Distribution Of Renewable Energy In Light-Rail Traction Grids

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11 november 2022

International Symposium on Electronics and Telecommunications ISETC2022

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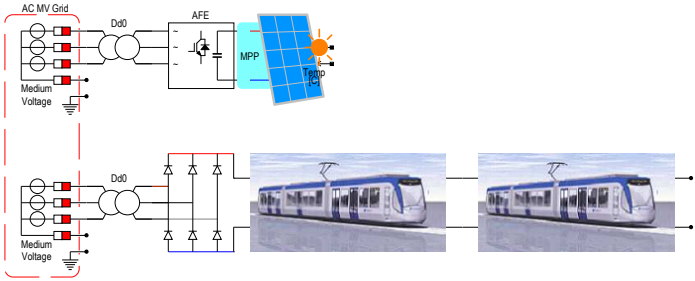
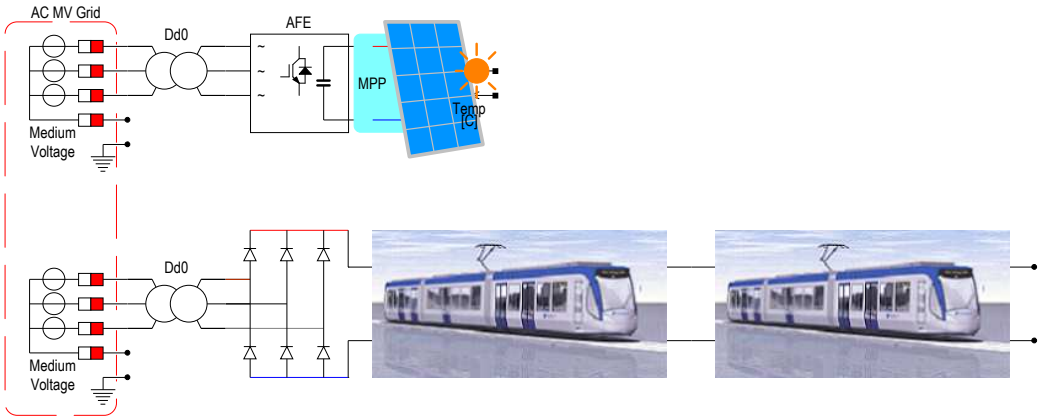
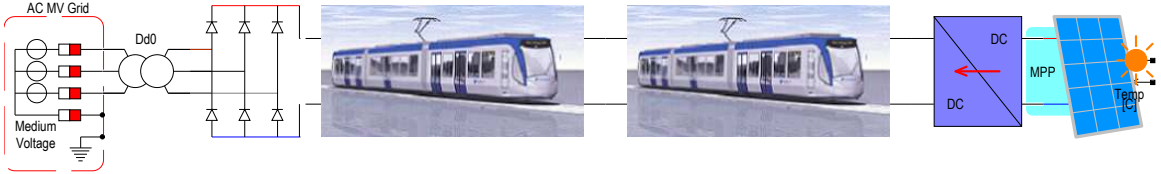


Traditional?
Use the AC grid



Traditional supply of the overhead lines from the public AC distribution grid. The Solar Farm feeds into the same public AC distribution grid.

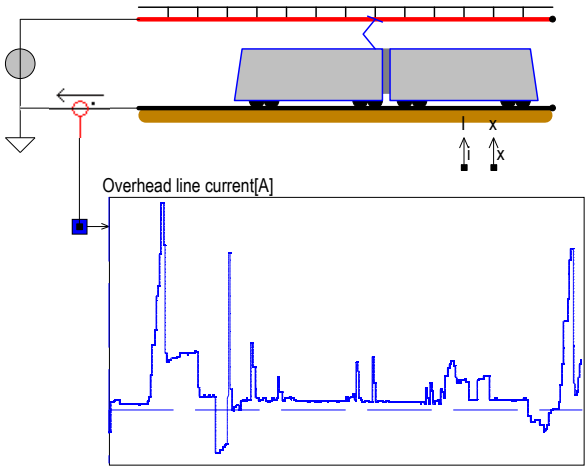
Idea?
Why not use the traction grid?



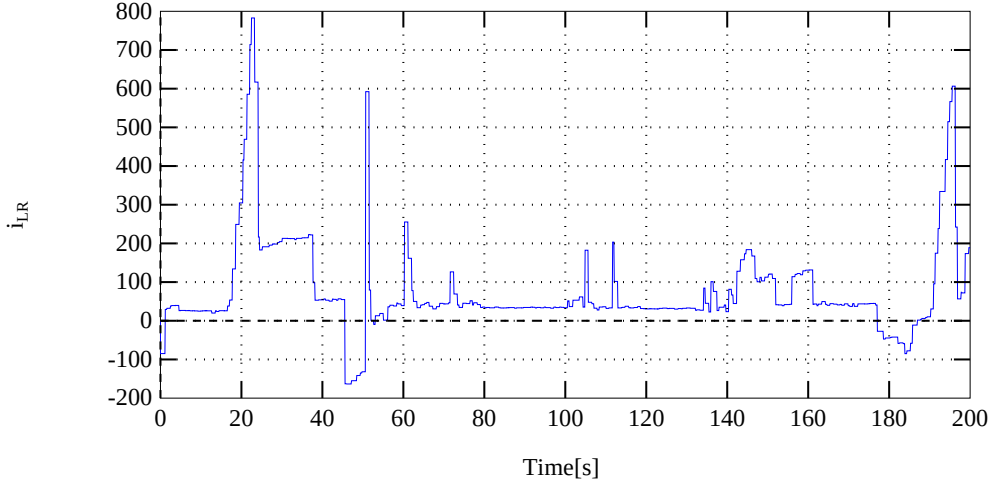
Feeding into the traction overhead lines from a Solar Farm, together with the AC distribution grid.

Energy demand Light Rail traction?
Accelerating, crousing and braking

600kW Light-Rail
Measured current consumption
during a 200 seconds trip



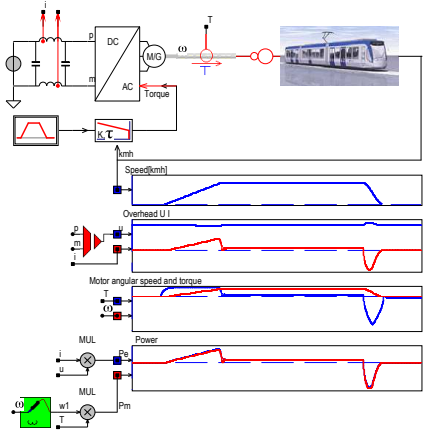
Overhead line current



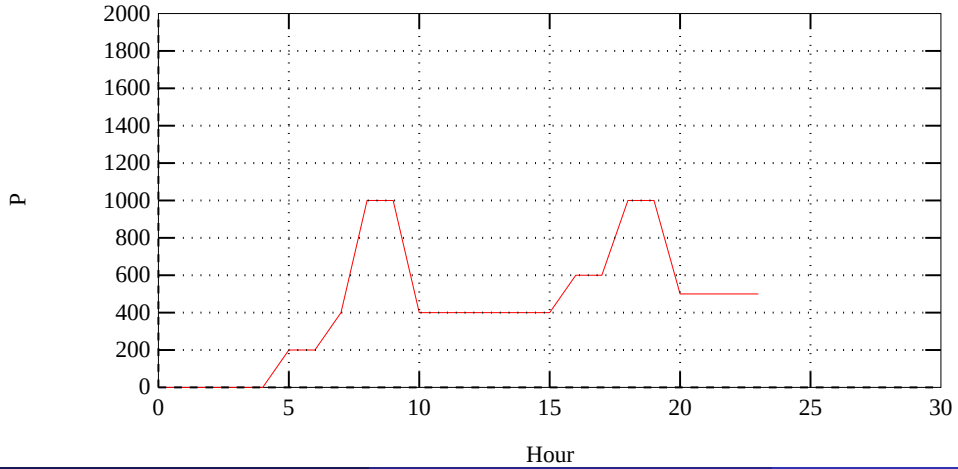
Current consumption during acceleration, cruising and braking.

Energy demand Light Rail traction?
Accelerating, crousing and braking

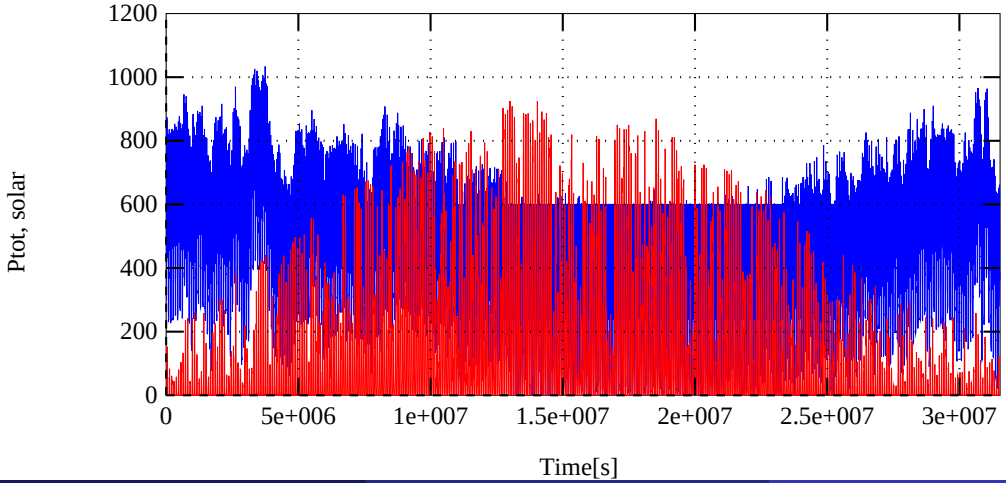
Acceleration
Cruising
Braking



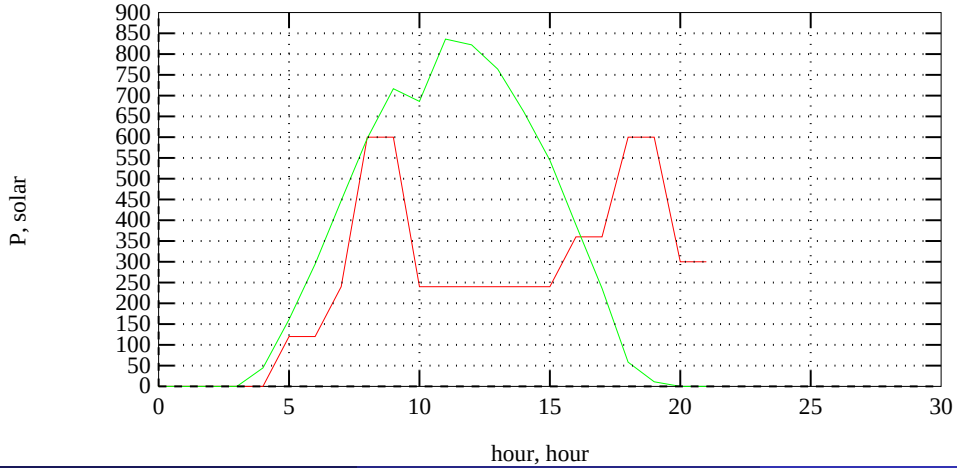
Normalized typical power consumption of Light-Rail
Single working day



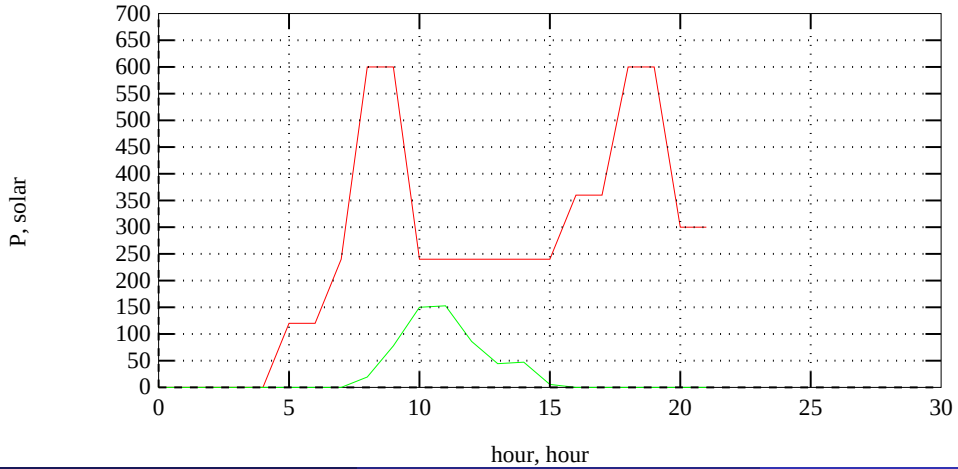
Power consumption and measured normalized solar insolation Year.



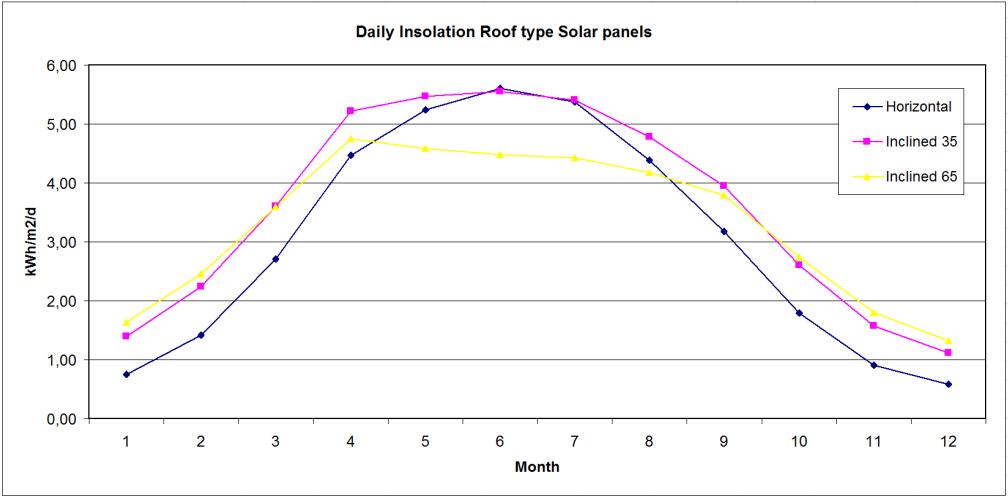
Power consumption and measured normalized solar insolation Summertime.



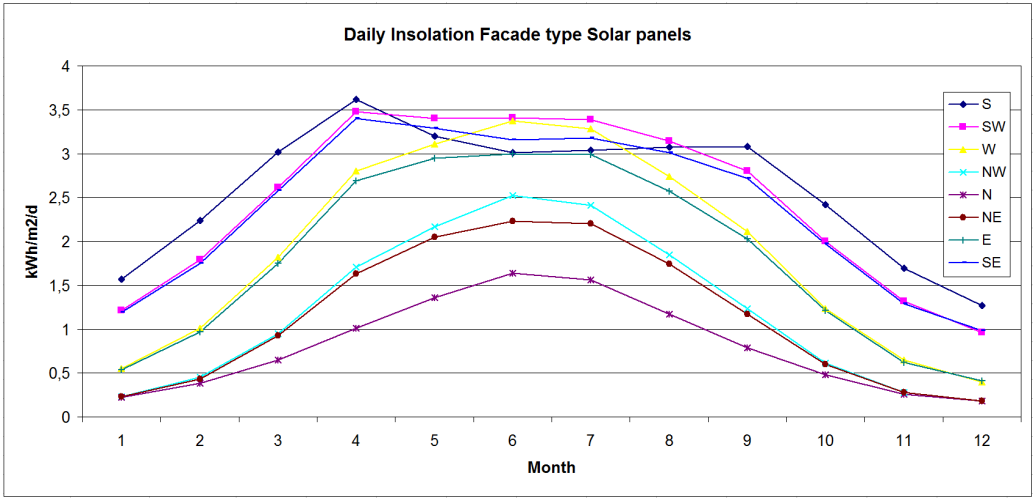
Power consumption and measured normalized solar insolation Wintertime.



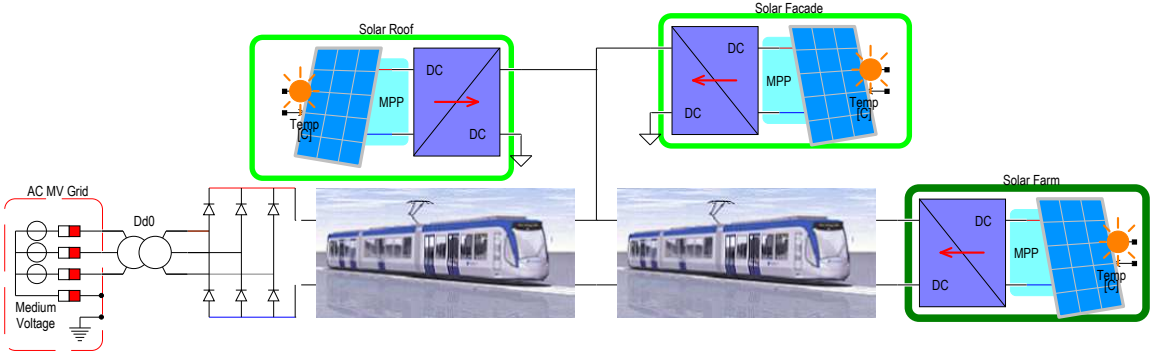
Solar insolation on Roof mounted solar panels Horizontal, 35, 65, kWh/m2/day.



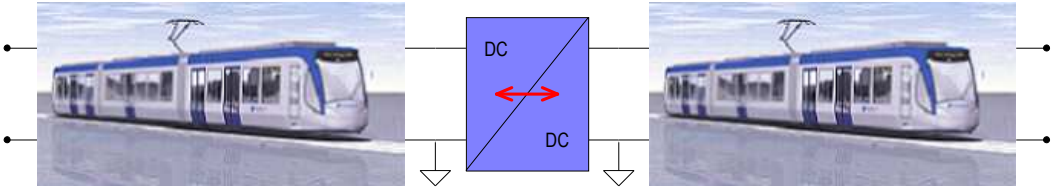
Solar insolation on Facade mounted solar panels, kWh/m2/day.

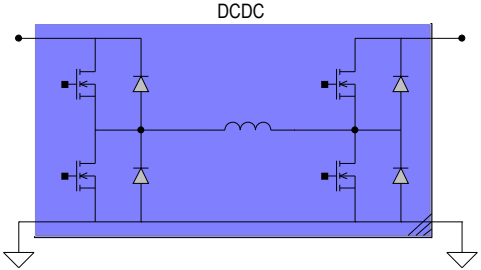


Additional feeding of solar power from Roofs and Facades into the overhead lines.

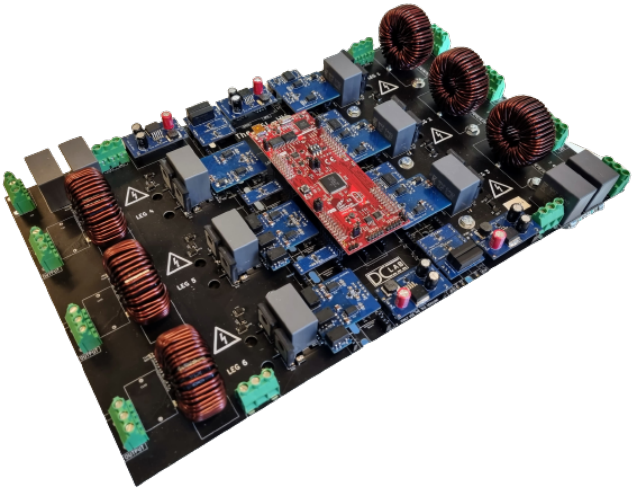


Application of a single inductor Dual Active Bridge Bidirectional power flow control.





Universal 6 Leg, to be configured as three parallel DAB bridges.



Conclusion:
Solar energy can be used for Light-Rail traction
Traction overhead lines become a DC grid

- Partial contribution (miday)
- Traditionally via public AC grid
- Use traction overhead lines
- Feed solar energy directly into the overhead lines
- Distribution via traction overhead lines
- Bidirectional DCDC converter for distribution

Mulțumesc!