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SOLAR THERMAL ENERGY RESEARCH GROUP

STERG overview and progress

Ist STERG Symposium

Paul Gauché

18 July 2013



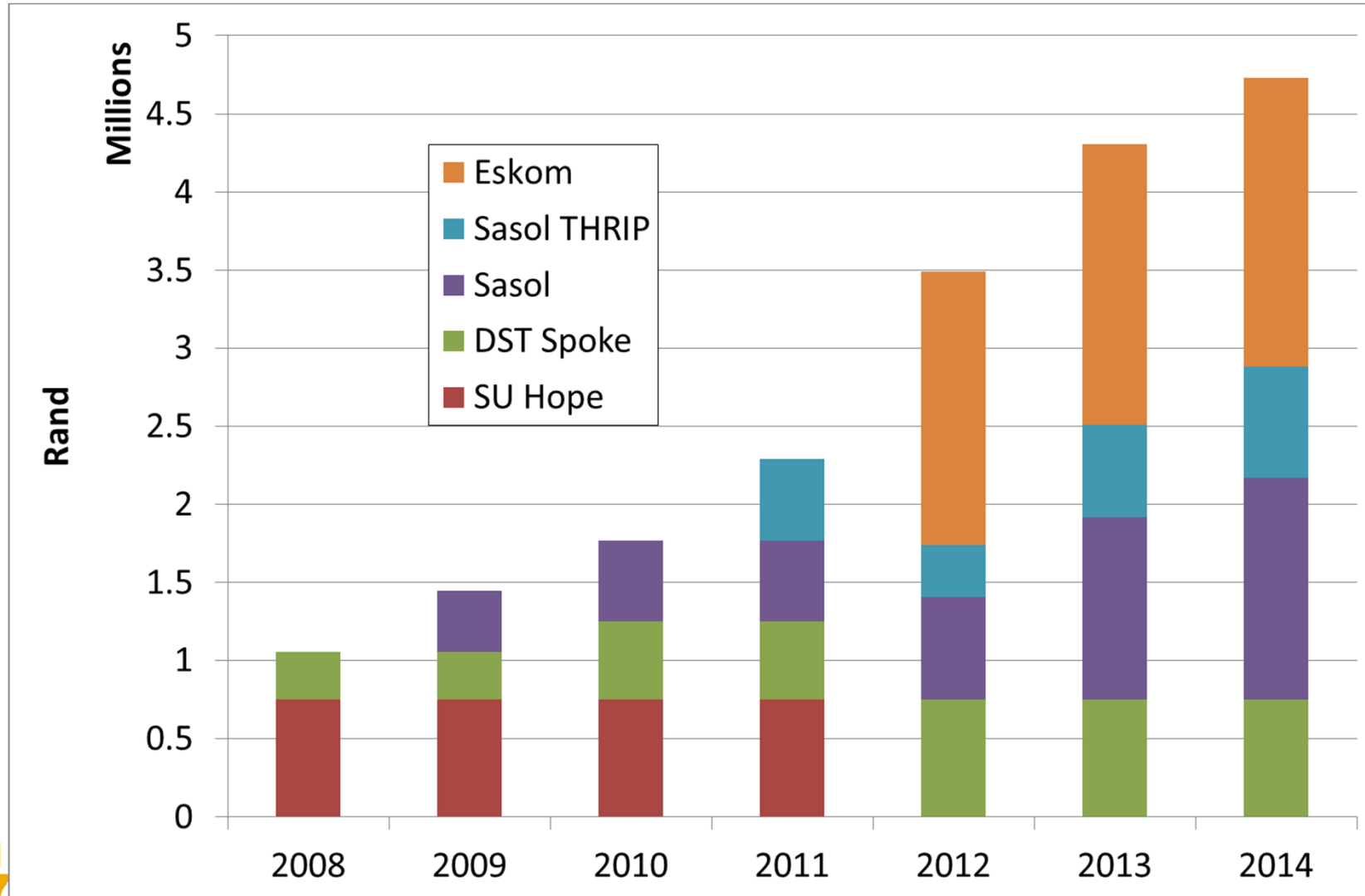
Fakulteit Ingenieurswese
•
Faculty of Engineering



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Funding and sponsors (approx CSP income)





Collaboration (some key partners)



Collaborator	Status
Sasol	Invitation to special equipment funds since 2013 Some contract research commencing in 2013
CSIR/SANEDI/RECORD	Solar research centre planning
DLR	Relationship with Christoph Richter Beginning discussions for formal collaboration with point focus group under Reiner Buck includes student exchanges and closer ties with some of our funders
NREL	Several meeting held with NREL CSP team on collaborating, exchanges of people. No activities yet.
Sandia Labs	Sandia willing to consider academic licensing of some technologies. Budgeting w/ Sasol 2014 grant. Sandia/STERG application to a US DoE grant to improve CSP knowledge transfer in SA for 2014/15
Imperial College/IIASA	Systems R&D
Technology suppliers	Several, but very limited contact





Solar thermal history at SU



1980 - 1989	1990 - 1999	2000 - 2009	2010 -
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First Parabolic Trough Research



Dry cooling research at SU commences



Solar chimney research at SU commences



Solar roof lab commissioned



RENEWABLE & SUSTAINABLE ENERGY STUDIES

National SANERI/DST RE centre founded

SANERI/DST Solar thermal spoke & Hope project



SASOL reaching new frontiers Sasol researcher



Research and academic committee representative



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Solar resource station at SU



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STERG acceleration



2010 7 – 15 people	2011 ~ 30 people	2012 ~ 45 people	2013 – ~ 60 (75) people
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NRF solar thermal spoke 2013 - 17



Solar roof lab expansion (with tower, kiln, etc)



SASOL reaching new frontiers
Sasol 40 m² heliostat field



Solar resource station at SU



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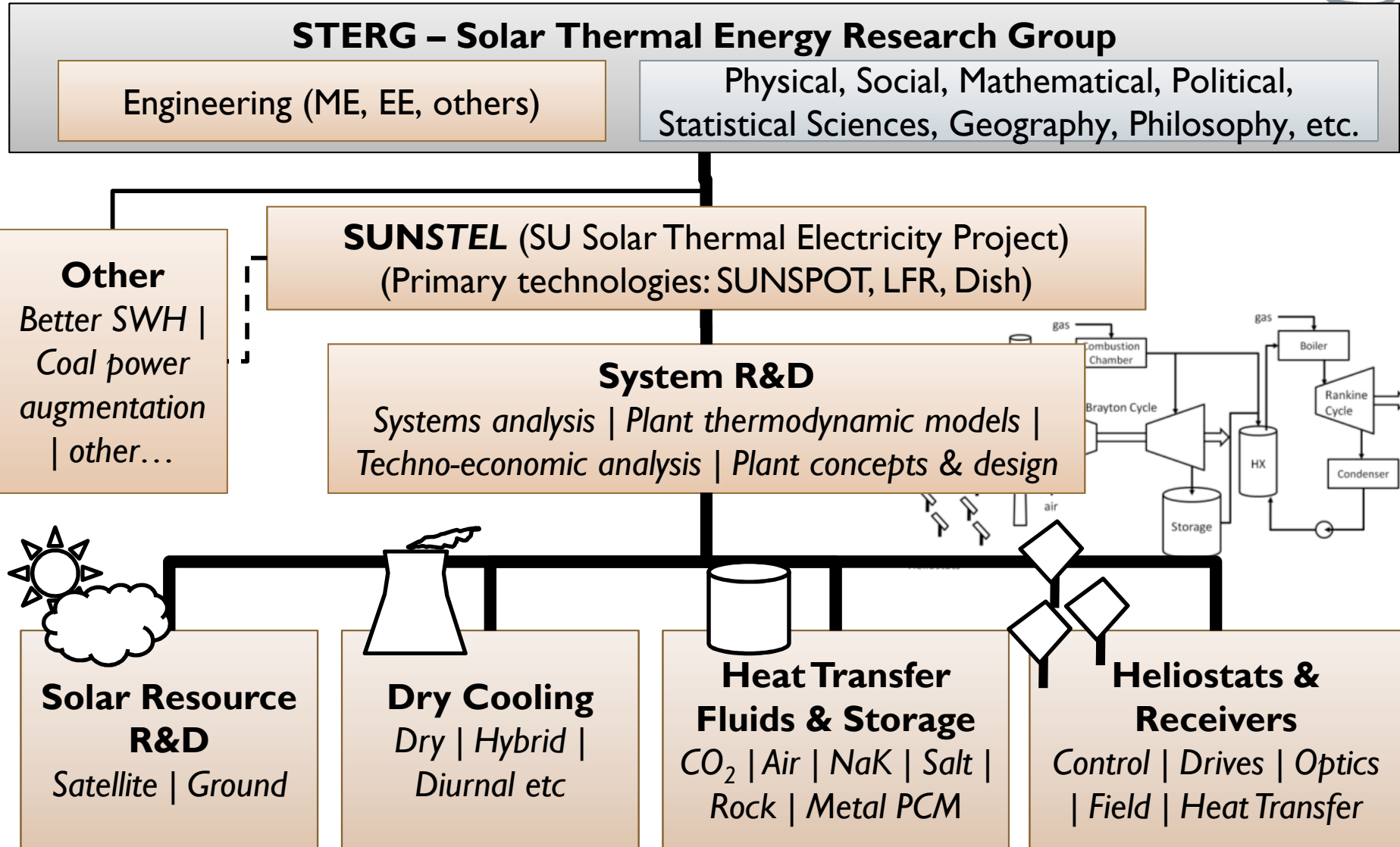
STERG infrastructure & resources

- Staff: 8+ (Eskom/Sasol researchers, administrative, engineering and technical support)
- 1,000 m² solar roof laboratory, staff office, workshop & control room
- 18 m lattice tower (multi-use)
- 600 °C, 1.5 m³ packed bed storage rig & 1,200 °C kiln
- Solar resource station with free web download (K&Z full tracker and shadow ring)
- ADA Solar water heating test facility
- 25 kWe Eskom McDonnell Douglas Stirling Dish
- Key SW: TRNSYS, Matlab, Flownex, Fluent & open source.
- Primary Grants: DST/NRF solar thermal spoke, Sasol Sr Researcher, Eskom Chair, SU Hope project, NRF THRIP.





STERG R&D overview (still relevant?)





Running STERG at this size



STERG steering committee

Faculty, staff and student reps. (Just formed)

“Managing up”: Informing SU, management guidance, strategy etc.

STERG ops committee

staff and student reps. (Just formed)

“Managing down”: operating the group w/ appropriate policy etc to streamline

Staff

Admin, research and lab

~7 fulltime

Faculty

Supervisory Profs etc

~19 mostly M&M

Researchers

M & PhD students

~38 Mostly residential
[The most important people in STERG]

Affiliates

Working students, funders, repeat visitors

~11

Key funders and affiliates: UP, UKZN, CSIR, Sasol, Eskom, DLR etc.





- Known journal articles in 2013
 - Kenny Allen et al: Packed bed paper in Power Technology journal
 - Johan Kotze et al: High temperature thermal energy storage utilizing metallic phase change materials and metallic heat transfer fluids. ASME Journal of Solar Energy Engineering
 - Paul Gauché et al: A concentrating solar power value proposition for South Africa, Journal of Energy in Southern Africa
 - Lukas Heller et al: Modeling of the Rock Bed Thermal Energy Storage System of a Combined Cycle Solar Thermal Power Plant in South Africa, ISES Solar Energy Journal
 - Other?





Other publications & associations



- 2013 Conferences
 - SolarPACES2013: ~11+ papers
 - SolarPACES2013 scientific committee members
- 2012 Conferences
 - SASEC2012: 14 peer review papers (without counting Thomas Roos)
 - Significant contribution to SASEC organising
 - SolarPACES2012: 6 papers
 - SolarPACES2012 scientific committee members + session chairs





Awards & Invitations



- Just in:
 - Innovation award by Stellenbosch Innovation District: STERG heliostat team
- M&G 200 YSA2013
 - Sebastian Bode
- SANEA award
 - Tba
- Keynotes, invited lectures etc
 - 2012 Sasol Global R&D conference
 - 2013 Future Megacities
 - 2013 Imperial College lecture
 - 2013 German-SA year of Science
 - 2013 NRF EPC conference





Big developments now



- Sauna thermal storage rig delivered
- Sasol Helio40 ongoing
 - A 40m² heliostat facility for S2 and tower
 - ~30kWthermal on tower
- Eskom 25 kWe dish structure up
- Other?

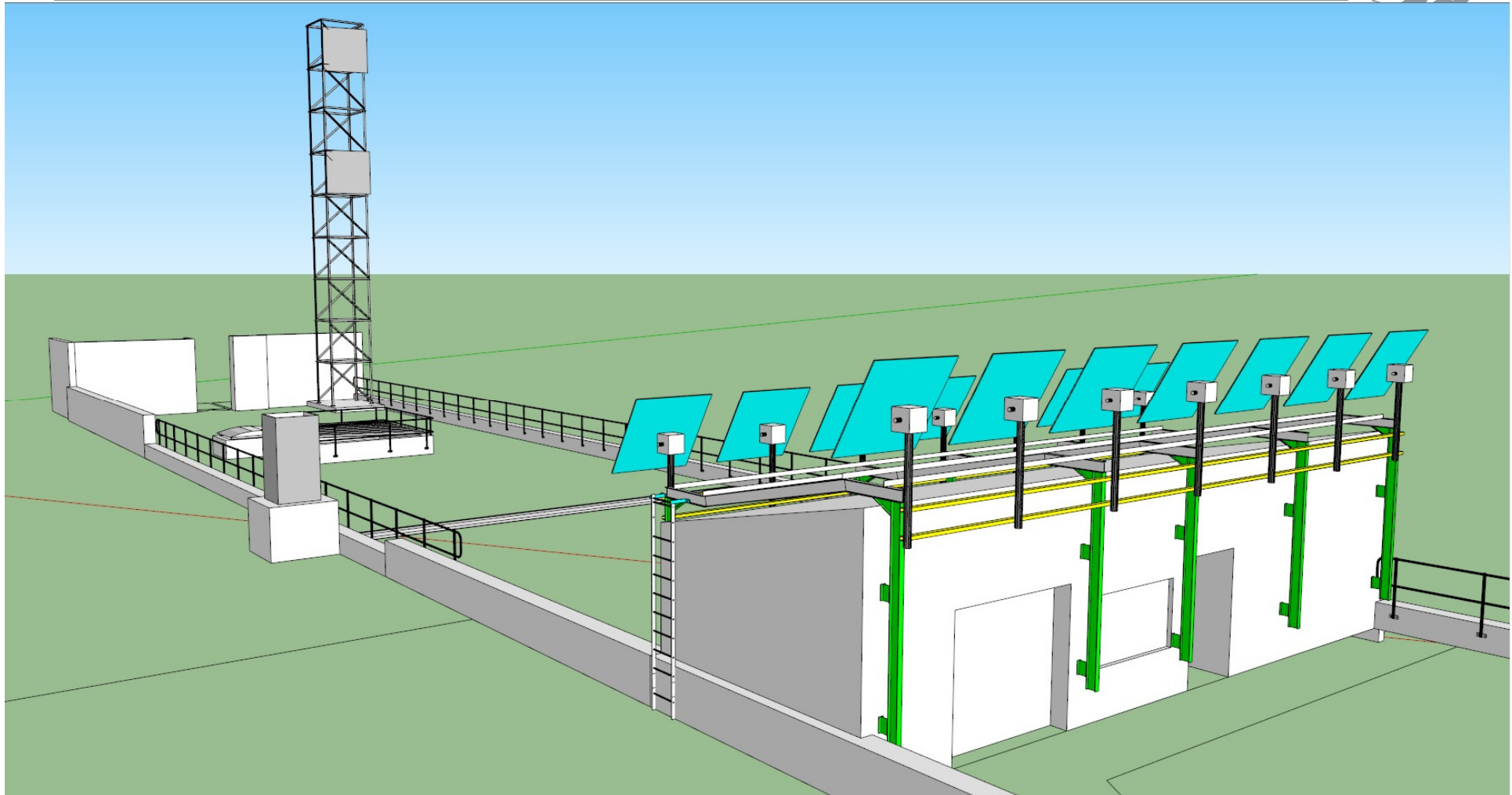
- STERG involvement
 - With CSIR, SANEDI etc, advising national solar centre planning
 - CSP public R&D strategizing

- Biggest issue?
 - We are out of space again!





Sasol Helio40 under construction





'Helio-40' Start-up and Stow





'Helio-40' prototype heliostat





2014 plans

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- Grant application to Sasol for
 - S2 / Helio40 receiver test facility
 - Sandia SOFAST heliostat characterization system
 - Differential scanning calorimeter
- Helio 100 with Sunfish or Helio400
 - Perhaps funded by TIA
 - A first pilot activity for many more to come
- What do you have in mind?



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Moving forward

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- The “big 3” funders are on board
 - DST/NRF
 - Sasol
 - Eskom
- Eskom CSP chair to co-lead STERG moving forward
 - Will provide an introductory view of where we could be headed.
- Indicators are that we are getting towards status as a centre in some way or another.
 - What does this mean?



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