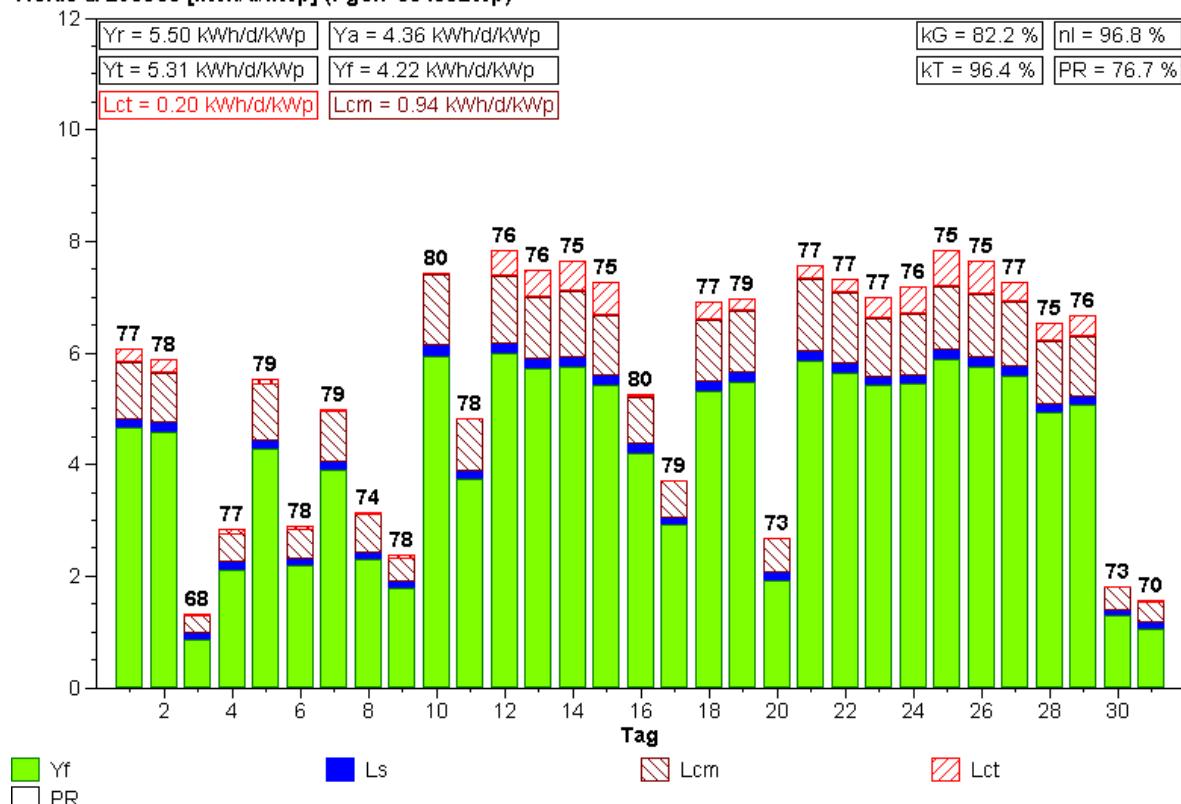
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 8.2001

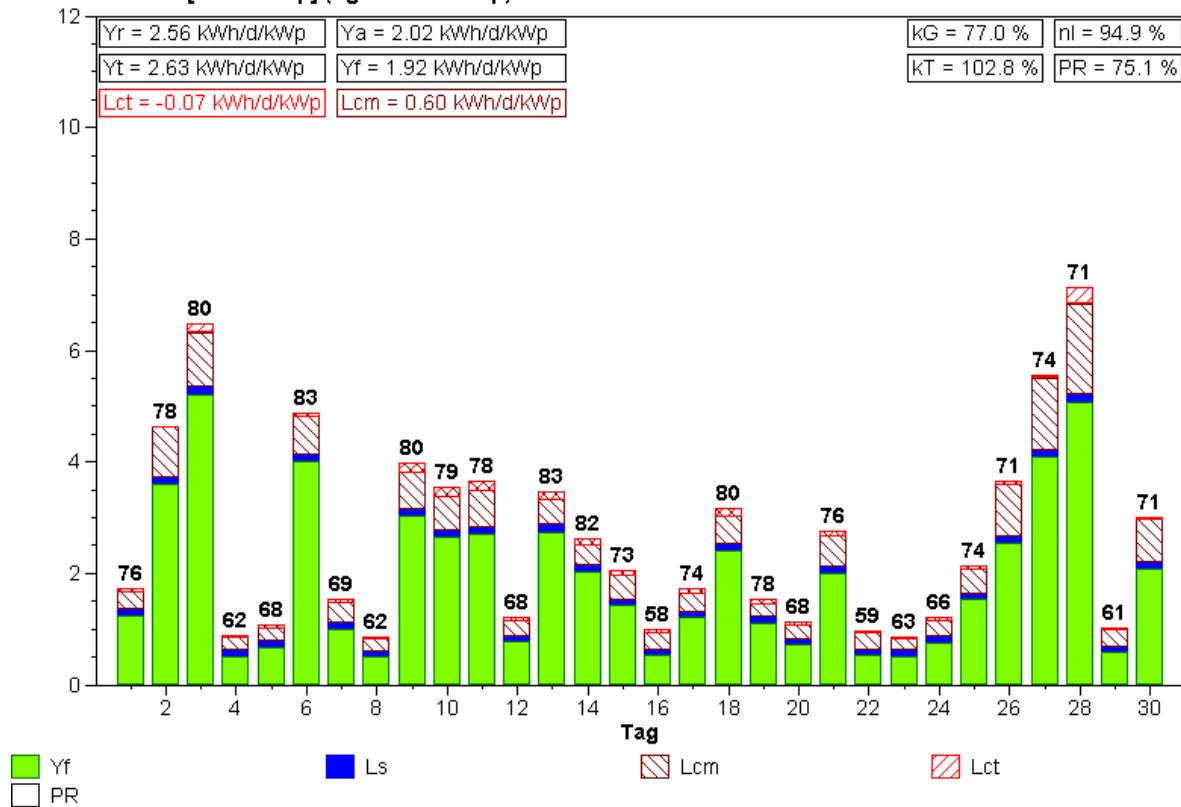
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 9.2001

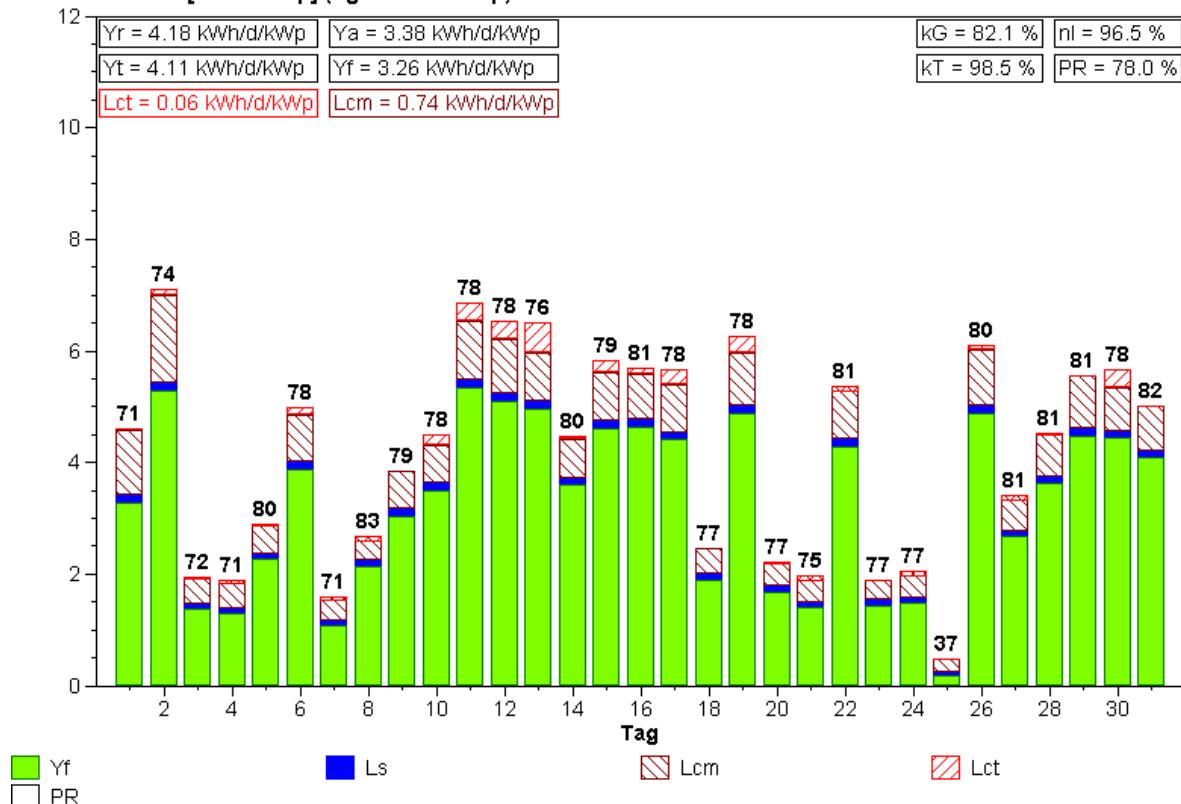
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 10.2001

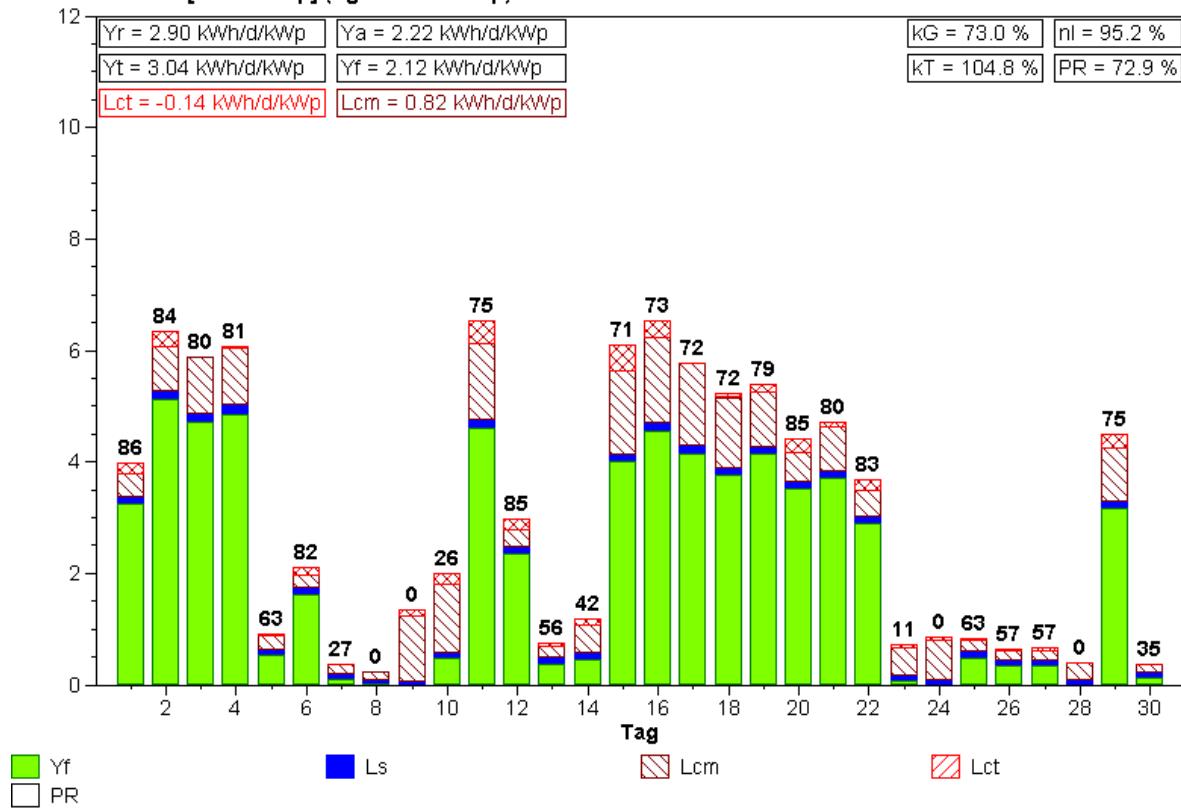
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 11.2001

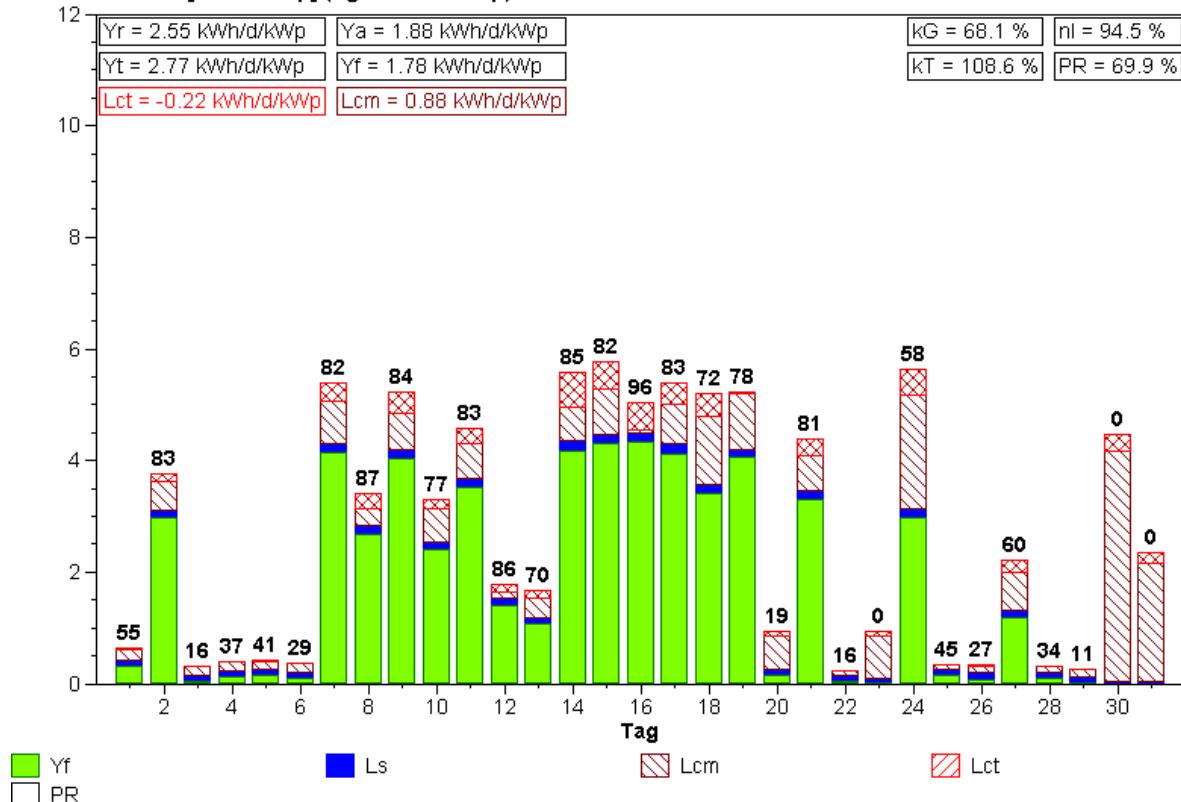
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 12.2001

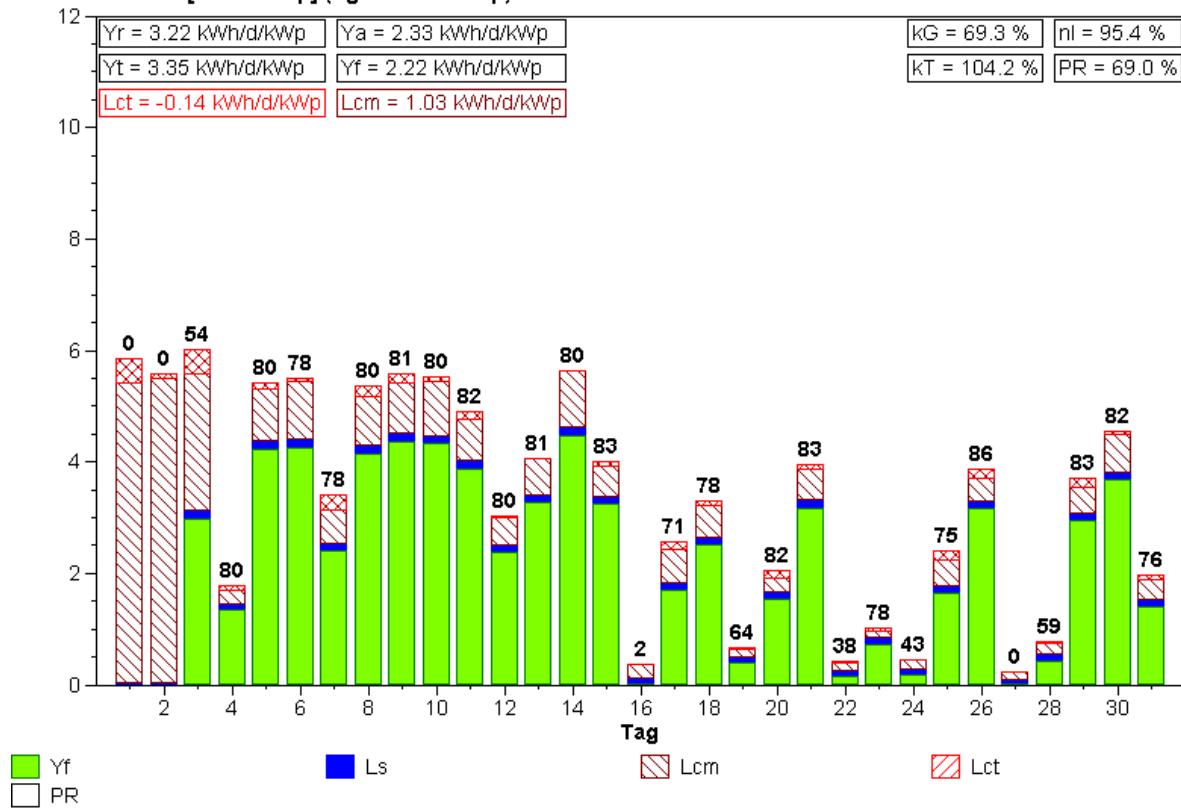
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 1.2002

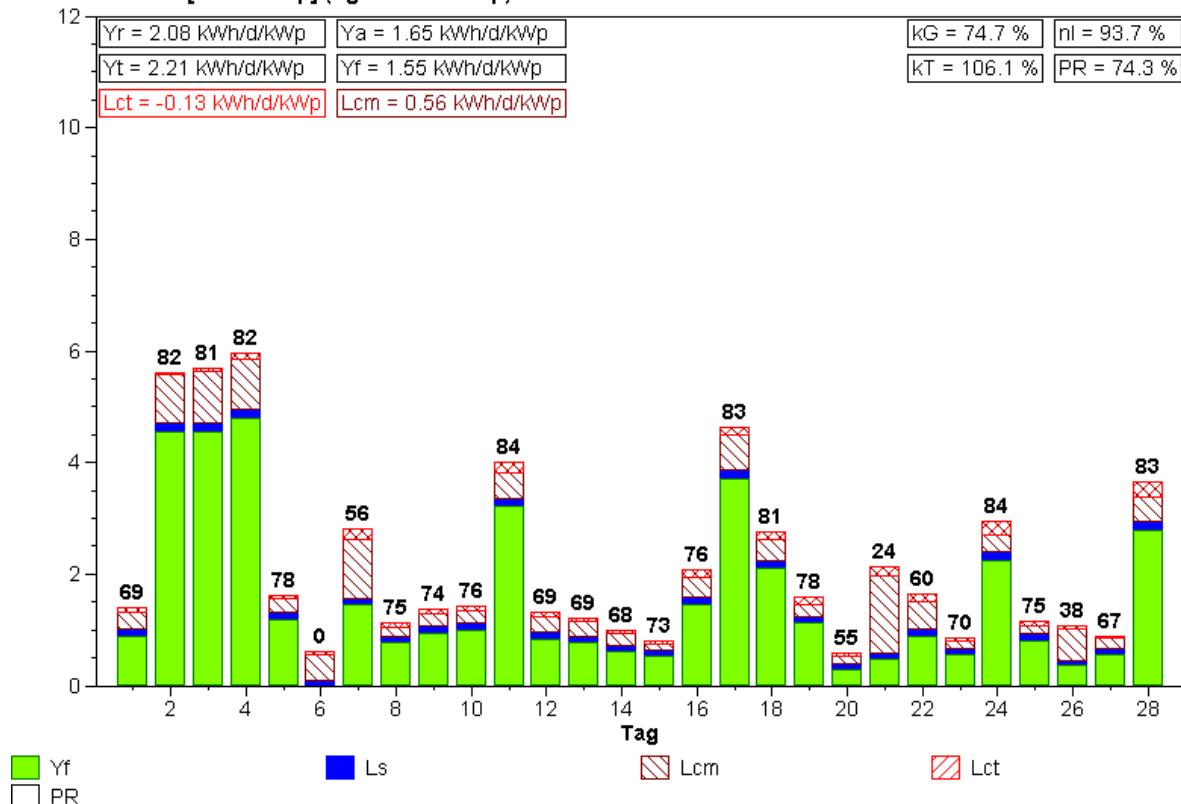
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 2.2002

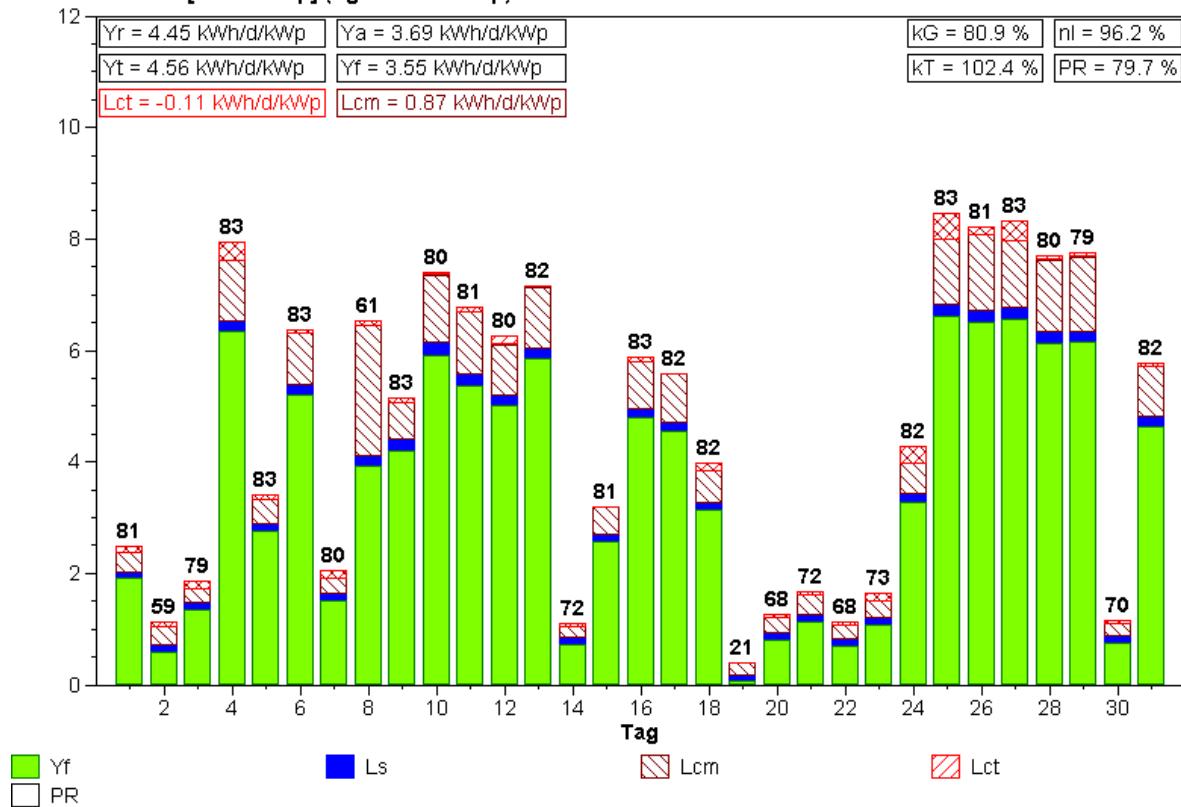
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 3.2002

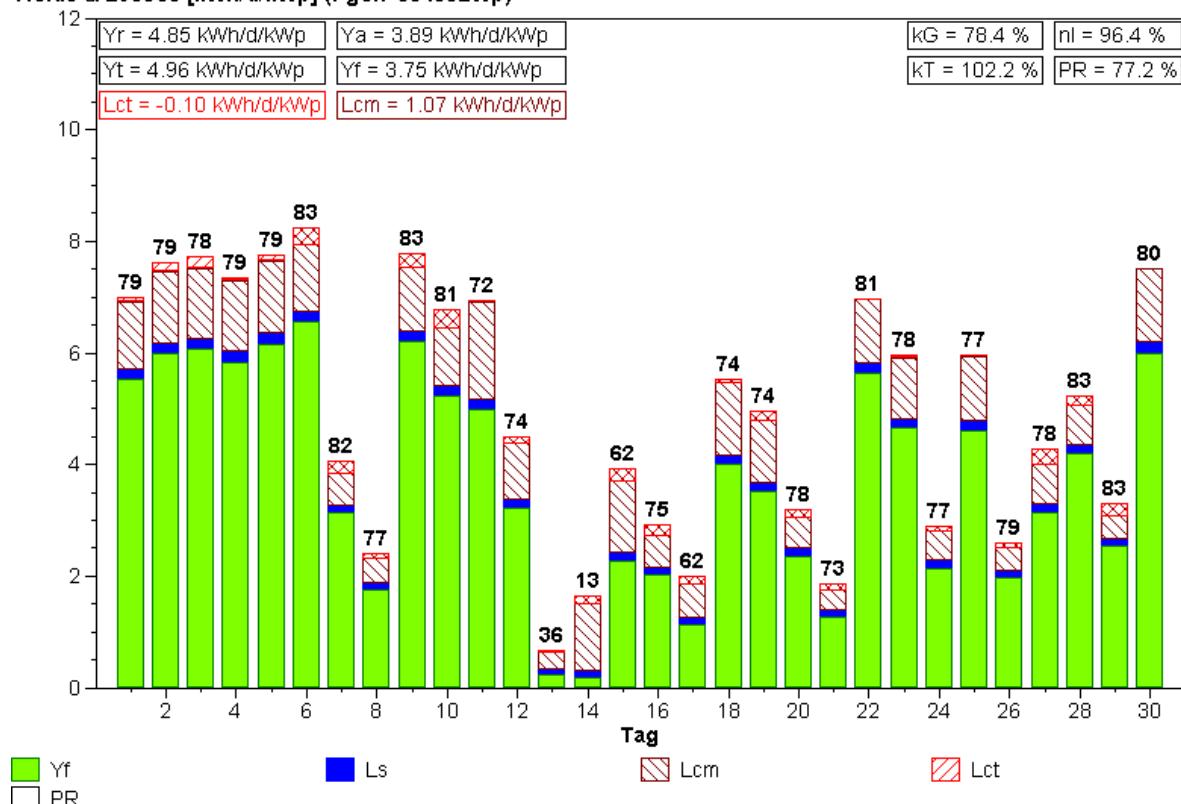
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 4.2002

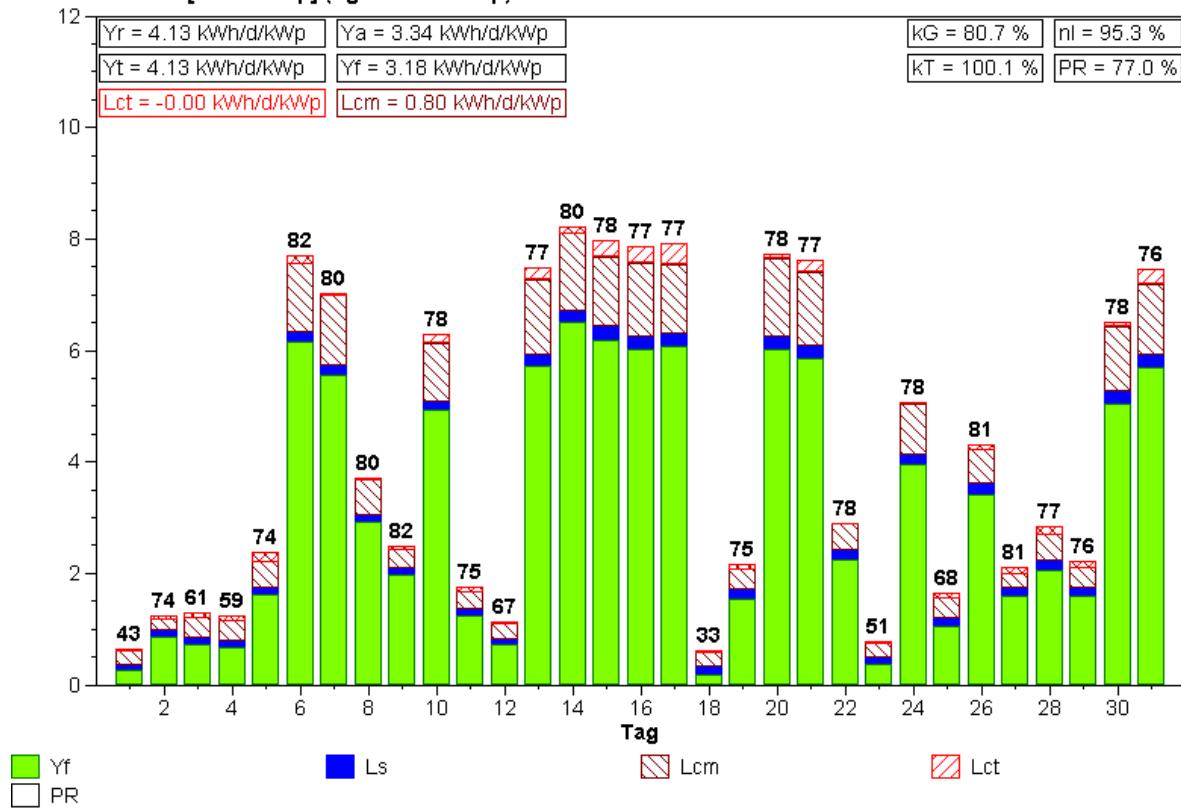
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 5.2002

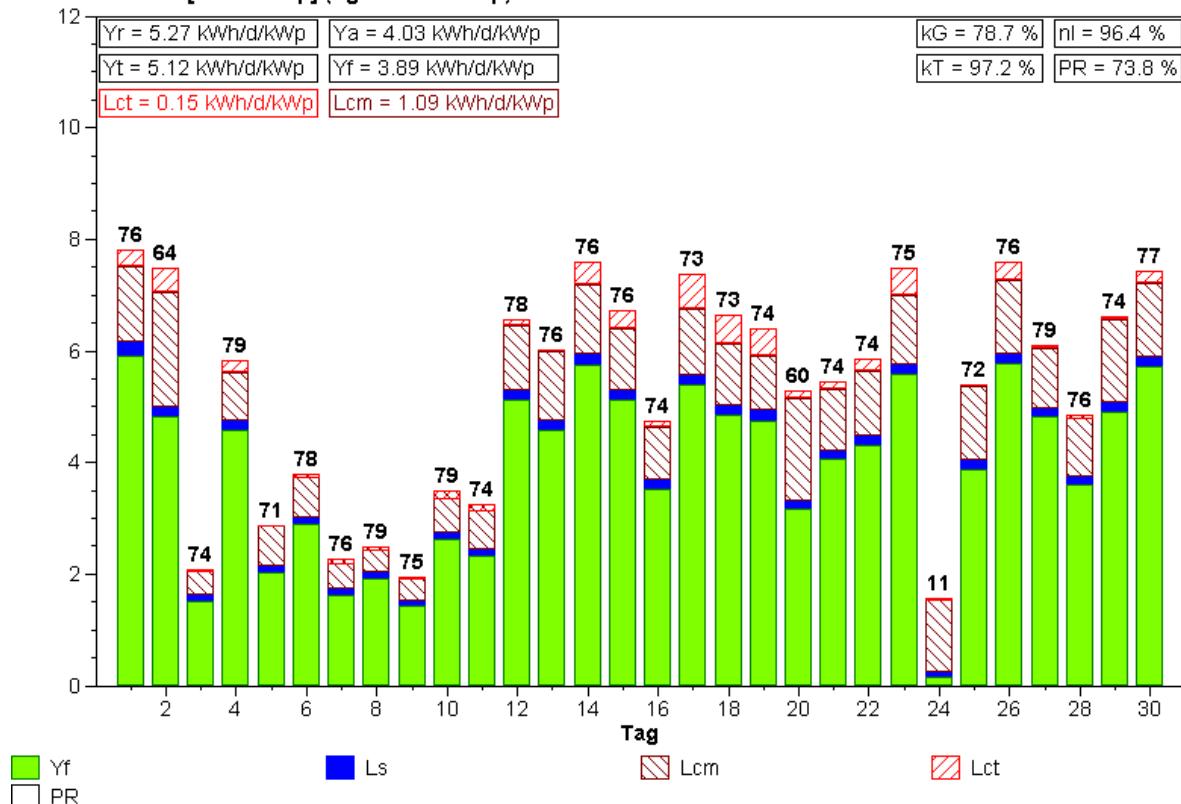
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 6.2002

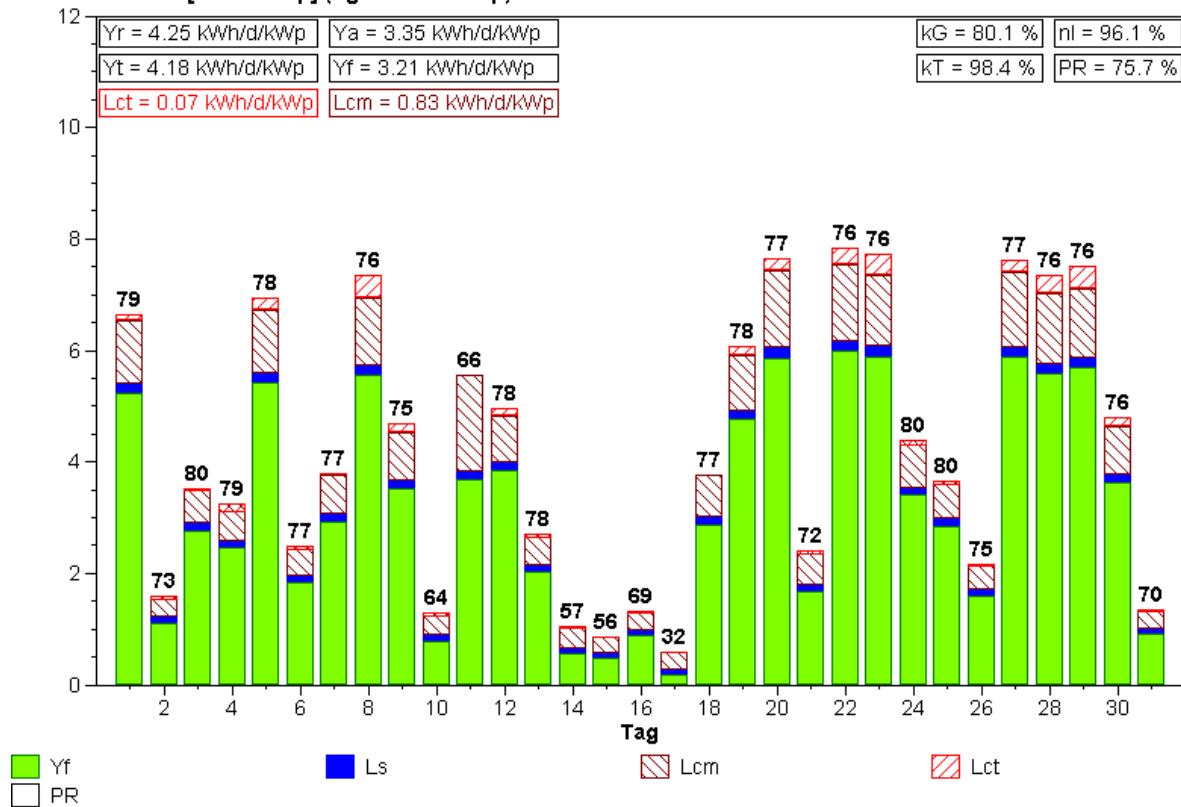
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 7.2002

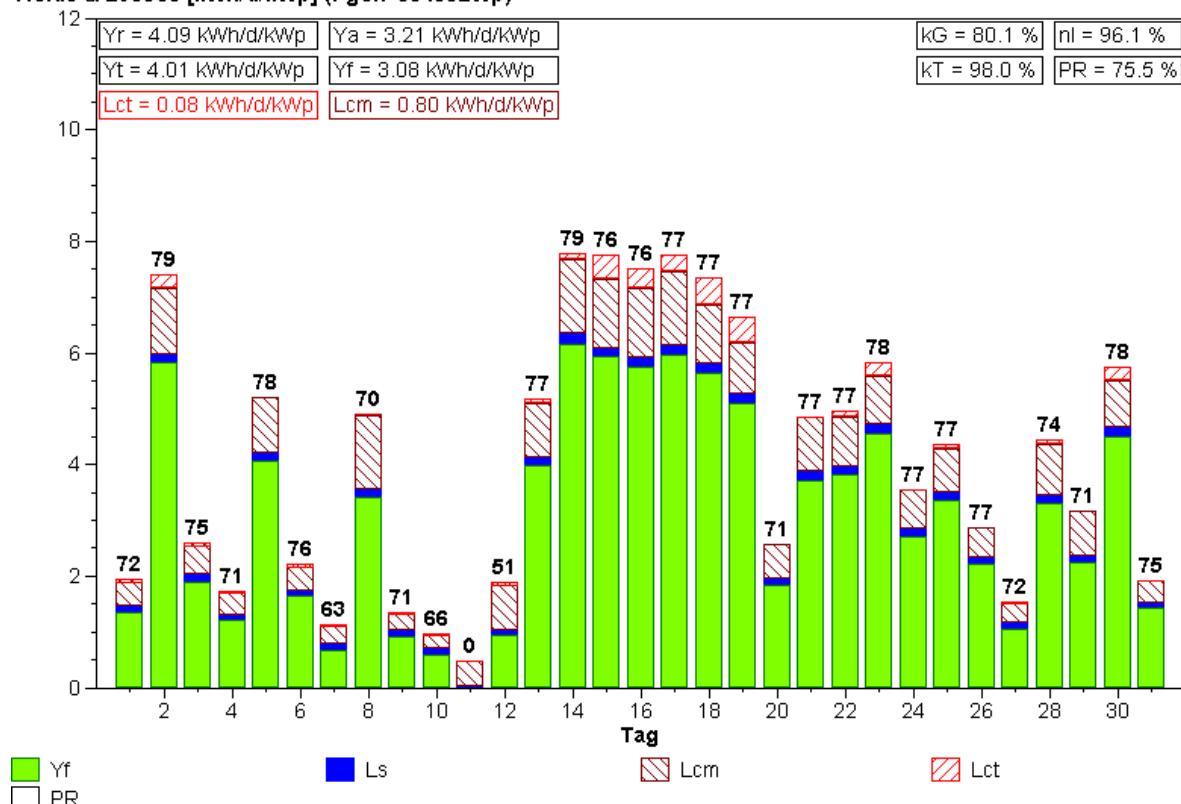
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 8.2002

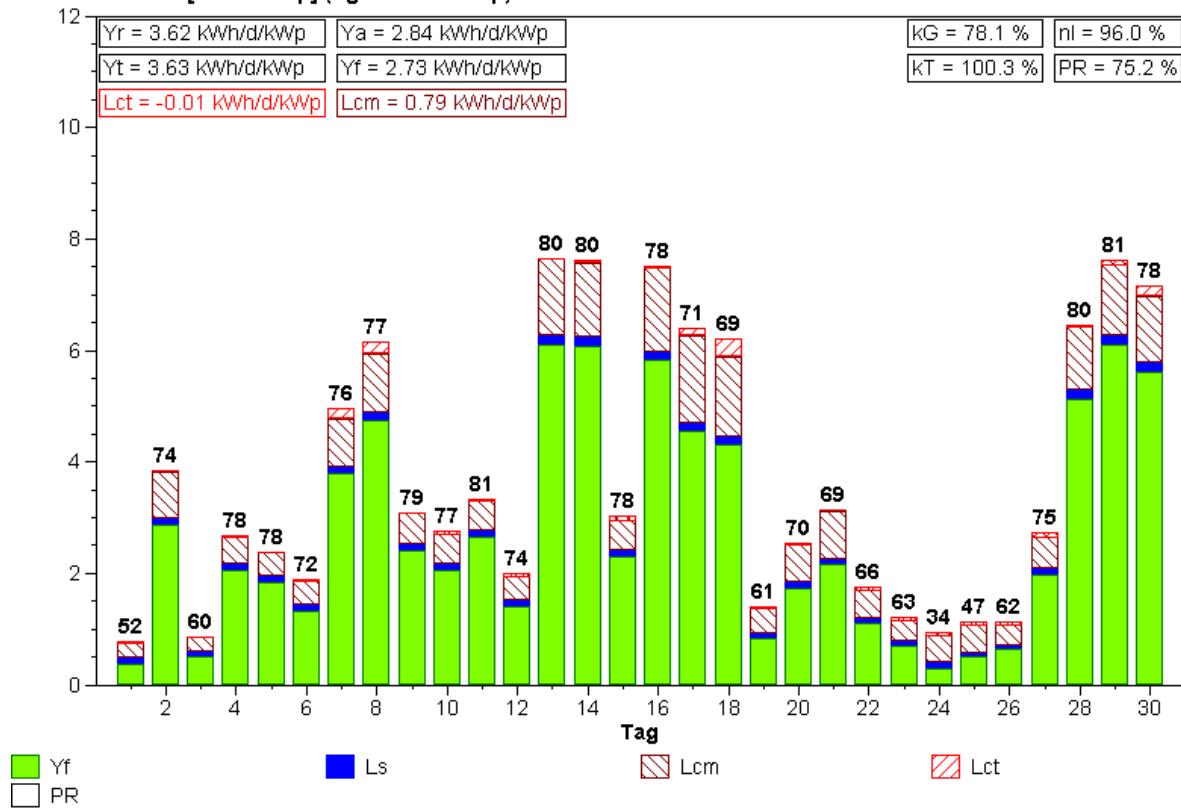
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 9.2002

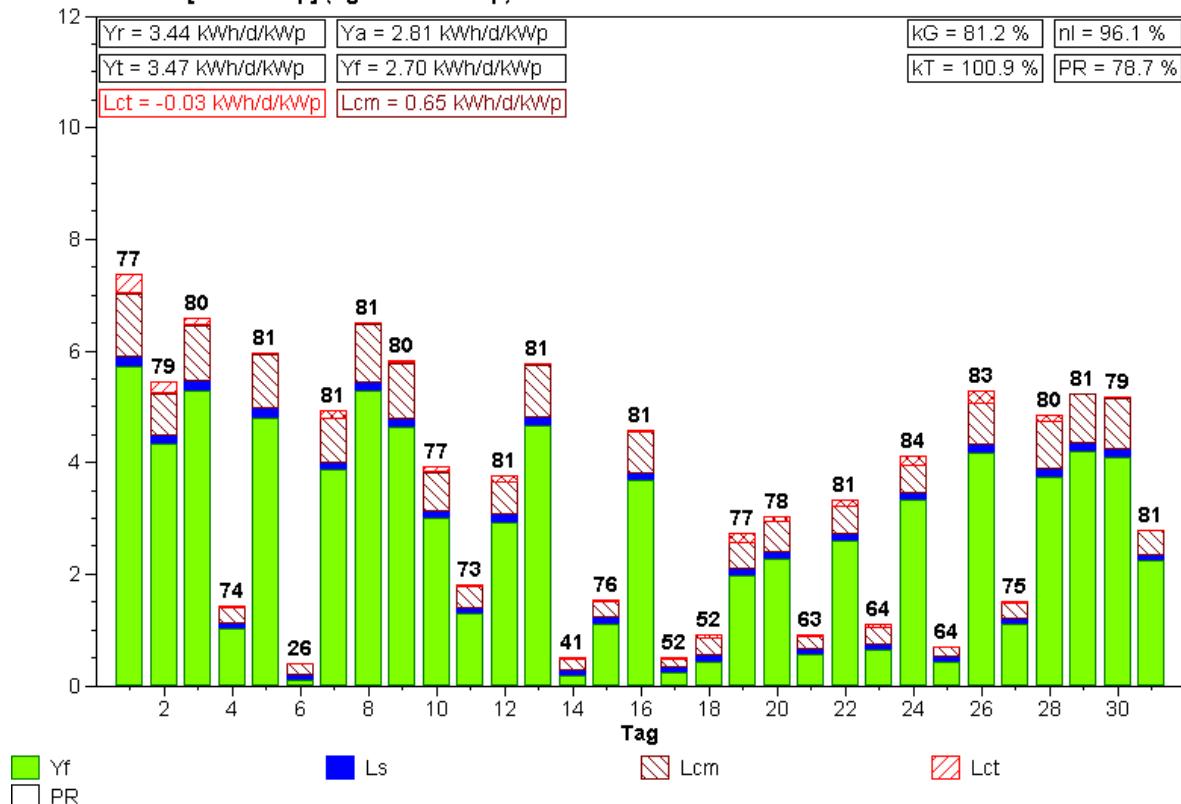
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 10.2002

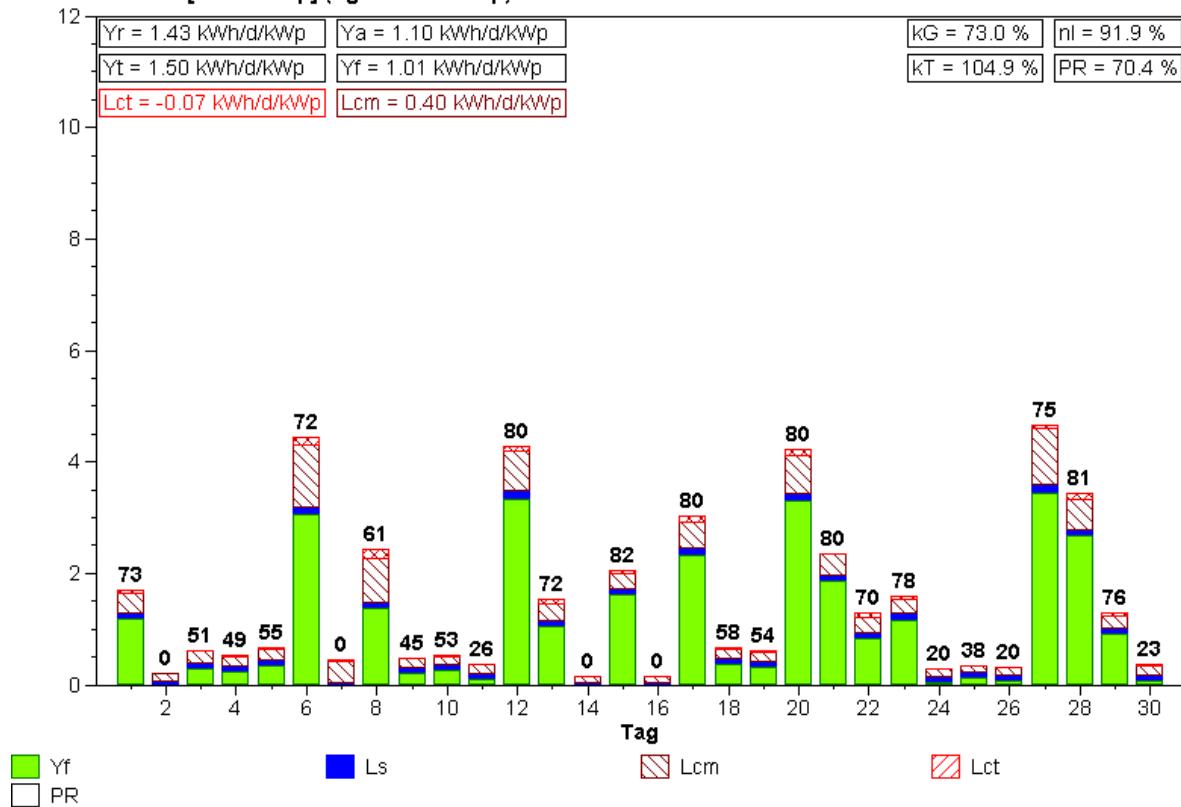
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 11.2002

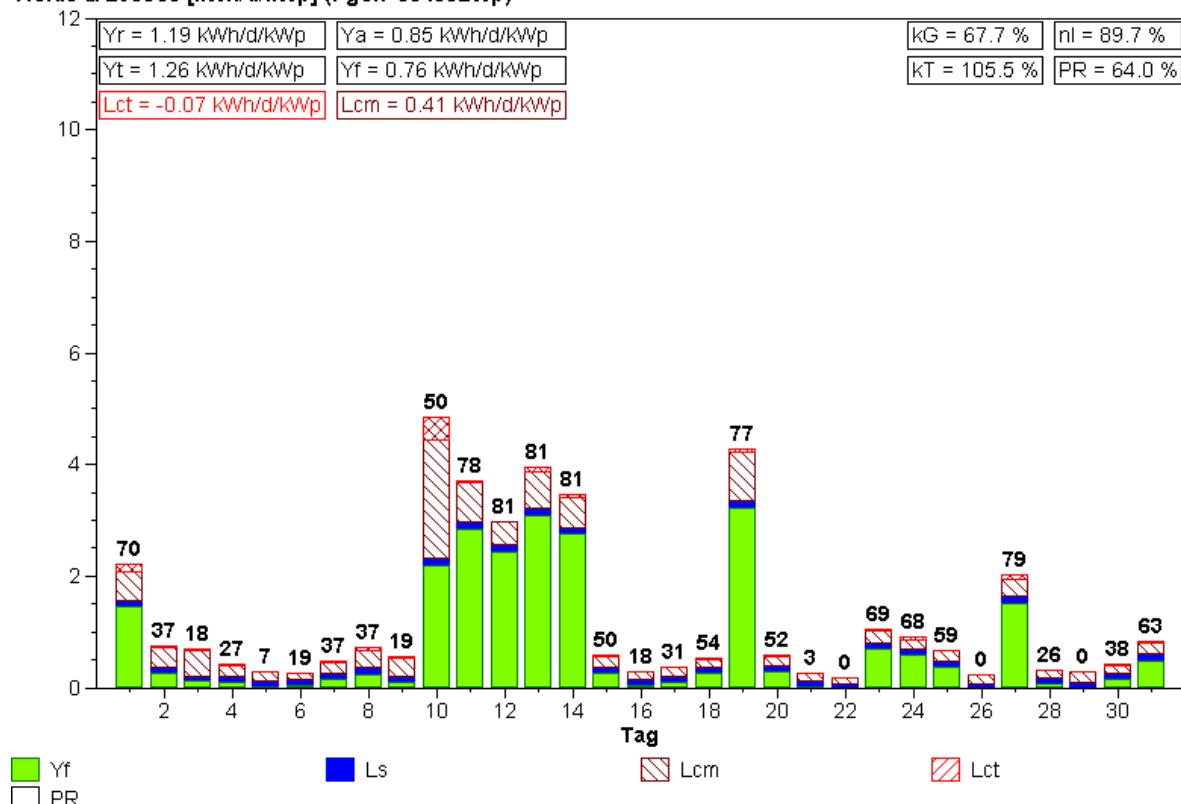
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 12.2002

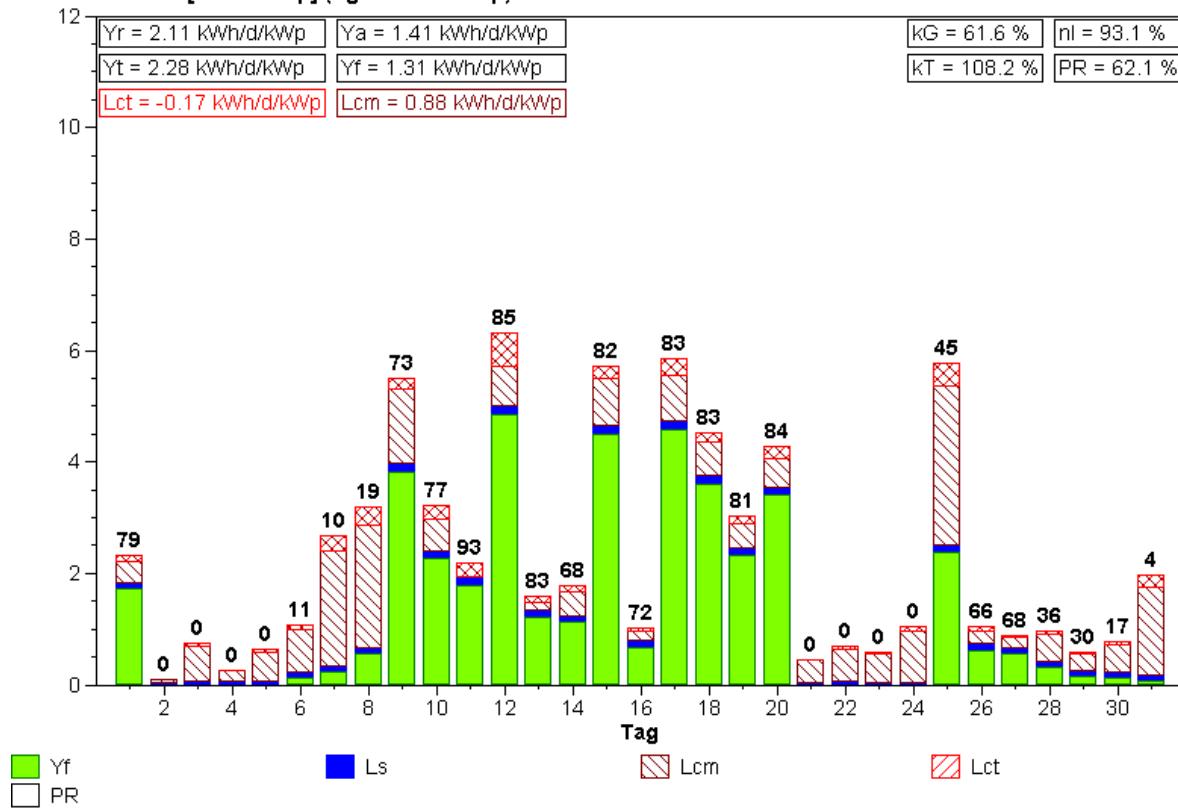
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 1.2003

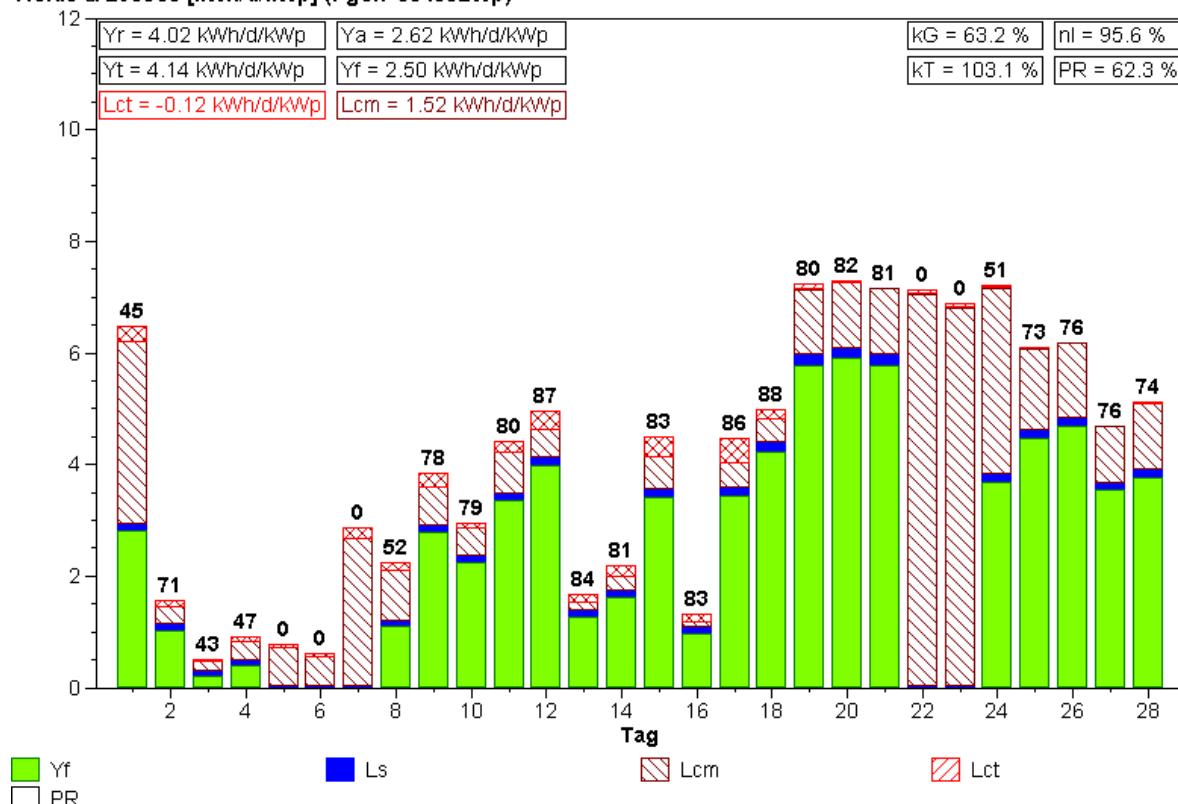
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 2.2003

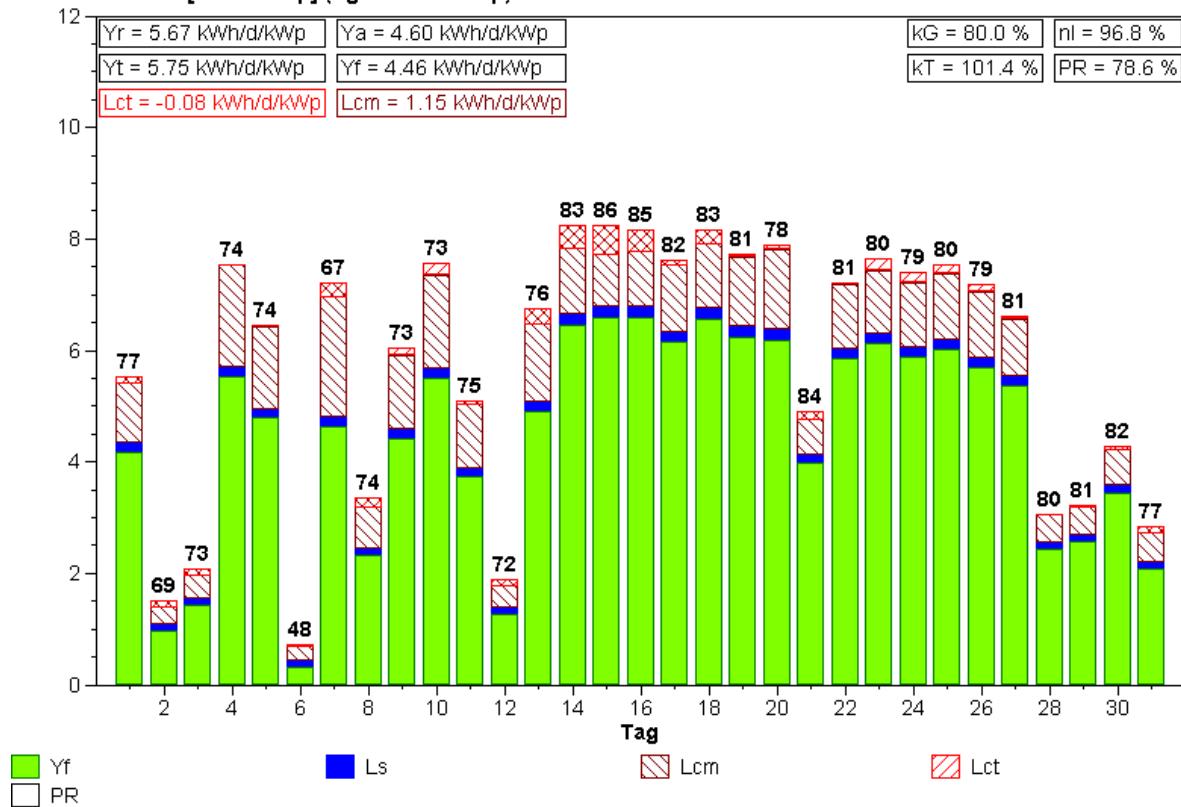
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 3.2003

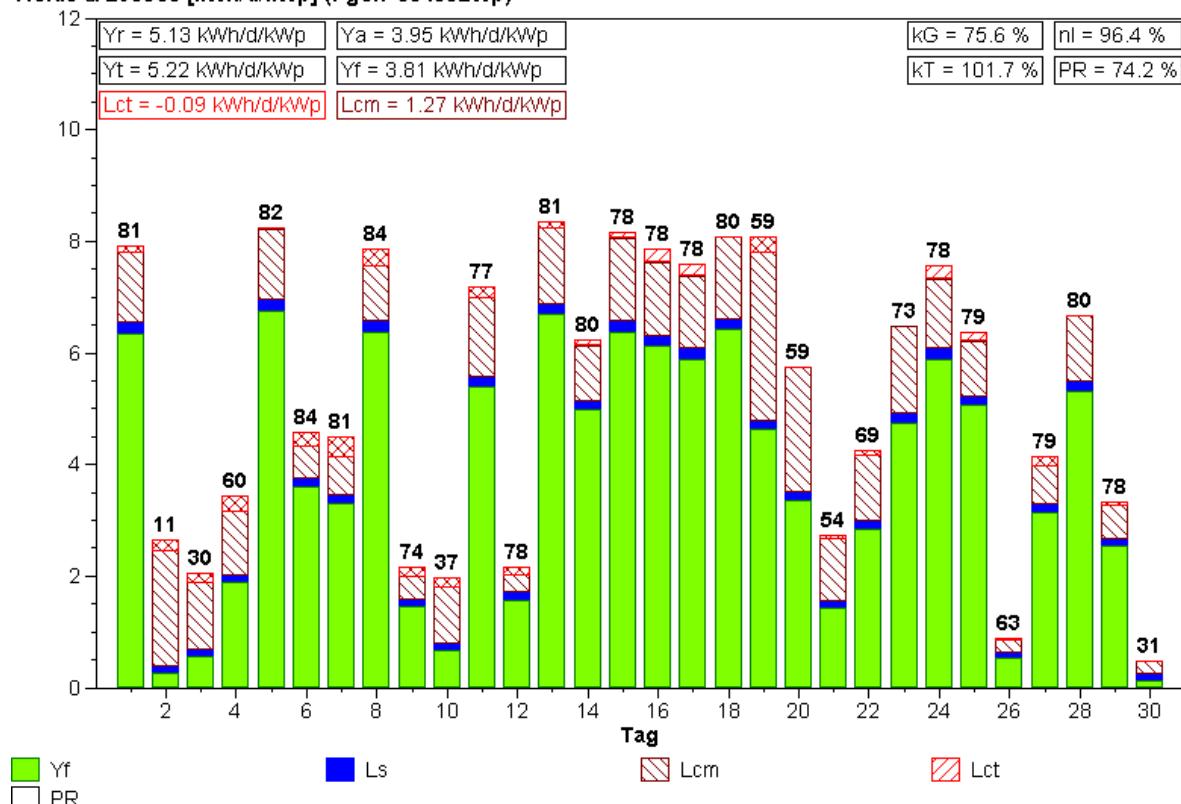
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 4.2003

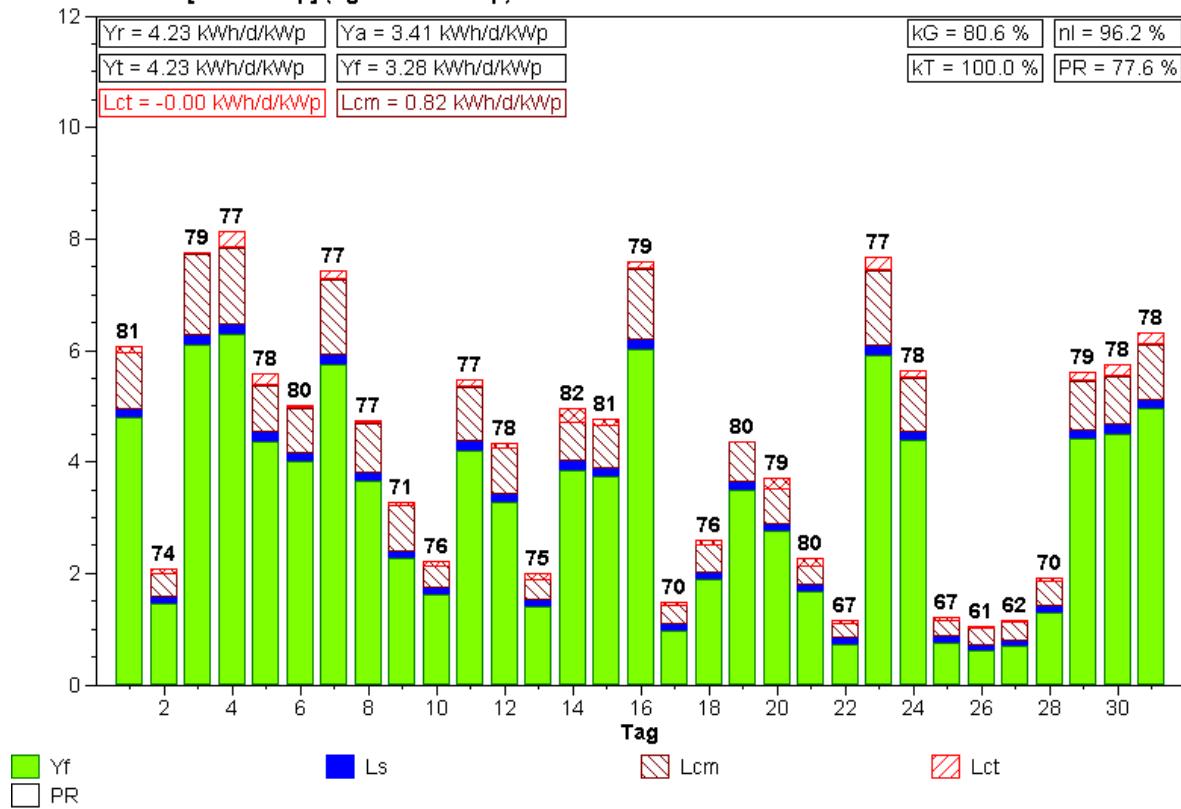
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 5.2003

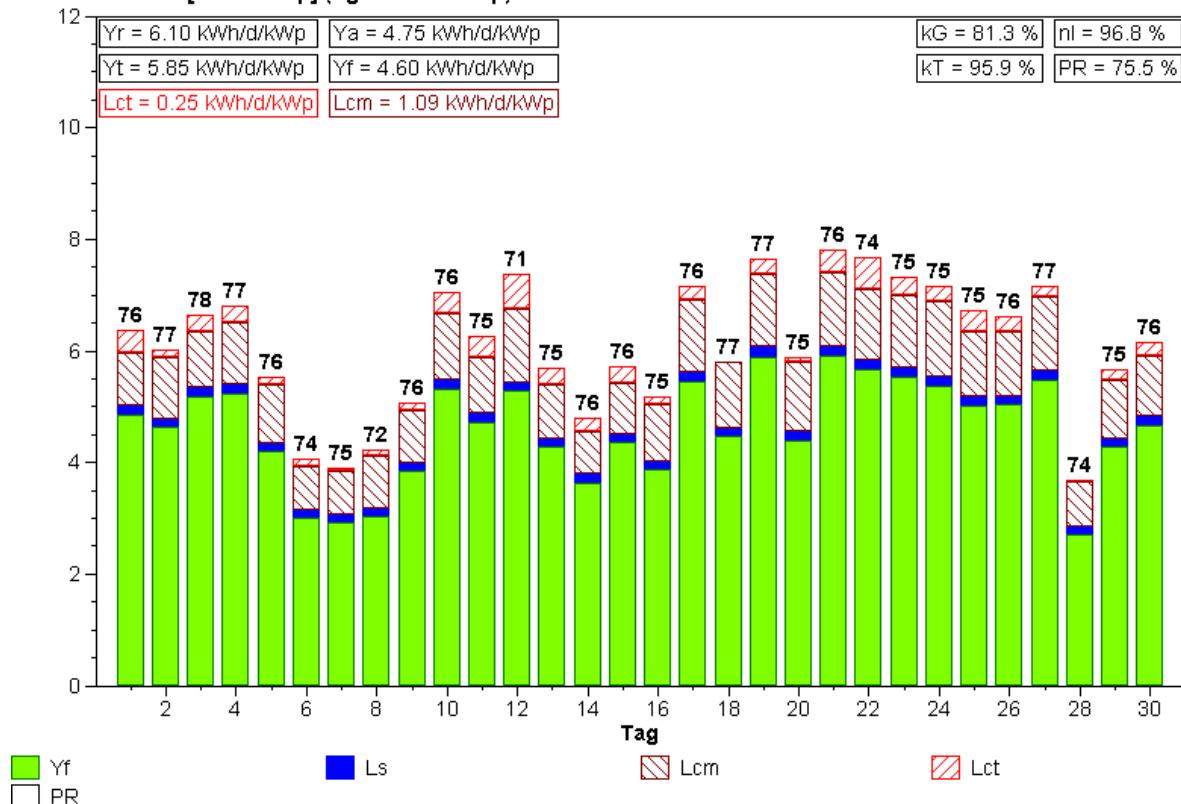
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 6.2003

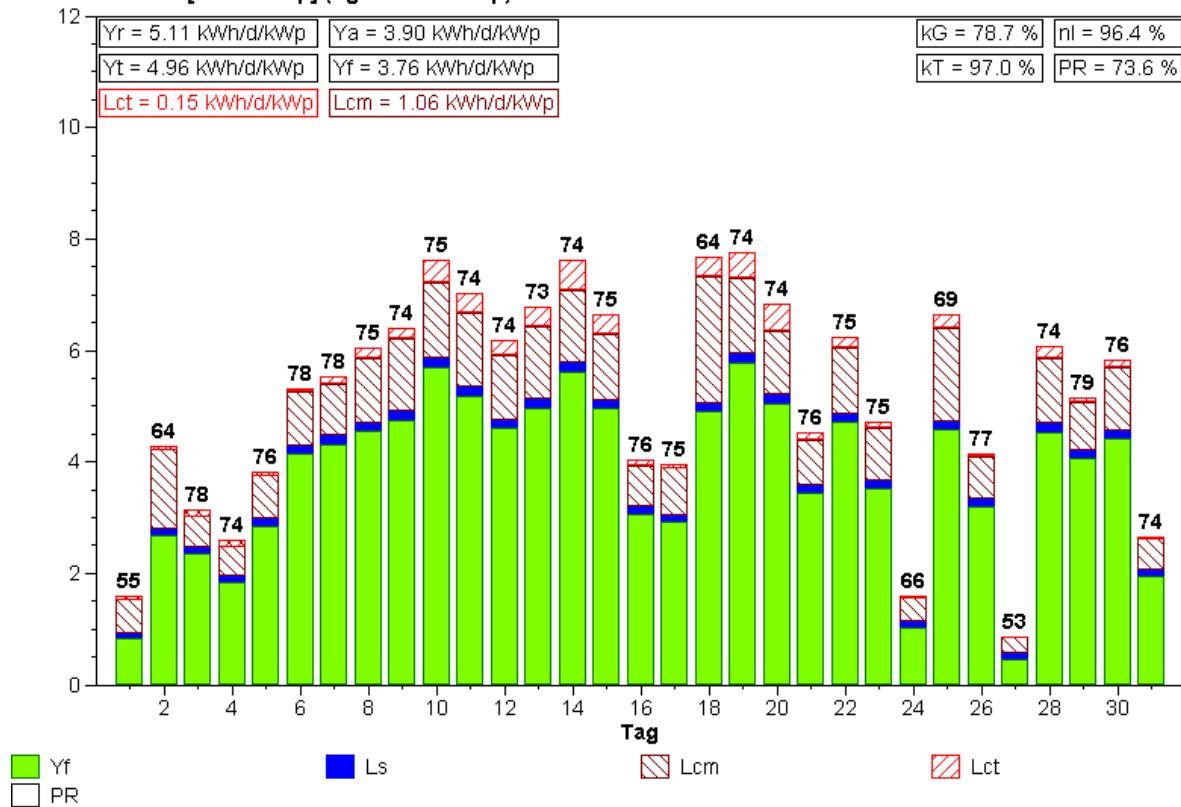
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 7.2003

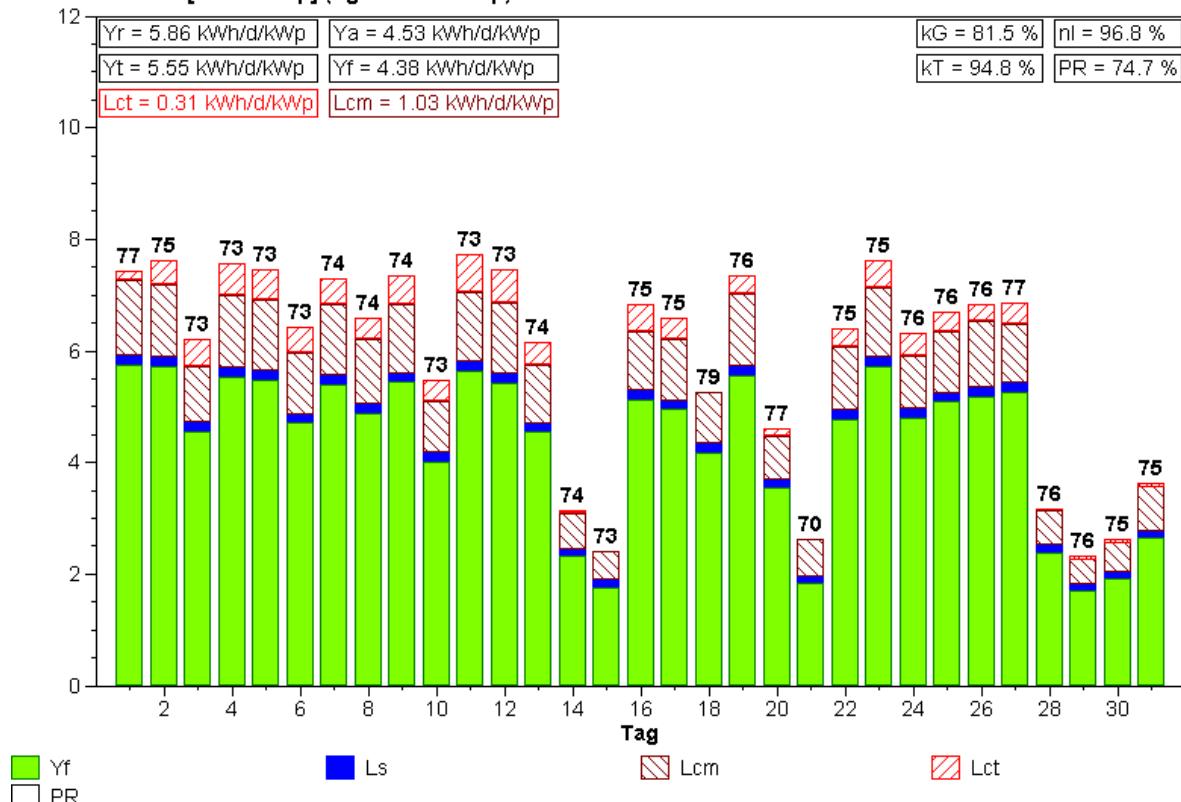
Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Mont Soleil Monat: 8.2003

Yields & Losses [kWh/d/kWp] (Pgen=554592Wp)



## zu 6.4 Newtech - Dünnschichtzellenanlage

**Ort:** Firma Disetronic AG, 3400 Burgdorf; 550m.ü.M.  
**Inbetriebnahme:** 17.12.2001

**Solargenerator:** 2844 Wp (nom.) **Neigung:** 30°  
**Ausrichtung:** 0° Süd

**Die PV-Anlage besteht aus 3 Teilanlagen :**

**Anlage Newtech 1: Kupfer-Indium-Diselenid-Zellen (CuInSe<sub>2</sub>- oder CIS-Zellen)**

24 gerahmte Module Siemens ST 40 (40 Wp), 3 Stränge zu 8 Modulen in Serie,  
 STC-Nennleistung  $P_{STC-Nenn} = 960 \text{ Wp}$ , TK  $\approx -0,33\%/\text{K}$ . Gemessen:  $P_{STC} \approx 1010 \text{ Wp}$ .  
 Modulfläche: 10,21m<sup>2</sup>

**Anlage Newtech 2: Tandemzellen aus amorphem Si**

20 gerahmte Module Solarex MST 43-LV (43 Wp), 2 Stränge zu 10 Modulen in Serie,  
 STC-Nennleistung  $P_{STC-Nenn} = 860 \text{ Wp}$ , TK  $\approx -0,22\%/\text{K}$ . Gemessen:  $P_{STC} \approx 810 \text{ Wp}$ .  
 Modulfläche: 16,37m<sup>2</sup>

**Anlage Newtech 3: Tripelzellen aus amorphem Si**

16 gerahmte Module Uni-Solar US-64 (64 Wp), 2 Stränge zu 8 Modulen in Serie,  
 STC-Nennleistung  $P_{STC-Nenn} = 1024 \text{ Wp}$ , TK  $\approx -0,21\%/\text{K}$ . Gemessen:  $P_{STC} \approx 1000 \text{ Wp}$ .  
 Modulfläche: 16,20m<sup>2</sup>

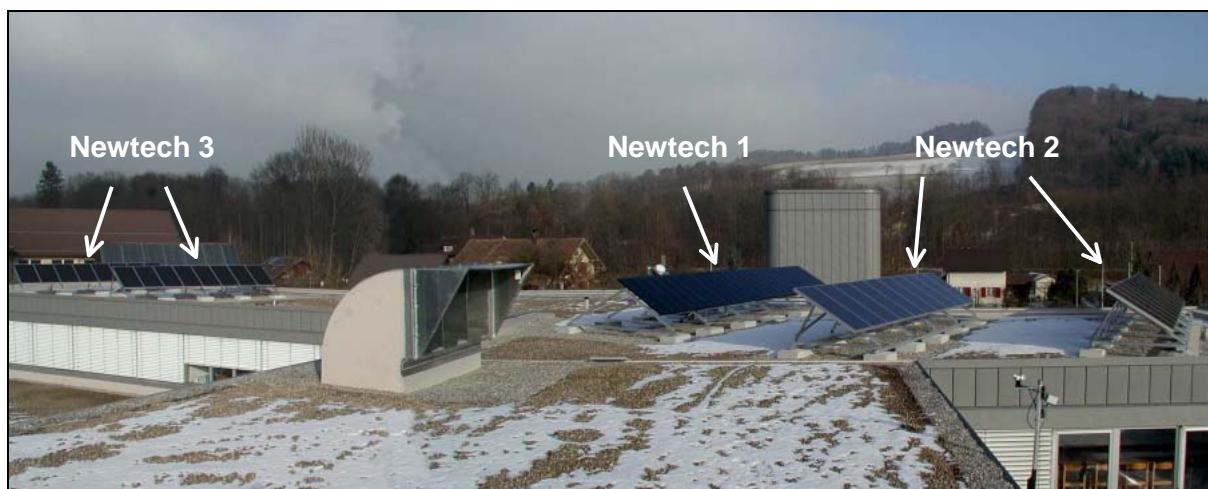
**Wechselrichter:** Jede der 3 Teilanlagen speist ihre Energie über einen eigenen  
 ASP Top Class Spark Wechselrichter (mit Trafo) ins Netz ein.

**Messgrößen:**

- Sonneneinstrahlung in Modulebene mit Pyranometer CM11 (beheizt)
- Solarzellentemperatur der 3 Solargeneratoren mit PT100-Anlegefühler
- Umgebungstemperatur mit PT100
- Netzspannung am Einspeisepunkt einer Phase

Von allen 3 Teilanlagen:

- Gleichstrom und Gleichspannung, daraus berechnet Gleichstromleistung
- ins Netz eingespeiste Wirkleistung



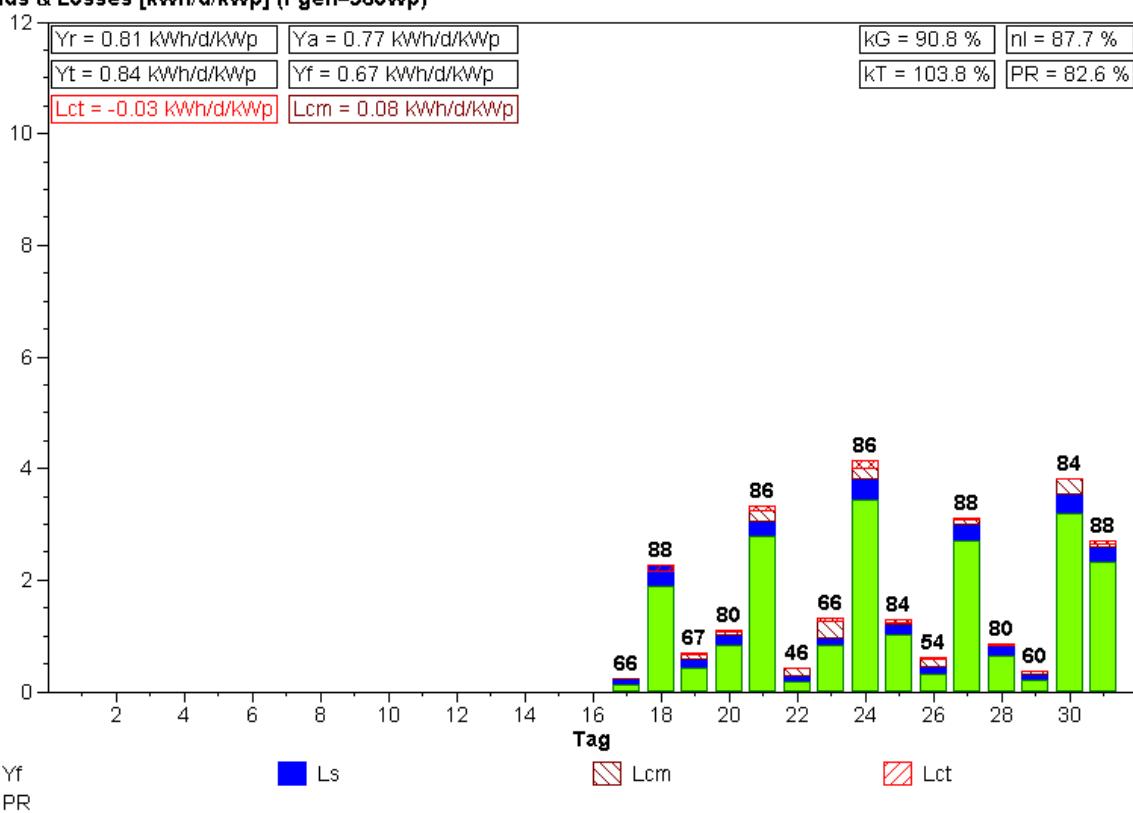


**Besondere Betriebsereignisse:**

26.03.2002	Kurzzeitige Ausserbetriebnahme der Anlagen wegen Arbeiten an der Messtechnik
02.04.2002	I-U-Kennlinienmessungen an den Solargeneratoren
30.09.2002	I-U-Kennlinienmessungen an den Solargeneratoren
21.03.2003	kurzzeitige Netzabschaltung
24.03.2003	I-U-Kennlinienmessungen an den Solargeneratoren
29.03.2003	kurzzeitige Netzabschaltung
30.08.2003	fast den ganzen Tag Netzabschaltung
03.09.2003	I-U-Kennlinienmessungen an den Solargeneratoren

**Normierte Monatsstatistik (Pyranometer)**

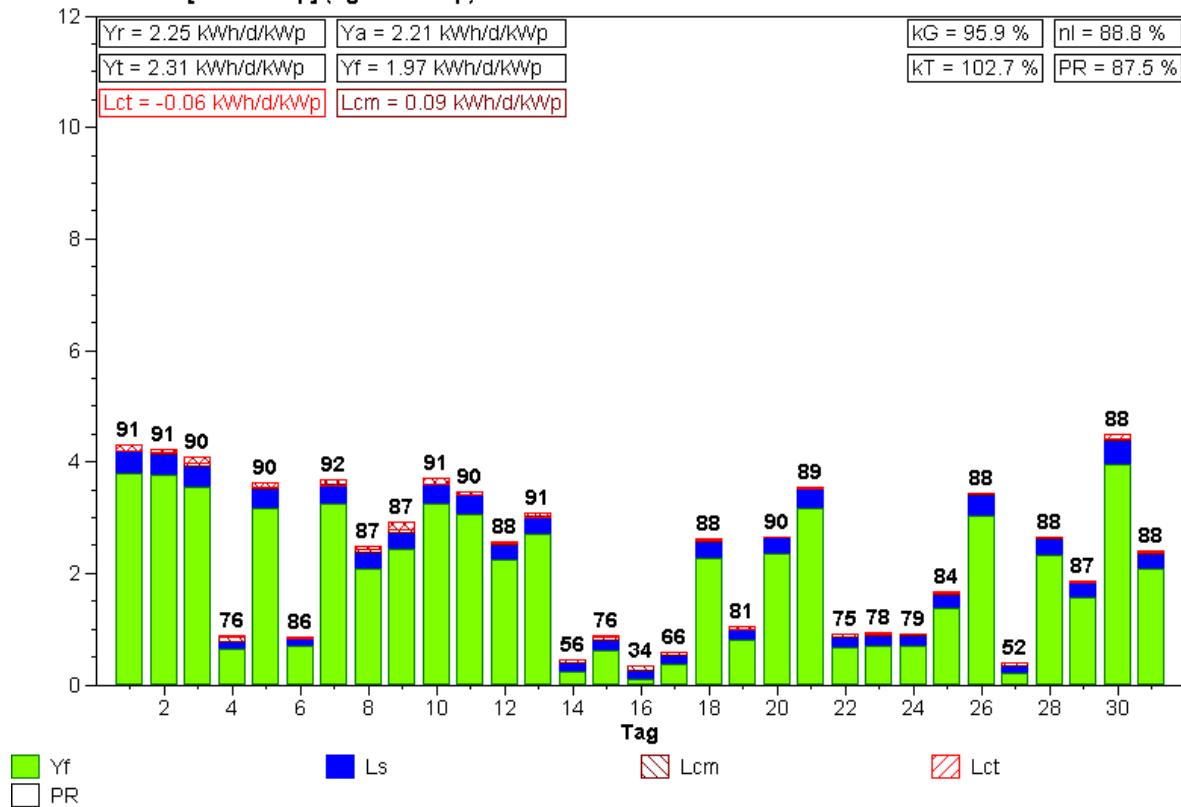
Anlage: Newtech 1 mit Siemens ST40 - Modulen    Monat: 12.2001

**Yields & Losses [kWh/d/kWp] (Pgen=960Wp)**

**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 1.2002

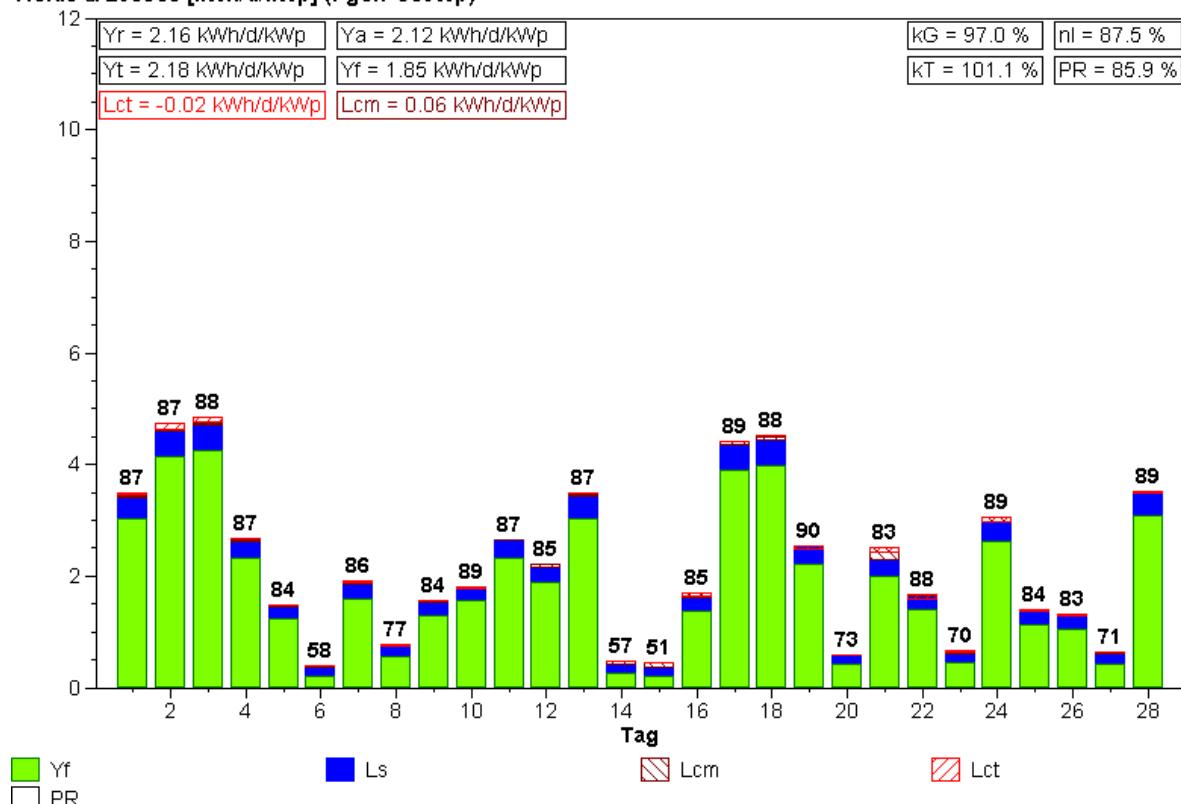
**Yields & Losses [kWh/d/kWp] (Pgen=960Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 2.2002

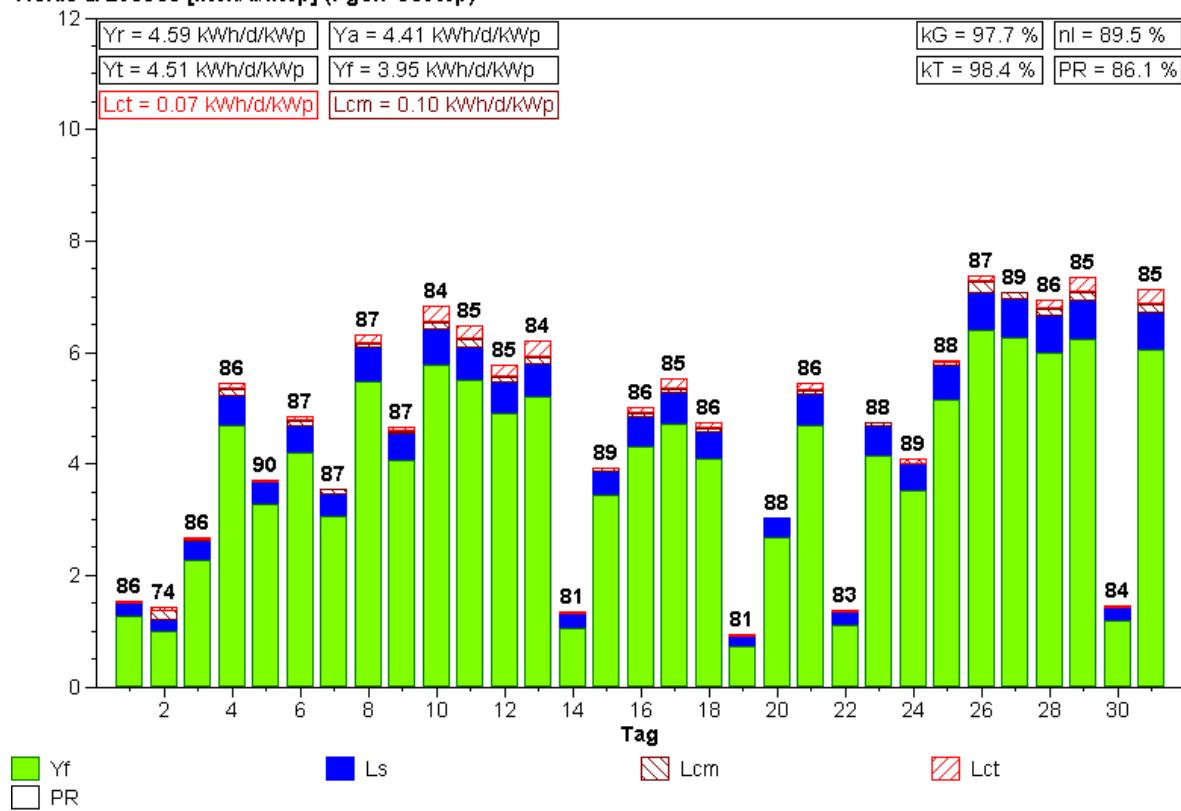
**Yields & Losses [kWh/d/kWp] (Pgen=960Wp)**



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 3.2002

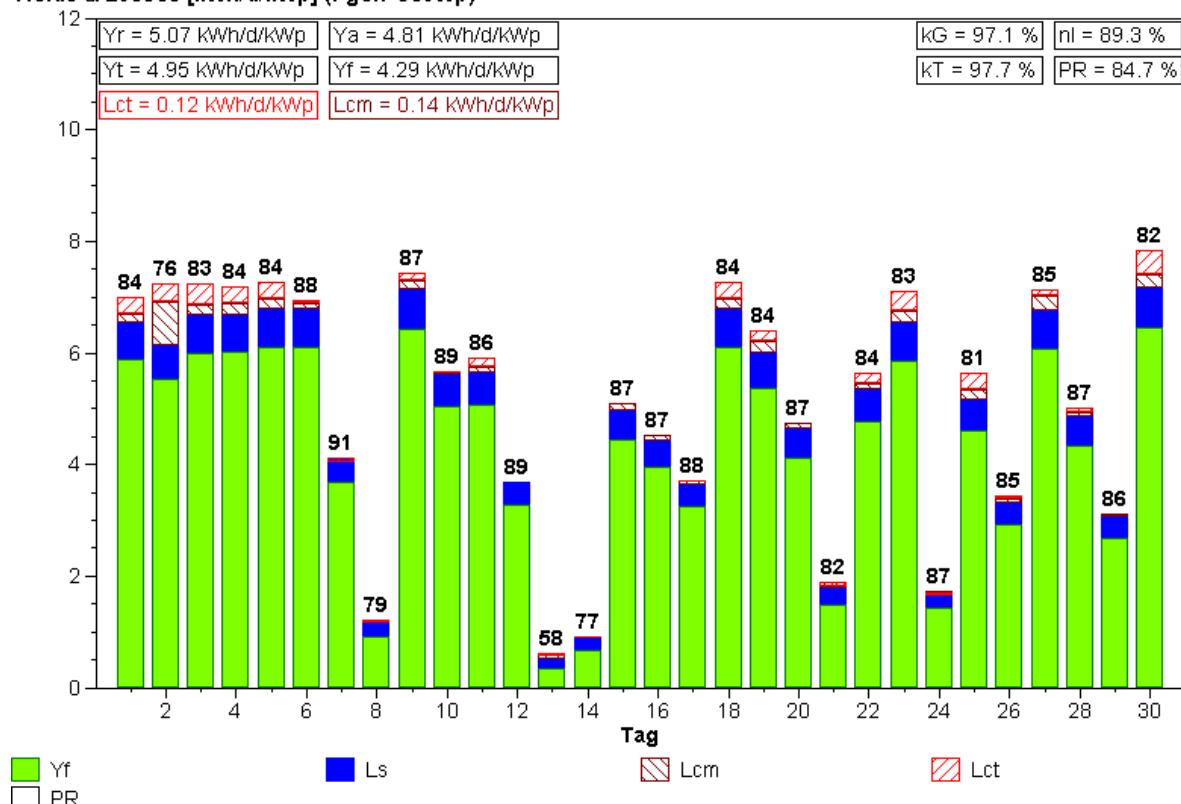
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 4.2002

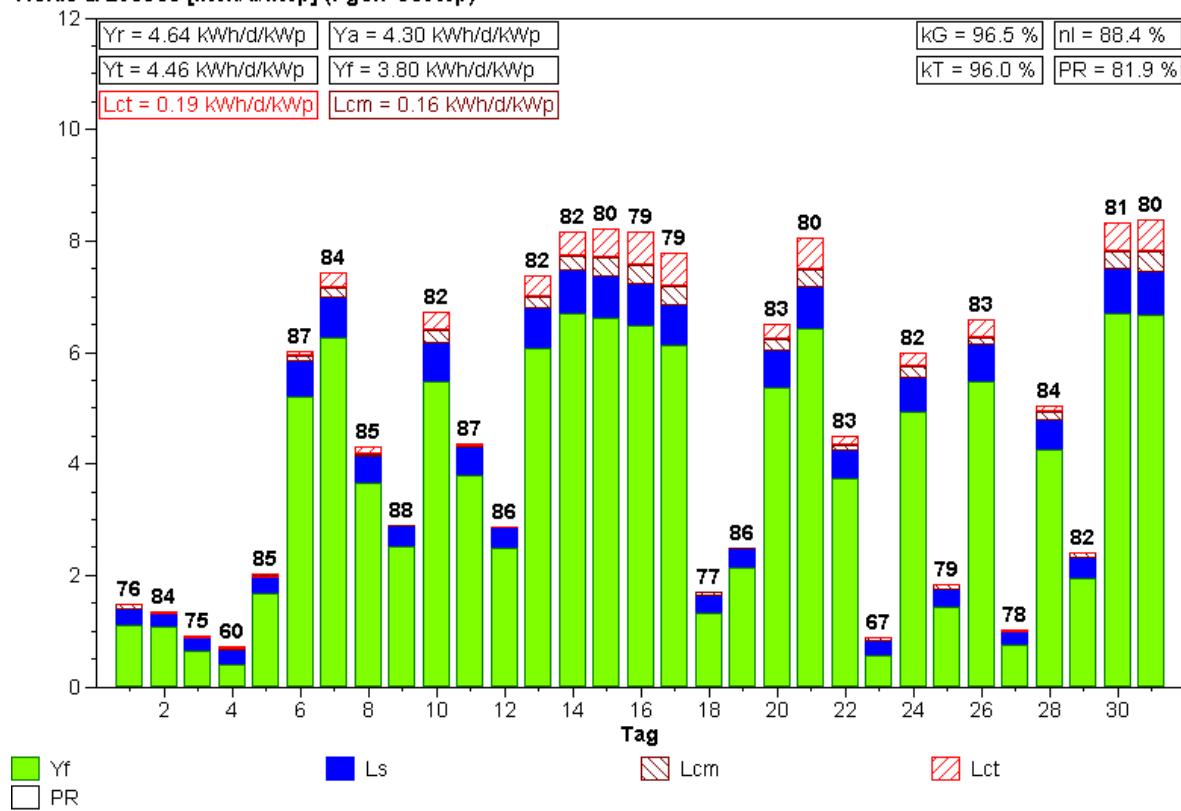
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 5.2002

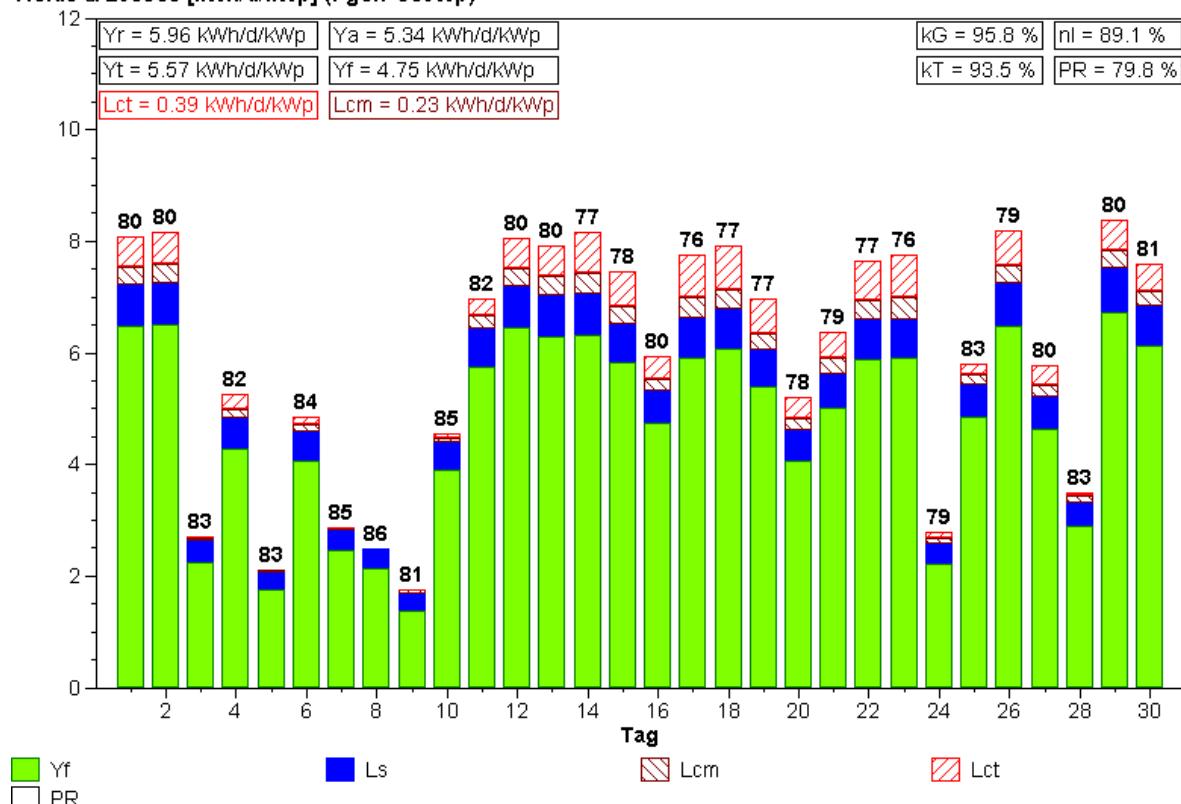
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 6.2002

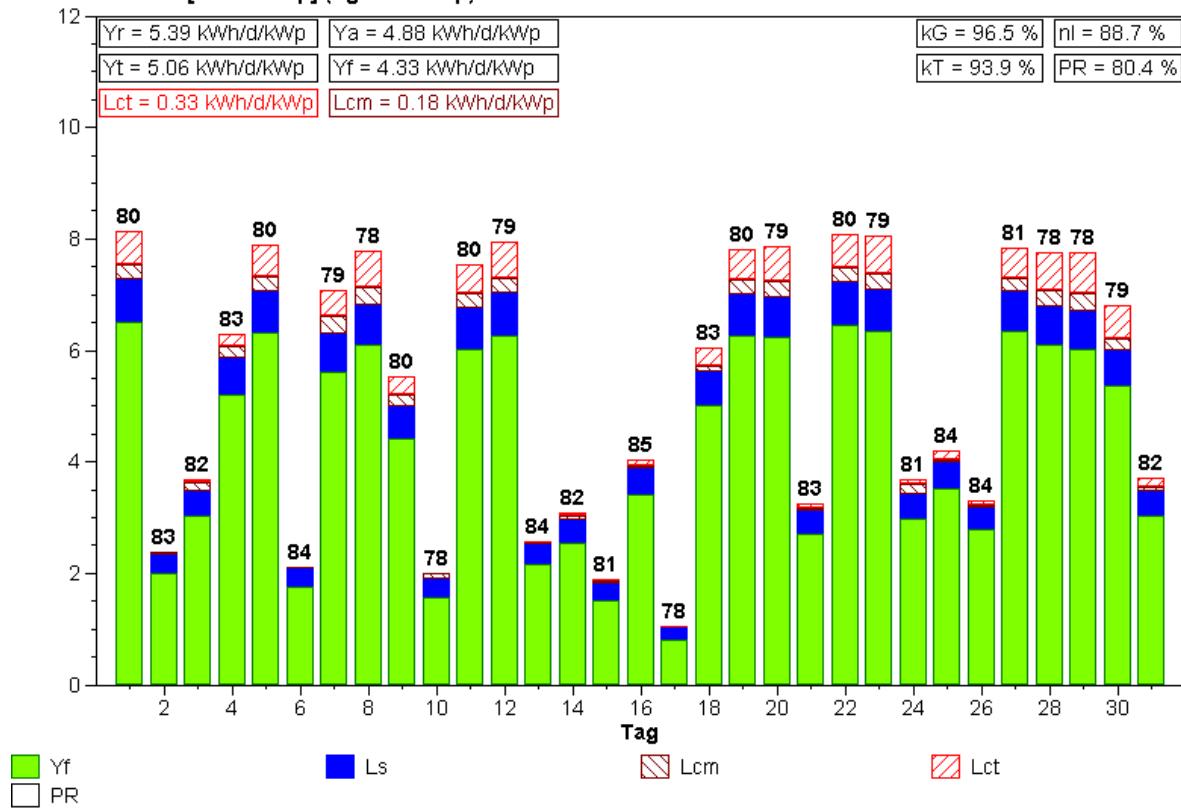
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 7.2002

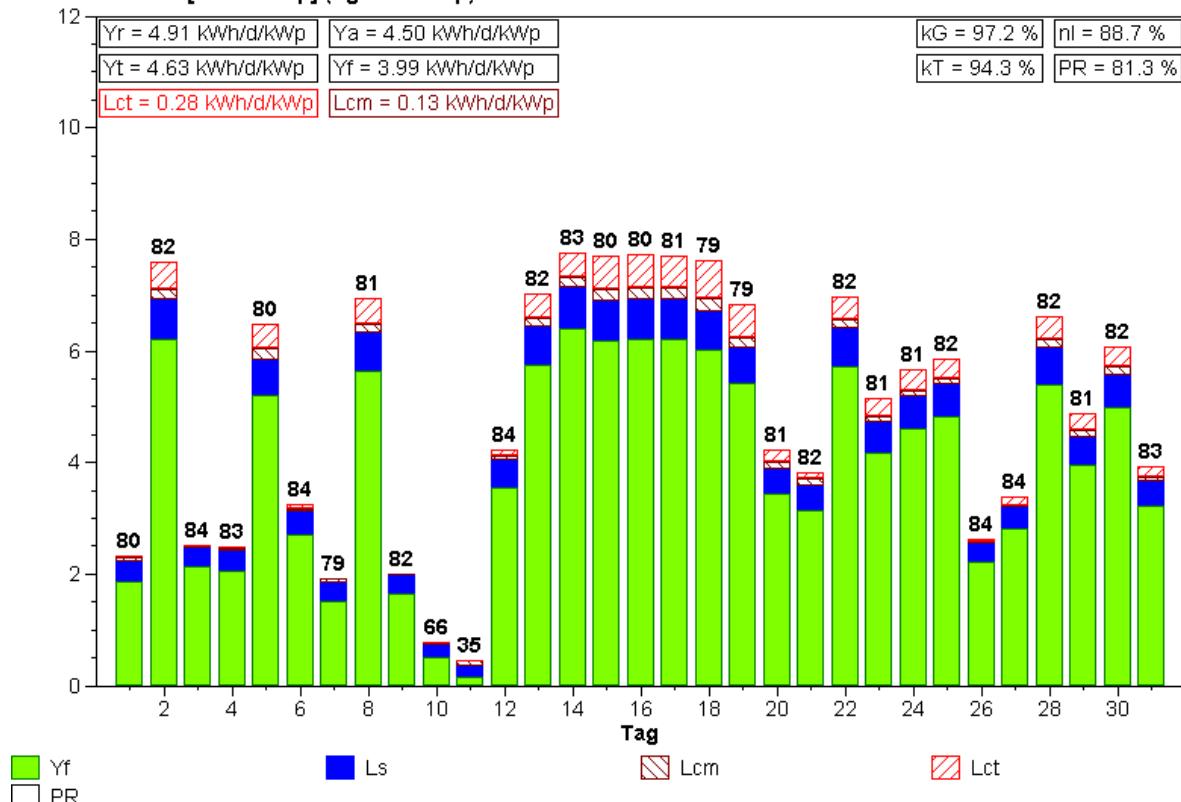
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 8.2002

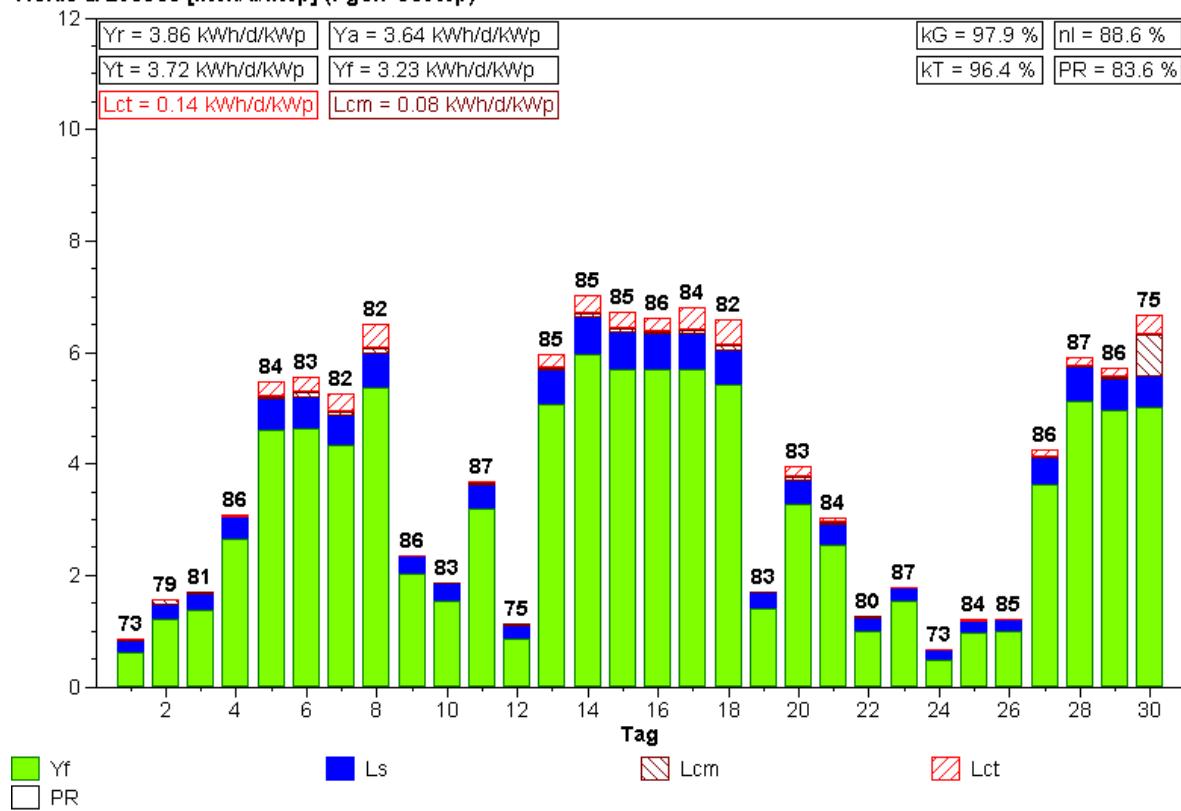
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 9.2002

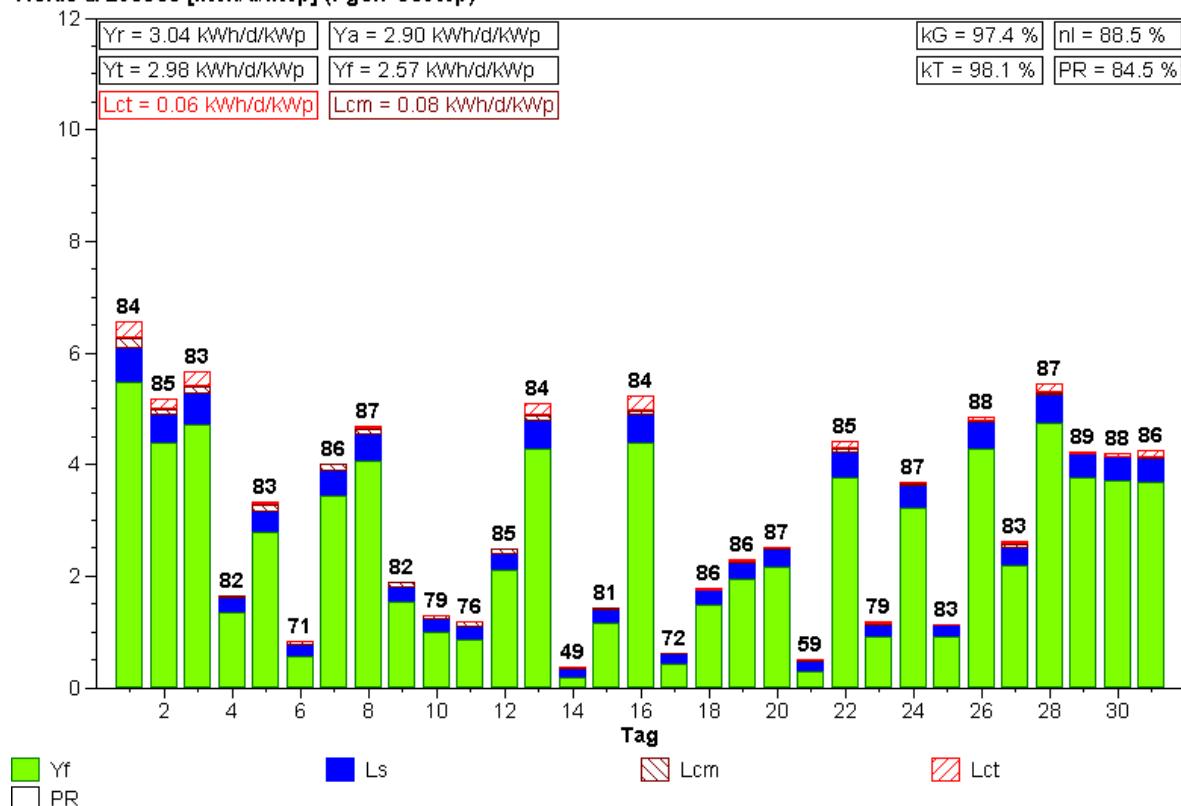
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 10.2002

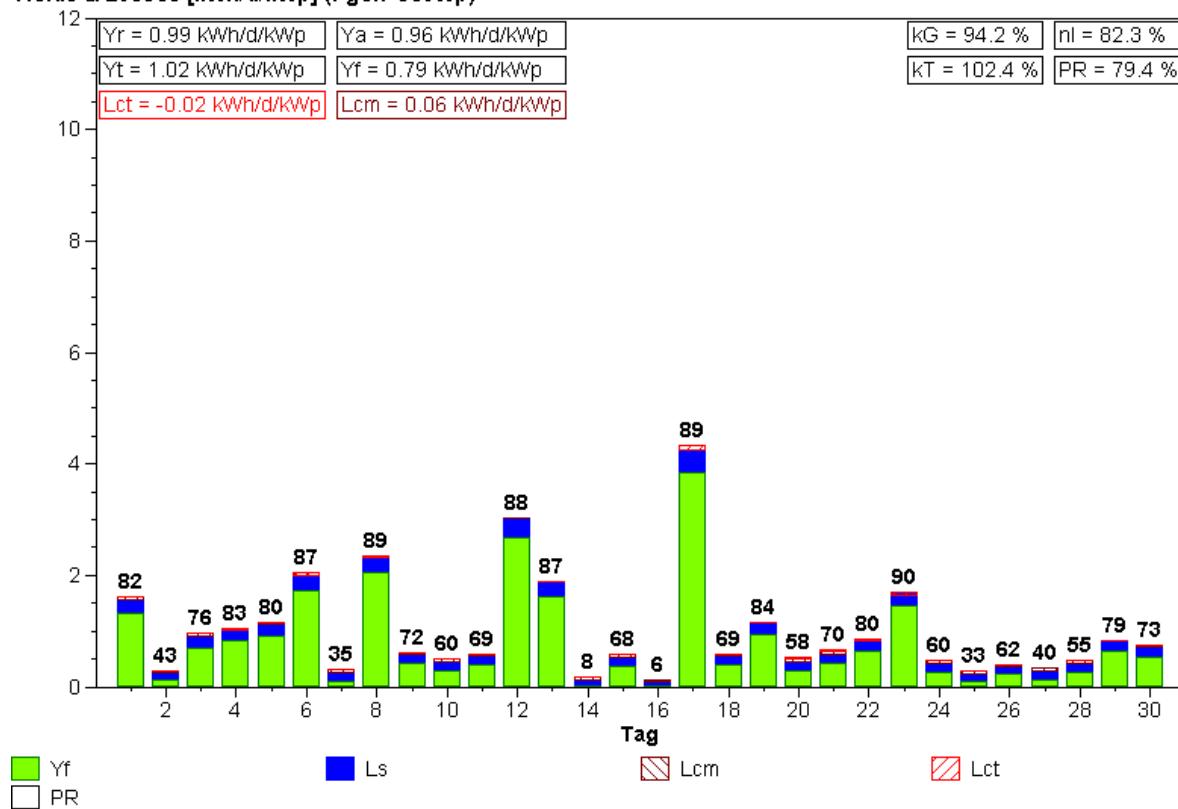
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 11.2002

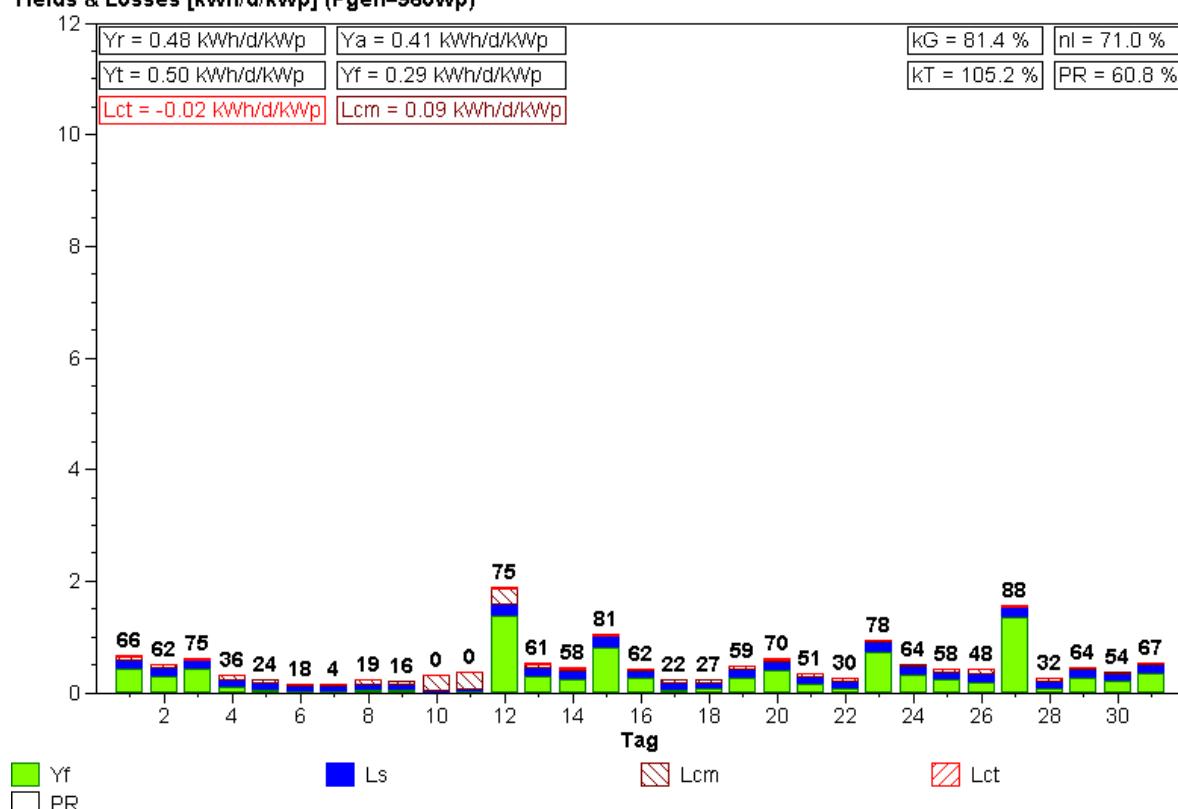
**Yields & Losses [kWh/d/kWp] (Pgen=960Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 12.2002

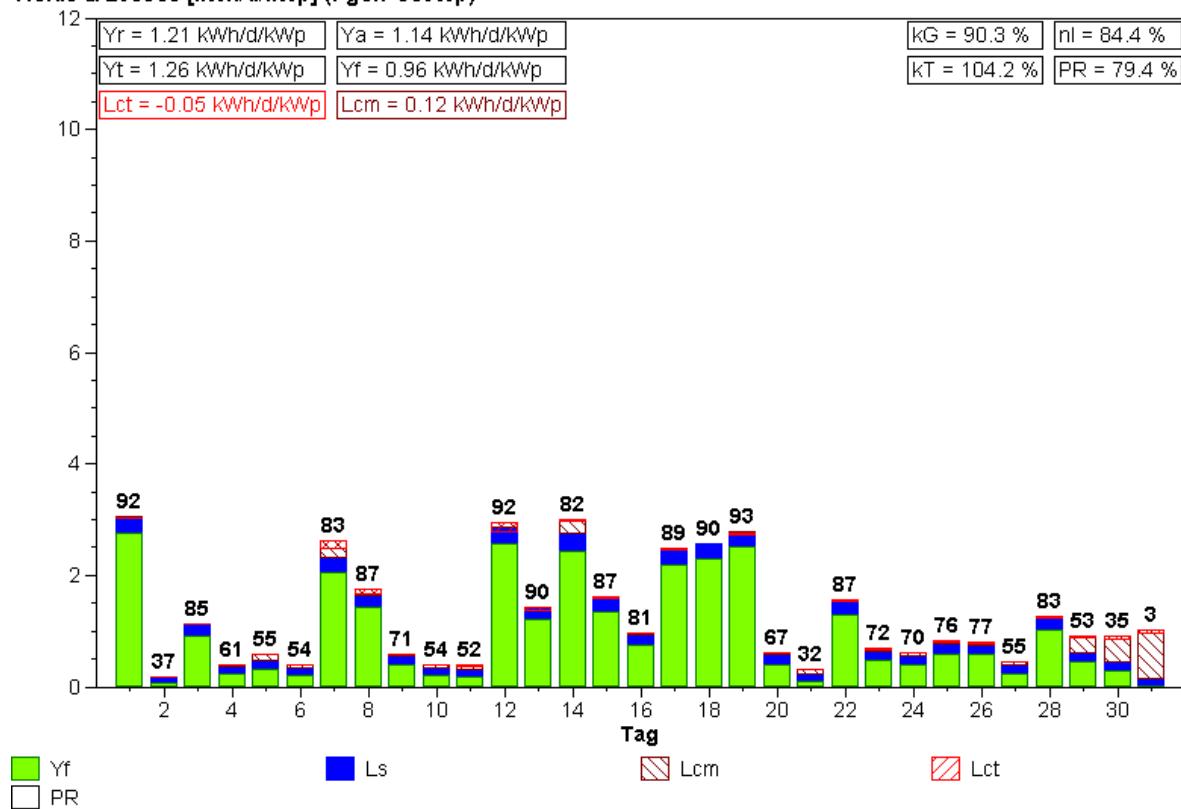
**Yields & Losses [kWh/d/kWp] (Pgen=960Wp)**



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 1.2003

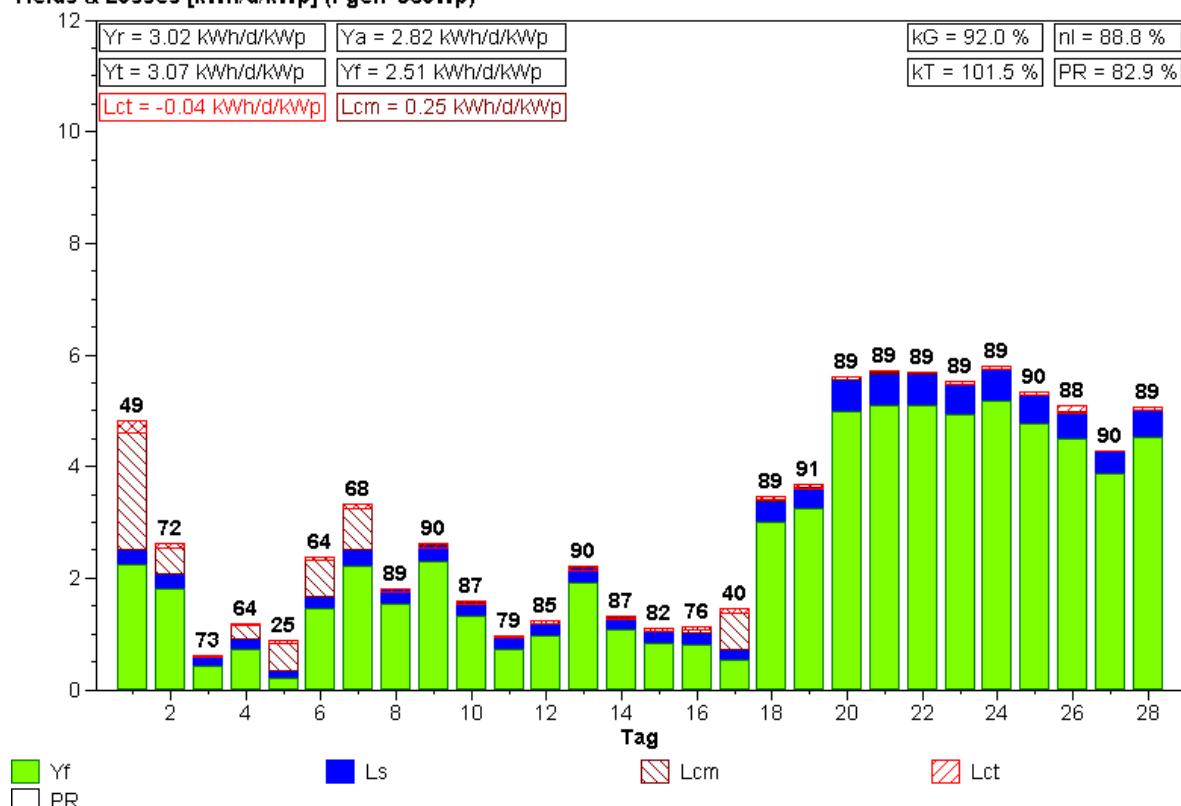
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 2.2003

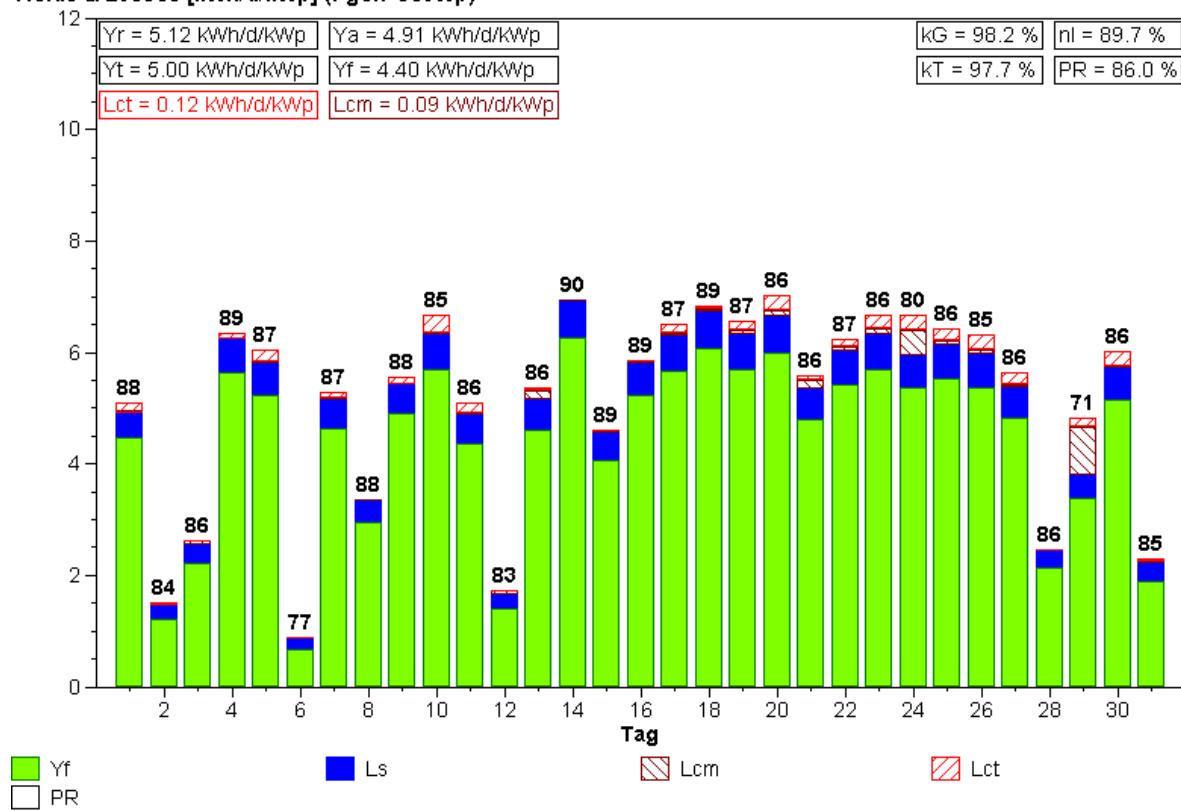
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 3.2003

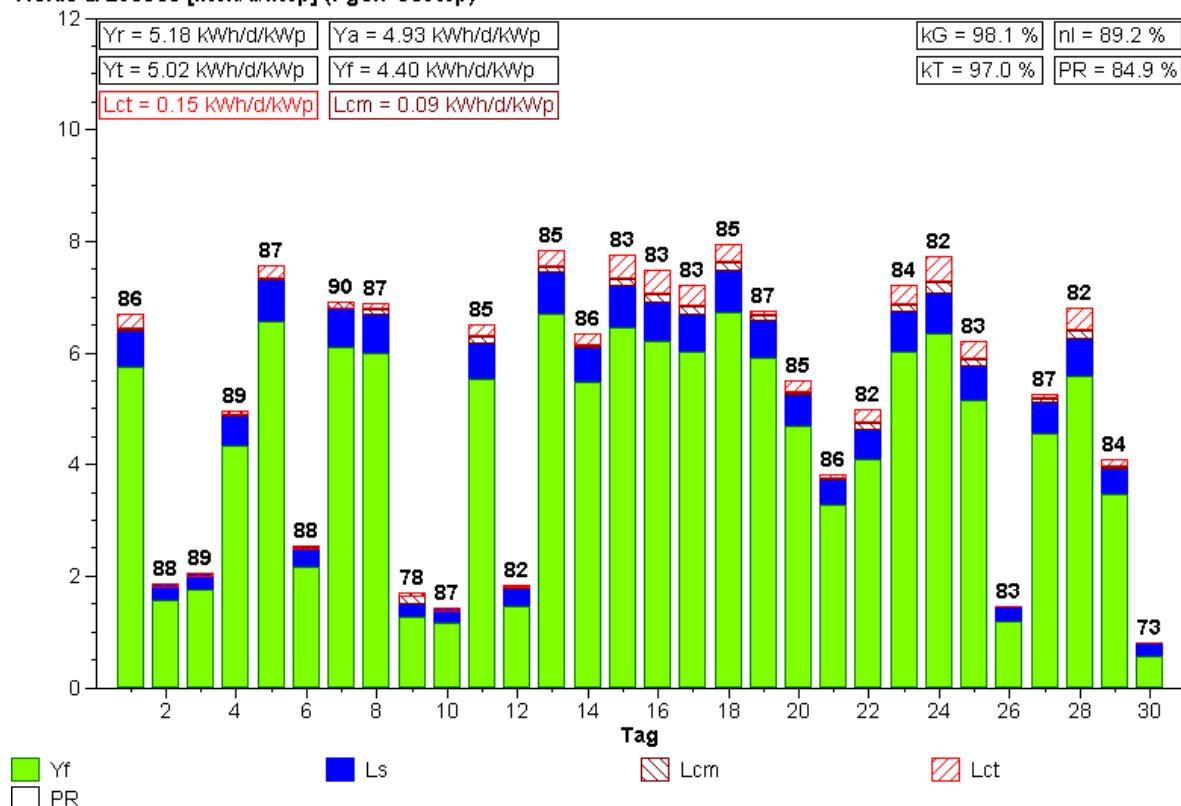
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 4.2003

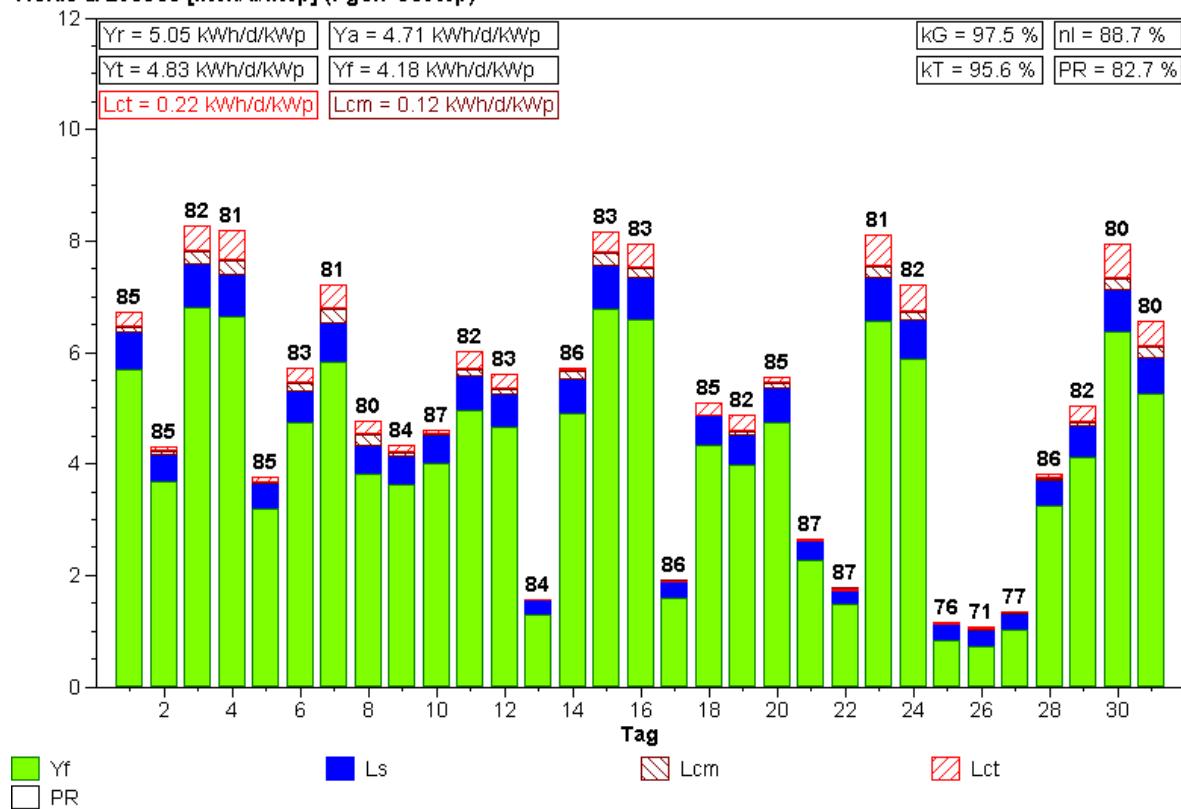
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 5.2003

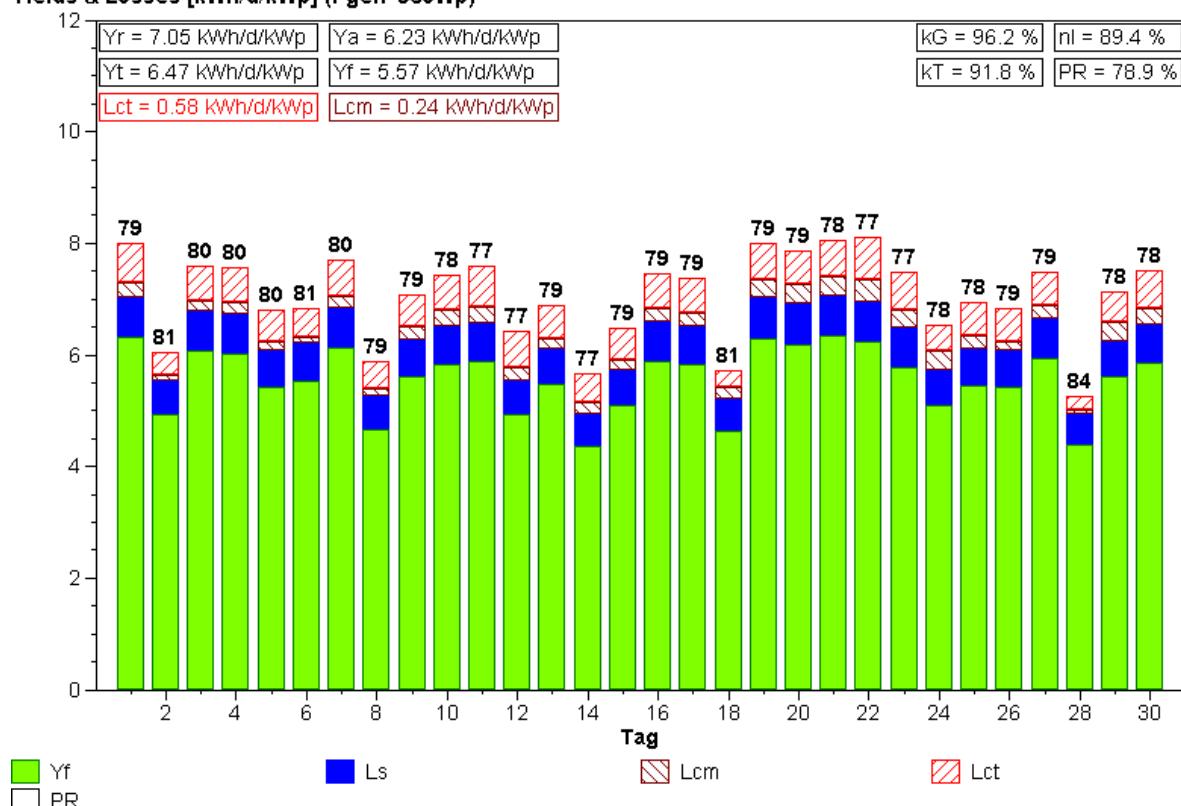
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 6.2003

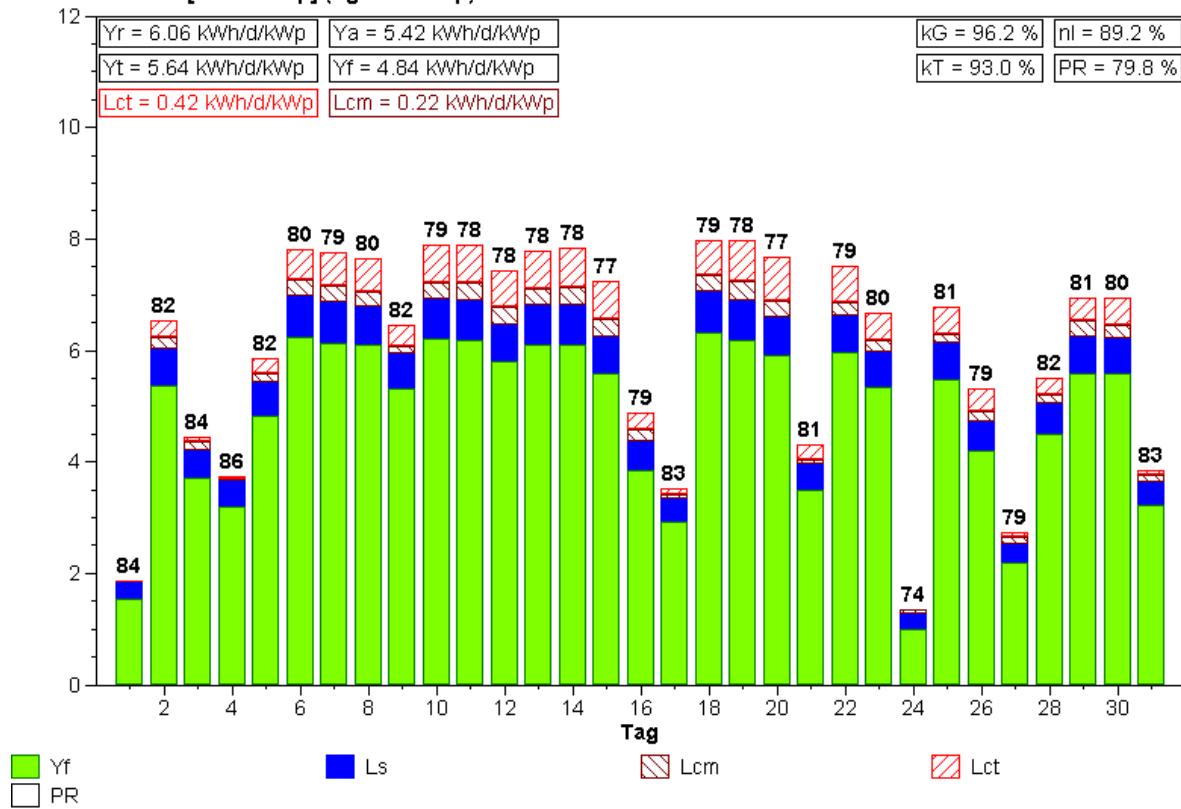
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 7.2003

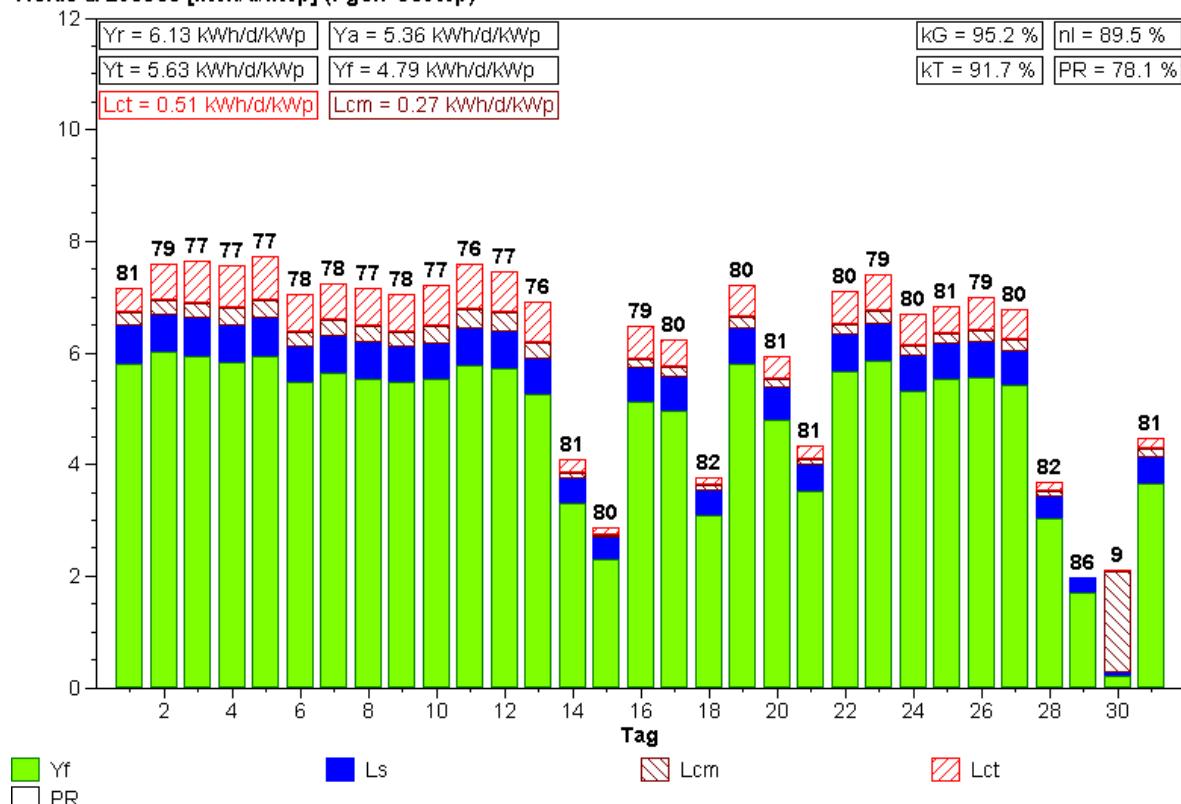
#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)

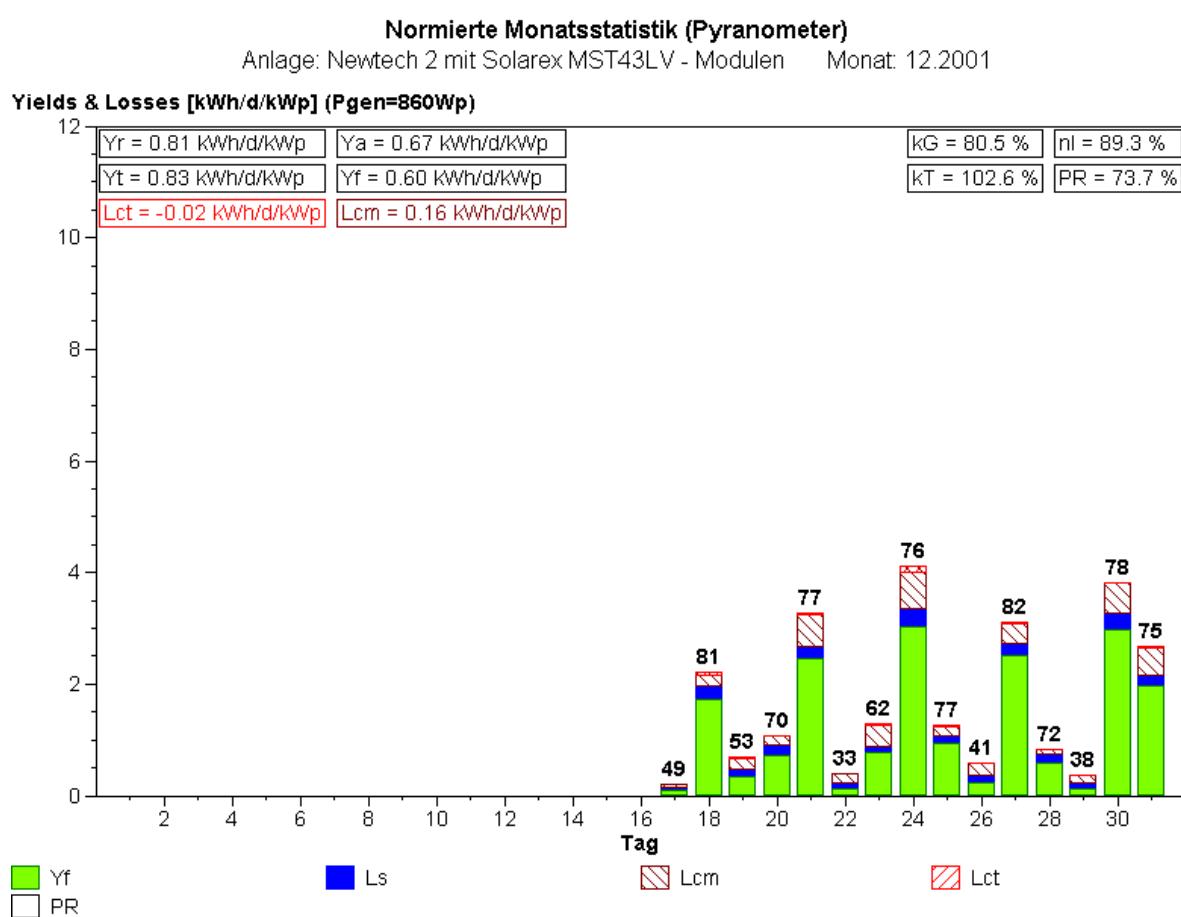


### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 1 mit Siemens ST40 - Modulen Monat: 8.2003

#### Yields & Losses [kWh/d/kWp] (Pgen=960Wp)

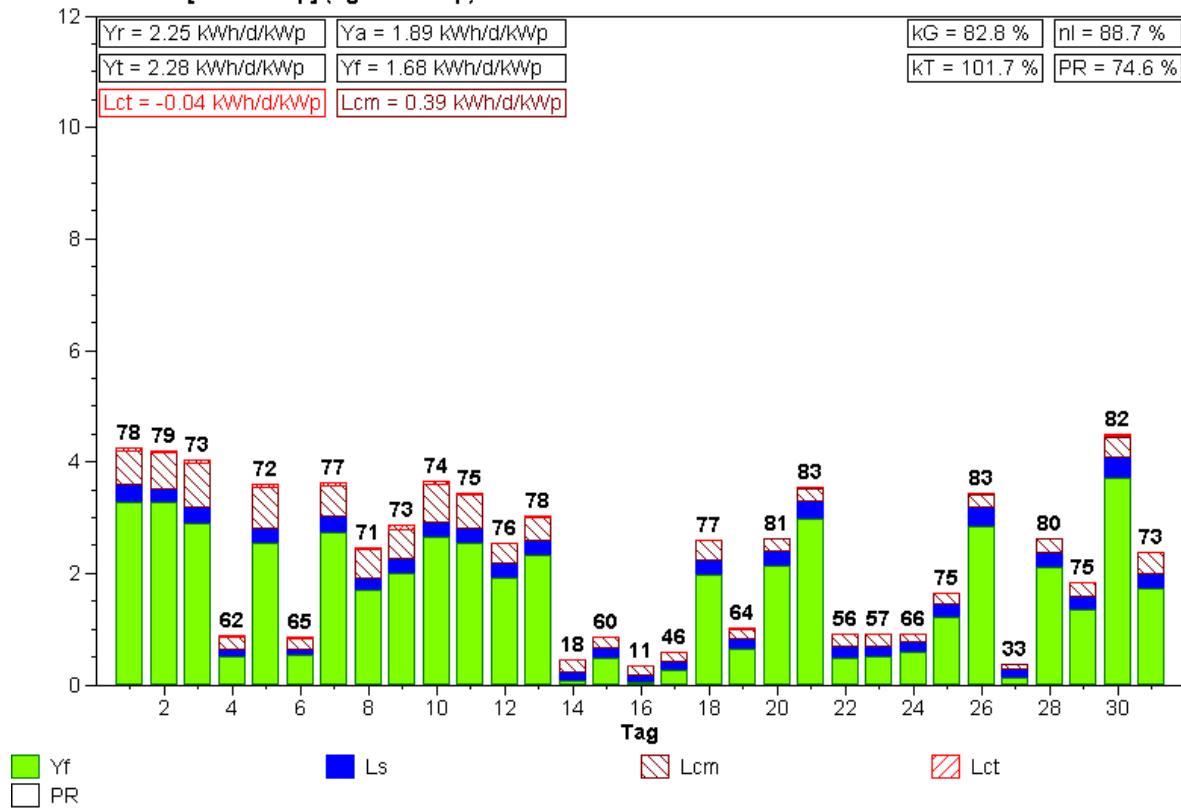




### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 1.2002

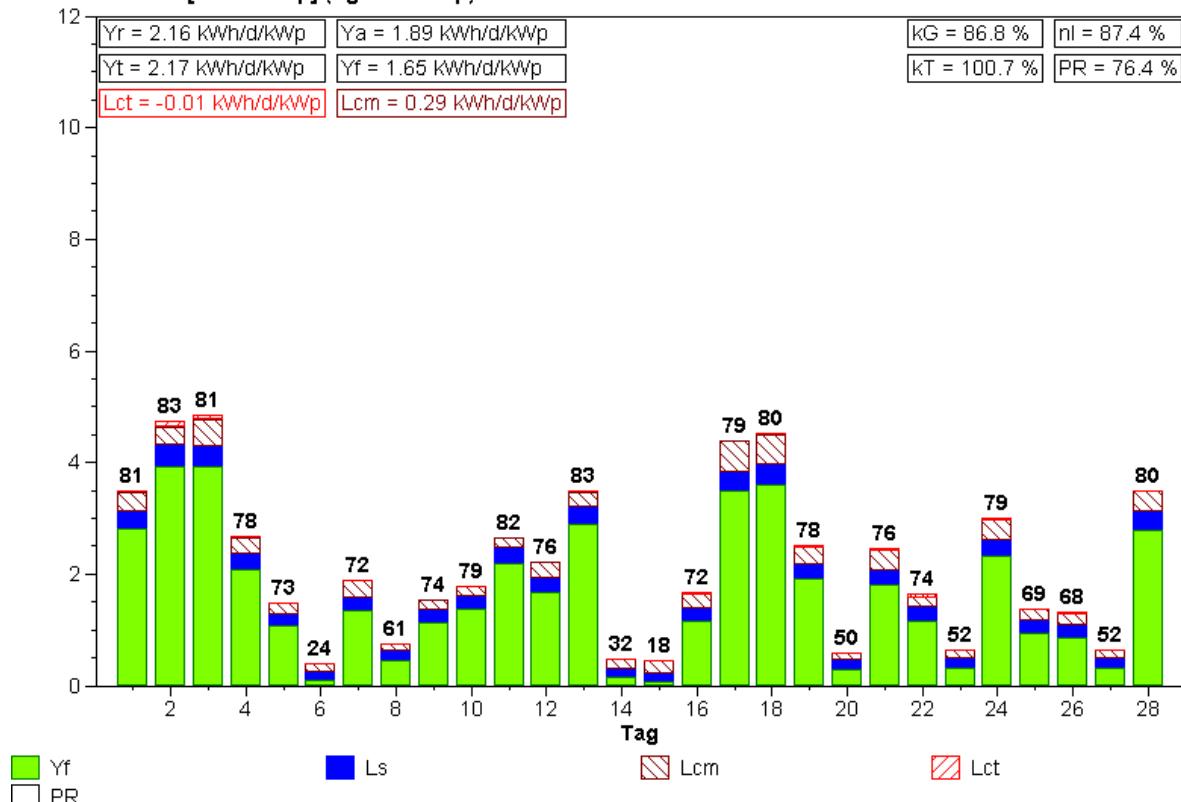
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 2.2002

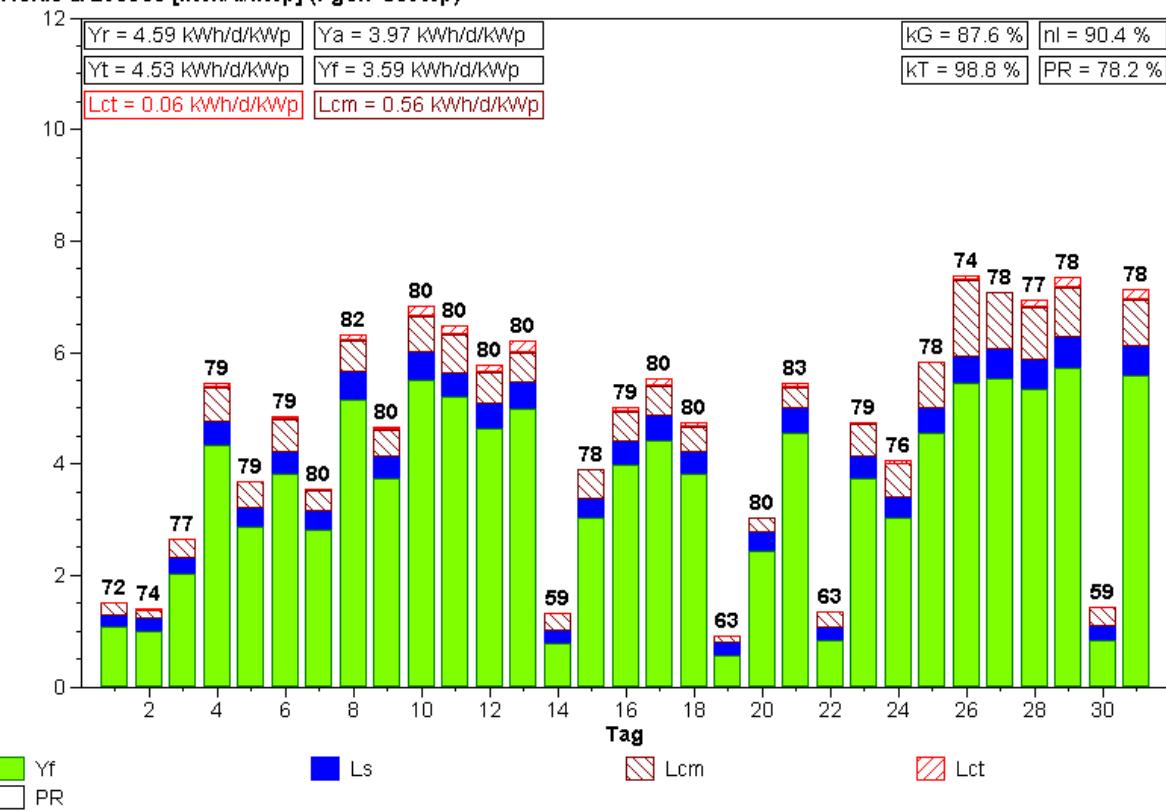
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 3.2002

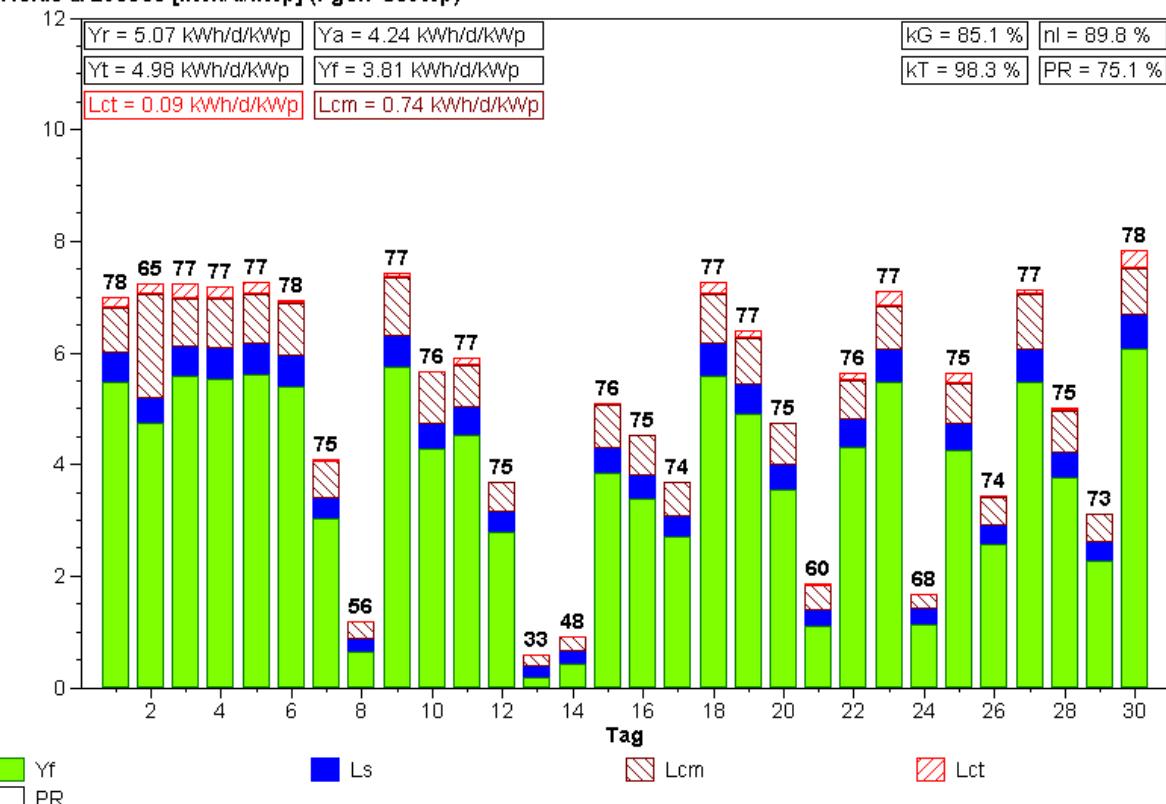
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 4.2002

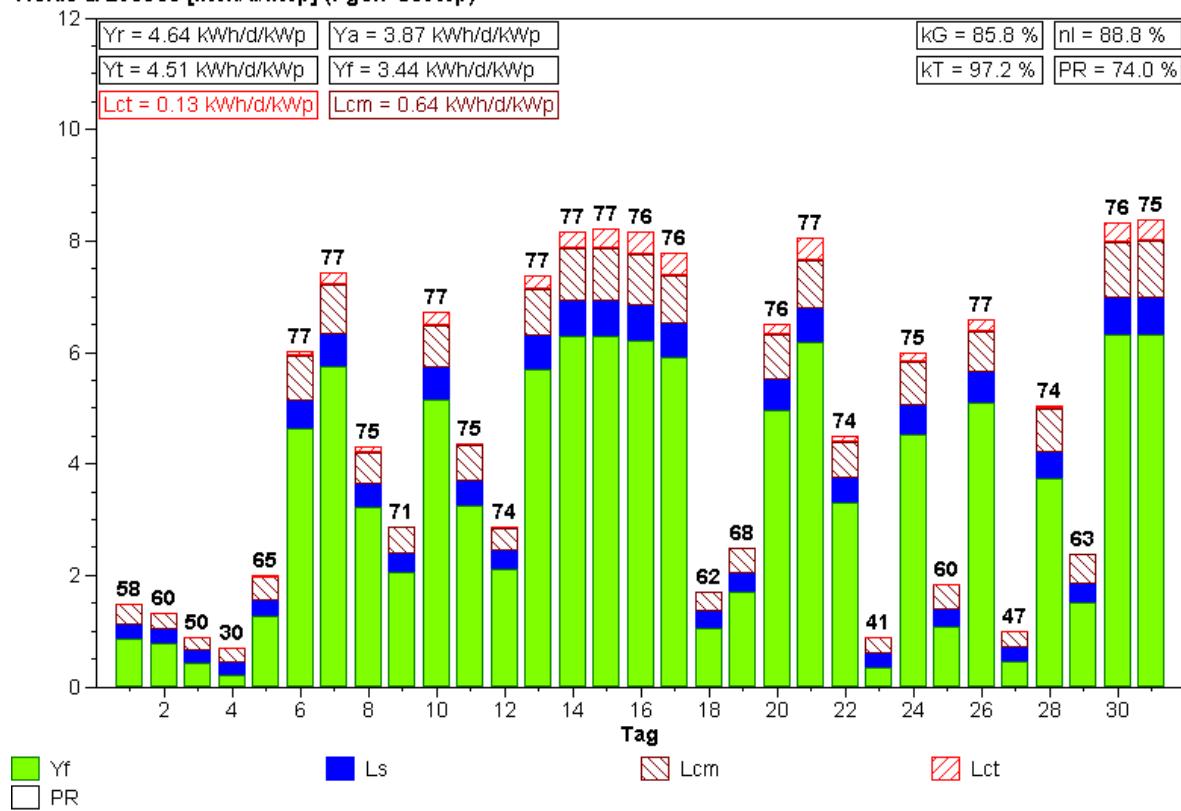
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 5.2002

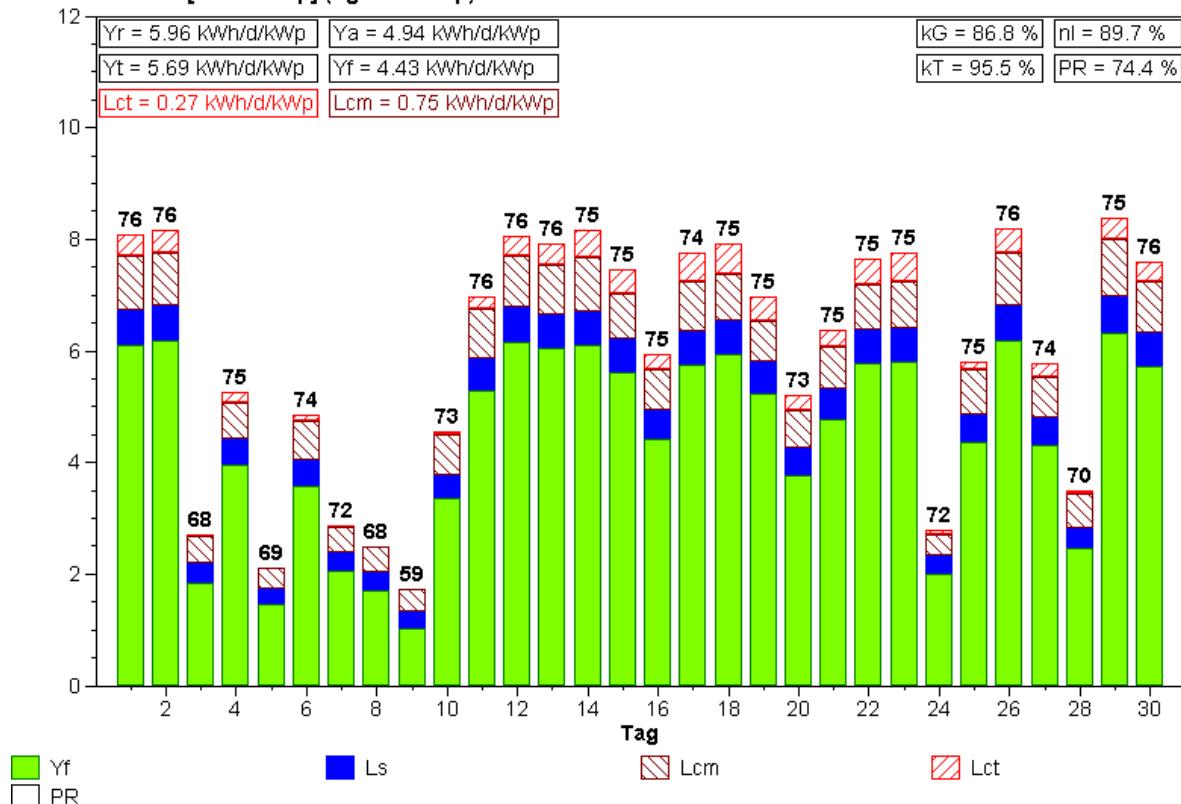
Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 6.2002

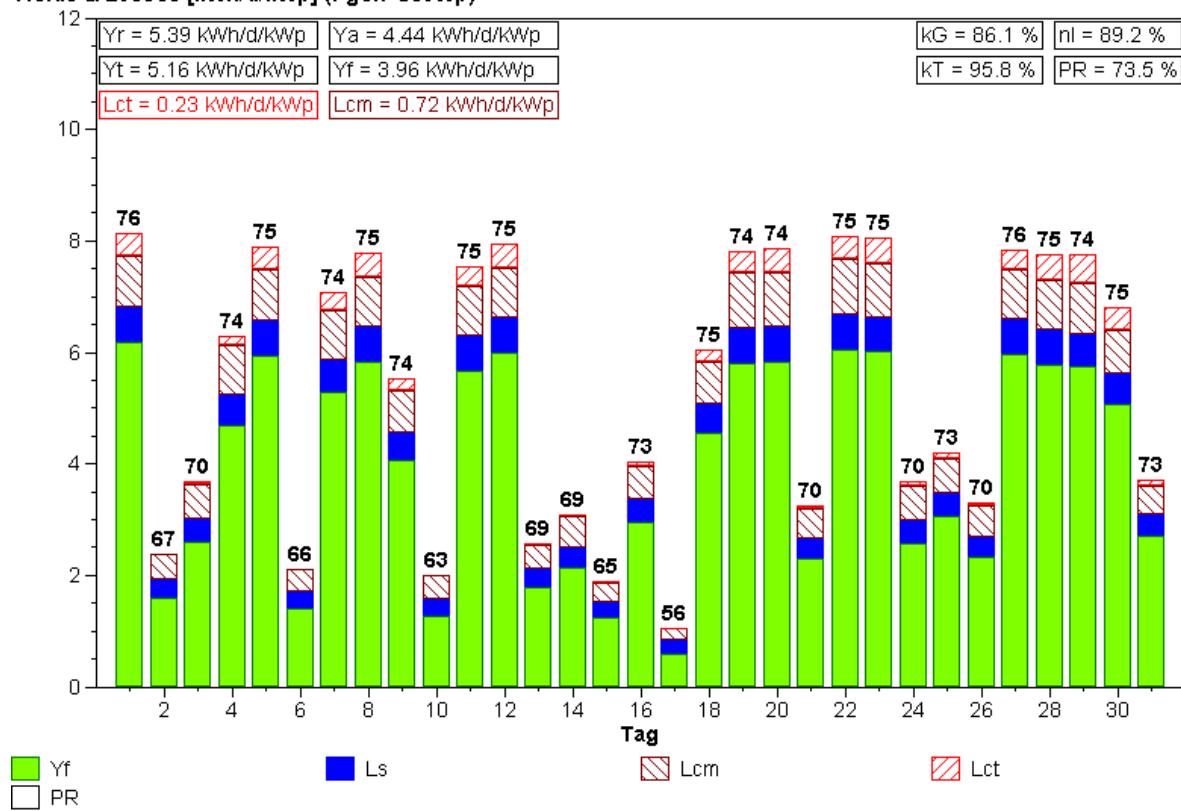
Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 7.2002

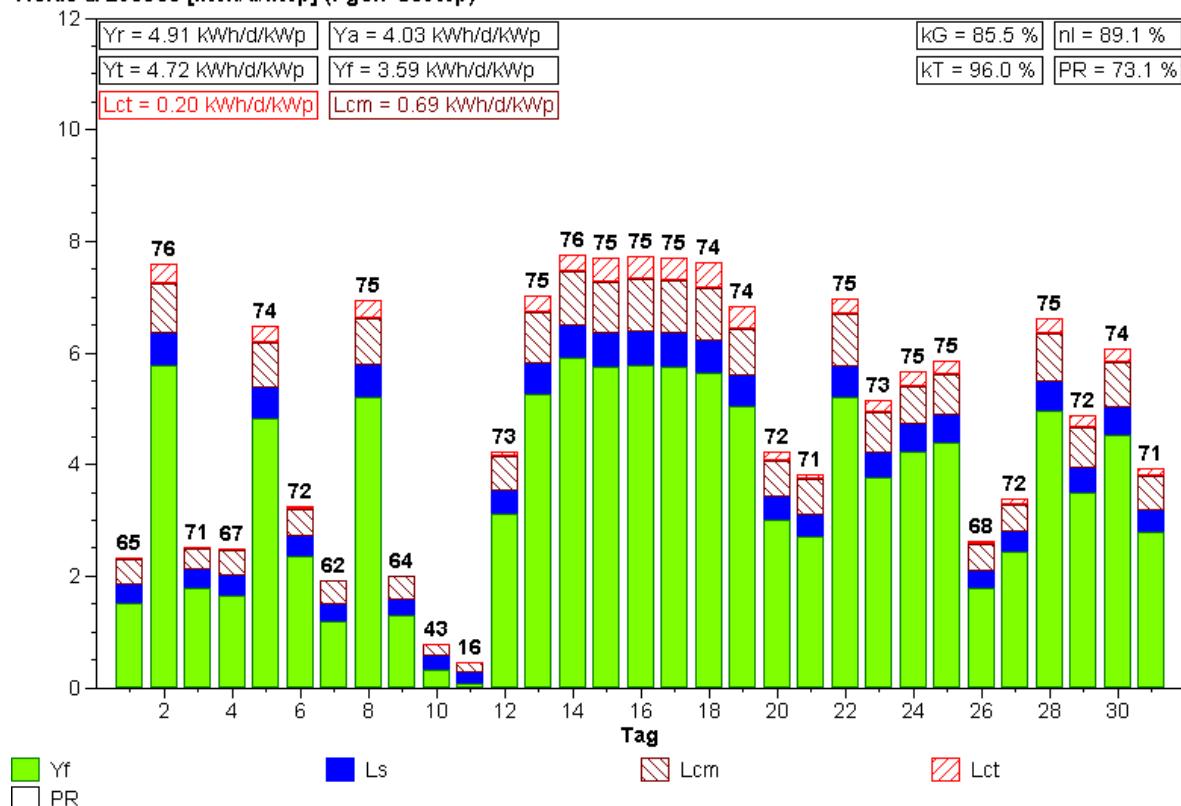
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 8.2002

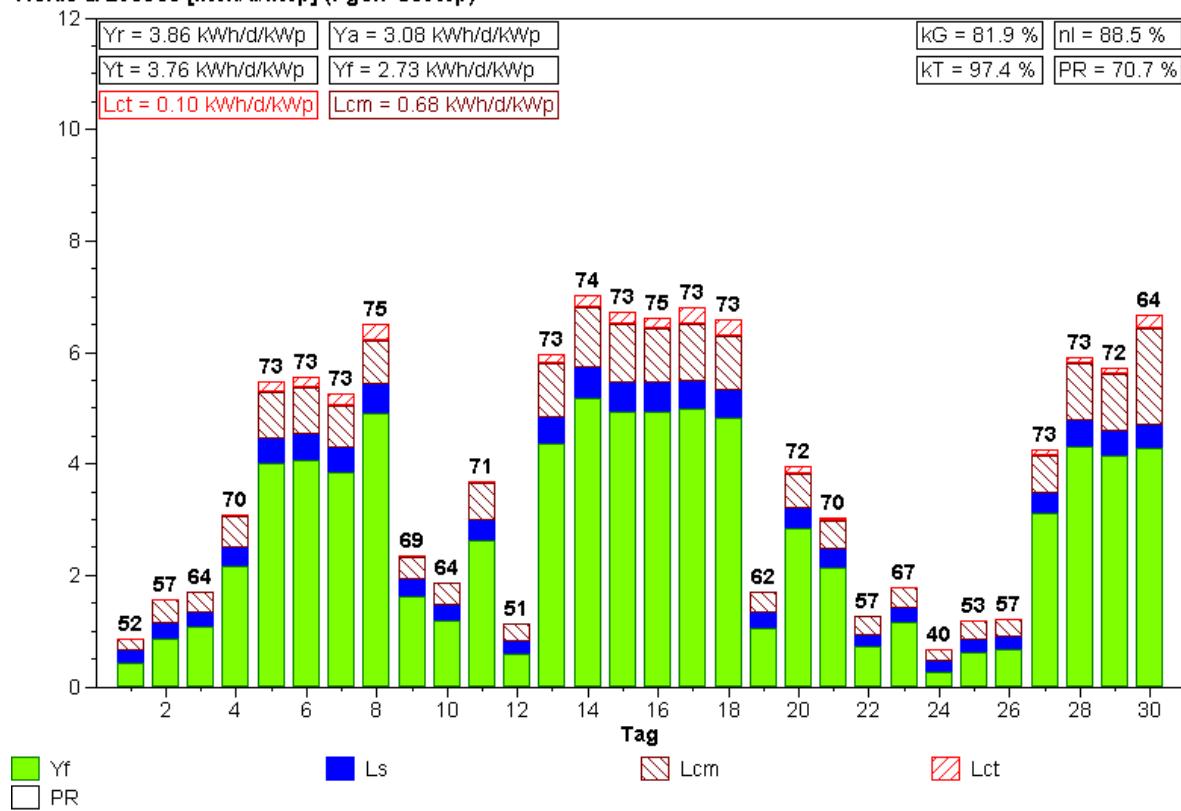
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 9.2002

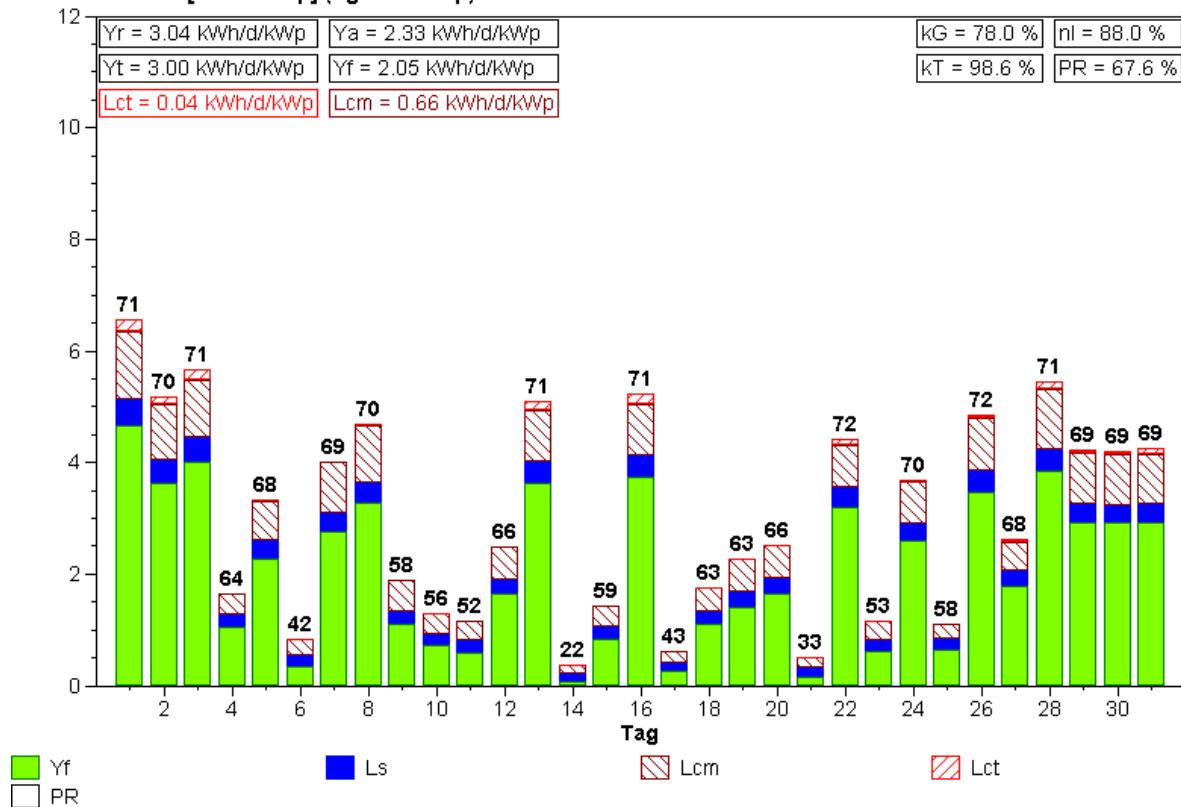
### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 10.2002

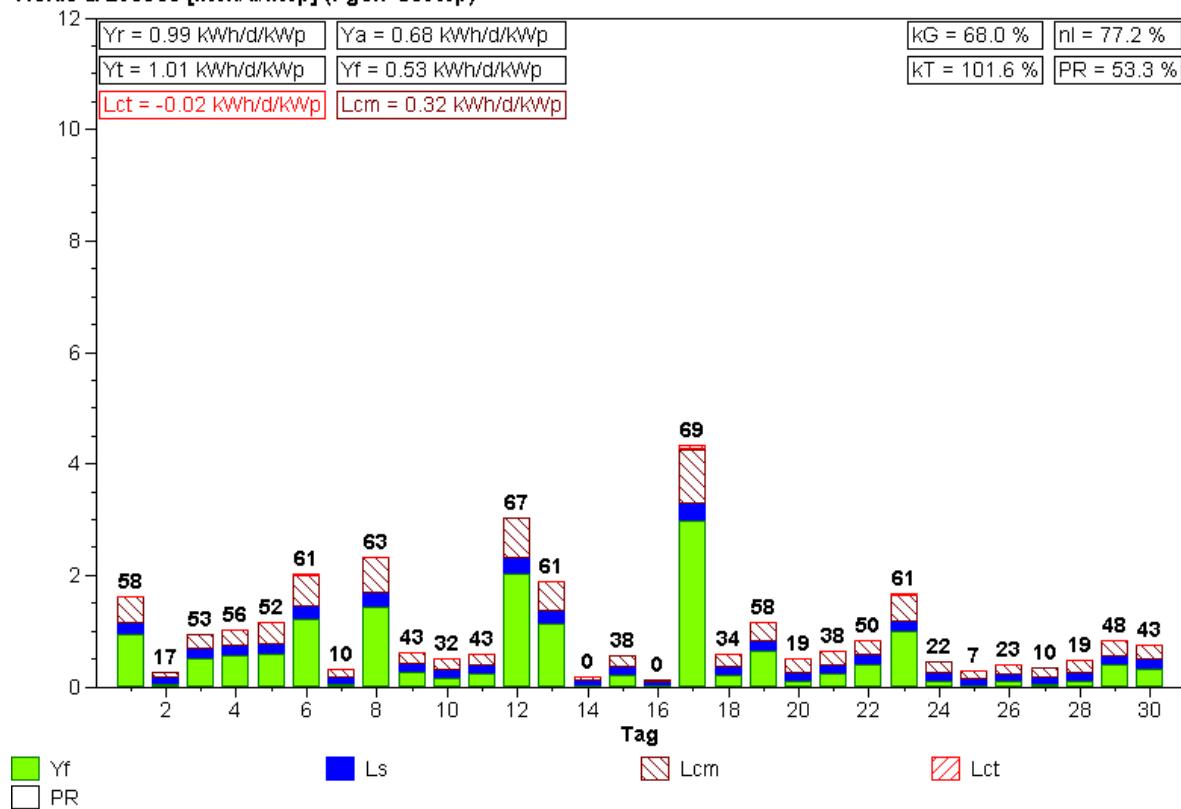
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 11.2002

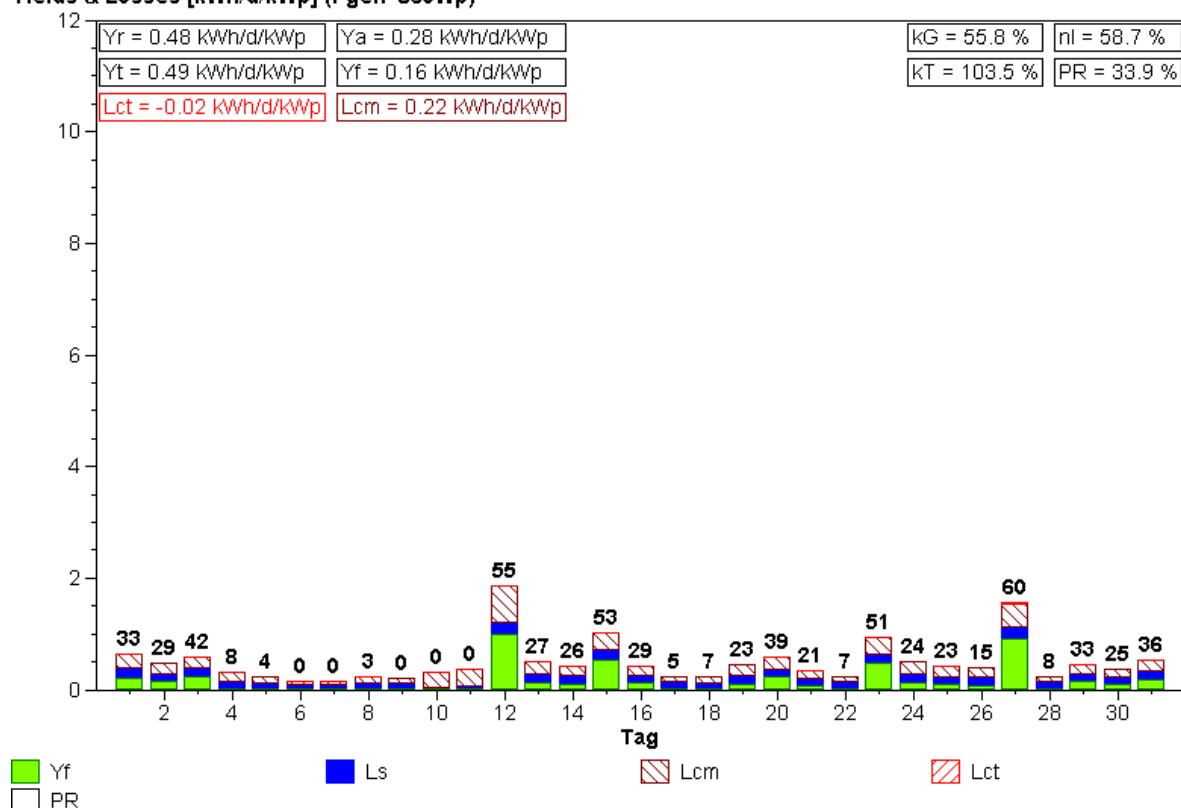
**Yields & Losses [kWh/d/kWp] (Pgen=860Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 12.2002

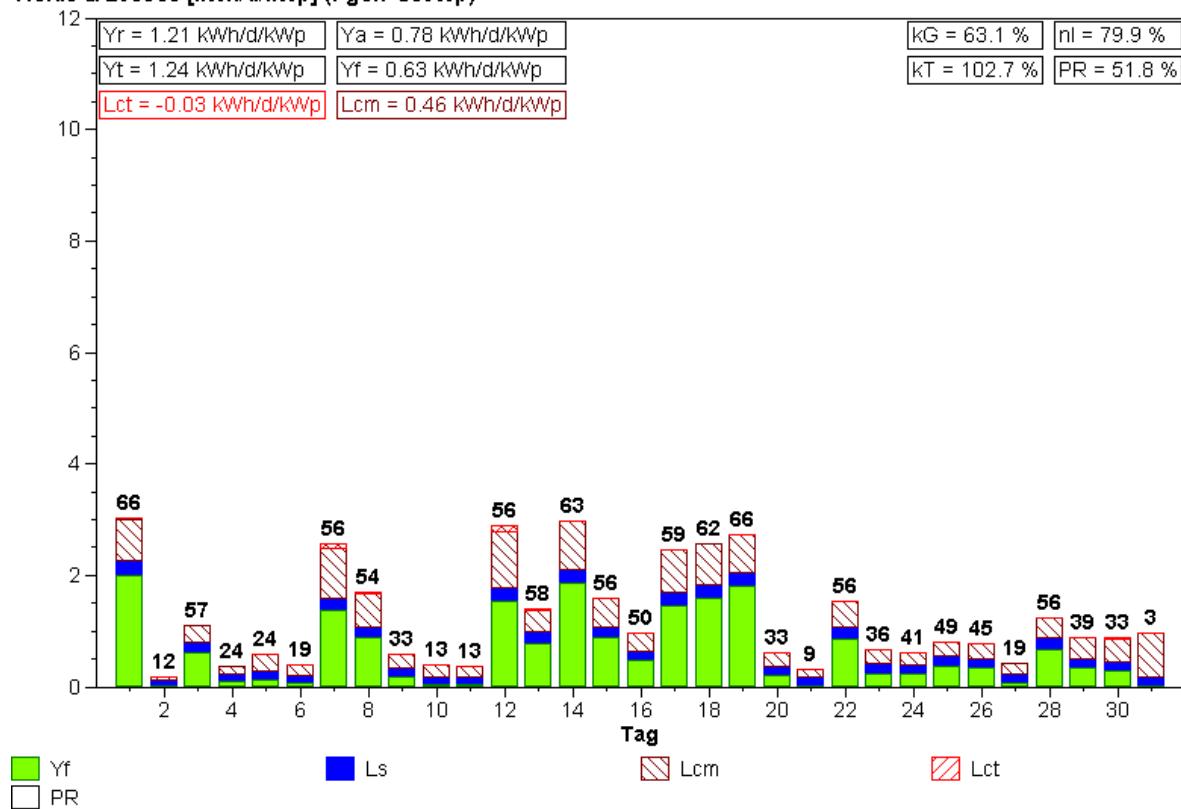
**Yields & Losses [kWh/d/kWp] (Pgen=860Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 1.2003

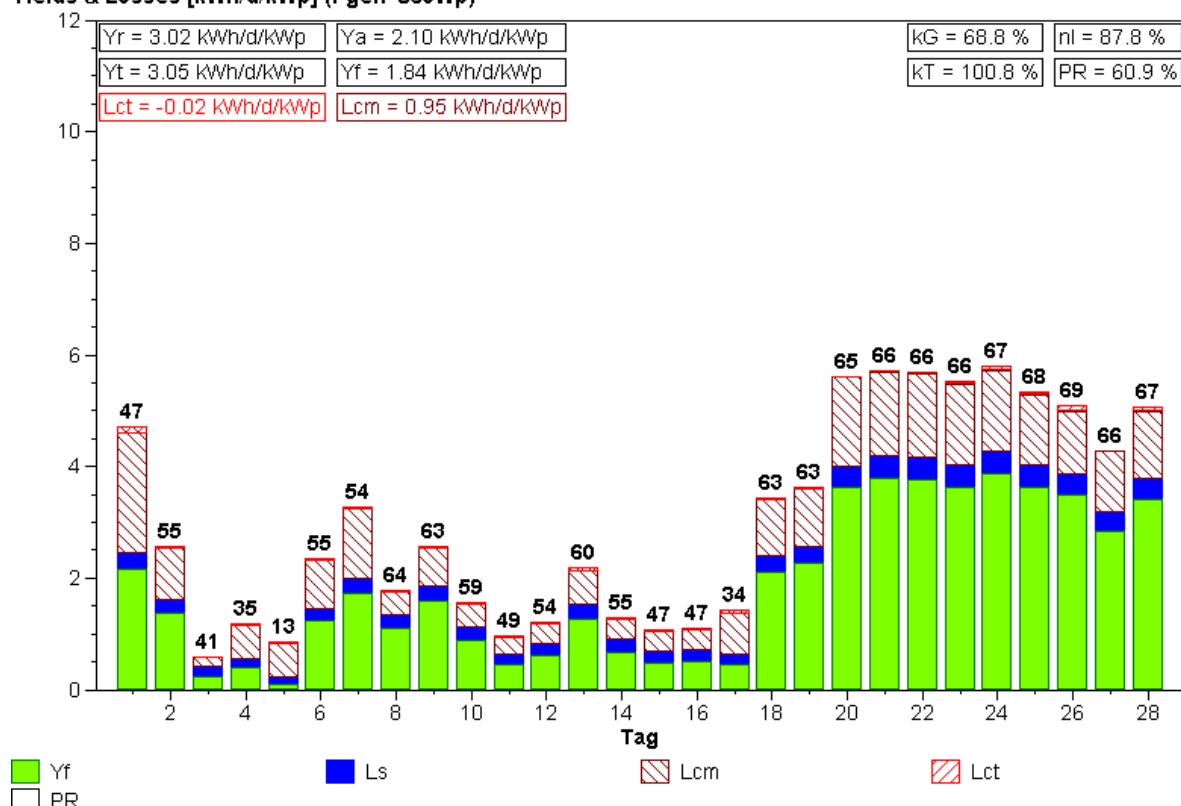
**Yields & Losses [kWh/d/kWp] (Pgen=860Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 2.2003

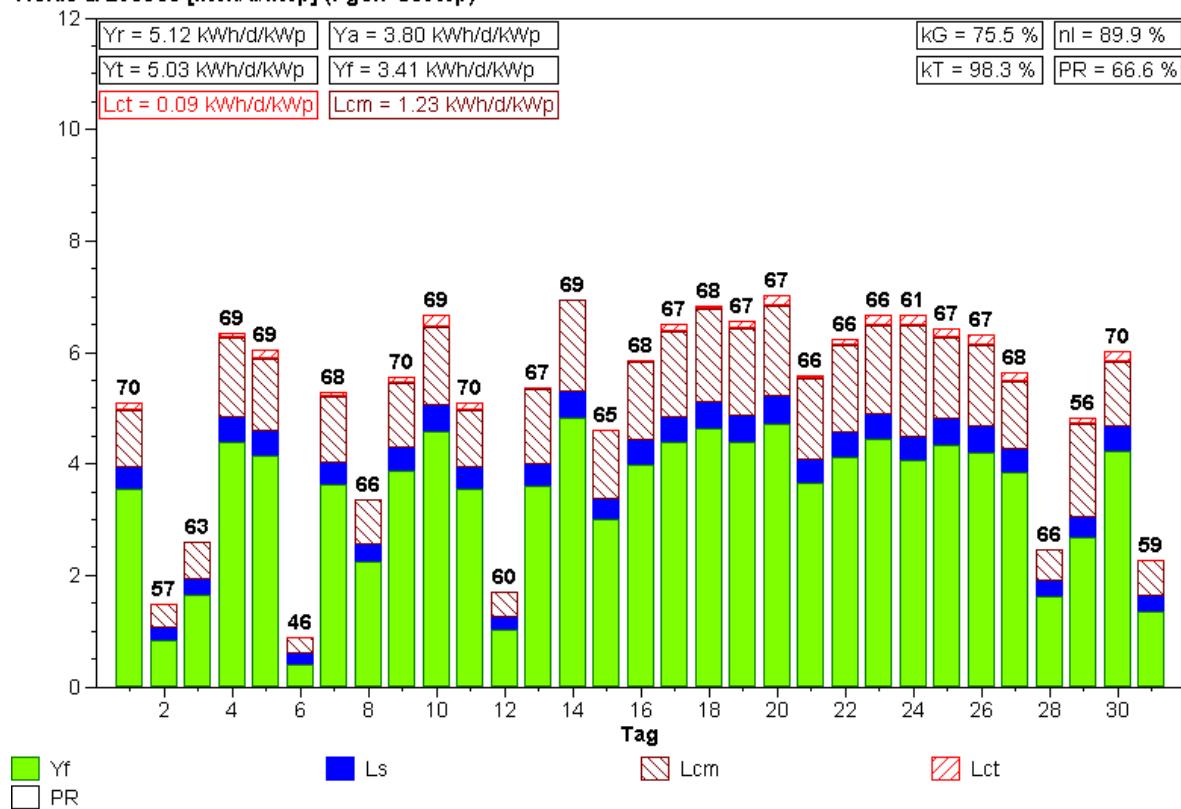
**Yields & Losses [kWh/d/kWp] (Pgen=860Wp)**



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 3.2003

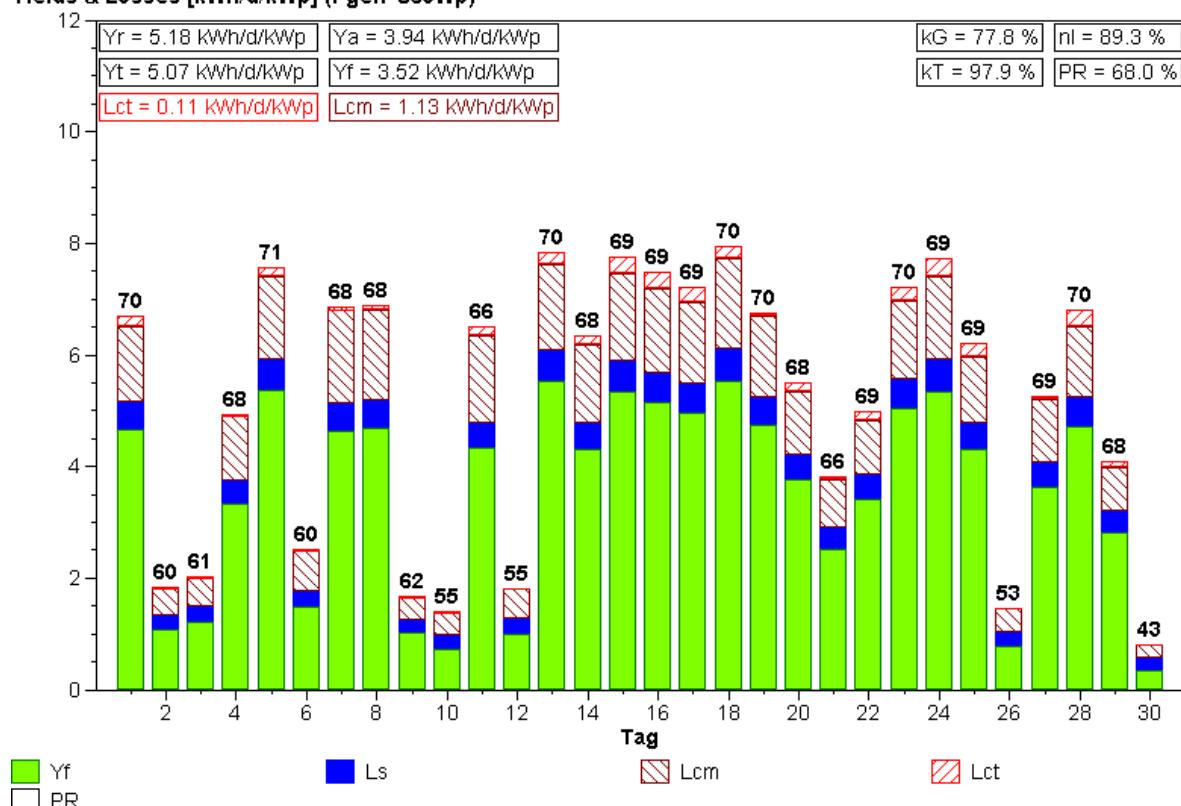
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 4.2003

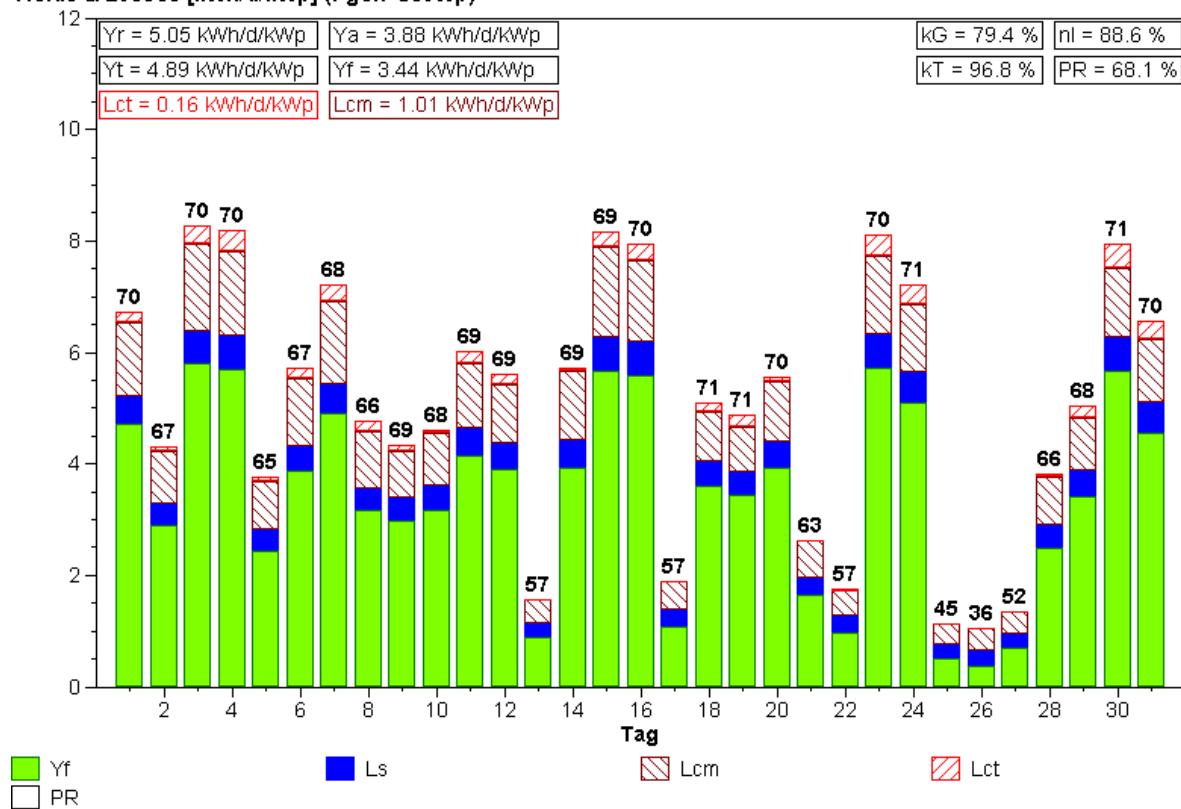
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 5.2003

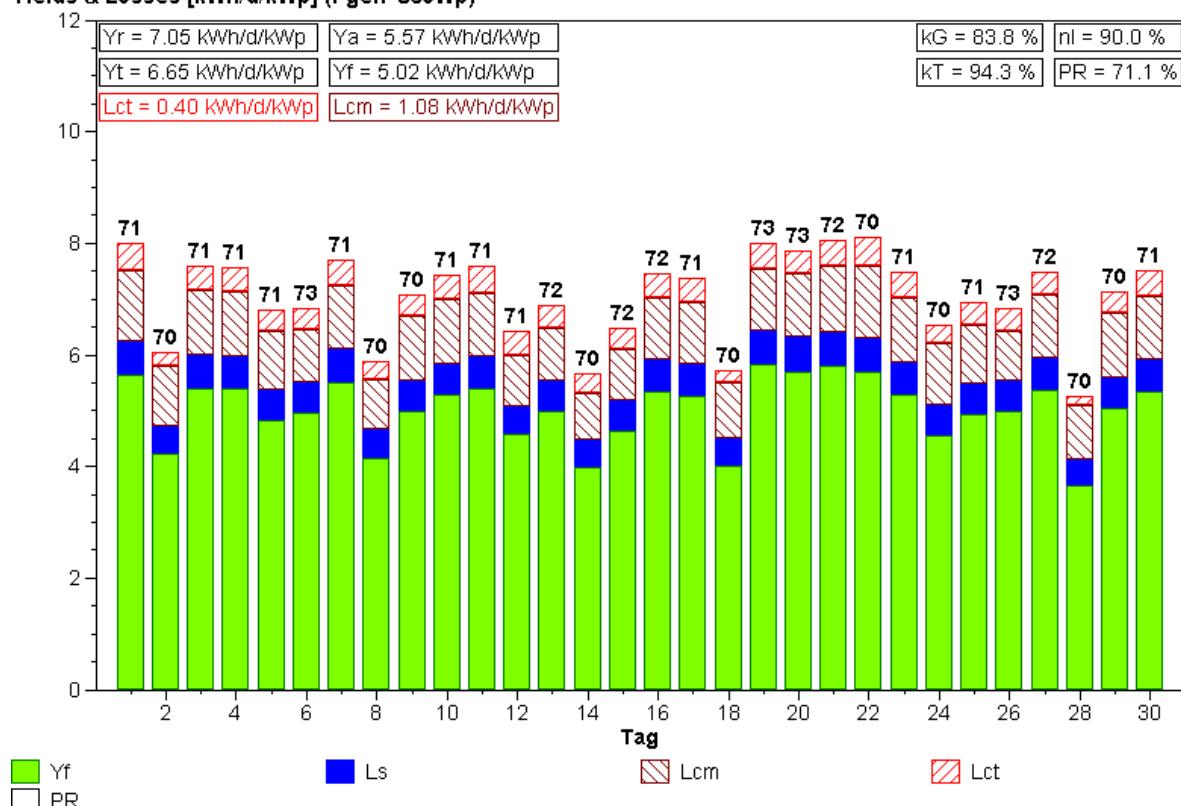
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 6.2003

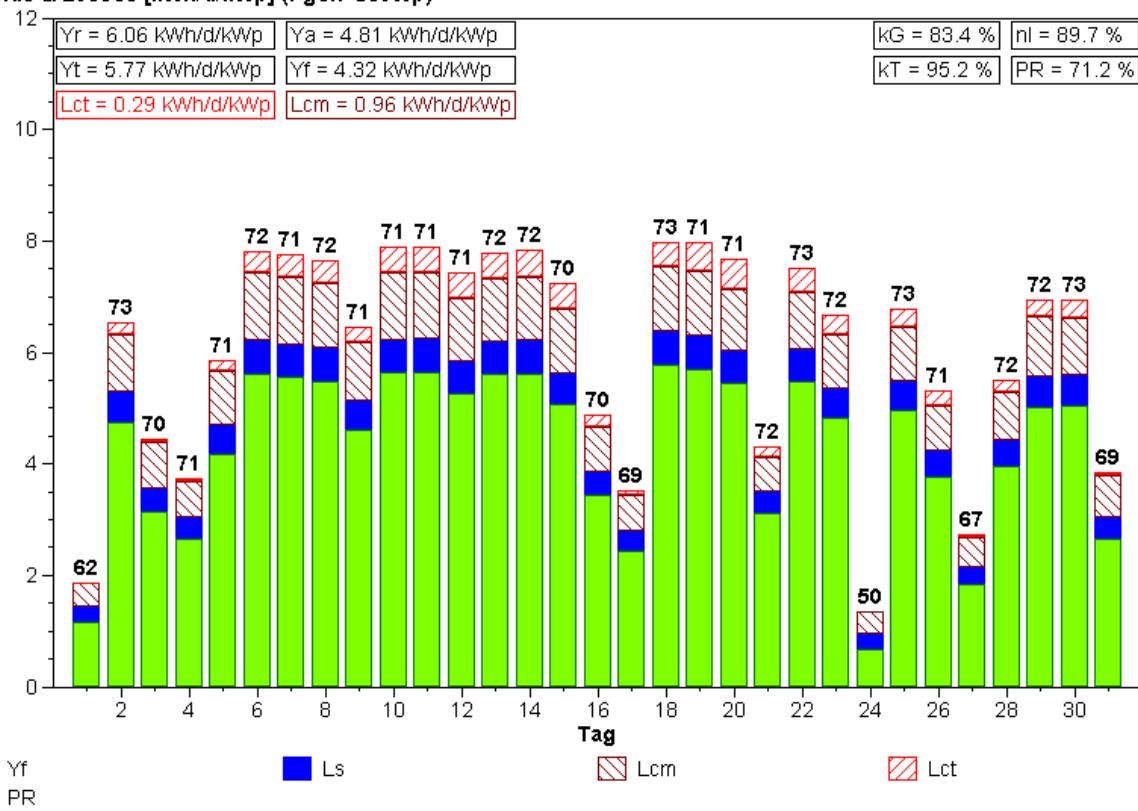
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 7.2003

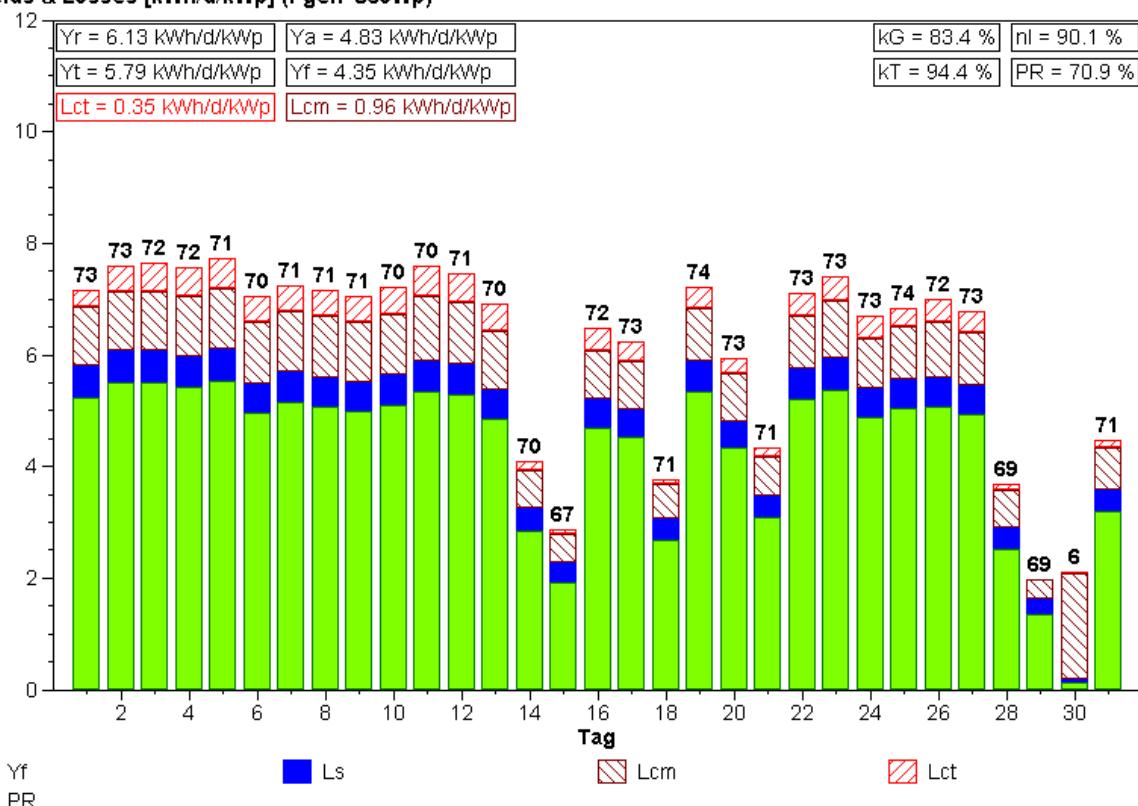
#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)

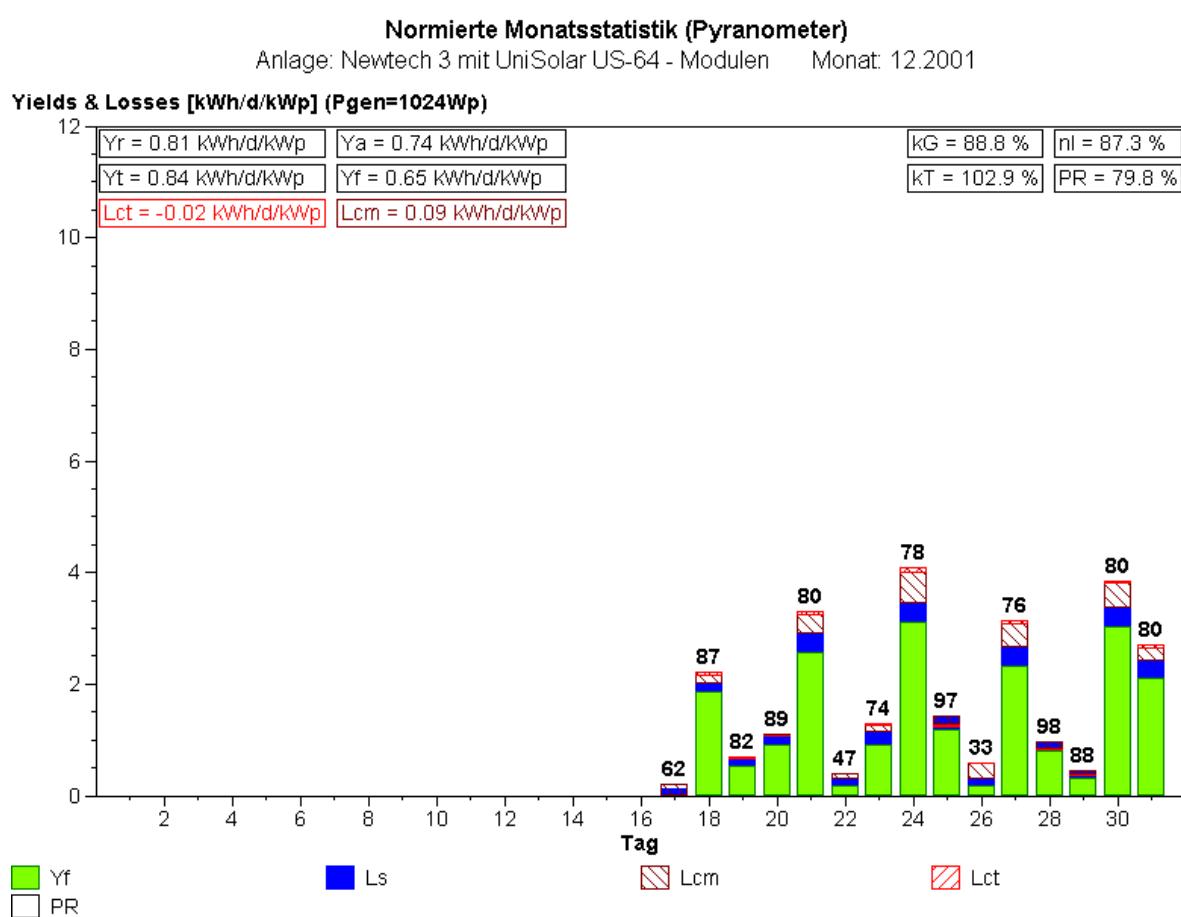


### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 2 mit Solarex MST43LV - Modulen Monat: 8.2003

#### Yields & Losses [kWh/d/kWp] (Pgen=860Wp)

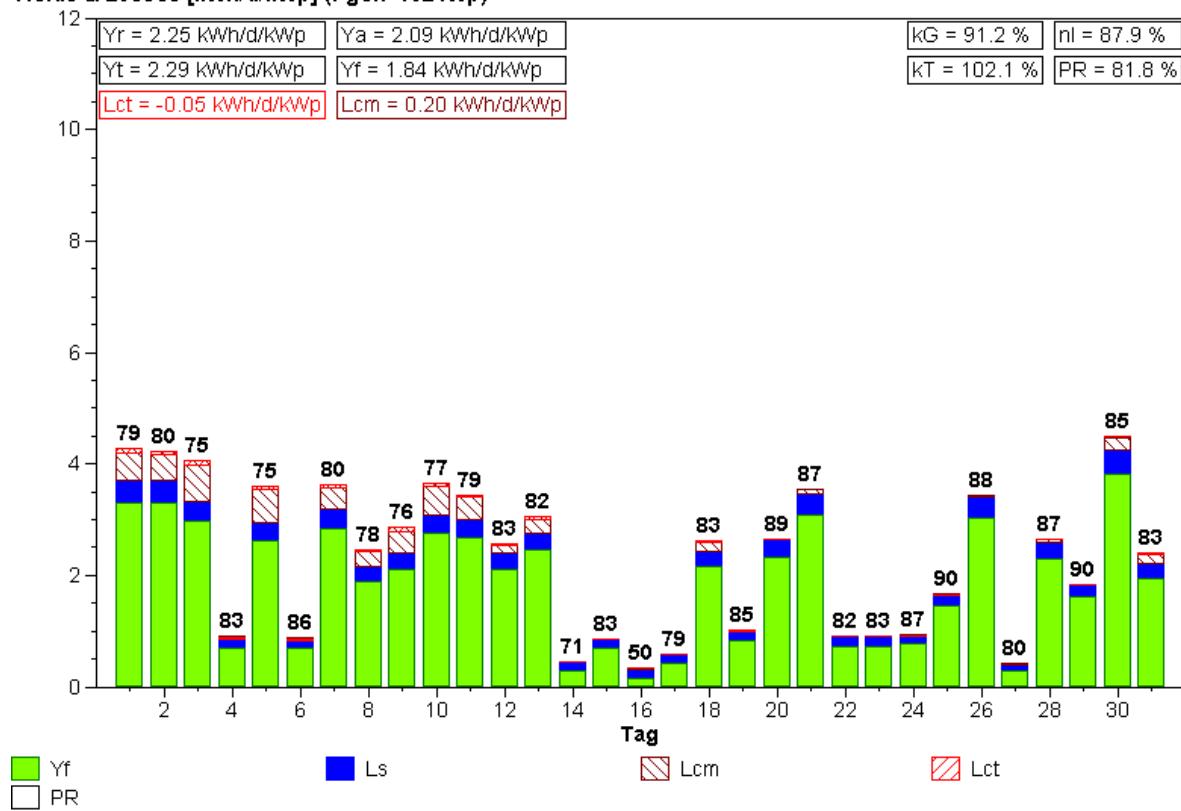




**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 1.2002

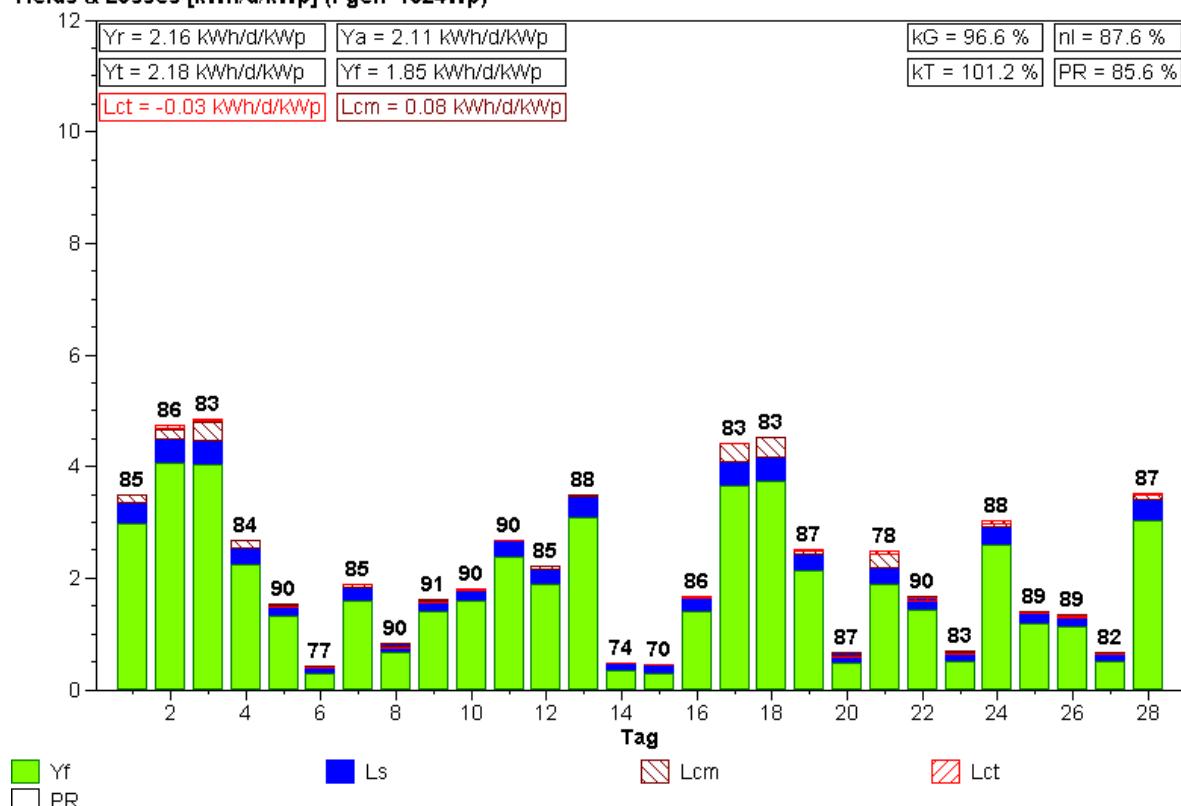
**Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 2.2002

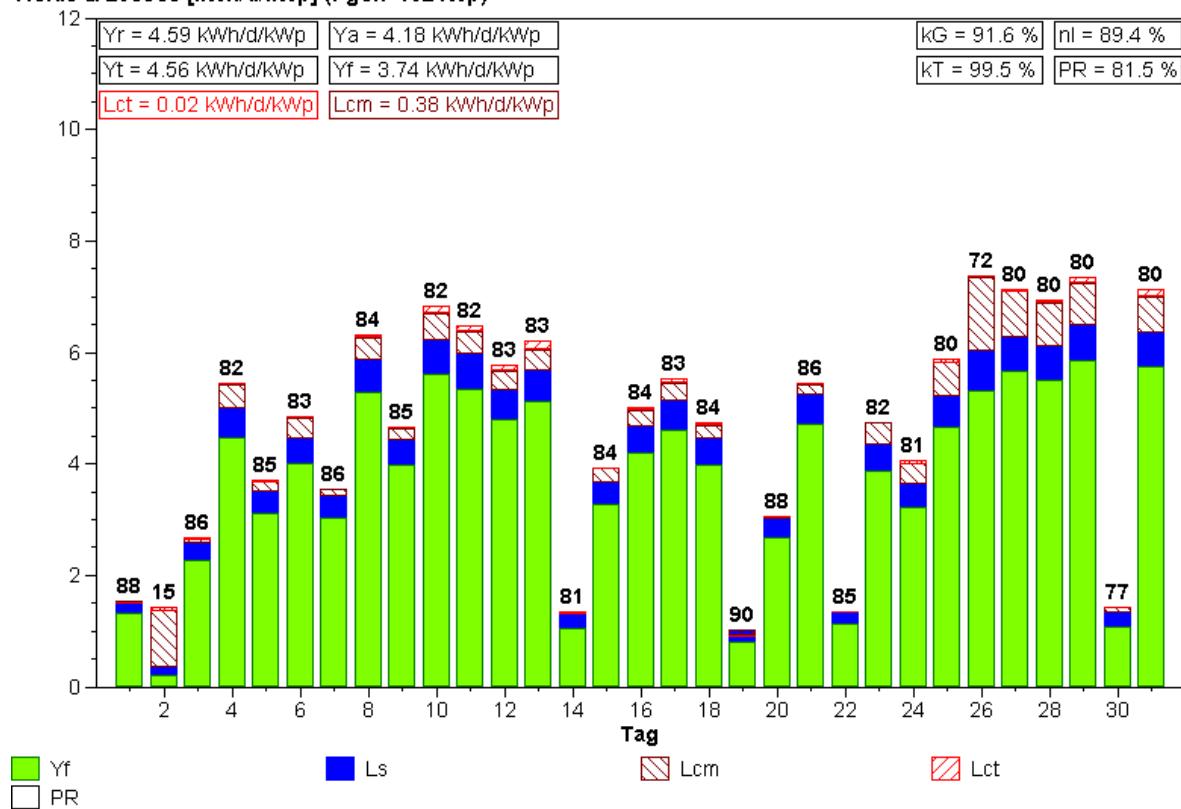
**Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)**



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 3.2002

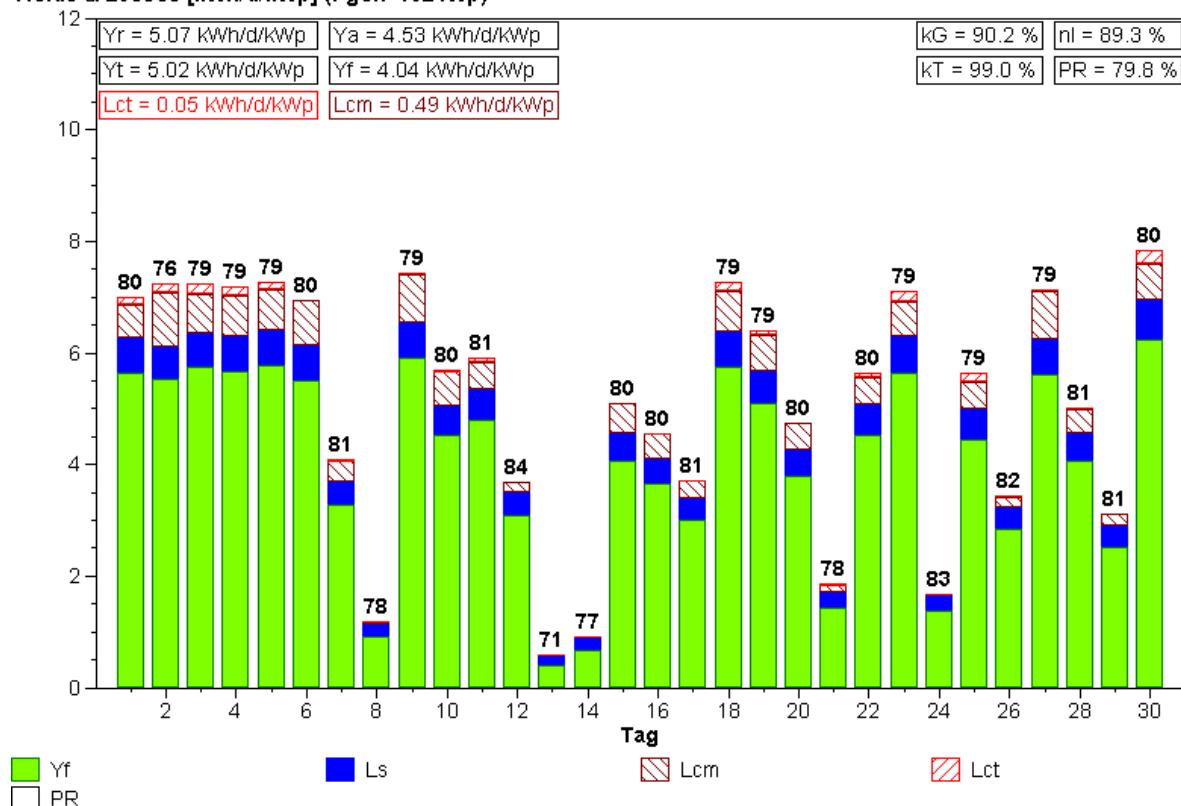
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 4.2002

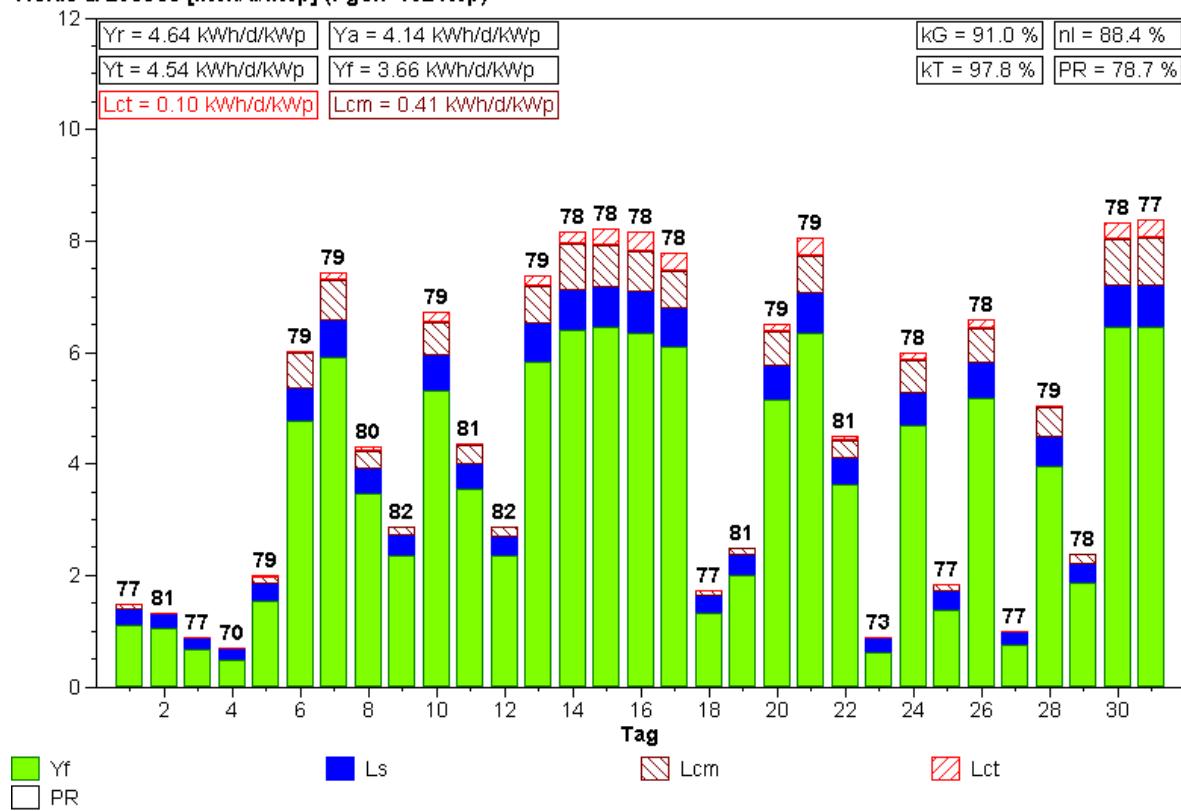
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 5.2002

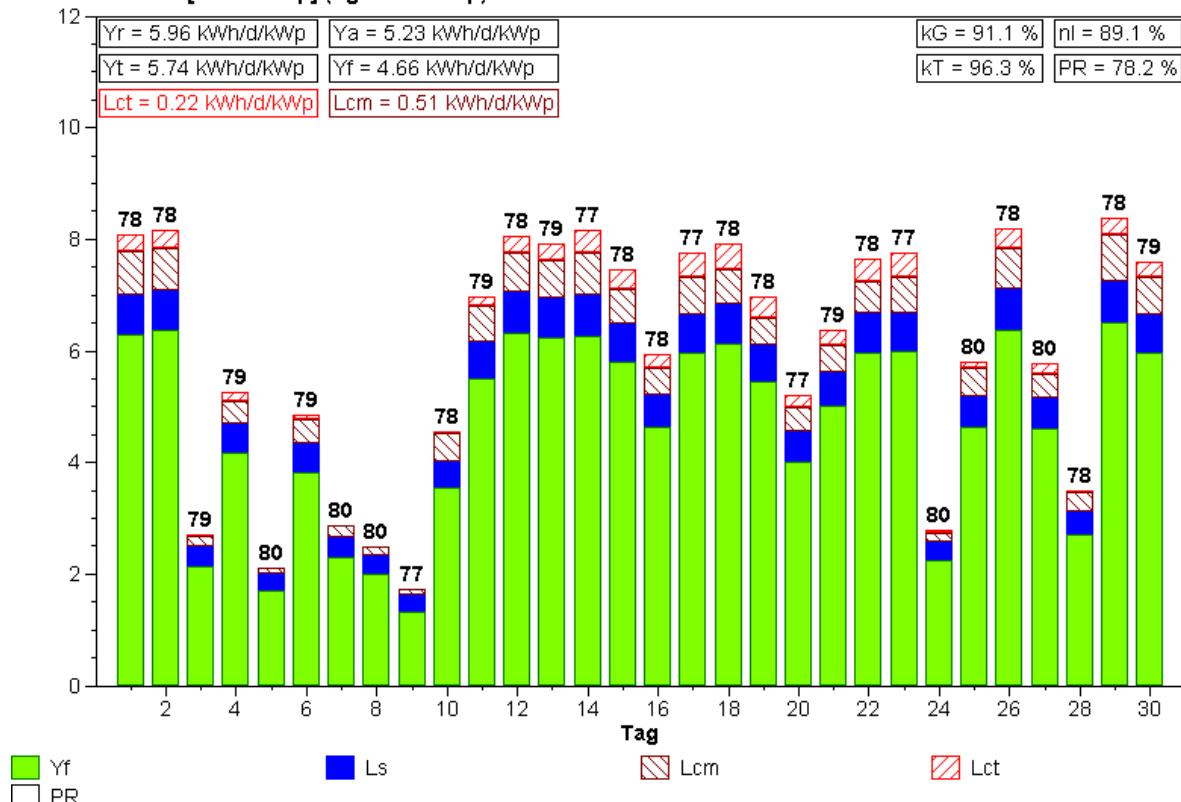
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 6.2002

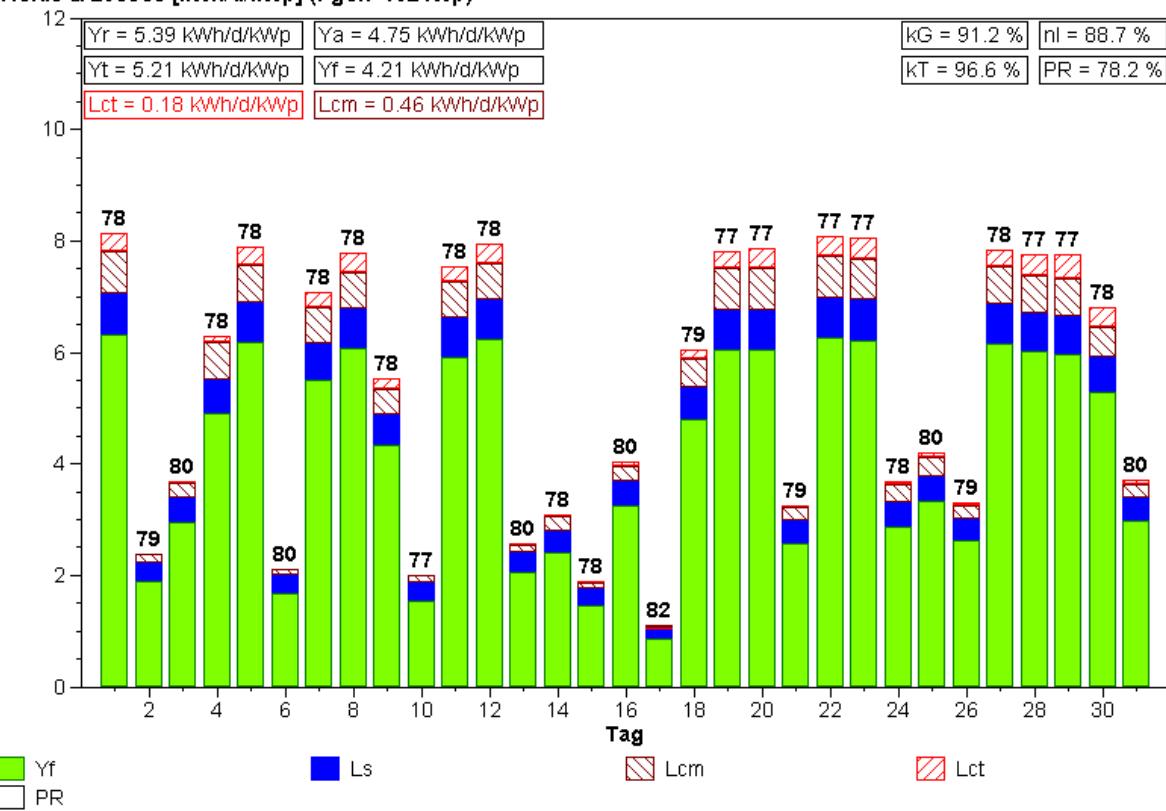
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 7.2002

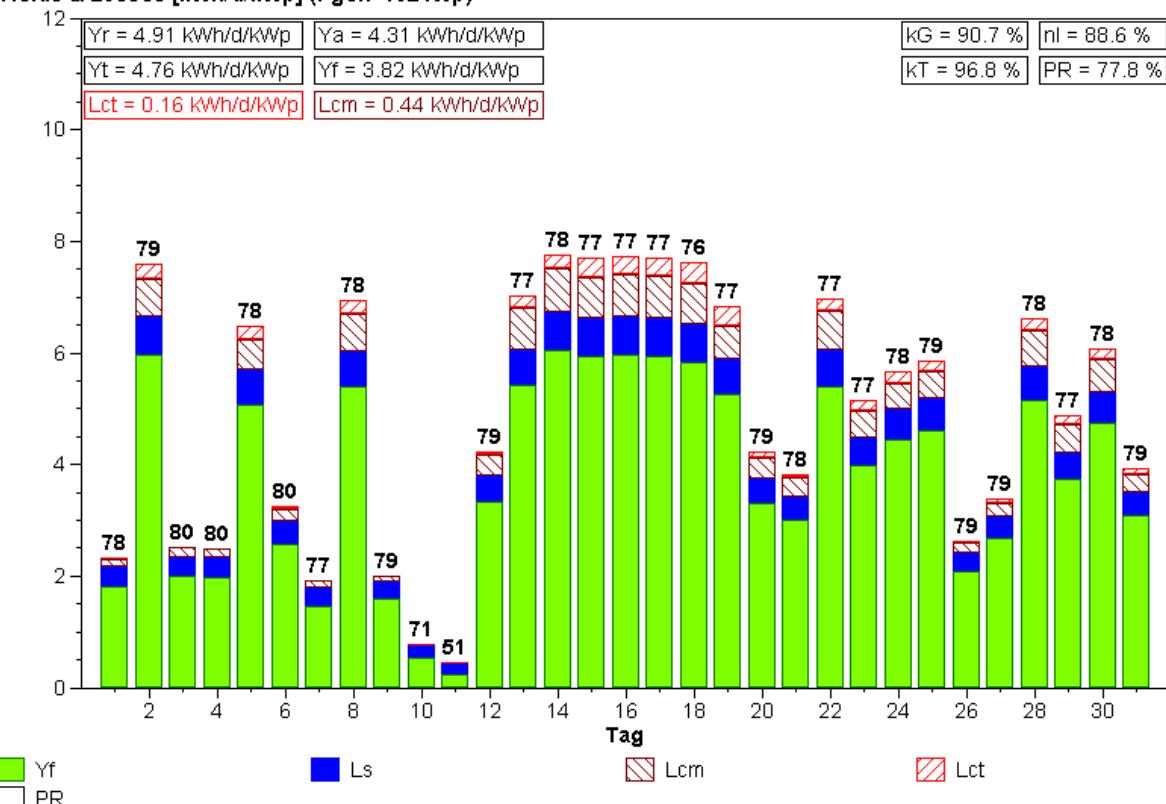
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 8.2002

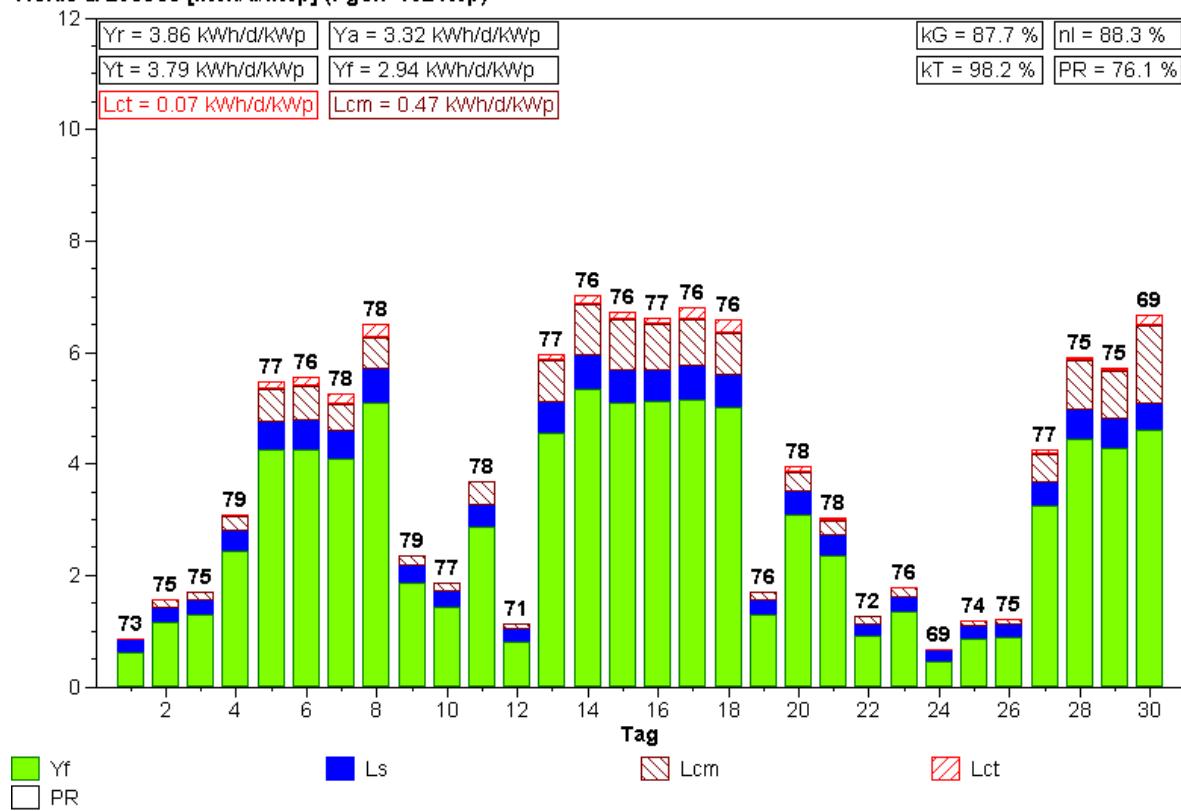
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 9.2002

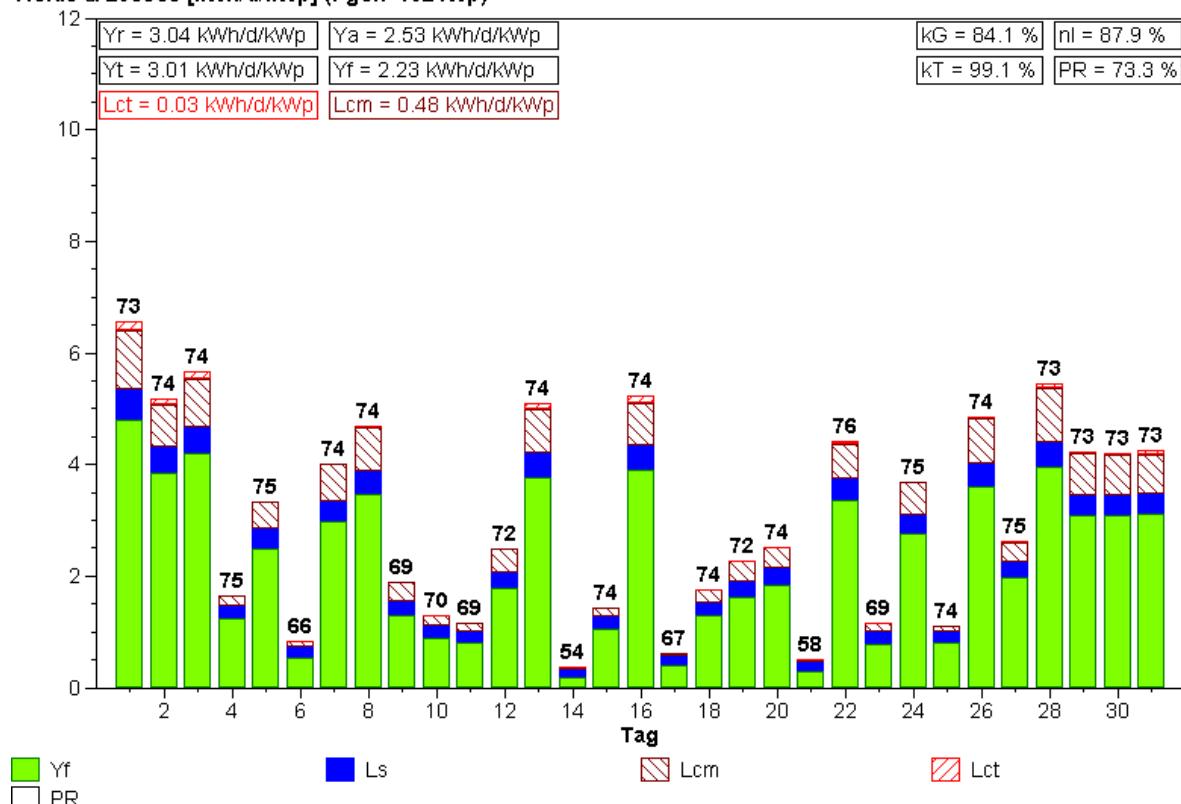
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 10.2002

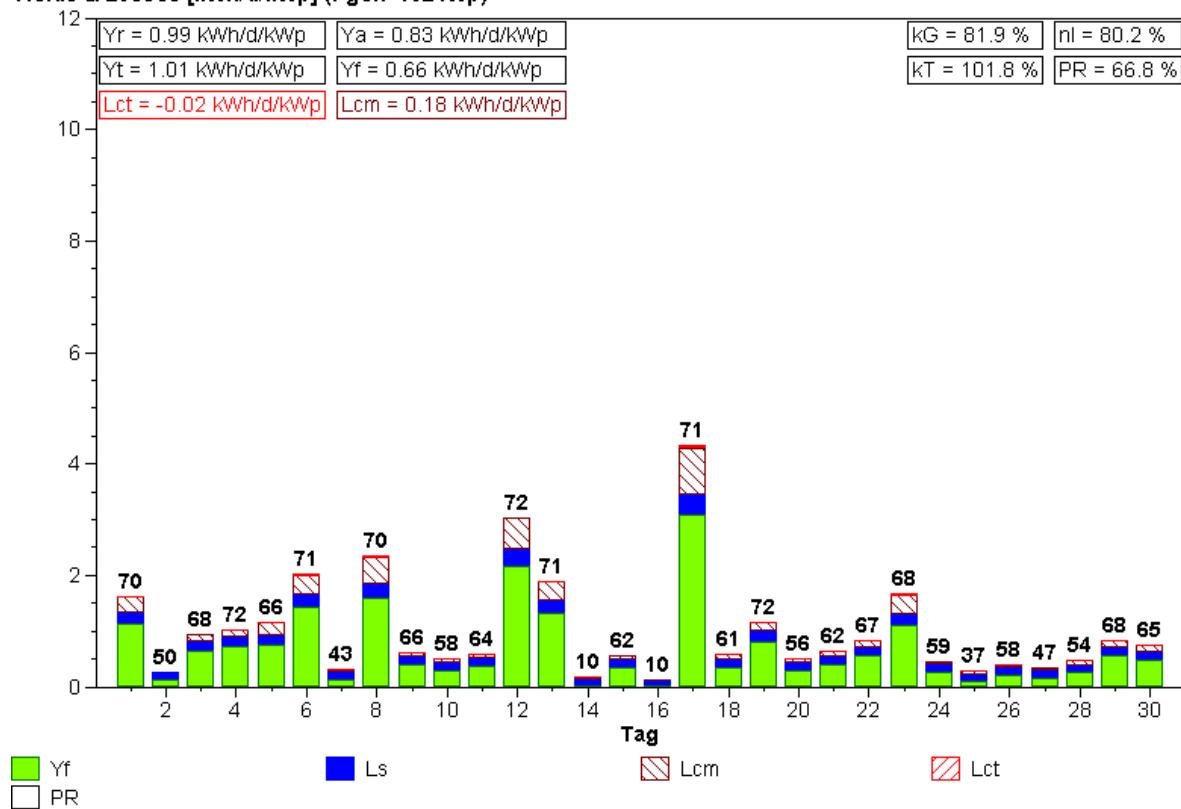
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 11.2002

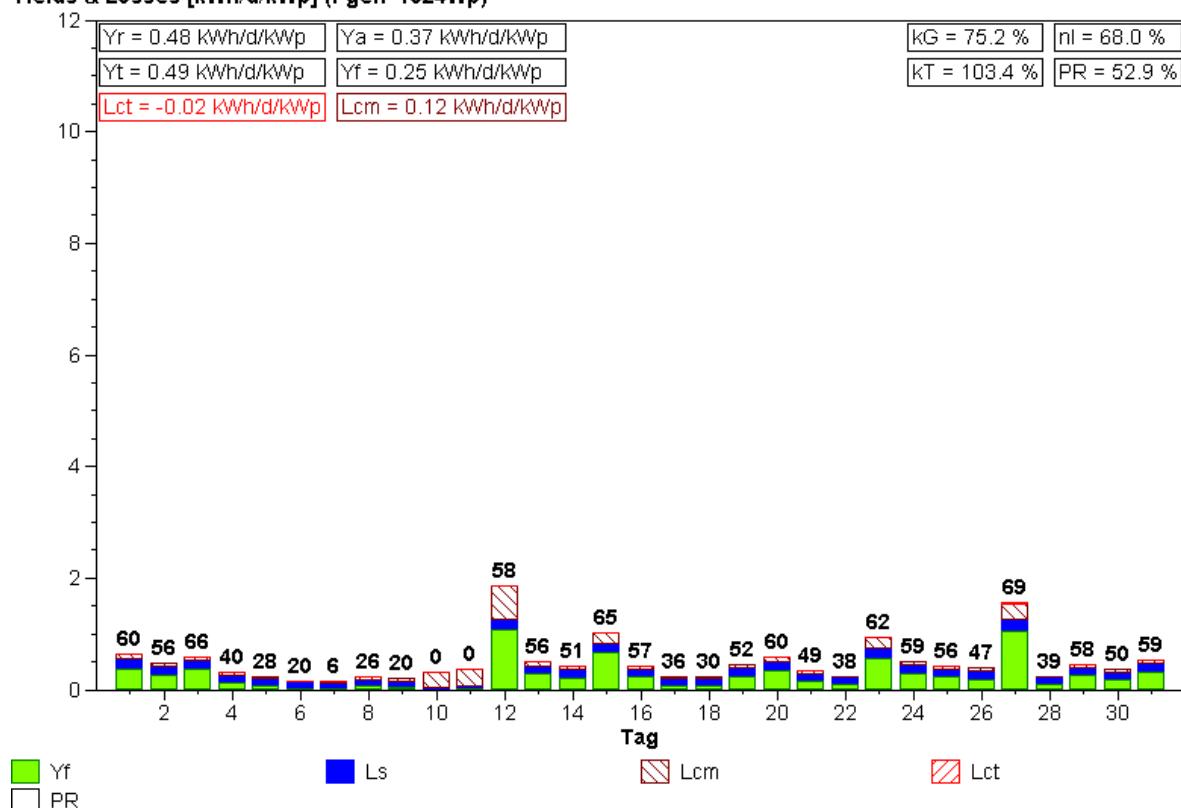
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 12.2002

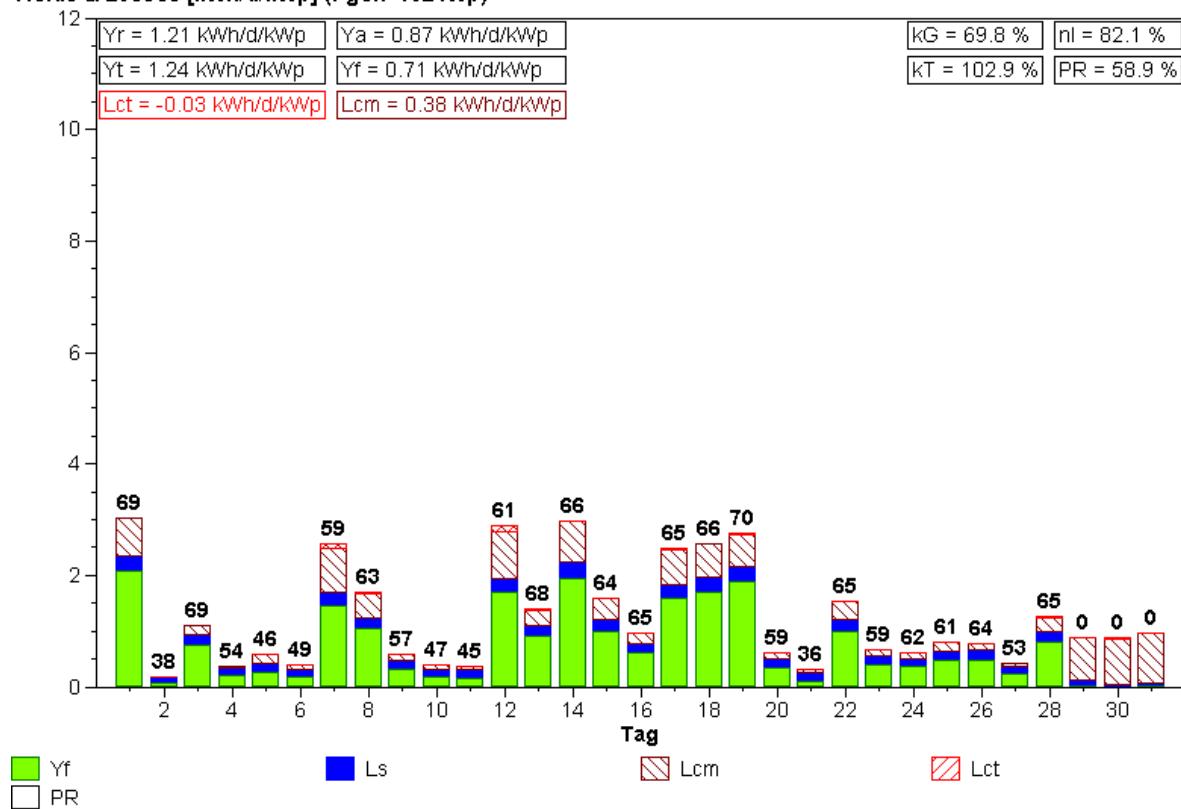
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 1.2003

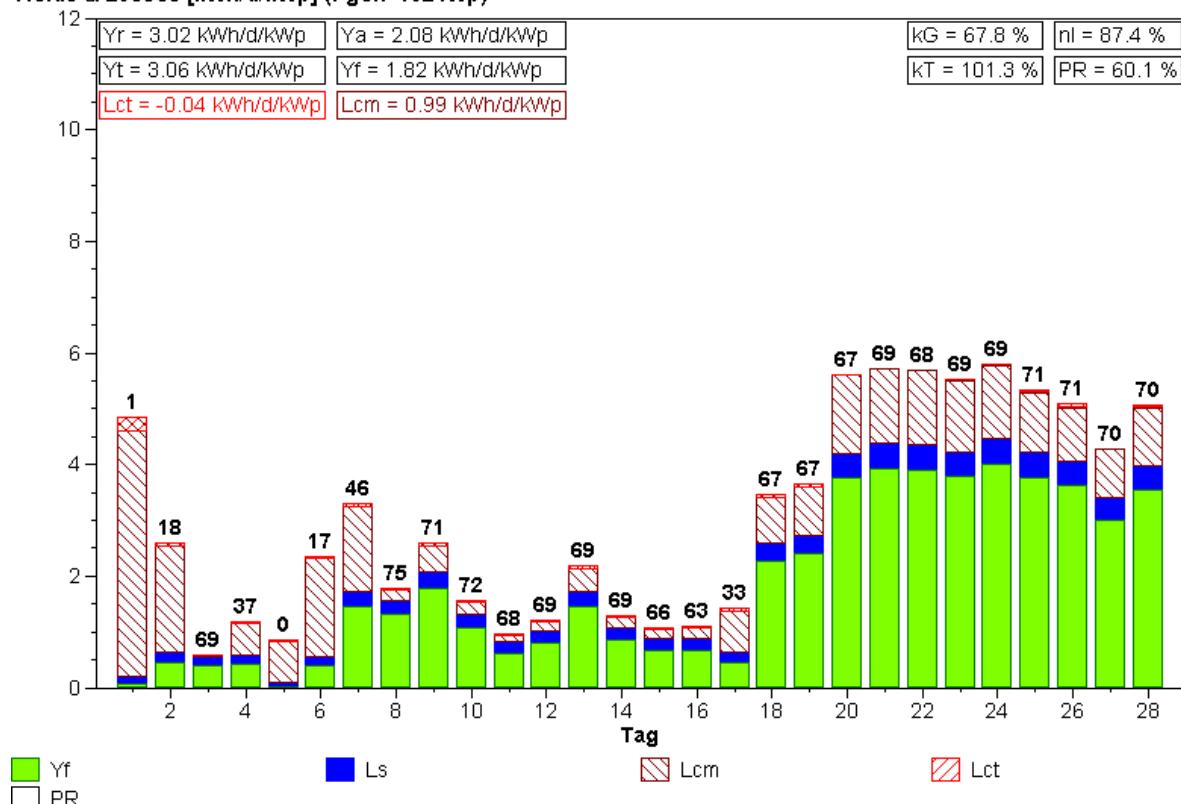
**Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 2.2003

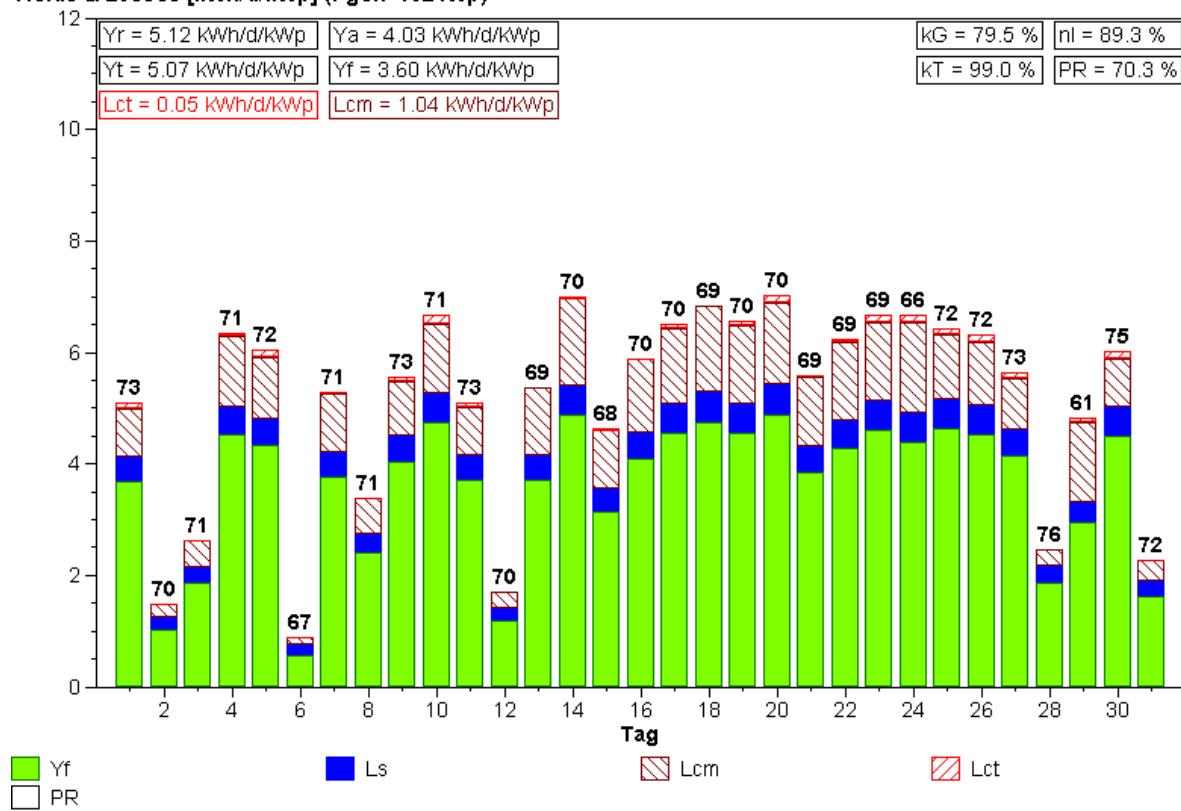
**Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)**



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 3.2003

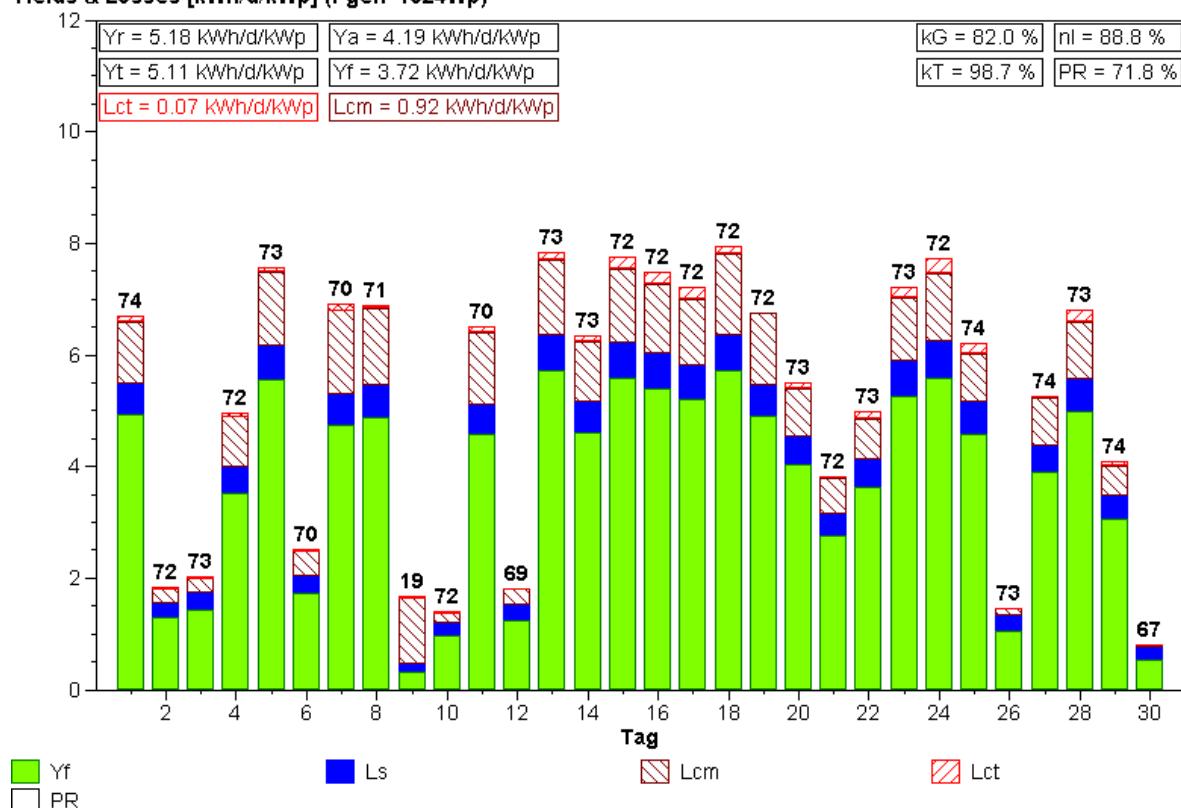
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 4.2003

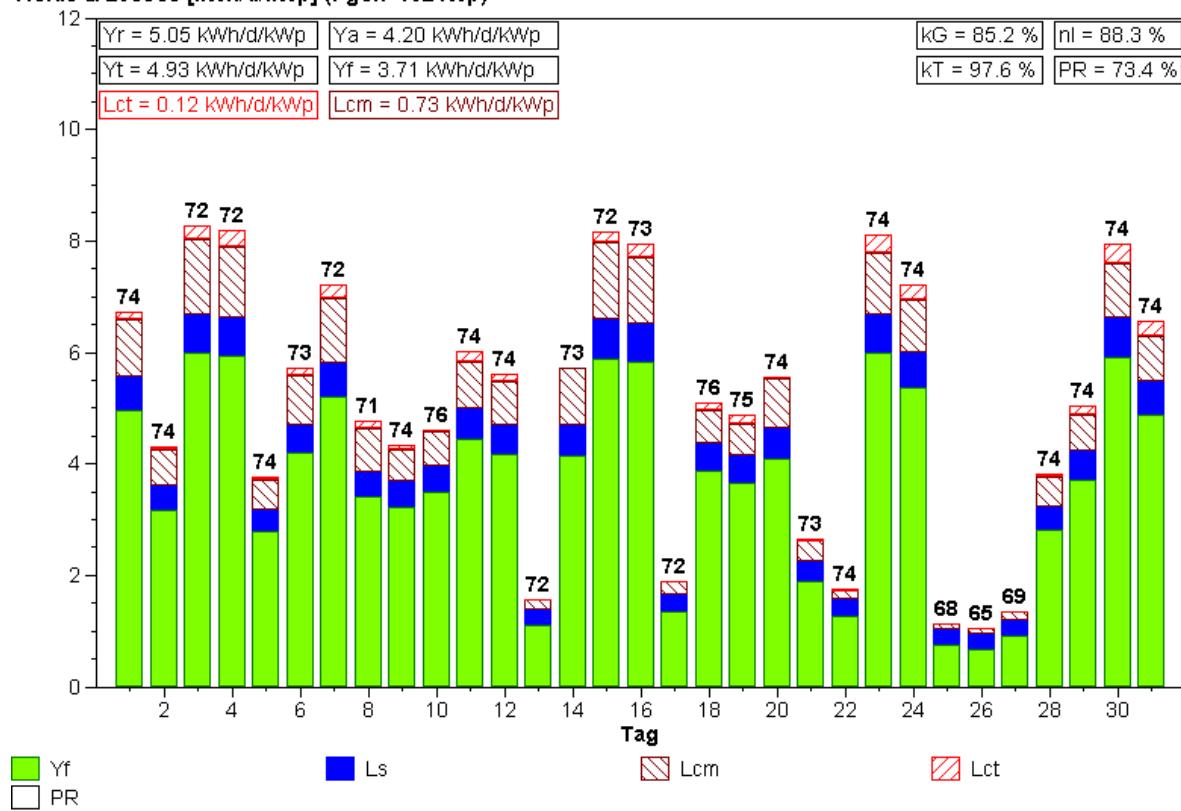
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 5.2003

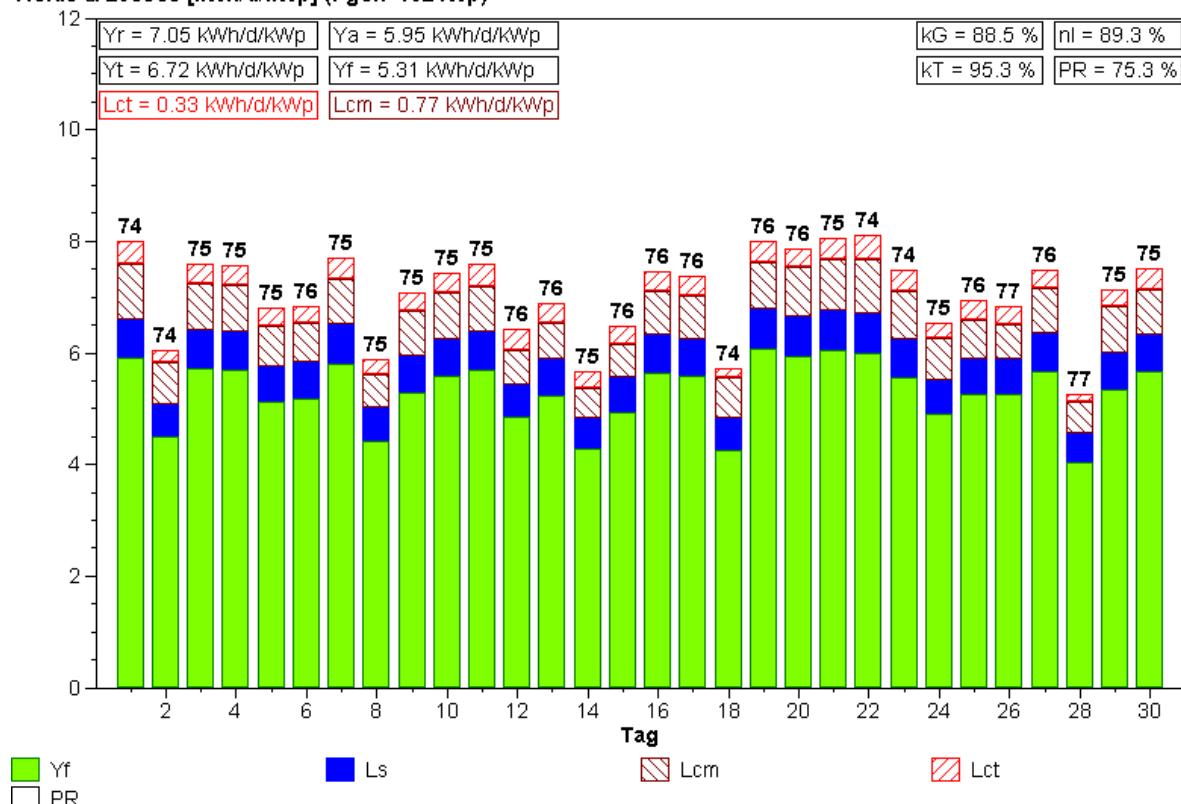
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 6.2003

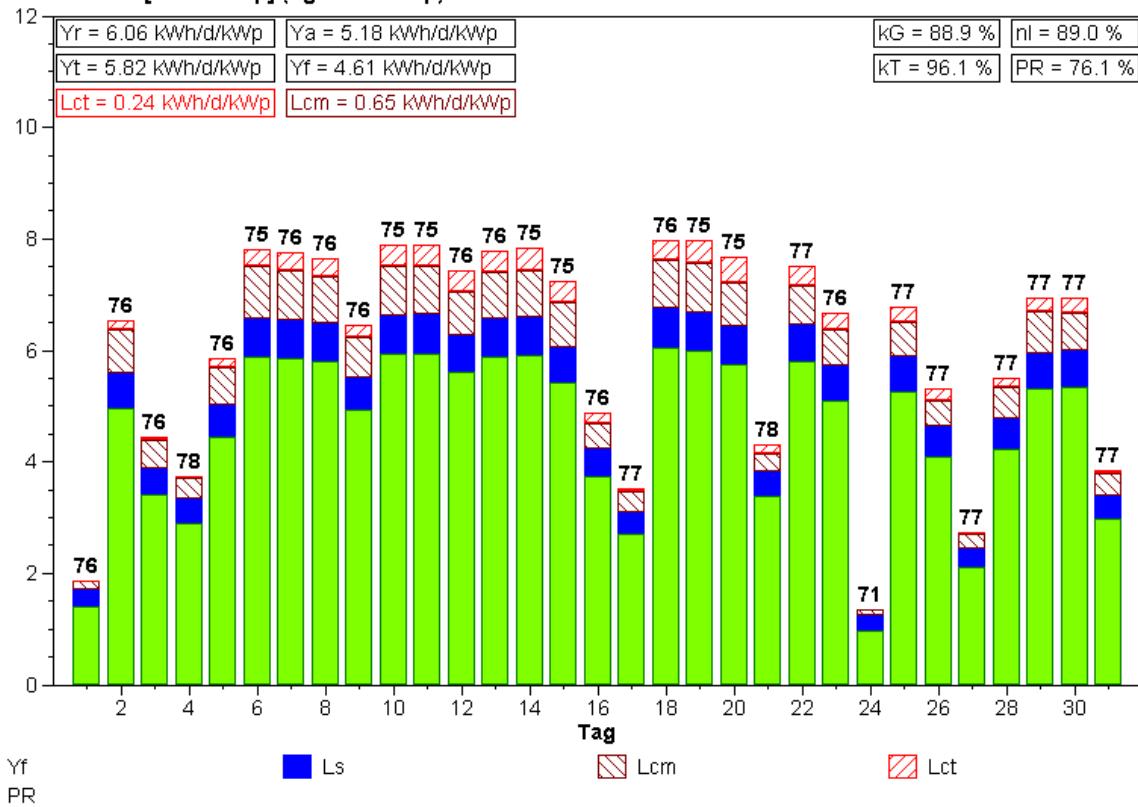
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 7.2003

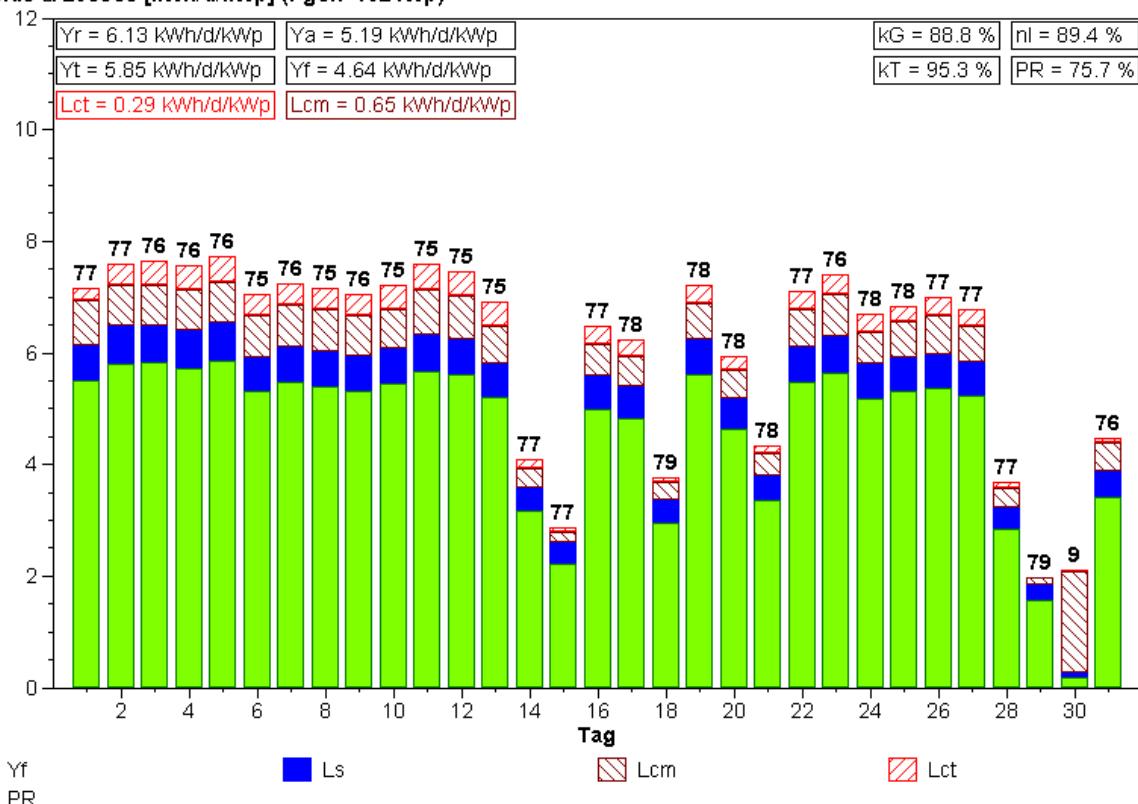
#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



### Normierte Monatsstatistik (Pyranometer)

Anlage: Newtech 3 mit UniSolar US-64 - Modulen Monat: 8.2003

#### Yields & Losses [kWh/d/kWp] (Pgen=1024Wp)



zu 6.5 Elektra Baselland (EBL), Liestal

**Ort:** Mühlemattstrasse 6, Magazingebäude, 4410 Liestal; 327 m.ü.M.  
0212 4222

**Inbetriebnahme:** 23.09.1992

13.12.1996 Inbetriebnahme der Messtechnik der HTA Burgdorf

## Solargenerator:

**Vom 13.12.1996 bis 02.07.2001**

**Module:** Kyocera LA361H51 (364 Stück)

**Feldleistung:** 18560 Wp (nom.) / 17070 Wp (eff.)

**Neigung:** 30° (Flachdach)

**Ausrichtung:** 0° Süd

Seit 10.09.2001

**Module:** Kyocera LA361H51 (363 Stück)

**Feldleistung:** 18510 Wp (nom.)

**Neigung:** 30° (Flachdach)

Periodenleistung:  
Bruttofläche:

Wechselrichter: Sputnik SolarMax20

## Messgrößen:

- Sonneneinstrahlung in Modulebene mit Pyranometer und Referenzzelle
  - Sonneneinstrahlung in Horizontalebene mit Pyranometer
  - Umgebungstemperatur und Modultemperatur
  - Gleichstrom und Gleichspannung
  - Eingespeiste Wechselstrom-Wirkleistung (3-phasig)
  - Netzspannung auf Phase 1





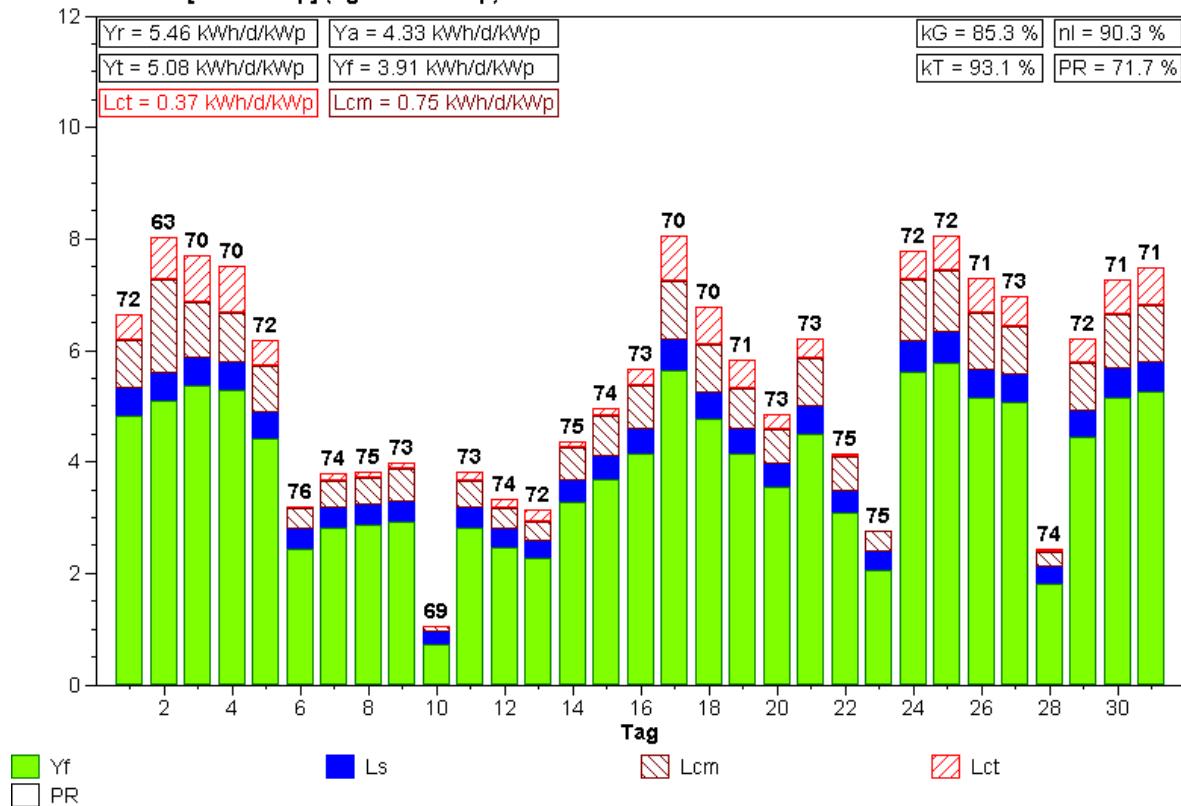
**Besondere Betriebsereignisse:**

29.01.2000 – 31.01.2000	Selbstauslösung des AC-Hauptschalters
06.02.2001 – 17.10.2001	Temporäre Verschattungen durch Baukran
09.02.2001 – 12.02.2001	Selbstauslösung des AC-Hauptschalters
22.04.2001 – 25.04.2001	Selbstauslösung des AC-Hauptschalters
02.07.2001 – 10.09.2001	Ausserbetriebnahme und temporäre Demontage der PV-Anlage
21.09.2001 – 24.09.2001	Selbstauslösung des AC-Hauptschalters
06.10.2001	Selbstauslösung des AC-Hauptschalters
23.10.2001	kurzzeitige Netzabschaltung
26.10.2001 – 29.10.2001	Selbstauslösung des AC-Hauptschalters
04.11.2001 – 06.11.2001	Selbstauslösung des AC-Hauptschalters
11.11.2001 – 12.11.2001	Selbstauslösung des AC-Hauptschalters
23.11.2001	kurzzeitige Netzabschaltung
27.11.2001 – 28.11.2001	Selbstauslösung des AC-Hauptschalters
03.12.2001	Austausch des defekten AC-Hauptschalters
19.12.2001	kurzzeitige Netzabschaltung
29.01.2002	kurzzeitige Wechselrichterabschaltung
22.05.2003 – 11.06.2003	Wechselrichterdefekt

Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 7.1999

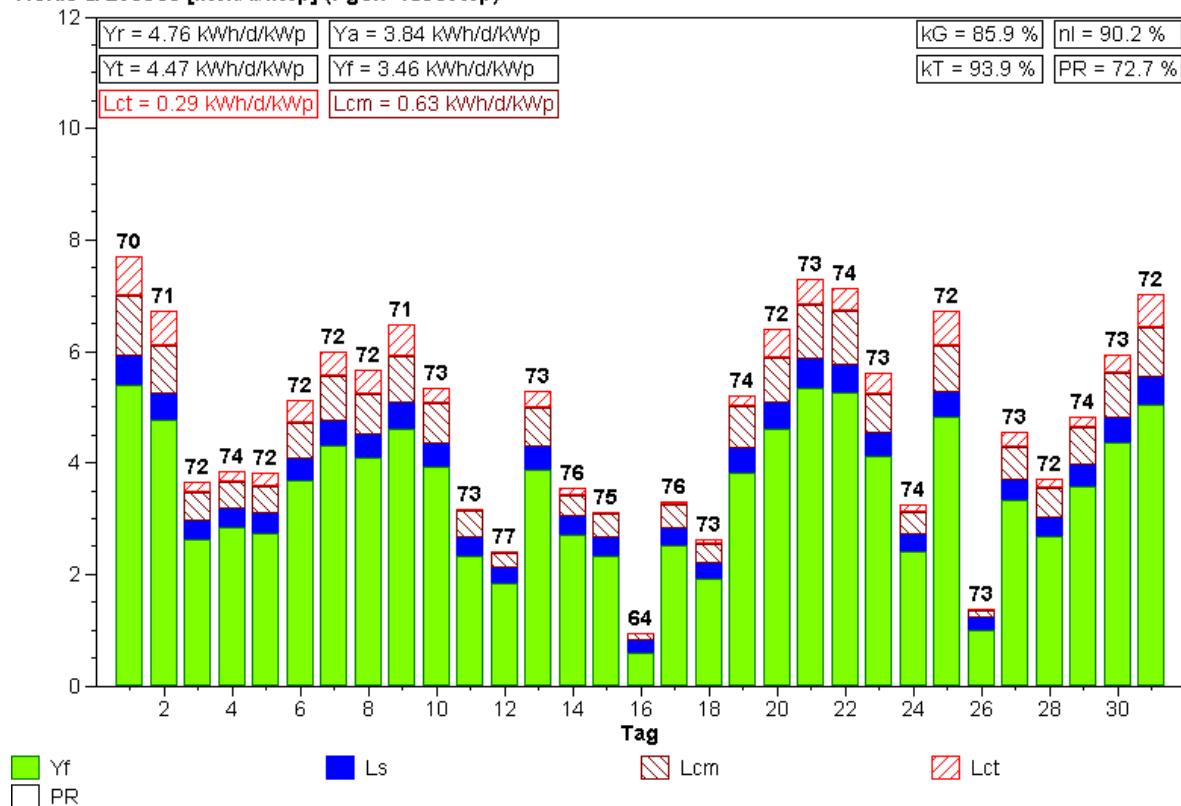
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 8.1999

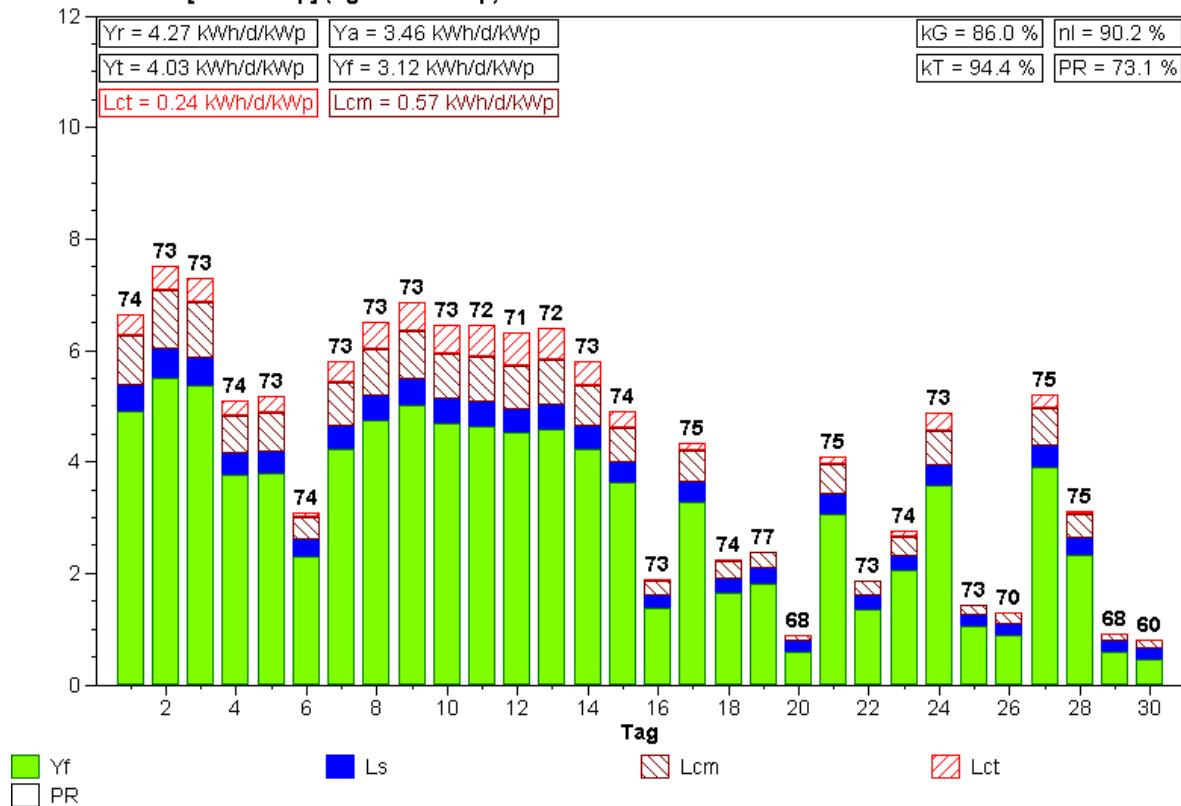
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 9.1999

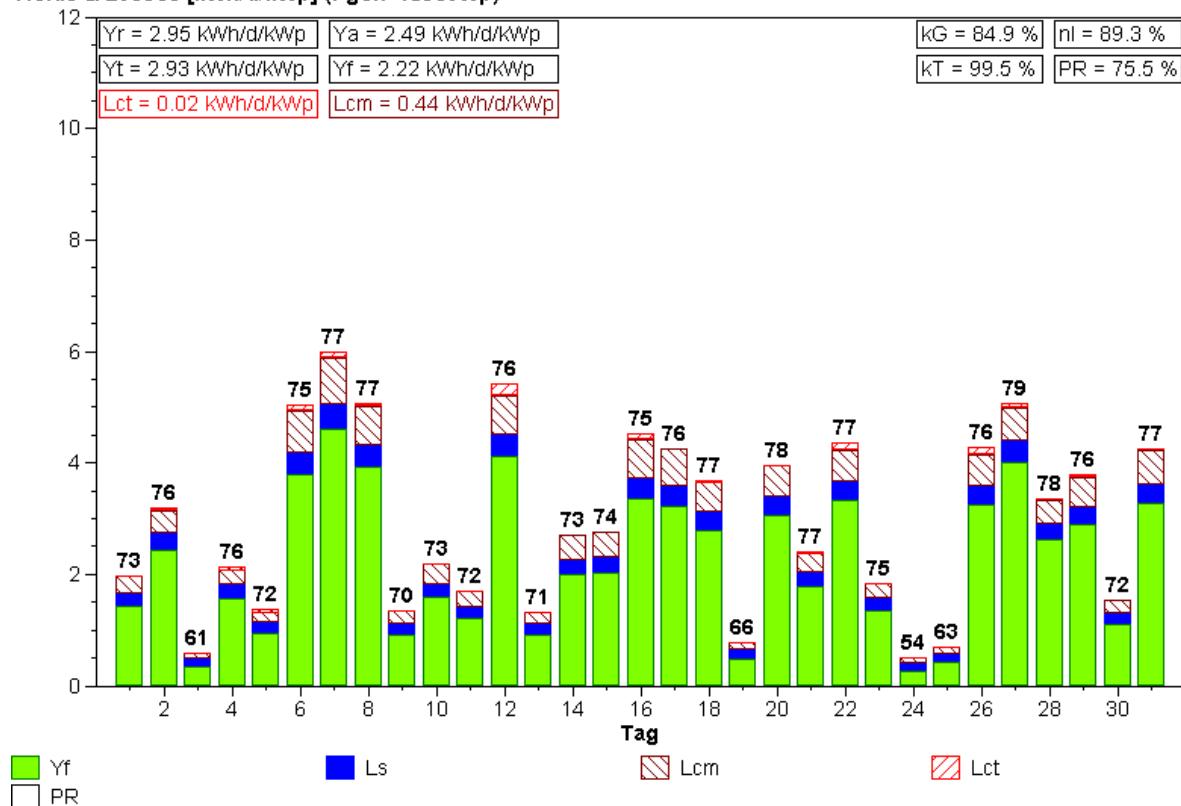
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 10.1999

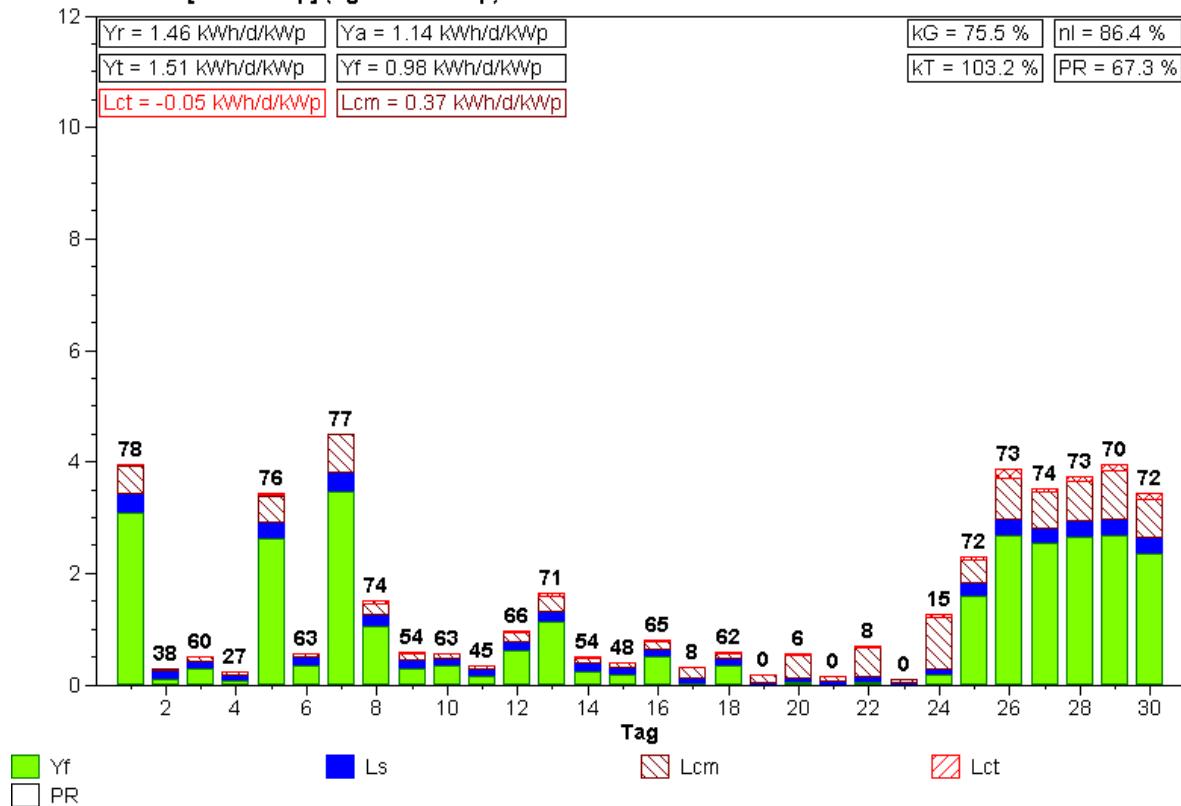
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 11.1999

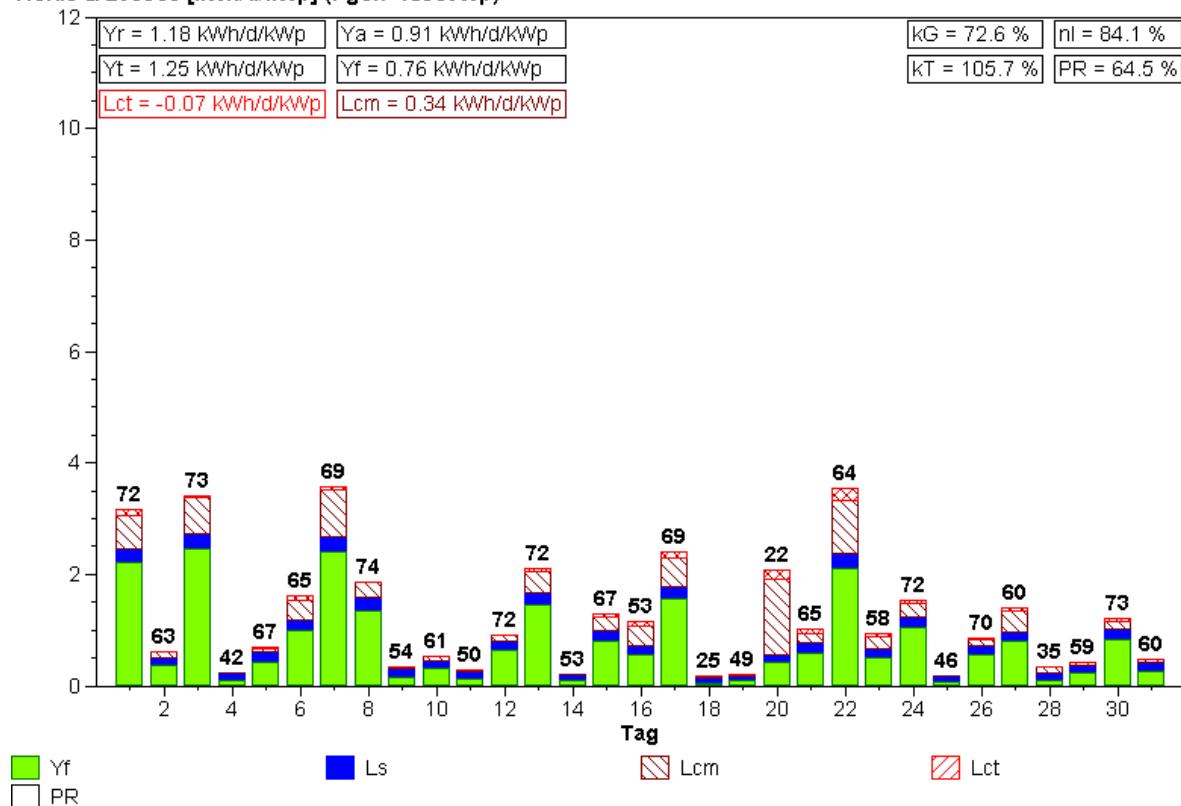
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)

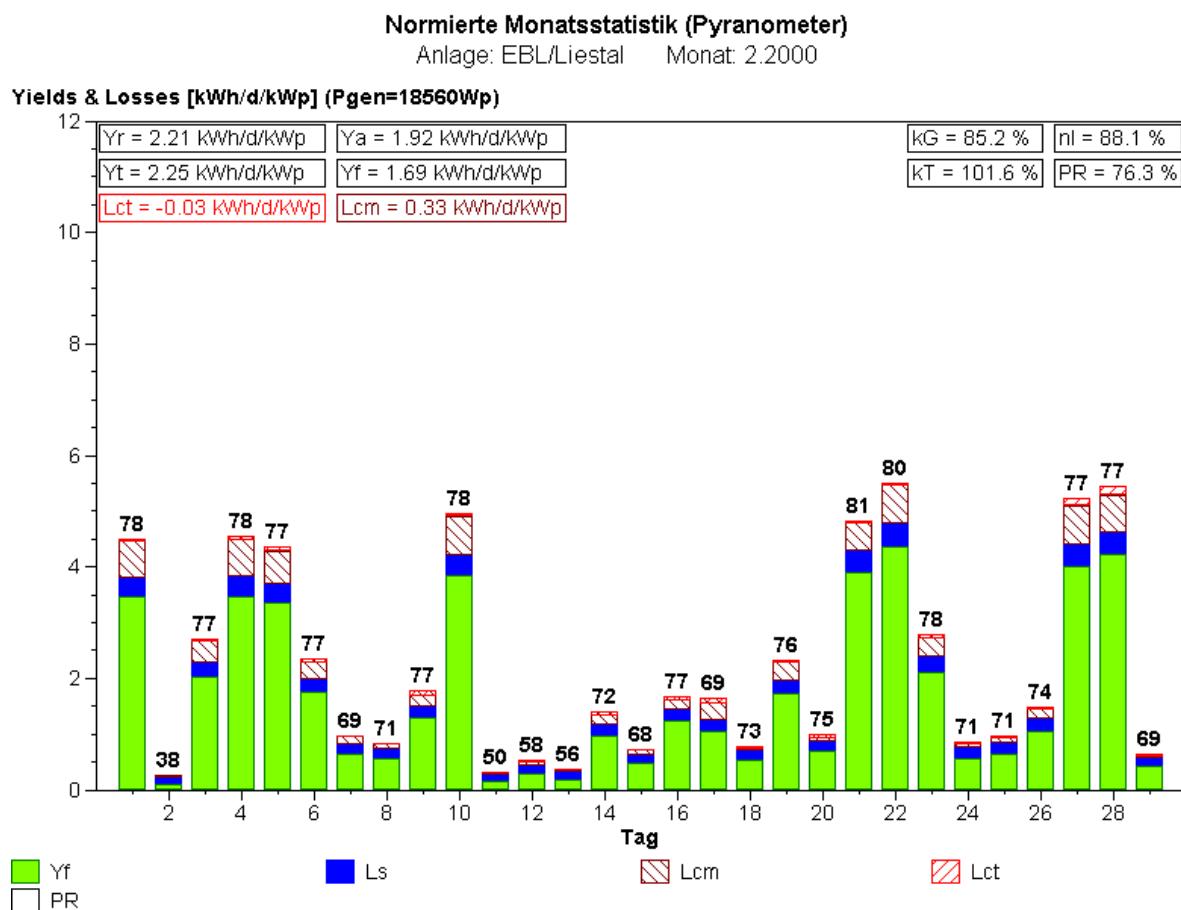
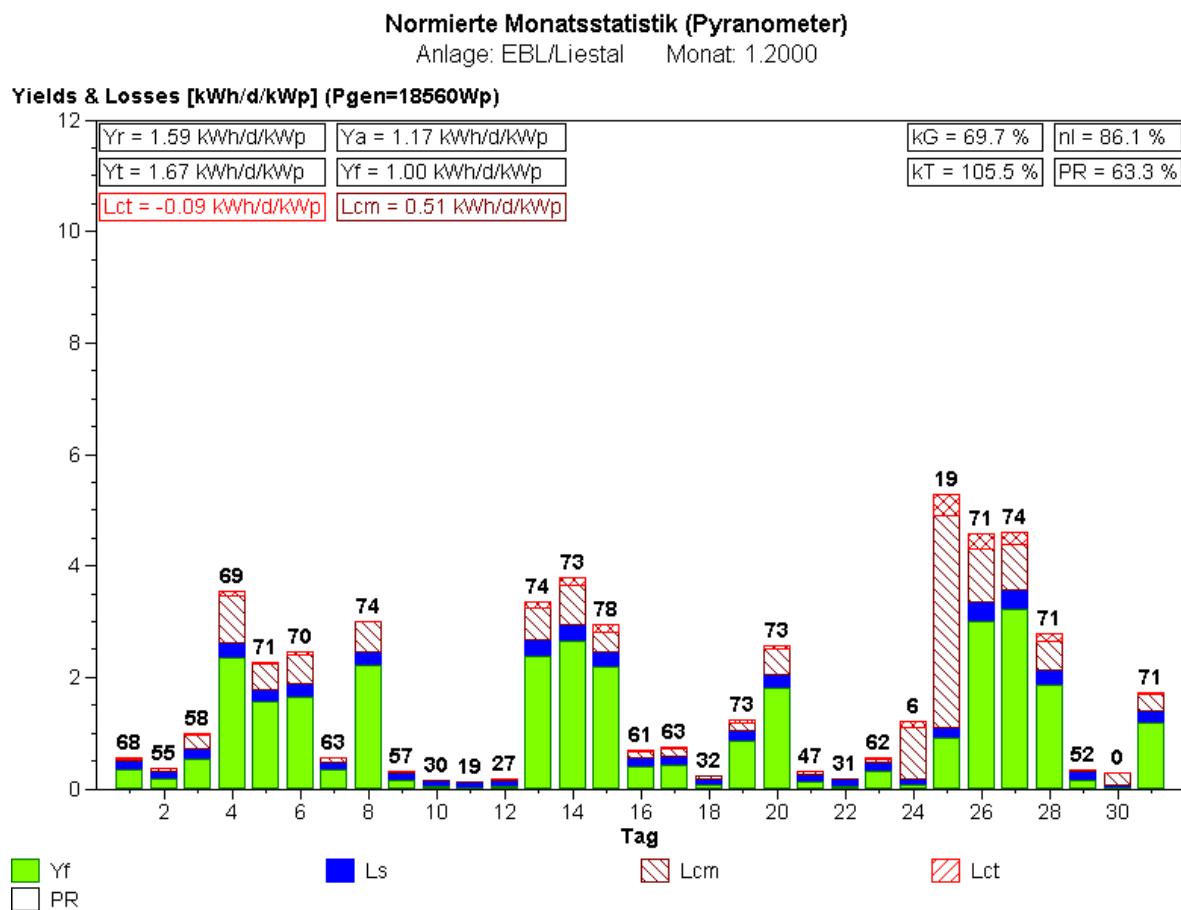


Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 12.1999

Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)

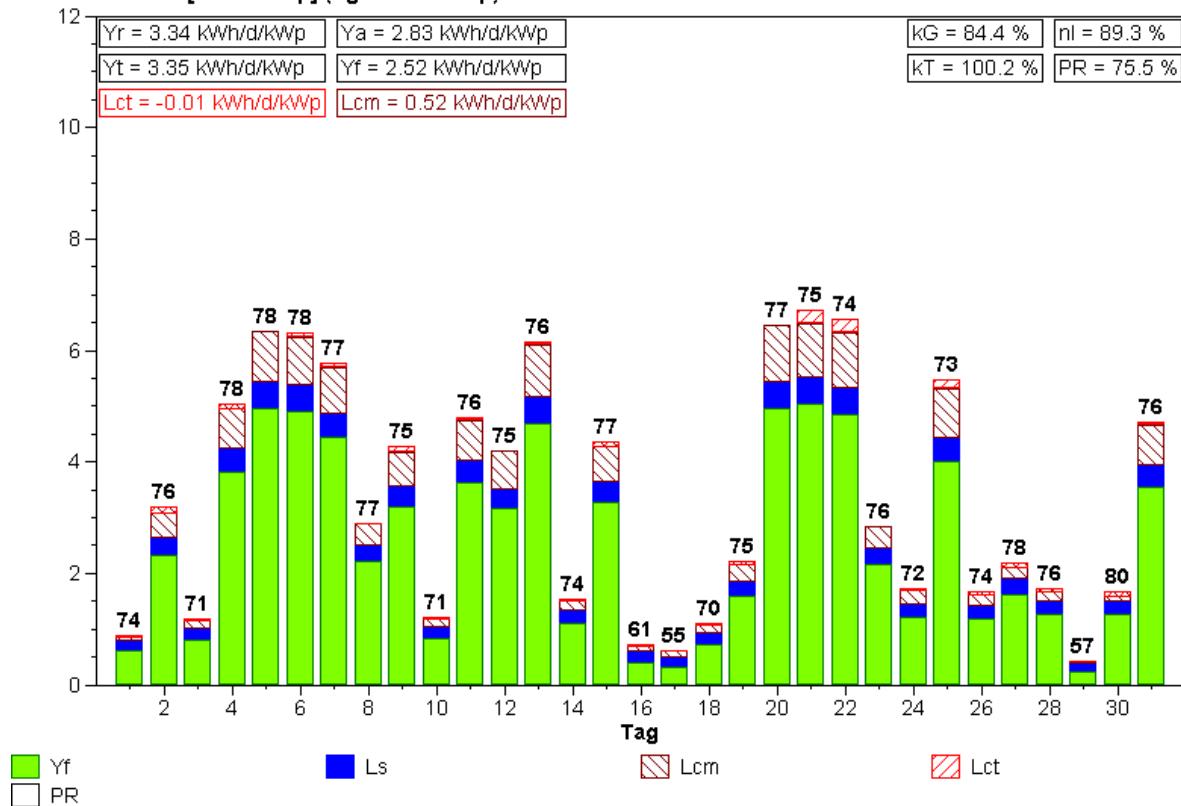




Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 3.2000

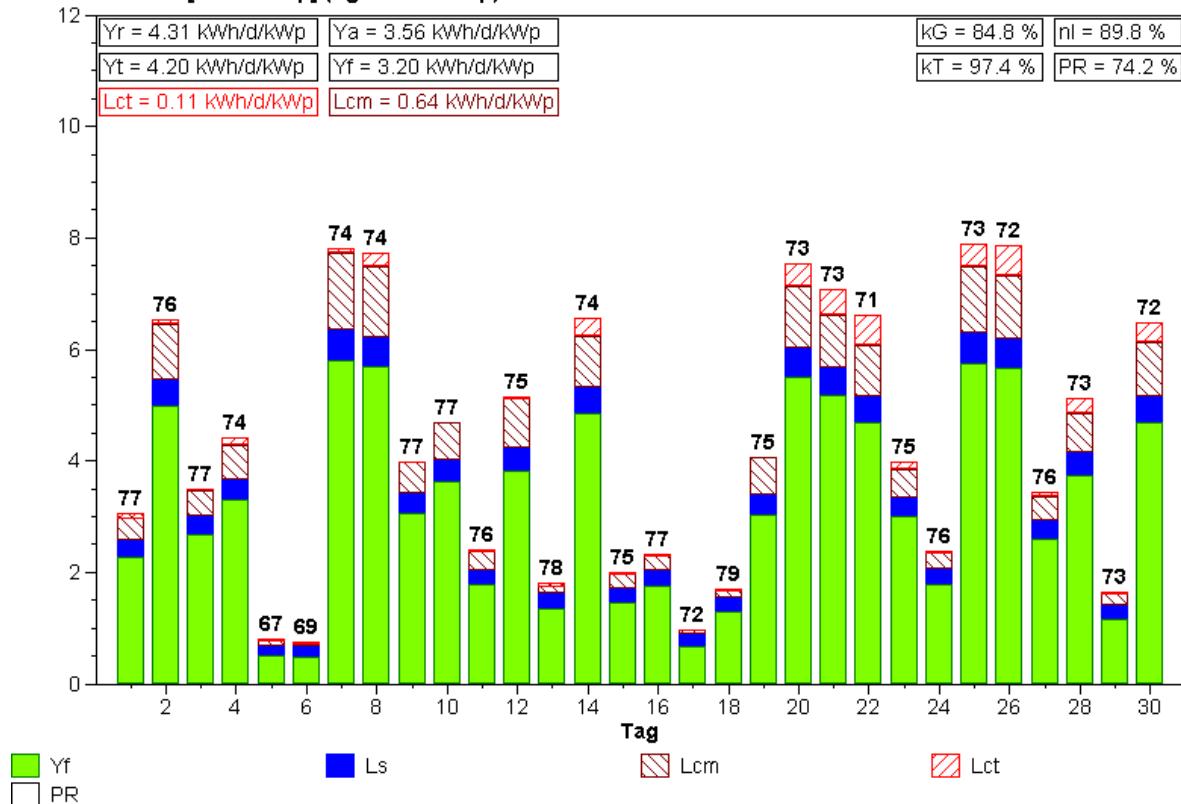
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)

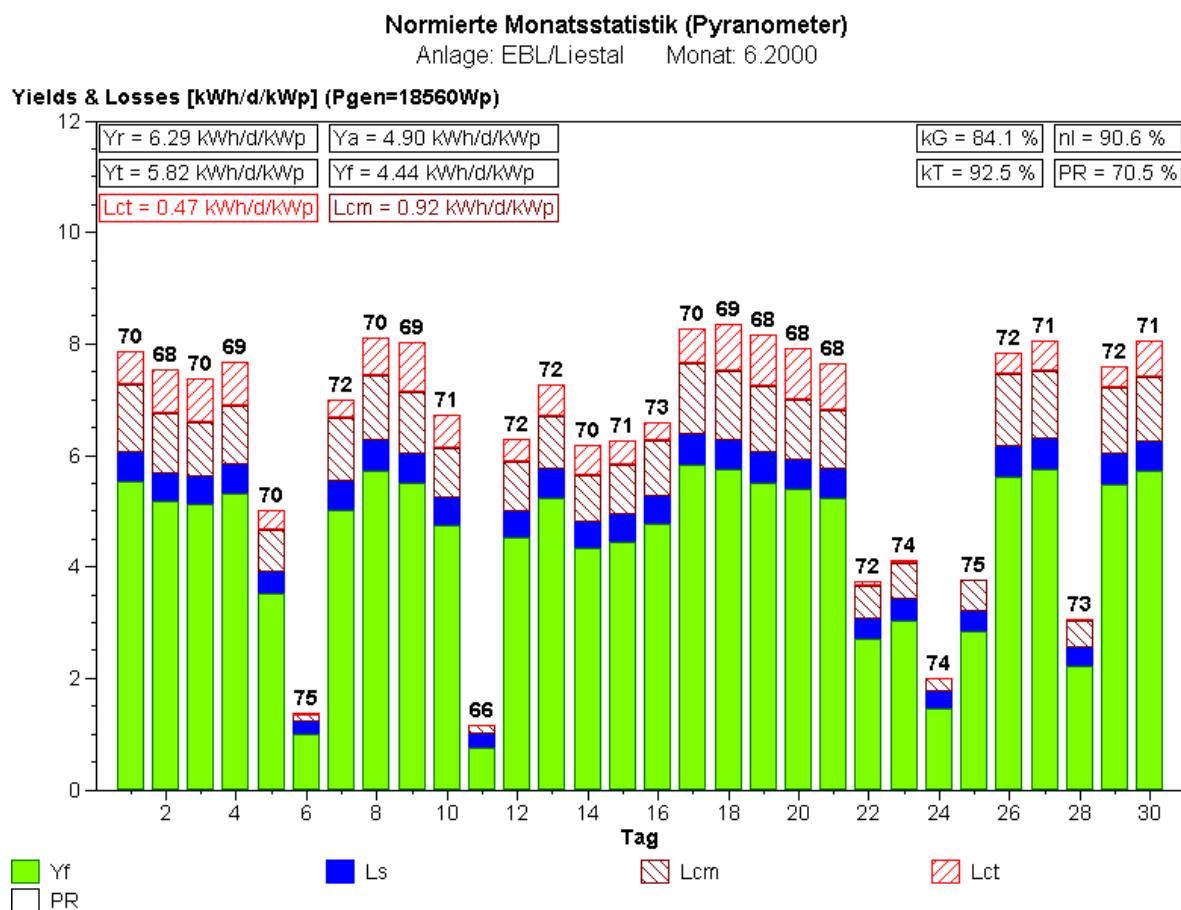
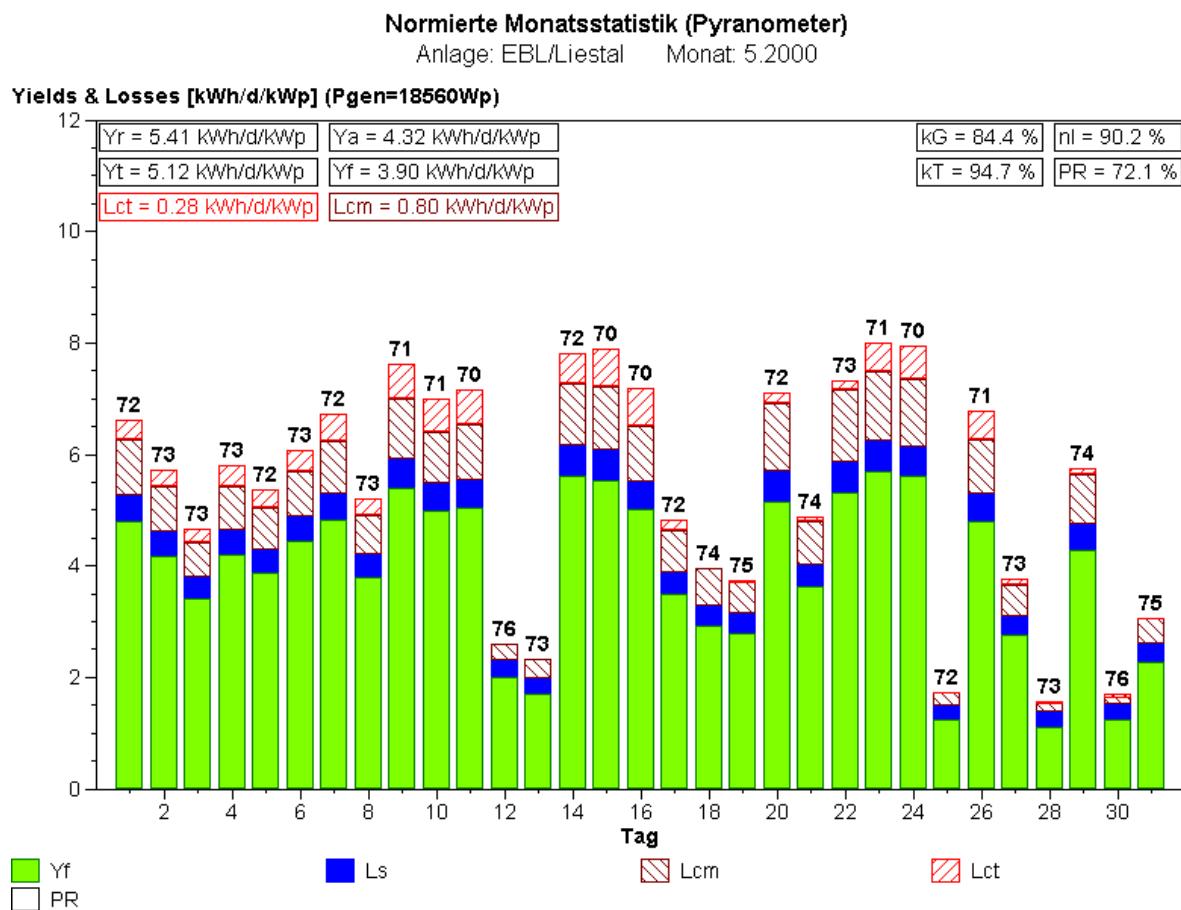


Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 4.2000

Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)

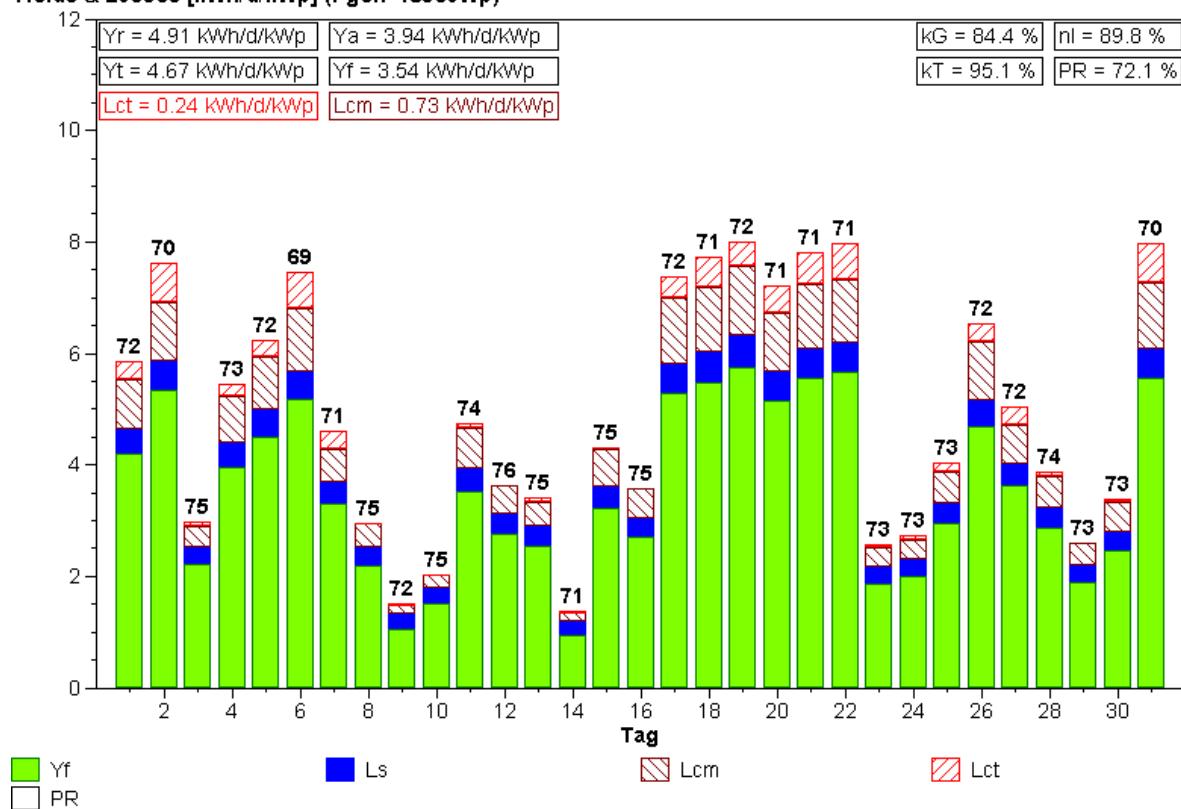




Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 7.2000

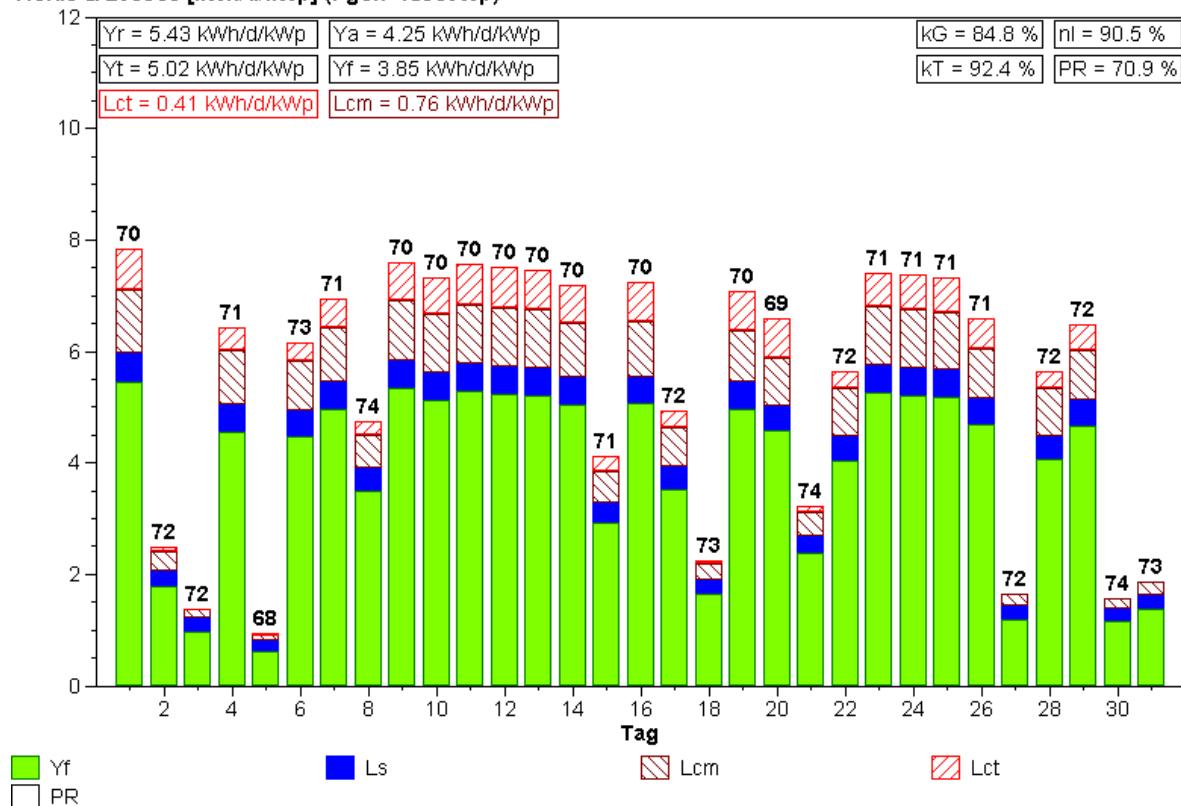
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)

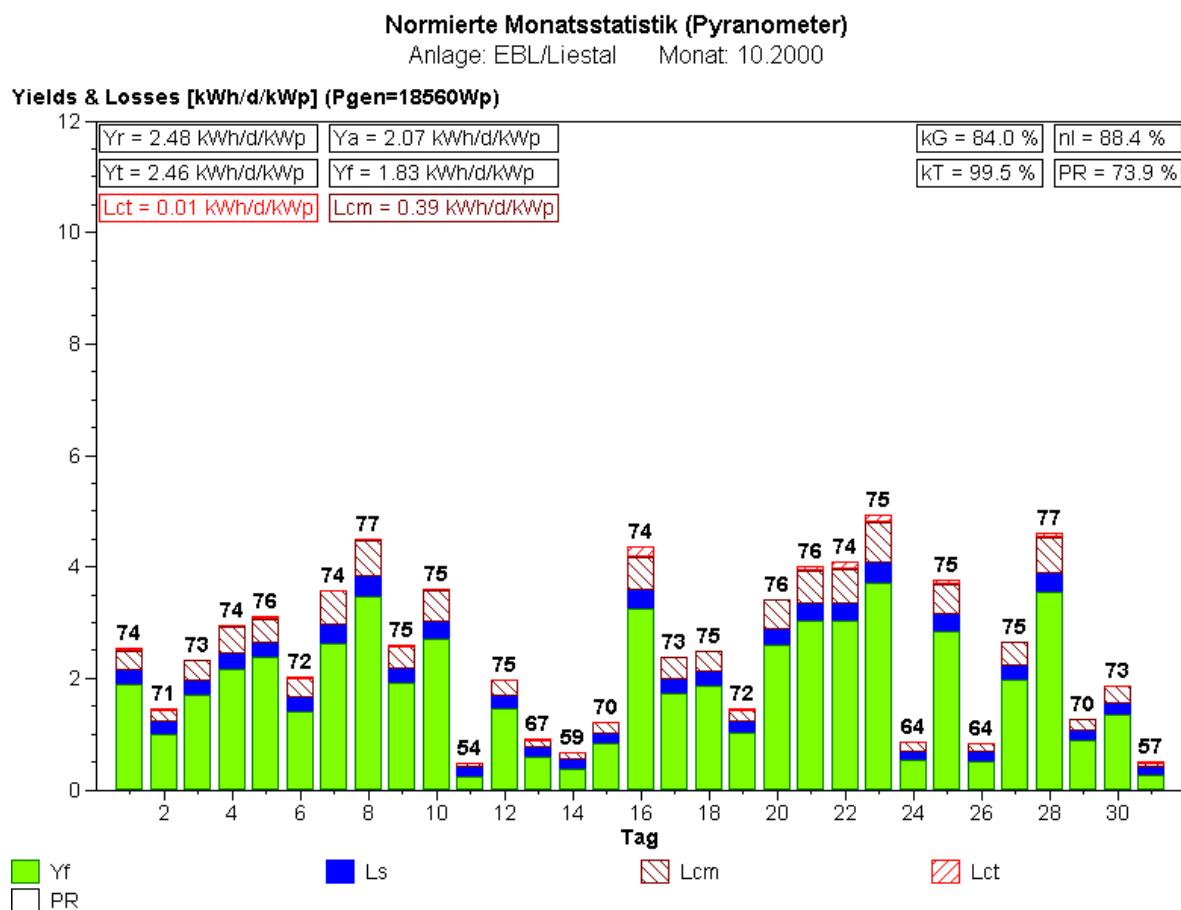
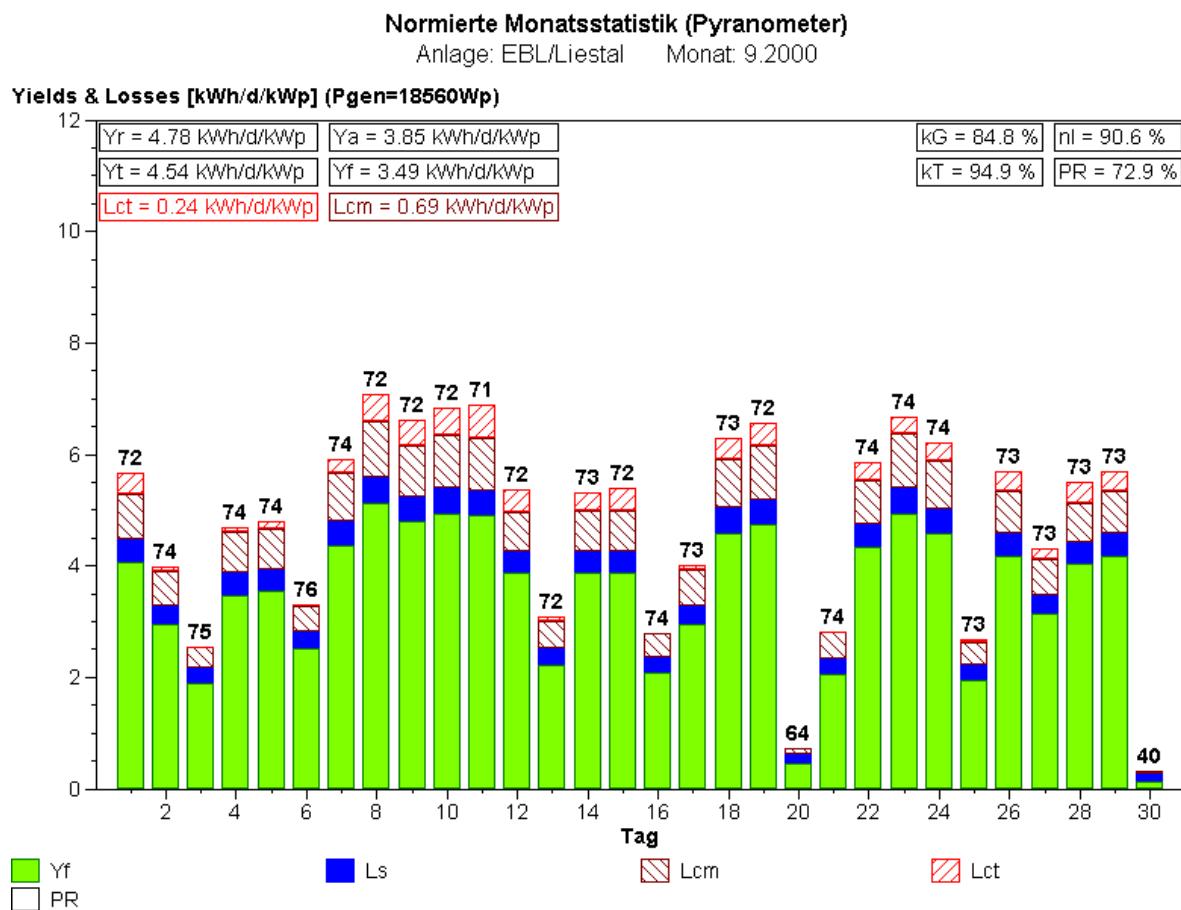


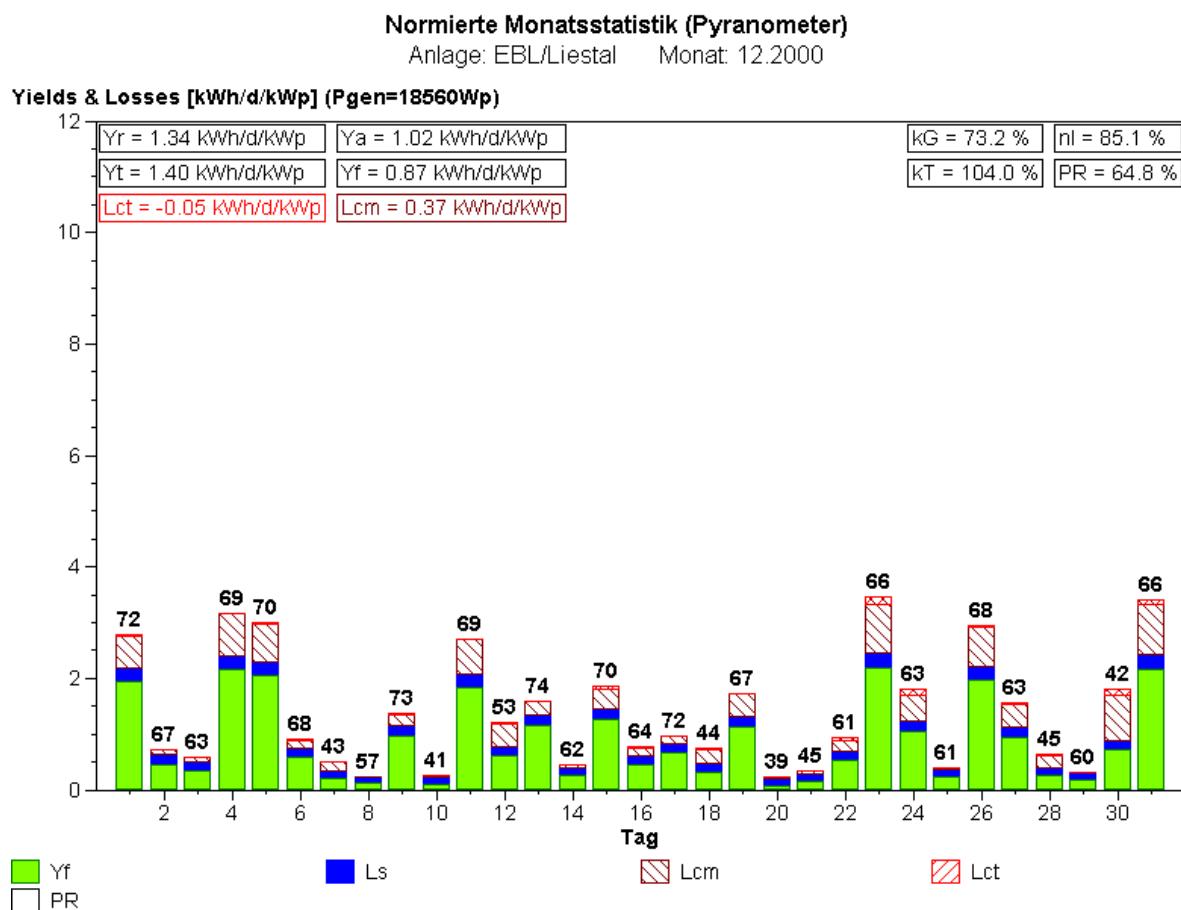
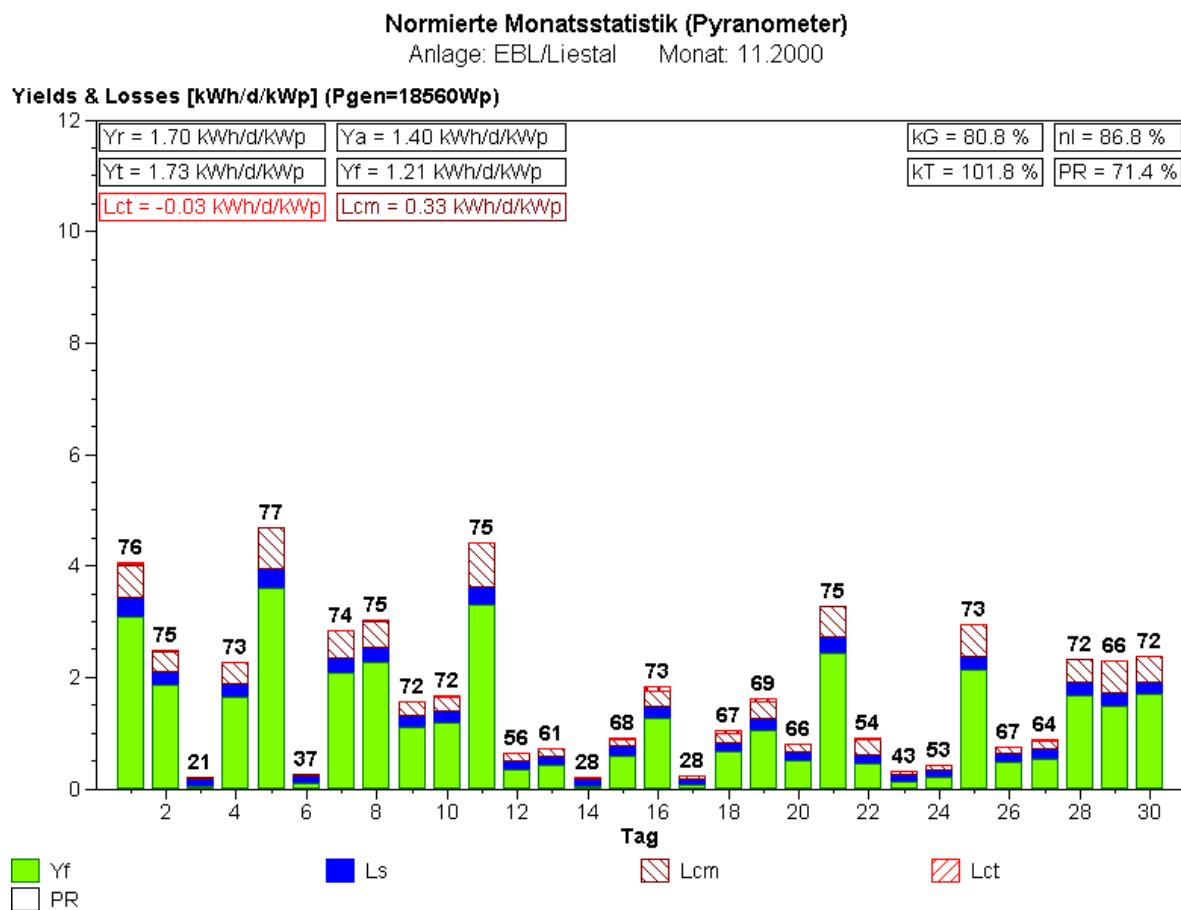
Normierte Monatsstatistik (Pyranometer)

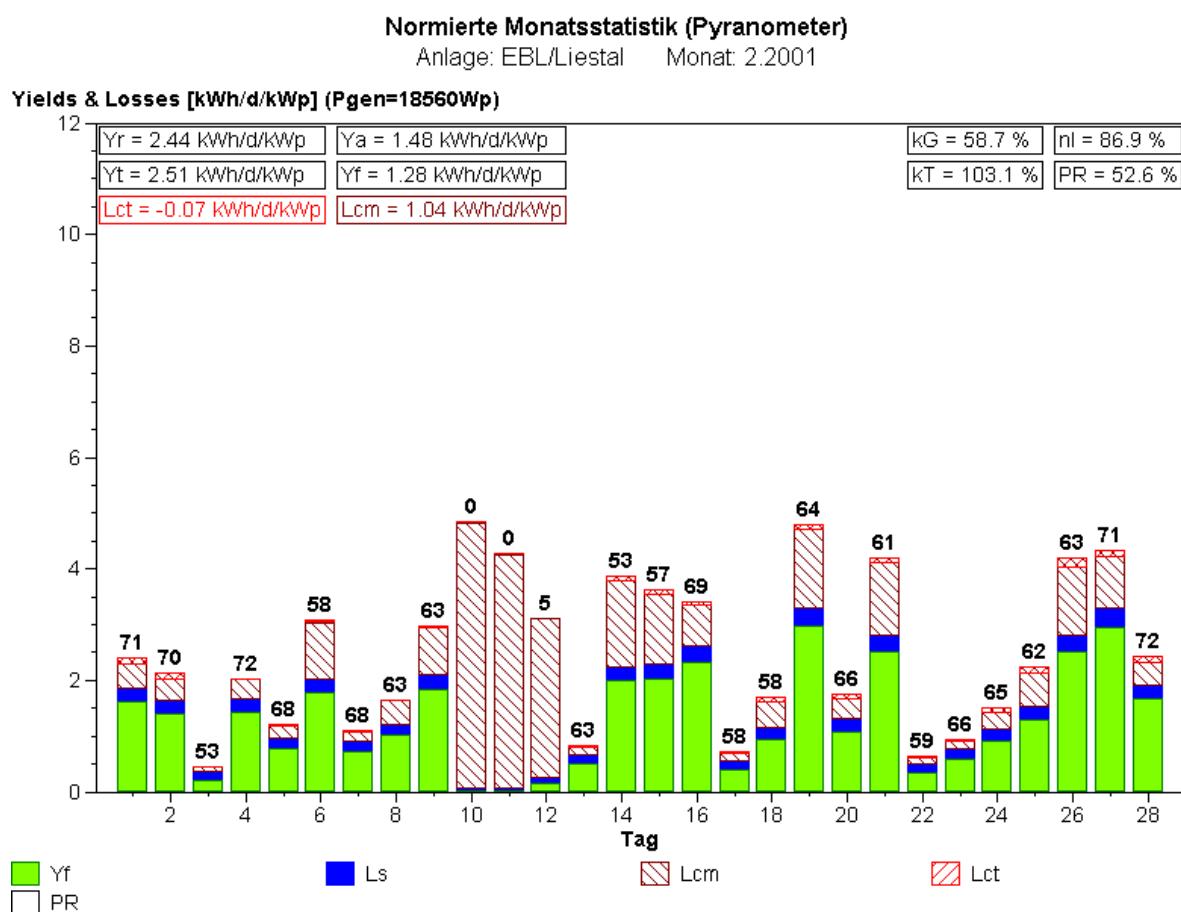
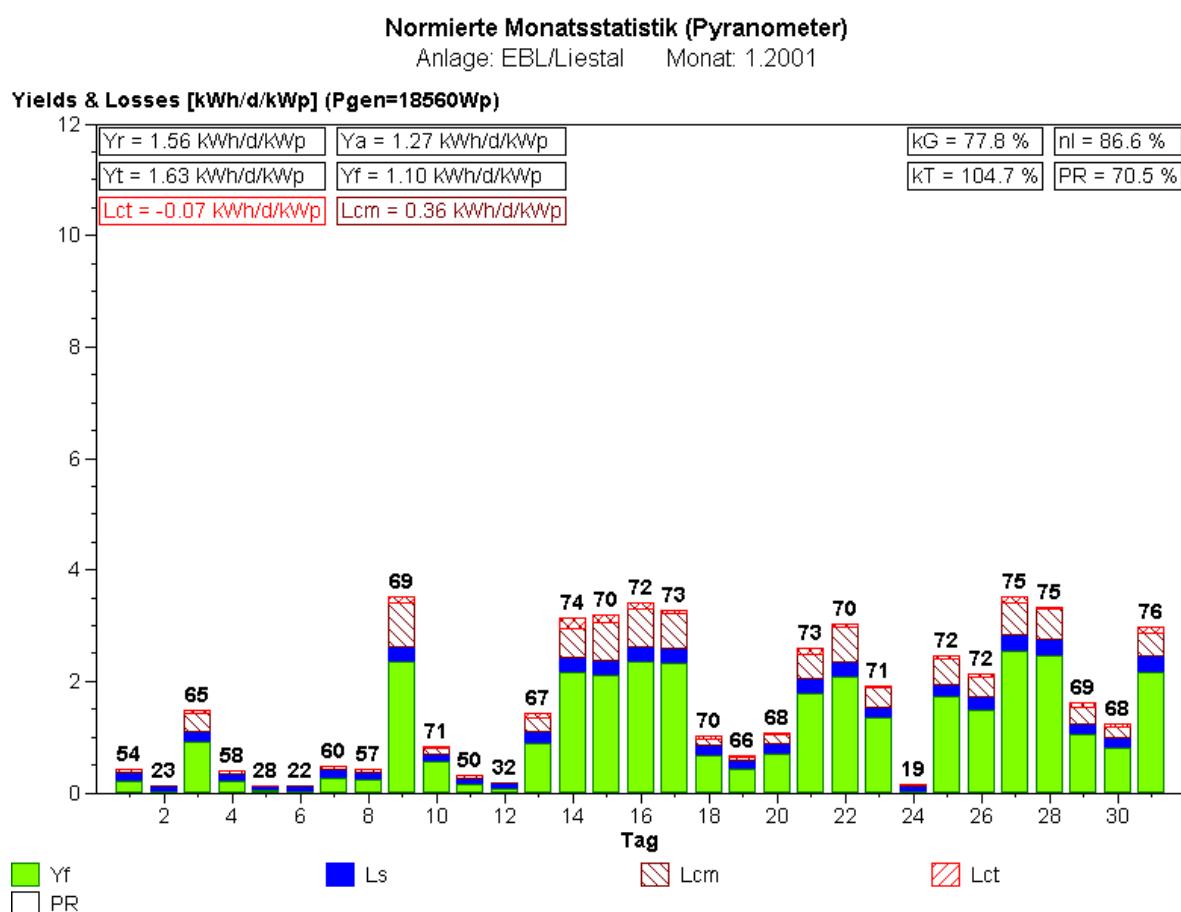
Anlage: EBL/Liestal Monat: 8.2000

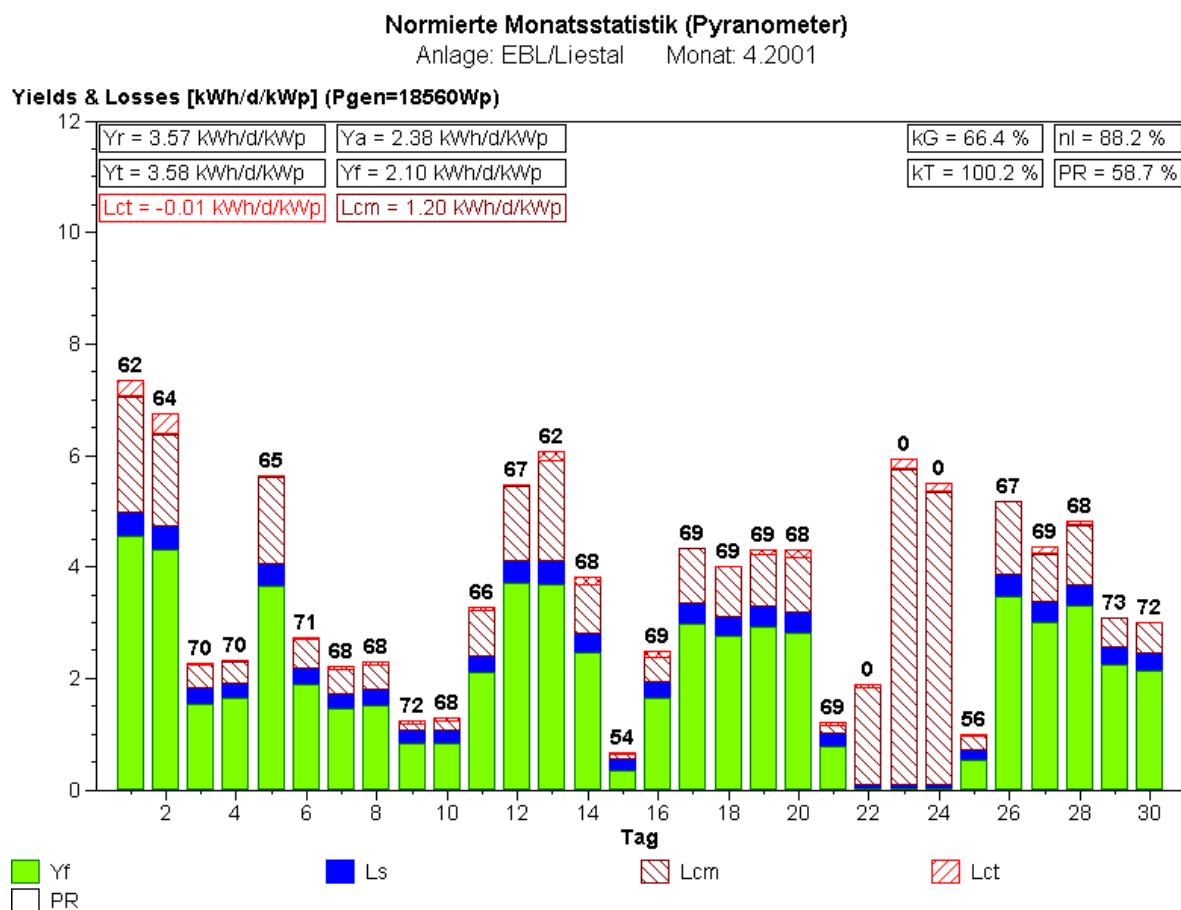
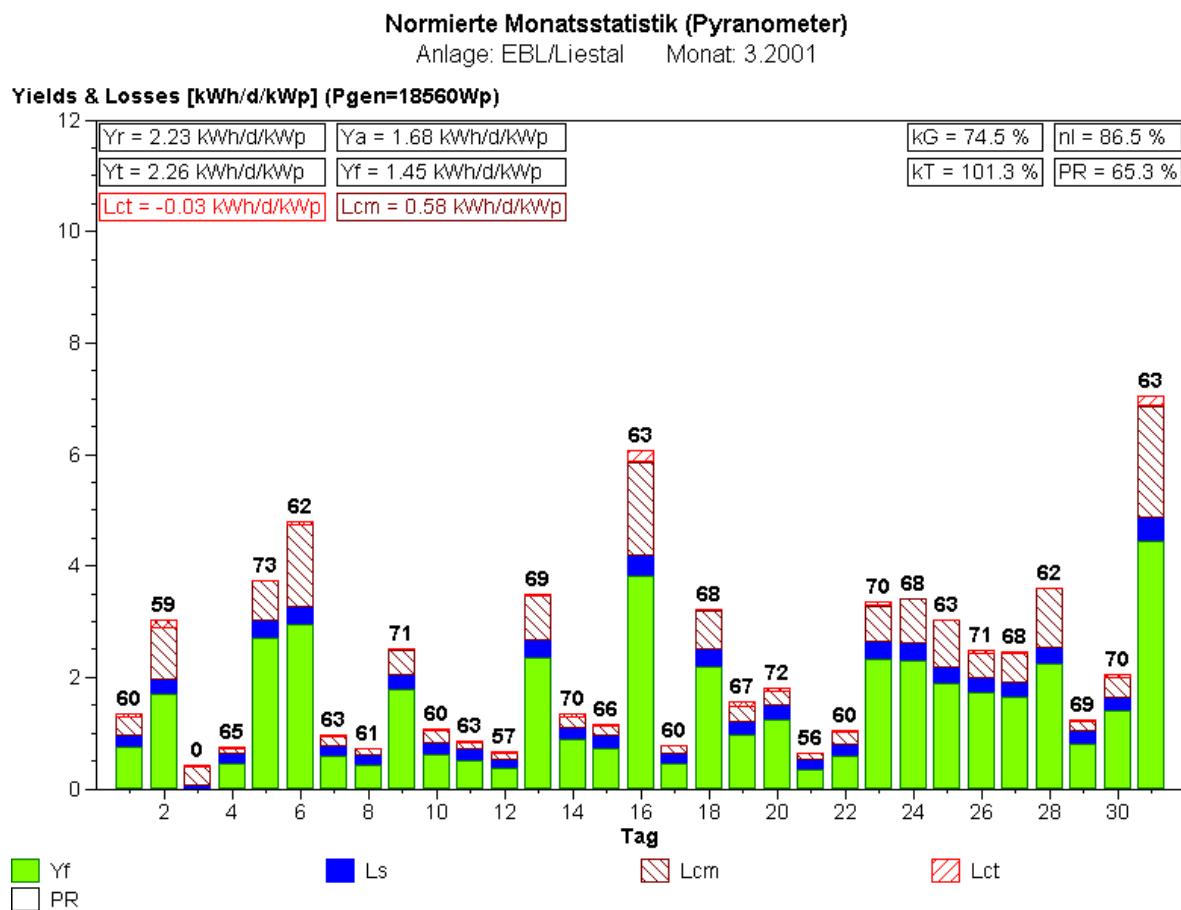
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)







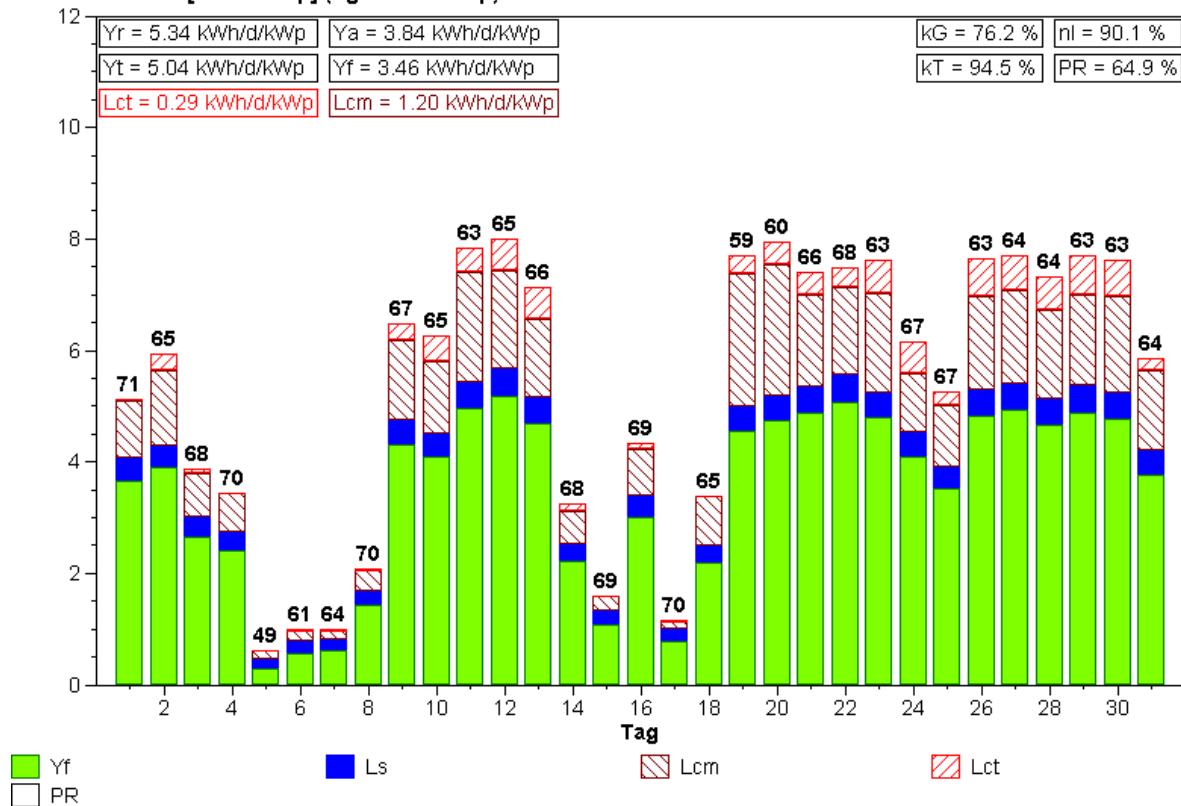




Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 5.2001

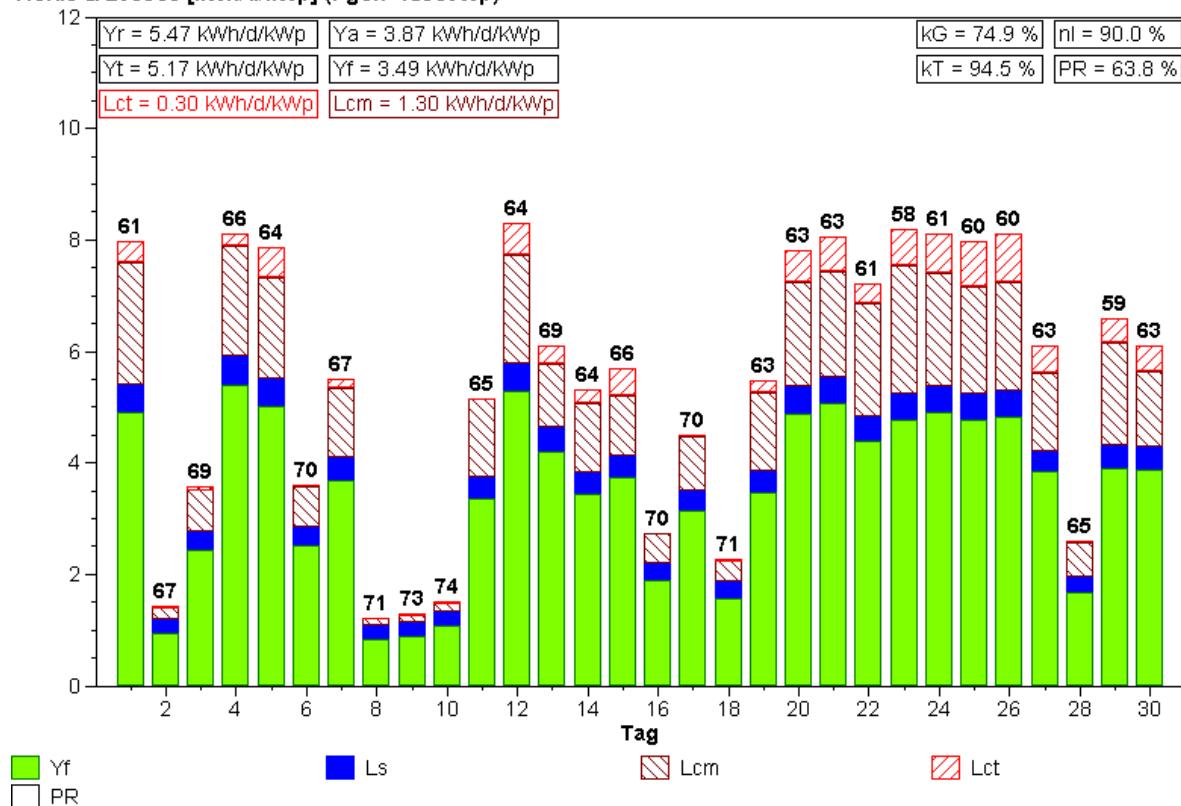
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 6.2001

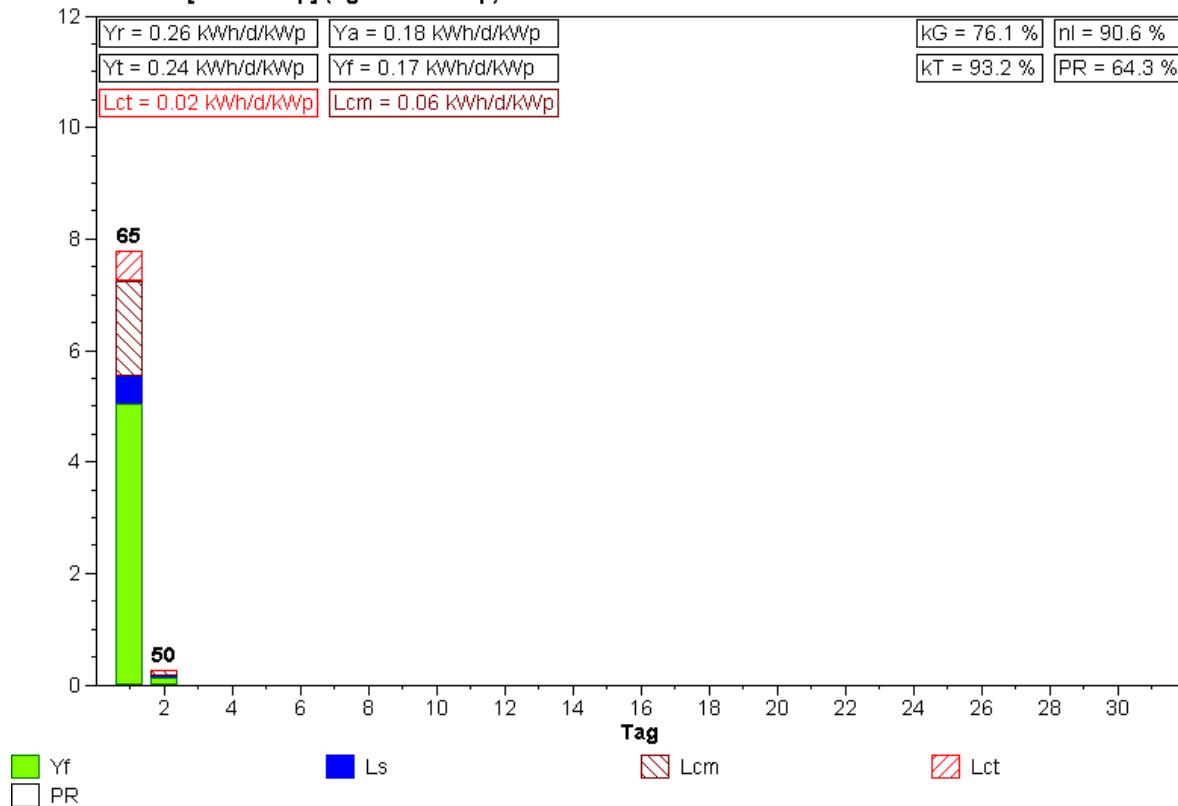
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 7.2001

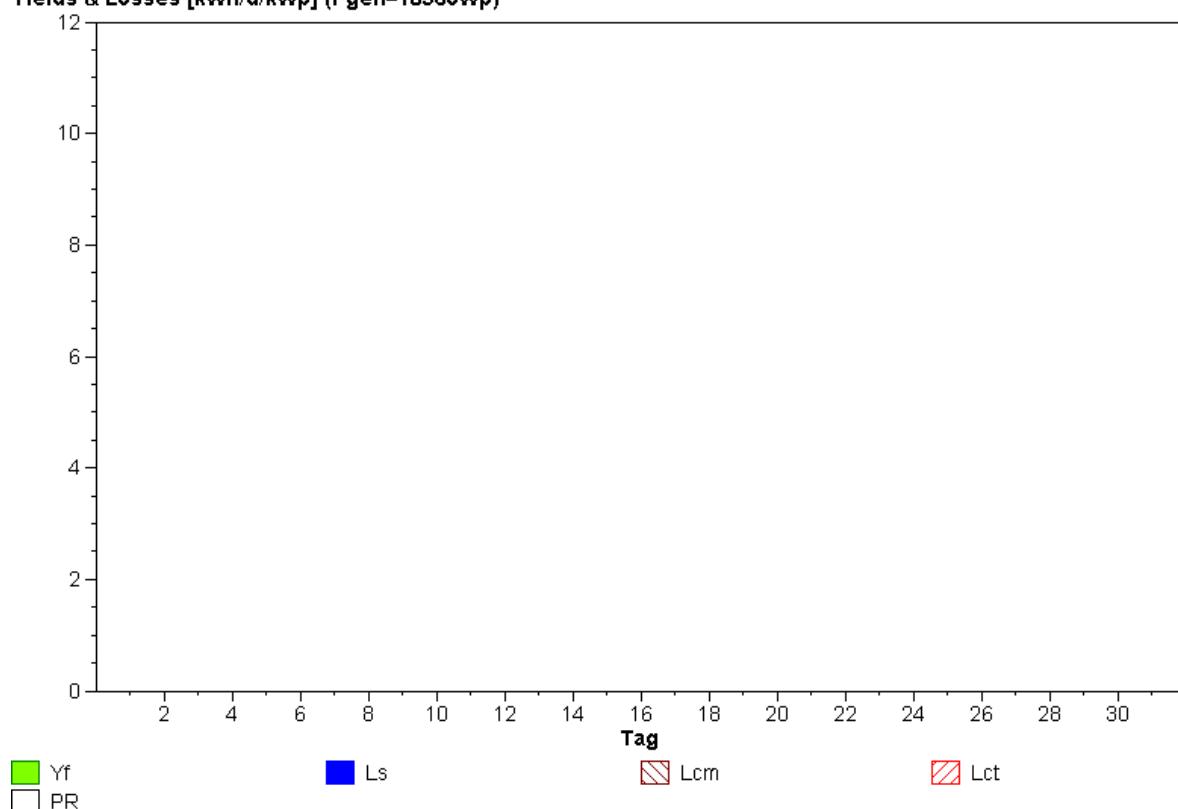
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 8.2001

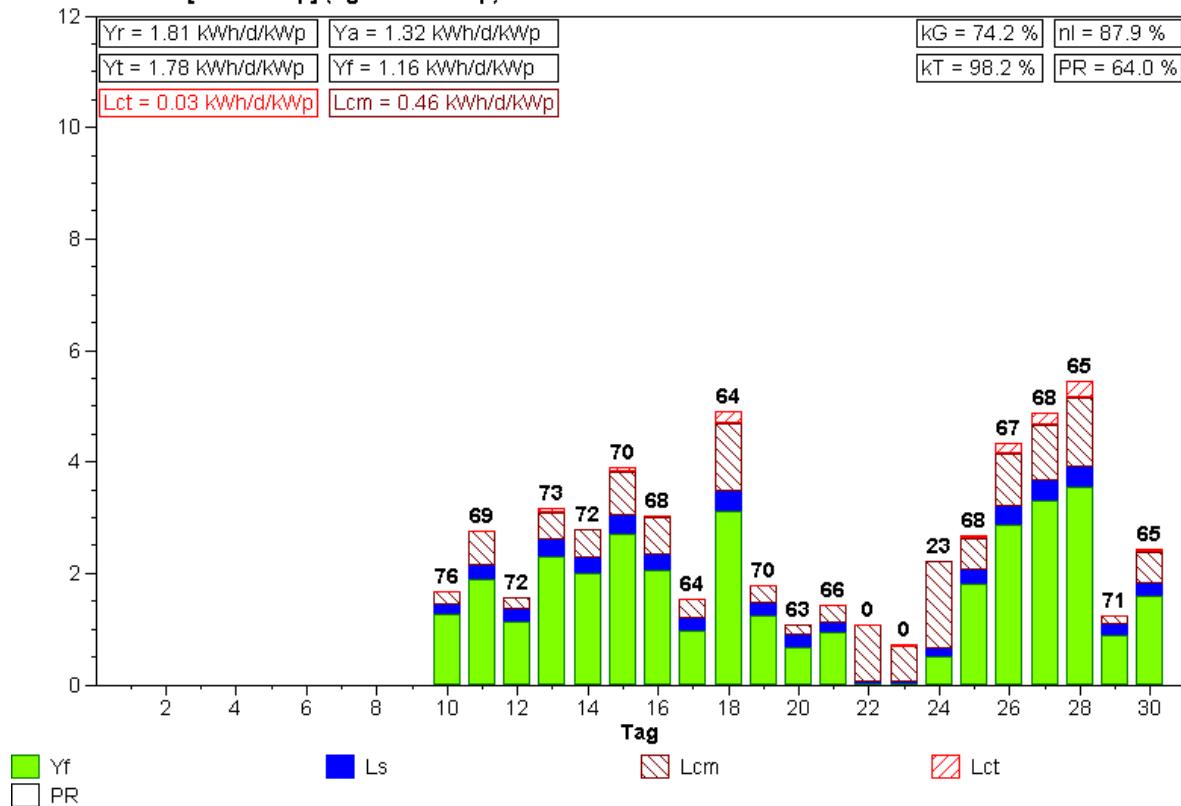
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 9.2001

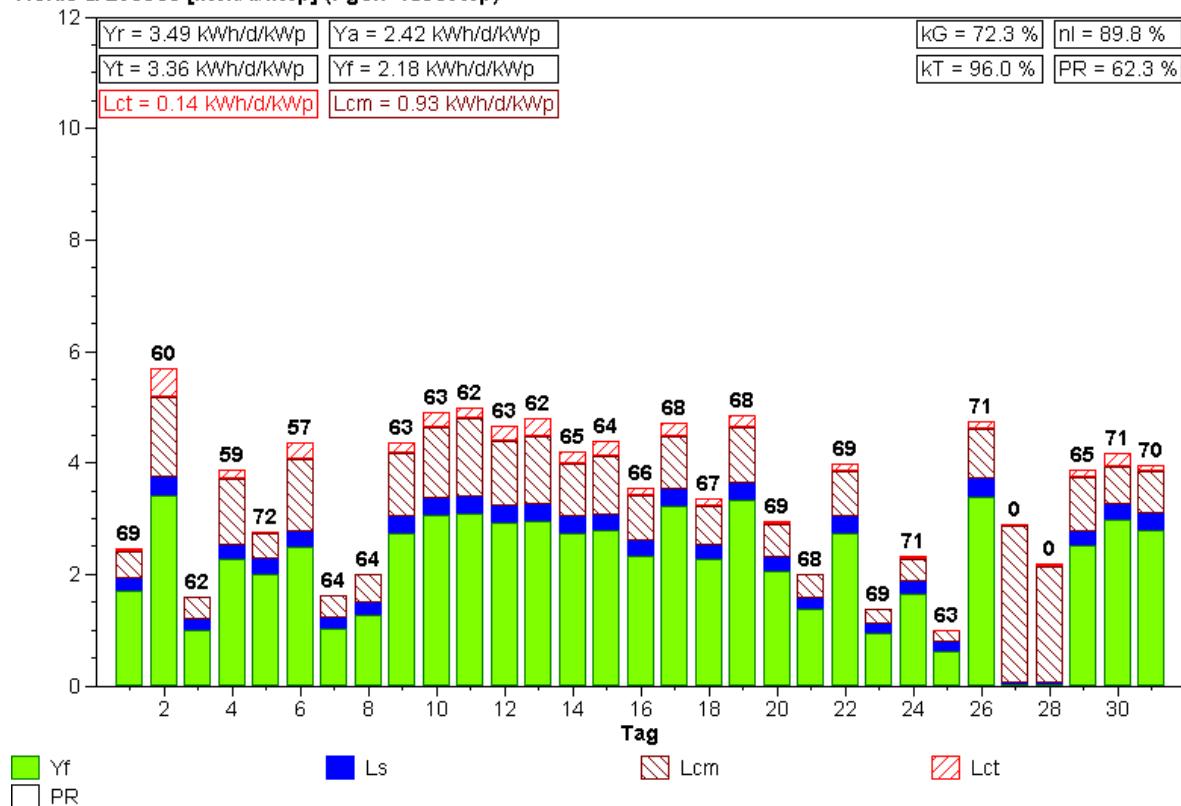
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 10.2001

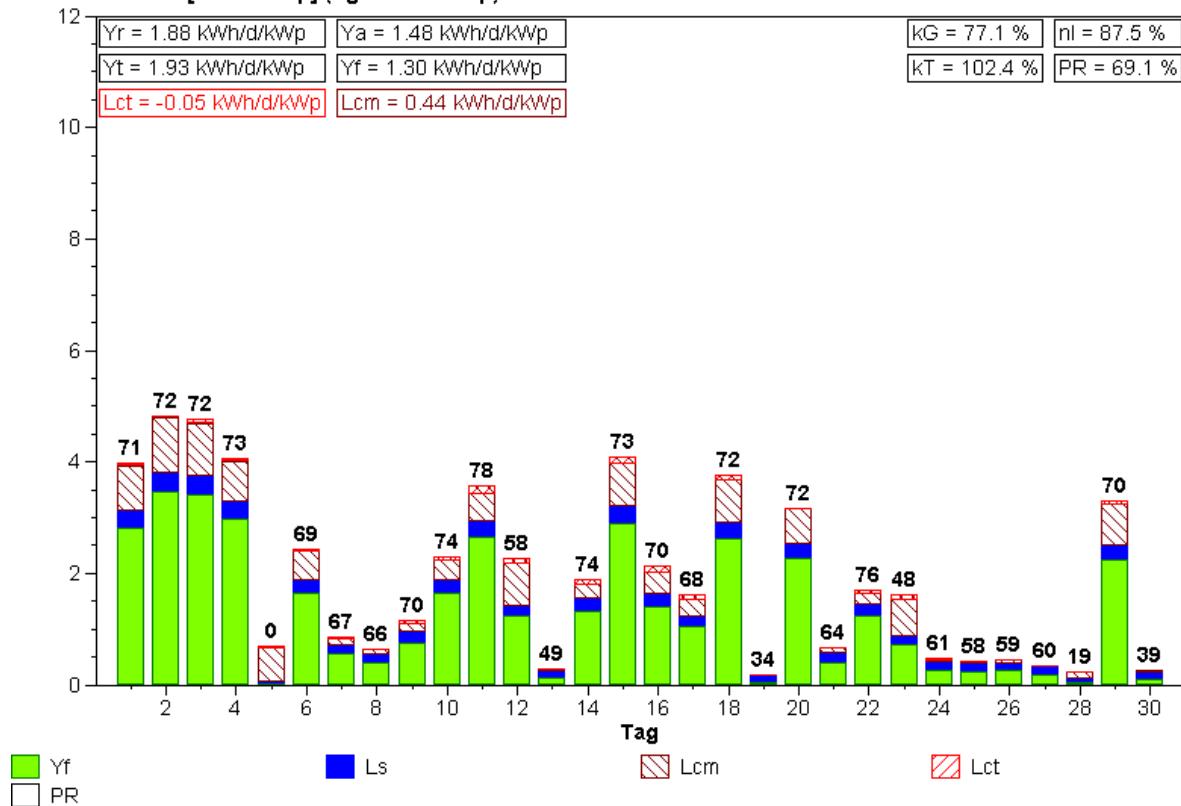
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 11.2001

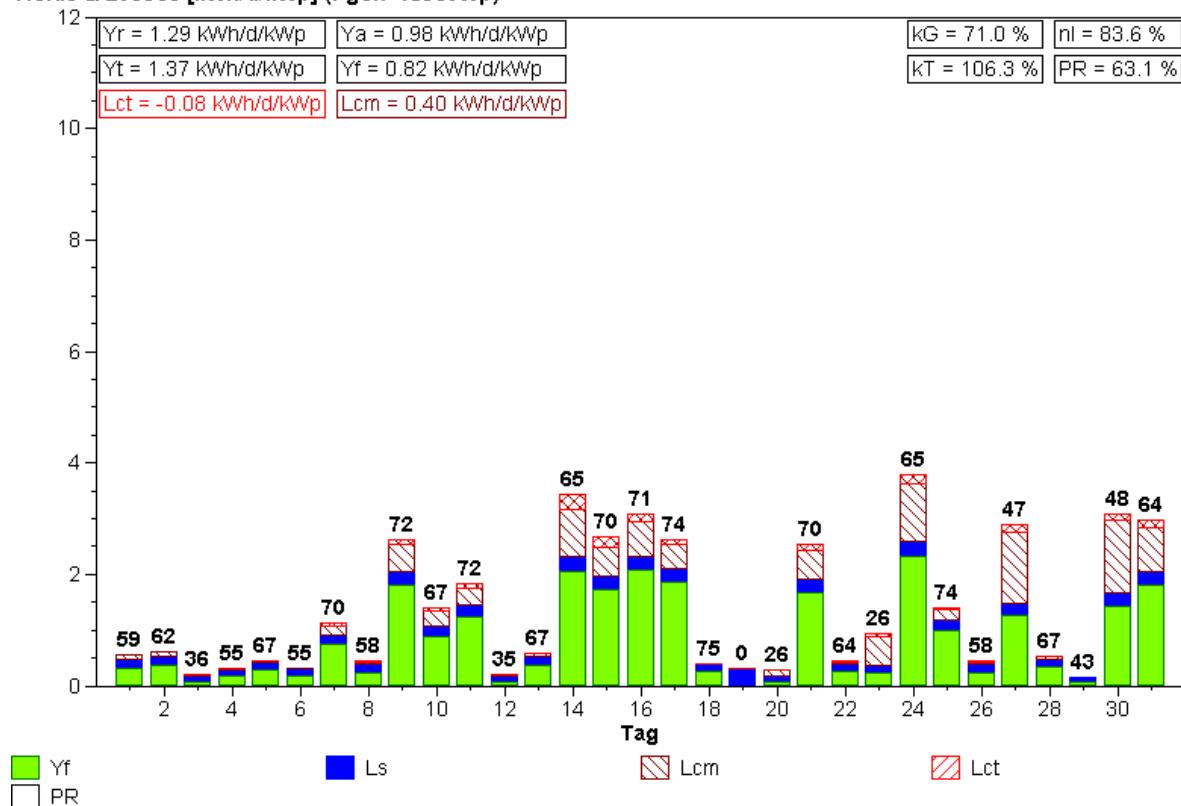
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)

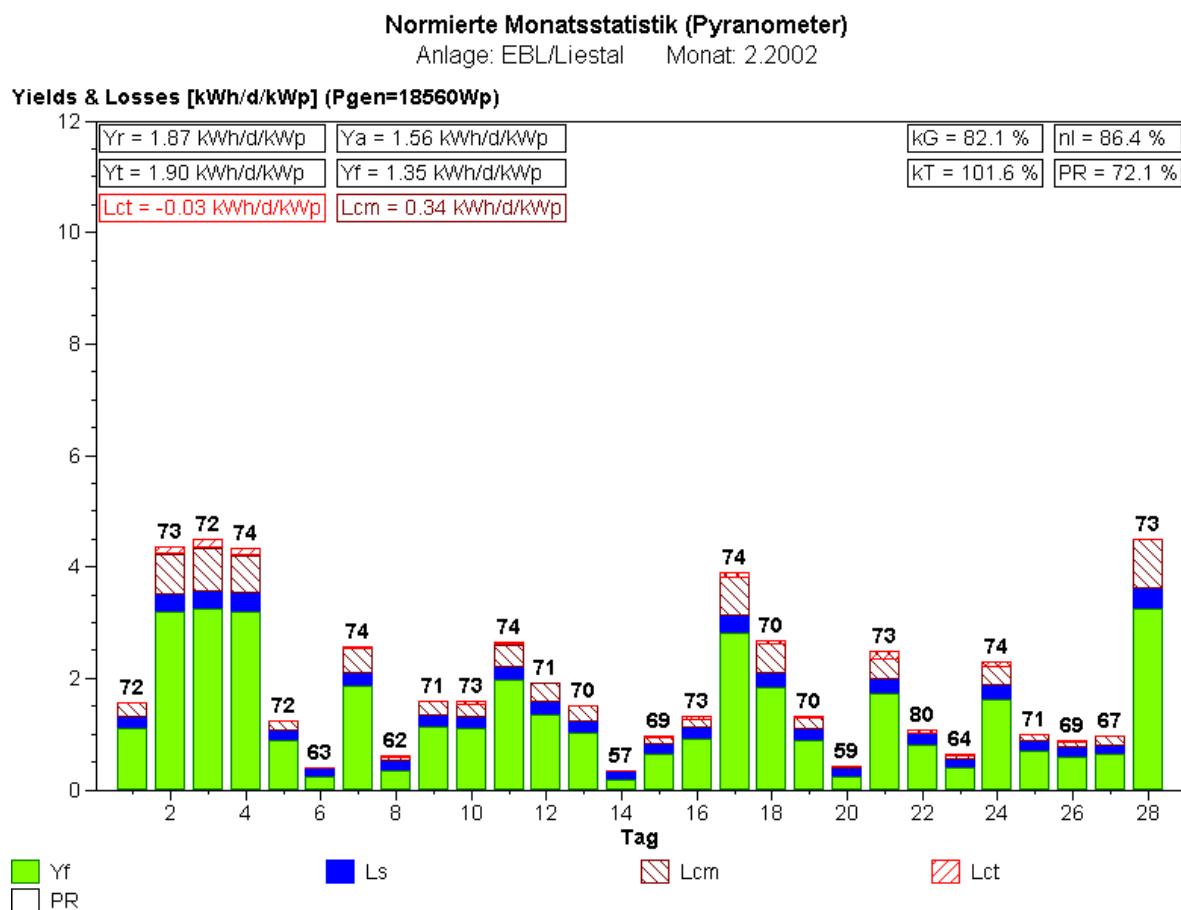
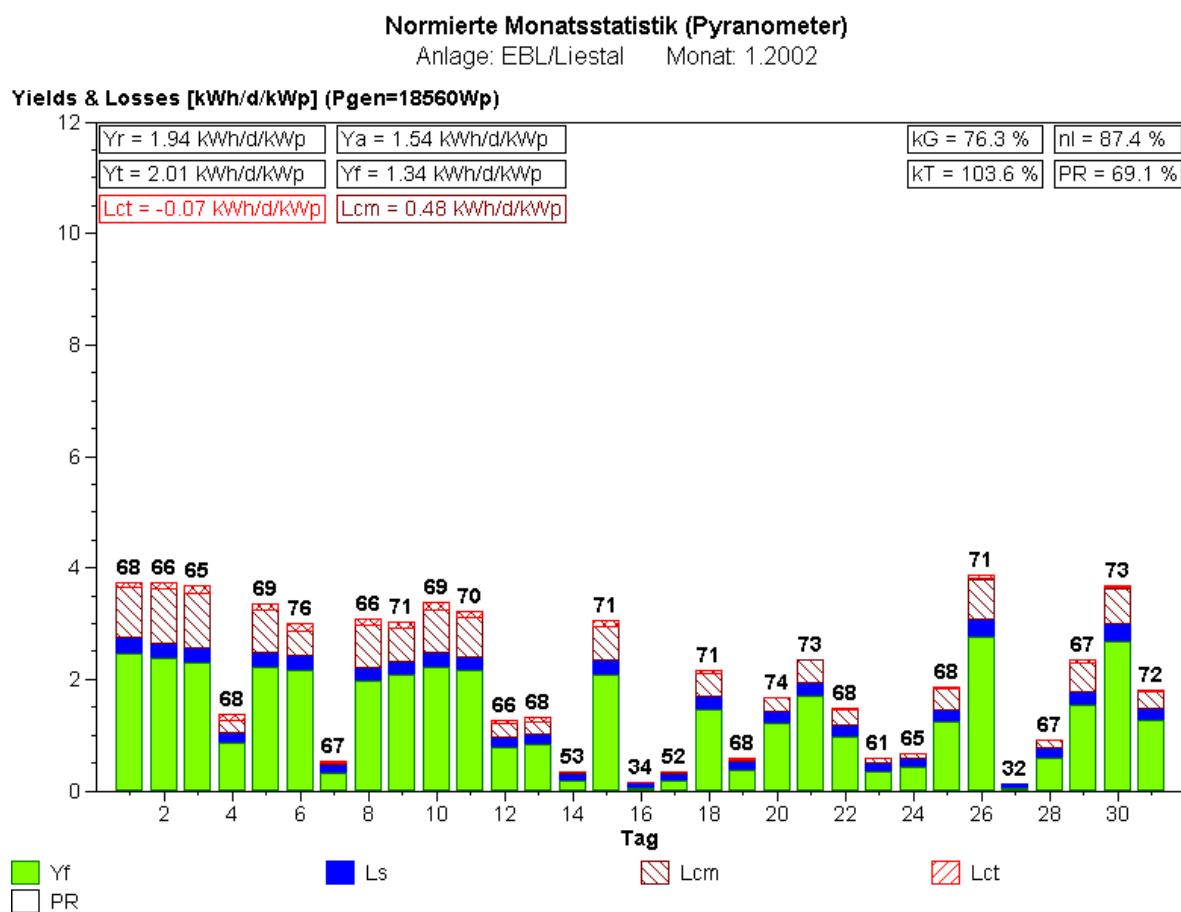


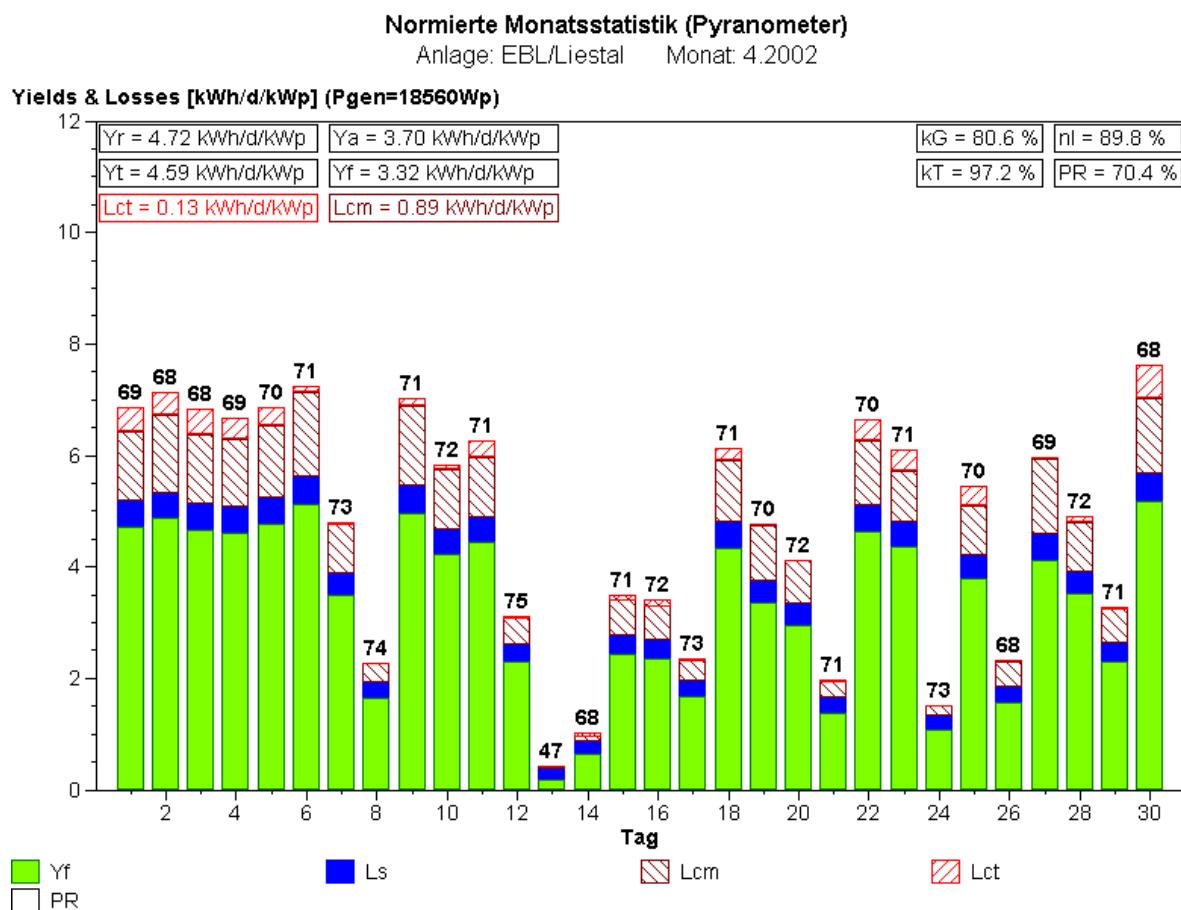
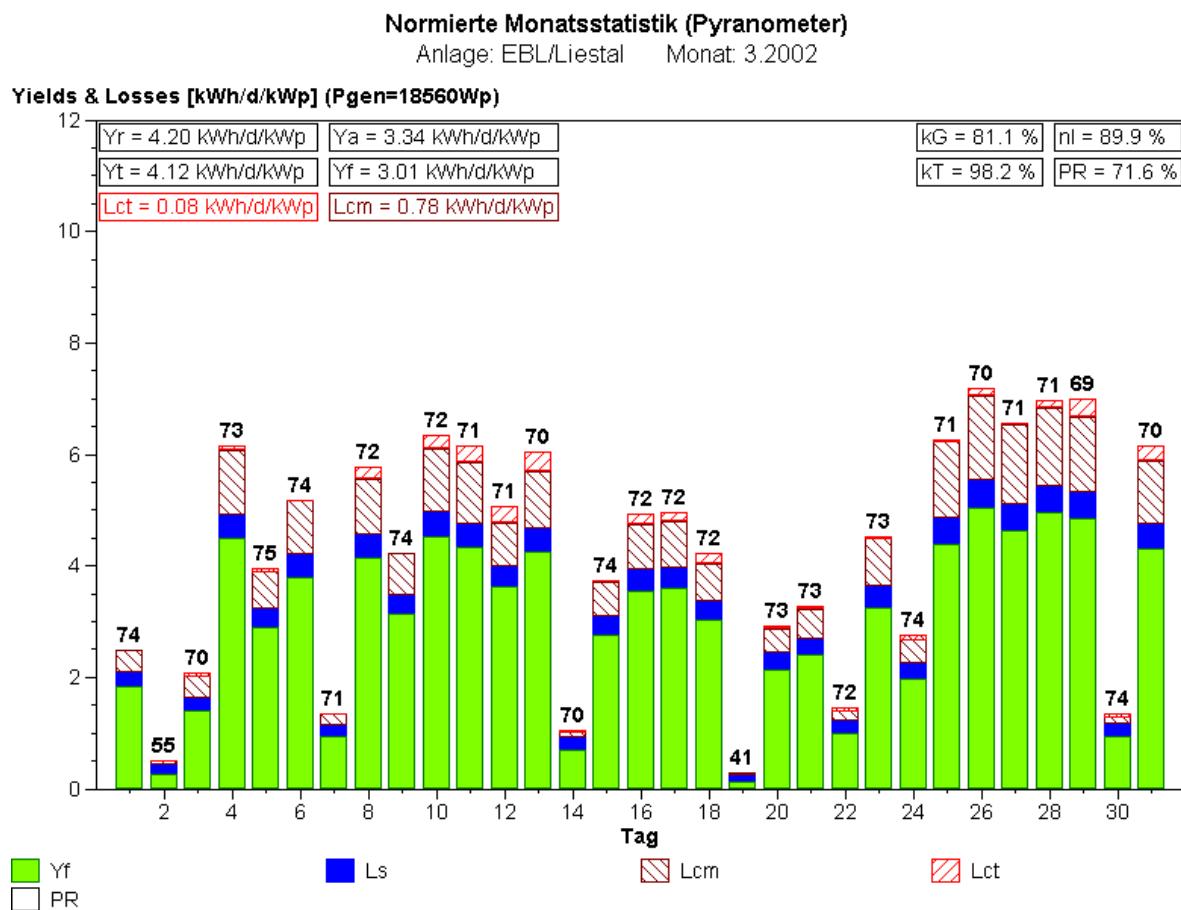
Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 12.2001

Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



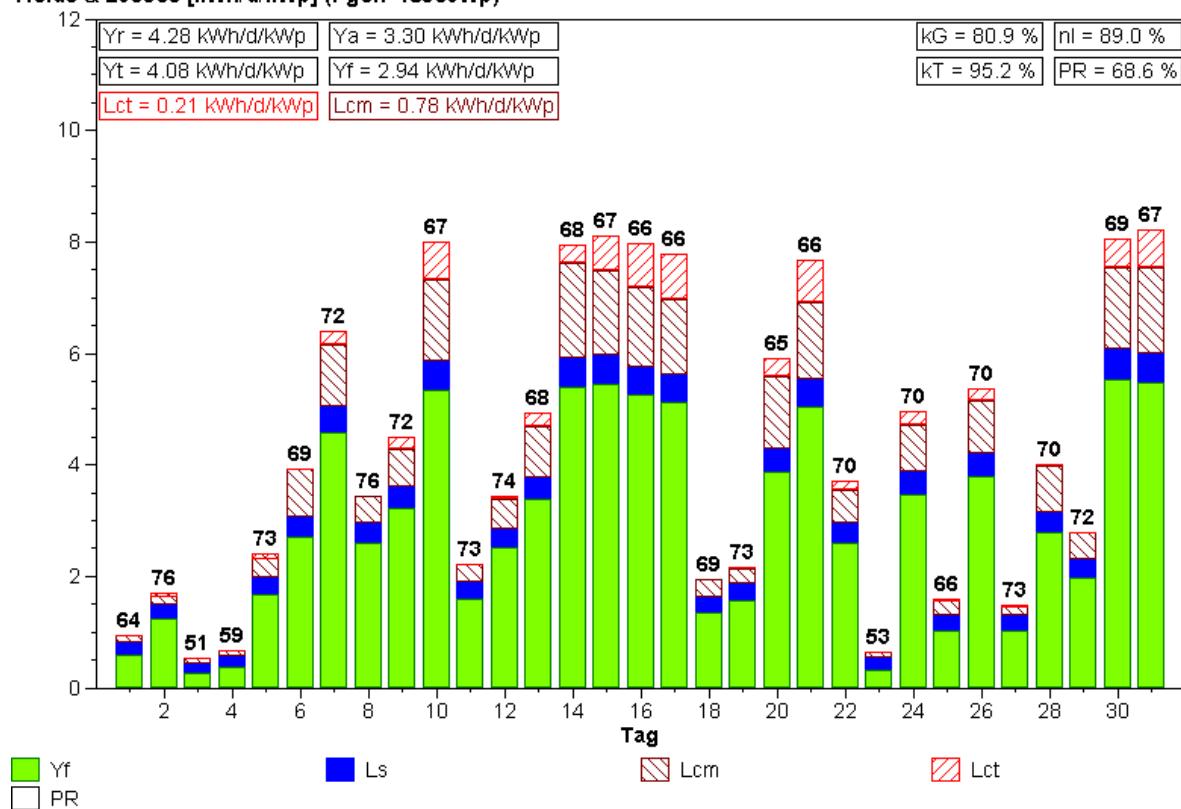




Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 5.2002

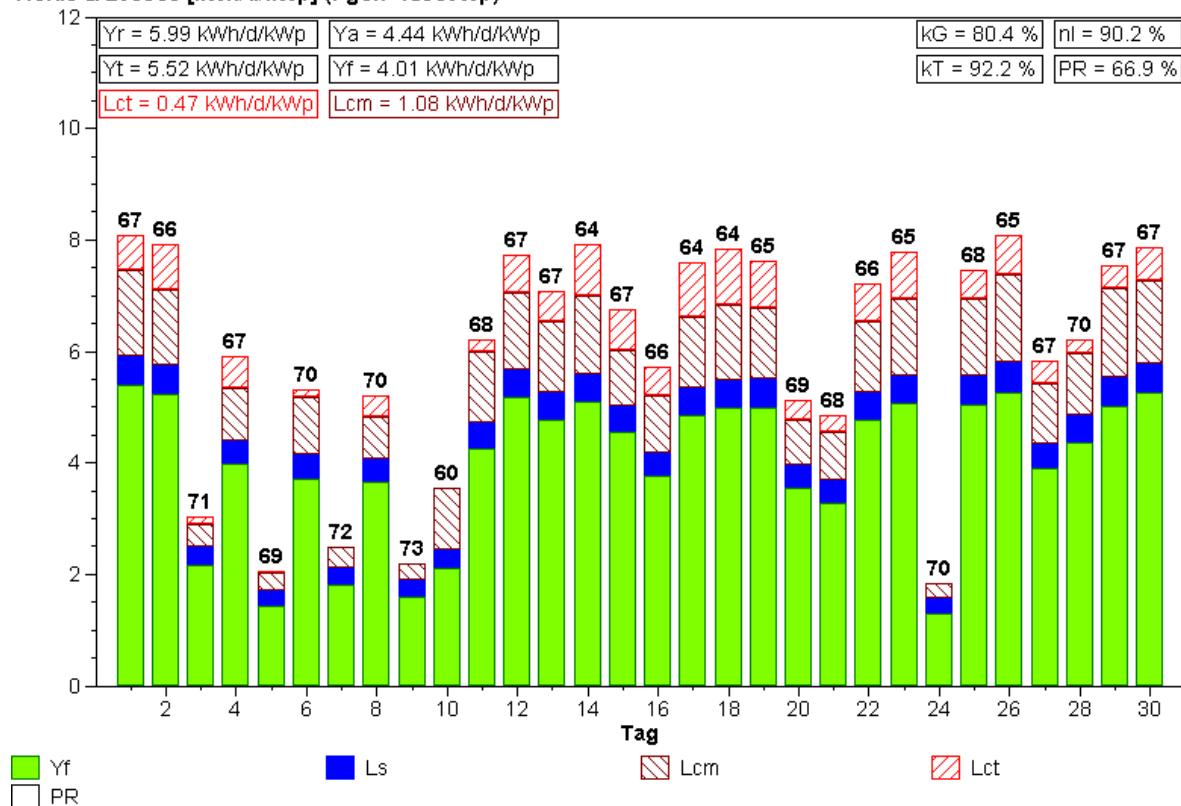
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 6.2002

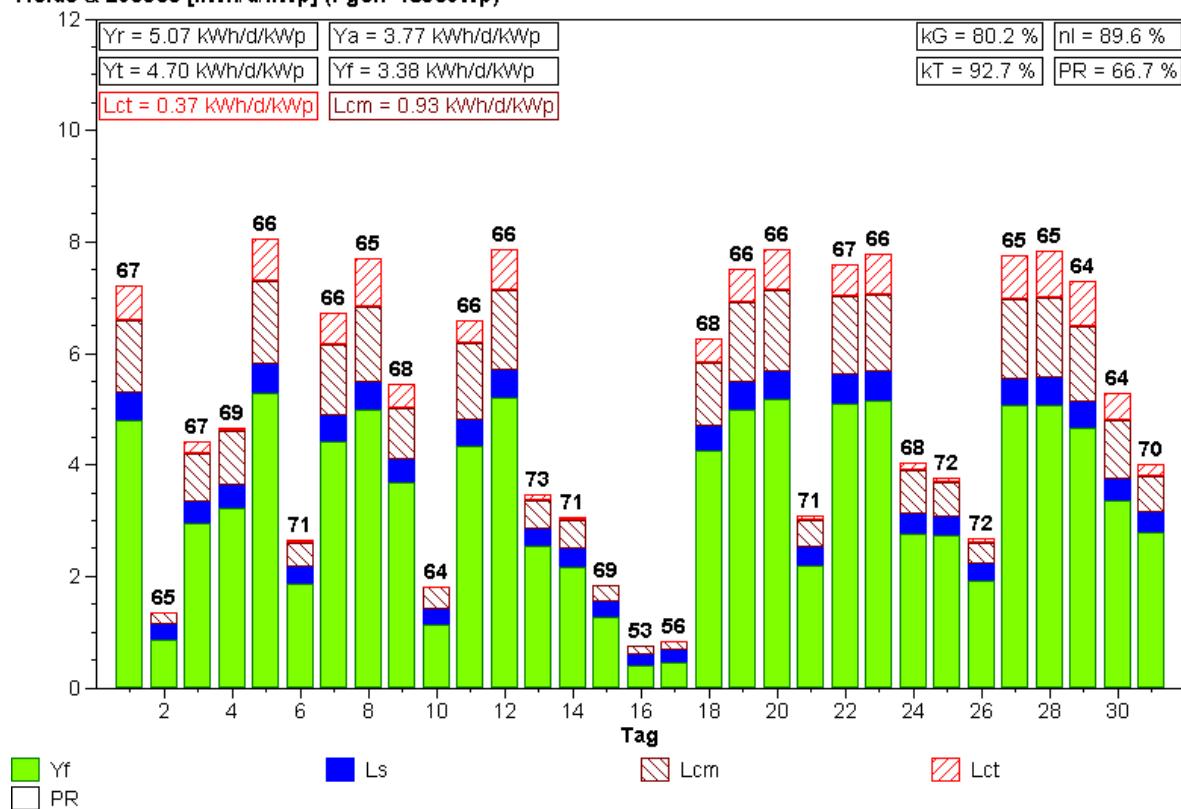
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: EBL/Liestal Monat: 7.2002

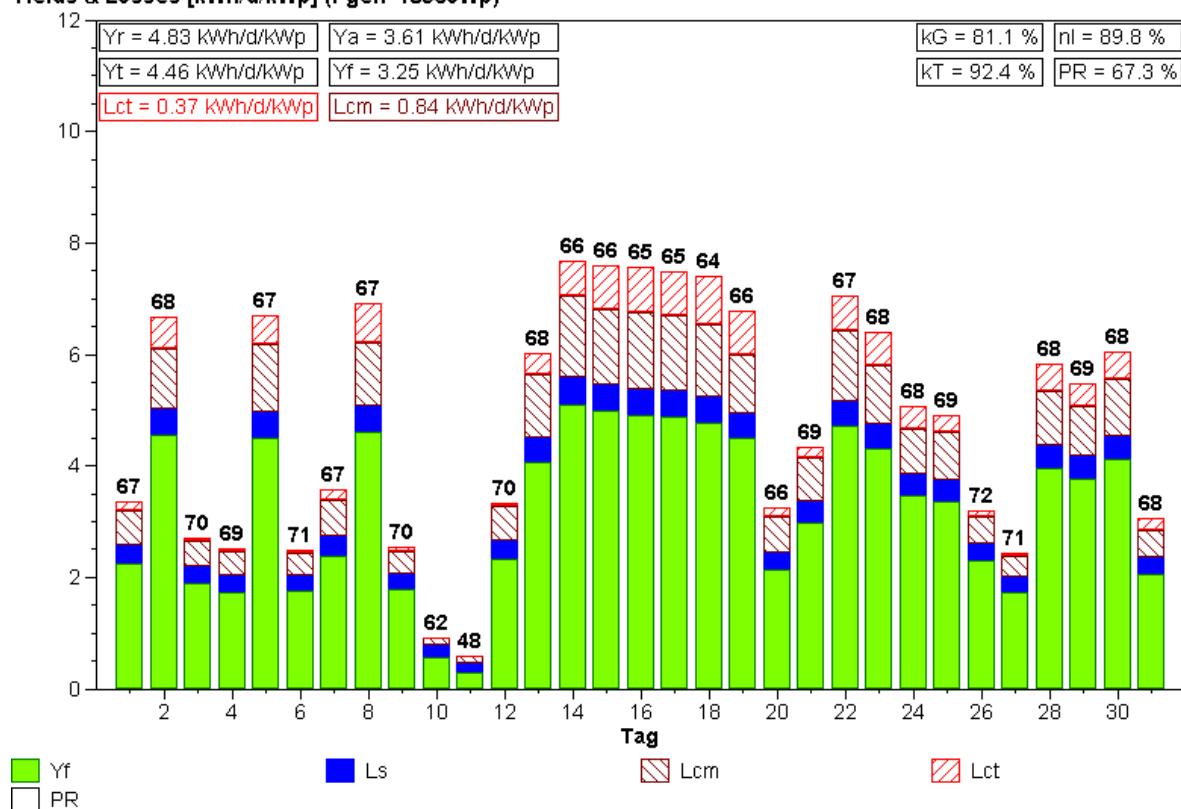
Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)

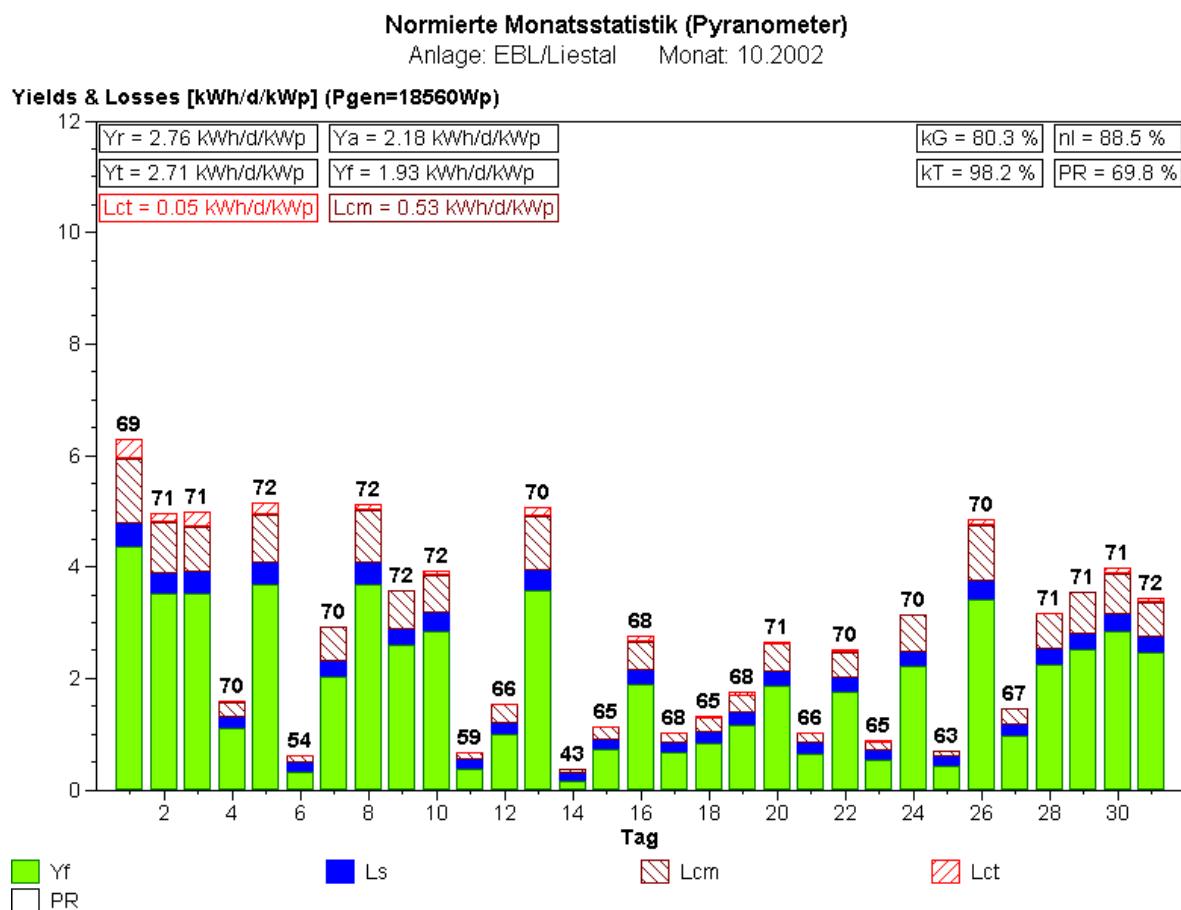
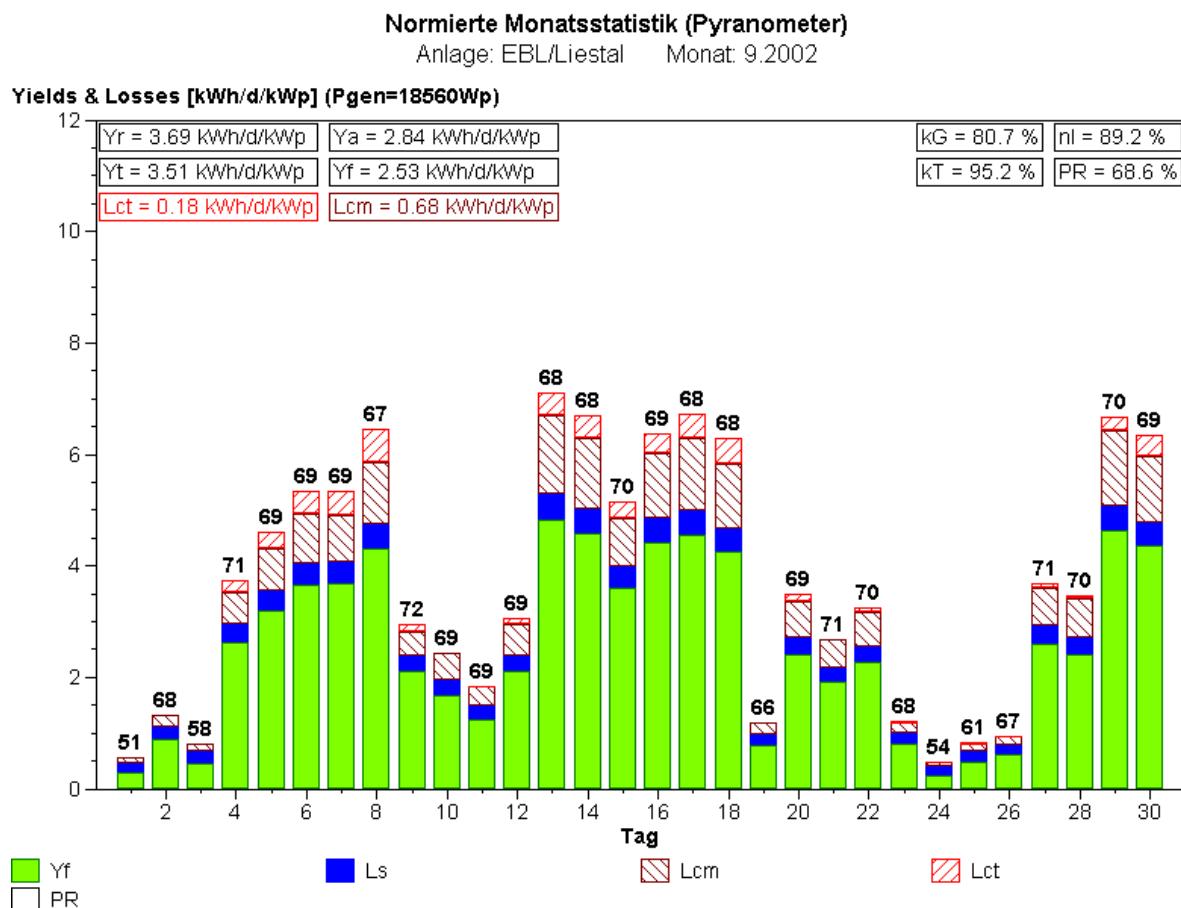


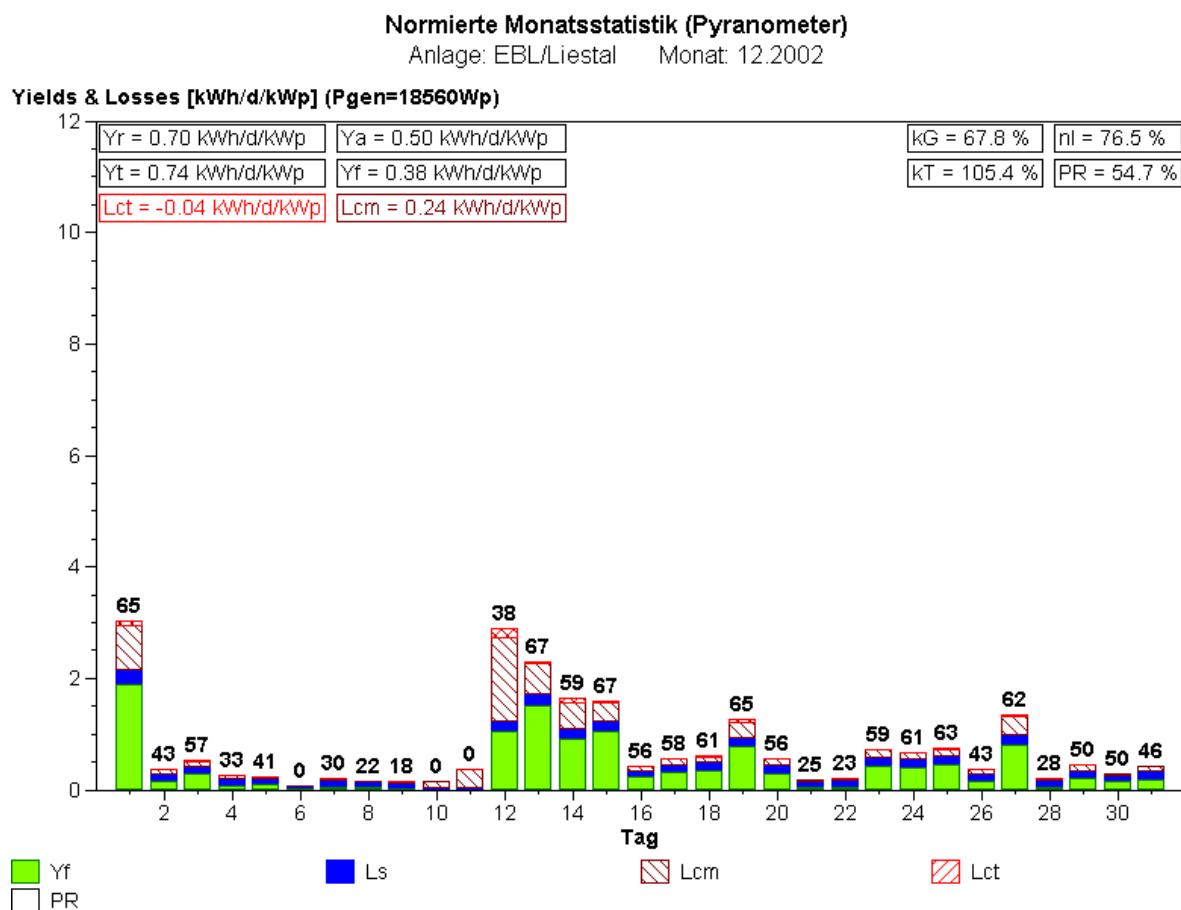
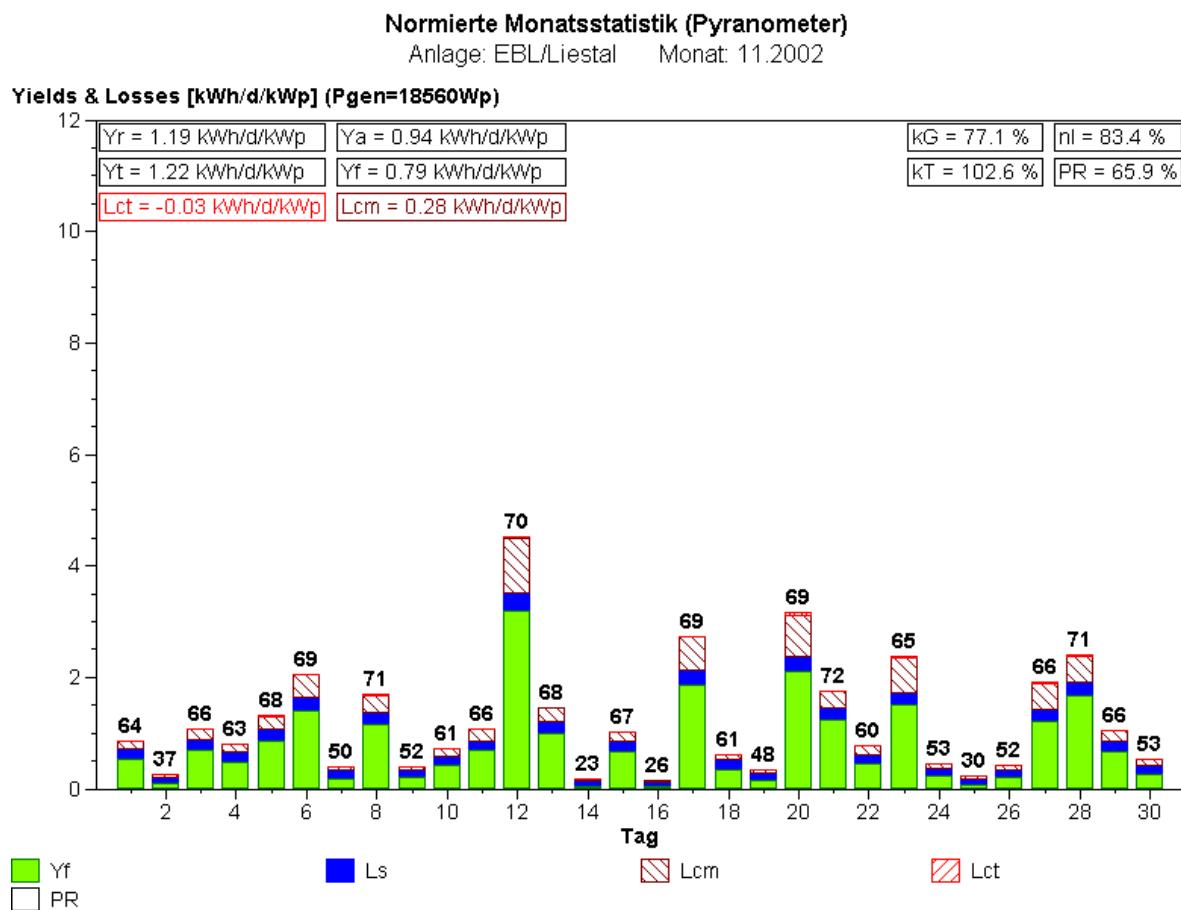
Normierte Monatsstatistik (Pyranometer)

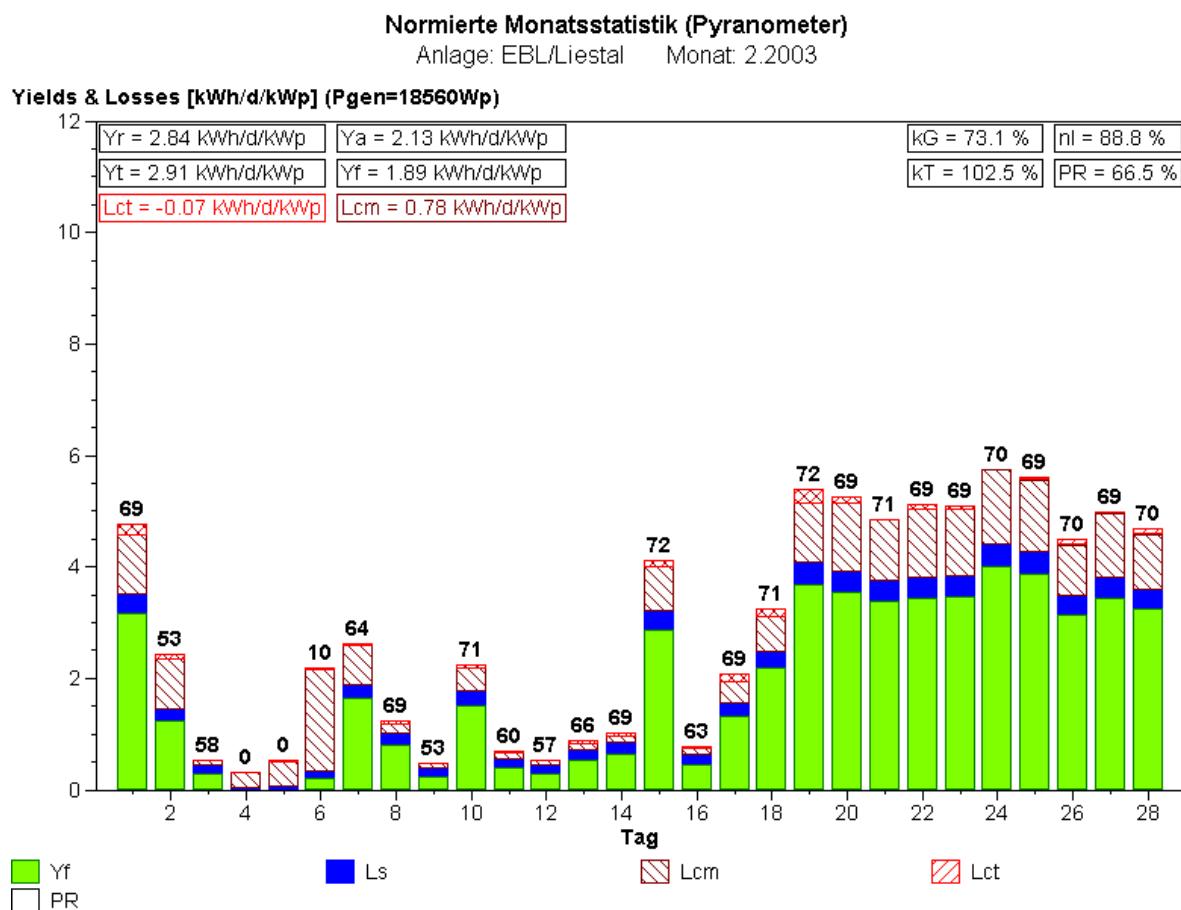
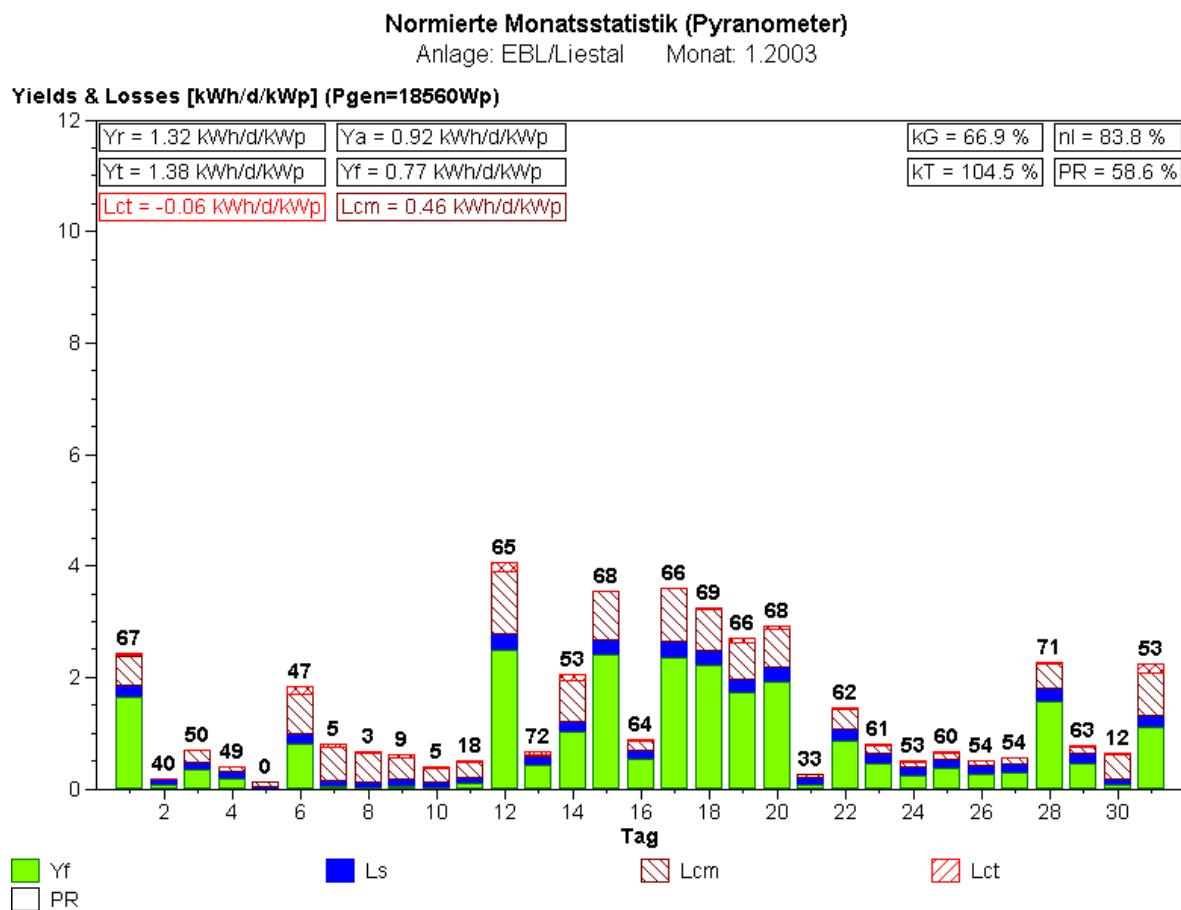
Anlage: EBL/Liestal Monat: 8.2002

Yields & Losses [kWh/d/kWp] (Pgen=18560Wp)





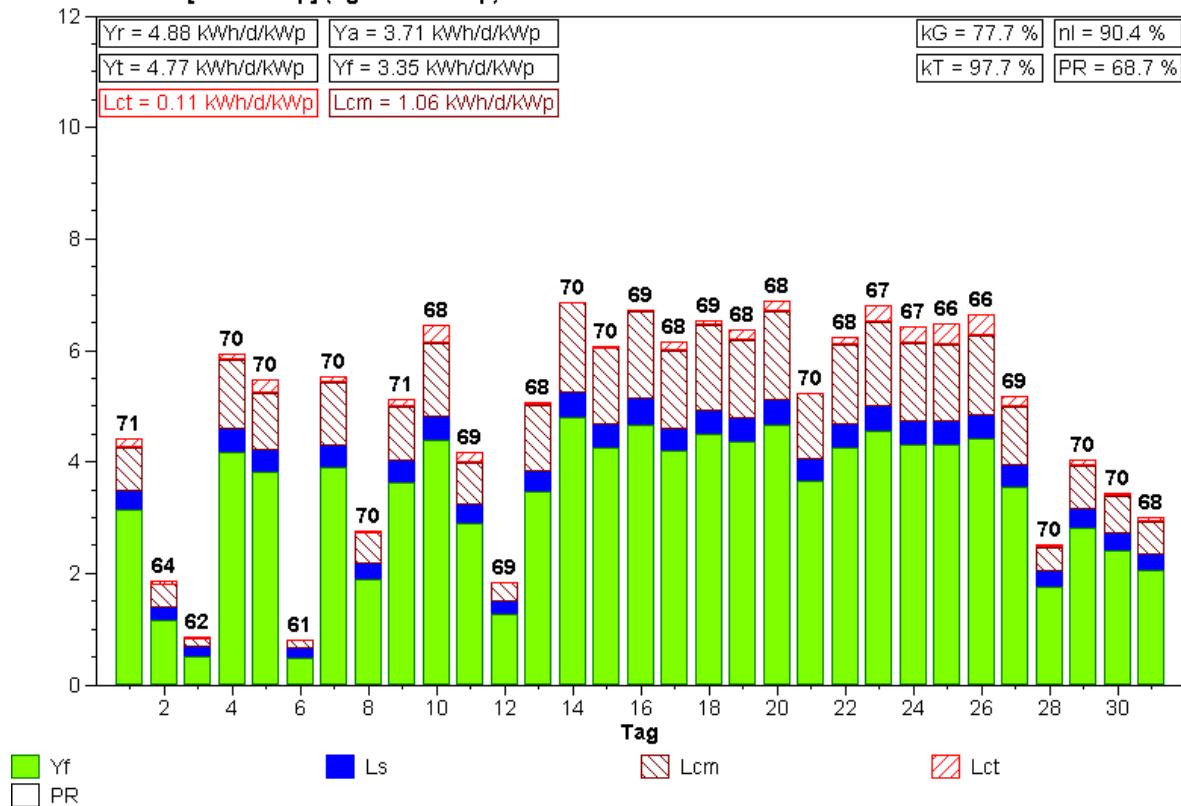




Normierte Monatsstatistik (Pyranometer)

Anlage: EBL Liestal Monat: 3.2003

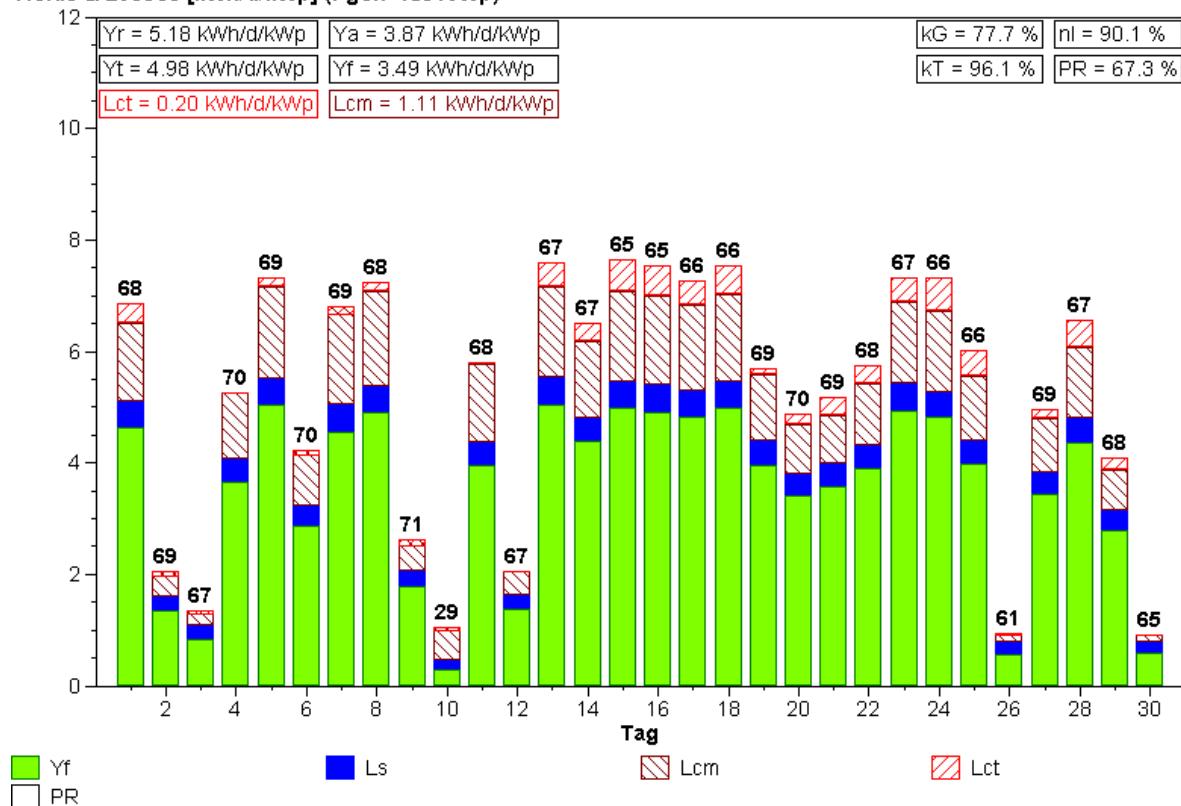
Yields & Losses [kWh/d/kWp] (Pgen=18510Wp)

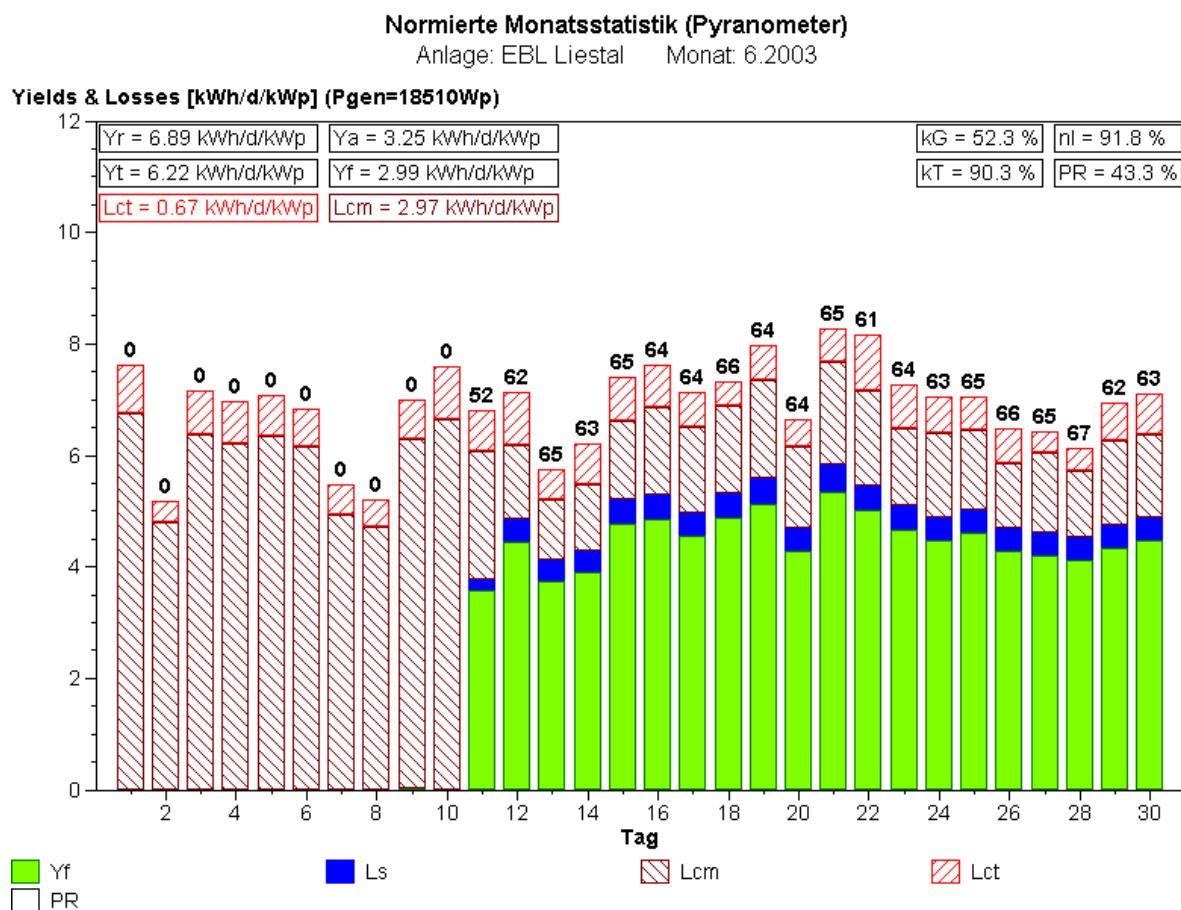
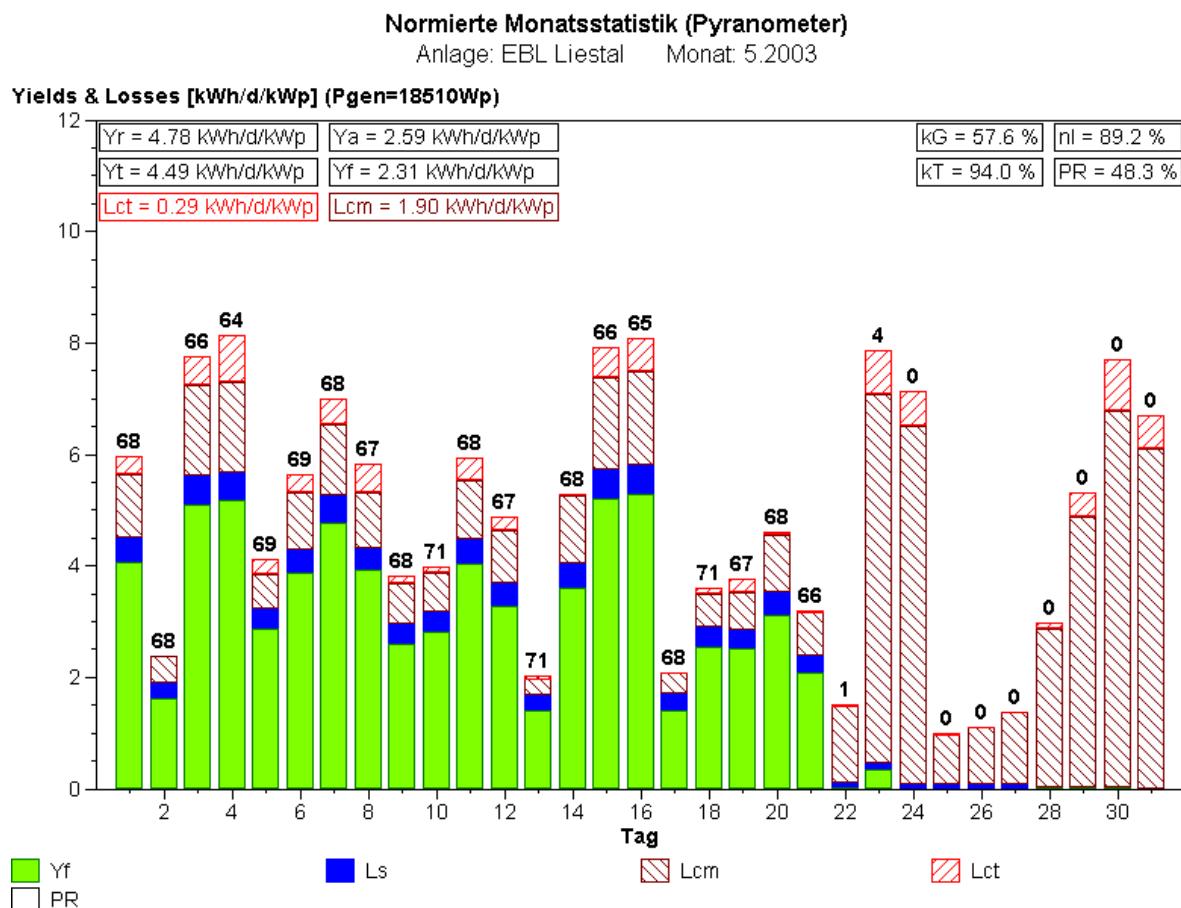


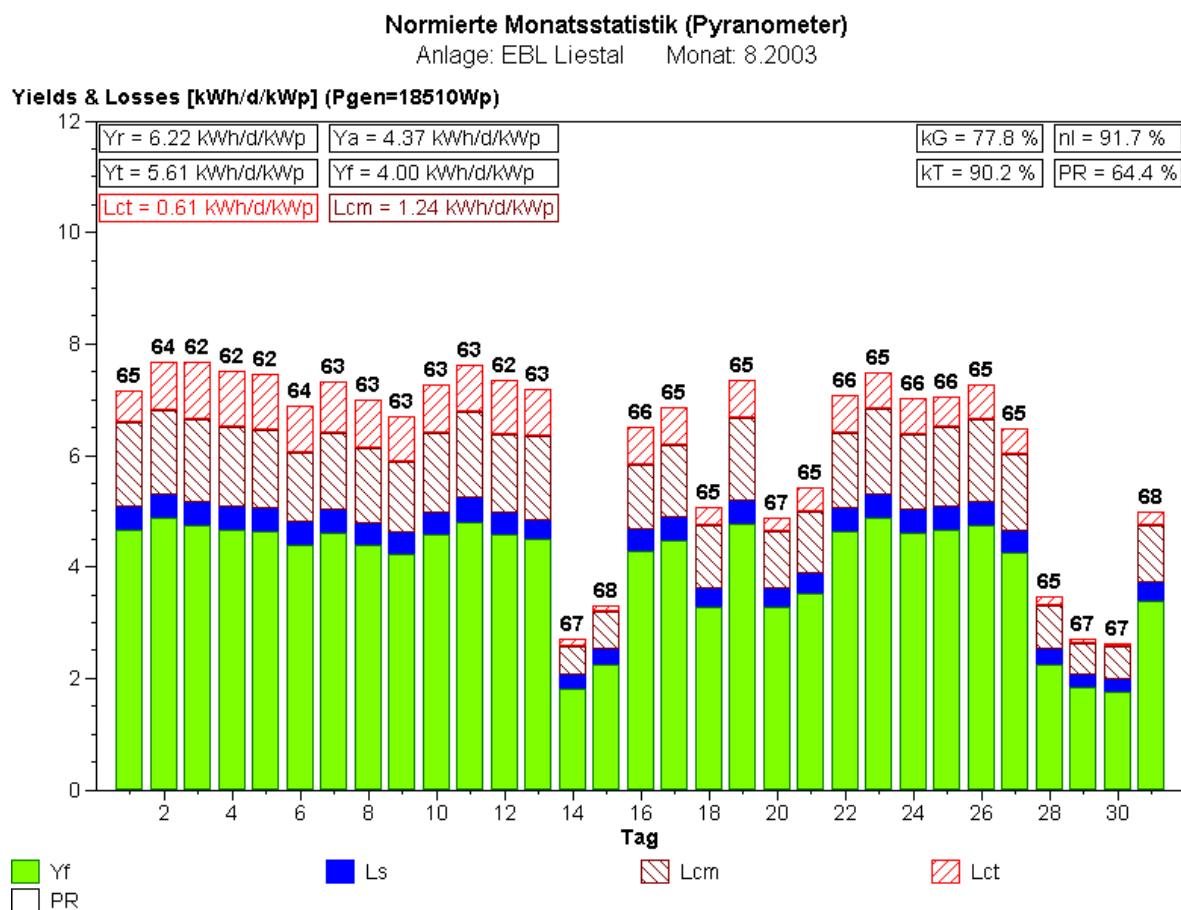
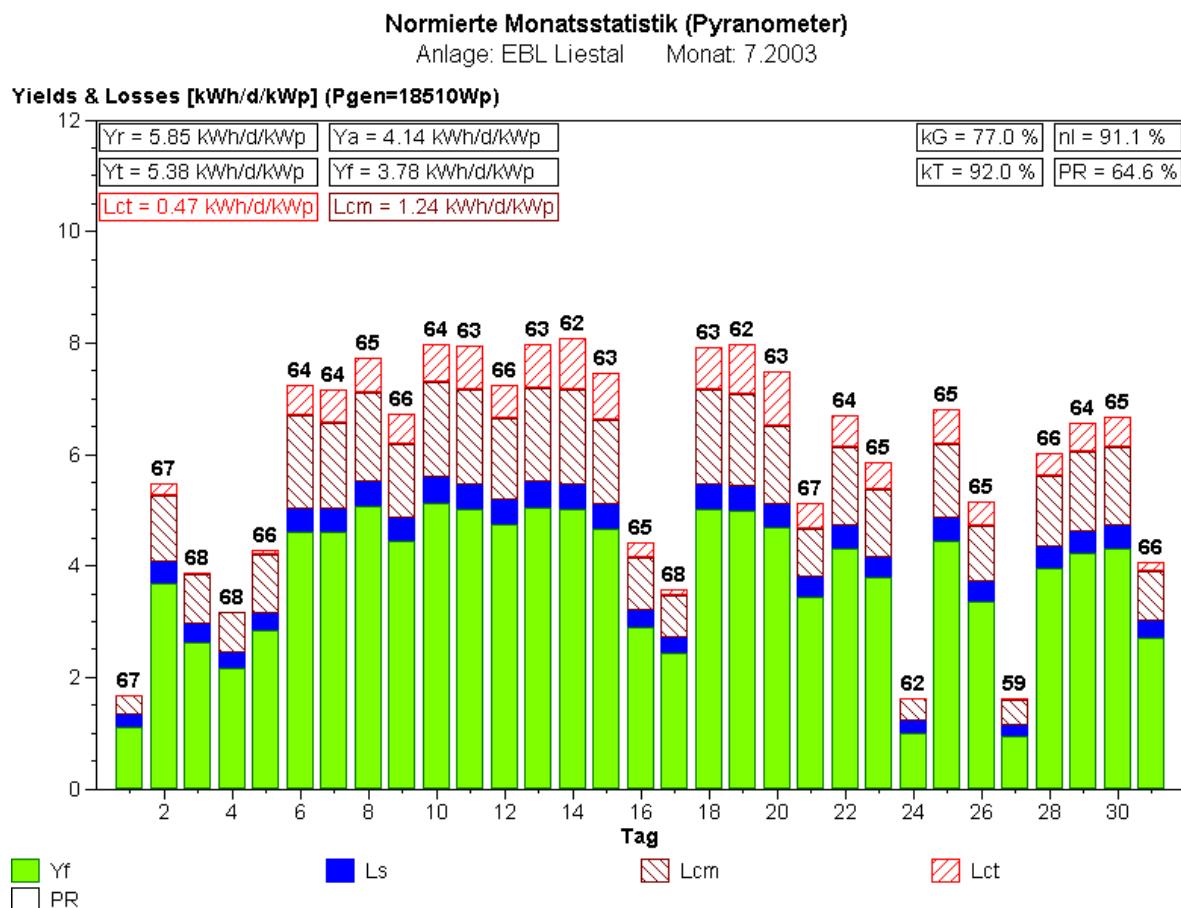
Normierte Monatsstatistik (Pyranometer)

Anlage: EBL Liestal Monat: 4.2003

Yields & Losses [kWh/d/kWp] (Pgen=18510Wp)







## **zu 6.6 Gfeller, Burgdorf**

**Ort:** Finkfeld 6, 3400 Burgdorf; 540 m.ü.M.  
**Inbetriebnahme:** 24.06.1992

**Solargenerator:**

**Module:** Siemens M55 (60 Stück)  
**Feldleistung:** 3180 Wp (nominell)  
**Bruttofläche:** 25,6 m<sup>2</sup>

**Neigung:** 28° (Schrägdach)  
**Ausrichtung:** 10° Ost

**Wechselrichter:** ASP TopClass 3000  
ASP TopClass Grid III 4000/6  
vom 24.06.92 bis 14.04.97  
seit 14.04.97

**Messgrößen:**

- Sonneneinstrahlung in Modulebene mit Pyranometer
- Umgebungstemperatur und Modultemperatur
- Gleichstrom und Gleichspannung
- Eingespeiste Wechselstrom-Wirkleistung



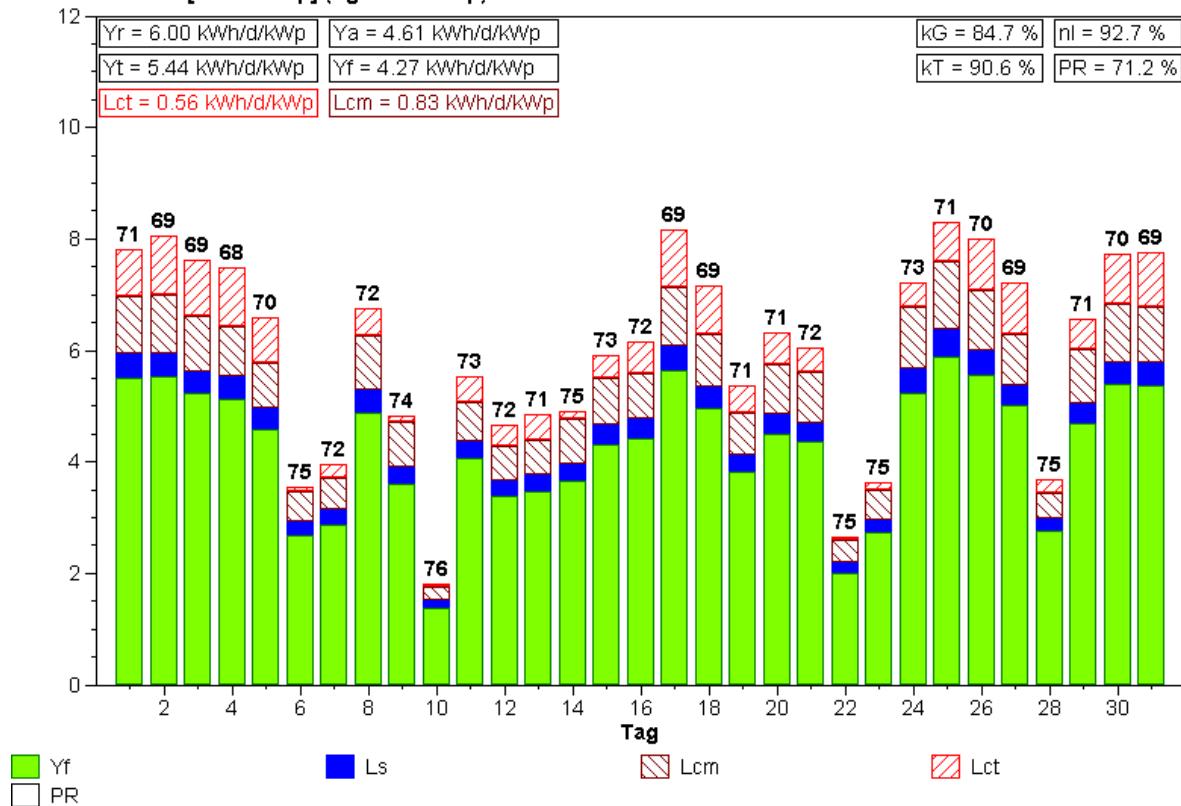
**Besondere Betriebsereignisse:**

- keine -

Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 7.1999

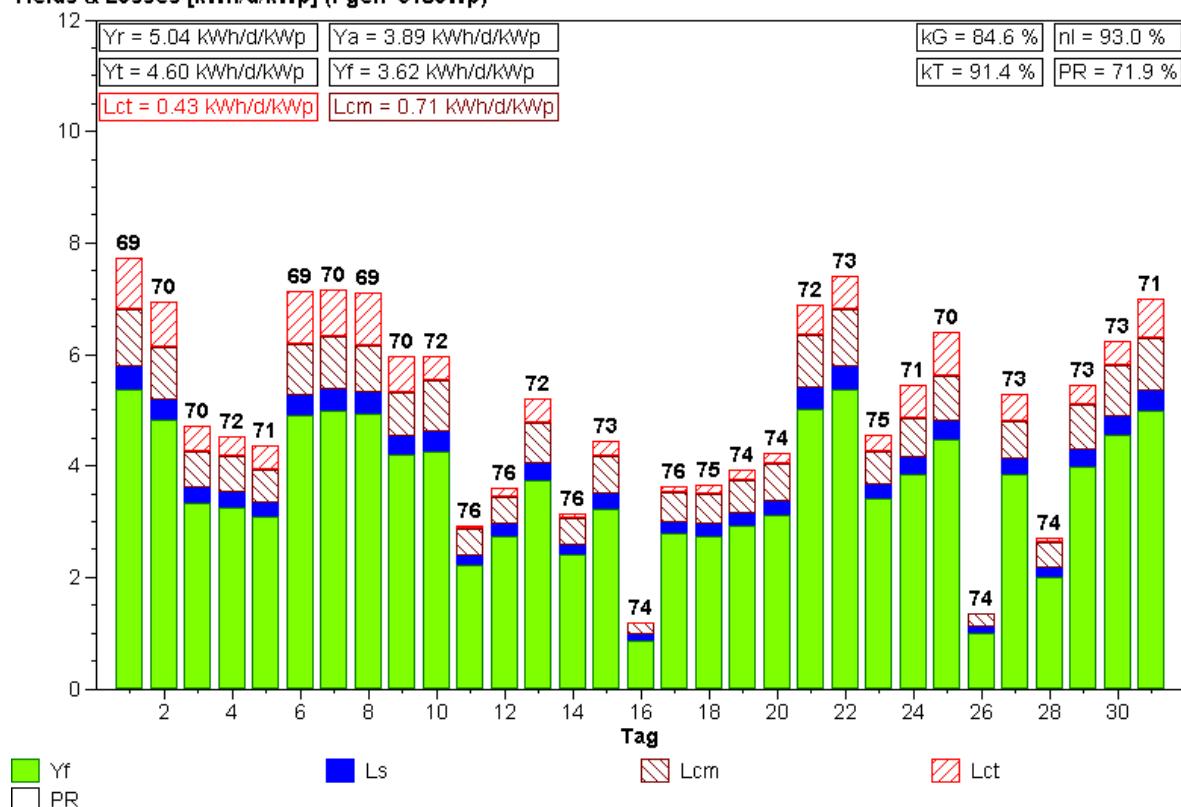
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

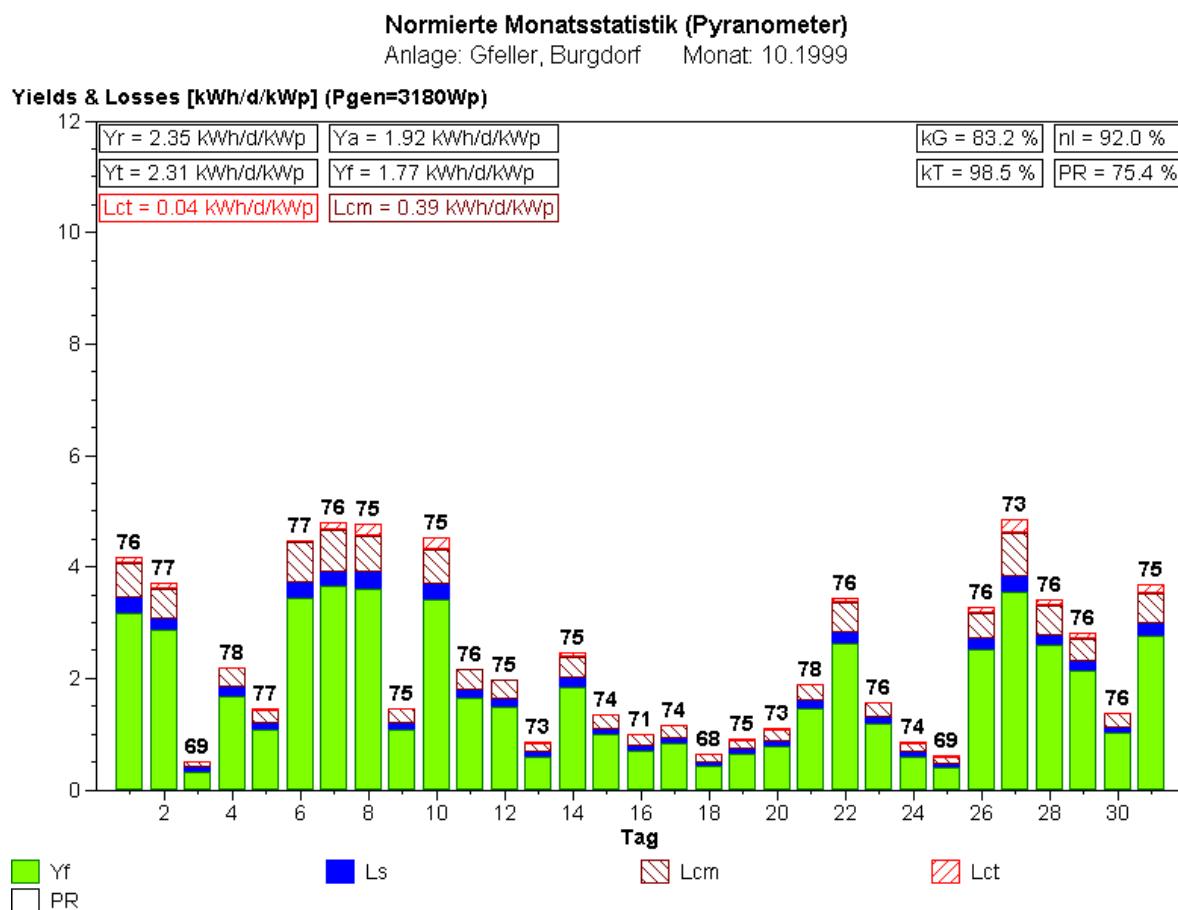
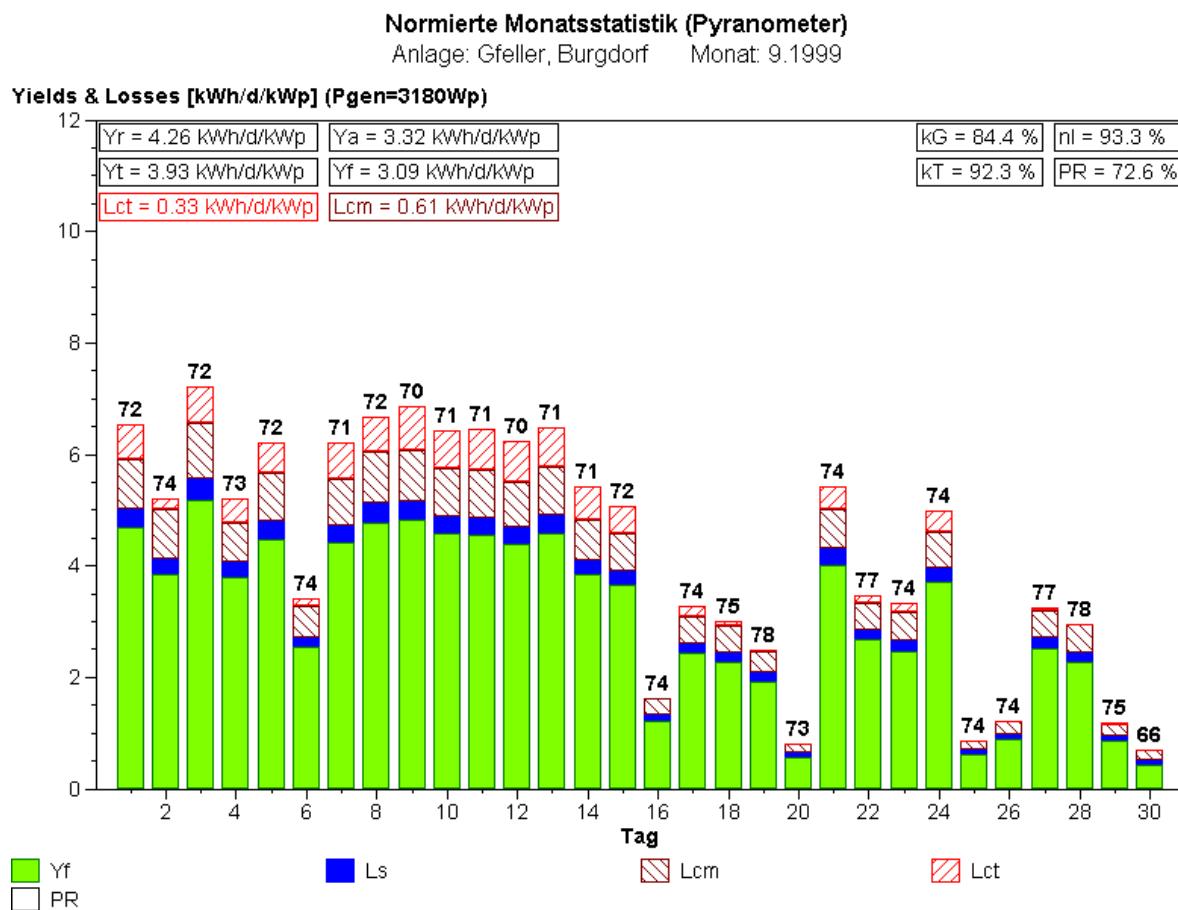


Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 8.1999

Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

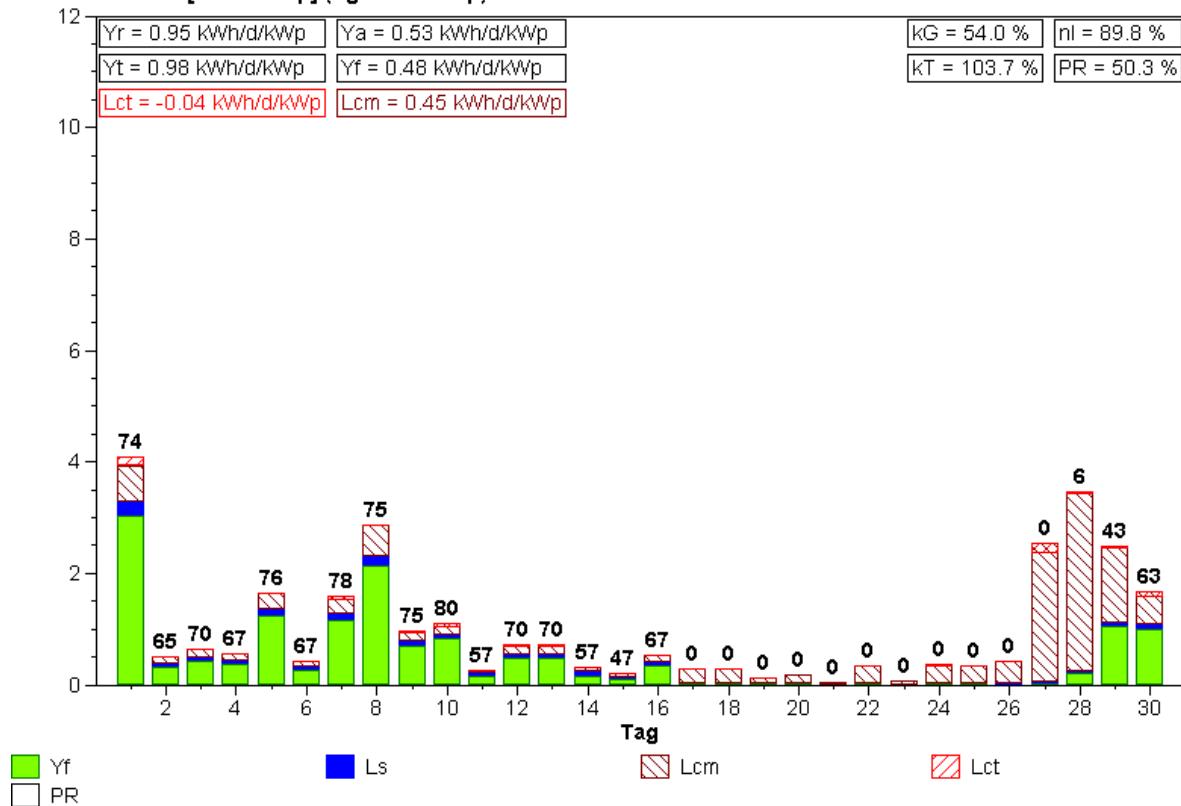




Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 11.1999

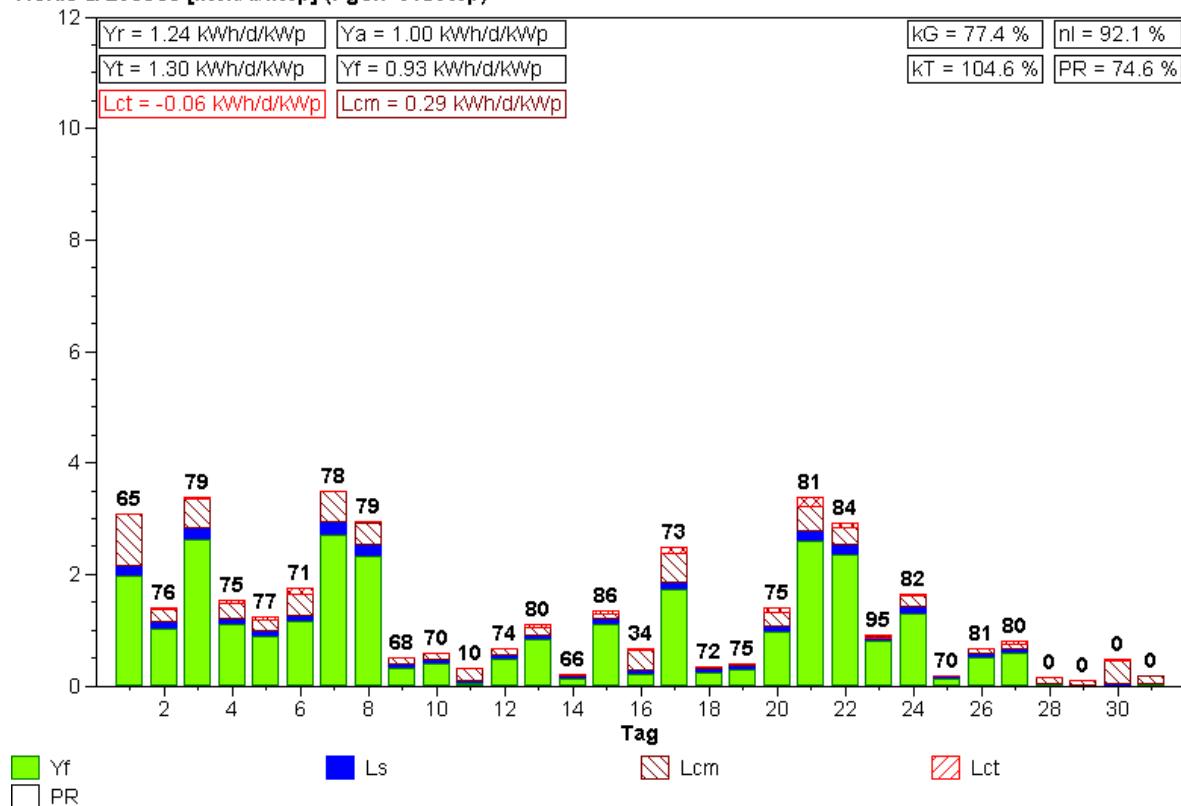
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 12.1999

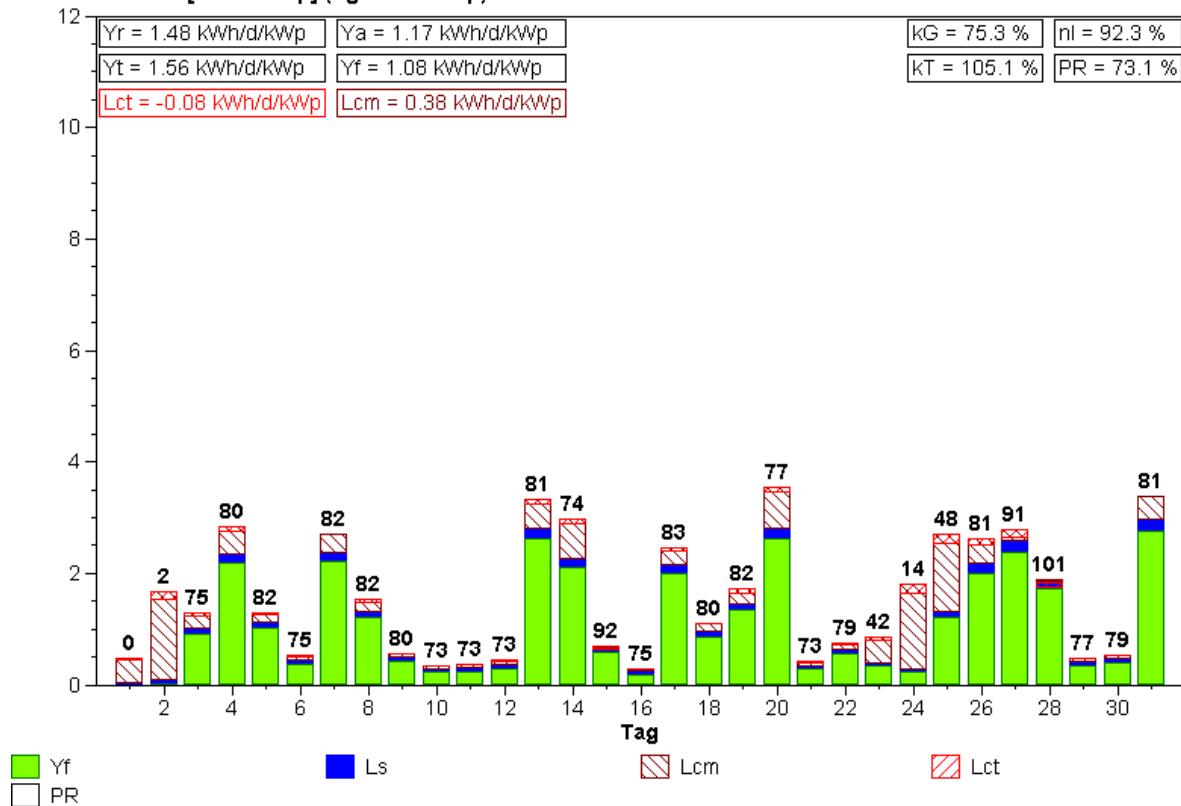
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 1.2000

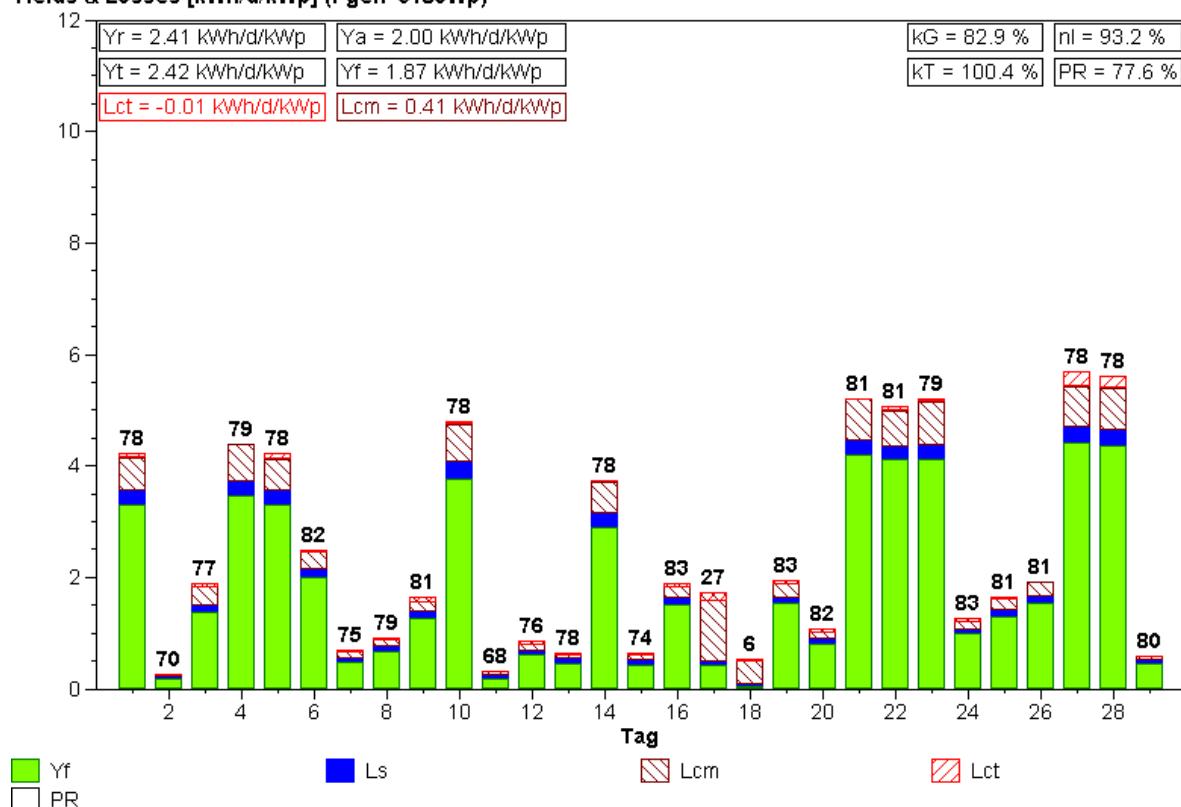
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 2.2000

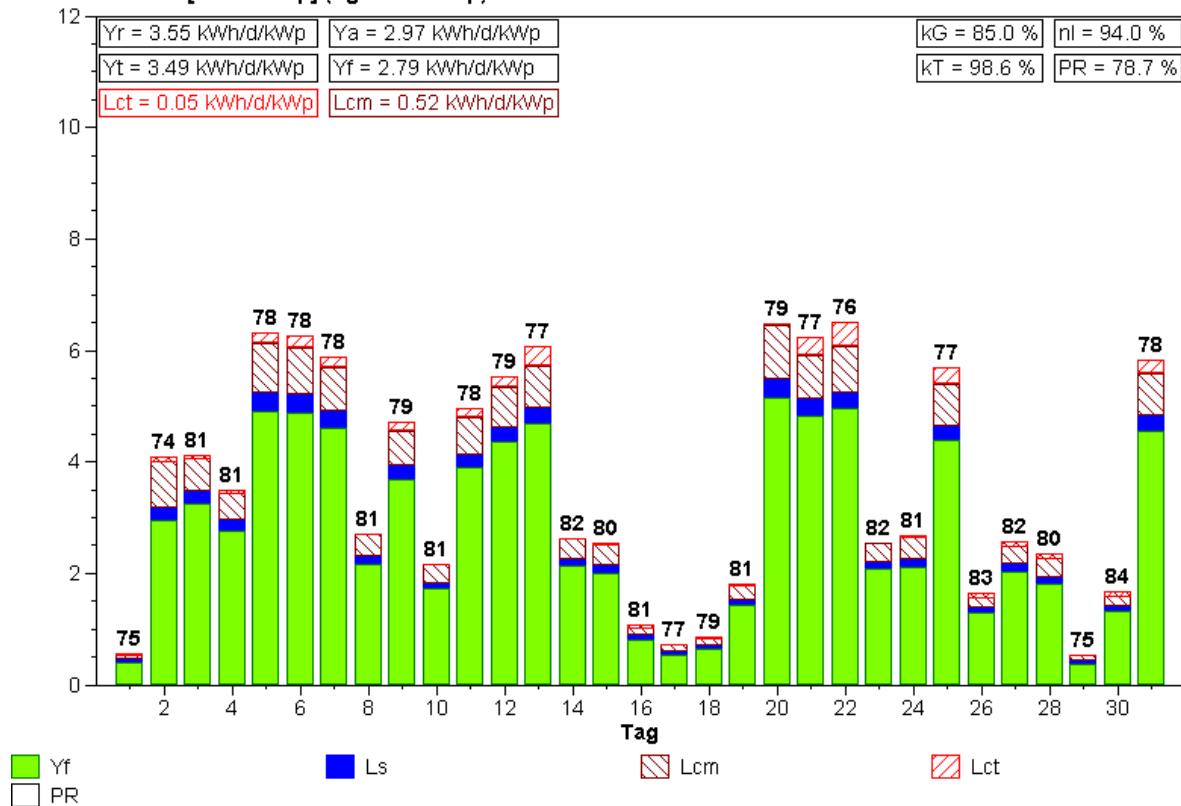
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 3.2000

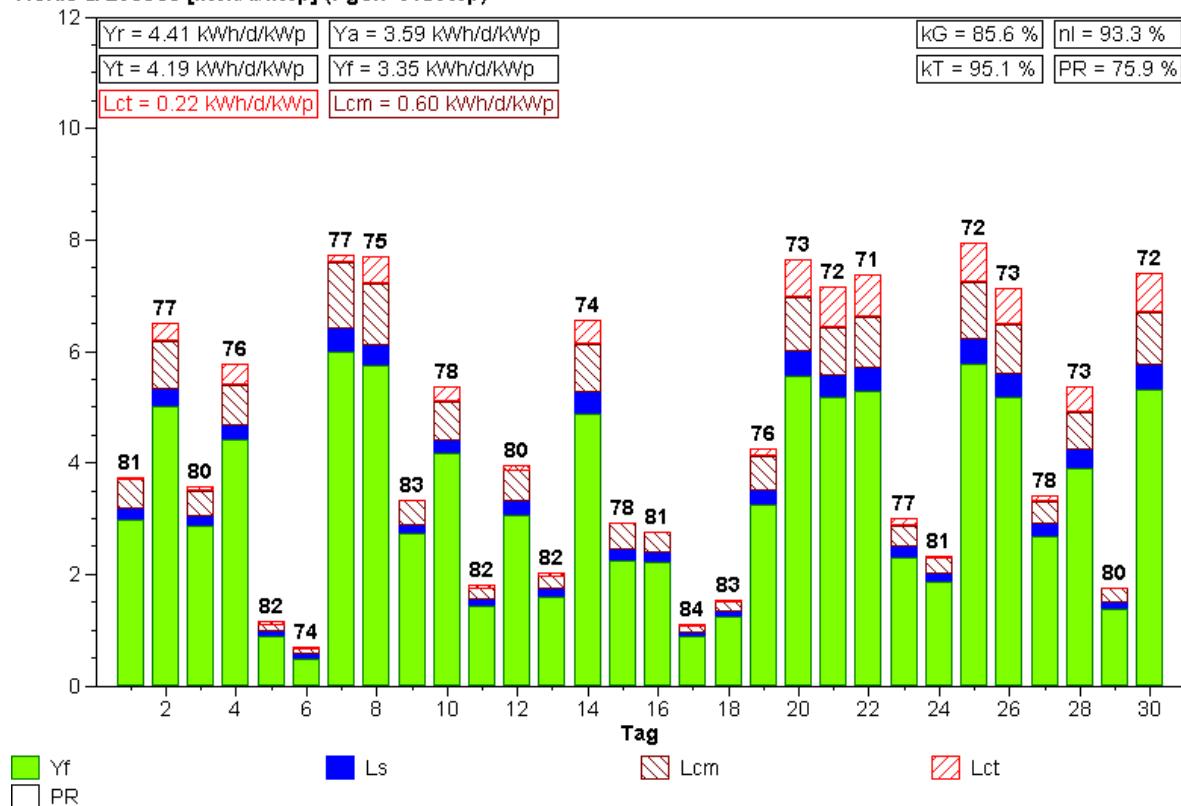
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

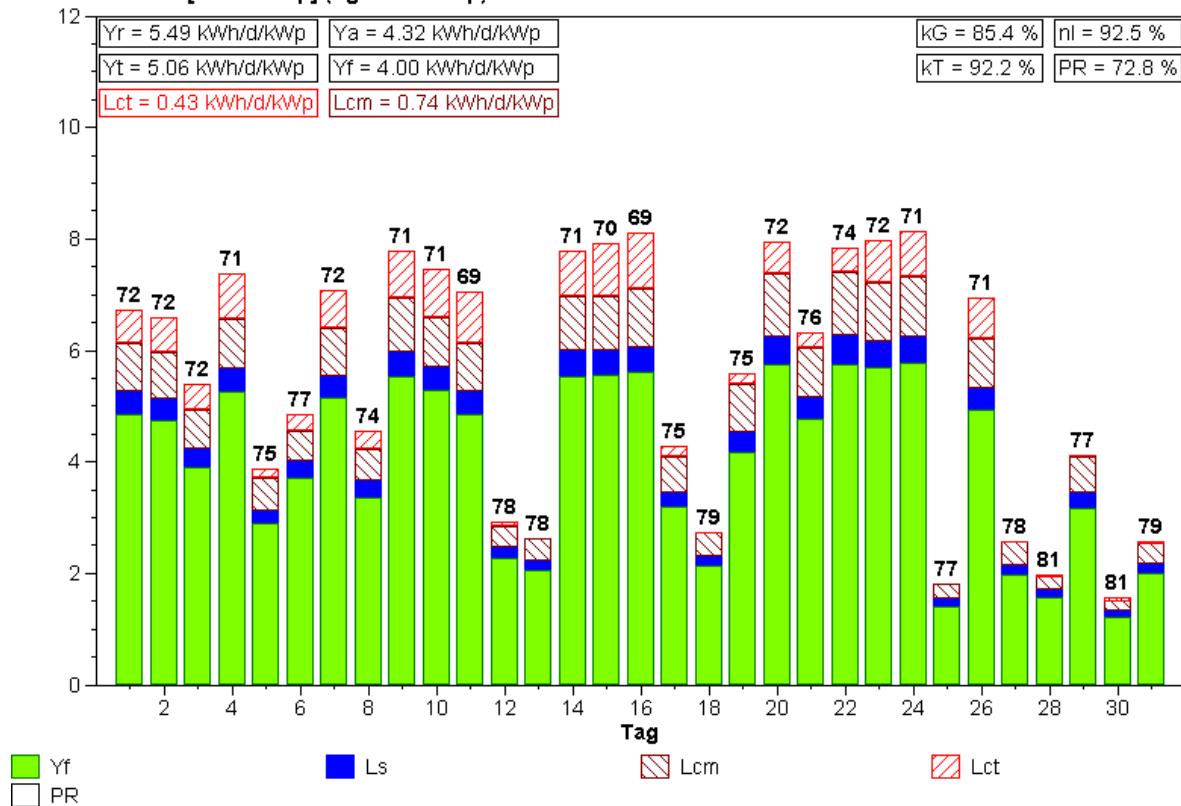
Anlage: Gfeller, Burgdorf Monat: 4.2000

Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

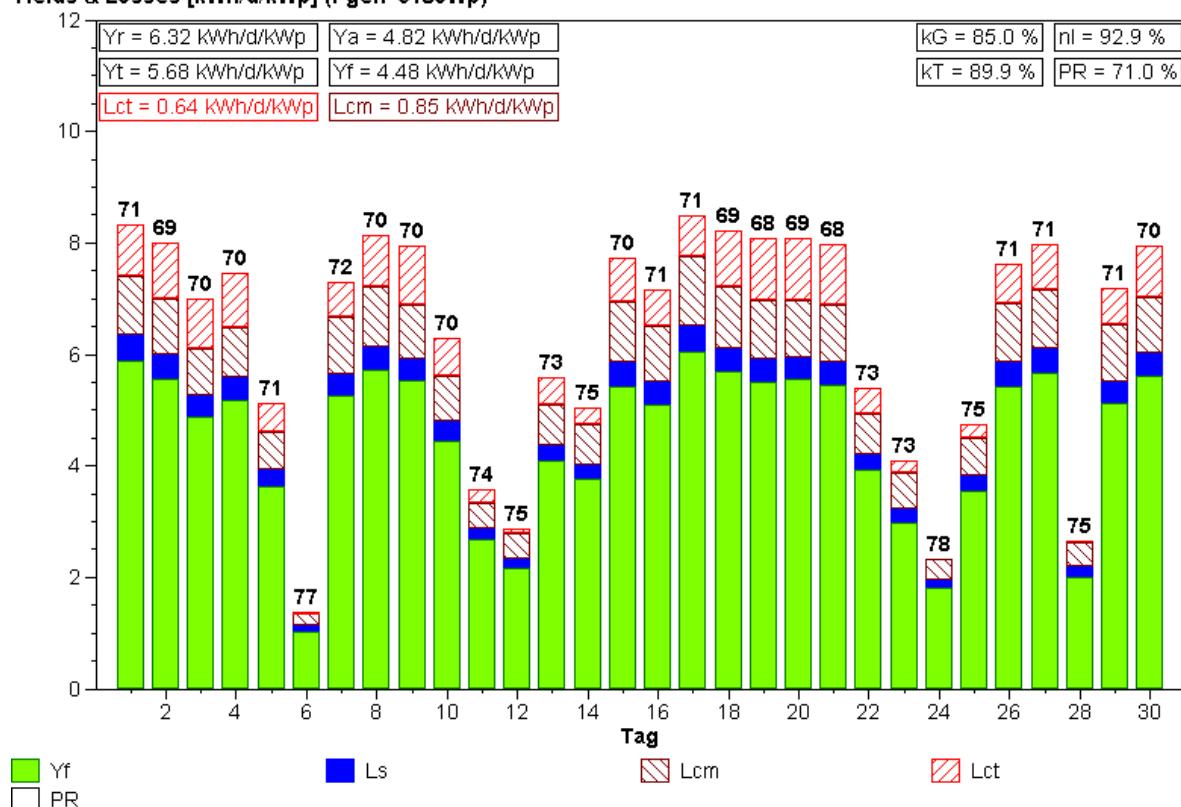


**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf      Monat: 5.2000

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**

**Normierte Monatsstatistik (Pyranometer)**

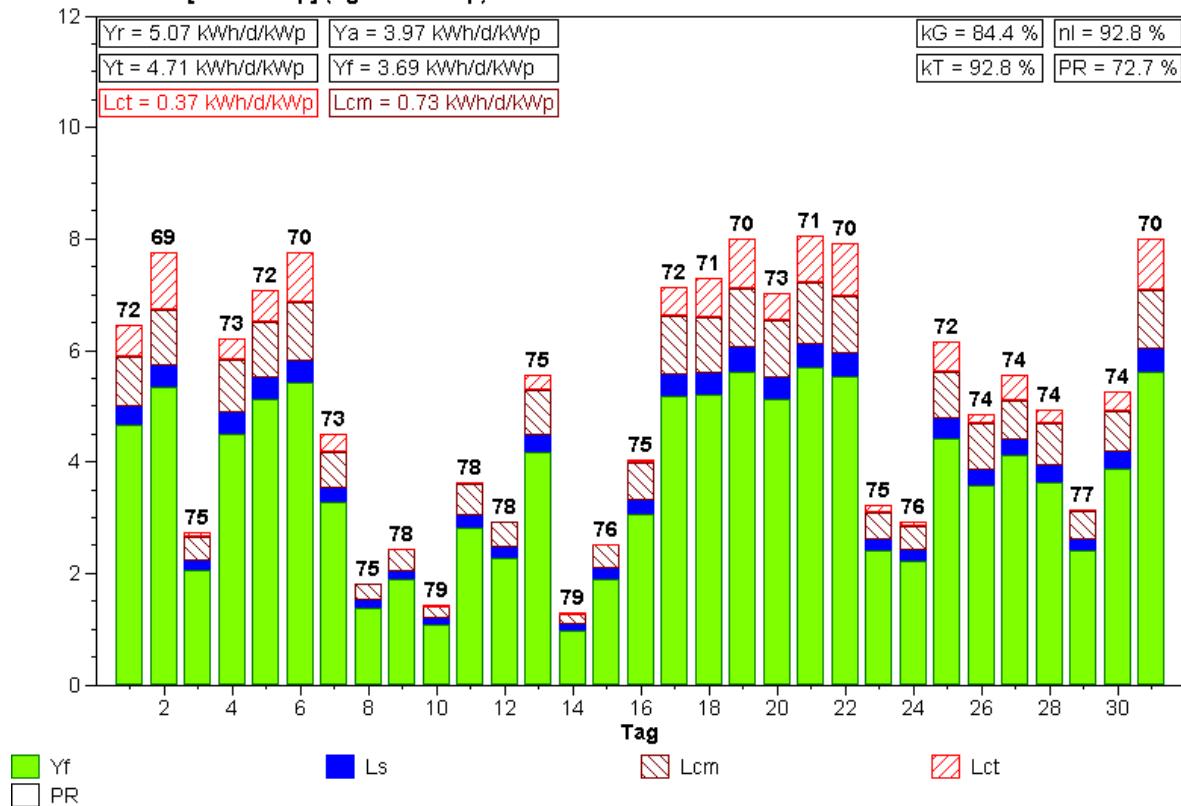
Anlage: Gfeller, Burgdorf      Monat: 6.2000

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**


Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 7.2000

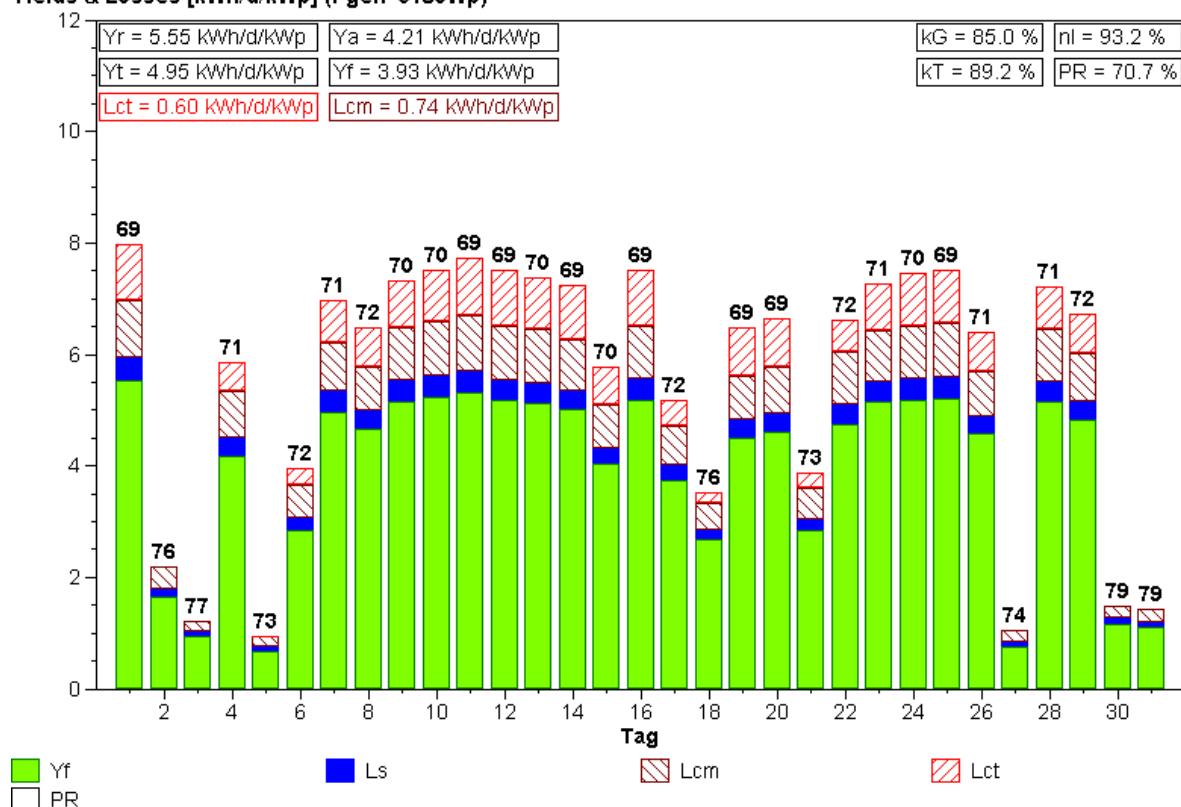
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

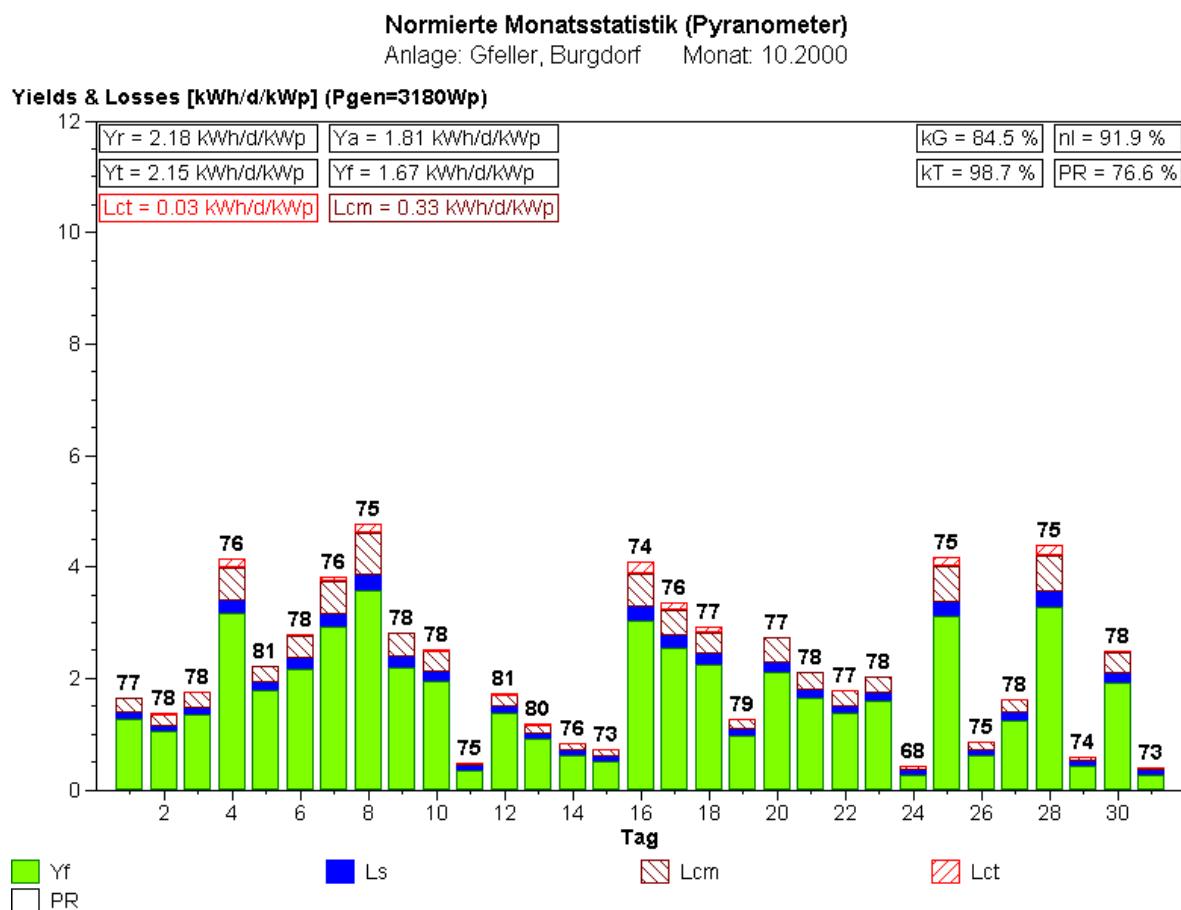
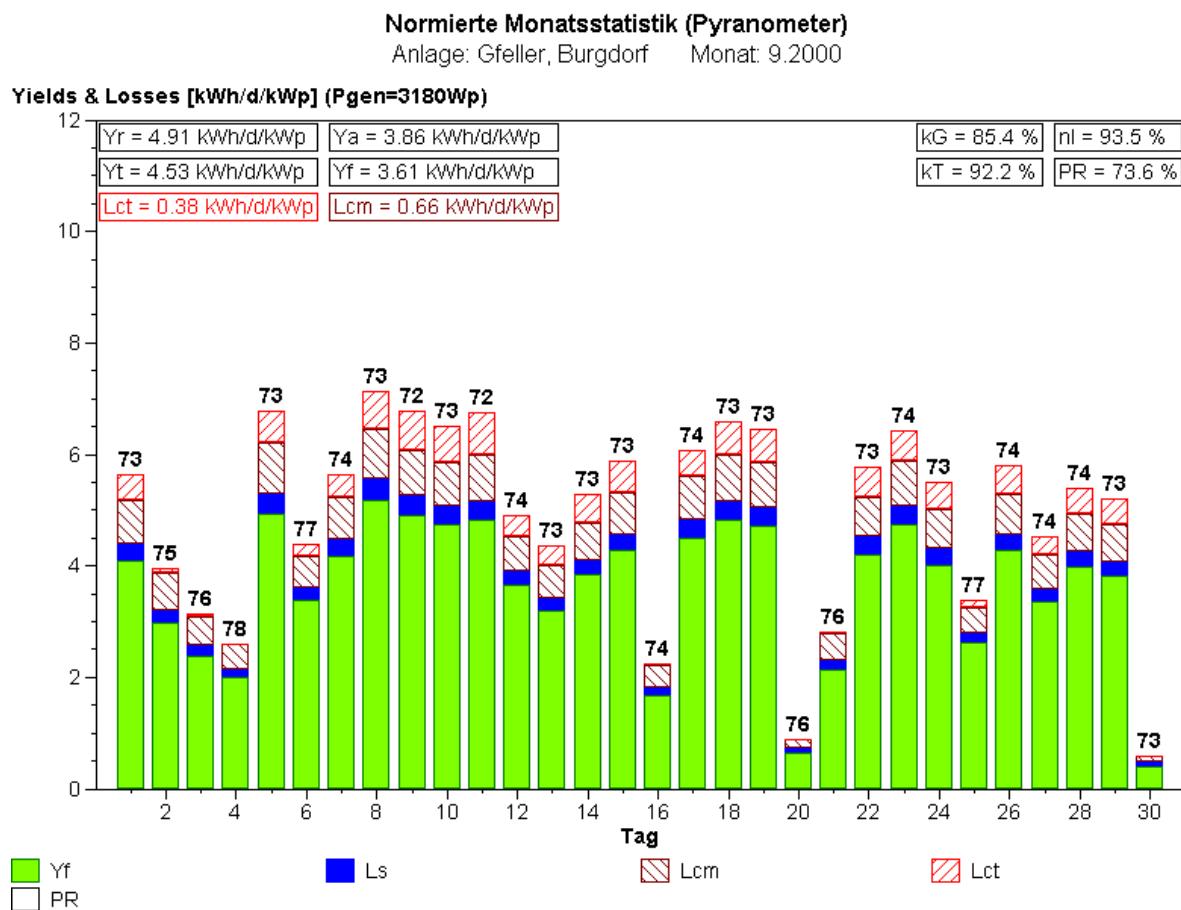


Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 8.2000

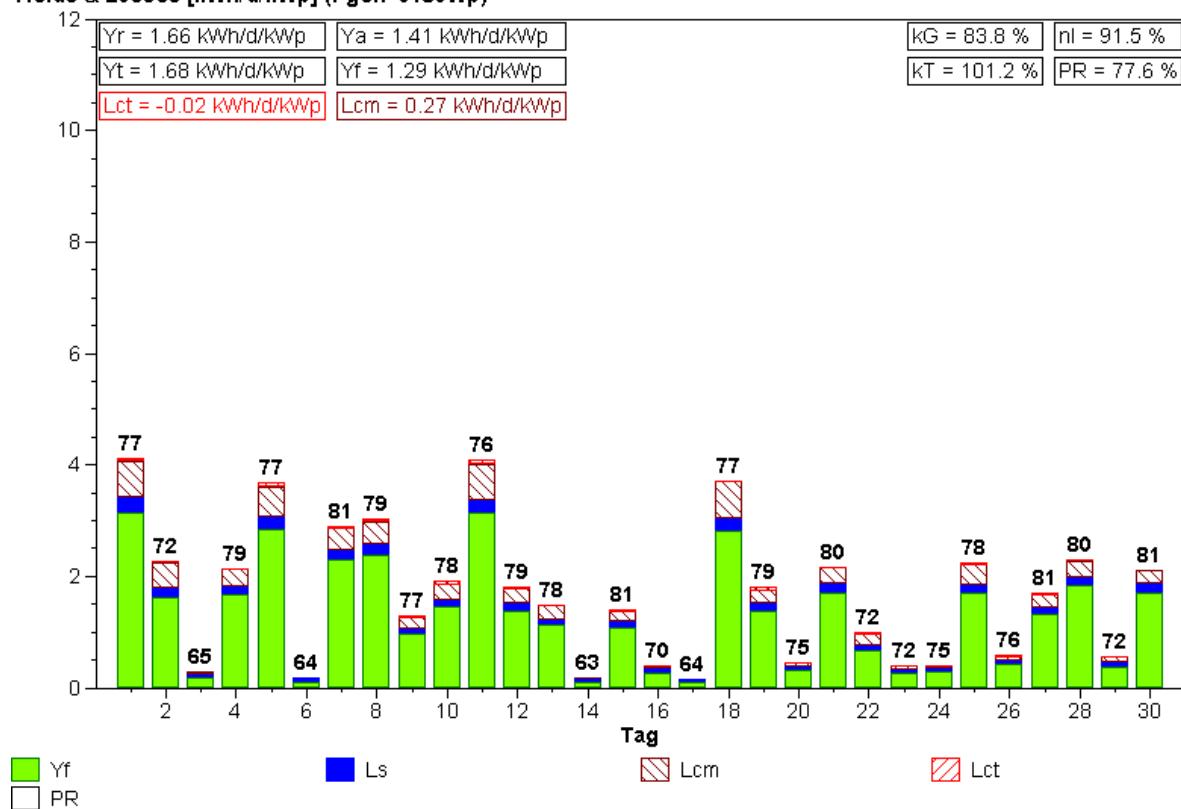
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



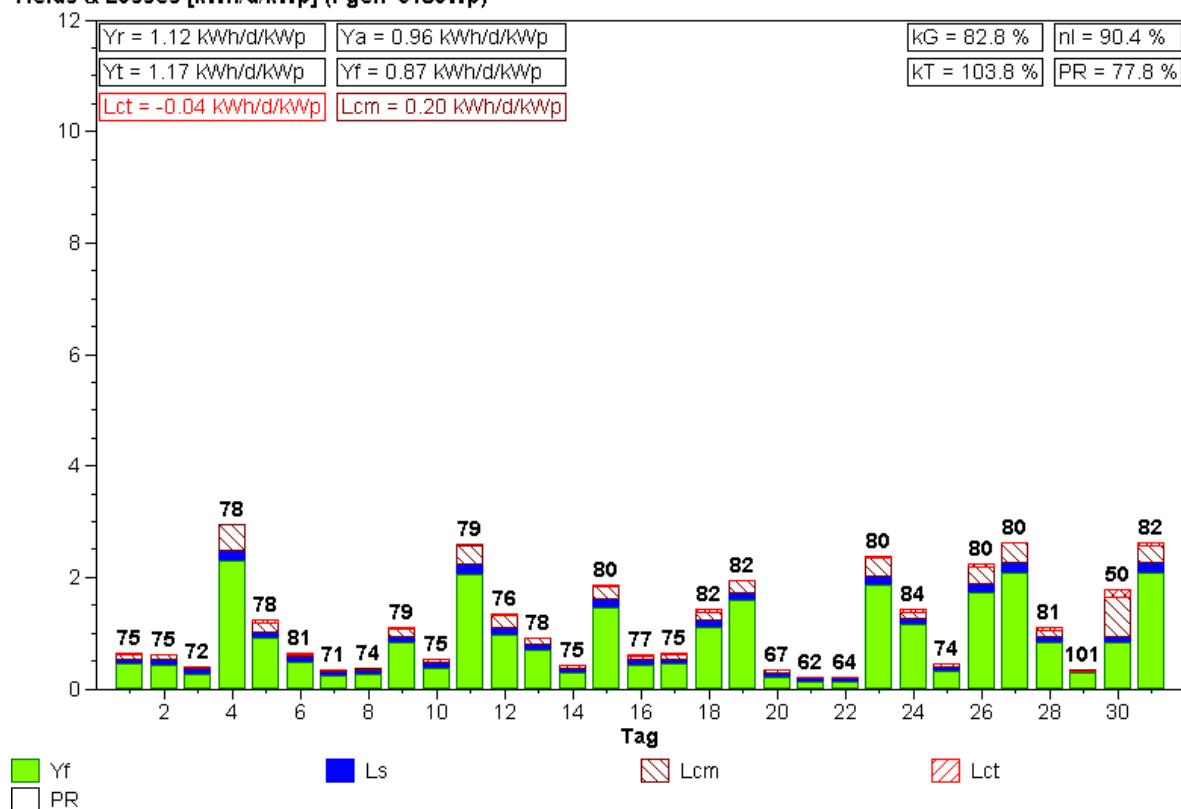


**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf    Monat: 11.2000

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**

**Normierte Monatsstatistik (Pyranometer)**

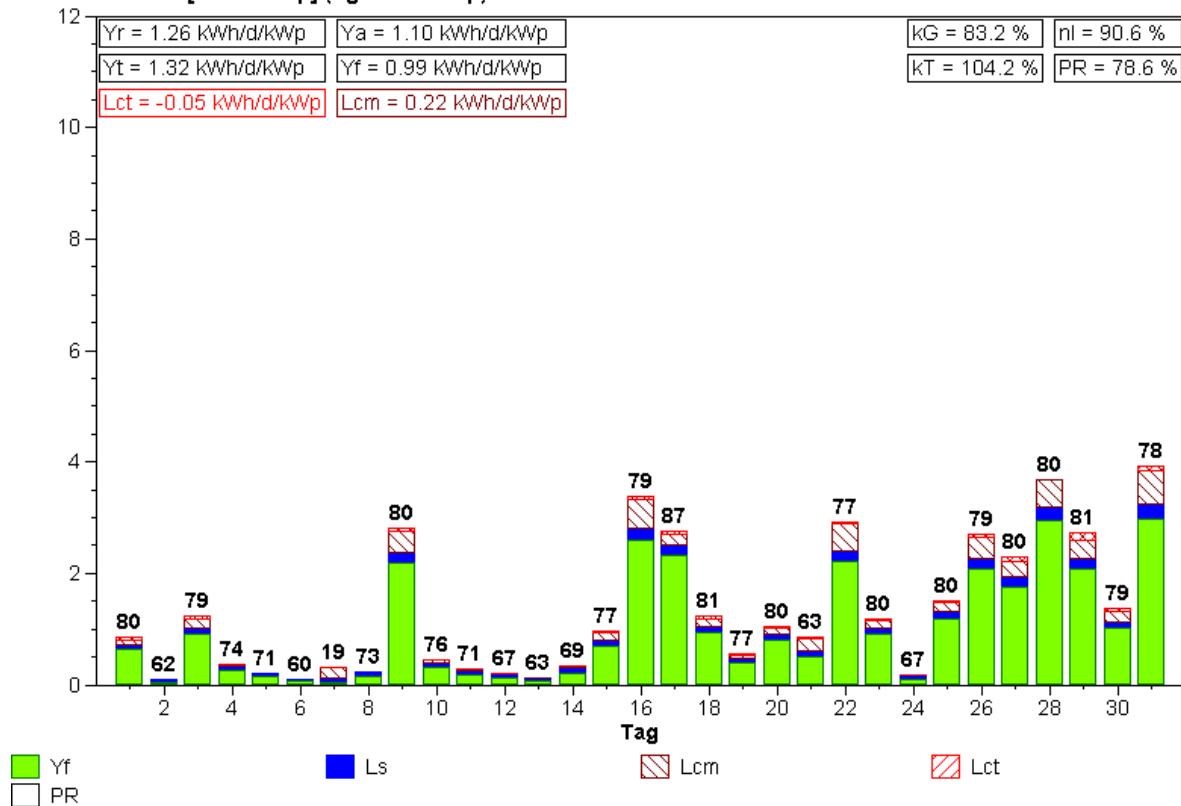
Anlage: Gfeller, Burgdorf    Monat: 12.2000

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**


Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 1.2001

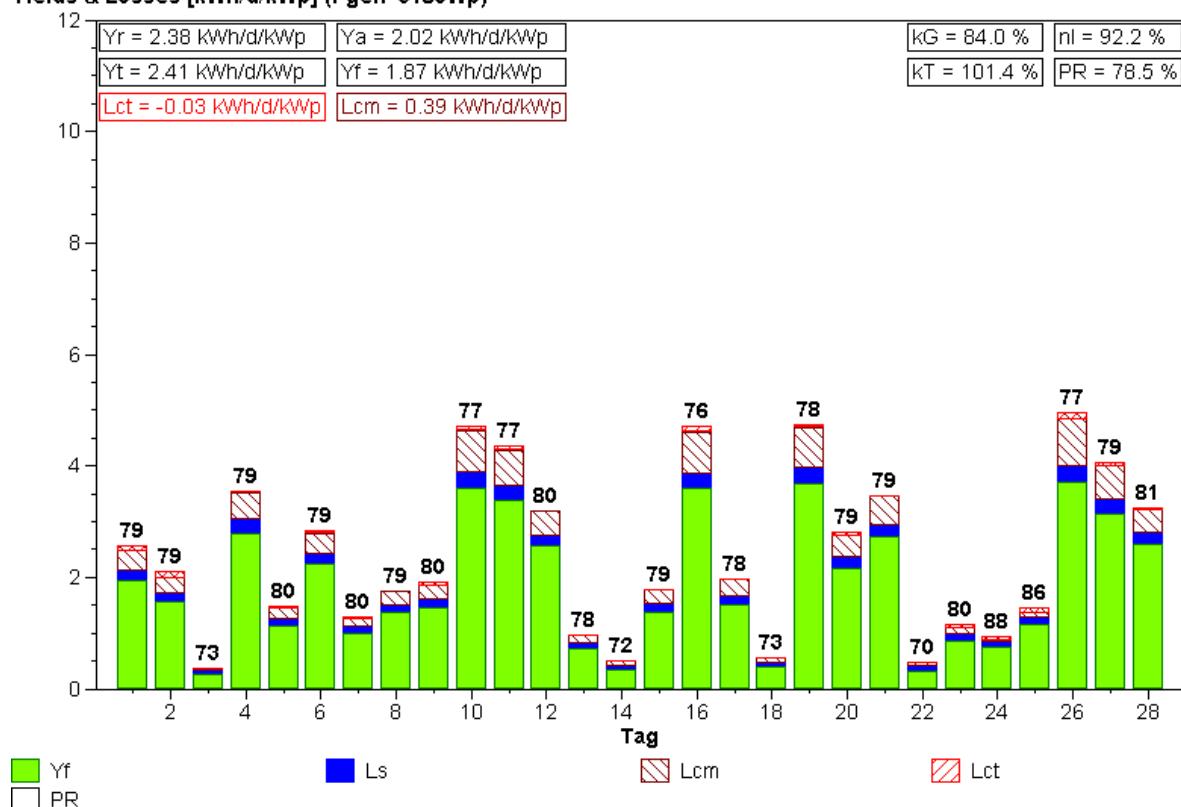
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

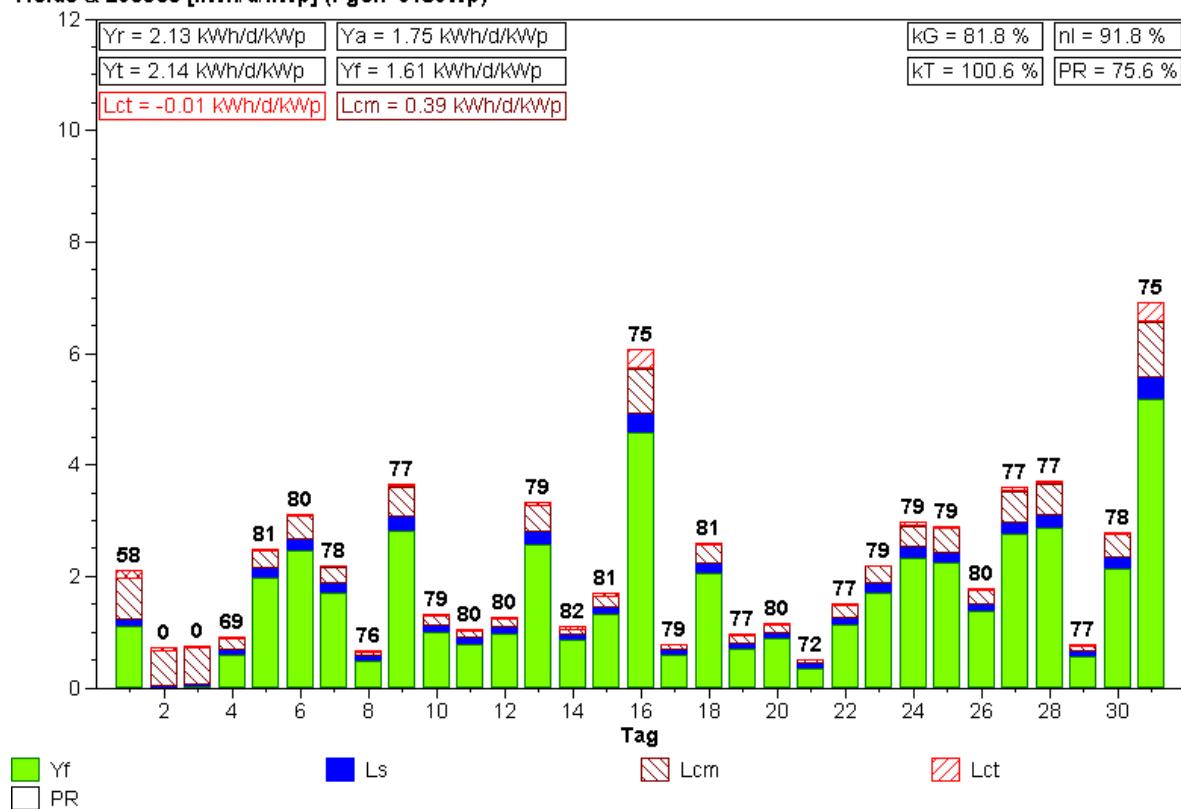
Anlage: Gfeller, Burgdorf Monat: 2.2001

Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

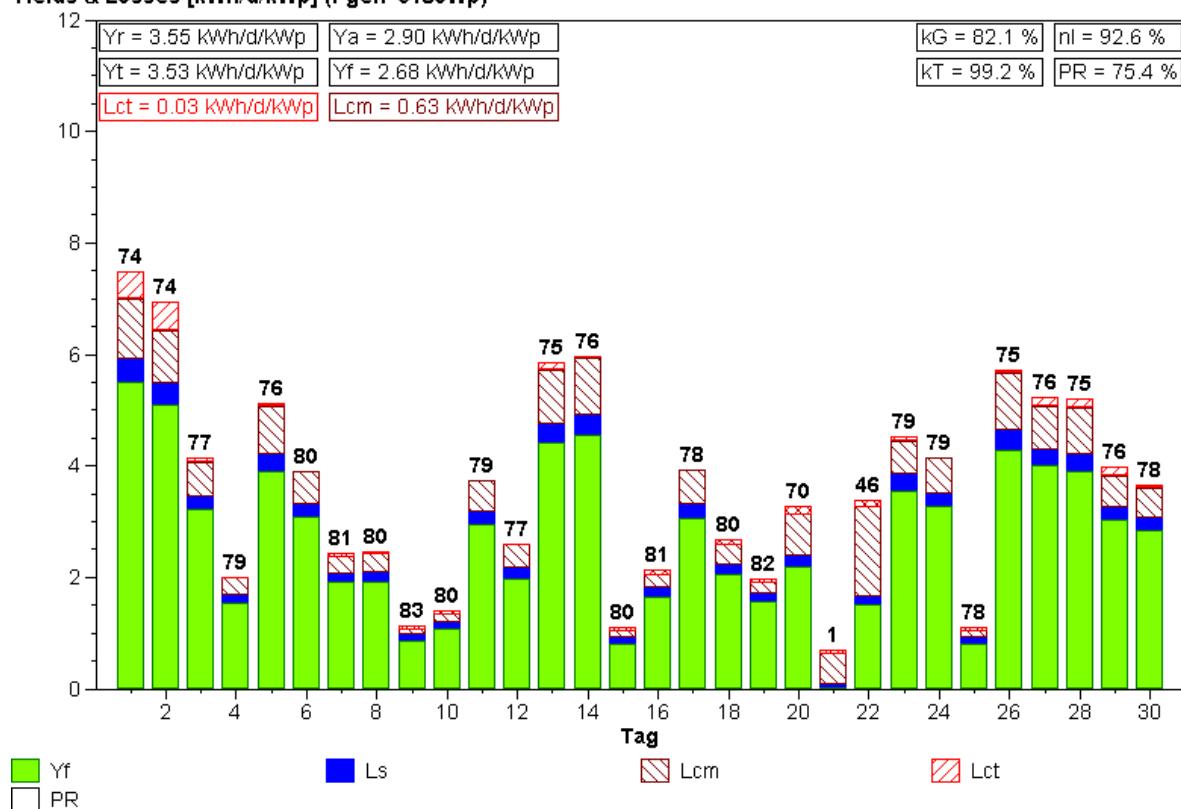


**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf      Monat: 3.2001

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**

**Normierte Monatsstatistik (Pyranometer)**

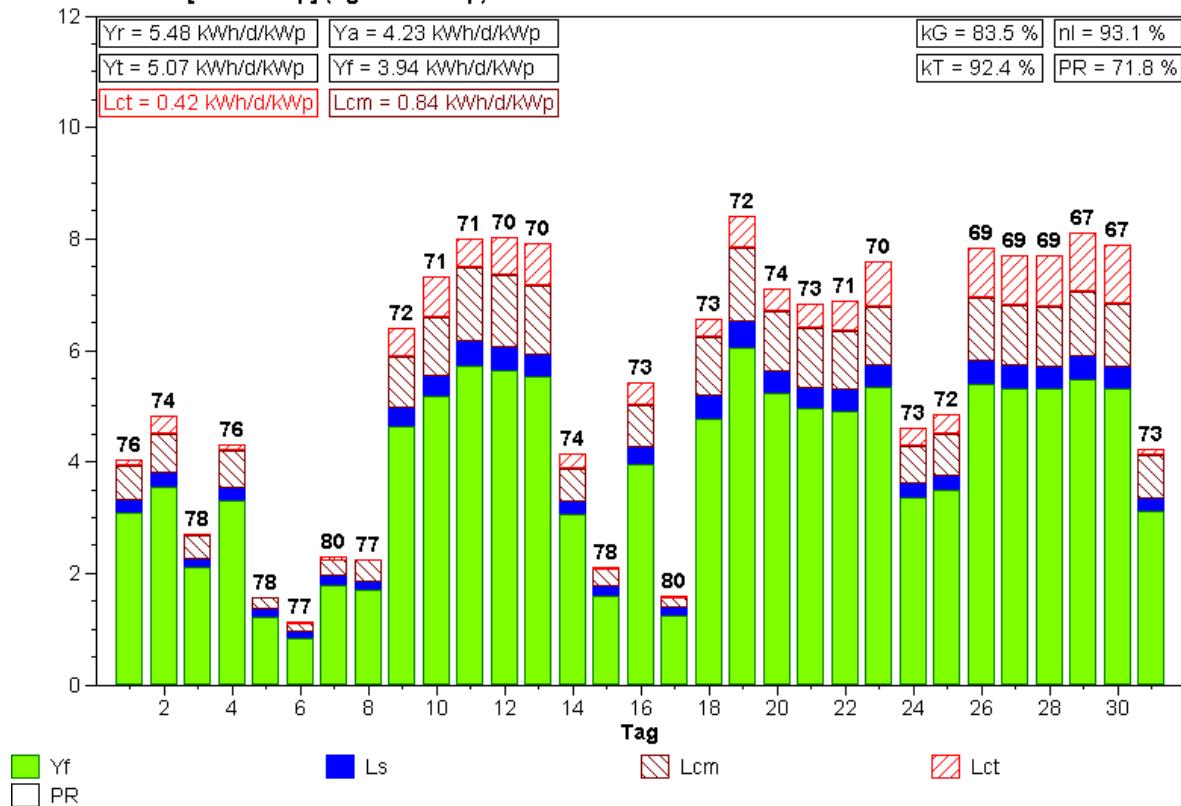
Anlage: Gfeller, Burgdorf      Monat: 4.2001

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**


Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 5.2001

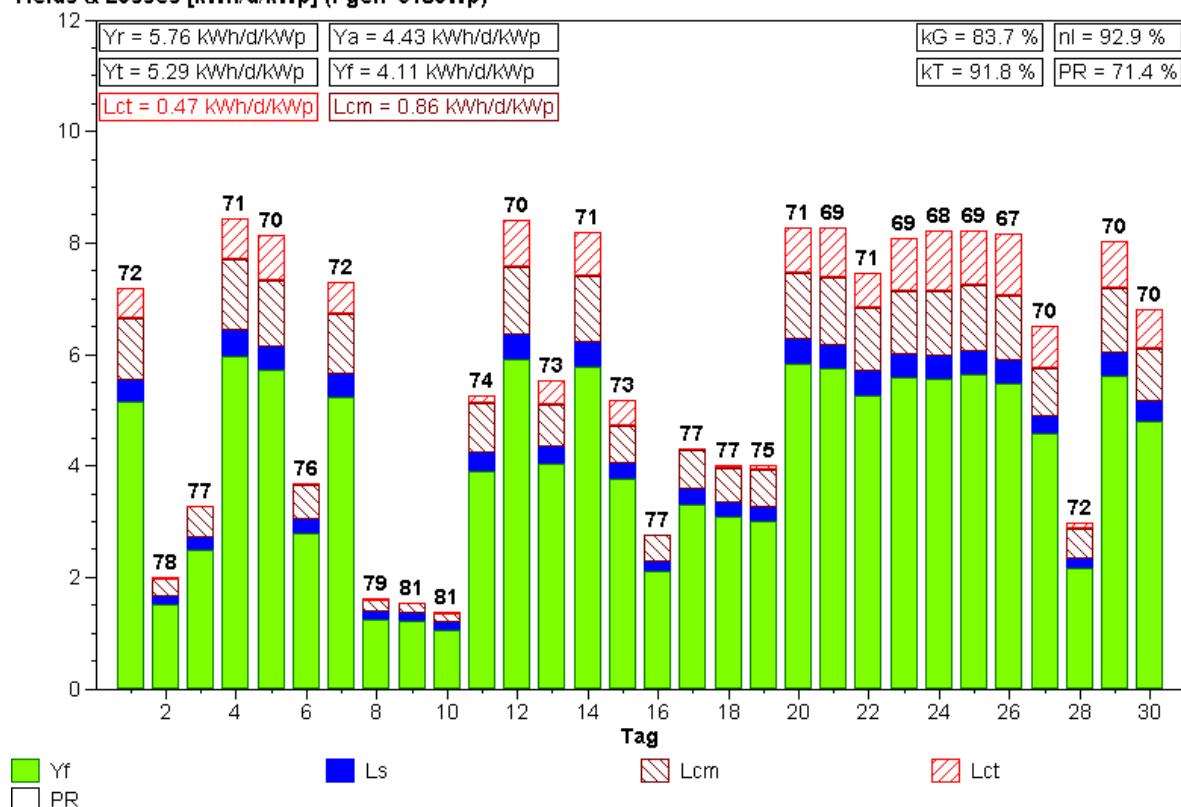
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 6.2001

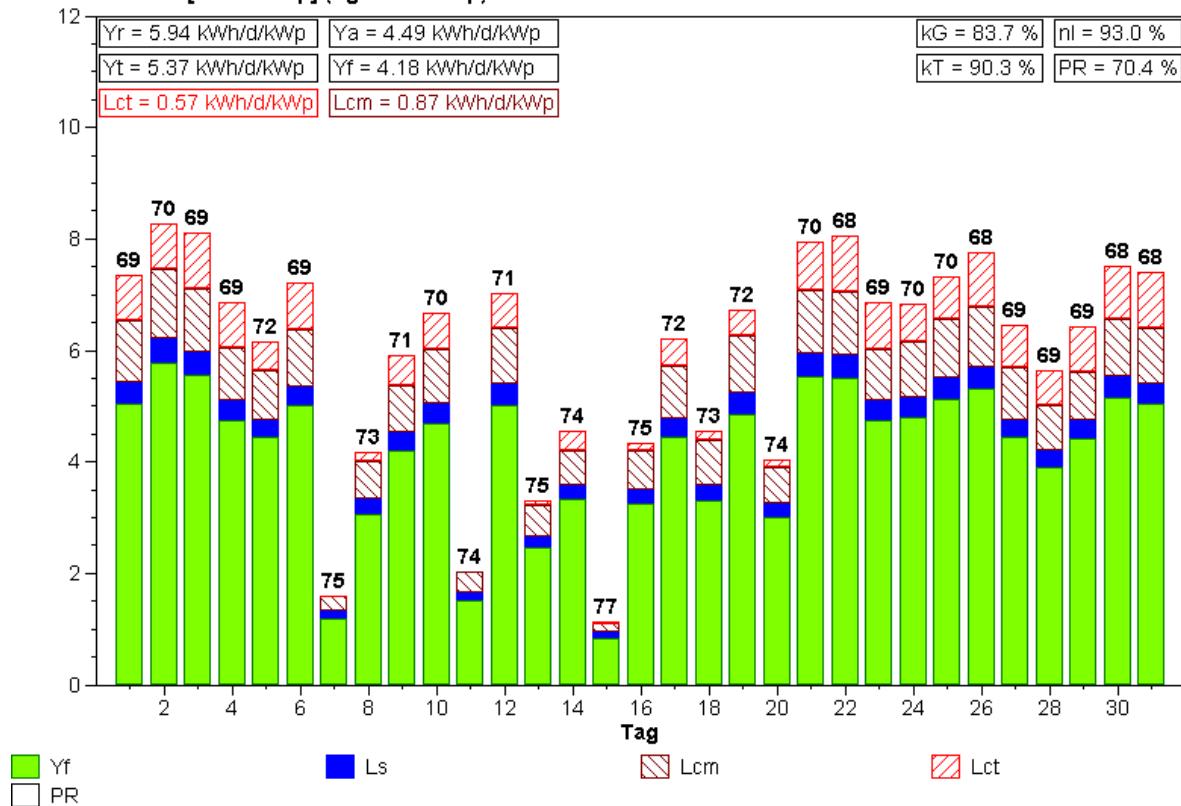
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 7.2001

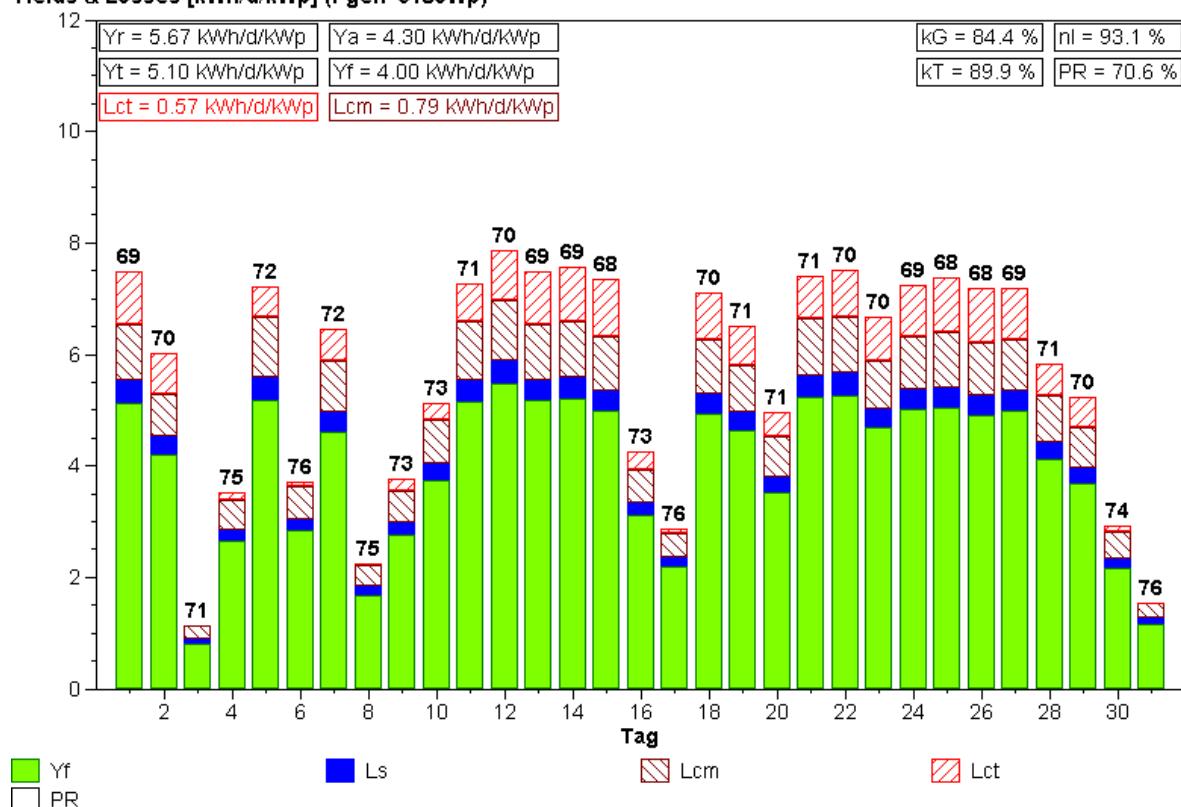
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 8.2001

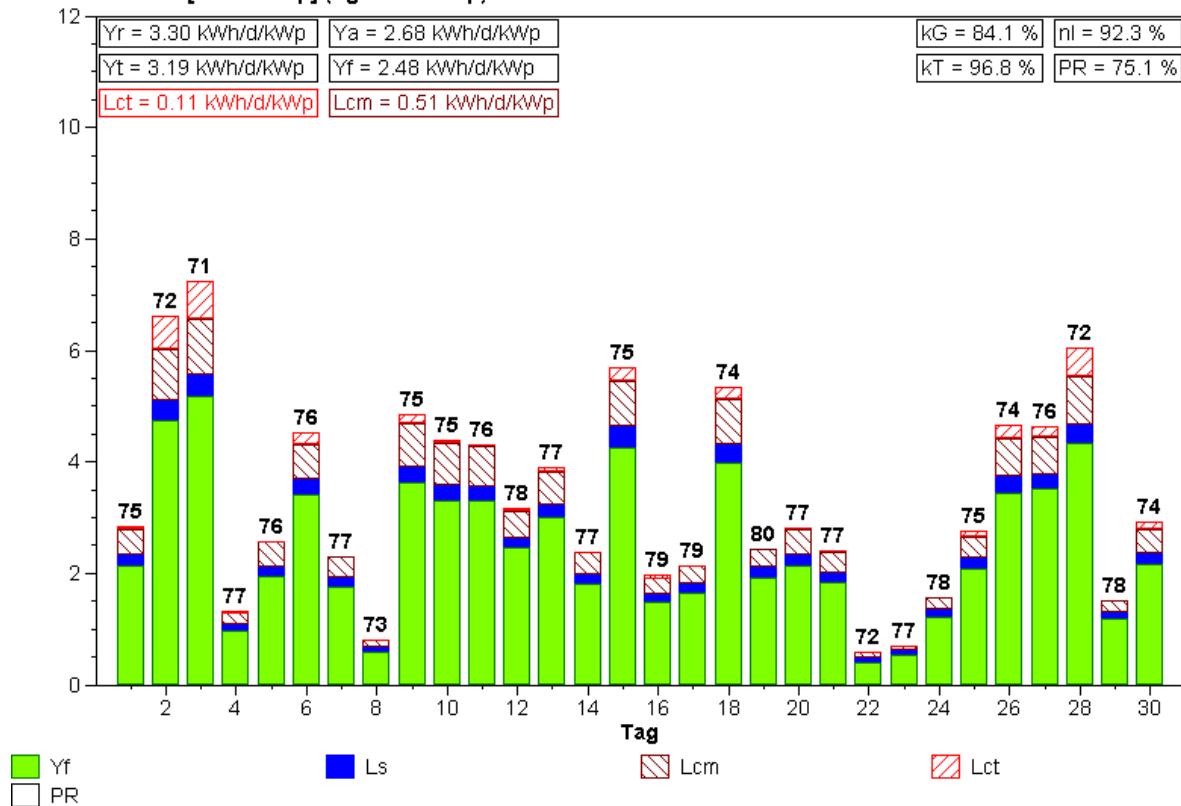
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 9.2001

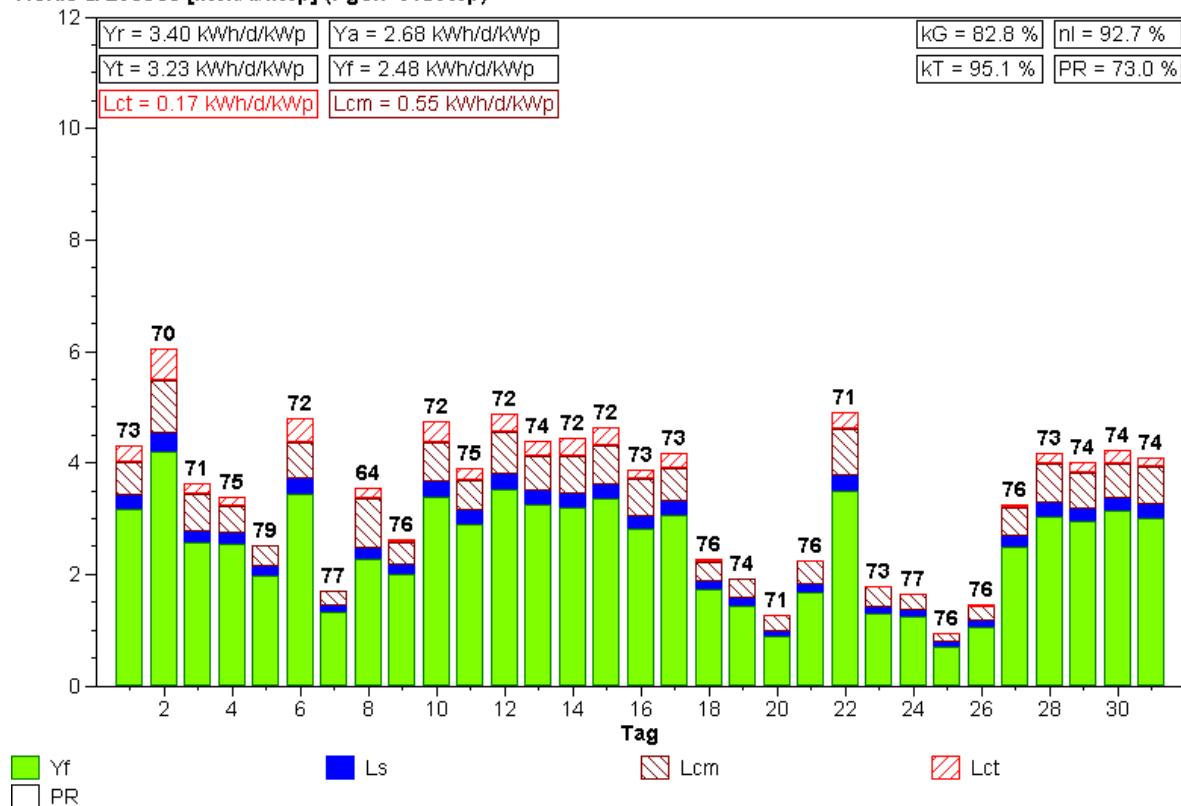
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

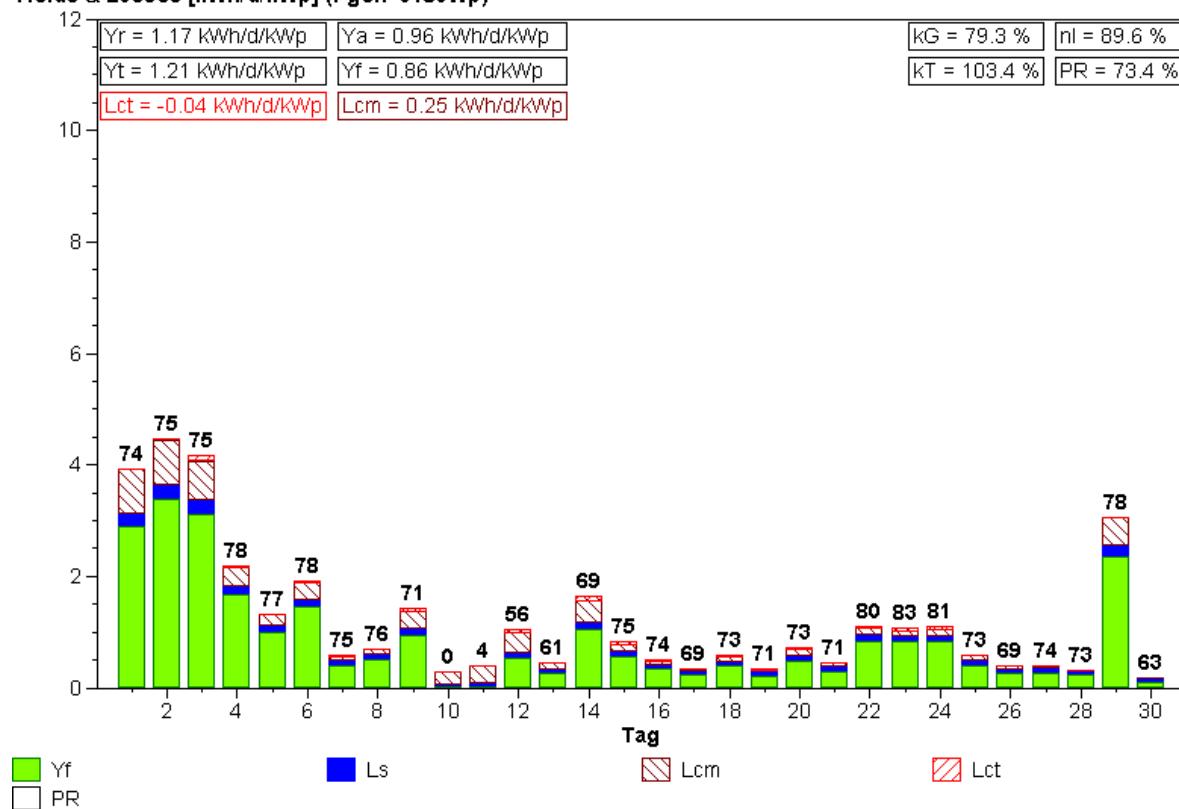
Anlage: Gfeller, Burgdorf Monat: 10.2001

Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

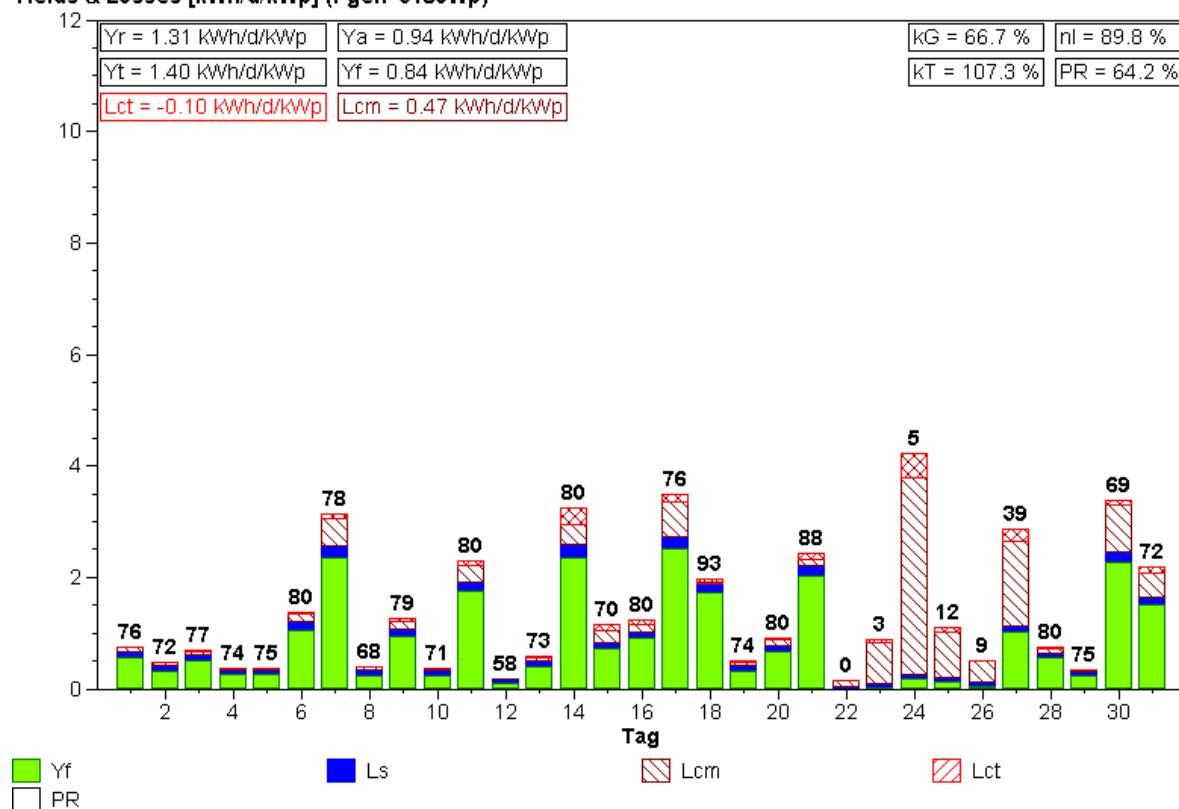


**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf Monat: 11.2001

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**

**Normierte Monatsstatistik (Pyranometer)**

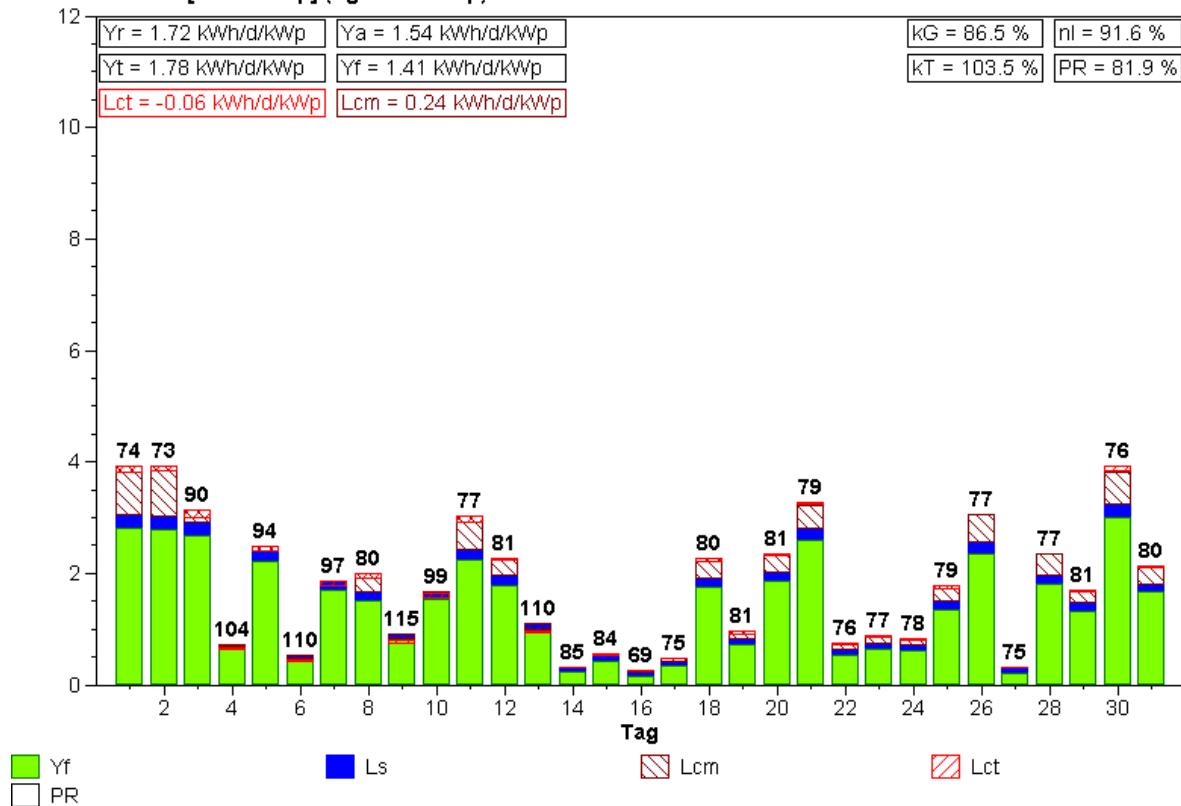
Anlage: Gfeller, Burgdorf Monat: 12.2001

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**


Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 1.2002

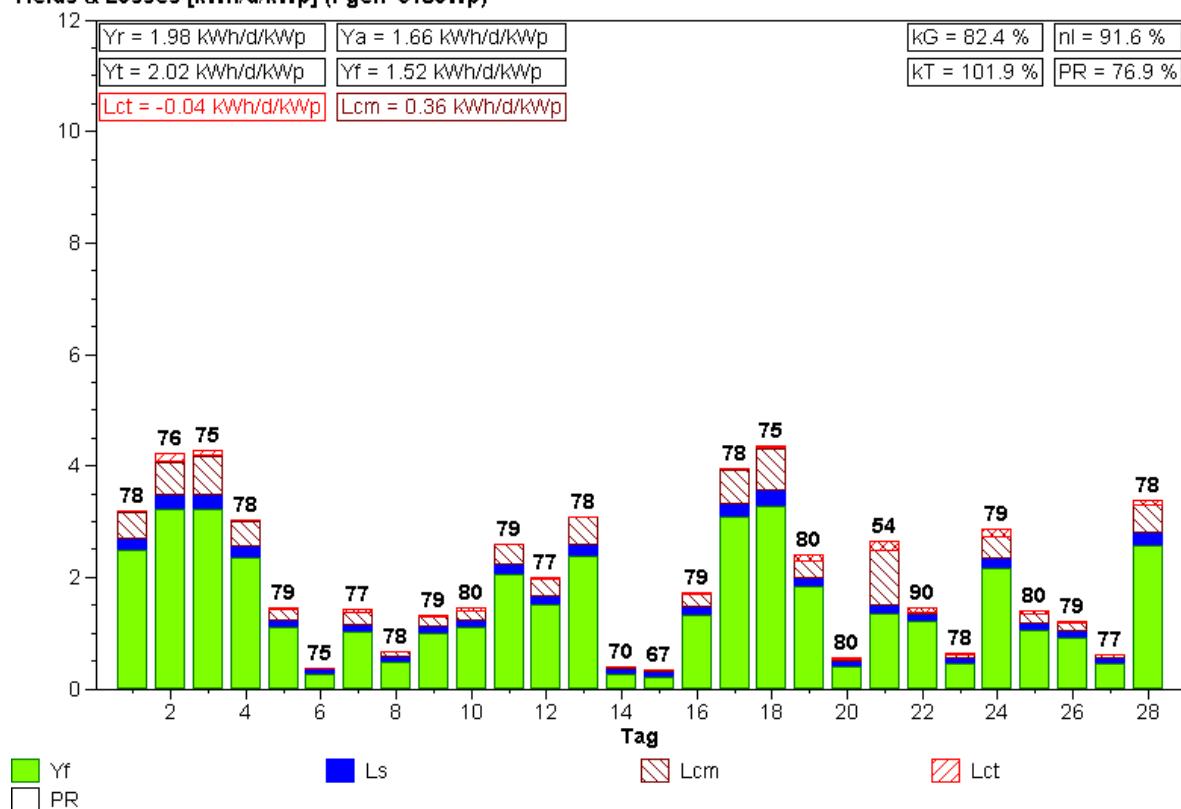
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 2.2002

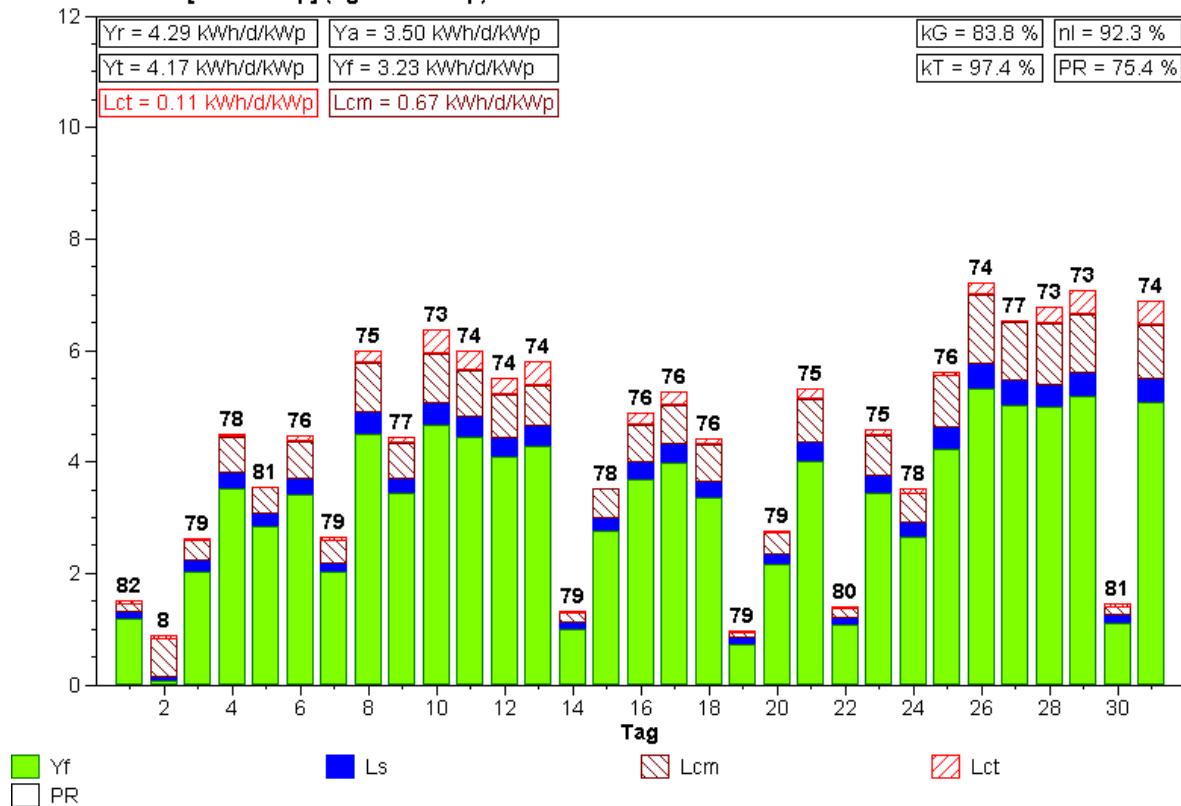
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 3.2002

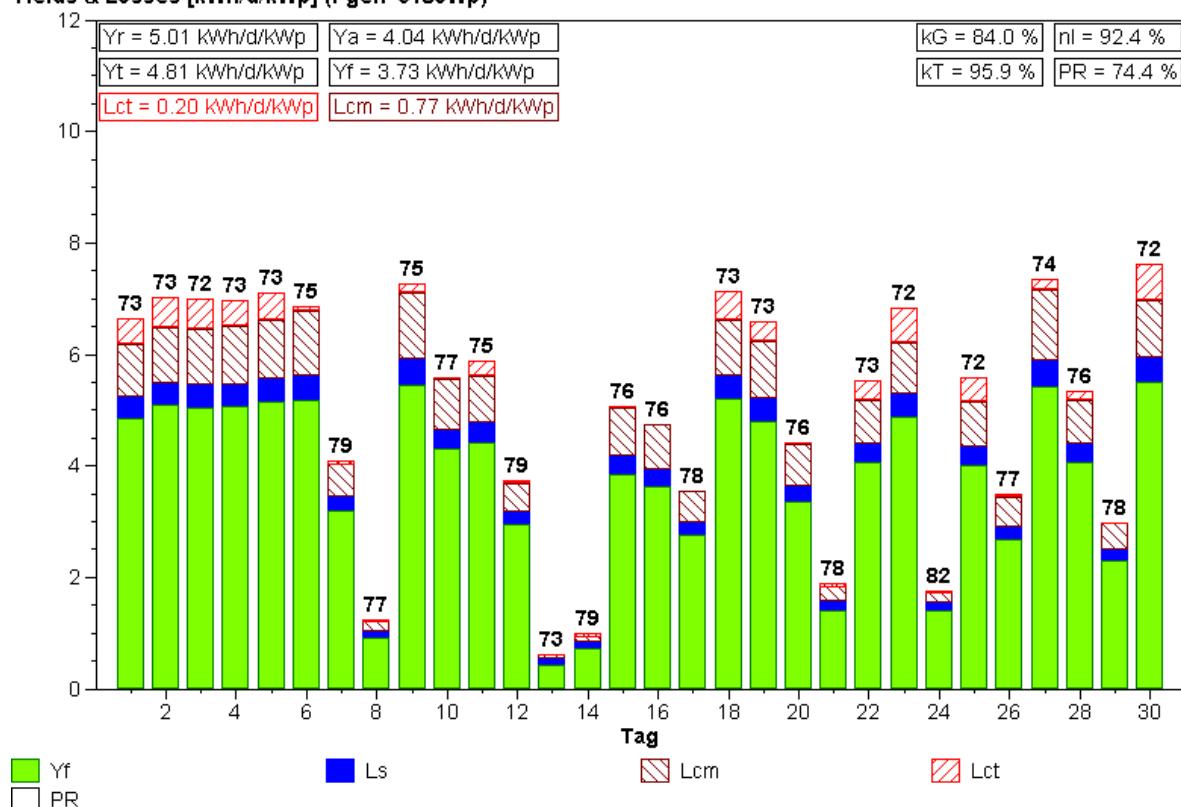
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 4.2002

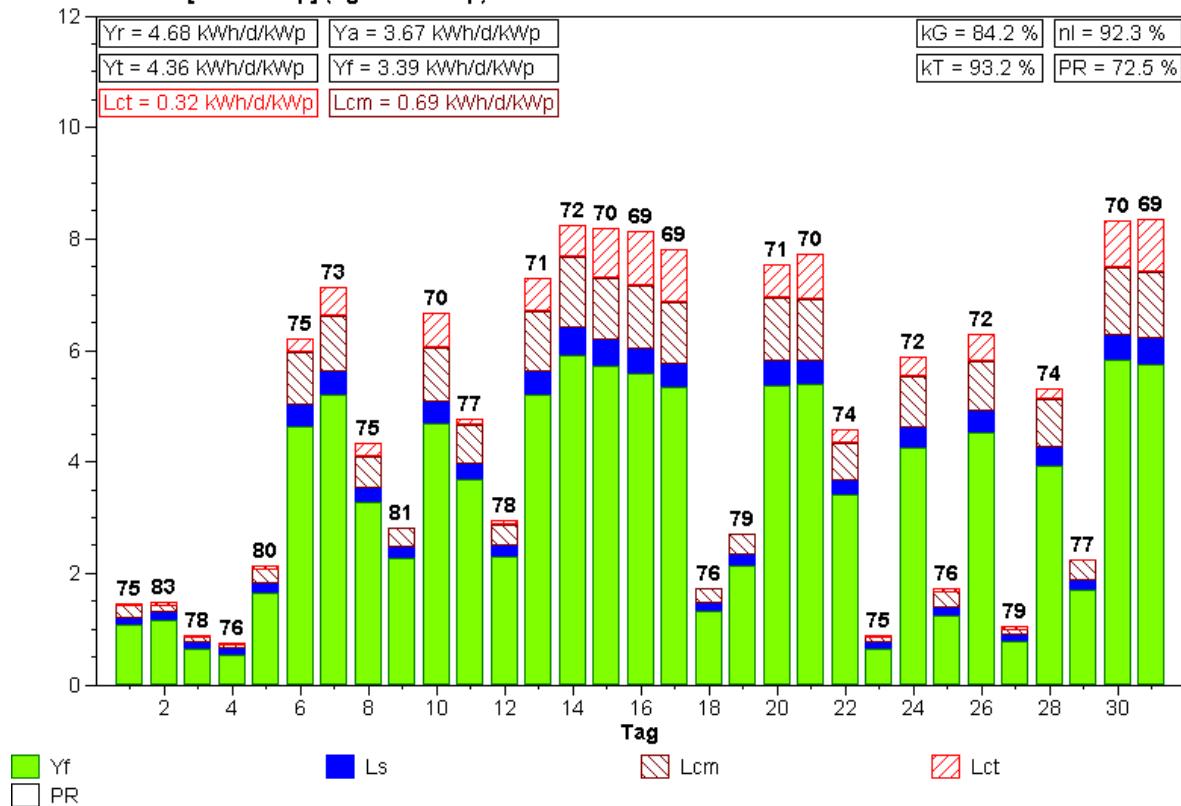
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 5.2002

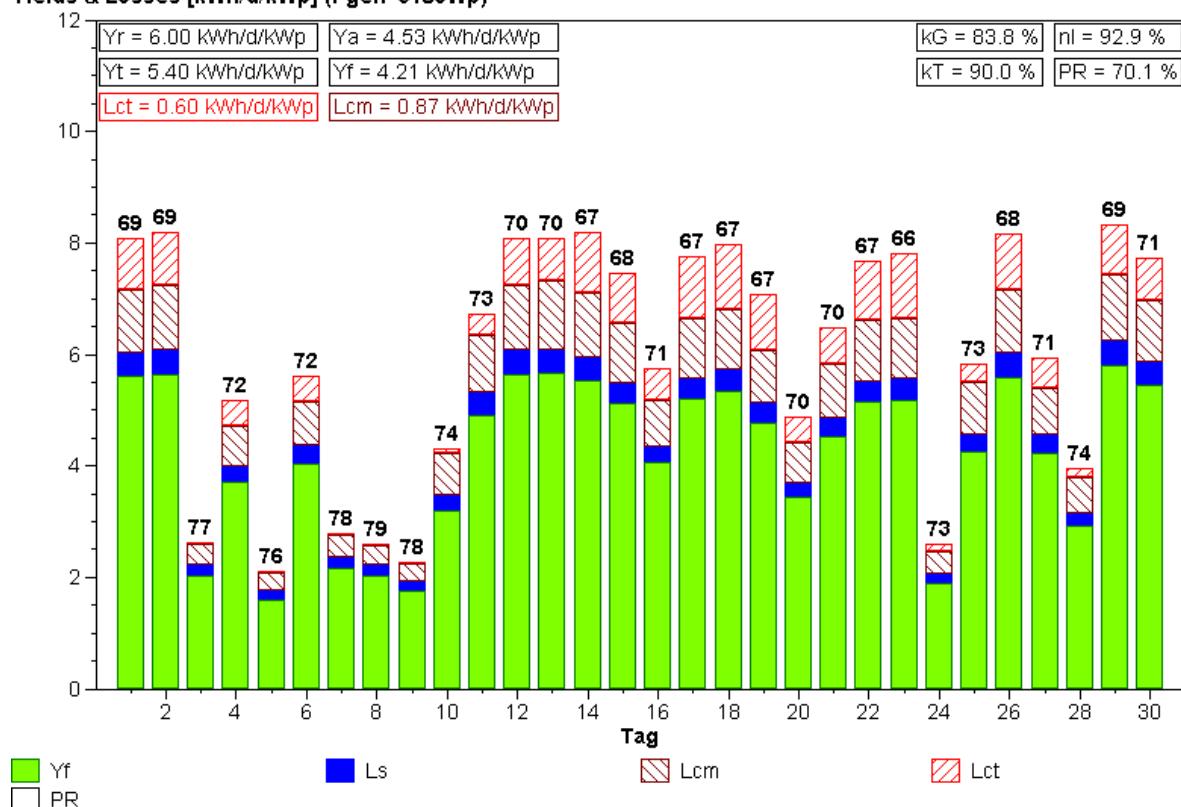
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 6.2002

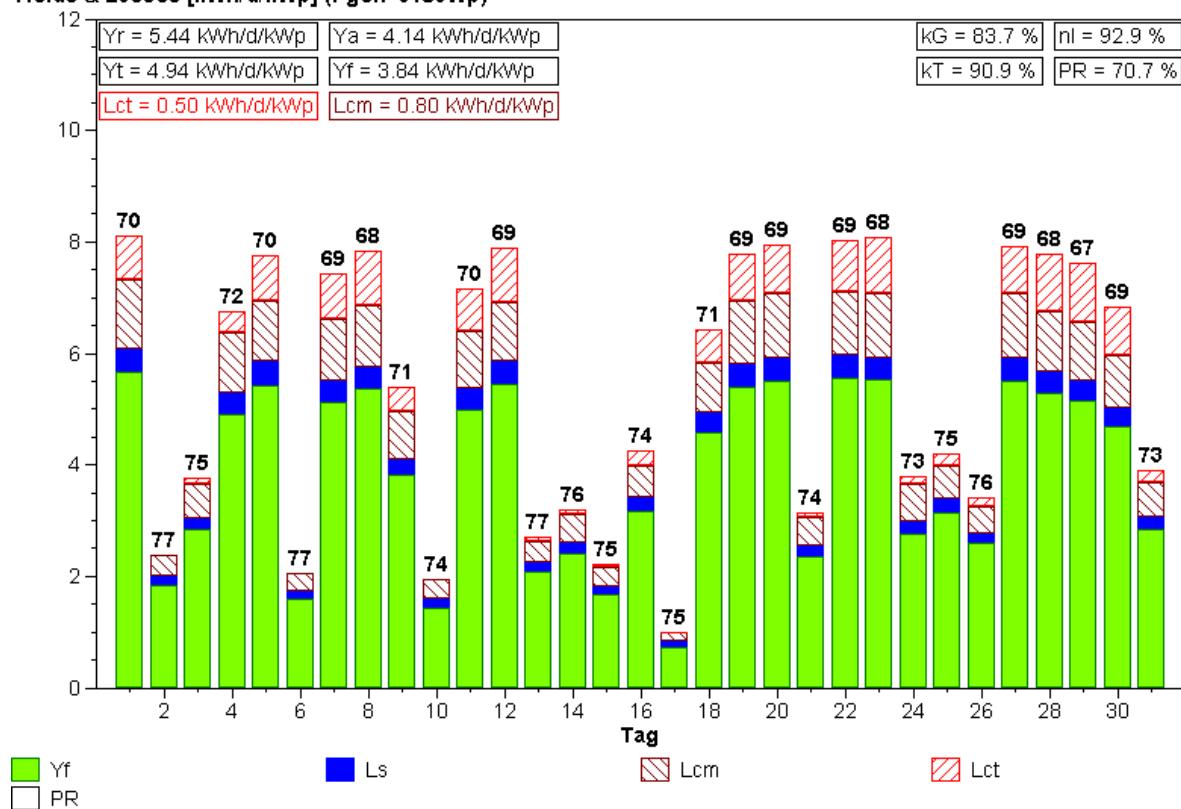
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 7.2002

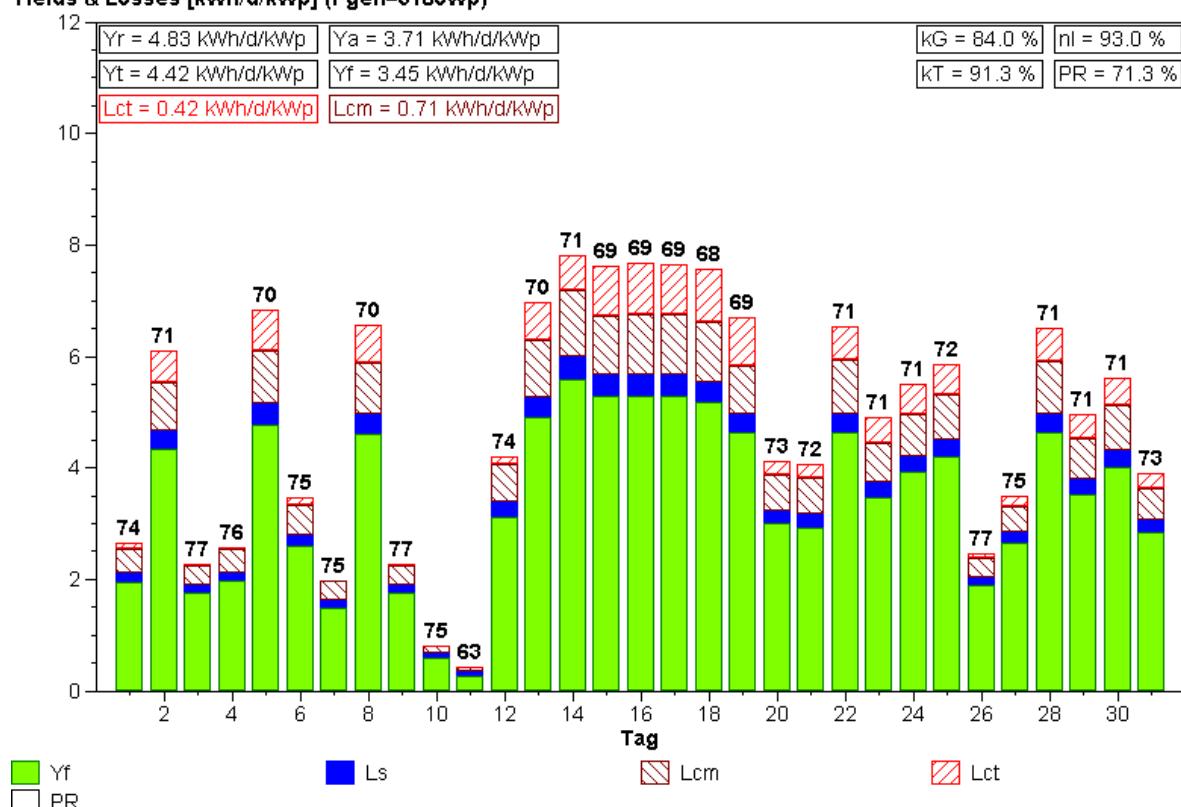
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

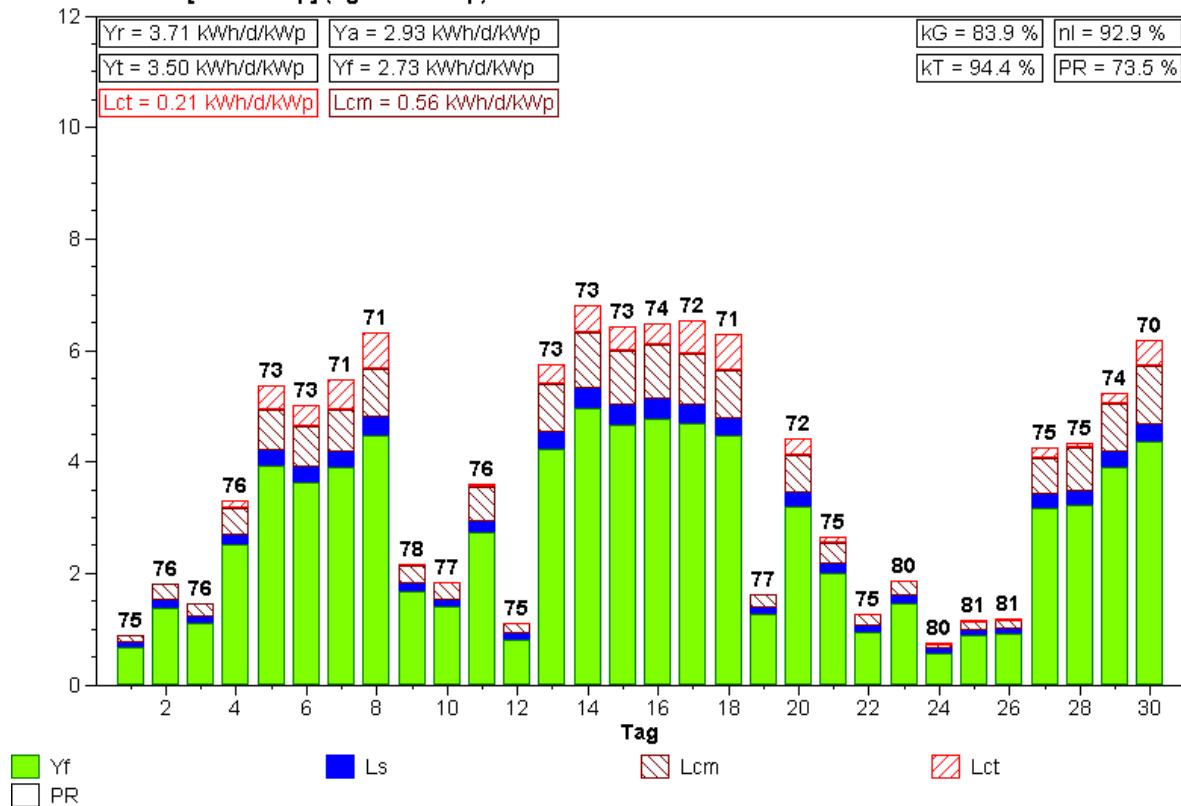
Anlage: Gfeller, Burgdorf Monat: 8.2002

Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

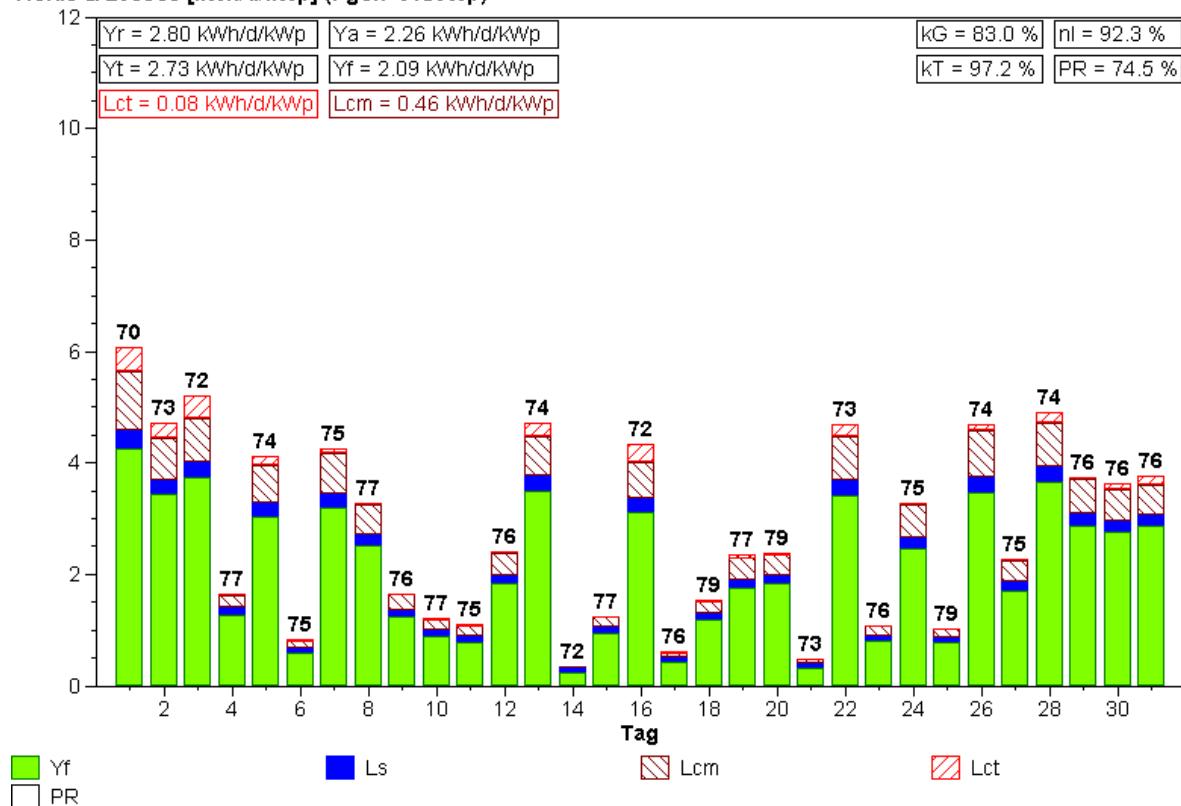


**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf      Monat: 9.2002

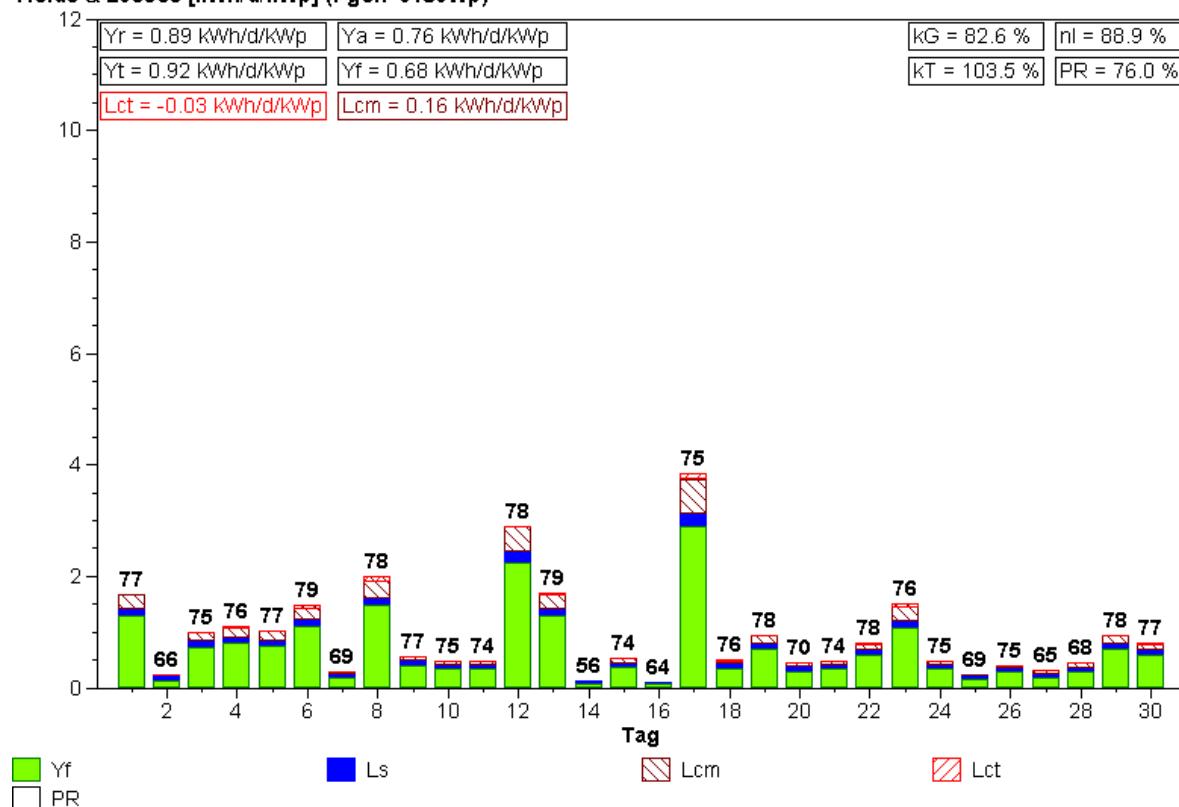
**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**

**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf      Monat: 10.2002

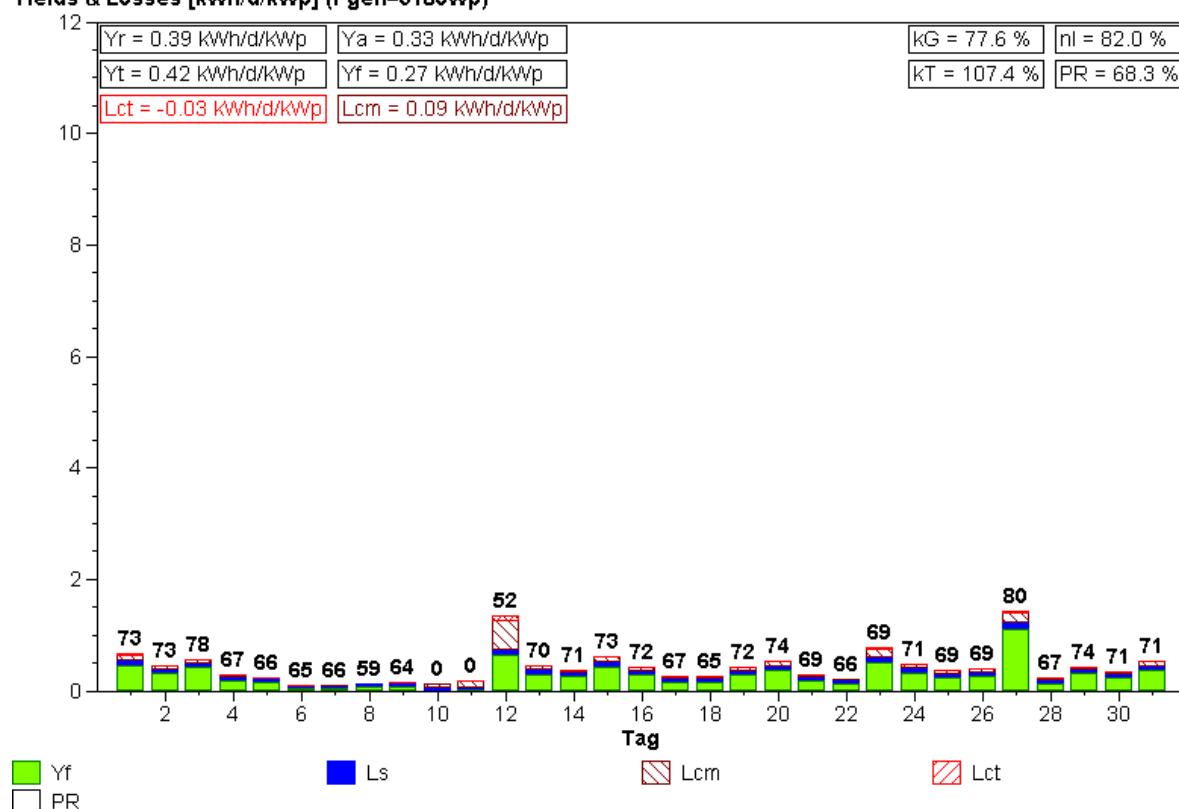
**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**


**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf Monat: 11.2002

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**

**Normierte Monatsstatistik (Pyranometer)**

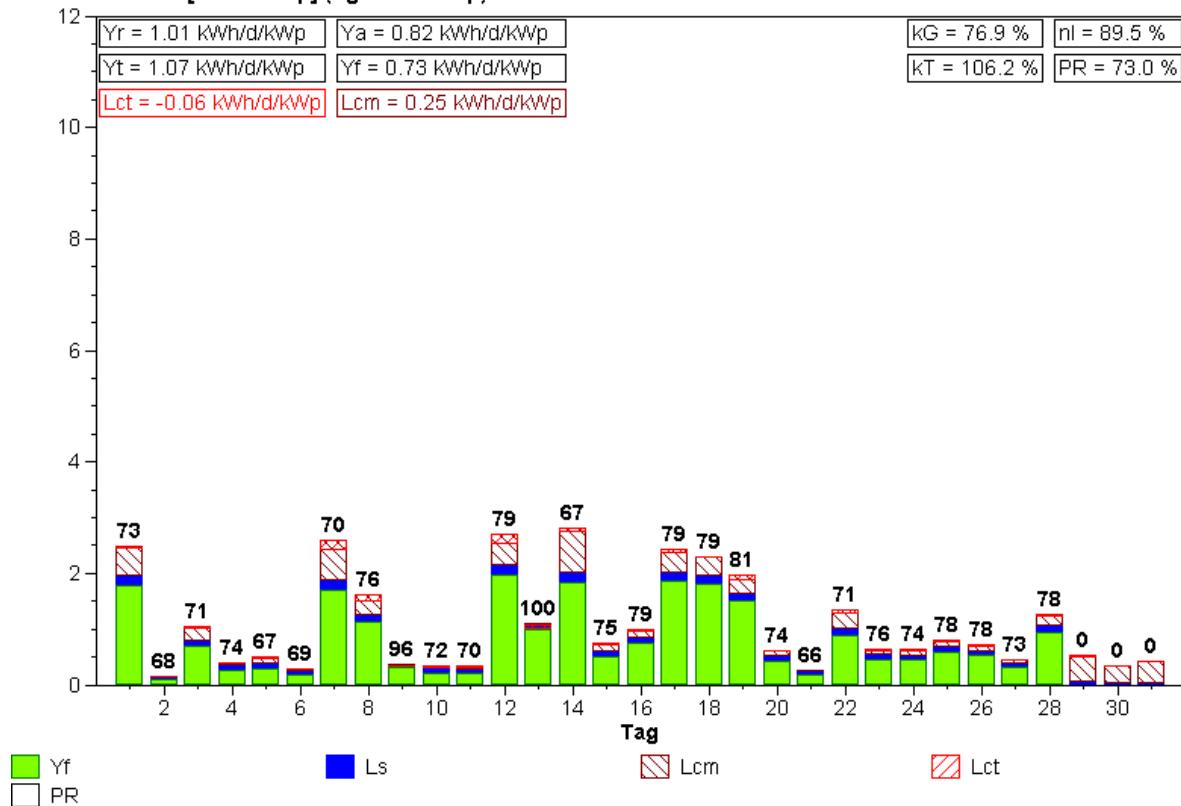
Anlage: Gfeller, Burgdorf Monat: 12.2002

**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**


**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf      Monat: 1.2003

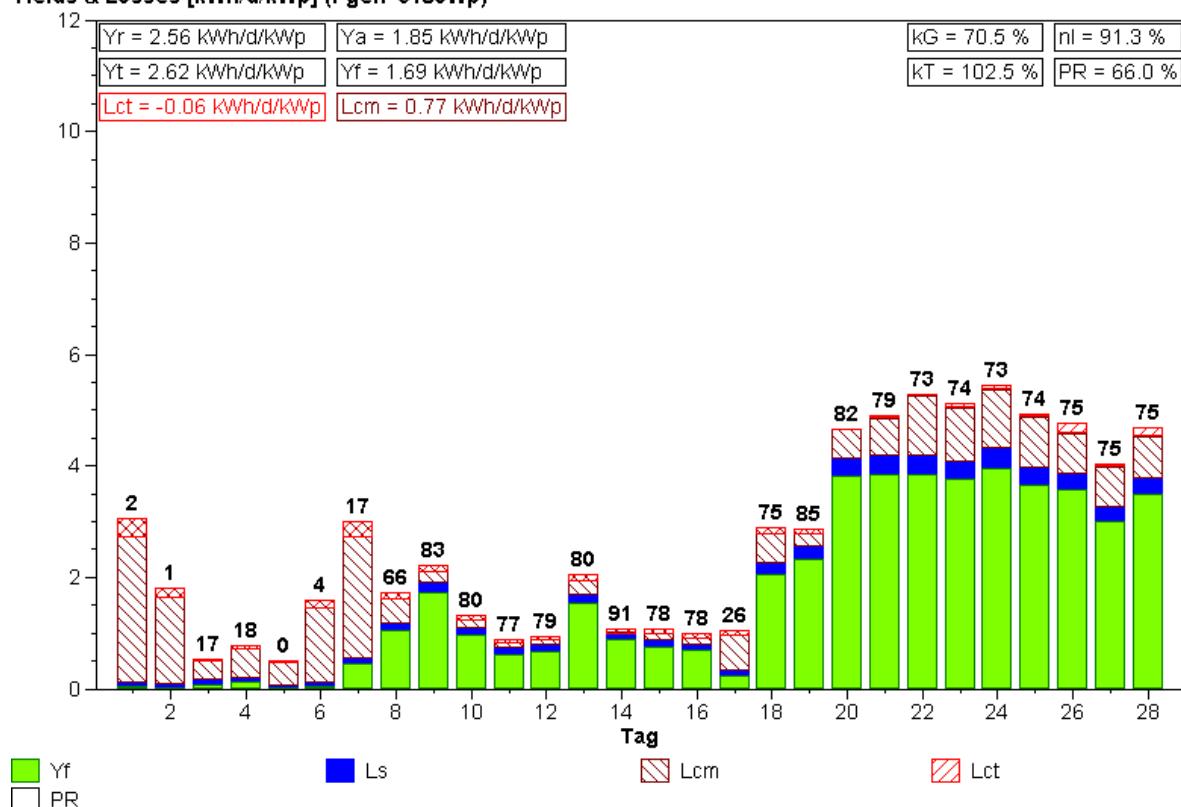
**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**



**Normierte Monatsstatistik (Pyranometer)**

Anlage: Gfeller, Burgdorf      Monat: 2.2003

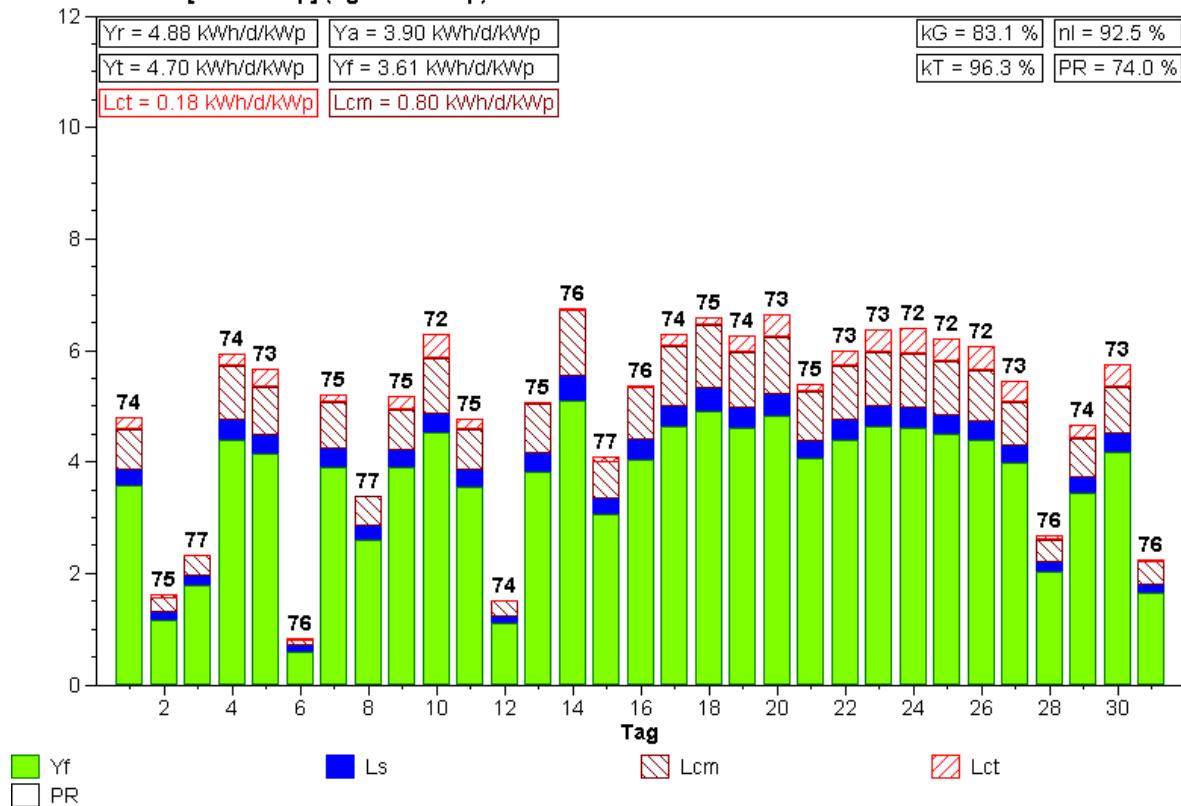
**Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)**



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 3.2003

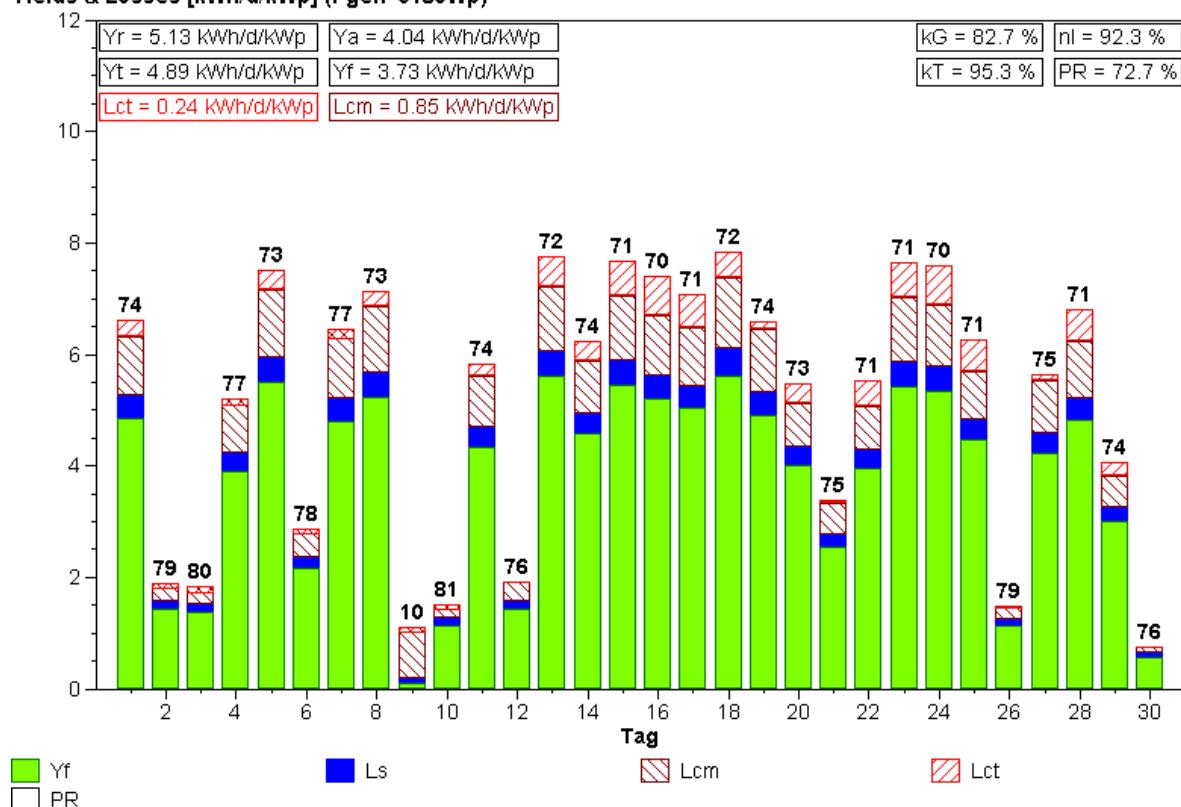
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 4.2003

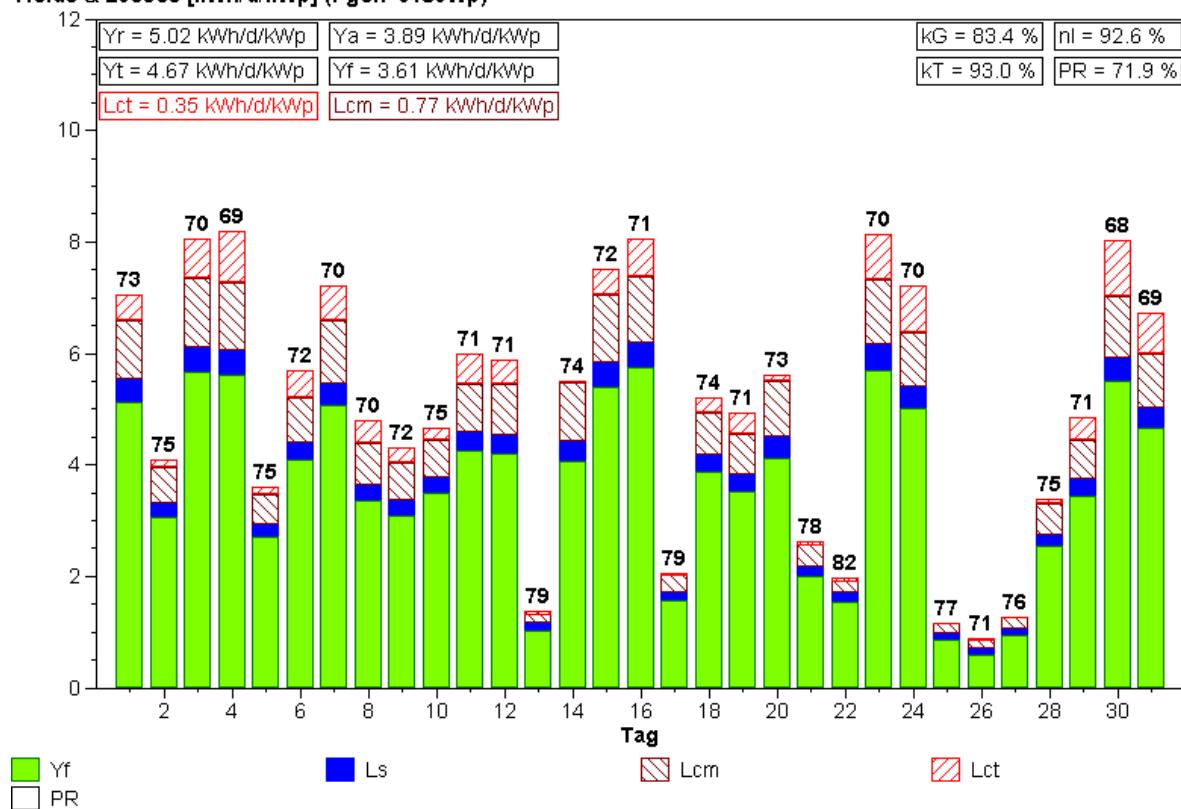
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 5.2003

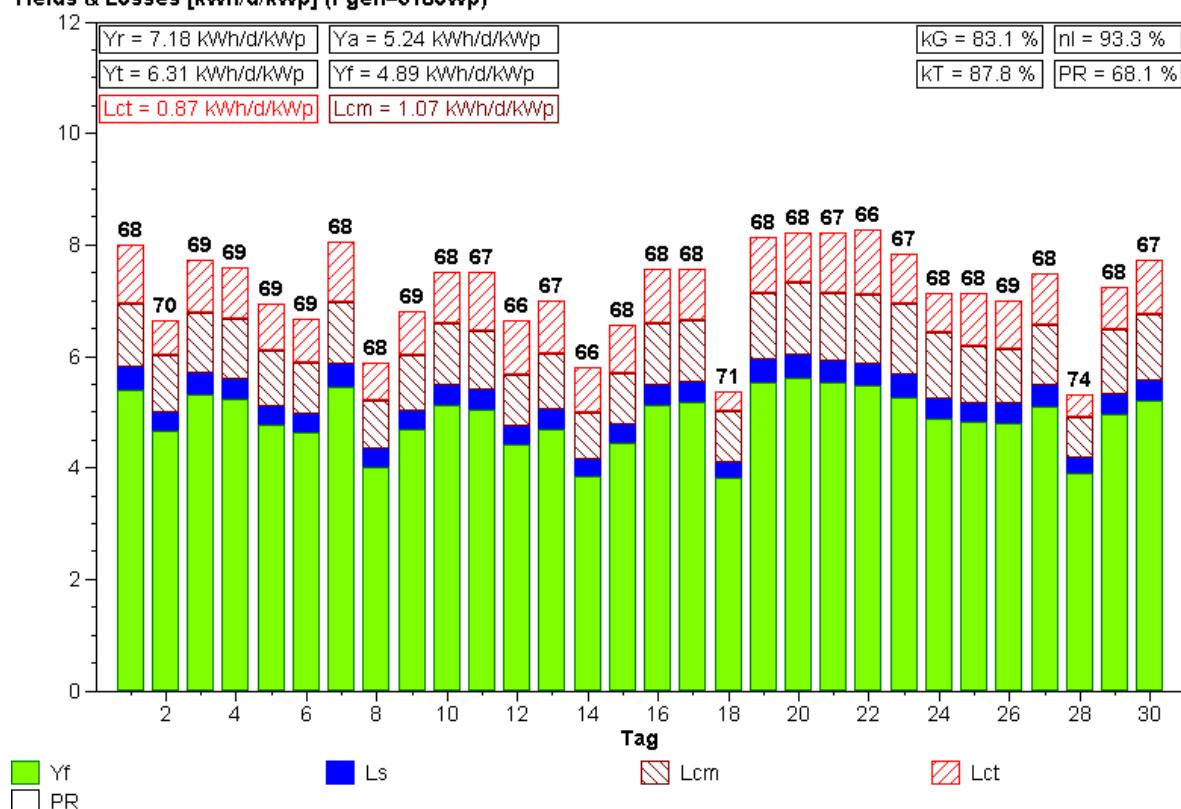
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)

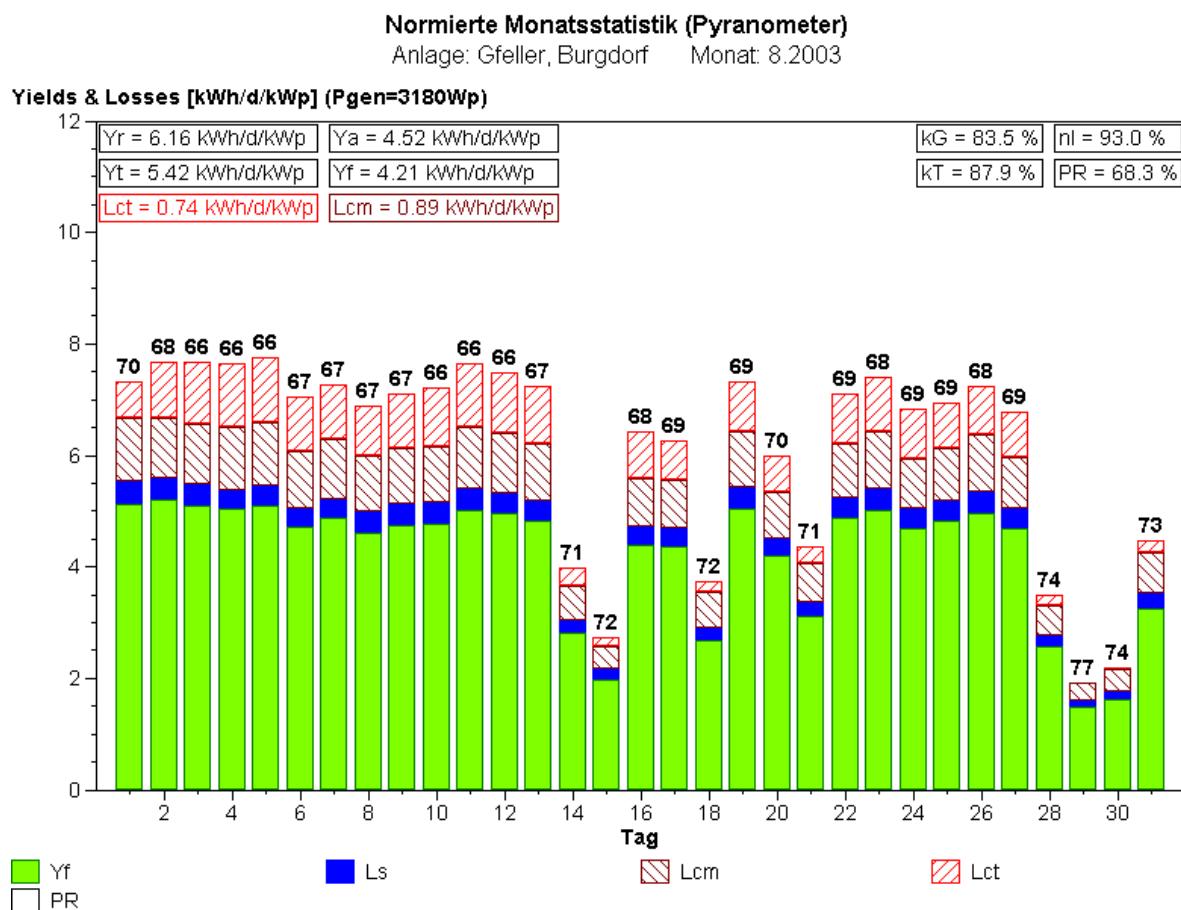
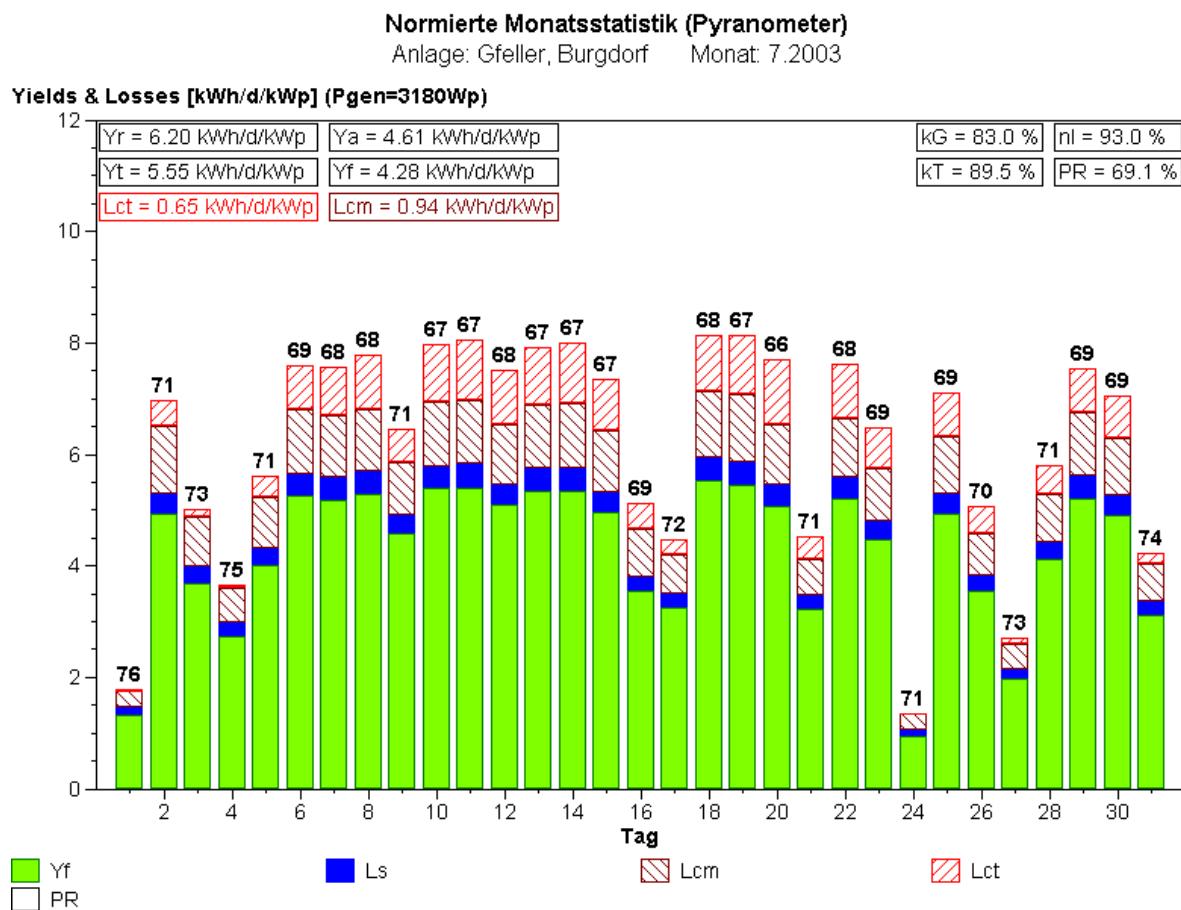


Normierte Monatsstatistik (Pyranometer)

Anlage: Gfeller, Burgdorf Monat: 6.2003

Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)





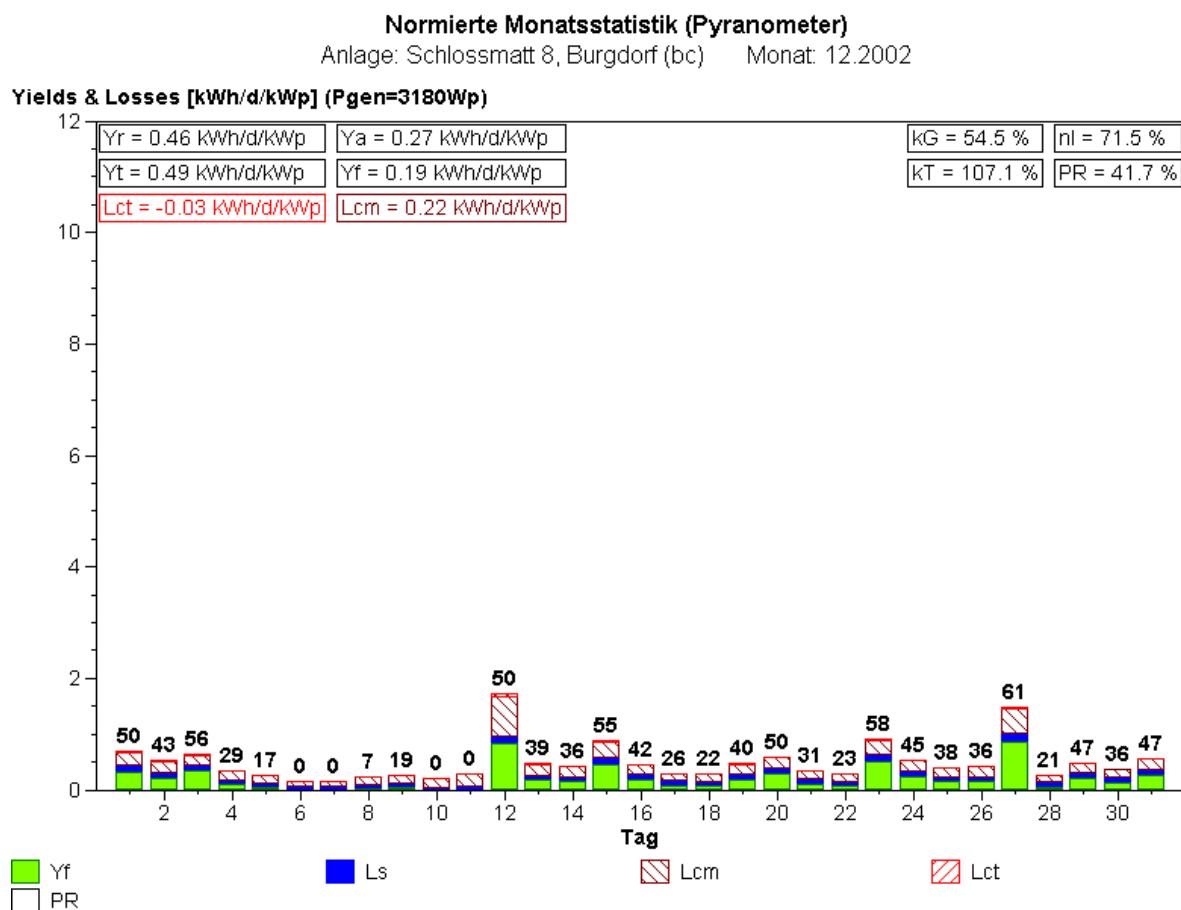
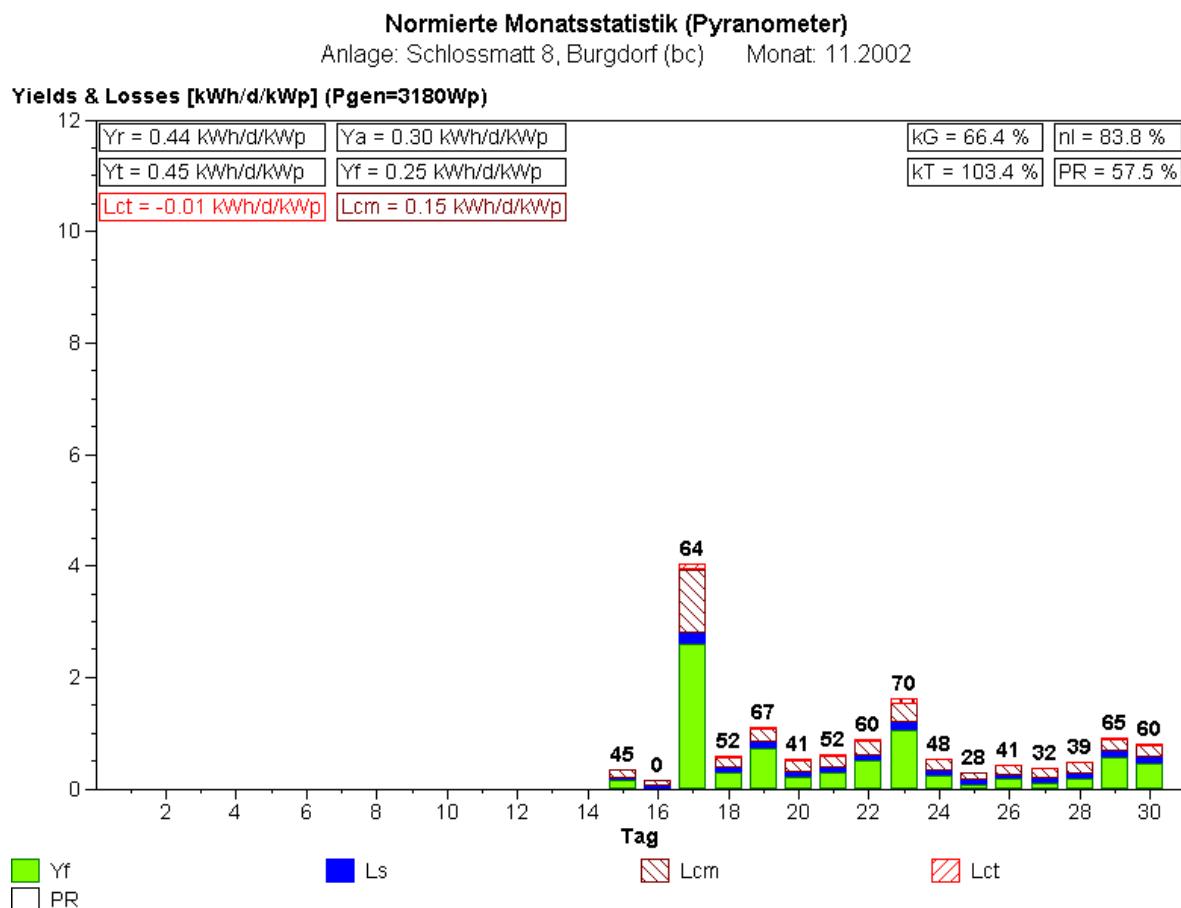
## zu 6.7 Schlossmatt 8, Burgdorf

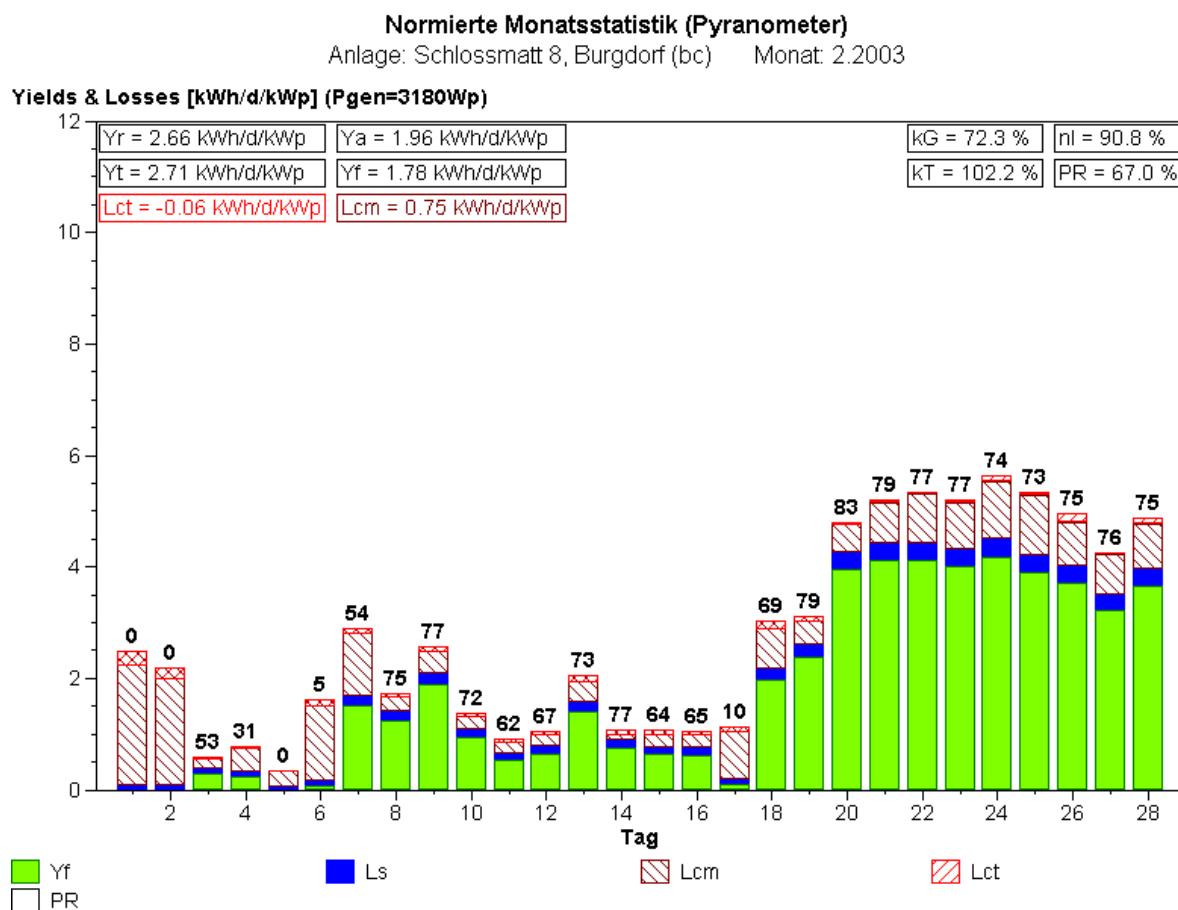
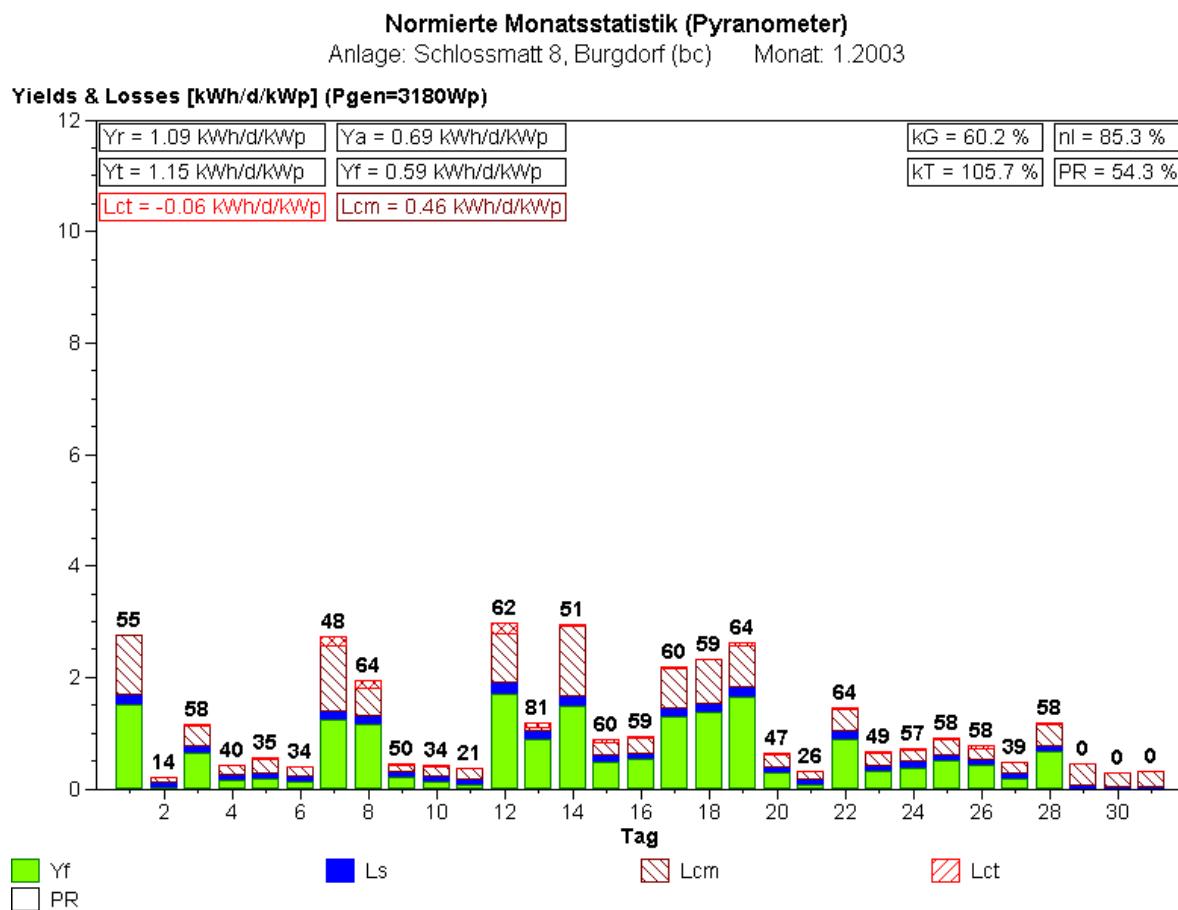
<b>Ort:</b>	Schlossmattschulhaus, Grunerstrasse 7, 3400 Burgdorf; 540 m.ü.M.					
<b>Inbetriebnahme:</b>	17.03.1995 15.11.2002 Inbetriebnahme der überarbeiteten Messtechnik der HTA Burgdorf					
<b>Solargenerator:</b>						
<b>Module:</b> Siemens M55 (60 Stück)						
<b>Feldleistung:</b>	3180 Wp (nominell)	<b>Neigung:</b>	30° (Schrägdachaufständerung)			
<b>Bruttofläche:</b>	25,6 m <sup>2</sup>	<b>Ausrichtung:</b>	7° Ost			
<b>Wechselrichter:</b>	Sputnik SolarMaxS					
<b>Messgrößen:</b>						
<ul style="list-style-type: none"><li>• Sonneneinstrahlung in Modulebene mit Pyranometer und Referenzzelle</li><li>• Umgebungstemperatur und Modultemperatur</li><li>• Gleichstrom und Gleichspannung</li><li>• Eingespeiste Wechselstrom-Wirkleistung</li><li>• Netzspannung</li></ul>						



### **Besondere Betriebsereignisse:**

- keine -

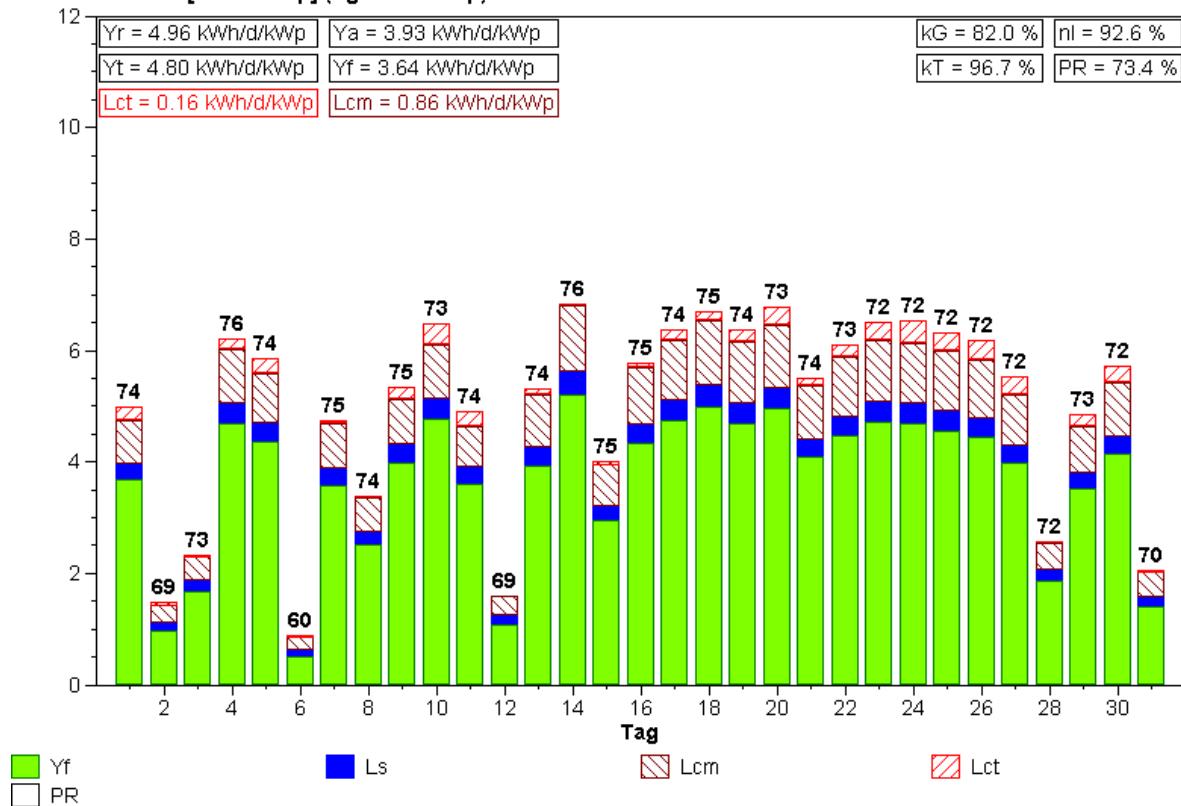




Normierte Monatsstatistik (Pyranometer)

Anlage: Schlossmatt 8, Burgdorf (bc) Monat: 3.2003

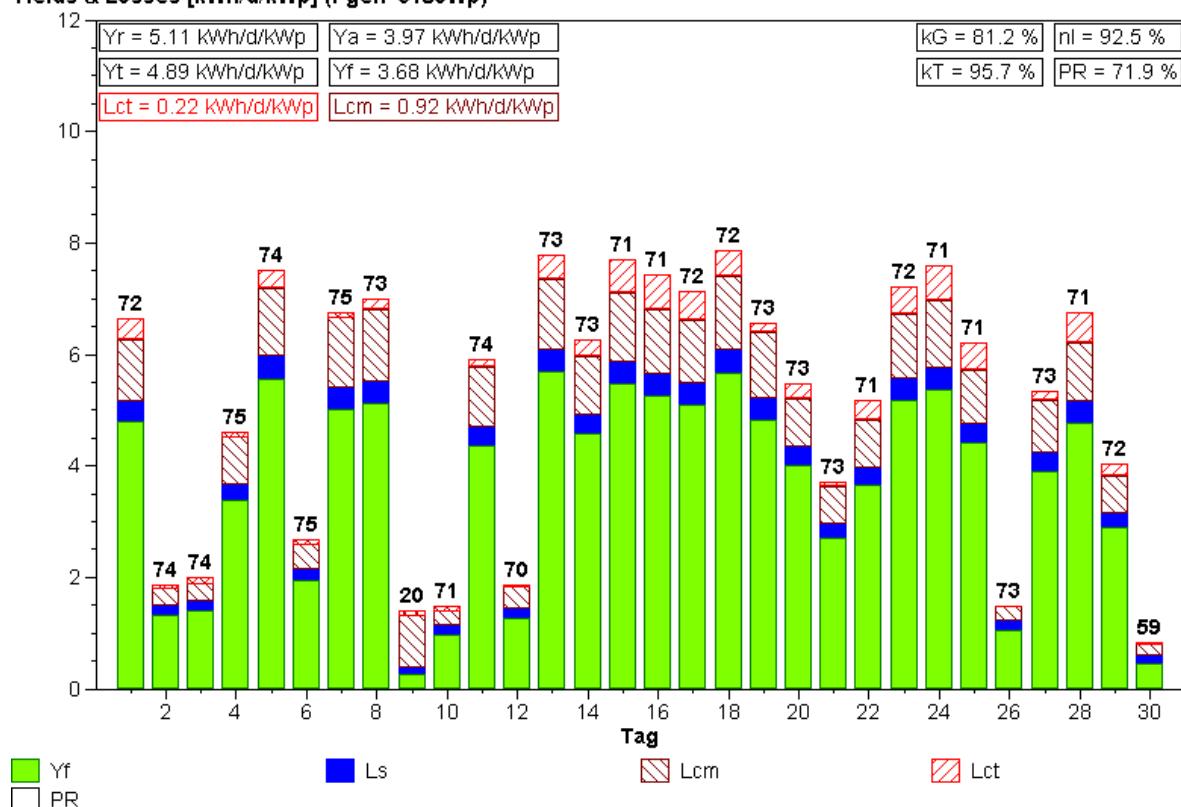
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Schlossmatt 8, Burgdorf (bc) Monat: 4.2003

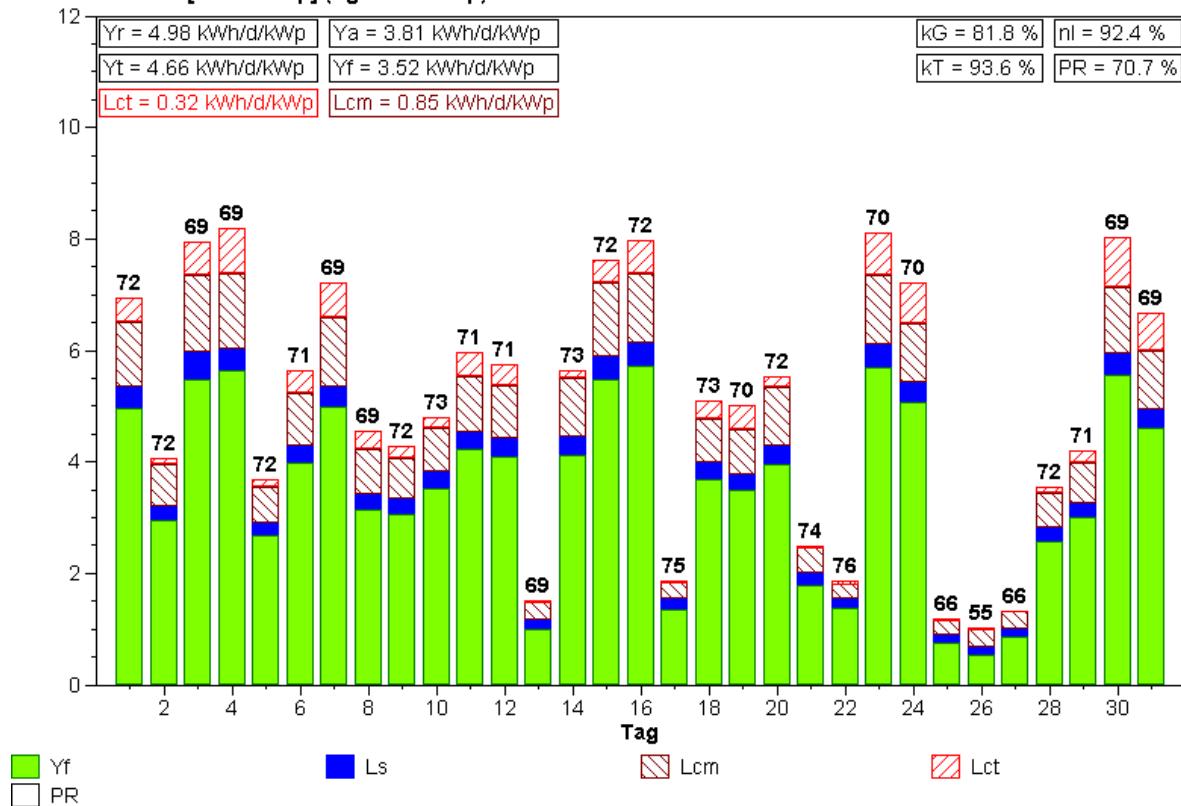
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Schlossmatt 8, Burgdorf (bc) Monat: 5.2003

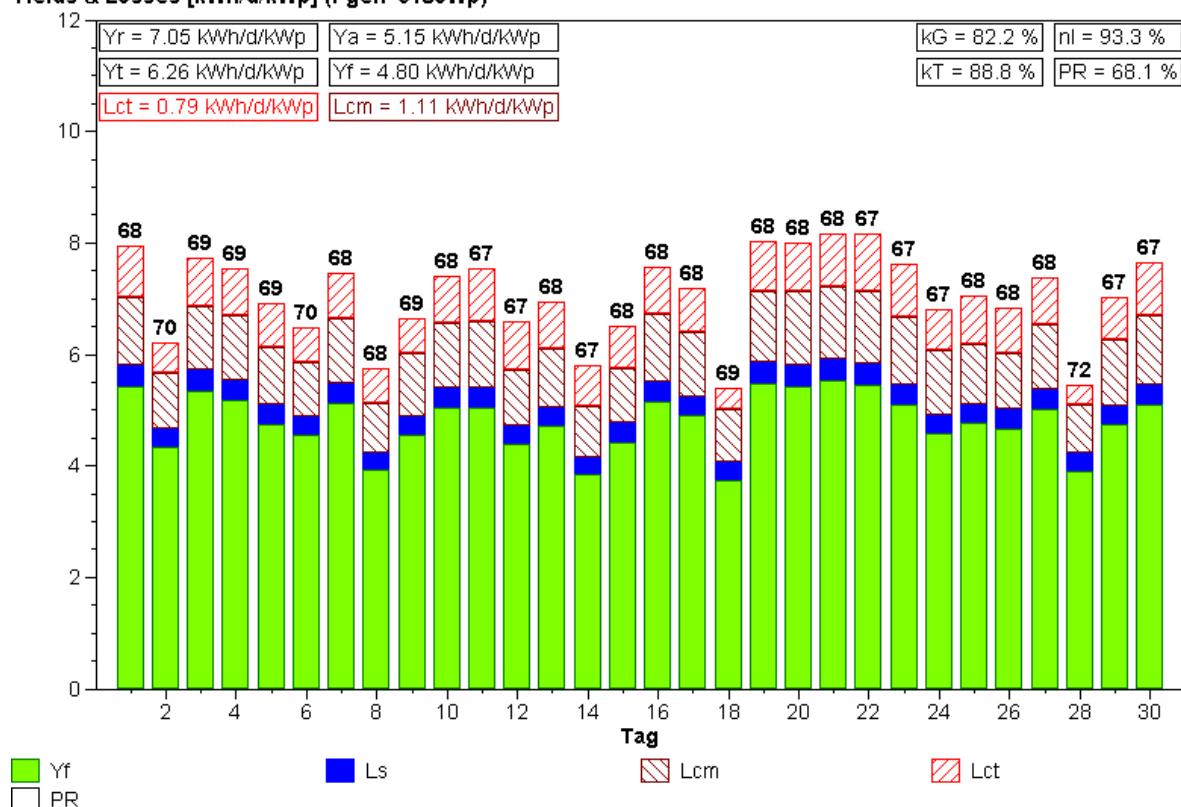
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Schlossmatt 8, Burgdorf (bc) Monat: 6.2003

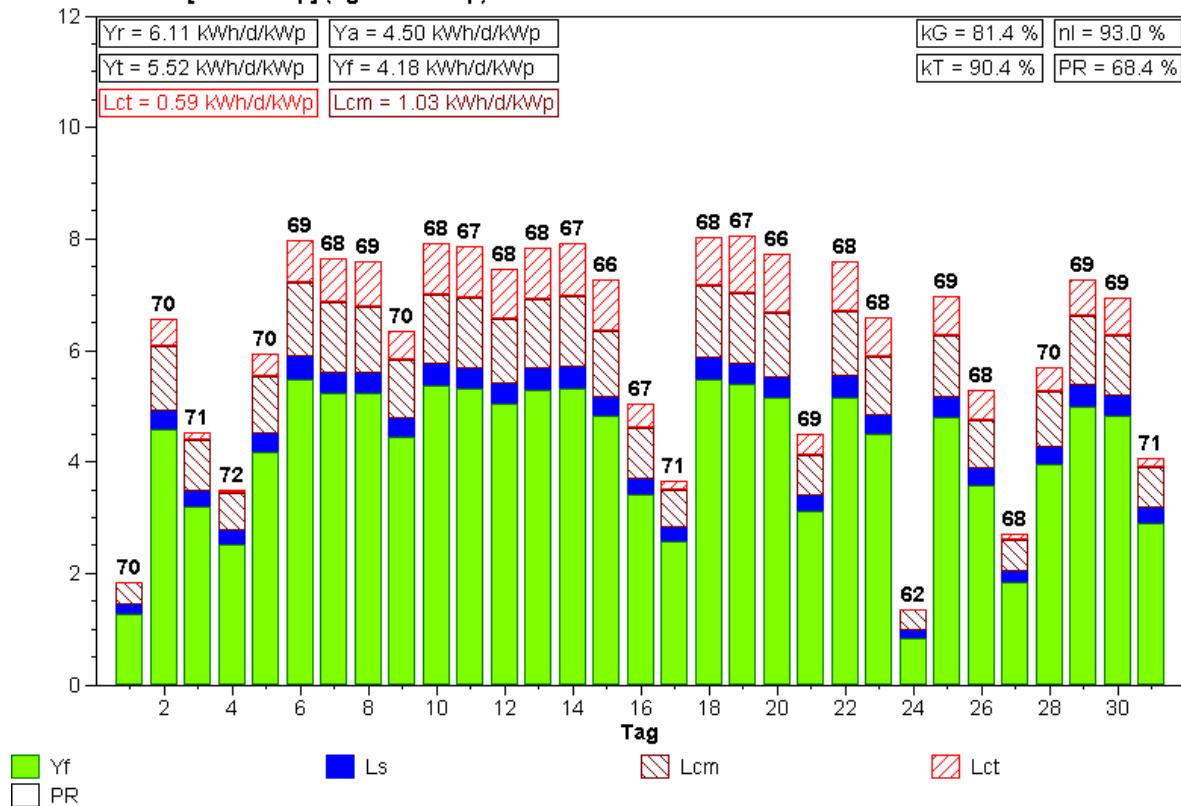
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Schlossmatt 8, Burgdorf (bc) Monat: 7.2003

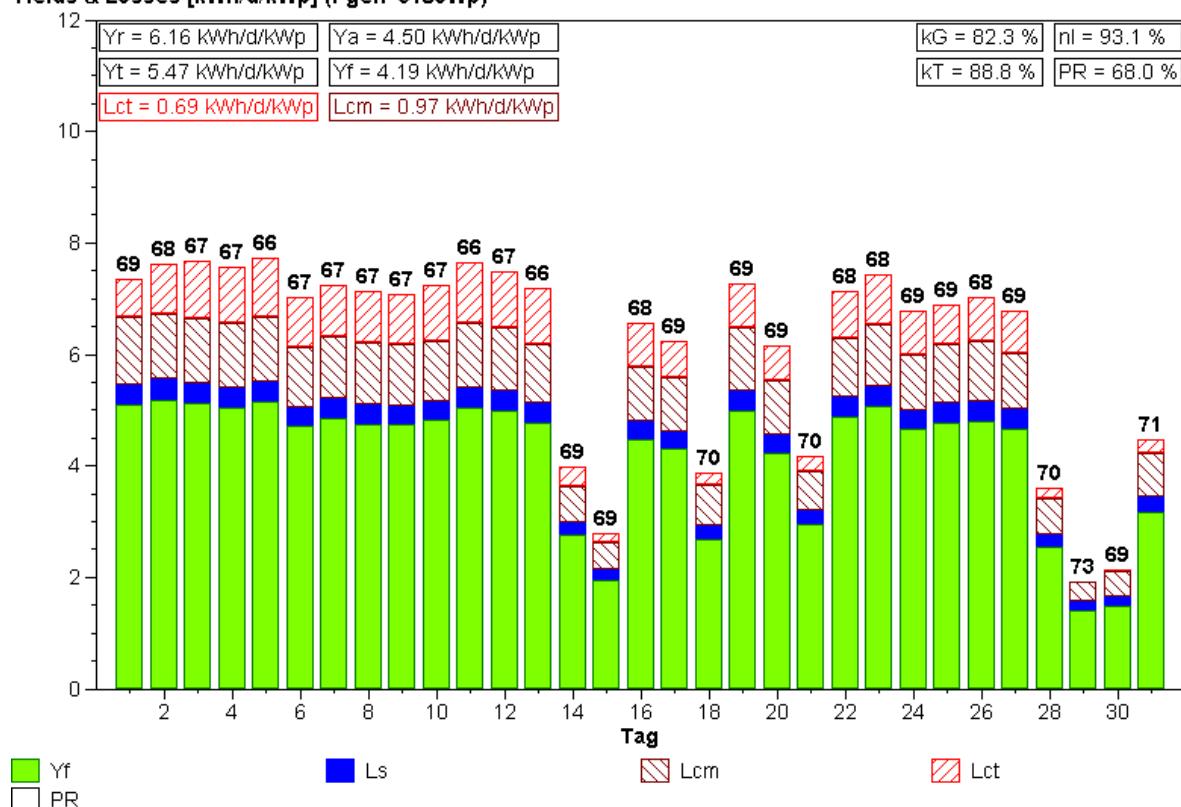
Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



Normierte Monatsstatistik (Pyranometer)

Anlage: Schlossmatt 8, Burgdorf (bc) Monat: 8.2003

Yields & Losses [kWh/d/kWp] (Pgen=3180Wp)



## zu 6.8 Localnet AG (ehemals IBB) Gsteighof, Burgdorf

**Ort:** Pestalozzistrasse 73, Schulgebäude, 3400 Burgdorf; 540 m.ü.M.  
**Inbetriebnahme:** 18.05.1995

**Solargenerator:**

**Module:** Solarex MSX120 (136 Stück)  
**Feldleistung:** 16320 kWp (nom.) / 15680 kWp (eff.)  
**Bruttofläche:** 151,1 m<sup>2</sup> **Neigung:** 30° (Flachdach)  
**Ausrichtung:** 20° Ost

**Wechselrichter:** Sputnik SolarMax15

**Messgrössen:**

- Sonneneinstrahlung in Modulebene mit Referenzzelle
- Sonneneinstrahlung in Horizontalebene mit Silizium-Pyranometer
- Umgebungstemperatur und Modultemperatur
- DC- und AC-Leistung



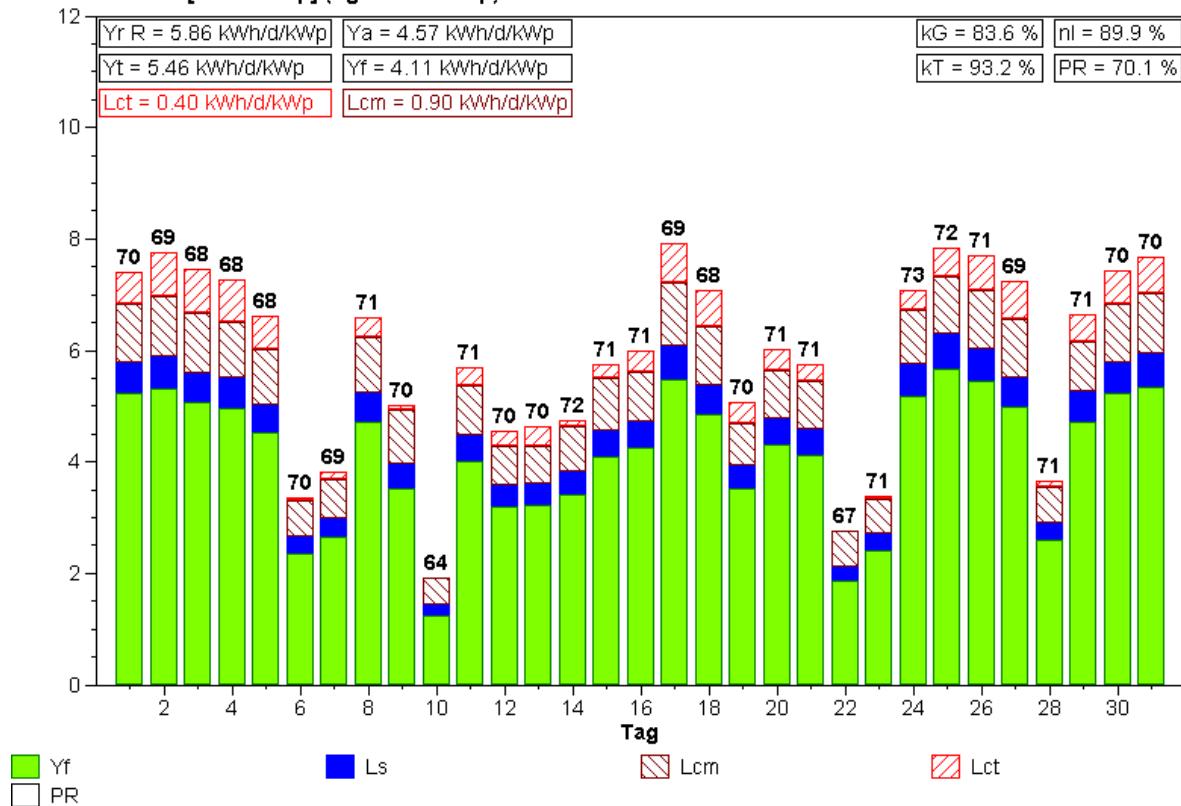
**Besondere Betriebsereignisse:**

29.10.2001 – 02.11.2001      Ausfall der Messtechnik

Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 7.1999

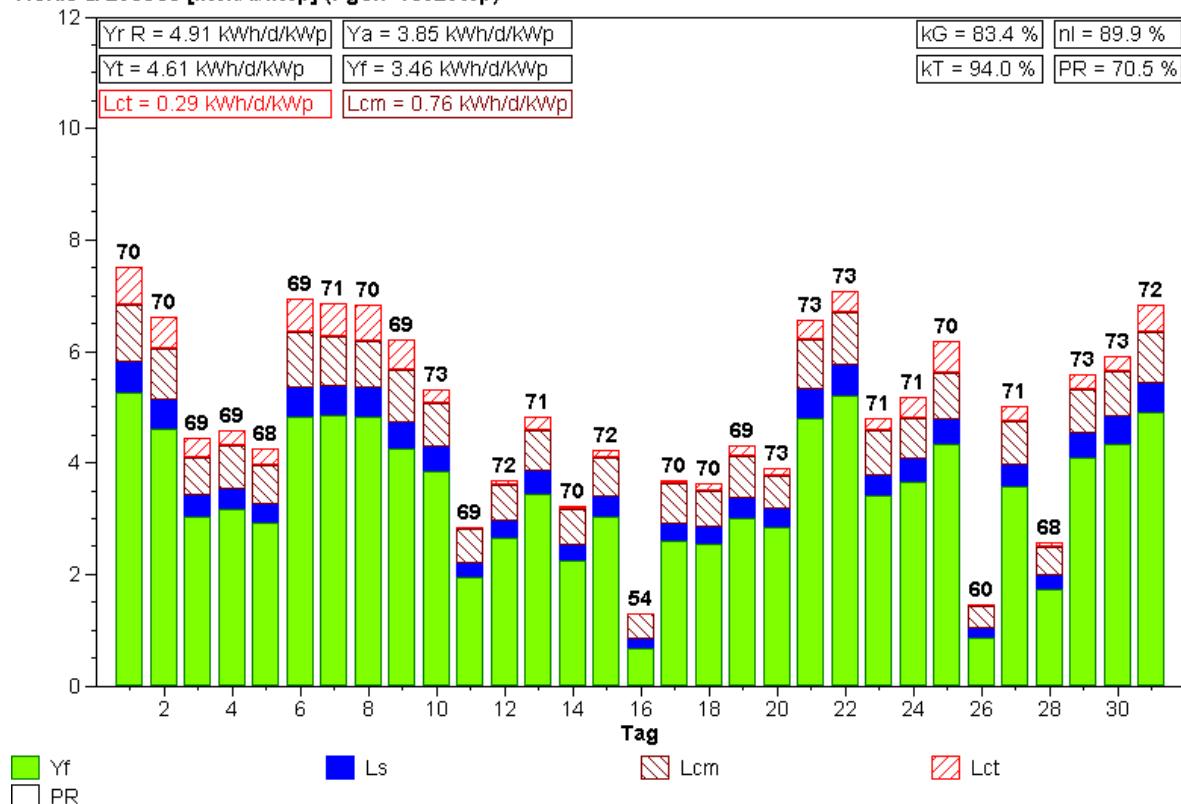
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 8.1999

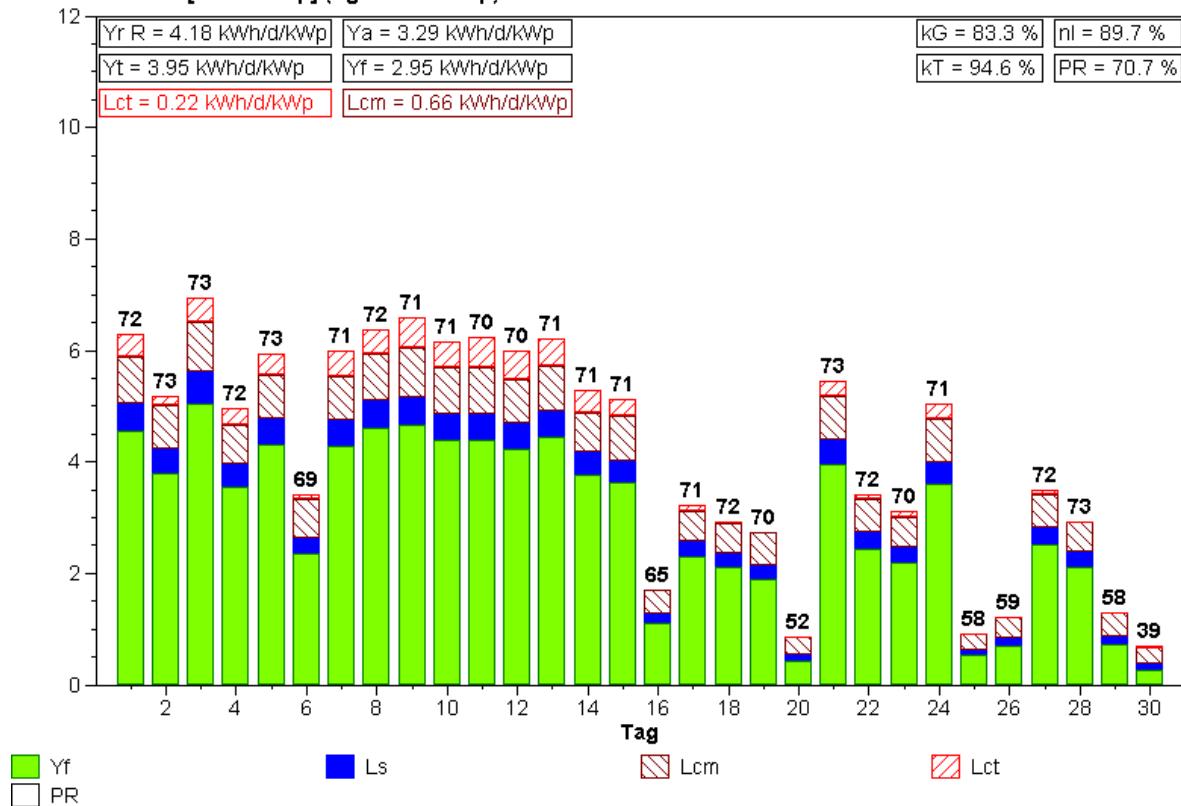
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 9.1999

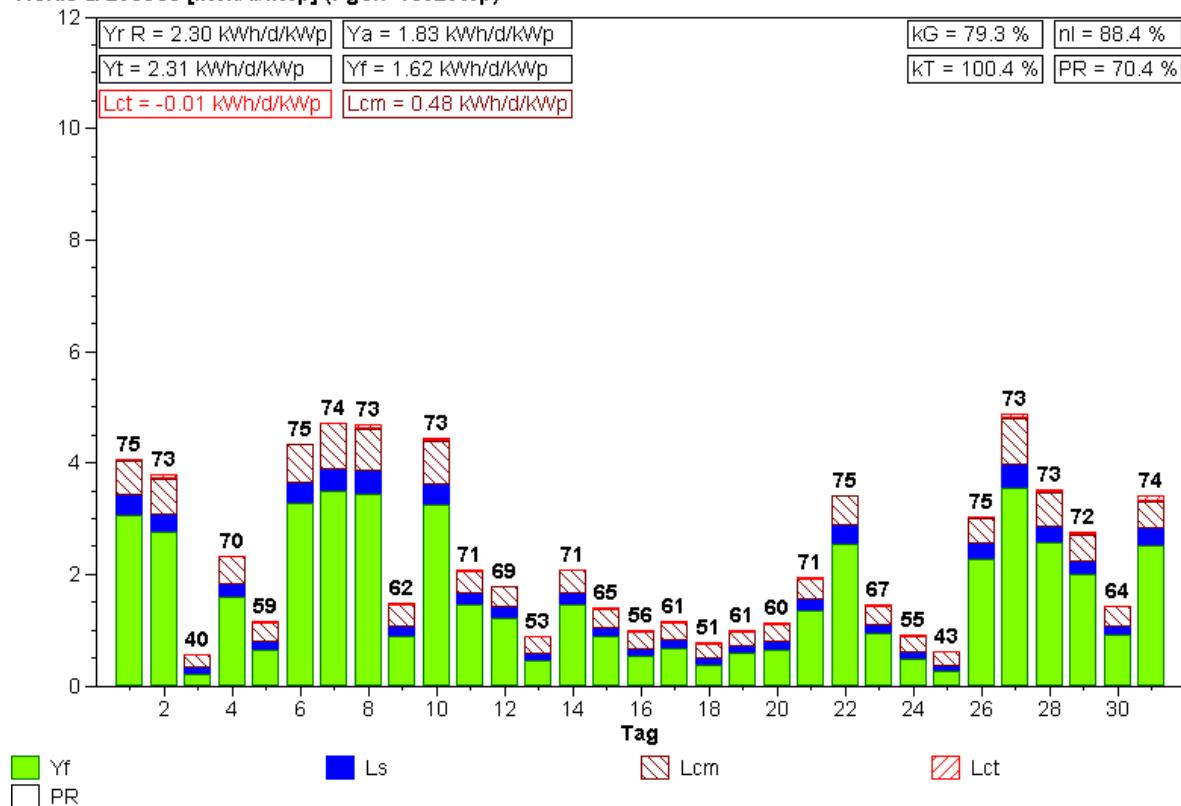
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 10.1999

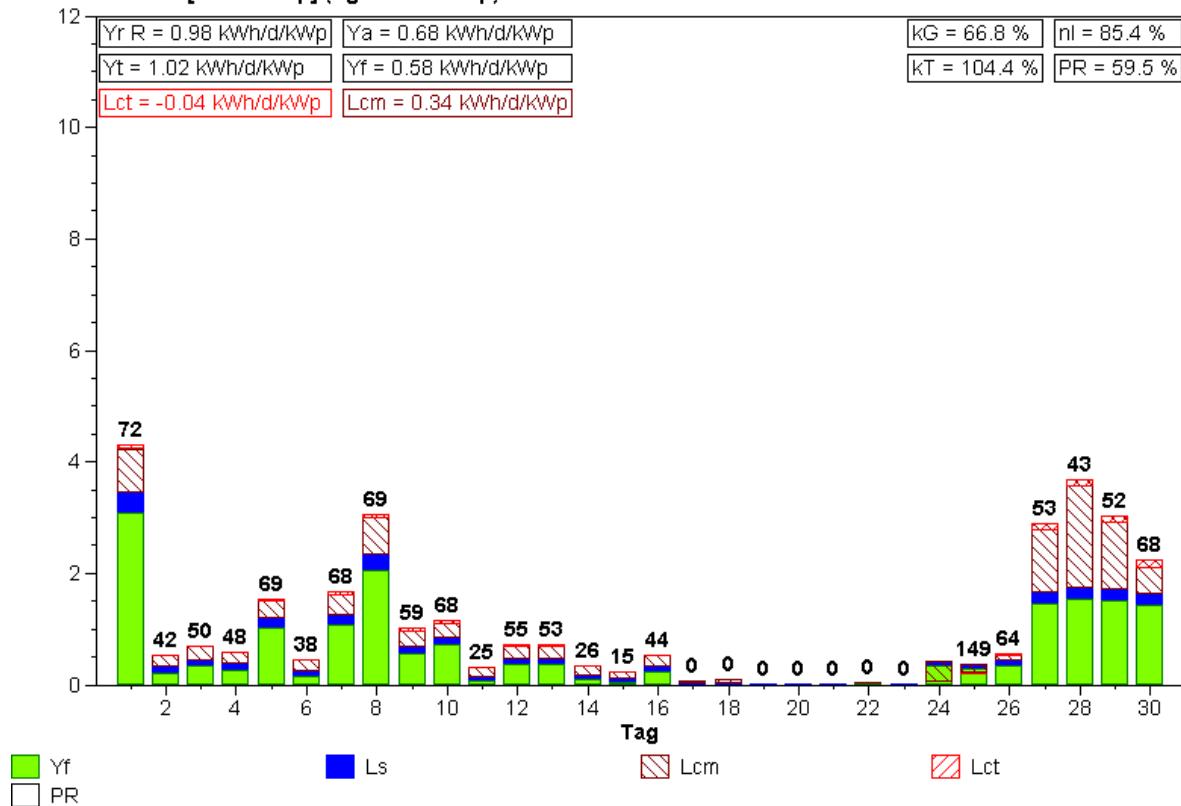
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 11.1999

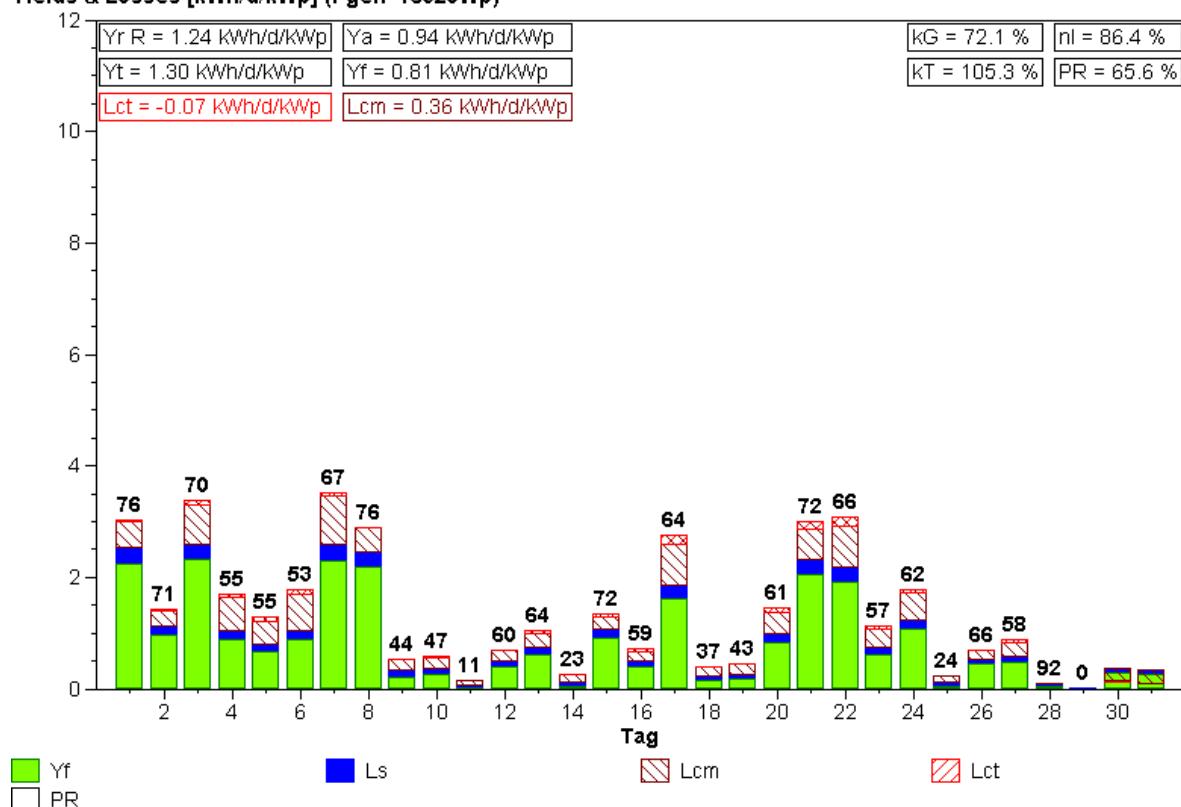
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 12.1999

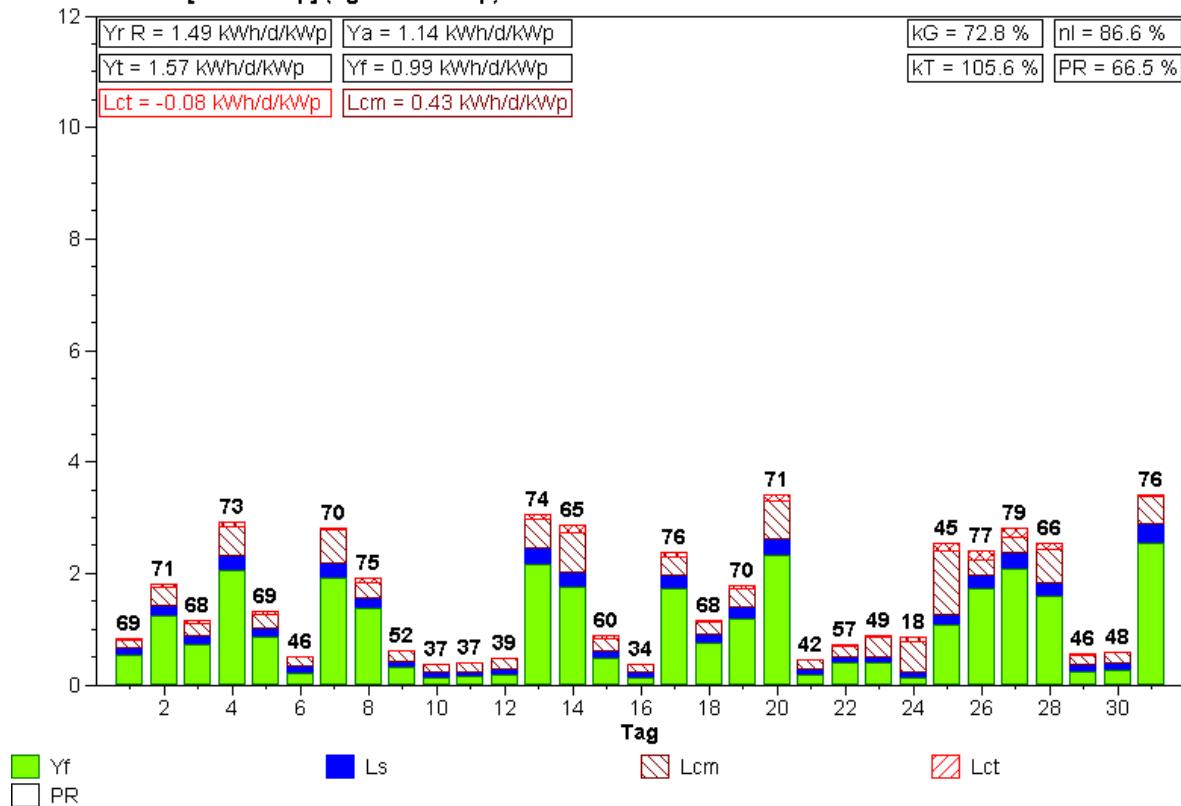
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 1.2000

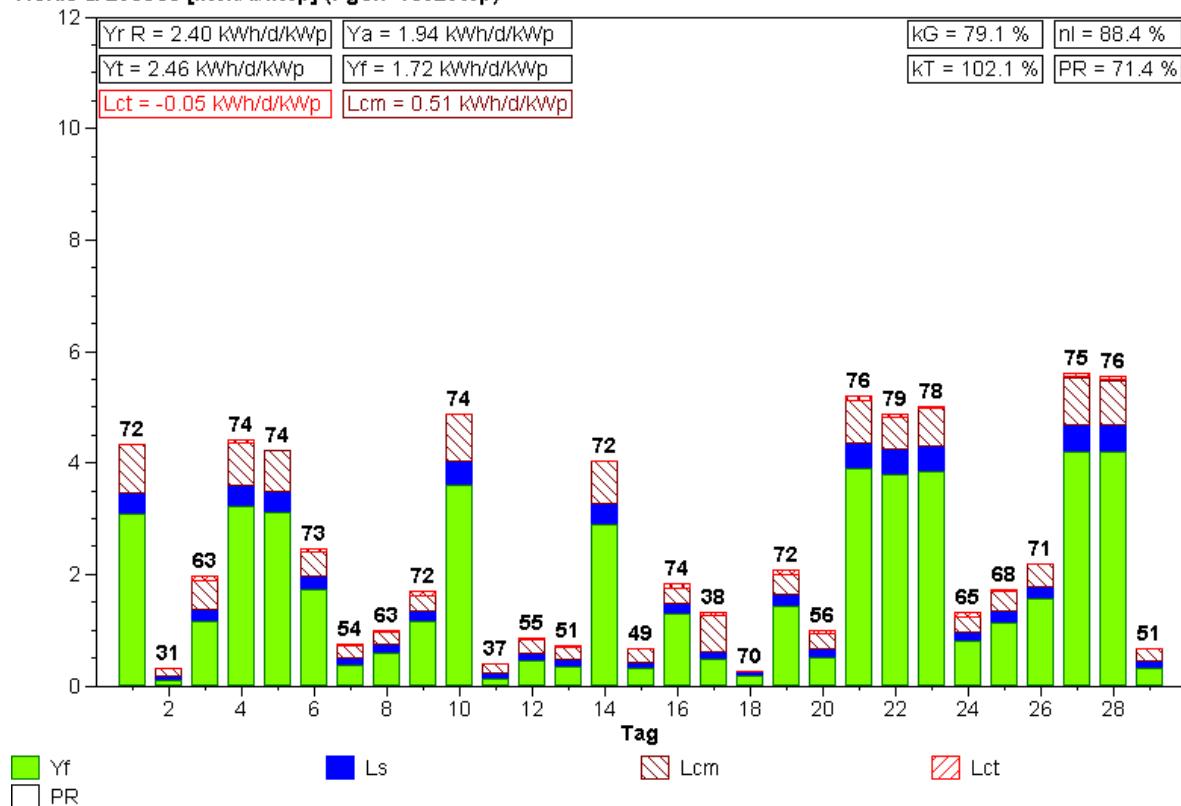
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 2.2000

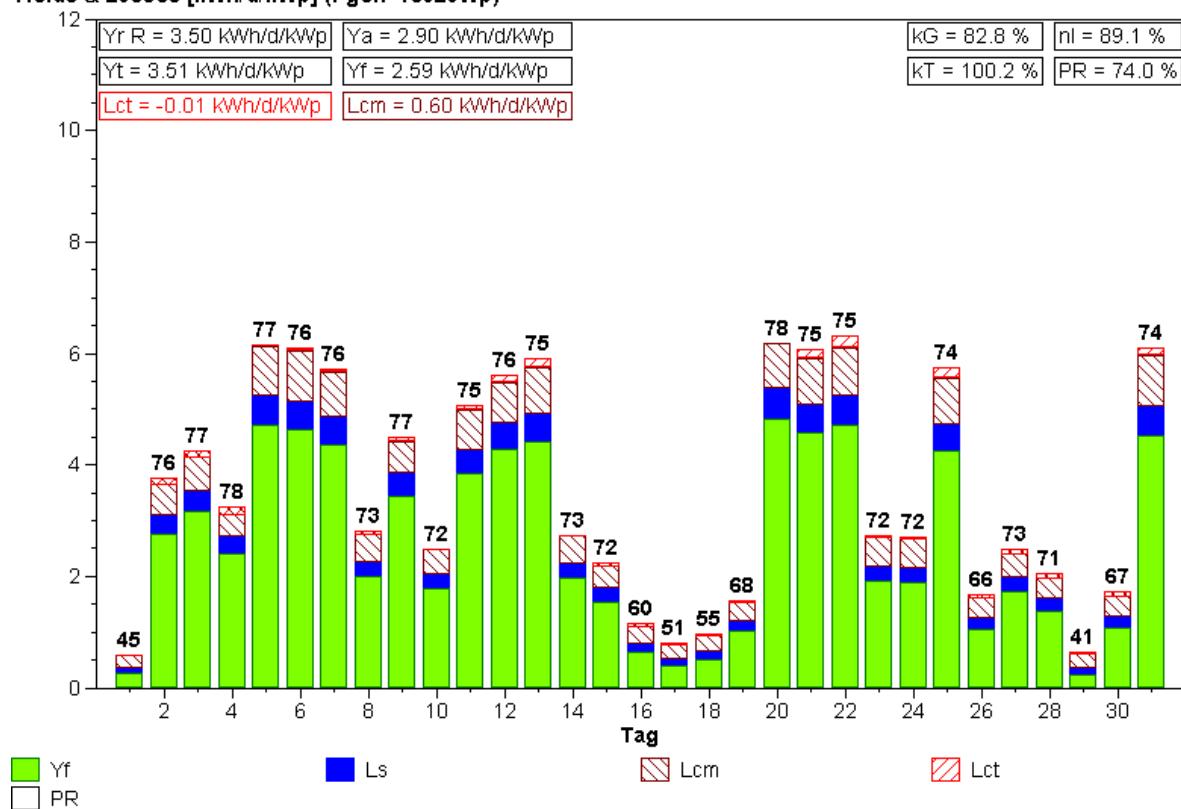
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 3.2000

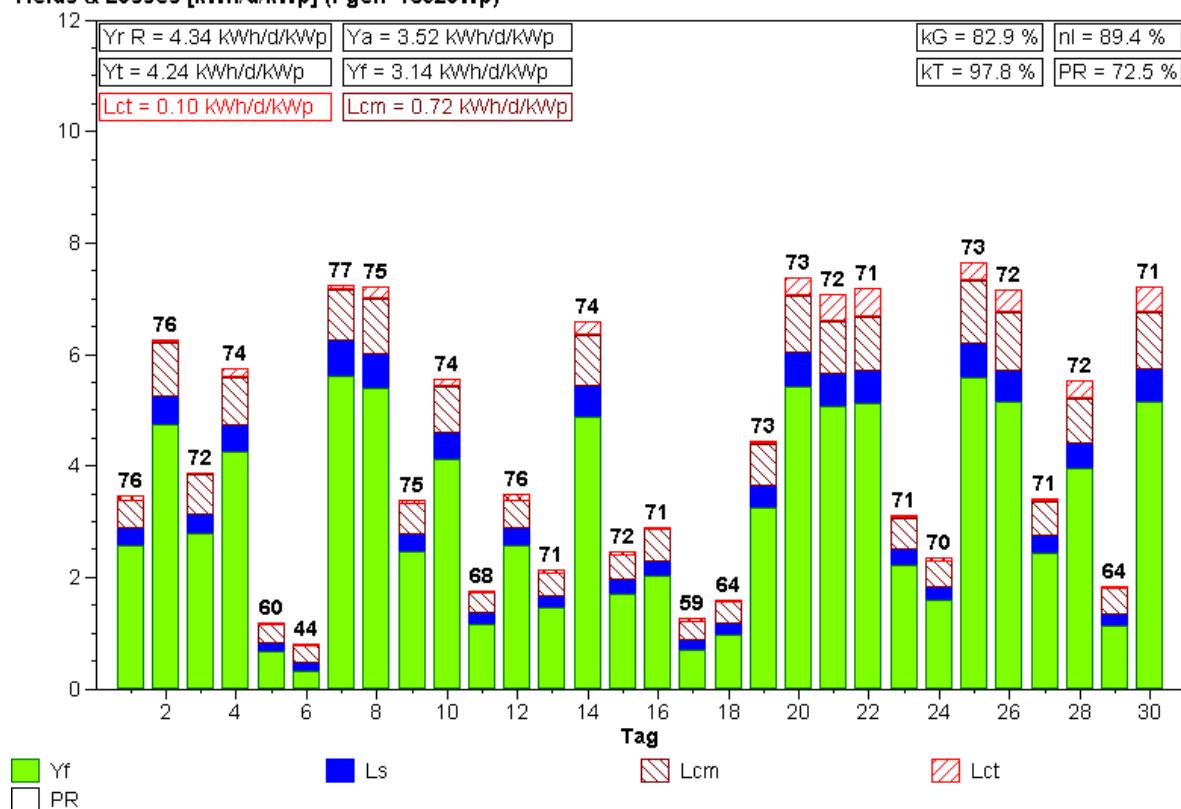
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 4.2000

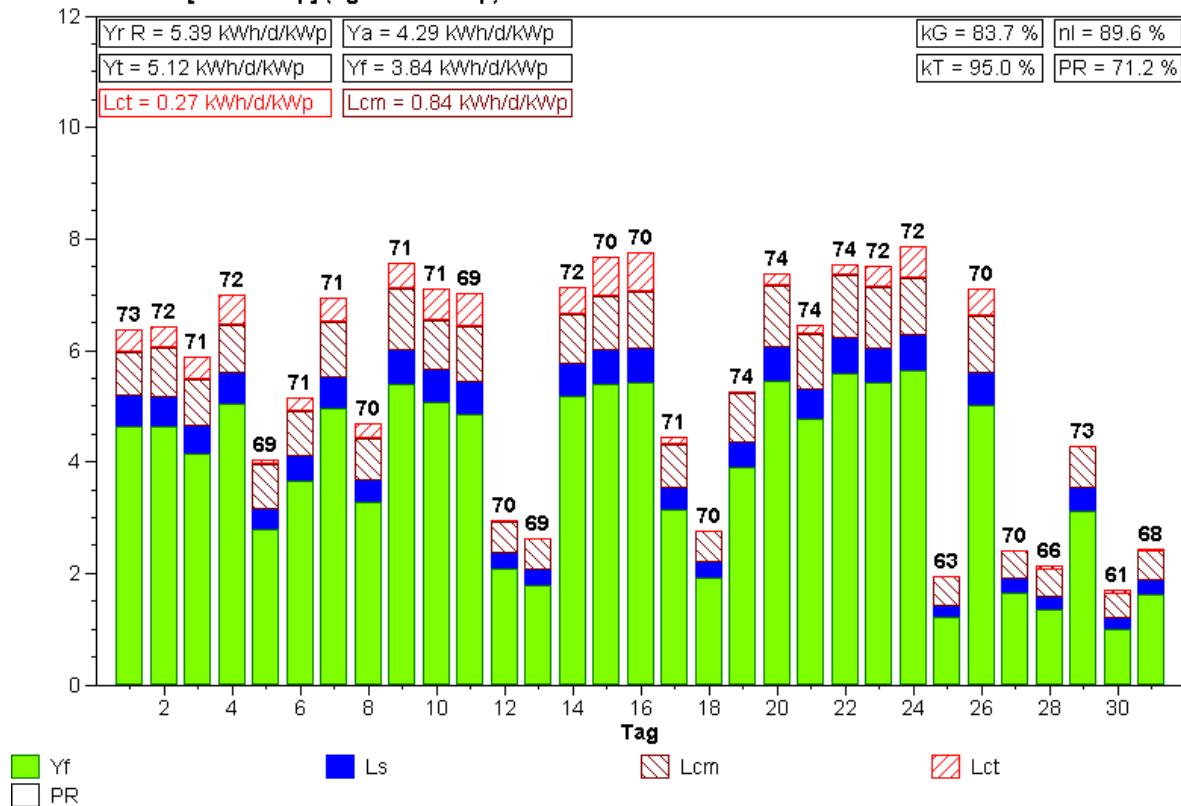
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 5.2000

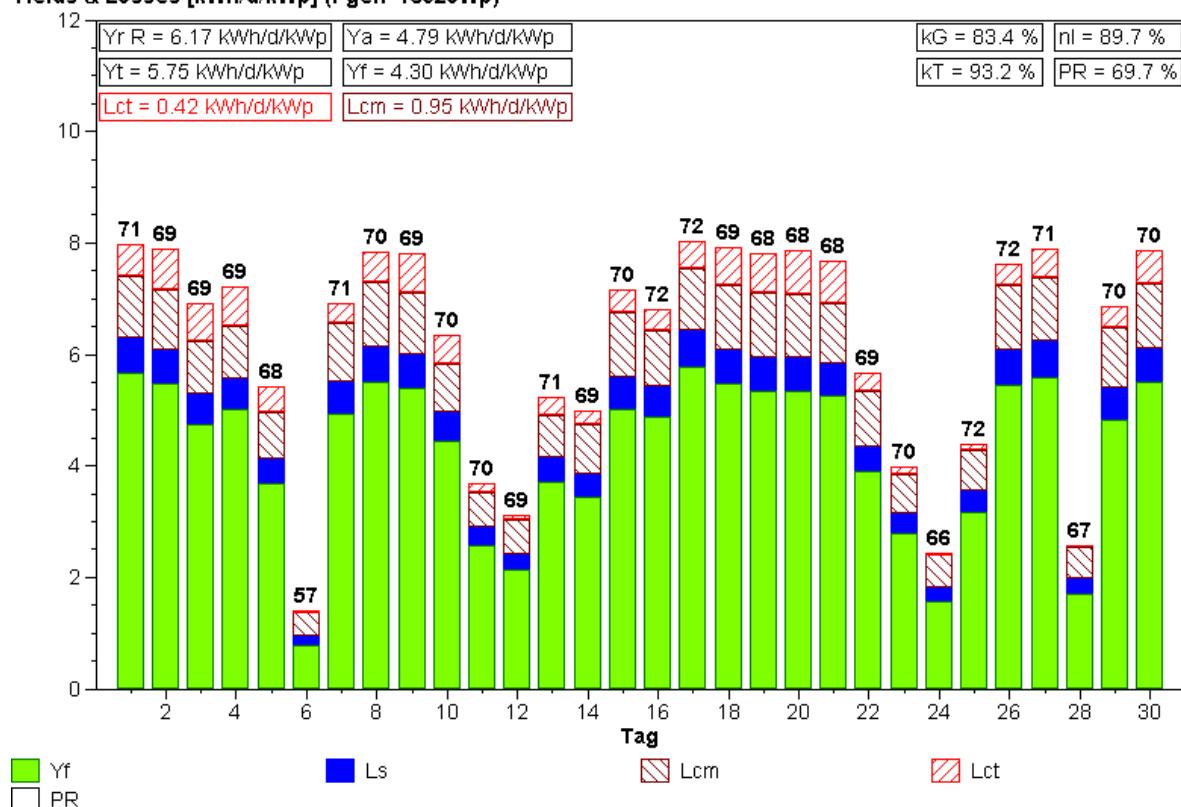
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 6.2000

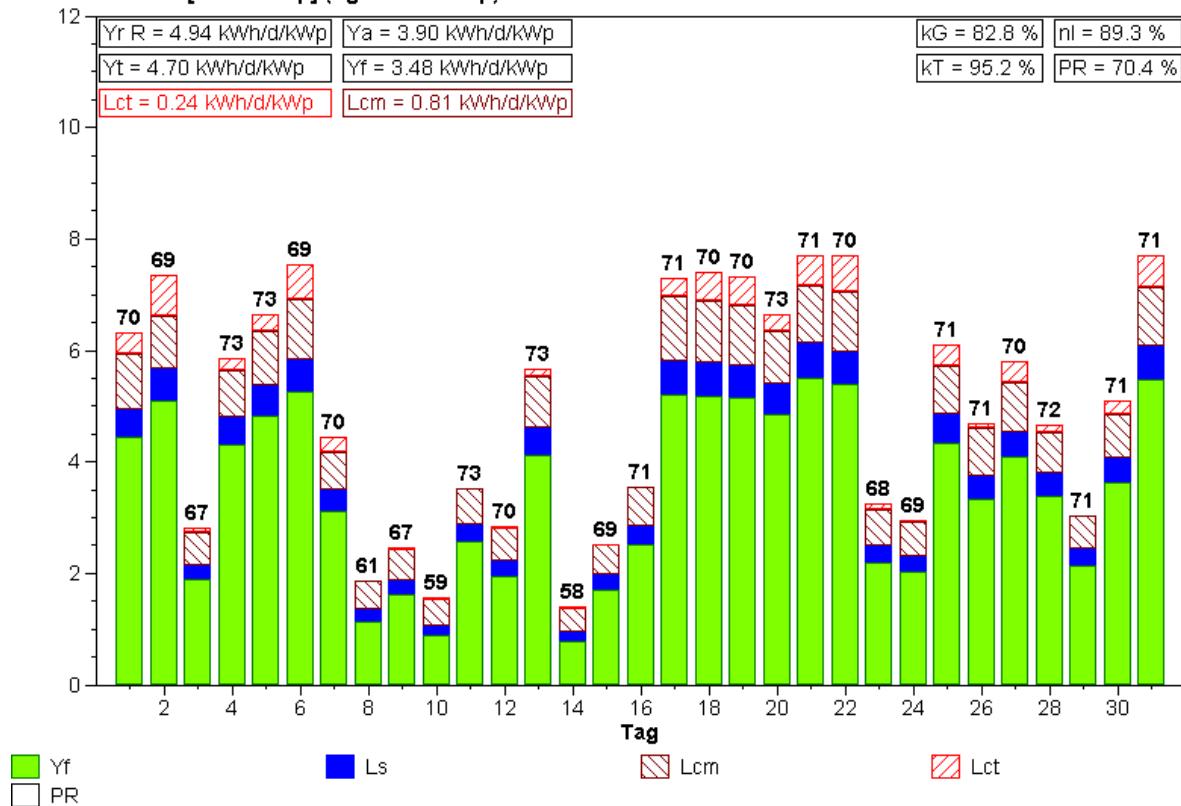
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 7.2000

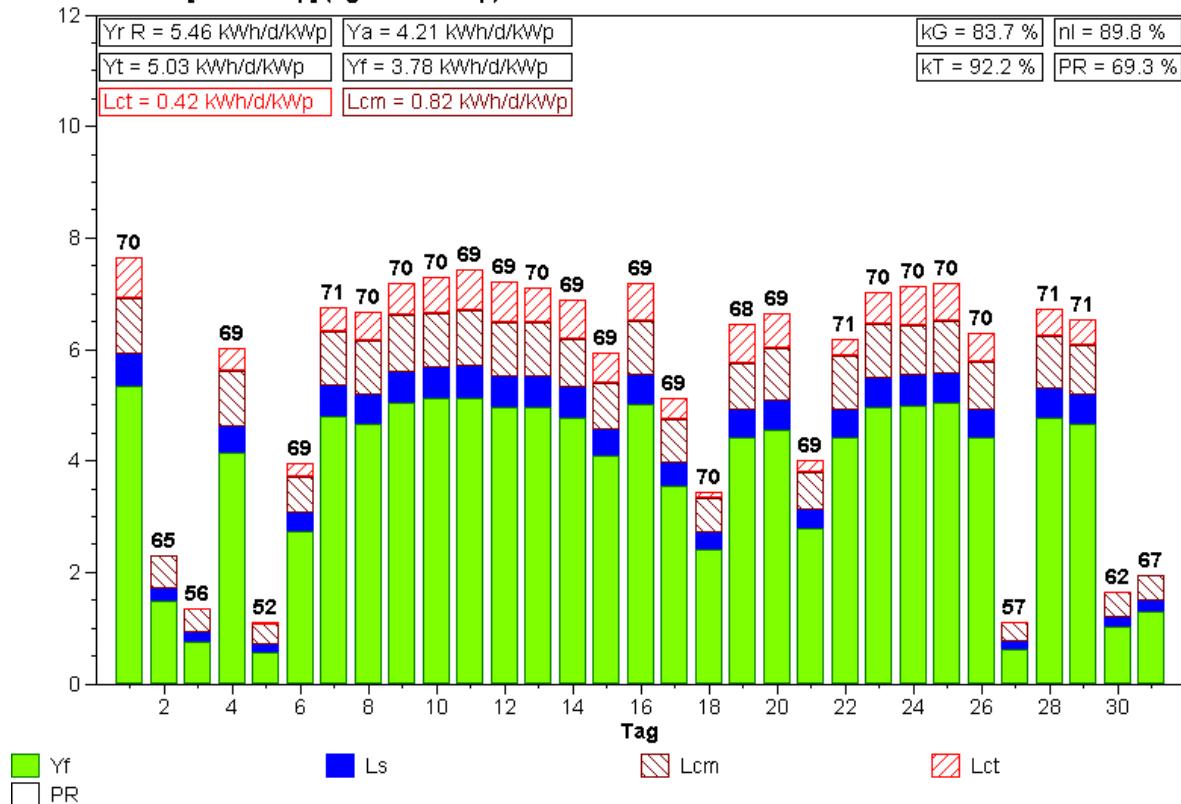
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 8.2000

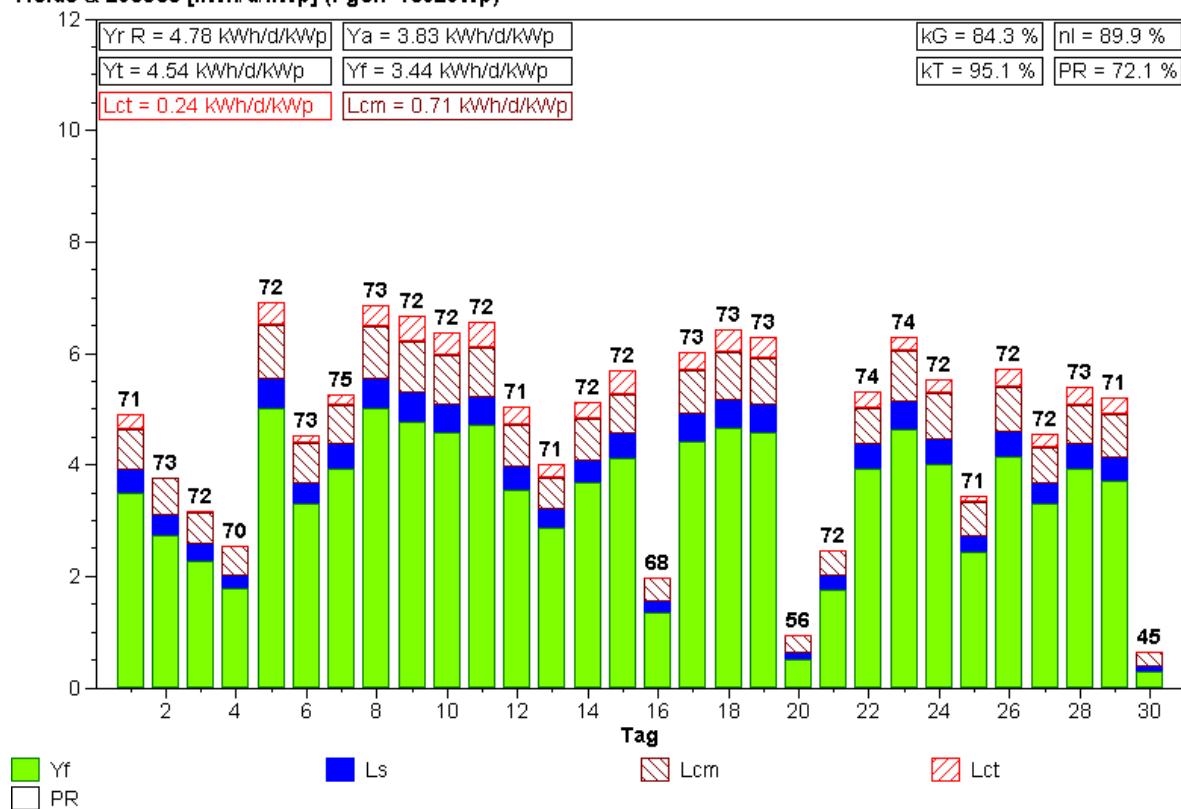
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 9.2000

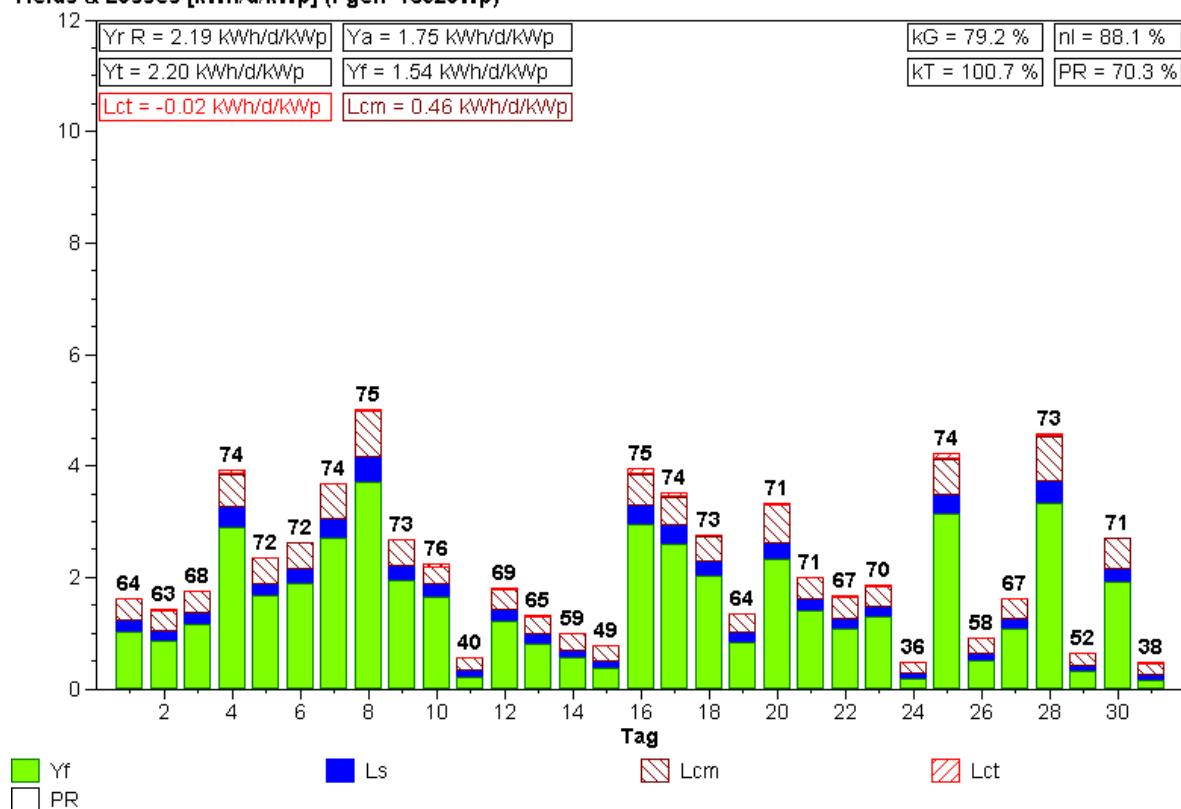
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 10.2000

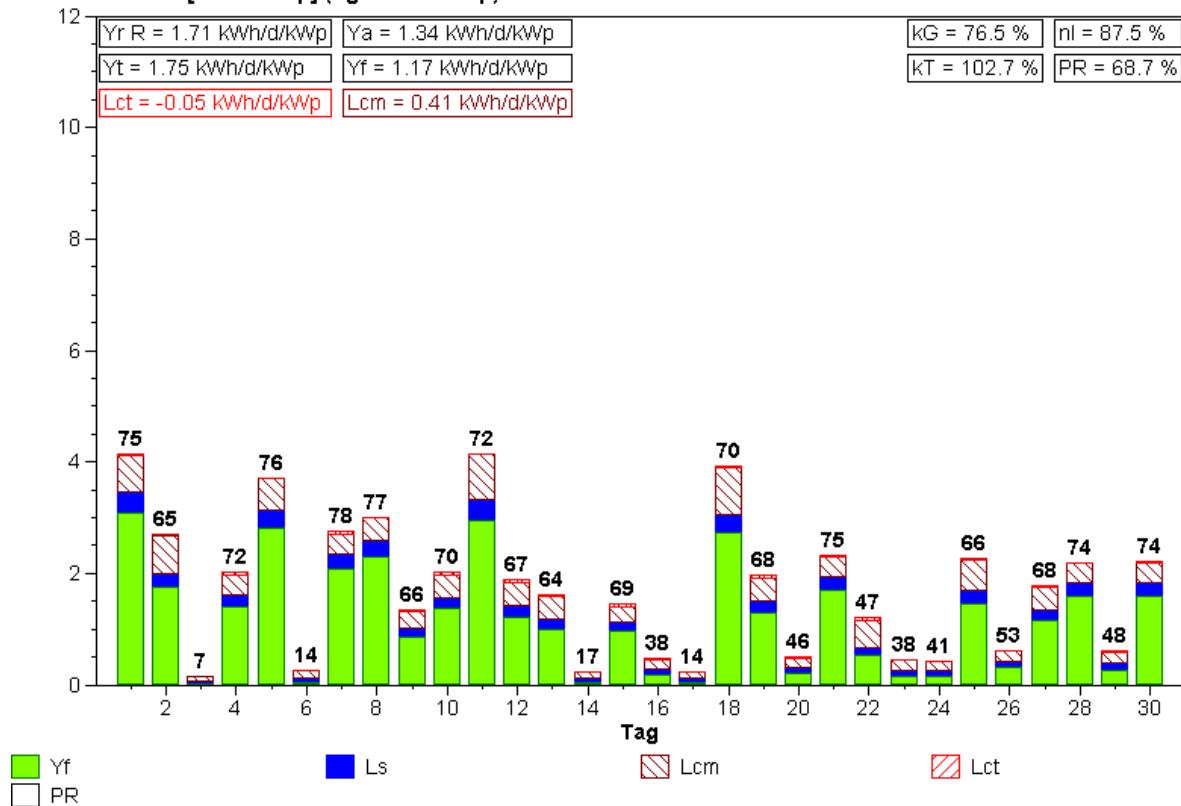
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 11.2000

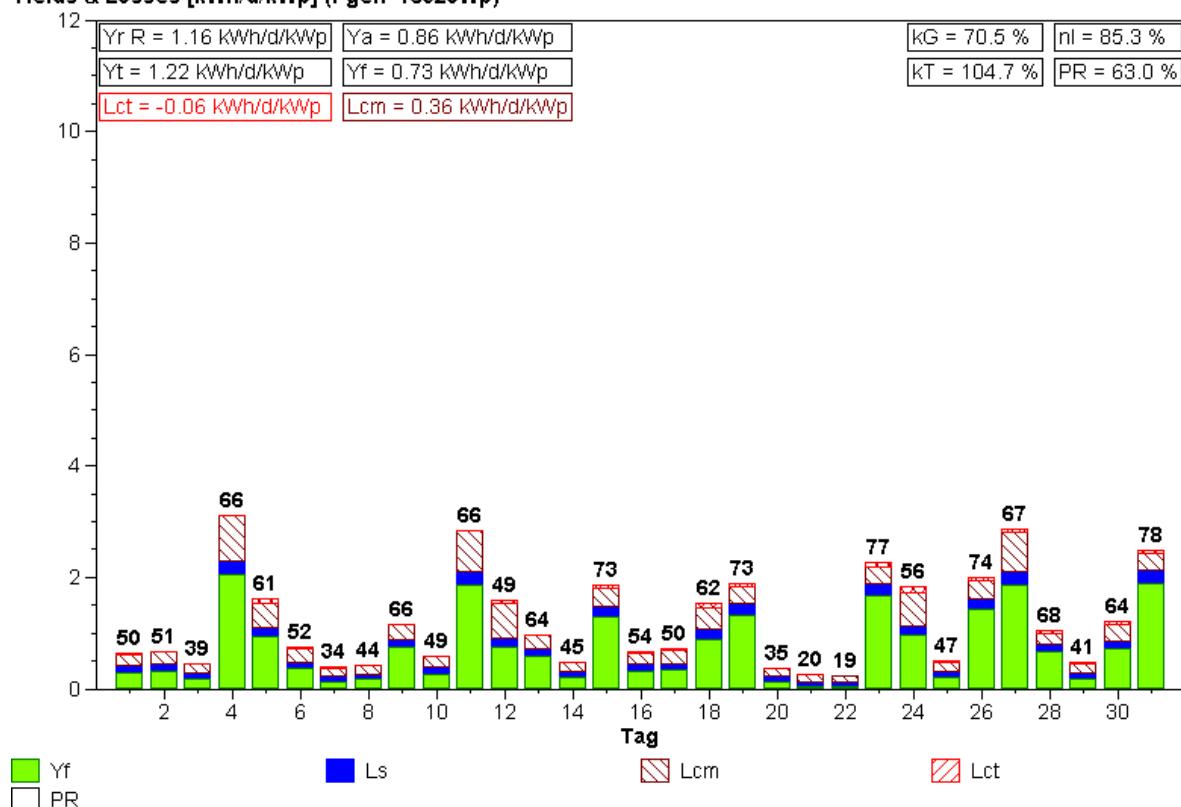
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 12.2000

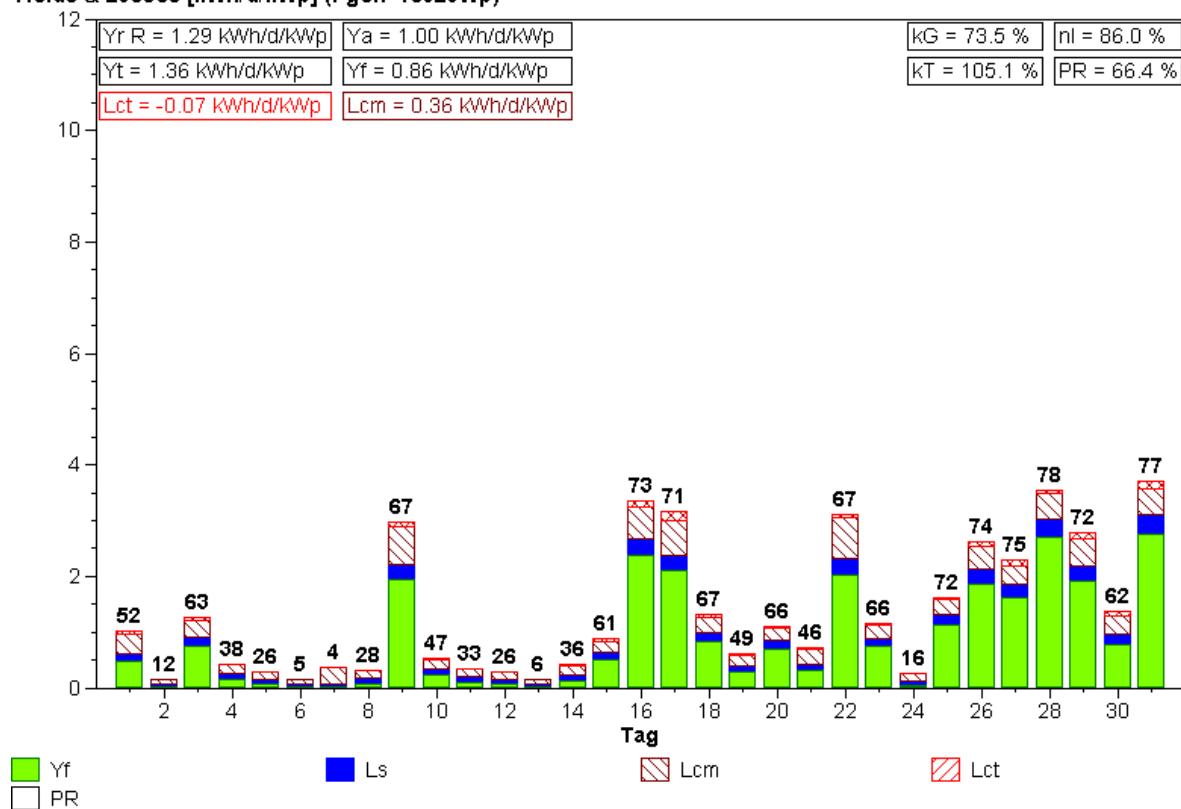
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 1.2001

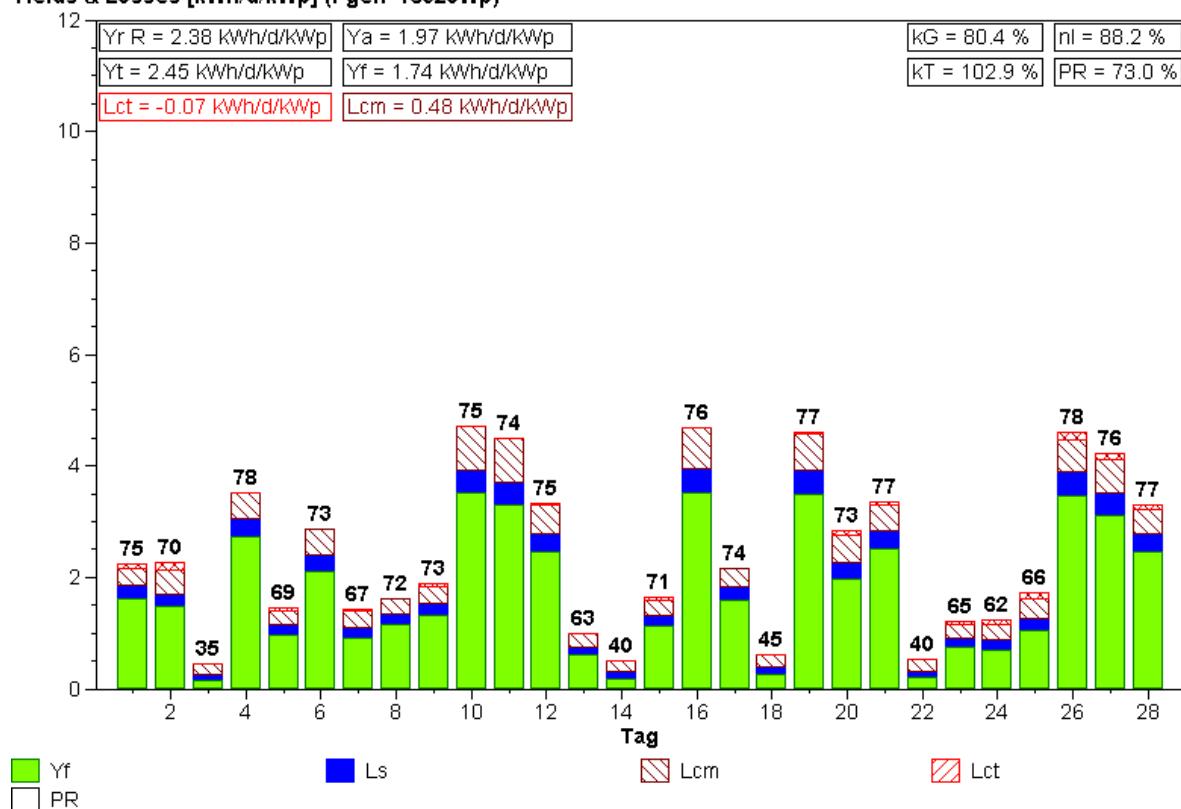
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 2.2001

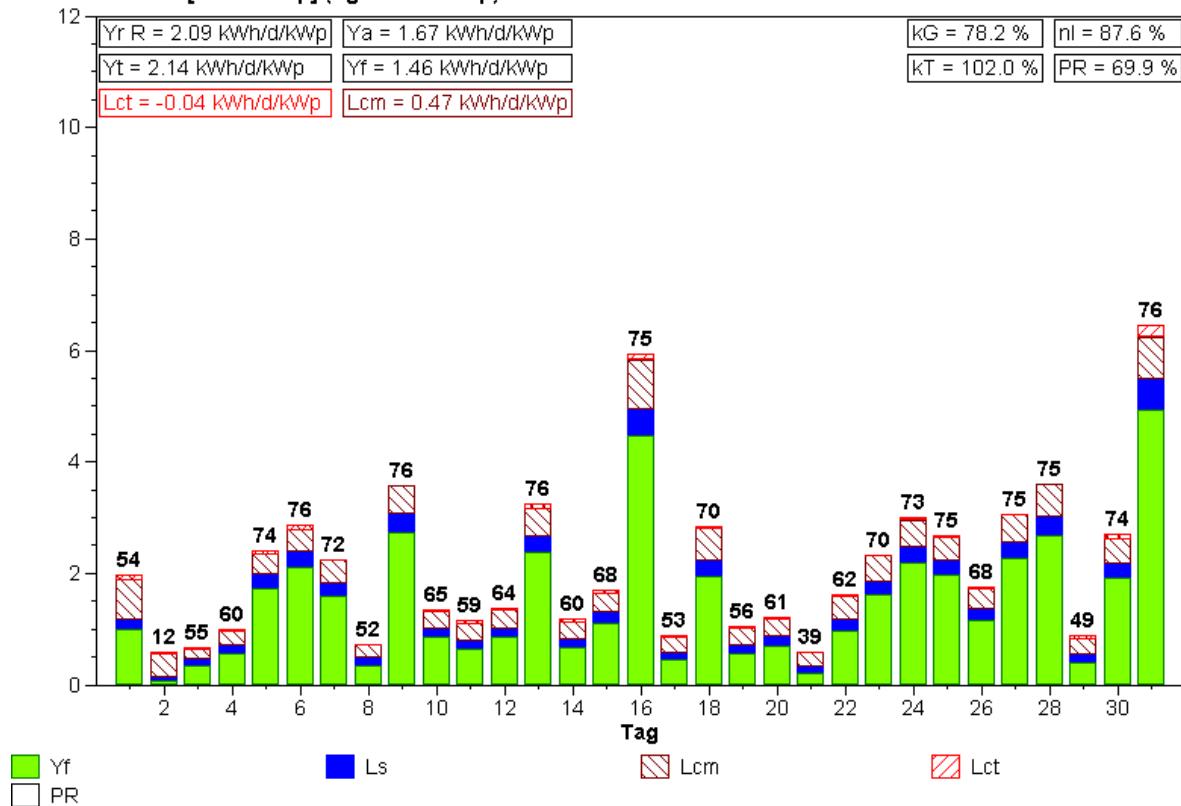
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 3.2001

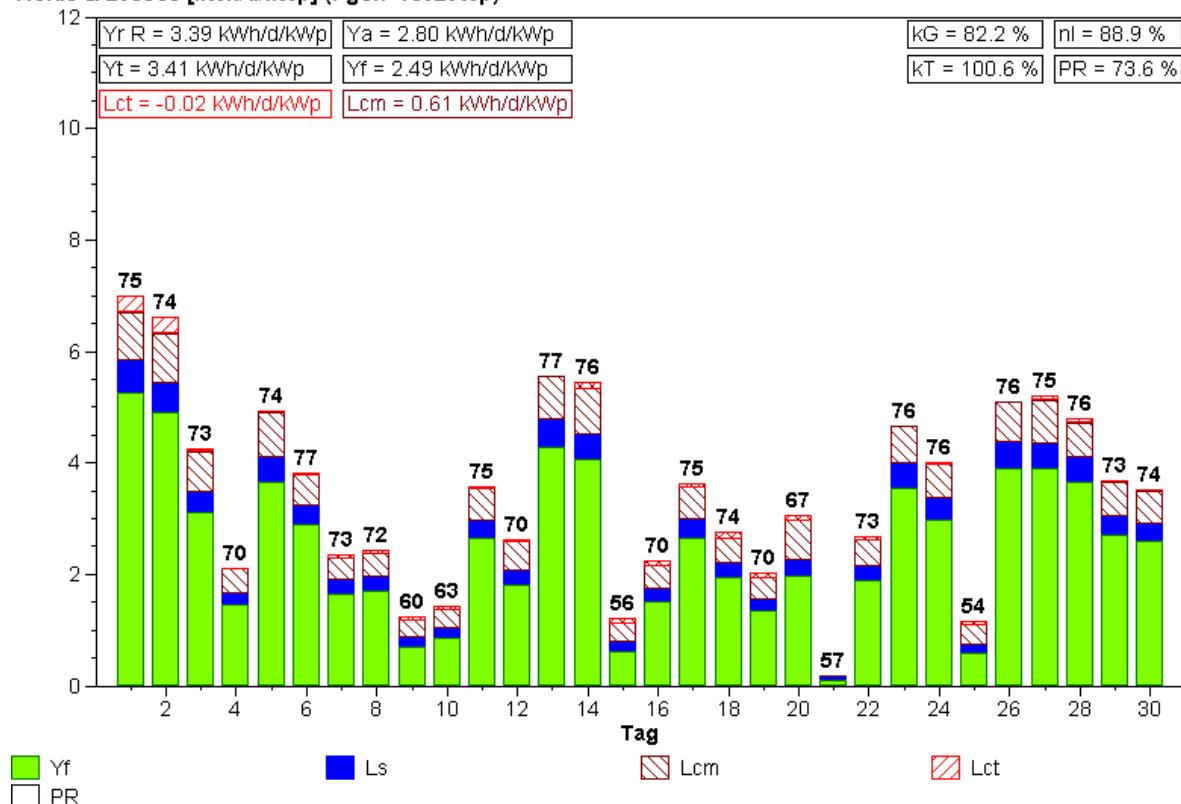
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 4.2001

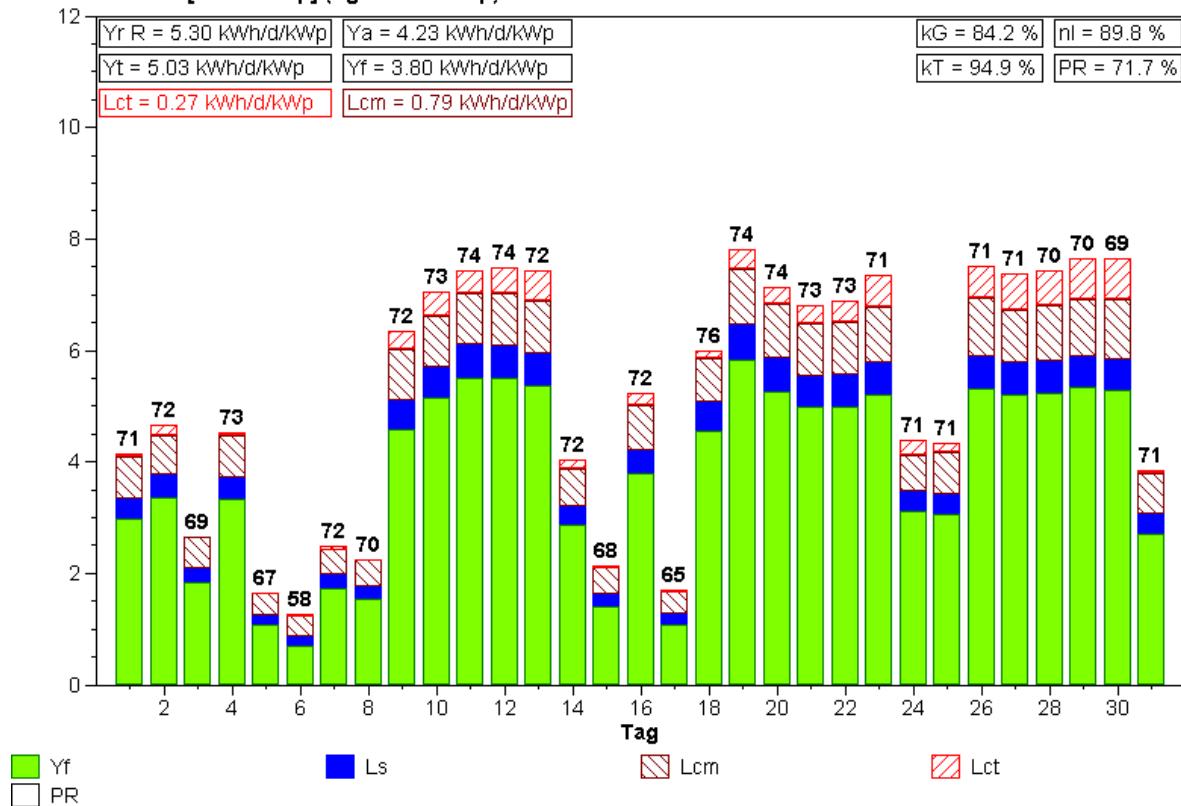
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 5.2001

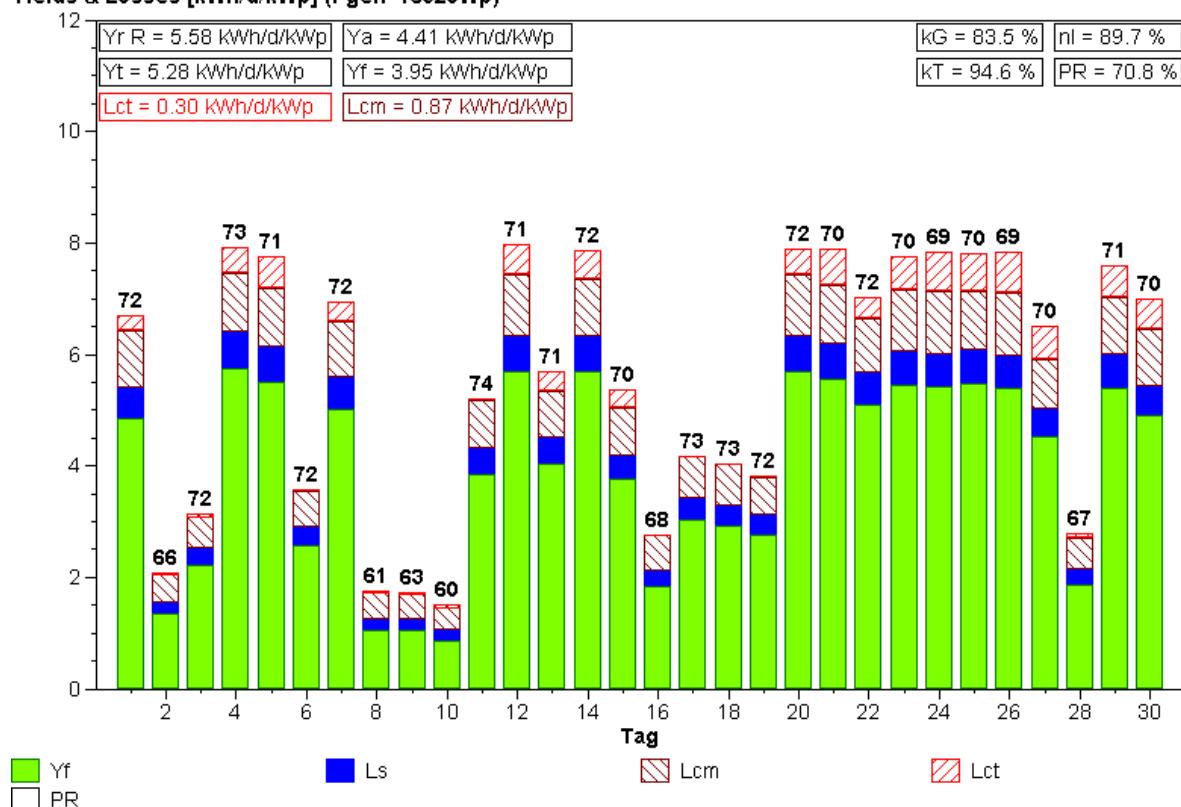
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 6.2001

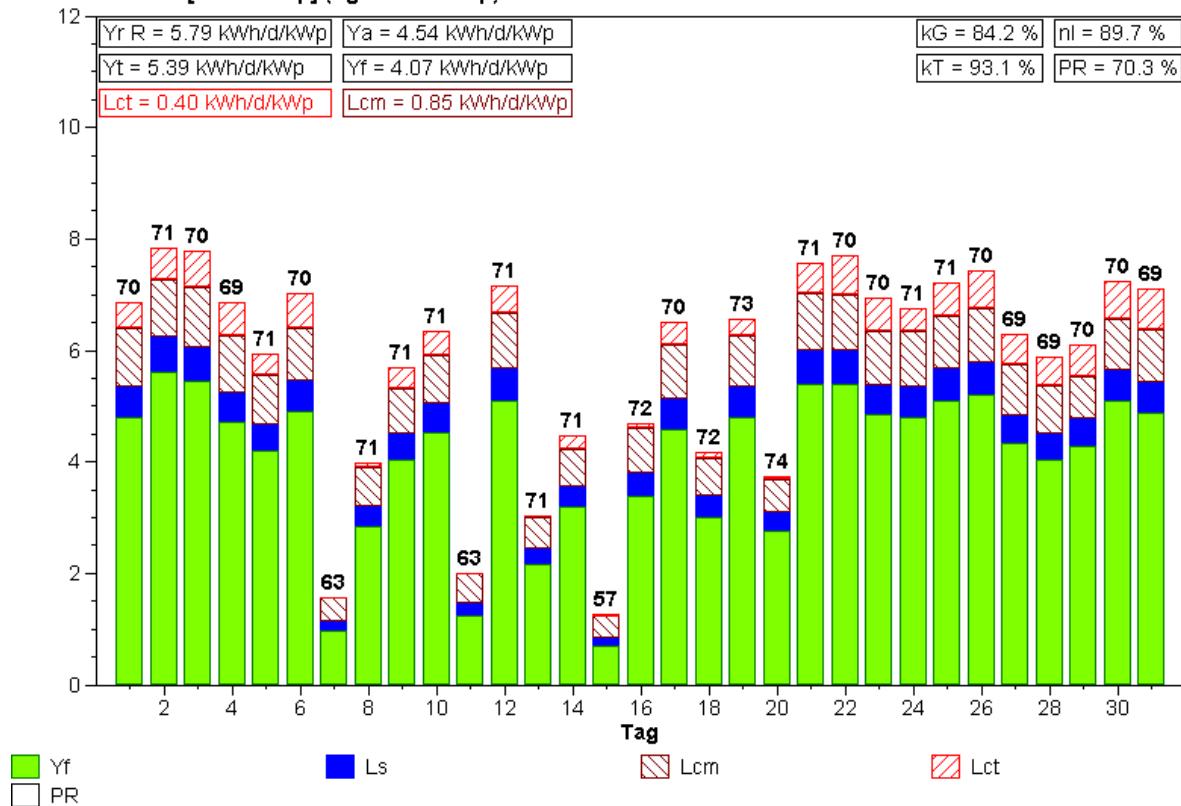
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 7.2001

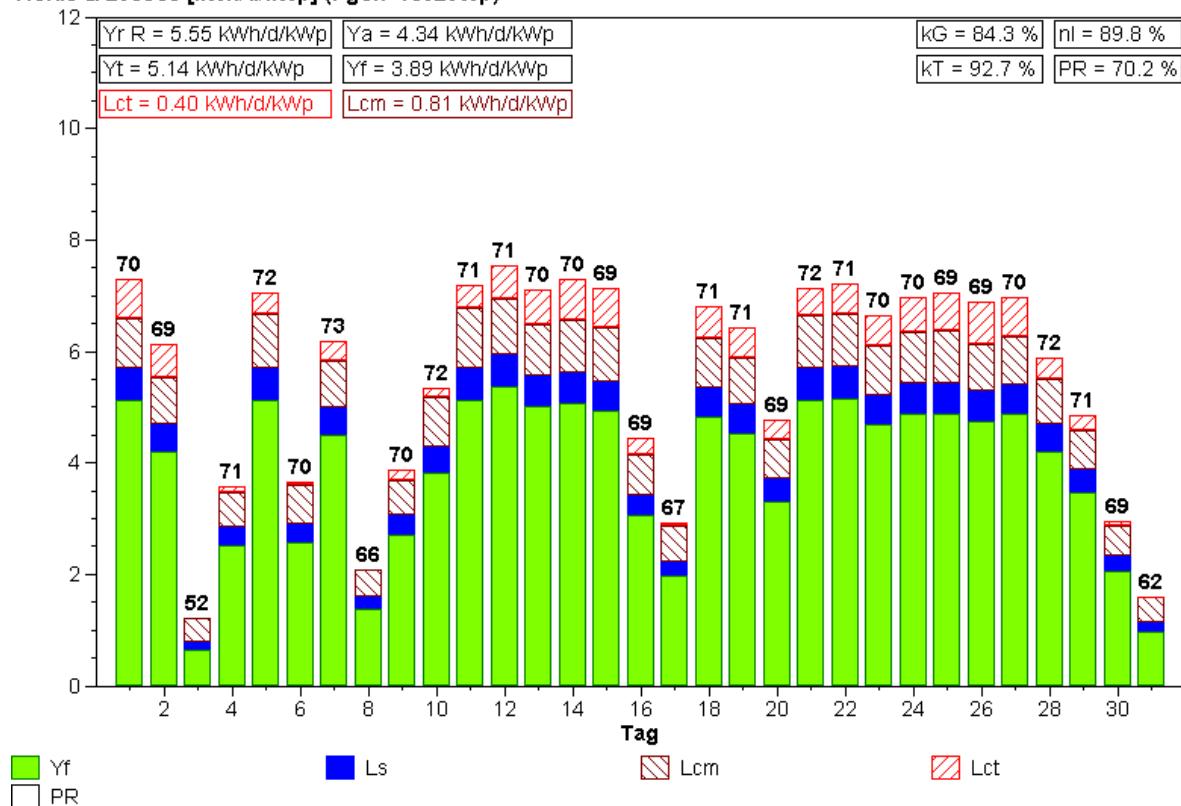
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 8.2001

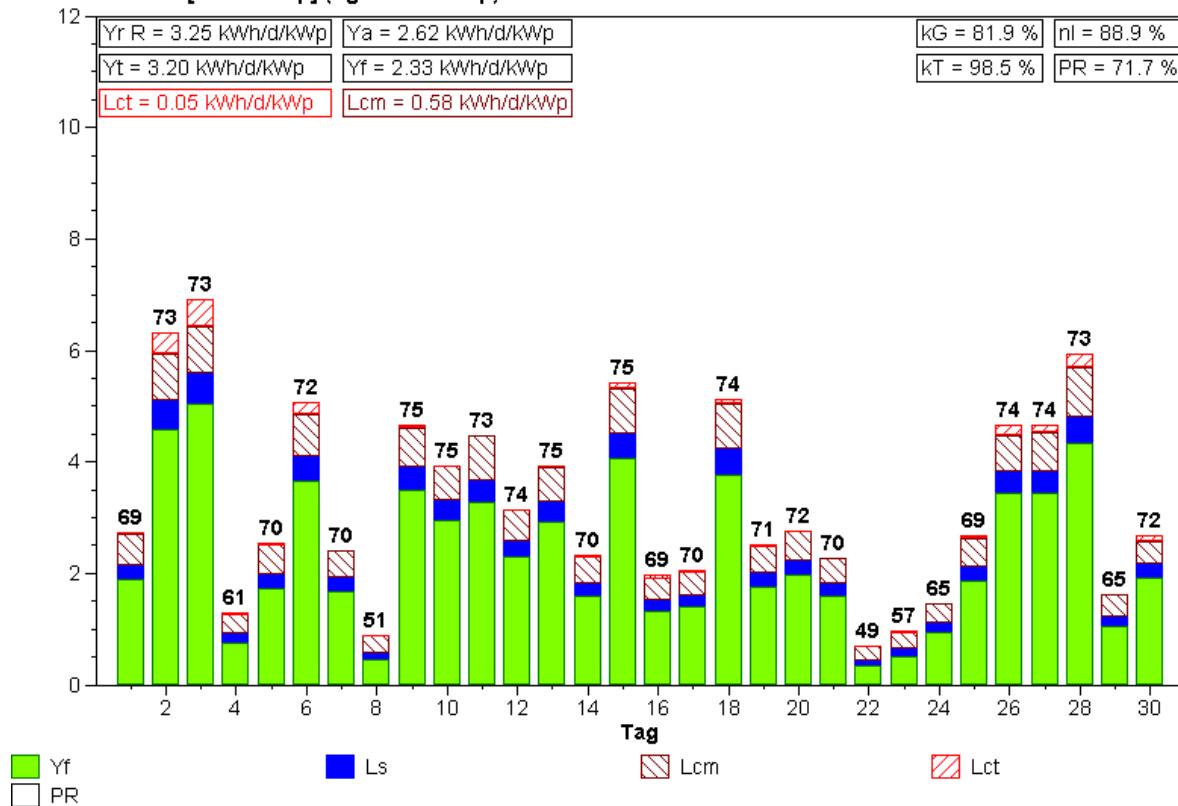
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 9.2001

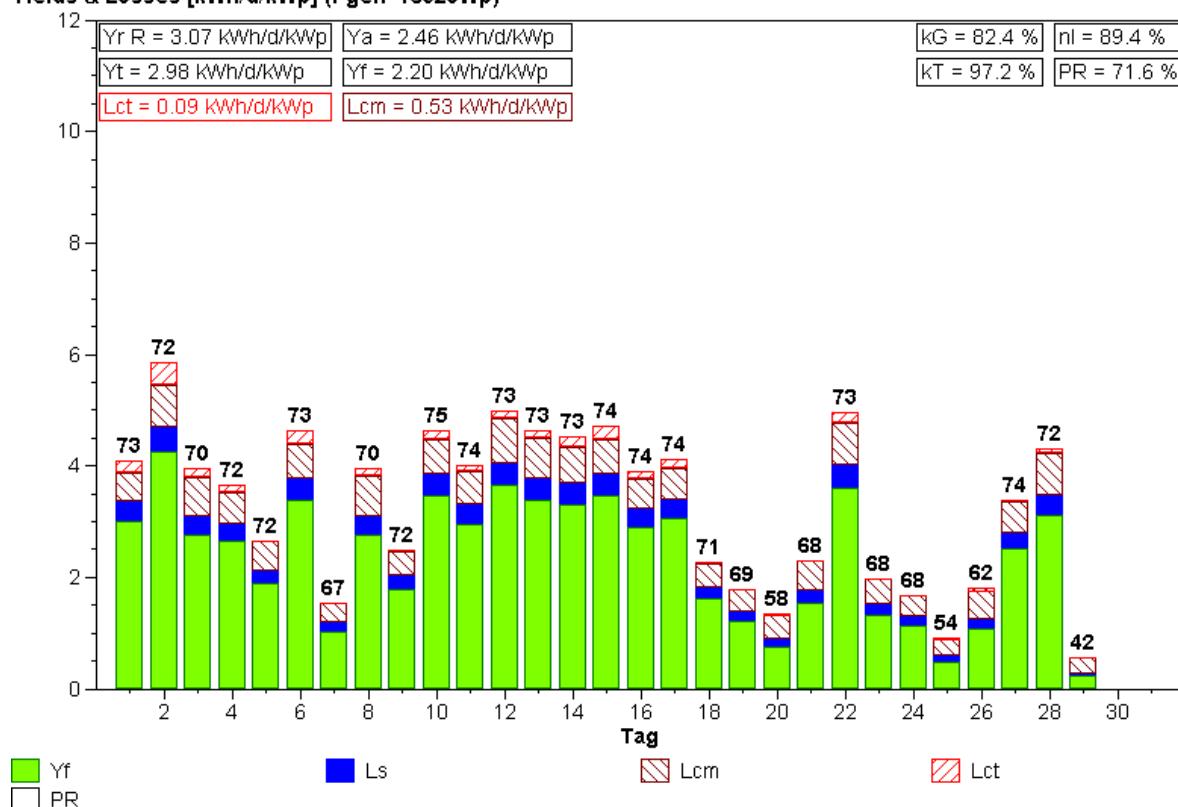
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 10.2001

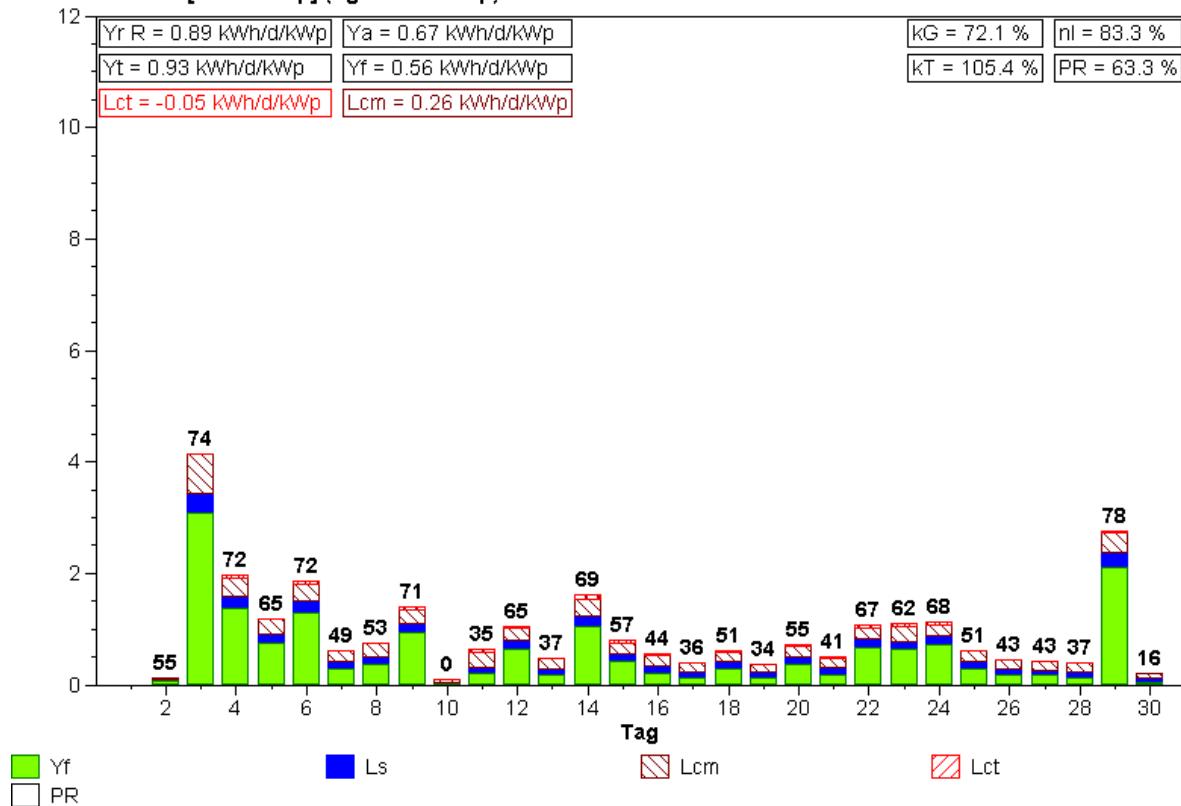
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 11.2001

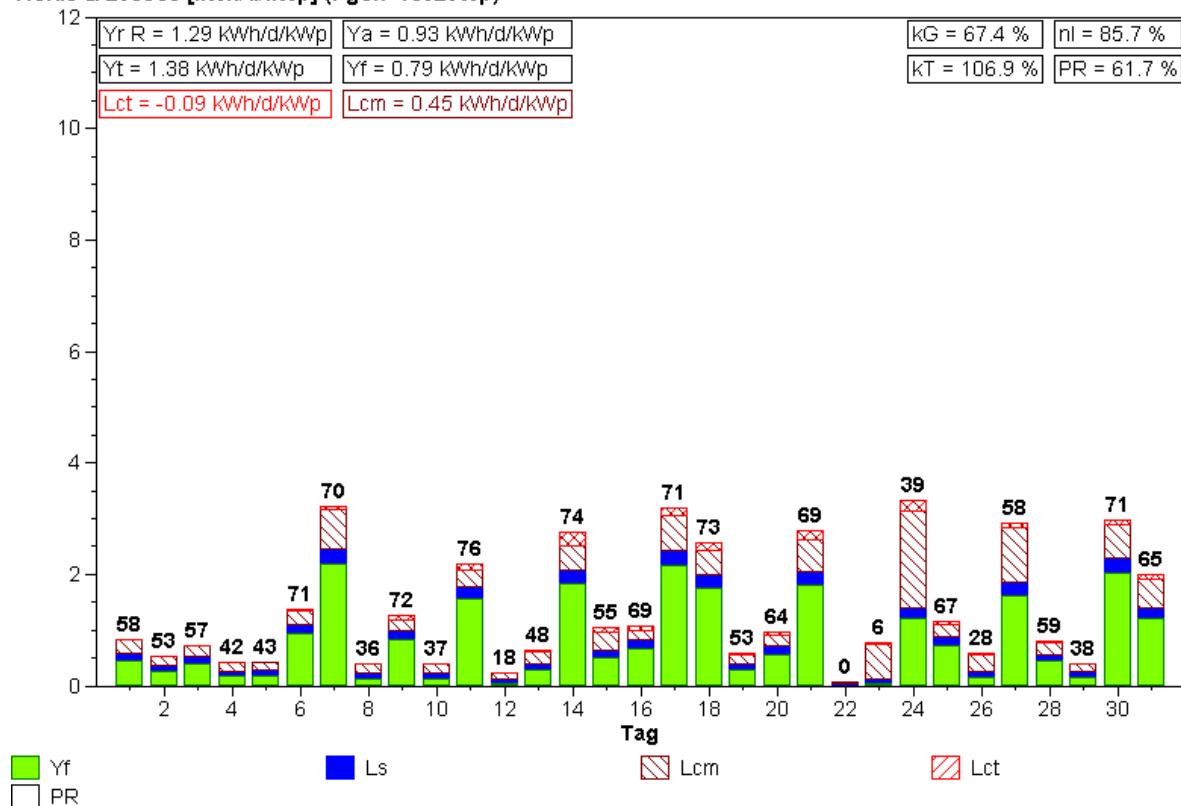
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 12.2001

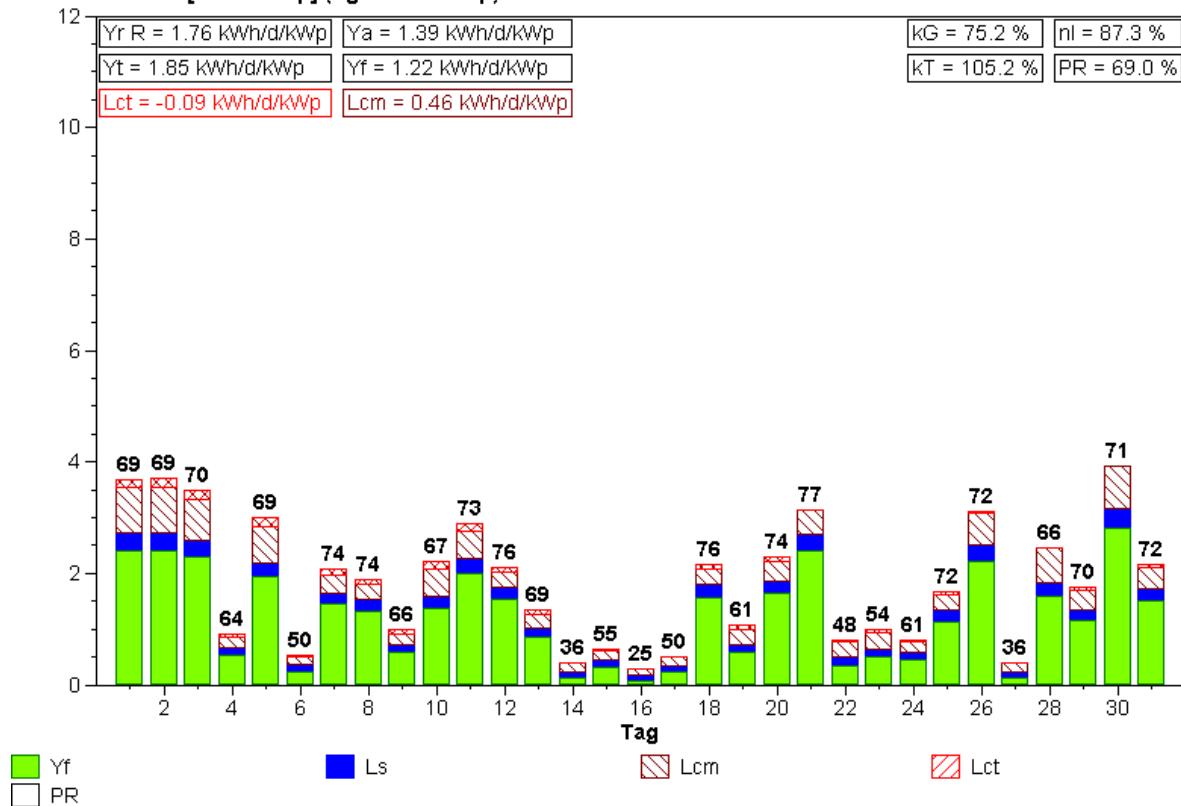
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 1.2002

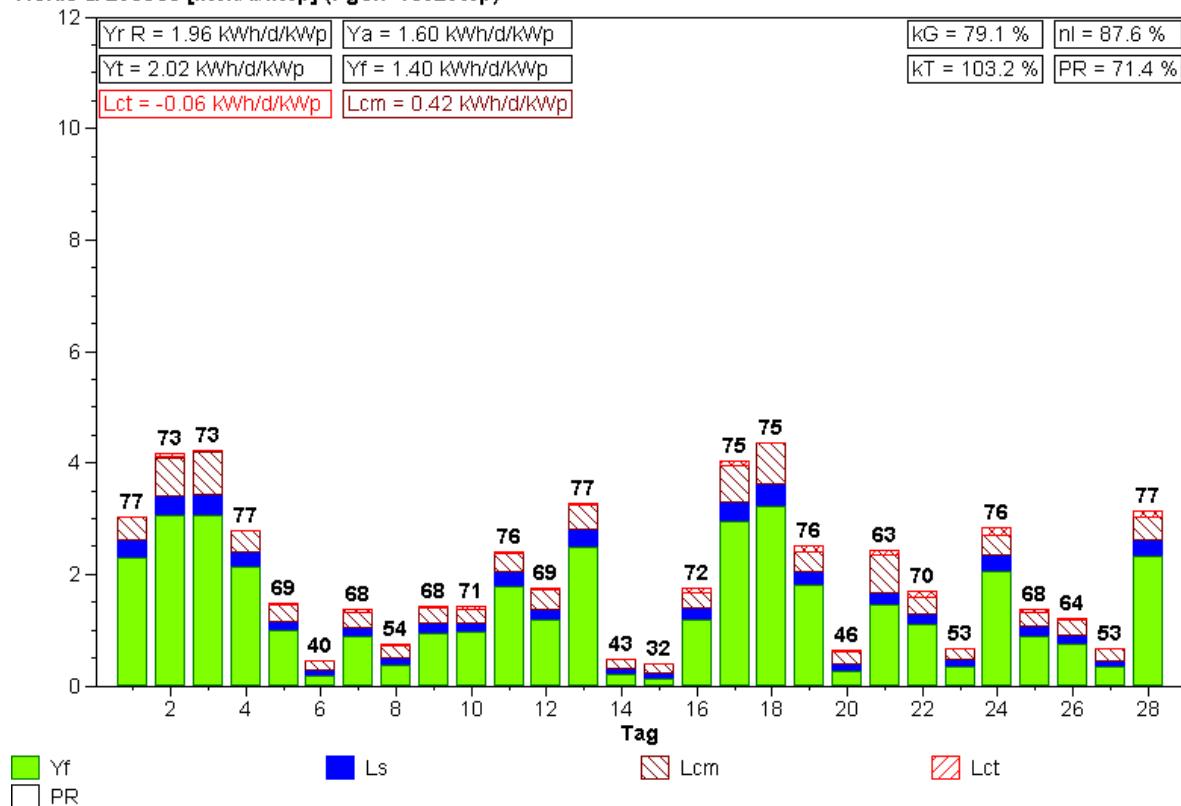
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 2.2002

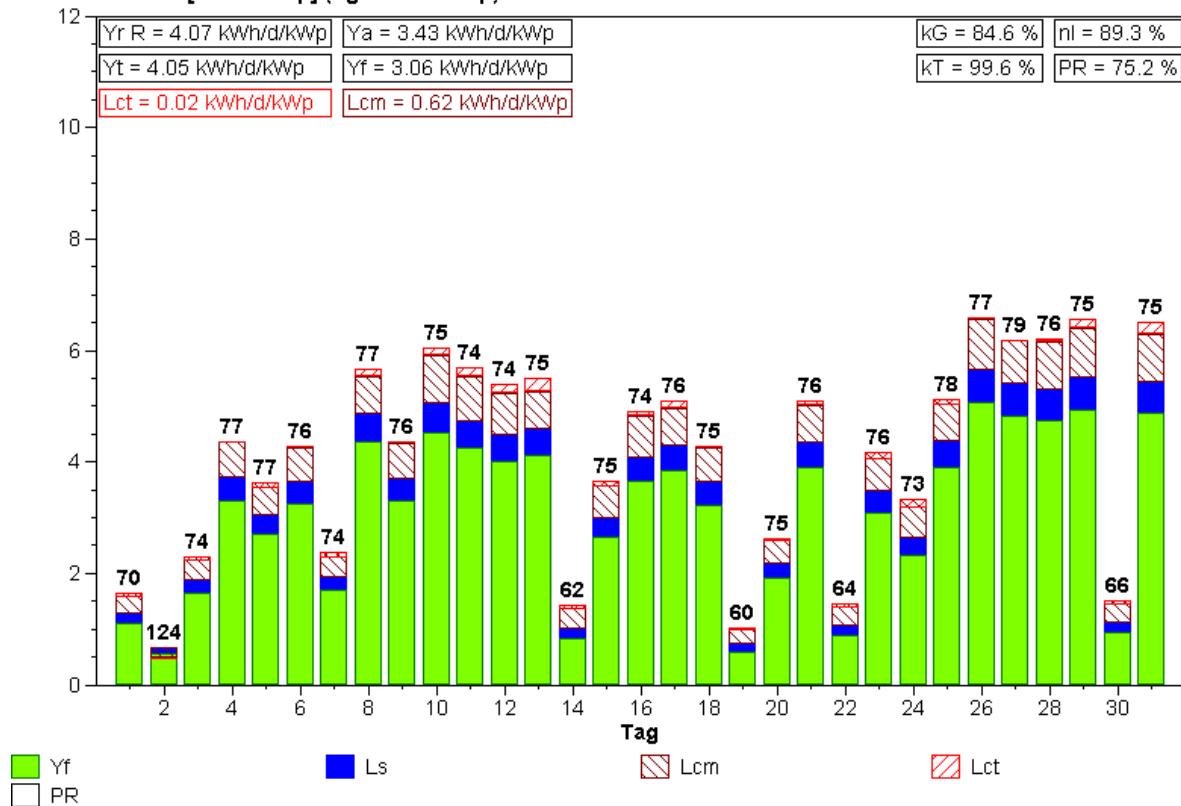
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 3.2002

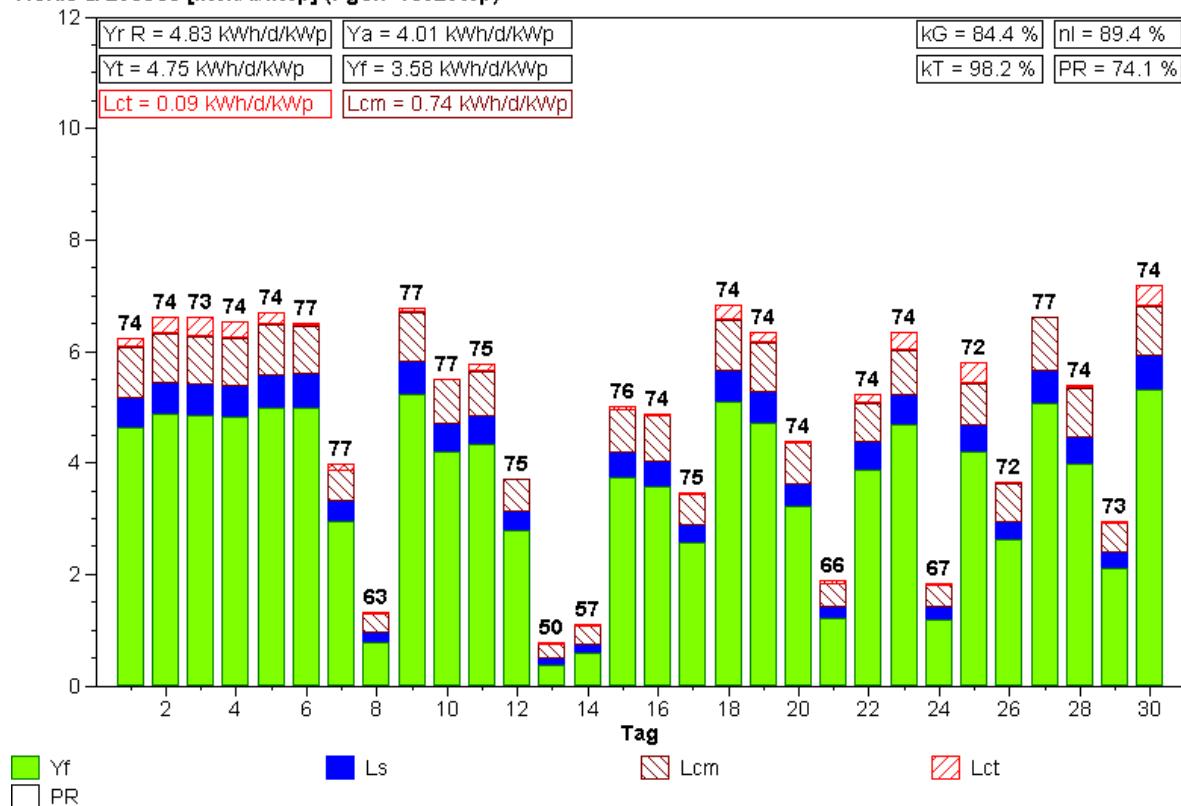
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 4.2002

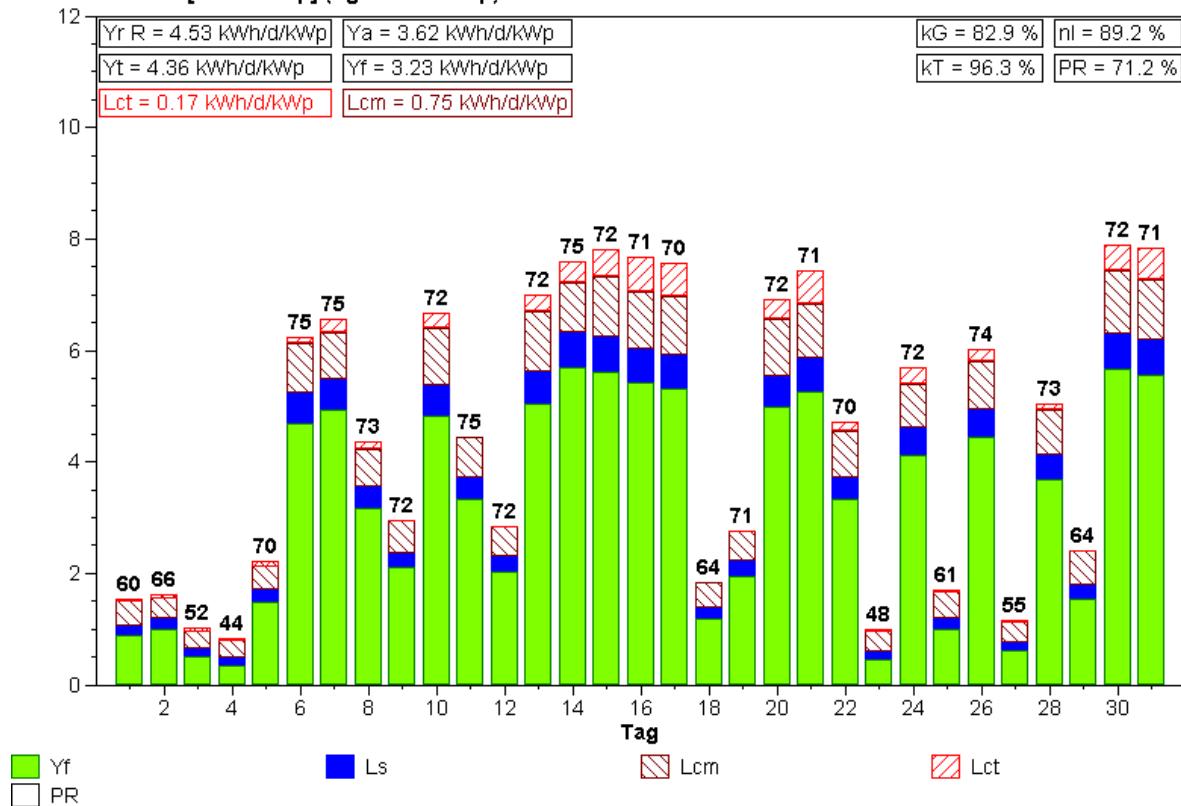
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 5.2002

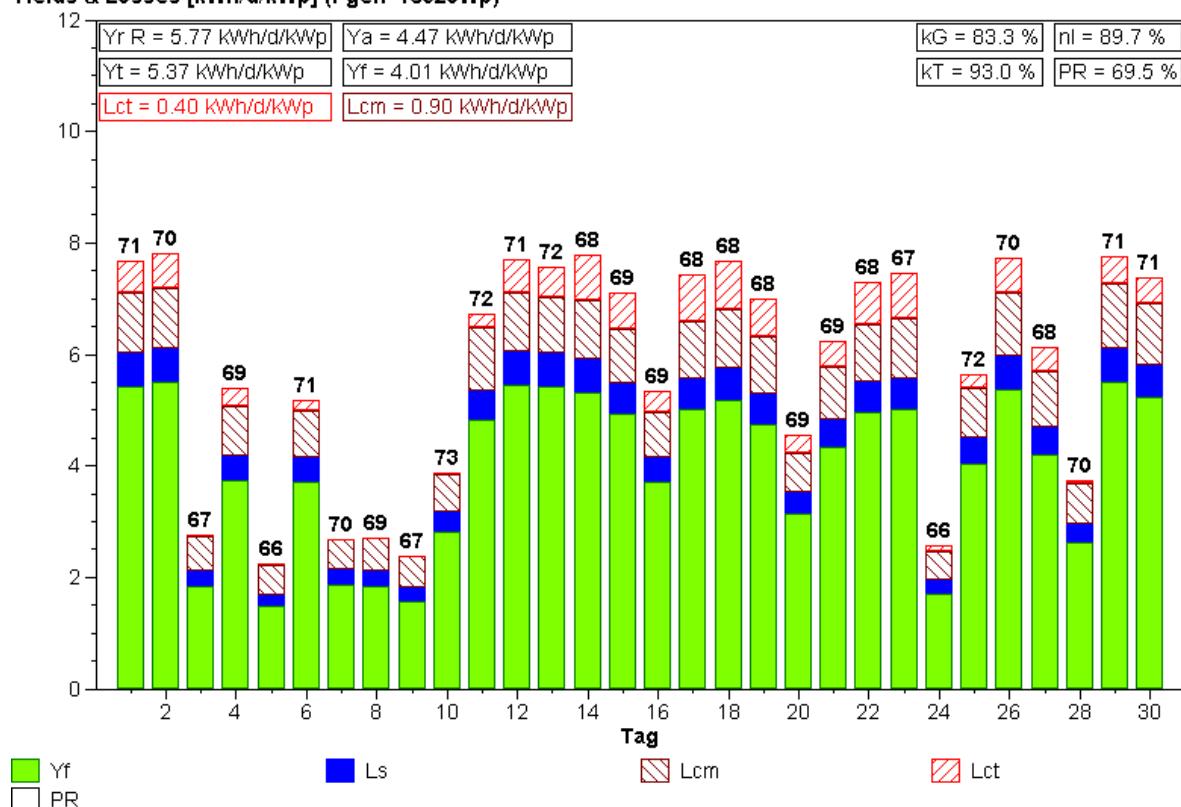
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 6.2002

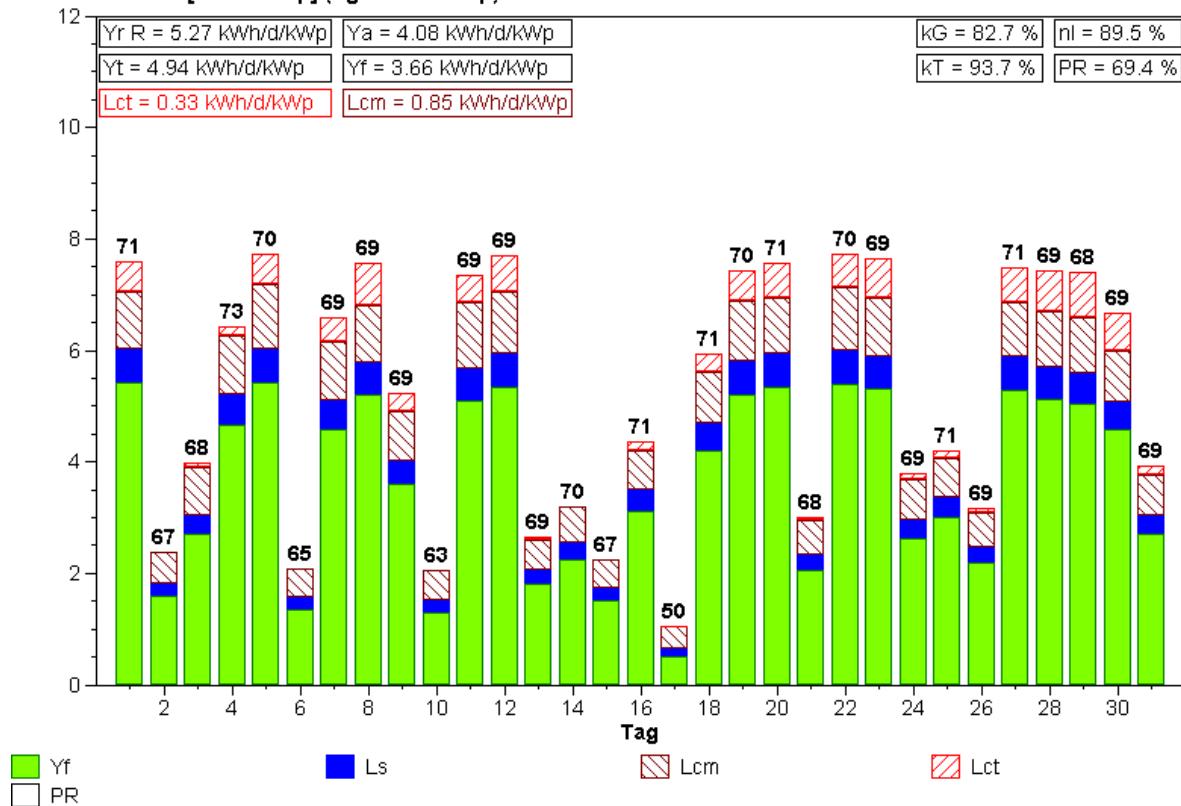
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 7.2002

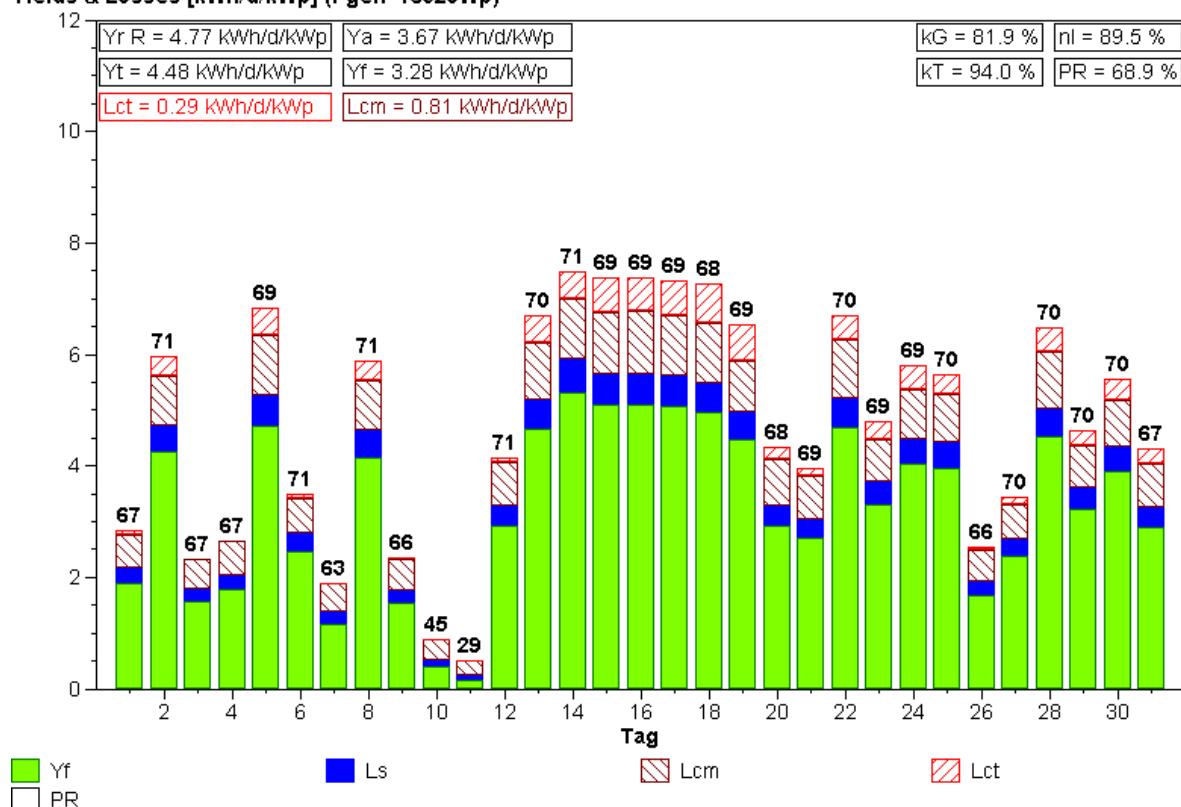
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 8.2002

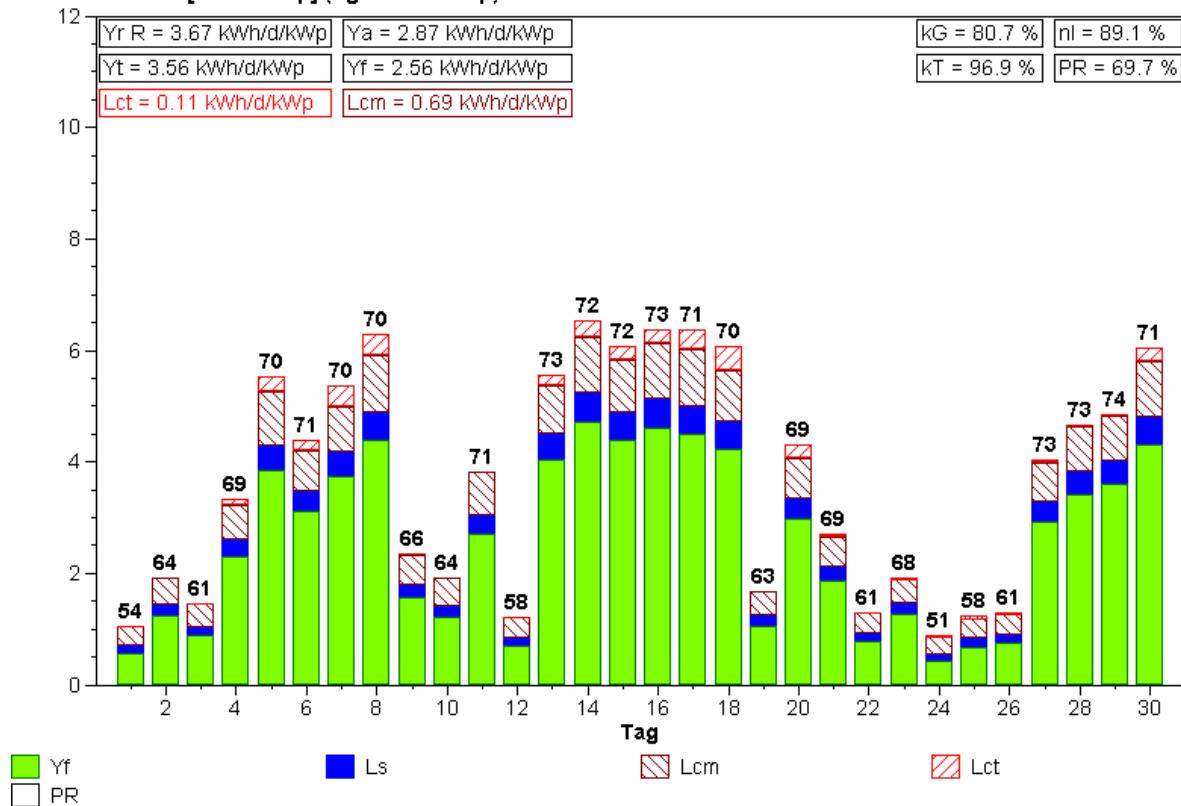
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 9.2002

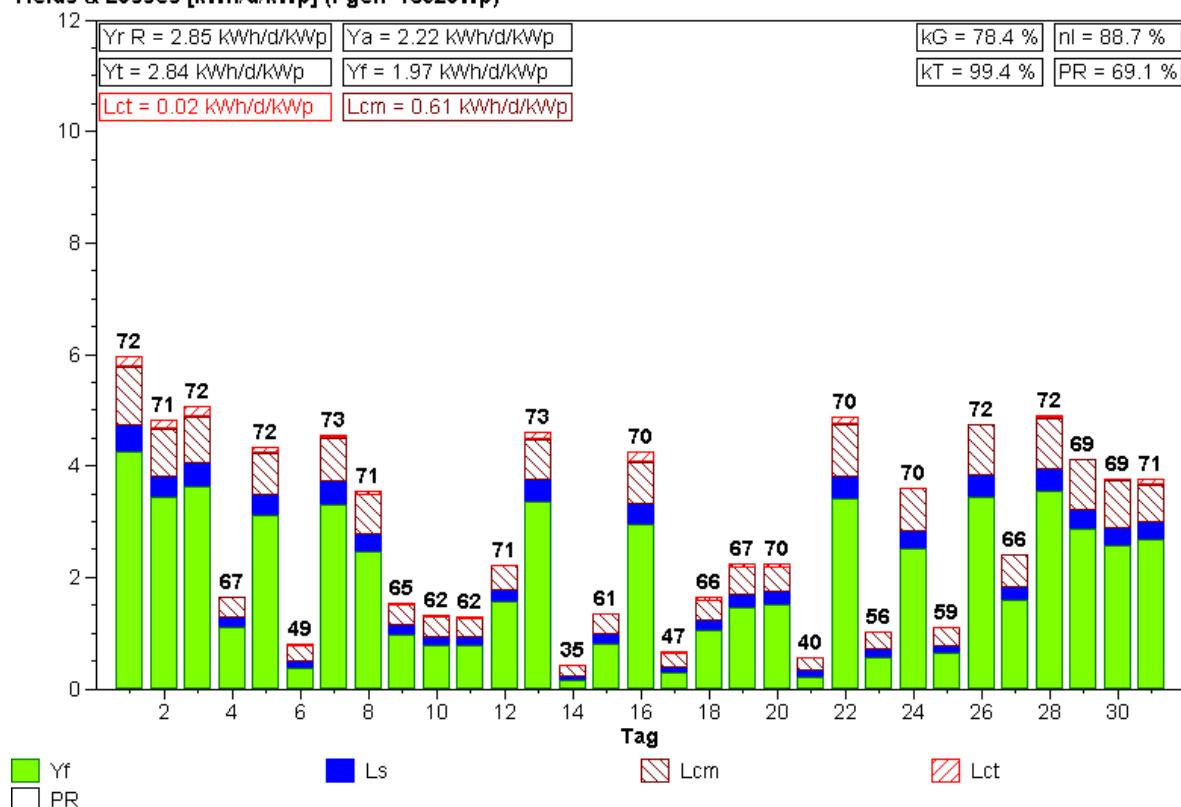
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

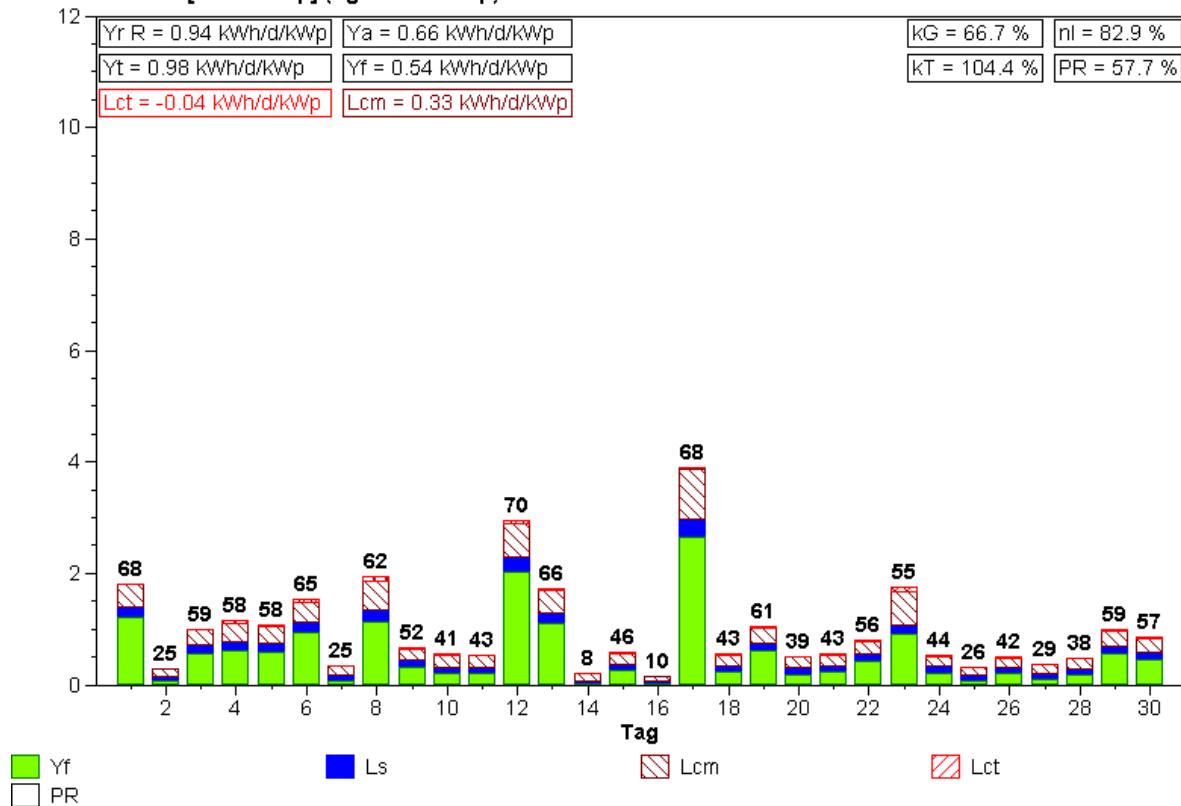
Anlage: LocalNet / Gsteighof, Burgdorf Monat: 10.2002

Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)

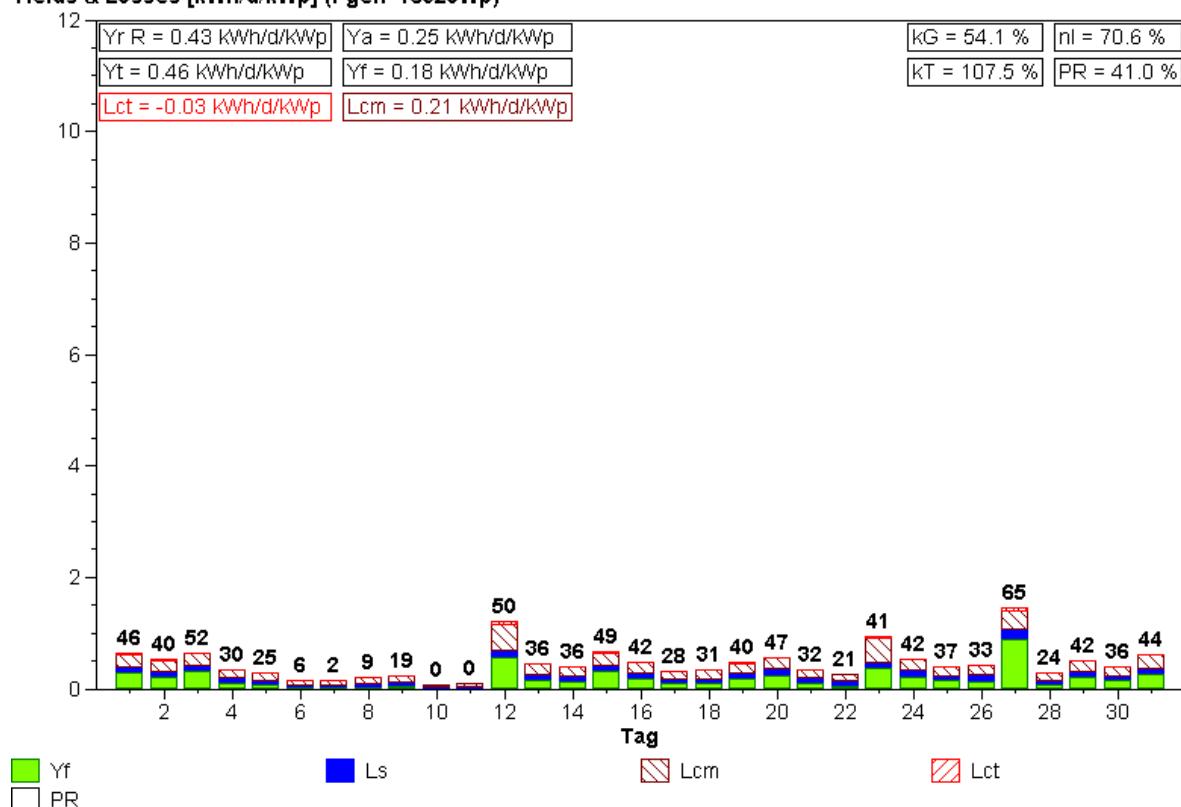


**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 11.2002

**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**

**Normierte Monatsstatistik (Referenzzelle)**

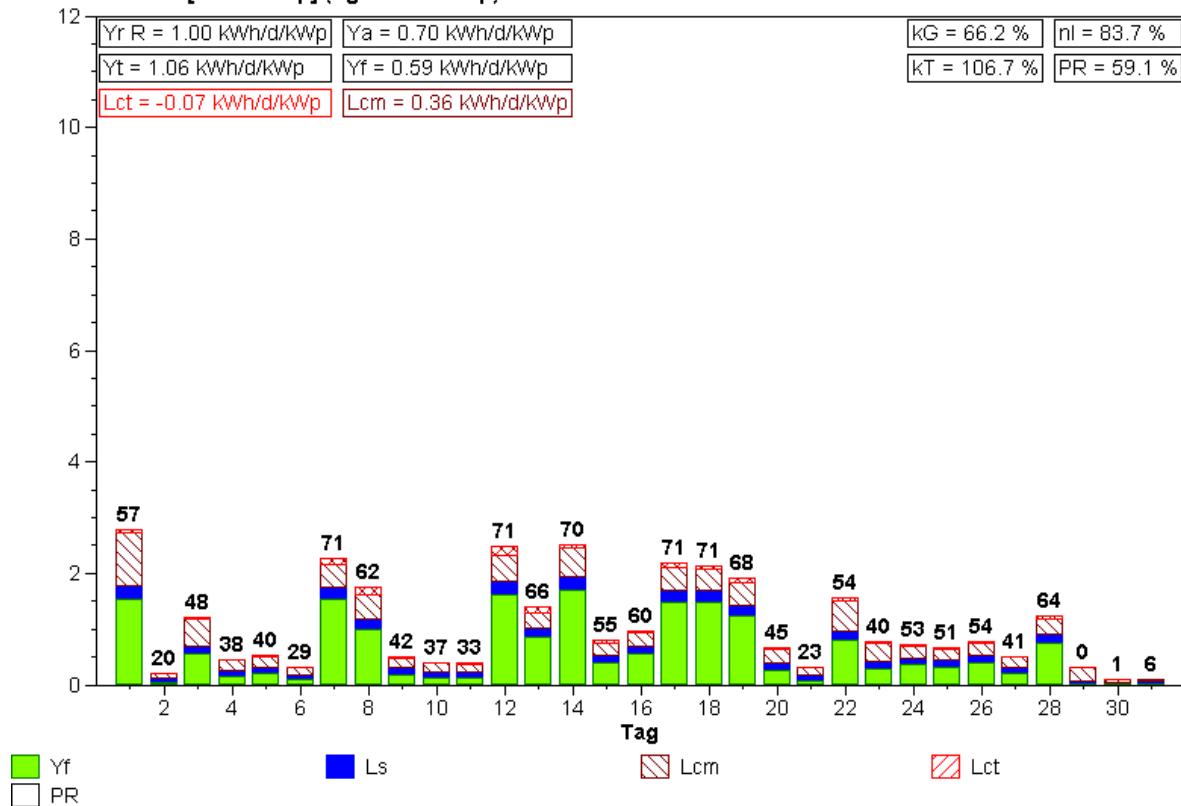
Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 12.2002

**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**


**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 1.2003

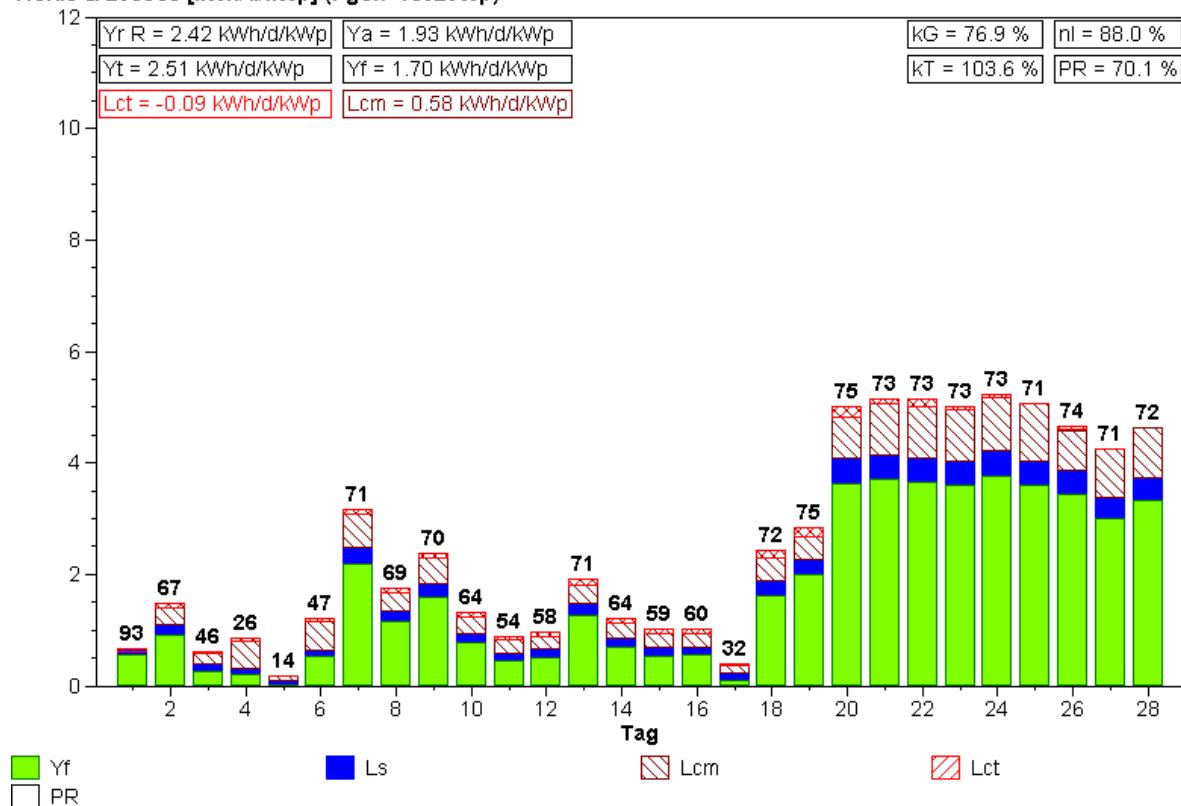
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



**Normierte Monatsstatistik (Referenzzelle)**

Anlage: LocalNet / Gsteighof, Burgdorf    Monat: 2.2003

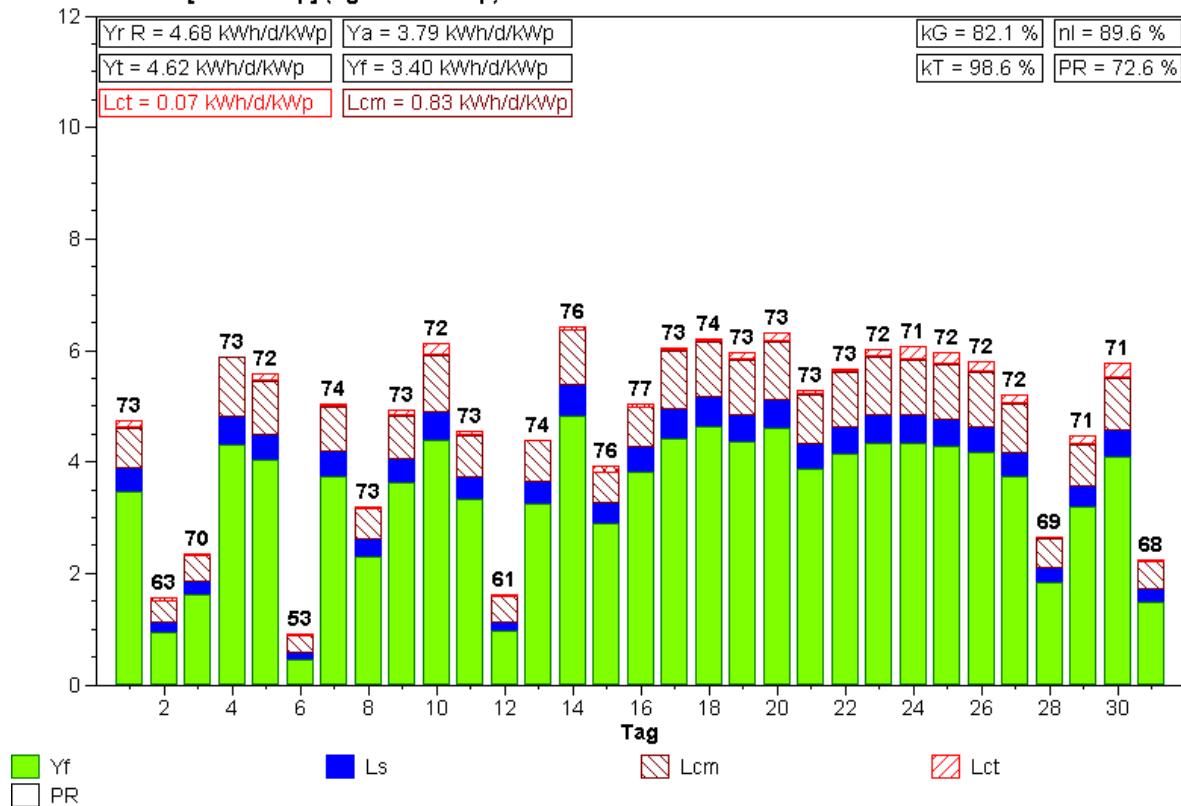
**Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)**



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 3.2003

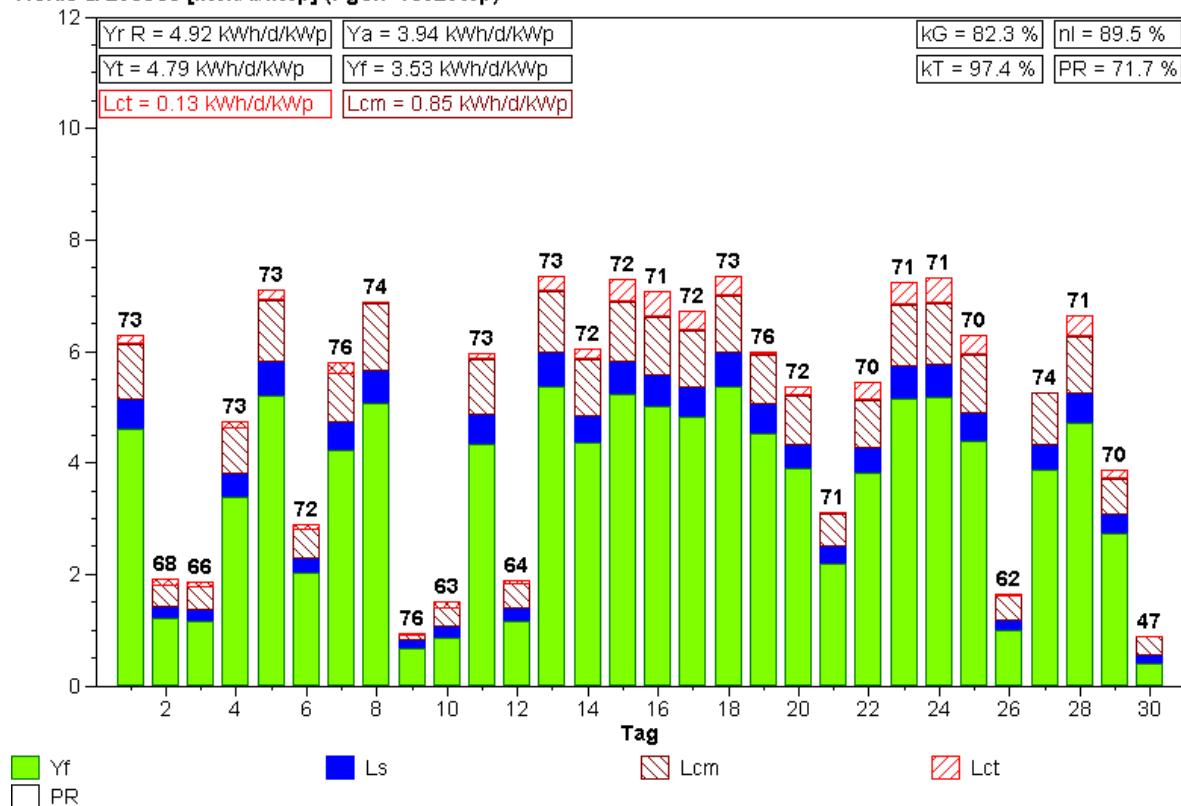
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 4.2003

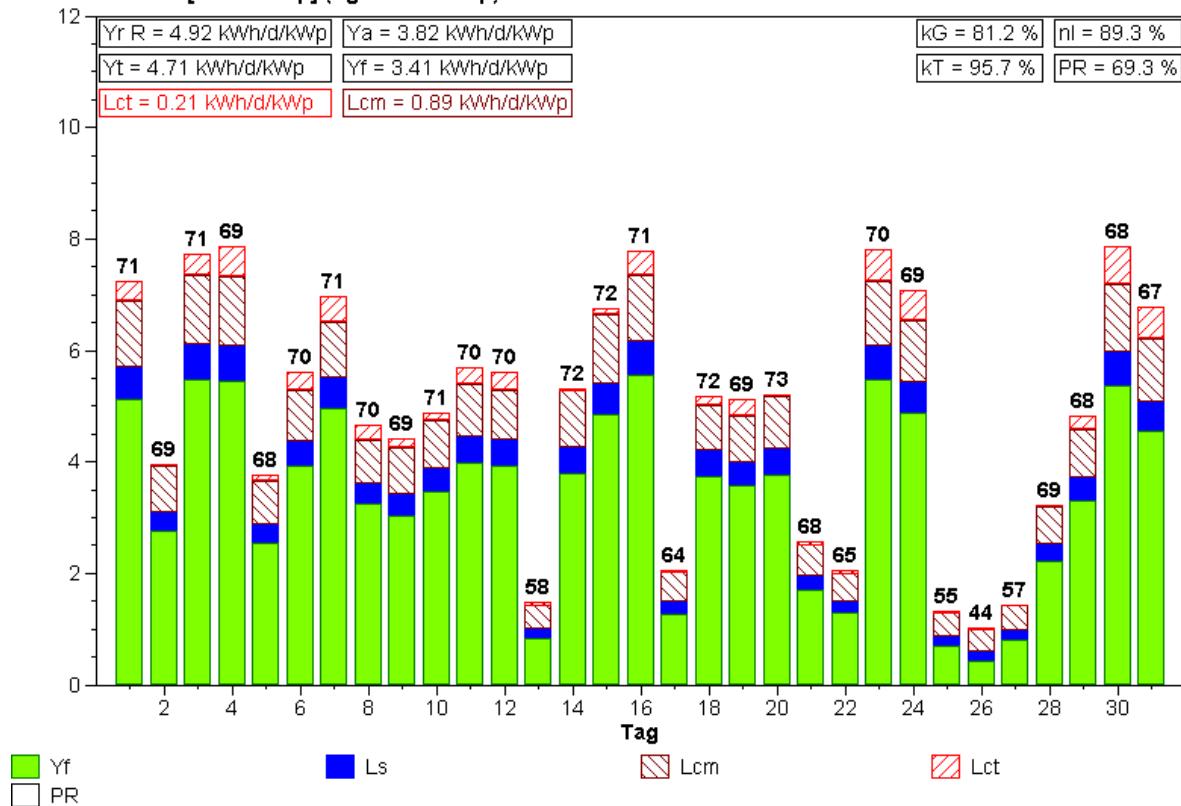
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 5.2003

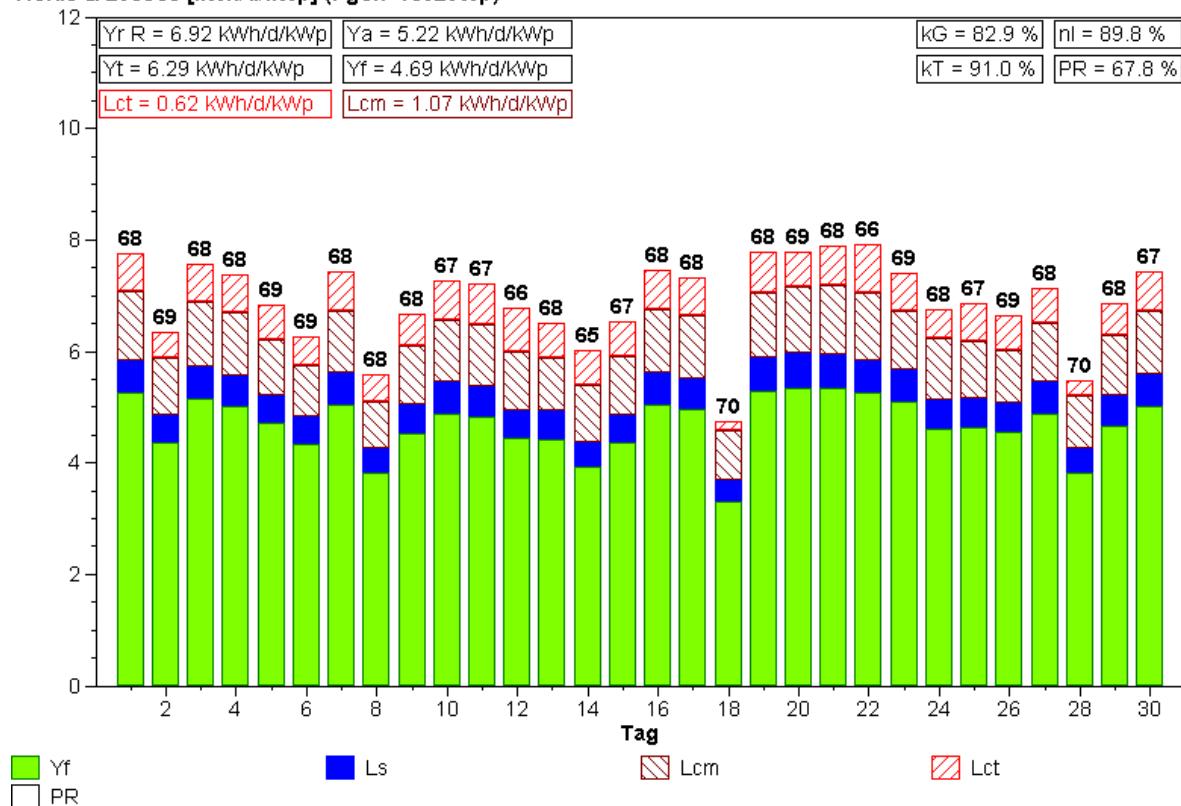
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 6.2003

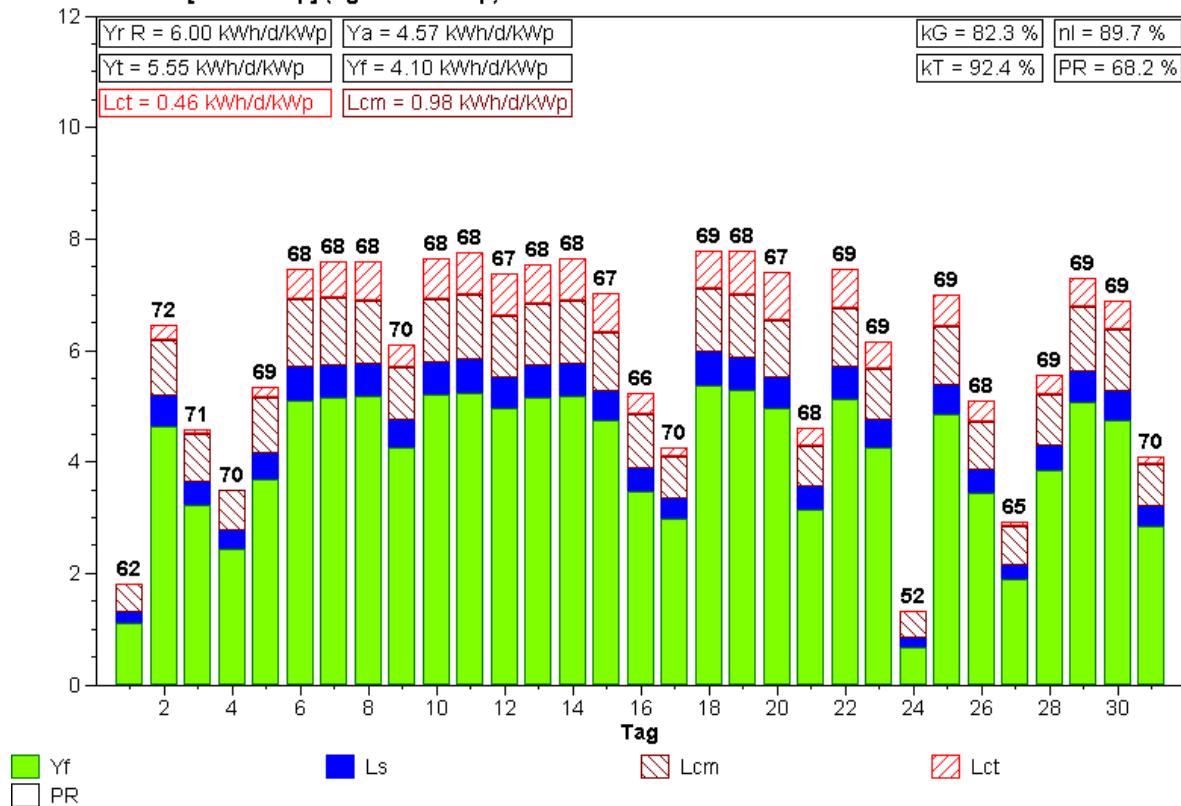
Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 7.2003

Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)



Normierte Monatsstatistik (Referenzzelle)

Anlage: LocalNet / Gsteighof, Burgdorf Monat: 8.2003

Yields & Losses [kWh/d/kWp] (Pgen=16320Wp)

